GEOTECHNICAL INVESTIGATION REPORT
DESIGN OF GRADE CONTROL STRUCTURES
PHOENIX, ARIZONA

AGRA Earth & Environmental

ENGINEERING GLOBAL SOLUTIONS

GEOTECHNICAL INVESTIGATION REPORT
DESIGN OF GRADE CONTROL STRUCTURES
PHOENIX, ARIZONA

Submitted To:

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May 16, 2000
AGRA Job No. 0-117-001007

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May 16, 2000
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WEST Consultants, Inc.
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Attention: Dennis L. Richards, P.E.

Gentlemen:

RE: GEOTECHNICAL INVESTIGATION
DESIGN OF GRADE CONTROL STRUCTURES
PHOENIX, ARIZONA

Submitted herein is our final Geotechnical Investigation Report for the grade control structures planned for the Phoenix Rio Salado project. The report presents the results of a geotechnical drilling program, analytical chemistry analyses of samples of groundwater collected at the four locations investigated, general recommendations for design of the grade control structures, and specific recommendations for the grade control structure to be located near the Central Avenue bridge.

Should you have any questions regarding the recommendations presented in this report, please do not hesitate in contacting the undersigned.

Respectfully submitted,

AGRA Earth & Environmental, Inc.

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ARIZONA U.S.A.

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1.0 INTRODUCTION

This report is submitted pursuant to a geotechnical investigation performed by AGRA Earth & Environmental, Inc. (AGRA) of the planned locations of four grade control structures for the Phoenix Rio Salado project. The report presents the results of a geotechnical drilling program, analytical chemistry analyses of samples of groundwater collected at the locations of the grade control structures, general geotechnical recommendations for design of the grade control structures, and the results of specific geotechnical analyses for the grade control structure to be located near Central Avenue.

2.0 PROJECT DESCRIPTION

Details of the project were provided by Dennis L. Richards, P.E. of WEST Consultants, Inc. and in the scope of work developed by the U.S. Army Corps of Engineers (USACOE) for Task Order No. 0010 of Contract No. DACW09-97-D-0022. It is the understanding of AGRA that a low flow channel will be constructed withing the Salt River between about 7th Avenue to the west and the Interstate 10 (I-10) bridge to the east. Grade control structures will be constructed near the Central Avenue bridge and at river miles 214.65, 215.56 and 216.23. Construction plans (90 percent submittal) for the Central Avenue grade control structure were reviewed as part of the project.

3.0 INVESTIGATION

3.1 HEALTH & SAFETY PLAN

The project site generally is located within an area potentially impacted by adjacent facilities, possibly resulting in contamination of the soils and groundwater. Specific facilities that may have impacted the site include the old Del Rio Landfill located on the south side of the Salt River between 7th and 16th Streets, the Estes Landfill located upstream of the I-10 bridge and the south side of the Salt River, and the Motorola NPL site which includes Sky Harbor International Airport. Since the groundwater in the areas investigated may have been contaminated, AGRA maintained the site-specific health and safety plan prepared by the City of Phoenix. Ambient air quality monitoring was performed during the drilling operations.

3.2 EXPLORATION FOR GRADE CONTROL STRUCTURES

AGRA's field geologist was on-site between March 13, 2000 and March 15, 2000 to conduct field activities including ambient air quality monitoring, logging of borings and groundwater sampling. Subsurface borings were located 2,170 feet east of the upstream face of the 24th Street bridge on the north side of the channel (Boring B-1), 800 feet west of the downstream face of the 24th Street bridge in the center of the channel (Boring B-2), 650 feet west of the

downstream face of the 16th Street bridge in the center of the channel (Boring B-3), and 150 feet west of the downstream face of the Central Avenue bridge in the center of the channel (Boring B-4). Boring locations are shown on the site plan included in Appendix A.

AGRA subcontracted an AP-1000 drill rig and auxiliary vehicles from Layne Christensen Company to complete the borings at the locations specified to a depth of 55 feet below existing subgrade. No water or drilling mud was added to the borings. The drill pipe was steam cleaned between borings to prevent cross-contamination. The borings were continuously logged in the field in accordance with the Unified Soil Classification System (USCS) ASTM D2488. The sediments in the Salt River consisted primarily of sand, gravel and cobbles. Because of the very coarse nature of the alluvium, soil samples were not collected. However, the effort required to advance the 9-inch diameter casing, as indicated by the number of blows per foot, was continuously recorded. The logs of the borings are provided in Appendix A, along with a brief description of drilling equipment and procedures, and a summary of the Unified Classification System.

As a precaution, drill cuttings from depths at or below the water table were containerized in 55-gallon drums because of potential soil contamination. These drums were placed in a secure location provided by the City of Phoenix at 7th Avenue and the Rio Salado until arrangements can be made for proper disposal pending laboratory analysis. The four borings were abandoned by backfilling with cement grout in accordance with Arizona Department of Water Quality standards.

Ambient air quality monitoring was conducted during the exploration program using a PID meter. Meter readings and the time of day when they were recorded are listed on the boring logs in Appendix A. Meter readings typically were less than 0.5, with a maximum reading of 1.1 recorded at the location of Boring B-3.

3.3 GROUNDWATER SAMPLING & TESTING

Groundwater samples were obtained for water quality testing during the geotechnical investigation. Groundwater sampling was not performed with the intent to fully characterize water quality; however, the geotechnical investigation provided an opportunity to obtain limited information regarding the potential impact to water quality from facilities and landfills located adjacent to the Salt River which are known or suspected to have contaminated groundwater. Water quality sampling would address the risk posed by potentially contaminated groundwater to the health of workers completing the Rio Salado Project.

Installation of monitor wells with perforated casing in the groundwater interval was not part of the scope of work. Groundwater was not purged from the boreholes because the drill casing was not perforated and purging would not have efficiently or effectively drawn

formation water into the borehole to be sampled. In addition, purging each 9-inch diameter boring would have generated a significant volume of water, which would have required containerizing pending the results of the water quality analysis. If this water had been contaminated, it would have required proper disposal.

Grab samples were collected from the open drill casing of the AP-1000 drill rig, as depicted in the diagram in Appendix A. The water level was allowed to stabilize for at least thirty minutes prior to sampling. Each well was sampled using a new disposable bailer. Upon retrieval of the bailer, the groundwater was transferred to laboratory prepared containers, labeled, stored and handled in accordance with AGRA standard sampling protocol, which has been prepared in accordance with guidelines specified by the Arizona Department of Environmental Quality (ADEQ).

The samples were submitted to the AGRA laboratory in Portland, Oregon, a State of Arizona certified laboratory. The laboratory testing program completed by AGRA included analyses for volatile organic compounds (VOCs) by EPA Method 8260B; for semi-volatile organic compounds (SVOCs) by EPA Method 8270C; for polychlorinated biphenyls (PCBs) by EPA Method 8082; and for pesticides by EPA Method 8081A.

Samples also were submitted by AGRA to SVL Analytical, Inc. (SVL) in Kellogg, Idaho, a State of Arizona certified laboratory. The laboratory testing program completed by SVL included a target analyte list (TAL) of metals (23 metals) by EPA Method 6010B; hardness as calcium chloride by EPA Method 200.7; sulfate, sulfides, nitrates, nitrites and chlorides by EPA Method 300.0; and total dissolved solids, pH, sulfides and calcium carbonate by EPA 100-series methods.

Although groundwater samples were handled in general accordance with ADEQ protocol, samples were not collected under conditions which would provide a representative groundwater sample. As discussed above, collecting a representative groundwater sample would have required the installation of a groundwater well with screened casing in the saturated interval, and purging the well of three casing volumes prior to sample collection. Recent precipitation resulted in flowing water in the river channel prior to the geotechnical investigation and water quality sampling. There likely is some recharge of surface water to groundwater through the coarse alluvial material in the river channel. AGRA is of the opinion that the presence of surface flow may cause the local groundwater conditions to vary from times when surface flow is not present.

Since the drilling method uses air injected into the formation and because friction heats the casing, the concentration of VOCs and SVOCs in the groundwater may have been altered by sampling directly from the drill casing. However, AGRA is of the opinion that high concentrations of VOCs or SVOCs, or the presence of free product, would have been detected

with the sampling method which was used. PCBs, pesticides, and total and dissolved metals concentrations likely were unaffected by the sampling method.

Detailed summaries of the laboratory analyses, including copies of chain of custody forms and laboratory sample receipt documentation forms, are presented in Appendix B. Level III Quality Assurance/Quality Control (QA/QC) procedures were performed by the analytical laboratories. The standard QA/QC data package is included in Appendix B. The remainder of the Level III QA/QC documentation is maintained in AGRA's project files.

4.0 DISCUSSION & SUMMARY

Based on the exploratory investigation, deposits of sand, gravel and cobbles were encountered to the full depths of the borings at the four locations planned for the grade control structures. Penetration resistance values typically varied from about 35 to 85. As indicated by these values, lenses and thin layers containing more sand and less gravel and cobbles were encountered at various depths throughout the borings. No significant or extensive predominately sand deposits are indicated by the penetration resistance profiles. Typically, the deposits contain less than about 5 to 10 percent silt and clay, based on AGRA's previous experience. Groundwater was encountered at depths varying from about 29 feet (Boring B-3) to between about 37 to 38 feet (Borings B-1, B-2 and B-4).

A summary of the analytical results is presented in Table 1. No VOCs, SVOCs, PCBs, or pesticides were detected at concentrations above their respective laboratory method reporting limits. Total dissolved solids concentrations varied from 410 to 665 milligrams per liter (mg/L), sulfate concentrations varied from 57.0 to 98.9 mg/L, and chlorides concentrations varied from 103 to 220 mg/L. Total concentrations of most metals were near or below their respective laboratory method reporting limits. However, total concentrations of sodium varied from 82.6 to 135 mg/L, total concentrations of magnesium varied from 21.1 to 53.2 mg/L, and total concentrations of calcium varied from 53.5 to 80.5 mg/L. Dissolved concentrations of these metals were of a similar order of magnitude. Total concentrations of aluminum varied from 5.5 to 103 mg/L, but the dissolved concentrations of this metal were either less than or only slightly above the detection limits.

5.0 ANALYSIS & RECOMMENDATIONS

Generally, roller compacted concrete structures are planned for the proposed low flow control facilities. The structures will include upstream aprons, bank and overbank protection dikes, channel weirs and channel grade control structures. The loads imposed by these structures are expected to be relatively low and spread over large areas. The maximum loads likely will be imposed by the channel weir structures. Allowable bearing pressures on the order of 10,000 to 12,000 pounds per square foot (psf) typically are assigned for design of isolated spread

footings bearing on the sand, gravel and cobbles in order to limit settlements to acceptable values. For the general types of structures planned, neither bearing capacity nor settlement considerations will control the design.

The potential for uplift or flotation due to buoyant forces, and for sliding due to unbalanced lateral forces, however, are primary design considerations. AGRA completed evaluations of the stability of the grade control structure and apron to be located downstream of the Central Avenue bridge. These analyses were detailed in Letter No. 1 dated February 15, 2000 and Letter No. 2 dated March 3, 2000. These letter reports are included in Appendix C of this report. The analyses generally were completed in accordance with USACOE guidance manuals*.

As presented in Letter No. 2, the combined weight of the channel weir and the channel grade control elements, assuming no redeposition of granular materials following a flow event, is about equal to the buoyant force acting on these elements, resulting in a factor of safety near unity. If the flow event results in redeposition of 50 percent of the granular fill, the factor of safety against buoyancy is increased to 1.52 and the factor of safety against sliding is 1.65. If the upstream apron and connecting bank control elements are included in the overall structure, but again assuming no redeposition of granular materials, the factors of safety against buoyancy and sliding are 1.39 and 1.82, respectively.

Based on the analyses completed, it is concluded the structure will remain stable relative to sliding and buoyancy considerations for the case where the flood waters have receded to a level coincident with the top of the upstream apron. This case reflects the most extreme buoyant condition that can exist. Because of the distribution of forces acting on the various parts of the grade control structure, moments and shear forces would need to resisted by the roller compacted concrete, particularly at the connection between the channel grade control structure and the weir, and the connections between the channel grade control structure and the bank control elements. This analysis is not part of the scope of work reported herein.

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*U.S. Army Corps of Engineers, Flotation Stability Criteria for Concrete Hydraulic Structures, ETL 1110-2-307, 20 August 1987.

U.S. Army Corps of Engineers, Sliding Stability for Concrete Structures, ETL 1110-2-256, 24 June 1981.

TABLE 1
SUMMARY OF GROUNDWATER SAMPLE ANALYTICAL TEST RESULTS

ANALYSIS	CONSTITUENT	SAMPLE NAME			
		B-1-GW	B-2-GW	B-3-GW	B-4-GW
EPA 130.2	CaCO3 (mg/L)	<1.0	<1.0	<1.0	<1.0
EPA 160.1	TDS (mg/L)	665	549	410	504
EPA 200.7	Hardness	284	420	288	220
EPA 180.1	Sulfide	<0.5	<0.5	<0.5	<0.5
EPA 150.1	pH	7.79	7.78	7.71	8.00
EPA 300.0	Sulfate (mg/L)	93.2	94.9	57.0	98.9
	Sulfides	<0.5	<0.5	<0.5	<0.5
	Nitrates (mg/L)	2.6	2.66	1.48	<0.05
	Nitrites	<0.25	<0.25	<0.5	<0.1
	Chlorides (mg/L)	220	176	103	105

TABLE 1 (CONT.)
SUMMARY OF GROUNDWATER SAMPLE ANALYTICAL TEST RESULTS

ANALYSIS	CONSTITUENT	SAMPLE NAME							
		B-1-GW		B-2-GW		B-3-GW		B-4-GW	
		Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved
Total Metals (mg/L)	Aluminum	5.5	<0.024	103	0.049	66.9	0.048	24.6	<0.024
	Antimony	<0.032	<0.032	<0.032	<0.032	<0.032	0.034	0.033	<0.032
	Arsenic	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
	Barium	0.156	0.101	0.842	0.063	0.959	0.080	0.248	0.069
	Beryllium	<0.002	<0.002	0.003	<0.002	0.002	<0.002	<0.002	<0.002
	Cadmium	<0.0024	<0.0024	0.0025	<0.0024	<0.0024	<0.0024	<0.0024	<0.0024
	Calcium	67.5	71.8	80.5	57.7	56.9	40.4	53.5	47.4
	Chromium	0.007	<0.005	0.129	<0.005	0.091	<0.005	0.037	<0.005
	Cobalt	<0.005	<0.005	0.056	0.006	0.050	<0.005	0.012	<0.005
	Copper	0.019	<0.003	0.283	<0.003	0.280	0.007	0.074	0.005
	Iron	10.1	<0.02	75.8	0.04	50.0	0.02	25.5	0.02
	Lead	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
	Magnesium	28.1	30.1	53.1	24.0	35.4	15.7	21.1	14.9
	Manganese	0.805	0.483	6.35	0.306	8.5	1.49	1.60	0.471
	Mercury	<0.0002	<0.0002	0.0003	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	Nickel	<0.023	<0.023	0.187	<0.023	0.258	<0.023	0.035	<0.023
	Potassium	7.8	6.3	16.2	5.4	12.2	5.7	8.7	6.6
	Selenium	<0.04	<0.04	0.14	<0.04	0.04	<0.04	<0.04	<0.04
	Silver	<0.006	<0.006	0.007	<0.006	<0.006	<0.006	<0.006	<0.006
	Sodium	135	145	104	114	82.6	88.0	112	117
	Thallium	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1
	Vanadium	0.008	<0.005	0.139	<0.005	0.100	<0.005	0.042	<0.005
	Zinc	0.021	<0.003	0.162	<0.003	0.116	<0.003	0.042	<0.003

TABLE 1 (CONT.)
SUMMARY OF GROUNDWATER SAMPLE ANALYTICAL TEST RESULTS

ANALYSIS	CONSTITUENT	SAMPLE NAME			
		B-1-GW	B-2-GW	B-3-GW	B-4-GW
Volatiles EPA 8260B		ND*	ND*	ND*	ND*
Semi-Volatiles EPA 8270C		ND*	ND*	ND*	ND*
PCBs EPA 8082		ND*	ND*	ND*	ND*
Pesticides EPA 8081A		ND*	ND*	ND*	ND*

*ND - No analytes were reported at concentrations which exceeded their respective laboratory method detection limits. Refer to the laboratory analytical data.

APPENDIX A

FIELD INVESTIGATION

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TEST DRILLING EQUIPMENT & PROCEDURES

Description of Subsurface Exploration Methods

Auger Boring Drilling through overburden soils is performed with 6 5/8-inch O.D., 3 1/4-inch I.D. hollow stem auger or 4 1/2-inch solid stem continuous flight auger. Carbide insert teeth are normally used on bits so they can penetrate soft rock or very strongly cemented soils. A CME-75 truck-mounted drill rig is used to advance the auger. The drill rigs are powered with six-cylinder Cummins diesel engines capable of delivering about 11.4 kN-m torque to the drill spindle. The spindle is advanced with twin hydraulic rams capable of exerting 90 kN (20,000 pounds) downward force.

Generally, refusal to penetration of the auger is adopted as top of the SGC or "river-run" material or harder bedrock, which require other techniques for penetration. Grab samples or auger cuttings may be taken as necessary. Standard penetration tests or 2.42-inch diameter ring samples are taken in conjunction with the auger borings as needed, with the sampling interval and type being indicated on the boring logs.

Hammer Drill Drilling with the Hammer drill is accomplished with a Drill Systems AP-1000 drill rig advancing a double-walled drive casing with a link-belt 180 diesel pile driving hammer, having a rated energy of 8,100 foot-pounds per blow. Where noted on the boring log, the hammer is equipped with a supercharger which can boost the energy to approximately 12,000 foot-pounds per blow. The supercharger is used only in portions of the boring where blow counts are relatively high. Cuttings are removed with compressed air by a reverse circulation process, and are collected in a cyclone from which grab samples are obtained. The drive casing is either 9-inch O.D. by 6-inch I.D. or 6 5/8-inch O.D. by 4-inch I.D. and employs an expendable bit of slightly larger diameter than the O.D. of the casing. Hammer blows required to advance the drive casing are recorded in 1-foot increments, as noted on the boring logs. Standard penetration tests or 2.42-inch diameter ring samples taken are noted on the boring logs.

Core Boring Rock core samples are retrieved using a CME-75 drill rig, SAITECH GH 3 rig or Burley 2500, 4500 or 4000. The GH 3 is a portable hydraulic core drill. The GH 3 is powered by a Kohler two-cylinder 25-horsepower engine. The hydraulics motor which feeds a two-speed transmission and powers the BW spindle. This unit has a 3-foot stroke and is hand-fed with a 2,000 pound push-pull capability. The GH 3 has the capability of drilling with either B- or N-size core steel using standard or wireline systems. N-size core is the preferred size and it has a nominal O.D. of about 2 inches. The Burley 2500 and 4500 series are portable hydraulic core drills. The 4500 series is capable of a track-mounted or skid-type chassis. The Burley 2500 and 4500 series are powered by 44 and 75 HP power units, respectively, provide up to 2,000 foot-pounds (ft.-lbs.) of torque and in excess of 1,000 revolutions per minute (RPM) of spindle speed. Both rigs are capable of retrieving either N- or H-sized core using wireline systems. The N-size core has a nominal O.D. of about 2 inches and the H-size of about 2.4 inches. The Burley 4000 is a track-mounted core drill.

The CME-75 utilizes a wireline core drilling system that takes N-size cores. Using the NQ wireline system, core is recovered quickly by retrieving the core-laden inner tube through the drill string.

TEST DRILLING EQUIPMENT & PROCEDURES (Cont.)

Sampling Procedures Dynamically driven tube samples are usually obtained at selected intervals in the borings by the ASTM D1586 test procedure. In many cases, 2-inch O.D., 1 3/8-inch I.D. samples are used to obtain the standard penetration resistance. "Undisturbed" samples of firmer soils are often obtained with 3-inch O.D. samples lined with 2.42-inch I.D. brass rings. The driving energy is generally recorded as the number of blows of a 140-pound, 30-inch free fall drop hammer required to advance the samples in 6-inch increments. However, in stratified soils, driving resistance is sometimes recorded in 2- or 3-inch increments so that soil changes and the presence of scattered gravel or cemented layers can be readily detected and the realistic penetration values obtained for consideration in design. These values are expressed in blows per 6 inches on the boring logs. "Undisturbed" sampling of softer soils is sometimes performed with thin walled Shelby tubes (ASTM D1587), pitcher samplers, Denison samplers or continuous CME samplers. Where samples of rock are required, they are obtained by NQ diamond core drilling (ASTM D2113). Tube samples are labeled and placed in watertight containers to maintain field moisture contents for testing. When necessary for testing, larger bulk samples are taken from auger cuttings. Also, representative samples are obtained from the cuttings from the hammer and Schramm drill rig.

Boring Records Drilling operations are directed by our field engineer or geologist who examines soil recovery and prepares the boring logs. Soils are visually classified in accordance with the Unified Soil Classification System (ASTM D2487), with appropriate group symbols being shown on the boring logs.

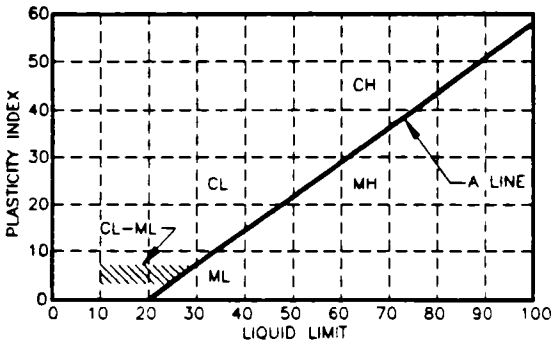
UNIFIED CLASSIFICATION SYSTEM FOR SOILS

Soils are visually classified by the Unified Soil Classification System on the boring logs presented in this report. Grain-size analysis and Atterberg Limits Tests are often performed on selected samples to aid in classification. The classification system is briefly outlined on this chart. For a more detailed description of the system, see "The Unified Soil Classification System" ASTM Designation: D2487.

MAJOR DIVISION				GRAPH SYMBOL	GROUP SYMBOL	TYPICAL DESCRIPTION
COARSE-GRAINED SOILS (Less than 50% passes No. 200 sieve)	GRAVELS (50% or less of coarse fraction passes No. 4 sieve)	CLEAN GRAVELS (Less than 5% passes No. 200 sieve)			GW	Well graded gravels, gravel-sand mixtures or sand-gravel-cobble mixtures.
					GP	poorly graded gravels, gravel-sand mixtures, or sand-gravel-cobble mixtures.
		GRAVELS WITH FINES (More than 12% passes No. 200 sieve)	Limits plot below "A" line & hatched zone on plasticity chart		GM	Silty gravels, gravel-sand-silt mixtures.
			Limits plot above "A" line & hatched zone on plasticity chart		GC	Clayey gravels, gravel-sand-clay mixtures.
	SANDS (More than 50% of coarse fraction passes No. 4 sieve)	CLEAN SANDS (Less than 5% passes No 200 sieve)			SW	Well graded sands, gravelly sands.
					SP	Poorly graded sands, gravelly sands.
		SANDS WITH FINES (More than 12% passes No. 200 sieve)	Limits plot below "A" line & hatched zone on plasticity chart		SM	Silty sands, sand-silt mixtures.
			Limits plot above "A" line & hatched zone on plasticity chart		SC	Clayey sands, sand-clay mixtures.
FINE-GRAINED SOILS (50% or more passes No 200 sieve)	SILTS (LIMITS PLOT BELOW "A" LINE & HATCH ZONE ON PLASTICITY CHART)	SILTS OF LOW PLASTICITY (Liquid Limit Less Than 50)			ML	Inorganic silts, clayey silts with slight plasticity.
		SILTS OF HIGH PLASTICITY (Liquid Limit More Than 50)			MH	Inorganic silts of high plasticity, silty soils, elastic silts.
	CLAYS (LIMITS PLOT ABOVE "A" LINE & HATCH ZONE ON PLASTICITY CHART)	CLAYS OF LOW PLASTICITY (Liquid Limit Less Than 50)			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
		CLAYS OF HIGH PLASTICITY (Liquid Limit More Than 50)			CH	Inorganic clays of high plasticity, fat clays, silty and sandy clays of high plasticity.

NOTE: Coarse-grained soils with between 5% & 12% passing the No. 200 sieve and fine-grained soils with limits plotting in the hatched zone on the plasticity chart to have dual symbol.

PLASTICITY CHART



DEFINITIONS OF SOIL FRACTIONS

SOIL COMPONENT	PARTICLE SIZE RANGE
Boulders	Above 300mm (12in.)
Cobbles	300mm to 75mm (12in. to 3in.)
Gravel	75mm (3in.) to No. 4 sieve
Coarse gravel	75mm to 19mm (3in. to 3/4in.)
Fine gravel	19mm (3/4in.) to No. 4 sieve
Sand	No. 4 to No. 200
Coarse	No. 4 to No. 10
Medium	No. 10 to No. 40
Fine	No. 40 to No. 200
Fines (silt or clay)	Below No. 200 sieve

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TERMINOLOGY USED TO DESCRIBE THE RELATIVE DENSITY, CONSISTENCY OR FIRMNESS OF SOILS

The terminology used on the boring logs to describe the relative density, consistency or firmness of soils relative to the standard penetration resistance is presented below. The standard penetration resistance (N) in blows per foot is obtained by the ASTM D1586 procedure using 2" O.D., 1 3/8" I.D. samplers.

1. Relative Density. Terms for description of relative density of cohesionless, uncemented sands and sand-gravel mixtures.

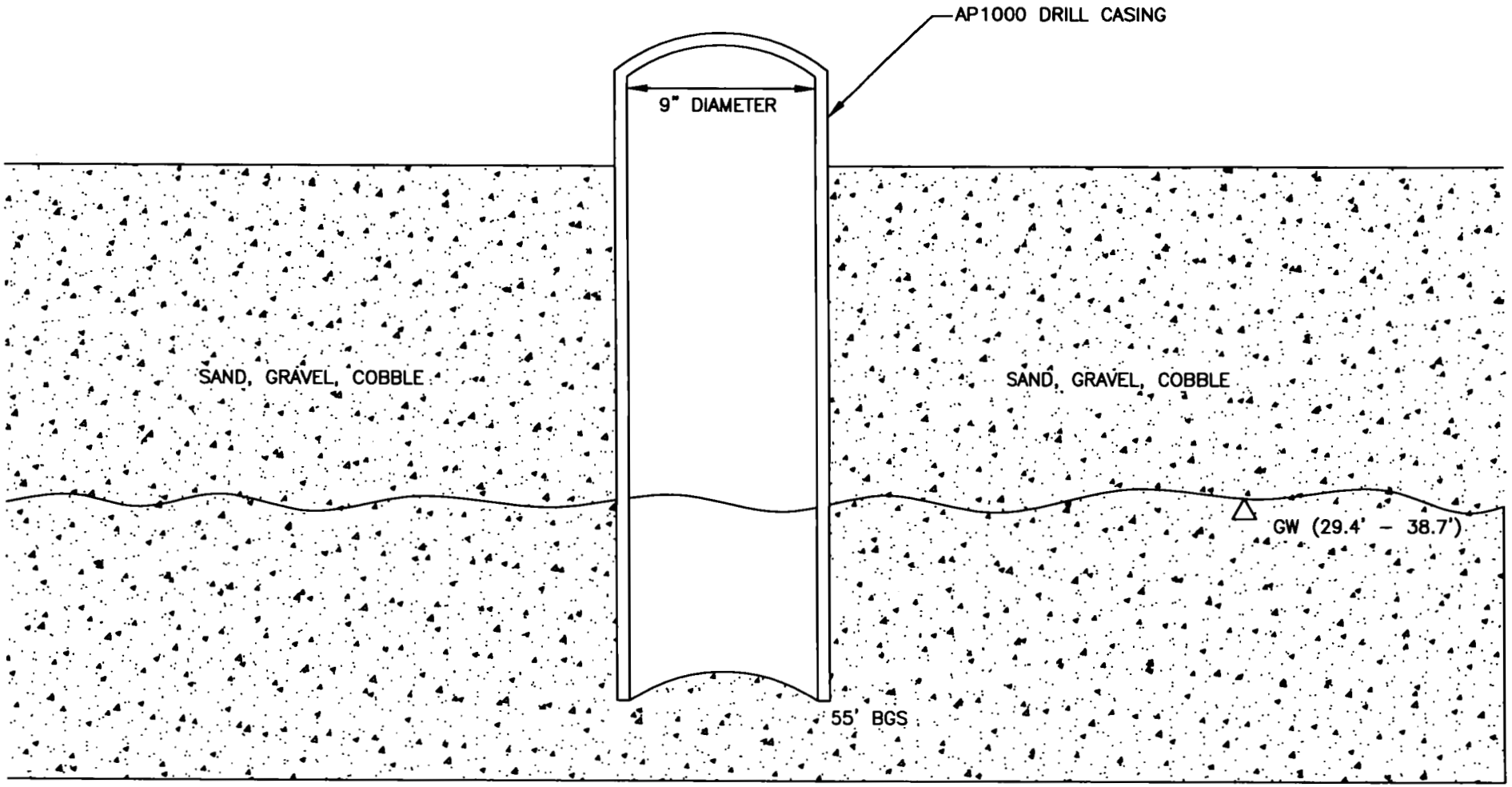
N	Relative Density
0-4	Very loose
5-10	Loose
11-30	Medium dense
31-50	Dense
50+	Very dense

2. Relative Consistency. Terms for description of clays which are saturated or near saturation.

N	Relative Consistency	Remarks
0-2	Very soft	Easily penetrated several inches with fist.
3-4	Soft	Easily penetrated several inches with thumb.
5-8	Medium stiff	Can be penetrated several inches with thumb with moderate effort.
9-15	Stiff	Readily indented with thumb, but penetrated only with great effort.
16-30	Very stiff	Readily indented with thumbnail.
30+	Hard	Indented only with difficulty by thumbnail.

3. Relative Firmness. Terms for description of partially saturated and/or cemented soils which commonly occur in the Southwest including clays, cemented granular materials, silts and silty and clayey granular soils.

N	Relative Firmness
0-4	Very soft
5-8	Soft
9-15	Moderately firm
16-30	Firm
31-50	Very firm
50+	Hard

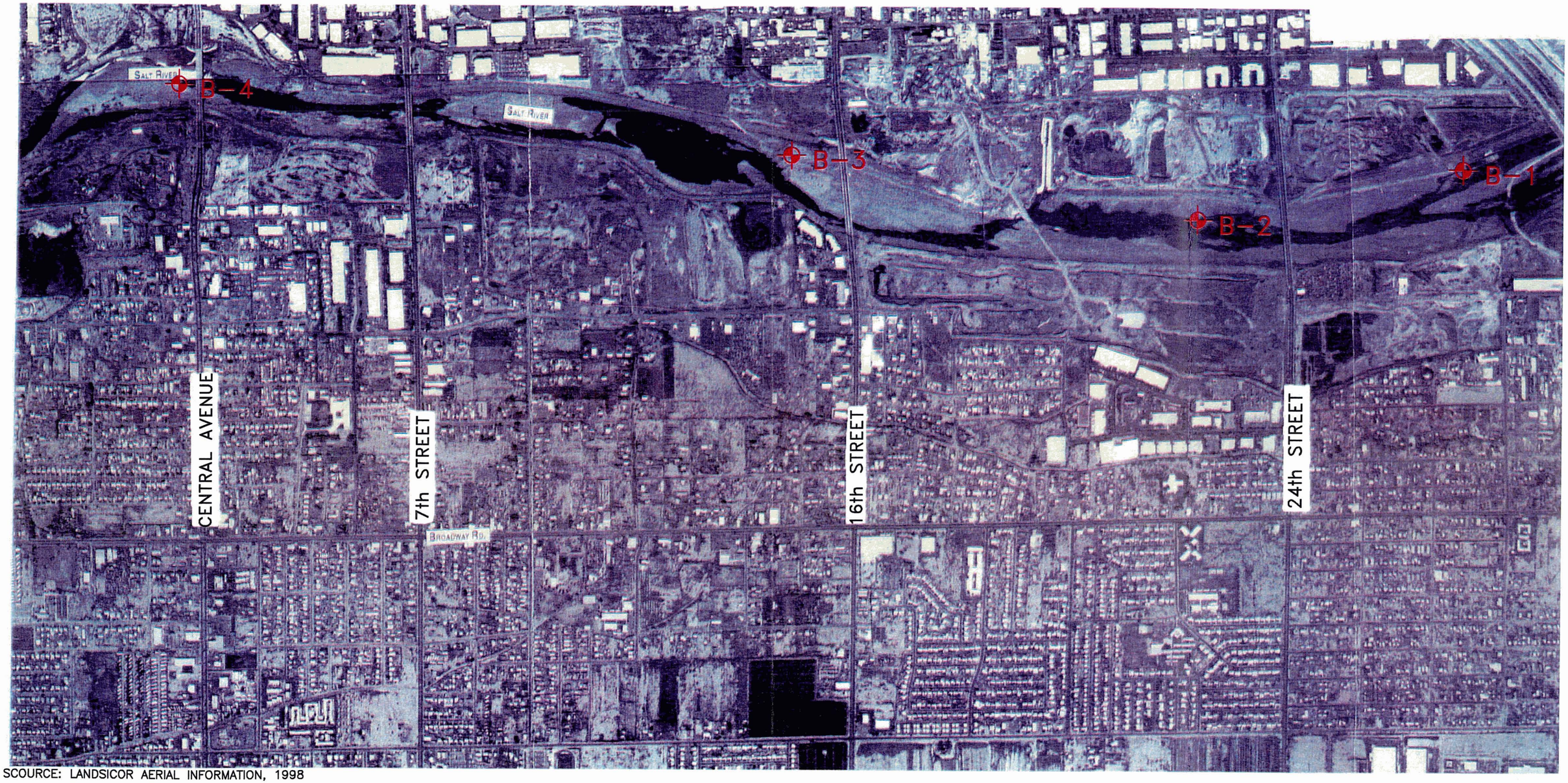


AGRA
Earth & Environmental
ENGINEERING GLOBAL SOLUTIONS
3232 West Virginia Avenue
Phoenix, Arizona 85009-1502
Tel: (602)272-6848
Fax: (602)272-7239

JOB NO.	0-117-001007
DESIGN	TOL
DRAWN	DJL
DATE	5/00
SCALE	N.T.S.

GENERALIZED GEOLOGIC CROSS-SECTION
RIO SALADO GEOTECHNICAL INVESTIGATION
PHOENIX, ARIZONA

G:\Engineering-Development\2000Projects\0-117-001007GradeControlStruc\CAD\Drill.dwg



SOURCE: LANDSICOR AERIAL INFORMATION, 1998

N

LEGEND

= BORING LOCATIONS

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Earth & Environmental
ENGINEERING GLOBAL SOLUTIONS
3232 West Virginia Avenue
Phoenix, Arizona 85009-1502
Tel: (602)272-6846
Fax: (602)272-7239

JOB NO.	0-117-001007
DESIGN	TOL
DRAWN	DJL
DATE	4/00
SCALE	1"=1200'

1998 AERIAL PHOTO
RIO SALADO GEOTECHNICAL INVESTIGATION
PHOENIX, AZ

G:\Engineering-Development\2000Projects\0-117-001007GradeControlStruc\CAD\Aerial.dwg

PROJECT Geotechnical Investigation
Design of Grade Control Structures
Rio Salado, Phoenix, Arizona

LOG OF TEST BORING NO. B-1

JOB NO. 0-117-001007 **DATE** 3/13/00

LOCATION 2170' East of Upstream face of 24th St. Bridge
RIG TYPE AP-1000
BORING TYPE Air Percussion
SURFACE ELEV.
DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blow Count	PID Meter Reading	Time	Unified Soil Classification	Remarks & Sample ID	VISUAL CLASSIFICATION
0					8					
					25					
5					92					**GRAVEL & COBBLES WITH SAND**, rock fragments, minor clay, damp, brown to reddish brown, dense
					65					
10					43	0.9	12:58			
					59					
15					159					**GRAVEL & COBBLES WITH SAND**, rock fragments, minor clay, slightly damp, brown to reddish brown, dense to very dense
					127					
					115	0.5	13:12			
20					92					Slightly damp
					79					
25					57					More sand from 24' to 27', damp
					55					
					56					
					48					
					41	0.6	12:27			
30					63					
					92					
35					41					
					82					
					16					
					22					
					32					Moist, 1" to 1.5" gravel, some clay & sand, dense
					60					
40										Wet
					39					
					29					
45					76					
					48					
					36					
					43	0.0	13:46			
50					33					

GROUNDWATER

DEPTH (ft)	HOUR	DATE
40.8	14:00	3-13-00
38.7	14:40	3-13-00

SAMPLE TYPE
A - Auger cuttings; NR - No Recovery
S - 2" O.D. 1.38" I.D. tube sample
U - 3" O.D. 2.42" I.D. tube sample
T - 1" O.D. thin-walled tube sample
D - 2.5" O.D. 1.9" I.D. tube sample
C - California sample

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ENGINEERING GLOBAL SOLUTIONS

PROJECT Geotechnical Investigation
Design of Grade Control Structures
Rio Salado, Phoenix, Arizona

LOG OF TEST BORING NO. B-1

JOB NO. 0-117-001007 **DATE** 3/13/00

LOCATION 2170' East of Upstream face of 24th St. Bridge
RIG TYPE AP-1000
BORING TYPE Air Percussion
SURFACE ELEV.
DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blow Count	PID Meter Reading	Time	Unified Soil Classification	Remarks & Sample ID	VISUAL CLASSIFICATION
50					30					
					28					
					46					
					30					
					42					
55										Total Depth of 55'
60										
65										
70										
75										
80										
85										
90										
95										
100										

ENVIRO-BORING 01171007.GPJ AGRA_PHX.GDT 4/28/00

GROUNDWATER

DEPTH (ft)	HOUR	DATE
40.8	14:00	3-13-00
38.7	14:40	3-13-00

SAMPLE TYPE
A - Auger cuttings; NR - No Recovery
S - 2" O.D. 1.38" I.D. tube sample
U - 3" O.D. 2.42" I.D. tube sample
T - 1" O.D. thin-walled tube sample
D - 2.5" O.D. 1.9" I.D. tube sample
C - California sample

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PROJECT Geotechnical Investigation
Design of Grade Control Structures
Rio Salado, Phoenix, Arizona

LOG OF TEST BORING NO. B-2

JOB NO. 0-117-001007 **DATE** 3/14/00

LOCATION 800' West of Downstream face of 24th St. Bridge
RIG TYPE AP-1000
BORING TYPE Air Percussion
SURFACE ELEV.
DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blow Count	PID Meter Reading	Time	Unified Soil Classification	Remarks & Sample ID	VISUAL CLASSIFICATION
0										
					123					
5					43					**SAND, GRAVEL & COBBLES**, brown, moist to damp, dense to very dense
					94					
					56					
10										
					69					
					46					Sandier from 14' to 15'6"
					86					Large cobbles
15										
					64	0.0	15:51		breathing zone	
20										
					71					
					85					**SAND, GRAVEL & COBBLES**, very damp to moist, dense to very dense
					65					
25					137					
					132	0.0	16:06		breathing zone	
					35					Sandier (coarse sand, sm-med gravel)
					56					
30					57					
					55	0.0	16:12		breathing zone	
					33					
					58					
35										
					84					
					36					
					33					Sandier from 38' to 39' & 40'6" to 41'6"
					35					
40					43					
					55					
					98					
					63					
					52					
45										
					54					
					46					
					79					
50										

GROUNDWATER

DEPTH (ft)	HOUR	DATE
36.8	16:40	3-14-00
36.7	17:10	3-14-00

SAMPLE TYPE
A - Auger cuttings; NR - No Recovery
S - 2" O.D. 1.38" I.D. tube sample
U - 3" O.D. 2.42" I.D. tube sample
T - 1" O.D. thin-walled tube sample
D - 2.5" O.D. 1.9" I.D. tube sample
C - California sample

AGRA
ENGINEERING GLOBAL SOLUTIONS

ENVIRO-BORING 01171007.GPJ AGRA_PHX.GDT 4/28/00

PROJECT Geotechnical Investigation
Design of Grade Control Structures
Rio Salado, Phoenix, Arizona

LOG OF TEST BORING NO. B-2

JOB NO. 0-117-001007 **DATE** 3/14/00

LOCATION 800' West of Downstream face of 24th St. Bridge
RIG TYPE AP-1000
BORING TYPE Air Percussion
SURFACE ELEV.
DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blow Count	PID Meter Reading	Time	Unified Soil Classification	Remarks & Sample ID	VISUAL CLASSIFICATION
50										Sandier from 50' to 55', coarse grained sand
					36					
					21					
55										Total Depth of 55'
60										
65										
70										
75										
80										
85										
90										
95										
100										

ENVIRO-BORING 01171007.GPJ AGRA_PHX.GDT 4/28/00

GROUNDWATER

DEPTH (ft)	HOUR	DATE
36.8	16:40	3-14-00
36.7	17:10	3-14-00

SAMPLE TYPE
A - Auger cuttings; NR - No Recovery
S - 2" O.D. 1.38" I.D. tube sample
U - 3" O.D. 2.42" I.D. tube sample
T - 1" O.D. thin-walled tube sample
D - 2.5" O.D. 1.9" I.D. tube sample
C - California sample

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PROJECT Geotechnical Investigation
Design of Grade Control Structures
Rio Salado, Phoenix, Arizona

LOG OF TEST BORING NO. B-3

JOB NO. 0-117-001007 **DATE** 3/15/00

LOCATION 650' West of Downstream face of 16th St. Bridge
RIG TYPE AP-1000
BORING TYPE Air Percussion
SURFACE ELEV.
DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blow Count	PID Meter Reading	Time	Unified Soil Classification	Remarks & Sample ID	VISUAL CLASSIFICATION
0										
					51					
					38					
					70					
					47					**SAND, GRAVEL & COBBLES** cobbles up to 4"+, brown, damp to moist, some clay, dense
5					87					
					46					
					62	0.0	09:48		breathing zone	
					48	1.1			cuttings	
10					40					
					36					
					68					
					79					
					83					
15					44					
					68					
					125	0.1	10:01		breathing zone	**SAND, GRAVEL & COBBLES** cobbles up to 4"+, brown, damp to moist, dense to very dense
					72					
20					81					
					90					
					99					
					113					
					38					
25					74					
					82					
					62					
					77	0.1	10:20		breathing zone	**SAND, GRAVEL & COBBLES** minor clay, damp to moist, dense to very dense
					59	0.3			cuttings	
30					76					
					74					
					65					
					54					
					56					
35										
					116					
					95					
					73					
					86					
40					47					
					79					
					27					
45					29					Sandier from 43' to 47'
					21					
					52	0.3			cuttings	
50										

GROUNDWATER

DEPTH (ft)	HOUR	DATE
35.2	11:00	3-15-00
29.4	11:34	3-15-00

SAMPLE TYPE
A - Auger cuttings; NR - No Recovery
S - 2" O.D. 1.38" I.D. tube sample
U - 3" O.D. 2.42" I.D. tube sample
T - 1" O.D. thin-walled tube sample
D - 2.5" O.D. 1.9" I.D. tube sample
C - California sample

AGRA
ENGINEERING GLOBAL SOLUTIONS

PROJECT Geotechnical Investigation
Design of Grade Control Structures
Rio Salado, Phoenix, Arizona

LOG OF TEST BORING NO. B-3

JOB NO. 0-117-001007 **DATE** 3/15/00

LOCATION 650' West of Downstream face of 16th St. Bridge
RIG TYPE AP-1000
BORING TYPE Air Percussion
SURFACE ELEV.
DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blow Count	PID Meter Reading	Time	Unified Soil Classification	Remarks & Sample ID	VISUAL CLASSIFICATION
50										
					35					
55										Total Depth of 55'
60										
65										
70										
75										
80										
85										
90										
95										
100										

ENVIRO-BORING 01171007.GPJ AGRA_PHX.GDT 4/28/00

GROUNDWATER

DEPTH (ft)	HOUR	DATE
35.2	11:00	3-15-00
29.4	11:34	3-15-00

SAMPLE TYPE
A - Auger cuttings; NR - No Recovery
S - 2" O.D. 1.38" I.D. tube sample
U - 3" O.D. 2.42" I.D. tube sample
T - 1" O.D. thin-walled tube sample
D - 2.5" O.D. 1.9" I.D. tube sample
C - California sample

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ENGINEERING GLOBAL SOLUTIONS

PROJECT Geotechnical Investigation
Design of Grade Control Structures
Rio Salado, Phoenix, Arizona

LOG OF TEST BORING NO. B-4

JOB NO. 0-117-001007 **DATE** 3/15/00

LOCATION 150' West of Downstream face of Central Ave. Bridge
RIG TYPE AP-1000
BORING TYPE Air Percussion
SURFACE ELEV.
DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blow Count	PID Meter Reading	Time	Unified Soil Classification	Remarks & Sample ID	VISUAL CLASSIFICATION
0										
					10					
					24					
					45					
					66					**COARSE SAND, GRAVEL & COBBLES**, rock fragments, slightly damp, brown, dense
5					64					
					48					
					61	0.1	14:08		breathing zone	
					35					Water at 9' likely due to water sitting in the river channel north of our position
10										
					62					
					67					
					136					
15					87					**SAND & GRAVEL**, rock fragments, damp to wet, some intervals saturated as above, dense to very dense
					86					
					85					
					57	0.3	14:31		breathing zone	
					61	0.0			cuttings	
20					34					
					62					
					43					
					35					
					22					
25					22					**SAND & GRAVEL**, rock fragments, damp to wet, some intervals saturated, dense to very dense
					66					
					61					
					102					
					128					
30					76					
					38					
					60					
					95					
					49					
35										
					44					
					46					
40										
45										
					69					
					64					
					55					
50										

GROUNDWATER

DEPTH (ft)	HOUR	DATE
38.3	15:28	3-15-00
37.8	15:38	3-15-00

SAMPLE TYPE
A - Auger cuttings; NR - No Recovery
S - 2" O.D. 1.38" I.D. tube sample
U - 3" O.D. 2.42" I.D. tube sample
T - 1" O.D. thin-walled tube sample
D - 2.5" O.D. 1.9" I.D. tube sample
C - California sample

AGRA
ENGINEERING GLOBAL SOLUTIONS

PROJECT Geotechnical Investigation
Design of Grade Control Structures
Rio Salado, Phoenix, Arizona

LOG OF TEST BORING NO. B-4

JOB NO. 0-117-001007 **DATE** 3/15/00

LOCATION 150' West of Downstream face of Central Ave. Bridge
RIG TYPE AP-1000
BORING TYPE Air Percussion
SURFACE ELEV.
DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blow Count	PID Meter Reading	Time	Unified Soil Classification	Remarks & Sample ID	VISUAL CLASSIFICATION
50										
					45					
					46	0.0	15:30		breathing zone	
55									cuttings	Total Depth of 55'
60										
65										
70										
75										
80										
85										
90										
95										
100										

GROUNDWATER

DEPTH (ft)	HOUR	DATE
38.3	15:28	3-15-00
37.8	15:38	3-15-00

SAMPLE TYPE
A - Auger cuttings; NR - No Recovery
S - 2" O.D. 1.38" I.D. tube sample
U - 3" O.D. 2.42" I.D. tube sample
T - 1" O.D. thin-walled tube sample
D - 2.5" O.D. 1.9" I.D. tube sample
C - California sample

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APPENDIX B

ANALYTICAL LABORATORY TEST RESULTS

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Project: Rio Salado
Project No.: 0-117-001007
Project Manager: Larry Hansen
Sample Matrix: Water

Service Request No.: AZ000162
Report Date: 03/21/00
Report No.: 00016201
C.O.C. No.: 4754

Volatile Organic Compounds by GC/MSD
EPA Methods 5030B/8260B
µg/L(ppb)

Sample Name:	**B-1-GW**	**Lab Blank**	**Reporting**
Lab Code:	**162-1**	**162-MB**	**Limit**
Dichlorodifluoromethane	ND	ND	1.0
Chloromethane	ND	ND	5.0
Vinyl Chloride	ND	ND	1.0
Bromomethane	ND	ND	1.0
Chloroethane	ND	ND	1.0
Trichlorofluoromethane	ND	ND	1.0
1,1-Dichloroethene	ND	ND	1.0
Acetone	ND	ND	20
Carbon Disulfide	ND	ND	1.0
Methylene Chloride	ND	ND	5.0
trans-1,2-Dichloroethene	ND	ND	1.0
MTBE	ND	ND	1.0
1,1-Dichloroethane	ND	ND	1.0
2,2-Dichloropropane	ND	ND	1.0
cis-1,2-Dichloroethene	ND	ND	1.0
2-Butanone(MEK)	ND	ND	10
Bromochloromethane	ND	ND	1.0
Chloroform	ND	ND	1.0
1,1,1-Trichloroethane	ND	ND	1.0
Carbon Tetrachloride	ND	ND	1.0
1,1-Dichloropropene	ND	ND	1.0
Benzene	ND	ND	1.0
1,2-Dichloroethane	ND	ND	1.0
Trichloroethene	ND	ND	1.0
1,2-Dichloropropane	ND	ND	1.0
Dibromomethane	ND	ND	1.0
Bromodichloromethane	ND	ND	1.0
cis-1,3-Dichloropropene	ND	ND	1.0
4-Methyl-2-Pentanone(MIBK)	ND	ND	10
Toluene	ND	ND	1.0
trans-1,3-Dichloropropene	ND	ND	1.0
1,1,2-Trichloroethane	ND	ND	1.0
Tetrachloroethene	ND	ND	1.0
2-Hexanone	ND	ND	10
1,3-Dichloropropane	ND	ND	1.0
Dibromochloromethane	ND	ND	1.0
1,2-Dibromoethane	ND	ND	1.0
Chlorobenzene	ND	ND	1.0
1,1,1,2-Tetrachloroethane	ND	ND	1.0
Ethylbenzene	ND	ND	1.0
m,p-Xylene	ND	ND	2.0
o-Xylene	ND	ND	1.0
Styrene	ND	ND	1.0

ND Not Detected

AGRA
ENGINEERING GLOBAL SOLUTIONS

Project: Rio Salado
Project No.: 0-117-001007
Project Manager: Larry Hansen
Sample Matrix: Water

Service Request No.: AZ000162
Report Date: 03/21/00
Report No.: 00016201b
C.O.C. No.: 4754

Volatile Organic Compounds by GC/MSD
EPA Methods 5030B/8260B
µg/L(ppb)

Sample Name:	B-1-GW	Lab Blank	**Reporting**
Lab Code:	162-1	162-MB	**Limit**
Bromoform	ND	ND	5.0
Isopropylbenzene	ND	ND	1.0
Bromobenzene	ND	ND	1.0
1,1,2,2-Tetrachloroethane	ND	ND	1.0
1,2,3-Trichloropropane	ND	ND	1.0
n-Propylbenzene	ND	ND	1.0
2-Chlorotoluene	ND	ND	1.0
4-Chlorotoluene	ND	ND	1.0
1,3,5-Trimethylbenzene	ND	ND	1.0
tert-Butylbenzene	ND	ND	1.0
1,2,4-Trimethylbenzene	ND	ND	1.0
sec-Butylbenzene	ND	ND	1.0
1,3-Dichlorobenzene	ND	ND	1.0
4-Isopropyltoluene	ND	ND	1.0
1,4-Dichlorobenzene	ND	ND	1.0
1,2-Dichlorobenzene	ND	ND	1.0
n-Butylbenzene	ND	ND	5.0
1,2-Dibromo-3-Chloropropane	ND	ND	5.0
1,2,4-Trichlorobenzene	ND	ND	25
Hexachlorobutadiene	ND	ND	25
Naphthalene	ND	ND	25
1,2,3-Trichlorobenzene	ND	ND	25
Vinyl Acetate	ND	ND	1.0
2-Chloroethylvinyl Ether	ND	ND	1.0
Sample Date:	03/13/00	03/20/00	
Analysis Date:	03/20/00	03/20/00	
Surrogate Recoveries:			**Control Limits**
Dibromofluoromethane:	111%	111%	81%-115%
Toluene-d_8:	93%	98%	88%-106%
4-Bromofluorobenzene:	103%	106%	88%-111%

ND Not Detected

Signature of Chemist

QA/QC Review

AGRA
ENGINEERING GLOBAL SOLUTIONS

Project: Rio Salado
Project No.: 0-117-001007
Project Manager: Larry Hansen
Sample Matrix: Water

Service Request No.: AZ000162
Report Date: 03/21/00
Report No.: 00016202
C.O.C. No.: 4754

QC Data Report
MS/MSD Summary
Volatile Organic Compounds by GC/MSD
EPA Methods 5030B/8260B
µg/L(ppb)

Sample Name: **Lab Code:**	Batch QC 147-1	Spike Level (µg/L)	Matrix Spike	Percent Recovery (MS)	Matrix Spike Duplicate	Percent Recovery (MSD)	% Recovery Control Criteria	Relative Percent Difference (RPD)
1,1 - Dichloroethene	<1.0	50.0	59.5	119	58.3	117	84% - 136%	2
Benzene	<1.0	50.0	51.0	102	51.4	103	92% - 112%	<1
Trichloroethene	8.34	50.0	57.4	98	58.8	101	86% - 116%	2
Toluene	<1.0	50.0	49.4	99	49.1	98	79% - 116%	<1
Chlorobenzene	<1.0	50.0	50.8	102	51.3	103	90% - 111%	<1
Sample Date:	03/08/00	~	03/08/00	~	03/08/00	~		
Analysis Date:	03/20/00	~	03/20/00	~	03/20/00	~		
Surrogate Recovery:							**Control Limits**	
Dibromofluoromethane:	110%	~	108%	~	105%	~	81%-115%	
Toluene-d_8:	97%	~	97%	~	97%	~	88%-106%	
4-Bromofluorobenzene:	105%	~	107%	~	107%	~	88%-111%	

ND Not Detected
Spike Source: Ultra Scientific, CLP-100N, Lot M-1791.

Signature of Chemist

QA/QC Review

AGRA
ENGINEERING GLOBAL SOLUTIONS

Project: Rio Salado
Project No.: 0-117-001007
Project Manager: Larry Hansen
Sample Matrix: Water

Service Request No.: AZ000162
Report Date: 03/31/00
Report No.: 00016206
C.O.C. No.: 04754

Semivolatile Organic Compounds by GC/MSD
EPA Methods 3510C/8270C
µg/L(ppb)

Sample Name:	B-1-GW	Lab Blank	**Reporting**
Lab Code:	162-1	162-MB	**Limit**
Pyridine	ND	ND	25
N-Nitrosodimethylamine	ND	ND	25
Aniline	ND	ND	25
Phenol	ND	ND	10
Bis(2-chloroethyl) Ether	ND	ND	10
2-Chlorophenol	ND	ND	10
1,3-Dichlorobenzene	ND	ND	10
1,4-Dichlorobenzene	ND	ND	10
Benzyl Alcohol	ND	ND	10
1,2-Dichlorobenzene	ND	ND	10
2-Methylphenol	ND	ND	10
Bis(2-chloroisopropyl) Ether	ND	ND	10
3- and 4- Methylphenol*	ND	ND	10
N-Nitrosodi-n-propylamine	ND	ND	10
Hexachloroethane	ND	ND	10
Nitrobenzene	ND	ND	10
Isophorone	ND	ND	10
2-Nitrophenol	ND	ND	10
2,4-Dimethylphenol	ND	ND	10
Bis(2-chloroethoxy) methane	ND	ND	10
Benzoic Acid	ND	ND	50
2,4-Dichlorophenol	ND	ND	10
1,2,4-Trichlorobenzene	ND	ND	10
Naphthalene	ND	ND	10
4-Chloroaniline	ND	ND	10
2,6-Dichlorophenol	ND	ND	10
Hexachlorobutadiene	ND	ND	10
4-Chloro-3-methylphenol	ND	ND	10
2-Methylnaphthalene	ND	ND	10
1-Methylnaphthalene	ND	ND	10
Hexachlorocyclopentadiene	ND	ND	10
2,4,6-Trichlorophenol	ND	ND	10
2,4,5-Trichlorophenol	ND	ND	10
2-Chloronaphthalene	ND	ND	10
2-Nitroaniline	ND	ND	10
Dimethyl Phthalate	ND	ND	10
Acenaphthylene	ND	ND	10
2,6-Dinitrotoluene	ND	ND	10
3-Nitroaniline	ND	ND	10

ND Not Detected
* Quantified as 4-Methylphenol

AGRA
ENGINEERING GLOBAL SOLUTIONS

Project: Rio Salado
Project No.: 0-117-001007
Project Manager: Larry Hansen
Sample Matrix: Water

Service Request No.: AZ000162
Report Date: 03/31/00
Report No.: 00016206b
C.O.C. No.: 04754

Semivolatile Organic Compounds by GC/MSD
EPA Methods 3510C/8270C
µg/L(ppb)

Sample Name:	B-1-GW	Lab Blank	**Reporting**
Lab Code:	162-1	162-MB	**Limit**
Acenaphthene	ND	ND	10
2,4-Dinitrophenol	ND	ND	25
4-Nitrophenol	ND	ND	25
Dibenzofuran	ND	ND	10
2,4-Dinitrotoluene	ND	ND	10
2,3,4,6-Tetrachlorophenol	ND	ND	10
Diethyl Phthalate	ND	ND	10
Fluorene	ND	ND	10
4-Chlorophenyl Phenyl Ether	ND	ND	10
4-Nitroaniline	ND	ND	10
Azobenzene	ND	ND	10
2-Methyl-4,6-dinitrophenol	ND	ND	25
N-Nitrosodiphenylamine	ND	ND	10
4-Bromophenyl Phenyl Ether	ND	ND	10
Hexachlorobenzene	ND	ND	10
Pentachlorophenol (PCP)	ND	ND	25
Phenanthrene	ND	ND	10
Anthracene	ND	ND	10
Carbazole	ND	ND	10
Di-n-butyl Phthalate	ND	ND	10
Fluoranthene	ND	ND	10
Benzidine	ND	ND	50
Pyrene	ND	ND	10
Butyl Benzyl Phthalate	ND	ND	10
Benzo(a)anthracene	ND	ND	10
3,3'-Dichlorobenzidine	ND	ND	10
Chrysene	ND	ND	10
Bis(2-ethylhexyl) Phthalate	ND	ND	10
Di-n-octyl Phthalate	ND	ND	10
Benzo(b)fluoranthene	ND	ND	10
Benzo(k)fluoranthene	ND	ND	10
Benzo(a)pyrene	ND	ND	10
Indeno(1,2,3-c,d)pyrene	ND	ND	10
Dibenzo(a,h)anthracene	ND	ND	10
Benzo(g,h,i)perylene	ND	ND	10
Sample Date:	03/13/00	03/20/00	
Extraction Date:	03/20/00	03/20/00	
Analysis Date:	03/22/00	03/22/00	

ND Not Detected

AGRA
ENGINEERING GLOBAL SOLUTIONS

Project: Rio Salado
Project No.: 0-117-001007
Project Manager: Larry Hansen
Sample Matrix: Water

Service Request No.: AZ000162
Report Date: 03/31/00
Report No.: 00016206c
C.O.C. No.: 04754

Semivolatile Organic Compounds by GC/MSD
EPA Methods 3510C/8270C
µg/L(ppb)

Surrogate Recoveries:

Sample Name:	B-1-GW	Lab Blank	
Lab Code:	162-1	162-MB	
Analysis Date:	03/22/00	03/22/00	**Control Limits**
2-Fluorophenol:	37%(a)	50%	46%-77%
Phenol-d5:	25%(a)	33%(b)	55%-78%
Nitrobenzene-d5:	71%	81%	65%-92%
2-Fluorobiphenyl:	77%	82%	67%-110%
2,4,6-Tribromophenol:	59%	72%	54%-105%
p-Terphenyl-d14:	90%	108%	80%-121%

(a) Outside of acceptance limits due to matrix effects. An unbreakable emulsion formed during sample preparation.
(b) Outside of acceptance limits. USEPA Method 8270 allows one surrogate from each fraction to be outside acceptance limits without affecting acceptability of the data.

Signature of Chemist

QA/QC Review

AGRA
ENGINEERING GLOBAL SOLUTIONS

Project: Rio Salado
Project No.: 0-117-001007
Project Manager: Larry Hansen
Sample Matrix: Water

Service Request No.: AZ000162
Report Date: 03/31/00
Report No.: 00016207
C.O.C.: 04754

QC Data Report
Blank Spike Summary
Semivolatile Organic Compounds by GC/MS
EPA Methods 3510C/8270C
µg/L(ppb)

Sample Name: **Lab Code:**	Lab Blank 162-MB	Spike Level (µg/L)	Blank Spike	Percent Recovery (BS)	Blank Spike Duplicate	Percent Recovery (BSD)	AEE % Recovery Acceptance Criteria	Relative Percent Difference (RPD)
Phenol	<10	80	37	46(a)	38	48(a)	56%-72%	3
2-Chlorophenol	<10	80	71	89(a)	70	88(a)	64%-81%	1
4-Chloro-3-methylphenol	<10	80	76	95	78	98	61%-97%	3
4-Nitrophenol	<25	80	26	32(a)	33	41(a)	42%-65%	24
Pentachlorophenol	<25	80	70	88	79	99	24%-109%	12
1,4-Dichlorobenzene	<10	40	31	78(a)	33	82(a)	61%-76%	6
N-Nitrosodi-n-propylamine	<10	40	37	92(a)	40	100(a)	63%-85%	8
1,2,4-Trichlorobenzene	<10	40	34	85(a)	36	90(a)	64%-84%	6
Acenaphthene	<10	40	37	92	40	100	75%-96%	8
2,4-Dinitrotoluene	<10	40	36	90	40	100	52%-107%	11
Pyrene	<10	40	40	100	43	108	93%-111%	7
Sample Date:	03/20/00	~	03/20/00	~	03/20/00	~	~	
Extraction Date:	03/20/00	~	03/20/00	~	03/20/00	~	~	
Analysis Date:	30/22/00	~	30/22/00	~	30/22/00	~	~	
Surrogate Recovery:							**Acceptance Limits**	
2-Fluorophenol:	50%	~	49%	~	49%	~	46%-77%	
Phenol-d5:	33%(b)	~	34%(b)	~	33%(b)	~	55%-78%	
Nitrobenzene-d5:	81%	~	80%	~	84%	~	65%-92%	
2-Fluorobiphenyl:	82%	~	78%	~	87%	~	67%-100%	
2,4,6-Tribromophenol:	72%	~	70%	~	74%	~	54%-105%	
p-Terphenyl-d14:	108%	~	100%	~	107%	~	80%-121%	

Spike Source: AEE 97-03-79-4

(a) Outside of AEE acceptance limits. Since the recovery is within USEPA method specified guidance limits, it is the opinion of the laboratory that usability of the data has not been adversely affected.
(b) Outside of acceptance limits. USEPA Method 8270 allows one surrogate from each fraction to be outside acceptance limits without affecting acceptability of the data.

Signature of Chemist

QA/QC Review

AGRA
ENGINEERING GLOBAL SOLUTIONS

Project: Rio Salado
Project No.: 0-117-001007
Project Manager: Larry Hansen
Sample Matrix: Water

Service Request No.: AZ000162
Report Date: 03/31/00
Report No.: 00016208
C.O.C.: 04754

QC Data Report
MS/MSD Summary
Semivolatile Organic Compounds by GC/MS
EPA Methods 3510C/8270C
µg/L(ppb)

Sample Name:	B-1-GW	Spike Level	Matrix	Percent Recovery	Matrix Spike	Percent Recovery	AEE % Recovery Acceptance Criteria	Relative Percent Difference
Lab Code:	162-1	(µg/L)	Spike	(MS)	Duplicate	(MSD)		(RPD)
Phenol	<10	80	28	35(a)	33	41	37%-73%	16
2-Chlorophenol	<10	80	54	68	68	85	38%-92%	23
4-Chloro-3-methylphenol	<10	80	57	71	69	86	71%-88%	19
4-Nitrophenol	<25	80	31	39	30	38	35%-110%	3
Pentachlorophenol	<25	80	32	40(a)	28	35(a)	47%-160%	13
1,4-Dichlorobenzene	<10	40	23	58	32	80	45%-94%	33
N-Nitrosodi-n-propylamine	<10	40	30	75	34	85	39%-91%	12
1,2,4-Trichlorobenzene	<10	40	26	65	35	88	33%-107%	30
Acenaphthene	<10	40	31	78	35	88	58%-103%	12
2,4-Dinitrotoluene	<10	40	33	82	34	85	63%-111%	3
Pyrene	<10	40	37	92	38	95	94%-105%	3
Sample Date:	03/13/00	~	03/13/00	~	03/13/00	~	~	
Extraction Date:	03/20/00	~	03/20/00	~	03/20/00	~	~	
Analysis Date:	03/22/00	~	03/22/00	~	03/22/00	~	~	
Surrogate Recovery:							**Acceptance Limits**	
2-Fluorophenol:	37%(a)	~	37%(a)	~	45%(a)	~	46%-77%	
Phenol-d5:	25%(a)	~	24%(a)	~	30%(a)	~	55%-78%	
Nitrobenzene-d5:	71%	~	60%(a)	~	72%	~	65%-92%	
2-Fluorobiphenyl:	77%	~	68%	~	78%	~	67%-100%	
2,4,6-Tribromophenol:	59%	~	57%	~	63%	~	54%-105%	
p-Terphenyl-d14:	90%	~	87%	~	82%	~	80%-121%	

Spike Source: AEE 97-03-79-4
(a) Outside of acceptance limits due to matrix effects. An unbreakable emulsion formed during sample preparation.

Signature of Chemist

QA/QC Review

AGRA
ENGINEERING GLOBAL SOLUTIONS

Project: Rio Salado
Project No.: 0-117-001007
Project Manager: Larry Hansen
Sample Matrix: Water

Service Request No.: AZ000162
Report Date: 03/29/00
Report No.: 00016203
C.O.C. No.: 4754

Polychlorinated Biphenyls (PCBs) as Aroclors by GC/ECD
EPA Methods 3510/8082
µg/L(ppb)

Sample Name:	B-1-GW	Lab Blank	**Reporting**
Lab Code:	162-1	162-MB	**Limit**
Aroclor 1016	ND	ND	0.5
Aroclor 1221	ND	ND	1.0
Aroclor 1232	ND	ND	0.5
Aroclor 1242	ND	ND	0.5
Aroclor 1248	ND	ND	0.5
Aroclor 1254	ND	ND	0.5
Aroclor 1260	ND	ND	0.5
Sample Date:	03/13/00	03/20/00	
Extraction Date:	03/20/00	03/20/00	
Analysis Date:	03/24/00	03/24/00	
Surrogate Recoveries:			**%Recovery Acceptance**
Decachlorobiphenyl:	40%(a)	90%	70%-130%

ND Not Detected
(a) Outside of acceptance limits due to matrix effects. An unbreakable emulsion formed during sample preparation.

Dan Hines
Signature of Chemist

QA/QC Review

AGRA
ENGINEERING GLOBAL SOLUTIONS

Project: Rio Salado
Project No.: 0-117-001007
Project Manager: Larry Hansen
Sample Matrix: Water

Service Request No.: AZ000162
Report Date: 03/29/00
Report No.: 00016204
C.O.C.: 4754

QC Data Report
Blank Spike Summary
Polychlorinated Biphenyls (PCBs) as Aroclors by GC/ECD
EPA Methods 3510/8082
µg/L(ppb)

Sample Name:	Lab Blank	Spike Level	Blank	Percent Recovery	Blank Spike	Percent Recovery	% Recovery Acceptance	Relative Percent Difference
Lab Code:	162-MB	(µg/L)	Spike	(BS)	Duplicate	(BSD)	Criteria	(RPD)
Aroclor 1016	<0.5	2.5	2.3	92	2.0	80	70%-130%	14
Aroclor 1260	<0.5	2.5	2.3	92	2.6	104	70%-130%	12
Sample Date:	03/20/00	~	03/20/00	~	03/20/00	~		
Extraction Date:	03/20/00	~	03/20/00	~	03/20/00	~		
Analysis Date:	03/24/00	~	03/24/00	~	03/24/00	~		
Surrogate Recovery:							**Control Limits**	
Decachlorobiphenyl:	90%	~	96%	~	111%	~	70%-130%	

ND Not Detected
Spike Source: AEE #99-06-34-1

Dan Hines
Signature of Chemist

QA/QC Review

AGRA
ENGINEERING GLOBAL SOLUTIONS

Project: Rio Salado
Project No.: 0-117-001007
Project Manager: Larry Hansen
Sample Matrix: Water

Service Request No.: AZ000162
Report Date: 03/29/00
Report No.: 00016205
C.O.C.: 4754

QC Data Report
MS/MSD Summary
Polychlorinated Biphenyls (PCBs) as Aroclors by GC/ECD
EPA Methods 3510/8082
µg/L(ppb)

Sample Name: **Lab Code:**	Batch QC 175-2	Spike Level (µg/L)	Matrix Spike	Percent Recovery (MS)	Matrix Spike Duplicate	Percent Recovery (MSD)	% Recovery Acceptance Criteria	Relative Percent Difference (RPD)
Aroclor 1016	<0.5	2.5	2.4	96	2.0	80	70%-130%	18
Aroclor 1260	<0.5	2.5	2.4	96	1.9	76	70%-130%	23
Sample Date:	03/15/00	~	03/15/00	~	03/15/00	~		
Extraction Date:	03/20/00	~	03/20/00	~	03/20/00	~		
Analysis Date:	03/24/00	~	03/24/00	~	03/24/00	~		
Surrogate Recovery:							**Control Limits**	
Decachlorobiphenyl:	41%(a)	~	100%	~	78%	~	70%-130%	

Spike Source: AEE #99-06-34-1

a) Outside of acceptance limits due to matrix effects. An unbreakable emulsion formed during sample preparation.

Signature of Chemist

QA/QC Review

AGRA
ENGINEERING GLOBAL SOLUTIONS

Project: Rio Salado
Project No.: 0-117-001007
Project Manager: Larry Hansen
Sample Matrix: Water

Service Request No.: AZ000162
Report Date: 04/10/00
Report No.: 00016209
C.O.C. No.: 04754

Organochlorine Pesticides by GC/ECD
EPA Methods 3510/8081A
µg/L(ppb)

Sample Name:	B-1-GW	Lab Blank	**Reporting**
Lab Code:	162-1	162-MB	**Limit**
alpha-BHC	ND	ND	0.04
beta-BHC	ND	ND	0.04
gamma-BHC	ND	ND	0.04
delta-BHC	ND	ND	0.04
Heptachlor	ND	ND	0.04
Aldrin	ND	ND	0.04
Heptachlor epoxide	ND	ND	0.04
alpha-Chlordane	ND	ND	0.04
gamma-Chlordane	ND	ND	0.04
Endosulfan I	ND	ND	0.04
4,4'-DDE	ND	ND	0.04
Dieldrin	ND	ND	0.04
Endrin	ND	ND	0.04
4,4'-DDD	ND	ND	0.04
Endosulfan II	ND	ND	0.04
Endrin aldehyde	ND	ND	0.04
4,4'-DDT	ND	ND	0.04
Endosulfan sulfate	ND	ND	0.04
Methoxychlor	ND	ND	0.04
Endrin ketone	ND	ND	0.04
Toxaphene	ND	ND	1.0
Sample Date:	03/13/00	03/20/00	
Extraction Date:	03/20/00	03/20/00	
Analysis Date:	04/05/00	04/05/00	
			% Recovery
Surrogate Recoveries:			**Acceptance**
2,4,5,6-tetrachloro-m-xylene	72%	64%	50%-118%
Decachlorobiphenyl	36%(a)	95%	83%-124%

ND Not Detected
(a) Outside of acceptance limits due to matrix effects. An unbreakable emulsion formed during sample preparation.

Dan Hines
Signature of Chemist

QA/QC Review

AGRA
ENGINEERING GLOBAL SOLUTIONS

Project: Rio Salado
Project No.: 0-117-001007
Project Manager: Larry Hansen
Sample Matrix: Water

Service Request No.: AZ000162
Report Date: 04/10/00
Report No.: 00016210
C.O.C. No.: 04754

QC Data Report
Blank Spike Summary
Organochlorine Pesticides by GC/ECD
EPA Methods 3545/8081A
µg/kg(ppb)
As Received Basis

Sample Name:	Lab Blank	Spike Level	Blank Spike	Percent Recovery	Blank Spike Duplicate	Percent Recovery	Control Limits	Relative Percent Difference
Lab Code:	162-MB	(µg/kg)	(BS)	(BS)	(BSD)	(BSD)		(RPD)
gamma-BHC	<0.04	1.0	0.9	90	0.9	90	70%-130%	<1
Heptachlor	<0.04	1.0	0.9	90	0.8	80	70%-130%	12
Aldrin	<0.04	1.0	0.9	90	0.8	80	70%-130%	12
Dieldrin	<0.04	2.5	2.5	100	2.5	100	70%-130%	<1
Endrin	<0.04	2.5	2.4	96	2.3	92	70%-130%	4
4,4'-DDT	<0.04	2.5	2.3	92	2.3	92	70%-130%	<1
Sample Date:	03/20/00	~	03/20/00	~	03/20/00	~	~	
Extraction Date:	03/20/00	~	03/20/00	~	03/20/00	~	~	
Analysis Date:	04/05/00	~	04/05/00	~	04/05/00	~	~	
Surrogate Recovery:							**Control Limits**	
2,4,5,6-Tetrachloro-m-xylene:	64%	~	70%	~	67%	~	50%-118%	
Decachlorobiphenyl:	95%	~	100%	~	100%	~	83%-124%	

Spike Source: 99-06-32-1

Dan Hines
Signature of Chemist

QA/QC Review

AGRA
ENGINEERING GLOBAL SOLUTIONS

Project: Rio Salado
Project No.: 0-117-001007
Project Manager: Larry Hansen
Sample Matrix: Water

Service Requrst No.: AZ000162
Report Date: 04/10/00
Report No.: 00016211
C.O.C. No.: 04754

QC Data Report - Matrix Spike Recoveries
Organochlorine Pesticides by GC/ECD
EPA Methods 3510/8081A
µg/L(ppb)

Sample Name: **Lab Code:**	Batch QC 175-1	Spike Level (µg/kg)	Matrix Spike (MS)	Percent Recovery (MS)	Matrix Spike Duplicate (MSD)	Percent Recovery (MSD)	Control Limits	Relative Percent Difference (RPD)
gamma-BHC	<0.04	1.0	1.0	100	0.8	80	70%-130%	22
Heptachlor	<0.04	1.0	1.0	100	0.8	80	70%-130%	22
Aldrin	<0.04	1.0	0.9	90	0.8	80	70%-130%	12
Dieldrin	<0.04	2.5	2.6	104	2.3	92	70%-130%	12
Endrin	<0.04	2.5	2.6	104	2.3	92	70%-130%	12
4,4'-DDT	<0.04	2.5	2.4	96	2.2	88	70%-130%	9
Sample Date:	03/15/00	~	03/15/00	~	03/15/00		~	~
Extraction Date:	03/20/00	~	03/20/00	~	03/20/00		~	~
Analysis Date:	04/05/00	~	04/05/00	~	04/05/00		~	~
Surrogate Recovery:								**Control Limits**
2,4,5,6-Tetrachloro-m-xylene:	62%	~	70%	~	64%		~	50%-118%
Decachlorobiphenyl:	26%(a)	~	26%(a)	~	25%(a)		~	83%-124%

Spike Source: 99-06-32-1

(a) Outside of acceptance limits due to matrix effects. An unbreakable emulsion formed during sample preparation.

Signature of Chemist

QA/QC Review

AGRA
ENGINEERING GLOBAL SOLUTIONS

AGRA Earth & Environmental Portland Chemistry Laboratory
Sample Receipt Documentation Form

Project:	Rio Salado	Cooler Temperatures	9.7
SR No.:	A7000162	13.2	
Date:	3/14/00	10.4	
Time:	10:70		
Temperature of Cooler Upon Receipt (Record to the Right):			
Received By:		6.5	8.8

Section One: Shipping/Delivery Issues

1.	Method of Sample Delivery: Fed EX			
2.	Airbill or Courier Receipt Number: 8147 1868 0286			
3.	Is a copy of the airbill or courier receipt available to be placed in the job file?	Yes	No	NA

Section Two: Sample Custody Issues

4.	Are custody seals on the shipping container intact?	Yes	No	NA
5.	Is a COC or other sample transmittal document present?	Yes	No	NA
6.	Is the COC complete?	Yes	No	NA
7.	Are the sample seals intact?	Yes	No	NA
8.	Does the COC match the samples received?	Yes	No	NA

Section Three: Sample Integrity Issues

9.	Are all sample containers intact and not leaking?	Yes	No	NA
10.	Are all samples preserved properly?	~~Yes~~	No	NA
11.	Are all samples within holding time for the required tests?	Yes	No	NA
12.	*Were all samples received at the proper temperature?	Yes	No	NA
13.	Are samples for volatiles and other headspace sensitive parameters free of headspace or bubbles?	Yes	No	NA

Section Four: Sample Containers Received:

14.	4 oz. glass jars:	19.	2oz. amber (MeOH):
15.	8 oz. glass jars:	20.	Encore samplers:
16.	40ml VOA vials: 4	21.	500ml plastic:
17.	1 liter glass: 5	22.	1liter plastic: 4
18.	Other (describe):		

*Temperatures for: soil and water = 4°C-6°C, MeOH jars = 25°C, air = not required

@ Dis metals sample not field filtered

Reviewed By:

Laboratory Manager or Designee

AGRA
ENGINEERING GLOBAL SOLUTIONS
7477 SW Tech Center Drive
Portland, Oregon, U.S.A. 97223-8025
Tel (503)639-3400 Fax (503) 620-7892

4754

CHAIN OF CUSTODY

PROJECT: RIO SALADO	PROJECT No.: 0-117-001007
REPORT TO: TIFFANY LOOFF	PHONE No.
PROJECT MANGER: LARRY HANSEN	PHONE No.
SAMPLER'S NAME (please print): TIFFANY LOOFF	PHONE No.: (602) 272-6848
SAMPLER'S SIGNATURE: Tiffany O. Looff	

ANALYSIS REQUESTED (circle, check box or write preferred method in box)

	SAMPLE I.D.	DATE	TIME	MATRIX	PRESERVATIVE	CONTAINERS No.	CONTAINERS VOL.	~~BTEX by EPA 602 / 8021~~	~~TPH~~ CaCO3 (130.2)	~~BTEX / TPH~~ TDS EPA 160.1	~~TPH~~ HARDNESS (200.7)	~~TPH~~ SULFIDE (180.1)	~~TPH~~ pH 150.1	TPH by EPA 8015 MODIFIED / 8015B	TPH-418.1 MODIFIED	TPH by EPA 418.1	GC / MS EPA 624 / EPA 8260 volatiles	GC / MS EPA 625 / 8270 semi-volatiles	VOCS EPA 601 / 602 or EPA 8021	PCBs EPA 608 / 8081 / 8082	LEAD EPA 6010 / EPA 7421 Total / Dissolved	TOTAL METALS	TCLP	DISSOLVED METALS	~~TOTAL METALS~~	SULFATE, SULFIDES (300.0) NITRATES, CHLORIDES	
1	1. B-1-GW	3/13/00	15:00	GW	VARIOUS	13		X	X	X	X	X					X	X		X		X		X	X	X	
2	2. TB-1	3/13/00	15:00	—		1																					
	3.																										
	4																										
	5																										
	6																										
	7.																										
	8																										
	9.																										
	10																										

SAMPLE RECEIPT: See SRDF	LABORATORY: See SRDF	TURNAROUND TIME	QC Reporting Requirements (Add'l charges may apply)
TOTAL # CONTAINERS	SHIPPING I.D. / AIRBILL #	☐ 8 HOUR	☐ LEVEL I
CONDITION OF CONTAINERS	CARRIER	☐ 24 HOUR	☐ LEVEL II
CONDITION OF SEALS	DOT DESIGNATION	☐ 1 WEEK	☐ LEVEL II w/project specific Duplicates/Spikes
		☒ 2 WEEK (standard)	☐ Level III (Full validation package)
		☐ OTHER ____	

COMMENTS / INSTRUCTIONS

METALS: AG, AS, AL, Ba, BC, CA, CD, CO, CR, CU, Fe, Hg, K, Mg, MN, Na, Ni, Pb, Sb, Se, Tl, V, ZN

ROSH! NITRATES

FILTER DISSOLVED METALS

PAGE ____ OF ____

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
1 Tiffany O. Looff	3/13/00	18:00	1		
2			2		
3			3 [signature] / AEE ROX	3/14/00	10:20

AGRA Earth & Environmental, Inc. (10/97)

AZ 000162

Appendix A

Subcontracted Data

SVL ANALYTICAL, Inc.
Client: Agra Earth & Environmental
Sample ID: B-1-GW
Date Collected: 3/13/00 15:00
Collected By:

REPORT OF ANALYTICAL RESULTS
Date of Report: 3/22/00
SVL Job No: 93886
SVL Sample No: 229000 | 229001
Sample Receipt: 3/15/00

PHYSICAL PROPERTIES	TOTAL	DISSOLVED
pH	7.79	
TDS, mg/L	665	
TSS, mg/L		
Conductivity		

INORGANIC NONMETALS, mg/L	TOTAL	DISSOLVED
Alkalinity (TOT)	175	
Bicarbonate	175	
Chloride	220	
Fluoride		
Nitrate-N	2.60	
Nitrogen-TKN		
Sulfate	93.2	
Sulfide	<0.5	

INORGANIC METALS, mg/L	TOTAL	DISSOLVED
Aluminum	5.50	<0.024
Antimony	<0.032	<0.032
Arsenic	<0.04	<0.04
Barium	0.156	0.101
Beryllium	<0.002	<0.002
Bismuth		
Boron		
Cadmium	<0.0024	<0.0024
Calcium	67.5	71.8
Cesium		
Chromium	0.007	<0.005

INORGANIC METALS (cont'd) mg/L	TOTAL	DISSOLVED
Cobalt	<0.005	<0.005
Copper	0.019	<0.003
Gallium		
Iron	10.1	<0.02
Lanthanum		
Lead	<0.04	<0.04
Lithium		
Magnesium	28.1	30.1
Manganese	0.805	0.483
Mercury	<0.0002	<0.0002
Molybdenum		
Nickel	<0.023	<0.023
Phosphorus		
Orthophosphate		
Potassium	7.8	6.3
Rubidium		
Scandium		
Selenium	<0.04	<0.04
Silica		
Silver	<0.006	<0.006
Sodium	135	145
Strontium		
Thallium	<0.1	<0.1
Tin		
Titanium		
Vanadium	0.008	<0.005
Zinc	0.021	<0.003

ADDITIONAL TESTS	TOTAL	DISSOLVED
CO3, CaCO3	<1.0	
Nitrite-N	<0.25*	

	TOTAL	DISSOLVED
Hardness	284	

*Elevated detection limit due to matrix interference.

This report has been checked and is certified to be accurate.

Signed: Kirby Gray Date: 3/22/00
3/22/00 11:36

SVL ANALYTICAL, INC. Quality Control Report

Part I Prep Blank and Laboratory Control Sample

Client :Agra Earth & Environmental SVL JOB No. :93886

Analyte	Method	Matrix	Units	Prep Blank	True—LCS—Found		LCS %R	Analysis Date
Silver	200.7	WATER	mg/L	<0.006	1.00	0.958	95.8	3/21/00
Aluminum	200.7	WATER	mg/L	<0.024	1.00	0.928	92.8	3/21/00
Arsenic	200.7	WATER	mg/L	<0.04	1.00	0.93	93.0	3/21/00
Barium	200.7	WATER	mg/L	<0.002	1.00	0.970	97.0	3/21/00
Beryllium	200.7	WATER	mg/L	<0.002	1.00	0.980	98.0	3/21/00
Calcium	200.7	WATER	mg/L	<0.013	20.0	18.9	94.5	3/21/00
Cadmium	200.7	WATER	mg/L	<0.0024	1.00	0.929	92.9	3/21/00
Cobalt	200.7	WATER	mg/L	<0.005	1.00	0.972	97.2	3/21/00
Chromium	200.7	WATER	mg/L	<0.005	1.00	0.959	95.9	3/21/00
Copper	200.7	WATER	mg/L	<0.003	1.00	0.952	95.2	3/21/00
Iron	200.7	WATER	mg/L	<0.02	10.0	9.91	99.1	3/21/00
Hardness	200.7	WATER	mg/L	<0.18	132	126	95.5	3/21/00
Potassium	200.7	WATER	mg/L	<1.7	30.0	28.5	95.0	3/21/00
Magnesium	200.7	WATER	mg/L	<0.035	20.0	19.1	95.5	3/21/00
Manganese	200.7	WATER	mg/L	<0.002	1.00	0.958	95.8	3/21/00
Sodium	200.7	WATER	mg/L	<0.088	20.0	19.3	96.5	3/21/00
Nickel	200.7	WATER	mg/L	<0.023	1.00	0.974	97.4	3/21/00
Lead	200.7	WATER	mg/L	<0.04	1.00	0.91	91.0	3/21/00
Antimony	200.7	WATER	mg/L	<0.032	1.00	0.962	96.2	3/21/00
Selenium	200.7	WATER	mg/L	<0.04	1.00	0.95	95.0	3/21/00
Thallium	200.7	WATER	mg/L	<0.1	1.0	0.9	90.0	3/21/00
Vanadium	200.7	WATER	mg/L	<0.005	1.00	0.972	97.2	3/21/00
Zinc	200.7	WATER	mg/L	<0.003	1.00	0.938	93.8	3/21/00
Mercury	245.1	WATER	mg/L	<0.0002	0.0050	0.0052	104.0	3/21/00
Chloride	300.0	WATER	mg/L	<0.2	54.2	55.2	101.8	3/16/00
Nitrite-N	300.0	WATER	mg/L	<0.05	3.65	3.69	101.1	3/15/00
Nitrate-N	300.0	WATER	mg/L	<0.05	19.4	19.3	99.5	3/15/00
Sulfate, SO4	300.0	WATER	mg/L	<0.3	5.1	5.2	102.0	3/15/00
Alkalinity,CaCO3	310.1	WATER	mg/L	<1.0	40.9	43.7	106.8	3/20/00
CO3, CaCO3	310.1	WATER	mg/L		N/A		N/A	3/25/00
HCO3, CaCO3	310.1	WATER	mg/L		N/A		N/A	3/25/00
pH	150.1	WATER		4.55	9.07	8.65	95.4	3/20/00
Sulfide	376.1	WATER	mg/L	<0.5	N/A		N/A	3/17/00
TDS	160.1	WATER	mg/L	<10	231	220	95.2	3/16/00

LEGEND:

LCS = Laboratory Control Sample LCS %R = LCS Percent Recovery N/A = Not Applicable

S[redacted]L ANALYTICAL, INC. Quality Control Report

Part II Duplicate and Spike Analysis

Client :Agra Earth & Environmental SVL JOB No :93886

Test	Method	Matrix	QC SAMPLE ID	Units	Result	Duplicate Result	RPD%	Matrix Spike Result	SPK ADD	%R	Test Date
Ag	200.7	WATER	1	mg/L	<0.006	<0.006	UDL	0.978	1.00	97.8	3/21/00
A[redacted]	200.7	WATER	2	mg/L	<0.006	<0.006	UDL	1.01	1.00	101.0	3/21/00
A[redacted]	200.7	WATER	1	mg/L	5.50	6.16	11.3	9.64	1.00	R >4S	3/21/00
Al	200.7	WATER	2	mg/L	<0.024	<0.024	UDL	1.07	1.00	107.0	3/21/00
As	200.7	WATER	1	mg/L	<0.04	<0.04	UDL	0.94	1.00	94.0	3/21/00
A[redacted]	200.7	WATER	2	mg/L	<0.04	<0.04	UDL	1.06	1.00	106.0	3/21/00
B[redacted]	200.7	WATER	1	mg/L	0.156	0.161	3.2	1.16	1.00	100.4	3/21/00
Ba	200.7	WATER	2	mg/L	0.101	0.101	0.0	1.17	1.00	106.9	3/21/00
B[redacted]	200.7	WATER	1	mg/L	<0.002	<0.002	UDL	0.999	1.00	99.9	3/21/00
B[redacted]	200.7	WATER	2	mg/L	<0.002	<0.002	UDL	1.07	1.00	107.0	3/21/00
Ca	200.7	WATER	1	mg/L	67.5	68.5	1.5	86.3	20.0	94.0	3/21/00
Ca	200.7	WATER	2	mg/L	71.8	72.7	1.2	90.9	20.0	95.5	3/21/00
C[redacted]	200.7	WATER	1	mg/L	<0.0024	<0.0024	UDL	0.936	1.00	93.6	3/21/00
Cd	200.7	WATER	2	mg/L	<0.0024	<0.0024	UDL	1.07	1.00	107.0	3/21/00
Co	200.7	WATER	1	mg/L	<0.005	<0.005	UDL	0.972	1.00	97.2	3/21/00
C[redacted]	200.7	WATER	2	mg/L	<0.005	<0.005	UDL	1.07	1.00	107.0	3/21/00
C[redacted]	200.7	WATER	1	mg/L	0.007	0.005	33.3	0.964	1.00	95.7	3/21/00
Cr	200.7	WATER	2	mg/L	<0.005	<0.005	UDL	1.06	1.00	106.0	3/21/00
Cu	200.7	WATER	1	mg/L	0.019	0.019	0.0	0.998	1.00	97.9	3/21/00
C[redacted]	200.7	WATER	2	mg/L	<0.003	<0.003	UDL	1.07	1.00	107.0	3/21/00
Fe	200.7	WATER	1	mg/L	10.1	10.6	4.8	21.0	10.0	109.0	3/21/00
Fe	200.7	WATER	2	mg/L	<0.02	<0.02	UDL	10.9	10.0	109.0	3/21/00
H[redacted]s	200.7	WATER	1	mg/L	284	290	2.1	416	132	100.0	3/21/00
K[redacted]	200.7	WATER	1	mg/L	7.8	7.3	6.6	36.9	30.0	97.0	3/21/00
K	200.7	WATER	2	mg/L	6.3	6.7	6.2	38.1	30.0	106.0	3/21/00
M[redacted]	200.7	WATER	1	mg/L	28.1	29.0	3.2	48.8	20.0	103.5	3/21/00
M[redacted]	200.7	WATER	2	mg/L	30.1	30.1	0.0	50.2	20.0	100.5	3/21/00
Mn	200.7	WATER	1	mg/L	0.805	0.820	1.8	1.77	1.00	96.5	3/21/00
Mn	200.7	WATER	2	mg/L	0.483	0.489	1.2	1.53	1.00	104.7	3/21/00
N[redacted]	200.7	WATER	1	mg/L	135	137	1.5	154	20.0	95.0	3/21/00
Na	200.7	WATER	2	mg/L	145	150	3.4	163	20.0	90.0	3/21/00
Ni	200.7	WATER	1	mg/L	<0.023	0.031	200.0	0.978	1.00	97.8	3/21/00
N[redacted]	200.7	WATER	2	mg/L	<0.023	<0.023	UDL	1.04	1.00	104.0	3/21/00
P[redacted]	200.7	WATER	1	mg/L	<0.04	<0.04	UDL	0.95	1.00	95.0	3/21/00
Pb	200.7	WATER	2	mg/L	<0.04	<0.04	UDL	1.04	1.00	104.0	3/21/00
S[redacted]	200.7	WATER	1	mg/L	<0.032	<0.032	UDL	0.962	1.00	96.2	3/21/00
S[redacted]	200.7	WATER	2	mg/L	<0.032	<0.032	UDL	1.06	1.00	106.0	3/21/00
Se	200.7	WATER	1	mg/L	<0.04	<0.04	UDL	0.96	1.00	96.0	3/21/00
Se	200.7	WATER	2	mg/L	<0.04	<0.04	UDL	1.13	1.00	113.0	3/21/00
T[redacted]	200.7	WATER	1	mg/L	<0.1	<0.1	UDL	0.9	1.00	90.0	3/21/00
T[redacted]	200.7	WATER	2	mg/L	<0.1	<0.1	UDL	1.0	1.00	100.0	3/21/00
V	200.7	WATER	1	mg/L	0.008	0.005	46.2	0.990	1.00	98.2	3/21/00
V[redacted]	200.7	WATER	2	mg/L	<0.005	<0.005	UDL	1.08	1.00	108.0	3/21/00
Z[redacted]	200.7	WATER	1	mg/L	0.021	0.020	4.9	0.959	1.00	93.8	3/21/00

LEGEND:

R[redacted] = (|SAM - DUP|/((SAM + DUP)/2) * 100) M in Duplicate indicates MSD. UDL = Both SAM & DUP not detected.

S[redacted]KE ADD column, A = Post Digest Spike; %R = Percent Recovery N/A = Not Analyzed; R > 4S = Result more than 4X the Spike Added

QC Sample 1: SVL SAM No.: 229000 Client Sample ID: B-1-GW ^T

[redacted] Sample 2: SVL SAM No.: 229001 Client Sample ID: B-1-GW ^D

[redacted]

3/22/00 11:20

SVL ANALYTICAL, INC. Quality Control Report

Part II Duplicate and Spike Analysis

Client :Agra Earth & Environmental SVL JOB No :93886

Test	Method	Matrix	QC SAMPLE ID Units	Result	Duplicate Result	RPD%	Matrix Spike Result	SPK ADD	%R	Test Date
Zn	200.7	WATER	2 mg/L	<0.003	<0.003	UDL	1.07	1.00	107.0	3/21/00
Be	245.1	WATER	1 mg/L	<0.0002	<0.0002	UDL	0.0011	0.0010	110.0	3/21/00
Be	245.1	WATER	2 mg/L	<0.0002	<0.0002	UDL	0.0011	0.0010	110.0	3/21/00
Cl	300.0	WATER	1 mg/L	220	221	0.5	322	100	102.0	3/16/00
NO2-N	300.0	WATER	1 mg/L	<0.25*	<0.25*	UDL	10.2	10.0	102.0	3/15/00
NO3-N	300.0	WATER	1 mg/L	2.60	2.54	2.3	4.63	2.00	101.5	3/15/00
SO4	300.0	WATER	1 mg/L	93.2	93.9	0.7	144	50.0	101.6	3/15/00
ALK	310.1	WATER	1 mg/L	175	175	0.0	N/A	N/A	N/A	3/20/00
CO3	310.1	WATER	1 mg/L	<1.0	<1.0	UDL	N/A	N/A	N/A	3/20/00
HCO3	310.1	WATER	1 mg/L	175	175	0.0	N/A	N/A	N/A	3/20/00
pH	150.1	WATER	1	7.79	7.80	0.1	N/A	N/A	N/A	3/20/00
TDS	160.1	WATER	1 mg/L	665	667	0.3	N/A	N/A	N/A	3/16/00

LEGEND:

RPD% = (|SAM - DUP|/((SAM + DUP)/2) * 100) M in Duplicate indicates MSD. UDL = Both SAM & DUP not detected.

SPIKE ADD column, A = Post Digest Spike; %R = Percent Recovery N/A = Not Analyzed; R > 4S = Result more than 4X the Spike Added

QC Sample 1: SVL SAM No.: 229000 Client Sample ID: B-1-GW ^T

QC Sample 2: SVL SAM No.: 229001 Client Sample ID: B-1-GW ^D

93886 4853

AGRA
ENGINEERING GLOBAL SOLUTIONS
7477 SW Tech Center Drive
Portland, Oregon, U.S.A. 97223-8025
Tel (503)639-3400 Fax (503) 620-7892

CHAIN OF CUSTODY

PROJECT: Rio Salado	PROJECT No.: 0-117-001007
REPORT TO: Sean Gornley	PHONE No.: 503 639-3400
PROJECT MANGER: —	PHONE No.: —
SAMPLER'S NAME (please print): —	PHONE No.: —
SAMPLER'S SIGNATURE: —	

ANALYSIS REQUESTED (circle, check box or write preferred method in box)

SAMPLE I.D.	DATE	TIME	MATRIX	PRESERVATIVE	CONTAINERS No.	CONTAINERS VOL.	BTEX by EPA 602 / 8021	TPH-G	BTEX / TPH-G	TPH-HCID	TPH-D / TPH-D EXTENDED	TPH by EPA 8015 MODIFIED / 8015B	TPH-418.1 MODIFIED	TPH by EPA 418.1	GC / MS EPA 624 / EPA 8260 Volatiles	GC / MS EPA 625 / 8270 Semi-volatiles	VOCS EPA 601 / 602 or EPA 8021	PCBs EPA 608 / 8081 / 8082	LEAD EPA 6010 / EPA 7421 Total / Dissolved	TOTAL METALS	TCLP	Analysis per attached Instructions.			
1. B-1-GW	3/13/00	15:00	W	Various	5	500 ml poly																X			
2.																									
3.																									
4.																									
5.																									
6.																									
7.																									
8.																									
9.																									
10.																									

SAMPLE RECEIPT	LABORATORY: SVL	TURNAROUND TIME	QC Reporting Requirements (Add'l charges may apply)	COMMENTS / INSTRUCTIONS
TOTAL # CONTAINERS	SHIPPING I.D. / AIRBILL #	☐ 8 HOUR	☐ LEVEL I	Filter Dissolved Metals in Lab
CONDITION OF CONTAINERS	CARRIER	☐ 24 HOUR	☐ LEVEL II	
CONDITION OF SEALS	DOT DESIGNATION	☐ 1 WEEK	☐ LEVEL II w/project specific Duplicates/Spikes	
		X 2 WEEK (standard)	☐ Level III (Full validation package)	
		☐ OTHER		

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
1. [signature]	3/14/00	10:30	1. [signature]	3/15	9:40
2.			2.		
3.			3.		

PAGE 1 OF 1

Project: Rio Salado
Project No.: 0-117-001007
Project Manager: Larry Hansen
Sample Matrix: Water

Service Request No.: AZ000170
Report Date: 03/21/00
Report No.: 00017001
C.O.C. No.: 4755

Volatile Organic Compounds by GC/MSD
EPA Methods 5030B/8260B
µg/L(ppb)

Sample Name:	B-2-GW	Lab Blank	**Reporting**
Lab Code:	170-1	170-MB	**Limit**
Dichlorodifluoromethane	ND	ND	1.0
Chloromethane	ND	ND	5.0
Vinyl Chloride	ND	ND	1.0
Bromomethane	ND	ND	1.0
Chloroethane	ND	ND	1.0
Trichlorofluoromethane	ND	ND	1.0
1,1-Dichloroethene	ND	ND	1.0
Acetone	ND	ND	20
Carbon Disulfide	ND	ND	1.0
Methylene Chloride	ND	ND	5.0
trans-1,2-Dichloroethene	ND	ND	1.0
MTBE	ND	ND	1.0
1,1-Dichloroethane	ND	ND	1.0
2,2-Dichloropropane	ND	ND	1.0
cis-1,2-Dichloroethene	ND	ND	1.0
2-Butanone(MEK)	ND	ND	10
Bromochloromethane	ND	ND	1.0
Chloroform	ND	ND	1.0
1,1,1-Trichloroethane	ND	ND	1.0
Carbon Tetrachloride	ND	ND	1.0
1,1-Dichloropropene	ND	ND	1.0
Benzene	ND	ND	1.0
1,2-Dichloroethane	ND	ND	1.0
Trichloroethene	ND	ND	1.0
1,2-Dichloropropane	ND	ND	1.0
Dibromomethane	ND	ND	1.0
Bromodichloromethane	ND	ND	1.0
cis-1,3-Dichloropropene	ND	ND	1.0
4-Methyl-2-Pentanone(MIBK)	ND	ND	10
Toluene	ND	ND	1.0
trans-1,3-Dichloropropene	ND	ND	1.0
1,1,2-Trichloroethane	ND	ND	1.0
Tetrachloroethene	ND	ND	1.0
2-Hexanone	ND	ND	10
1,3-Dichloropropane	ND	ND	1.0
Dibromochloromethane	ND	ND	1.0
1,2-Dibromoethane	ND	ND	1.0
Chlorobenzene	ND	ND	1.0
1,1,1,2-Tetrachloroethane	ND	ND	1.0
Ethylbenzene	ND	ND	1.0
m,p-Xylene	ND	ND	2.0
o-Xylene	ND	ND	1.0
Styrene	ND	ND	1.0

ND Not Detected

AGRA
ENGINEERING GLOBAL SOLUTIONS

Project: Rio Salado
Project No.: 0-117-001007
Project Manager: Larry Hansen
Sample Matrix: Water

Service Request No.: AZ000170
Report Date: 03/21/00
Report No.: 00017001b
C.O.C. No.: 4755

Volatile Organic Compounds by GC/MSD
EPA Methods 5030B/8260B
µg/L(ppb)

Sample Name:	B-2-GW	Lab Blank	**Reporting**
Lab Code:	170-1	170-MB	**Limit**
Bromoform	ND	ND	5.0
Isopropylbenzene	ND	ND	1.0
Bromobenzene	ND	ND	1.0
1,1,2,2-Tetrachloroethane	ND	ND	1.0
1,2,3-Trichloropropane	ND	ND	1.0
n-Propylbenzene	ND	ND	1.0
2-Chlorotoluene	ND	ND	1.0
4-Chlorotoluene	ND	ND	1.0
1,3,5-Trimethylbenzene	ND	ND	1.0
tert-Butylbenzene	ND	ND	1.0
1,2,4-Trimethylbenzene	ND	ND	1.0
sec-Butylbenzene	ND	ND	1.0
1,3-Dichlorobenzene	ND	ND	1.0
4-Isopropyltoluene	ND	ND	1.0
1,4-Dichlorobenzene	ND	ND	1.0
1,2-Dichlorobenzene	ND	ND	1.0
n-Butylbenzene	ND	ND	5.0
1,2-Dibromo-3-Chloropropane	ND	ND	5.0
1,2,4-Trichlorobenzene	ND	ND	25
Hexachlorobutadiene	ND	ND	25
Naphthalene	ND	ND	25
1,2,3-Trichlorobenzene	ND	ND	25
Vinyl Acetate	ND	ND	1.0
2-Chloroethylvinyl Ether	ND	ND	1.0
Sample Date:	03/15/00	03/20/00	
Analysis Date:	03/20/00	03/20/00	

Surrogate Recoveries:			**Control Limits**
Dibromofluoromethane:	110%	111%	81%-115%
Toluene-d_8:	98%	98%	88%-106%
4-Bromofluorobenzene:	106%	106%	88%-111%

ND Not Detected

Signature of Chemist

QA/QC Review

AGRA
ENGINEERING GLOBAL SOLUTIONS

Project: Rio Salado
Project No.: 0-117-001007
Project Manager: Larry Hansen
Sample Matrix: Water

Service Request No.: AZ000170
Report Date: 03/21/00
Report No.: 00017002
C.O.C. No.: 4755

QC Data Report
MS/MSD Summary
Volatile Organic Compounds by GC/MSD
EPA Methods 5030B/8260B
µg/L(ppb)

Sample Name: **Lab Code:**	Batch QC 147-1	Spike Level (µg/L)	Matrix Spike	Percent Recovery (MS)	Matrix Spike Duplicate	Percent Recovery (MSD)	% Recovery Control Criteria	Relative Percent Difference (RPD)
1,1 - Dichloroethene	<1.0	50.0	59.5	119	58.3	117	84% - 136%	2
Benzene	<1.0	50.0	51.0	102	51.4	103	92% - 112%	<1
Trichloroethene	8.34	50.0	57.4	98	58.8	101	86% - 116%	2
Toluene	<1.0	50.0	49.4	99	49.1	98	79% - 116%	<1
Chlorobenzene	<1.0	50.0	50.8	102	51.3	103	90% - 111%	<1
Sample Date:	03/08/00	~	03/08/00	~	03/08/00	~		
Analysis Date:	03/20/00	~	03/20/00	~	03/20/00	~		

Surrogate Recovery:							**Control Limits**
Dibromofluoromethane:	110%	~	108%	~	105%	~	81%-115%
Toluene-d_8:	97%	~	97%	~	97%	~	88%-106%
4-Bromofluorobenzene:	105%	~	107%	~	107%	~	88%-111%

ND Not Detected
Spike Source: Ultra Scientific, CLP-100N, Lot M-1791.

Signature of Chemist

QA/QC Review

AGRA
ENGINEERING GLOBAL SOLUTIONS

Project: Rio Salado
Project No.: 0-117-001007
Project Manager: Larry Hansen
Sample Matrix: Water

Service Request No.: AZ000170
Report Date: 03/31/00
Report No.: 00017006
C.O.C. No.: 4755

Semivolatile Organic Compounds by GC/MSD
EPA Methods 3510C/8270C
µg/L(ppb)

Sample Name:	B-2-GW	Lab Blank	**Reporting**
Lab Code:	170-1	170-MB	**Limit**
Pyridine	ND	ND	25
N-Nitrosodimethylamine	ND	ND	25
Aniline	ND	ND	25
Phenol	ND	ND	10
Bis(2-chloroethyl) Ether	ND	ND	10
2-Chlorophenol	ND	ND	10
1,3-Dichlorobenzene	ND	ND	10
1,4-Dichlorobenzene	ND	ND	10
Benzyl Alcohol	ND	ND	10
1,2-Dichlorobenzene	ND	ND	10
2-Methylphenol	ND	ND	10
Bis(2-chloroisopropyl) Ether	ND	ND	10
3- and 4- Methylphenol*	ND	ND	10
N-Nitrosodi-n-propylamine	ND	ND	10
Hexachloroethane	ND	ND	10
Nitrobenzene	ND	ND	10
Isophorone	ND	ND	10
2-Nitrophenol	ND	ND	10
2,4-Dimethylphenol	ND	ND	10
Bis(2-chloroethoxy) methane	ND	ND	10
Benzoic Acid	ND	ND	50
2,4-Dichlorophenol	ND	ND	10
1,2,4-Trichlorobenzene	ND	ND	10
Naphthalene	ND	ND	10
4-Chloroaniline	ND	ND	10
2,6-Dichlorophenol	ND	ND	10
Hexachlorobutadiene	ND	ND	10
4-Chloro-3-methylphenol	ND	ND	10
2-Methylnaphthalene	ND	ND	10
1-Methylnaphthalene	ND	ND	10
Hexachlorocyclopentadiene	ND	ND	10
2,4,6-Trichlorophenol	ND	ND	10
2,4,5-Trichlorophenol	ND	ND	10
2-Chloronaphthalene	ND	ND	10
2-Nitroaniline	ND	ND	10
Dimethyl Phthalate	ND	ND	10
Acenaphthylene	ND	ND	10
2,6-Dinitrotoluene	ND	ND	10
3-Nitroaniline	ND	ND	10

ND Not Detected
* Quantified as 4-Methylphenol

AGRA
ENGINEERING GLOBAL SOLUTIONS

Project: Rio Salado
Project No.: 0-117-001007
Project Manager: Larry Hansen
Sample Matrix: Water

Service Request No.: AZ000170
Report Date: 03/31/00
Report No.: 00017006b
C.O.C. No.: 4755

Semivolatile Organic Compounds by GC/MSD
EPA Methods 3510C/8270C
µg/L(ppb)

Sample Name:	B-2-GW	Lab Blank	**Reporting**
Lab Code:	170-1	170-MB	**Limit**
Acenaphthene	ND	ND	10
2,4-Dinitrophenol	ND	ND	25
4-Nitrophenol	ND	ND	25
Dibenzofuran	ND	ND	10
2,4-Dinitrotoluene	ND	ND	10
2,3,4,6-Tetrachlorophenol	ND	ND	10
Diethyl Phthalate	ND	ND	10
Fluorene	ND	ND	10
4-Chlorophenyl Phenyl Ether	ND	ND	10
4-Nitroaniline	ND	ND	10
Azobenzene	ND	ND	10
2-Methyl-4,6-dinitrophenol	ND	ND	25
N-Nitrosodiphenylamine	ND	ND	10
4-Bromophenyl Phenyl Ether	ND	ND	10
Hexachlorobenzene	ND	ND	10
Pentachlorophenol (PCP)	ND	ND	25
Phenanthrene	ND	ND	10
Anthracene	ND	ND	10
Carbazole	ND	ND	10
Di-n-butyl Phthalate	ND	ND	10
Fluoranthene	ND	ND	10
Benzidine	ND	ND	50
Pyrene	ND	ND	10
Butyl Benzyl Phthalate	ND	ND	10
Benzo(a)anthracene	ND	ND	10
3,3'-Dichlorobenzidine	ND	ND	10
Chrysene	ND	ND	10
Bis(2-ethylhexyl) Phthalate	ND	ND	10
Di-n-octyl Phthalate	ND	ND	10
Benzo(b)fluoranthene	ND	ND	10
Benzo(k)fluoranthene	ND	ND	10
Benzo(a)pyrene	ND	ND	10
Indeno(1,2,3-c,d)pyrene	ND	ND	10
Dibenzo(a,h)anthracene	ND	ND	10
Benzo(g,h,i)perylene	ND	ND	10
Sample Date:	03/15/00	03/20/00	
Extraction Date:	03/20/00	03/20/00	
Analysis Date:	03/22/00	03/22/00	

ND Not Detected

AGRA
ENGINEERING GLOBAL SOLUTIONS

Project: Rio Salado
Project No.: 0-117-001007
Project Manager: Larry Hansen
Sample Matrix: Water

Service Request No.: AZ000170
Report Date: 03/31/00
Report No.: 00017006c
C.O.C. No.: 4755

Semivolatile Organic Compounds by GC/MSD
EPA Methods 3510C/8270C
µg/L(ppb)

Surrogate Recoveries:

Sample Name:	B-2-GW	Lab Blank	
Lab Code:	170-1	170-MB	
Analysis Date:	03/22/00	03/22/00	**Control Limits**
2-Fluorophenol:	20%(a)	50%	46%-77%
Phenol-d5:	14%(a)	33%(b)	55%-78%
Nitrobenzene-d5:	71%	81%	65%-92%
2-Fluorobiphenyl:	74%	82%	67%-110%
2,4,6-Tribromophenol:	53%(a)	72%	54%-105%
p-Terphenyl-d14:	91%	108%	80%-121%

(a) Outside of acceptance limits due to matrix effects. An unbreakable emulsion formed during sample preparation.
(b) Outside of acceptance limits. USEPA Method 8270 allows one surrogate from each fraction to be outside acceptance limits without affecting acceptability of the data.

Signature of Chemist

QA/QC Review

AGRA
ENGINEERING GLOBAL SOLUTIONS

Project: Rio Salado
Project No.: 0-117-001007
Project Manager: Larry Hansen
Sample Matrix: Water

Service Request No.: AZ000170
Report Date: 03/31/00
Report No.: 00017007
C.O.C.: 4755

QC Data Report
Blank Spike Summary
Semivolatile Organic Compounds by GC/MS
EPA Methods 3510C/8270C
µg/L(ppb)

Sample Name: / **Lab Code:**	Lab Blank 170-MB	Spike Level (µg/L)	Blank Spike	Percent Recovery (BS)	Blank Spike Duplicate	Percent Recovery (BSD)	AEE % Recovery Acceptance Criteria	Relative Percent Difference (RPD)
Phenol	<10	80	37	46(a)	38	48(a)	56%-72%	3
2-Chlorophenol	<10	80	71	89(a)	70	88(a)	64%-81%	1
4-Chloro-3-methylphenol	<10	80	76	95	78	98	61%-97%	3
4-Nitrophenol	<25	80	26	32(a)	33	41(a)	42%-65%	24
Pentachlorophenol	<25	80	70	88	79	99	24%-109%	12
1,4-Dichlorobenzene	<10	40	31	78(a)	33	82(a)	61%-76%	6
N-Nitrosodi-n-propylamine	<10	40	37	92(a)	40	100(a)	63%-85%	8
1,2,4-Trichlorobenzene	<10	40	34	85(a)	36	90(a)	64%-84%	6
Acenaphthene	<10	40	37	92	40	100	75%-96%	8
2,4-Dinitrotoluene	<10	40	36	90	40	100	52%-107%	11
Pyrene	<10	40	40	100	43	108	93%-111%	7
Sample Date:	03/20/00	~	03/20/00	~	03/20/00	~	~	
Extraction Date:	03/20/00	~	03/20/00	~	03/20/00	~	~	
Analysis Date:	03/22/00	~	03/22/00	~	03/22/00	~	~	
Surrogate Recovery:							**Acceptance Limits**	
2-Fluorophenol:	50%	~	49%	~	49%	~	46%-77%	
Phenol-d5:	33%(b)	~	34%(b)	~	33%(b)	~	55%-78%	
Nitrobenzene-d5:	81%	~	80%	~	84%	~	65%-92%	
2-Fluorobiphenyl:	82%	~	78%	~	87%	~	67%-100%	
2,4,6-Tribromophenol:	72%	~	70%	~	74%	~	54%-105%	
p-Terphenyl-d14:	108%	~	100%	~	107%	~	80%-121%	

Spike Source: AEE 97-03-79-4
(a) Outside of AEE acceptance limits. Since the recovery is within USEPA method specified guidance limits, it is the opinion of the laboratory that usability of the data has not been adversely affected.
(b) Outside of acceptance limits. USEPA Method 8270 allows one surrogate from each fraction to be outside acceptance limits without affecting acceptability of the data.

Signature of Chemist

QA/QC Review

AGRA
ENGINEERING GLOBAL SOLUTIONS

Project: Rio Salado
Project No.: 0-117-001007
Project Manager: Larry Hansen
Sample Matrix: Water

Service Request No.: AZ000170
Report Date: 03/31/00
Report No.: 00017008
C.O.C.: 4755

QC Data Report
MS/MSD Summary
Semivolatile Organic Compounds by GC/MS
EPA Methods 3510C/8270C
µg/L(ppb)

Sample Name: **Lab Code:**	Batch QC 162-1	Spike Level (µg/L)	Matrix Spike	Percent Recovery (MS)	Matrix Spike Duplicate	Percent Recovery (MSD)	AEE % Recovery Acceptance Criteria	Relative Percent Difference (RPD)
Phenol	<10	80	28	35(a)	33	41	37%-73%	16
2-Chlorophenol	<10	80	54	68	68	85	38%-92%	23
4-Chloro-3-methylphenol	<10	80	57	71	69	86	71%-88%	19
4-Nitrophenol	<25	80	31	39	30	38	35%-110%	3
Pentachlorophenol	<25	80	32	40(a)	28	35(a)	47%-160%	13
1,4-Dichlorobenzene	<10	40	23	58	32	80	45%-94%	33
N-Nitrosodi-n-propylamine	<10	40	30	75	34	85	39%-91%	12
1,2,4-Trichlorobenzene	<10	40	26	65	35	88	33%-107%	30
Acenaphthene	<10	40	31	78	35	88	58%-103%	12
2,4-Dinitrotoluene	<10	40	33	82	34	85	63%-111%	3
Pyrene	<10	40	37	92	38	95	94%-105%	3
Sample Date:	03/13/00	~	03/13/00	~	03/13/00	~	~	
Extraction Date:	03/20/00	~	03/20/00	~	03/20/00	~	~	
Analysis Date:	03/22/00	~	03/22/00	~	03/22/00	~	~	
Surrogate Recovery:							**Acceptance Limits**	
2-Fluorophenol:	37%(a)	~	37%(a)	~	45%(a)	~	46%-77%	
Phenol-d5:	25%(a)	~	24%(a)	~	30%(a)	~	55%-78%	
Nitrobenzene-d5:	71%	~	60%(a)	~	72%	~	65%-92%	
2-Fluorobiphenyl:	77%	~	68%	~	78%	~	67%-100%	
2,4,6-Tribromophenol:	59%	~	57%	~	63%	~	54%-105%	
p-Terphenyl-d14:	90%	~	87%	~	82%	~	80%-121%	

Spike Source: AEE 97-03-79-4
(a) Outside of acceptance limits due to matrix effects. An unbreakable emulsion formed during sample preparation.

Signature of Chemist

QA/QC Review

AGRA
ENGINEERING GLOBAL SOLUTIONS

Project: Rio Salado
Project No.: 0-117-001007
Project Manager: Larry Hansen
Sample Matrix: Water

Service Request No.: AZ000170
Report Date: 03/29/00
Report No.: 00017003
C.O.C. No.: 4755

Polychlorinated Biphenyls (PCBs) as Aroclors by GC/ECD
EPA Methods 3510/8082
µg/L(ppb)

Sample Name:	B-2-GW	Lab Blank	**Reporting**
Lab Code:	170-1	170-MB	**Limit**
Aroclor 1016	ND	ND	0.5
Aroclor 1221	ND	ND	1.0
Aroclor 1232	ND	ND	0.5
Aroclor 1242	ND	ND	0.5
Aroclor 1248	ND	ND	0.5
Aroclor 1254	ND	ND	0.5
Aroclor 1260	ND	ND	0.5
Sample Date:	03/15/00	03/20/00	
Extraction Date:	03/20/00	03/20/00	
Analysis Date:	03/24/00	03/24/00	
Surrogate Recoveries:			**%Recovery Acceptance**
Decachlorobiphenyl:	37%(a)	90%	70%-130%

ND Not Detected
(a) Outside of acceptance limits due to matrix effects. An unbreakable emulsion formed during sample preparation.

Dan Hines
Signature of Chemist

QA/QC Review

AGRA
ENGINEERING GLOBAL SOLUTIONS

Project: Rio Salado
Project No.: 0-117-001007
Project Manager: Larry Hansen
Sample Matrix: Water

Service Request No.: AZ000170
Report Date: 03/29/00
Report No.: 00017004
C.O.C.: 4755

QC Data Report
Blank Spike Summary
Polychlorinated Biphenyls (PCBs) as Aroclors by GC/ECD
EPA Methods 3510/8082
µg/L(ppb)

Sample Name: **Lab Code:**	Lab Blank 170-MB	Spike Level (µg/L)	Blank Spike	Percent Recovery (BS)	Blank Spike Duplicate	Percent Recovery (BSD)	% Recovery Acceptance Criteria	Relative Percent Difference (RPD)
Aroclor 1016	<0.5	2.5	2.3	92	2.0	80	70%-130%	14
Aroclor 1260	<0.5	2.5	2.3	92	2.6	104	70%-130%	12
Sample Date:	03/20/00	~	03/20/00	~	03/20/00	~		
Extraction Date:	03/20/00	~	03/20/00	~	03/20/00	~		
Analysis Date:	03/24/00	~	03/24/00	~	03/24/00	~		
Surrogate Recovery:							**Control Limits**	
Decachlorobiphenyl:	90%	~	96%	~	111%	~	70%-130%	

ND Not Detected
Spike Source: AEE #99-06-34-1

Dan Hines
Signature of Chemist

QA/QC Review

AGRA
ENGINEERING GLOBAL SOLUTIONS

Project: Rio Salado
Project No.: 0-117-001007
Project Manager: Larry Hansen
Sample Matrix: Water

Service Request No.: AZ000170
Report Date: 03/29/00
Report No.: 00017005
C.O.C.: 4755

QC Data Report
MS/MSD Summary
Polychlorinated Biphenyls (PCBs) as Aroclors by GC/ECD
EPA Methods 3510/8082
µg/L(ppb)

Sample Name: **Lab Code:**	Batch QC 175-2	Spike Level (µg/L)	Matrix Spike	Percent Recovery (MS)	Matrix Spike Duplicate	Percent Recovery (MSD)	% Recovery Acceptance Criteria	Relative Percent Difference (RPD)
Aroclor 1016	<0.5	2.5	2.4	96	2.0	80	70%-130%	18
Aroclor 1260	<0.5	2.5	2.4	96	1.9	76	70%-130%	23
Sample Date:	03/15/00	~	03/15/00	~	03/15/00	~		
Extraction Date:	03/20/00	~	03/20/00	~	03/20/00	~		
Analysis Date:	03/24/00	~	03/24/00	~	03/24/00	~		
Surrogate Recovery:							**Control Limits**	
Decachlorobiphenyl:	41%(a)	~	100%	~	78%	~	70%-130%	

ND Not Detected
Spike Source: AEE #99-06-34-1
(a) Outside of acceptance limits due to matrix effects. An unbreakable emulsion formed during sample preparation.

Signature of Chemist

QA/QC Review

AGRA
ENGINEERING GLOBAL SOLUTIONS

Project: Rio Salado
Project No.: 0-117-001007
Project Manager: Larry Hansen
Sample Matrix: Water

Service Request No.: AZ000170
Report Date: 04/10/00
Report No.: 00017009
C.O.C. No.: 4755

Organochlorine Pesticides by GC/ECD
EPA Methods 3510/8081A
µg/L(ppb)

Sample Name:	B-2-GW	Lab Blank	**Reporting**
Lab Code:	170-1	170-MB	**Limit**
alpha-BHC	ND	ND	0.04
beta-BHC	ND	ND	0.04
gamma-BHC	ND	ND	0.04
delta-BHC	ND	ND	0.04
Heptachlor	ND	ND	0.04
Aldrin	ND	ND	0.04
Heptachlor epoxide	ND	ND	0.04
alpha-Chlordane	ND	ND	0.04
gamma-Chlordane	ND	ND	0.04
Endosulfan I	ND	ND	0.04
4,4'-DDE	ND	ND	0.04
Dieldrin	ND	ND	0.04
Endrin	ND	ND	0.04
4,4'-DDD	ND	ND	0.04
Endosulfan II	ND	ND	0.04
Endrin aldehyde	ND	ND	0.04
4,4'-DDT	ND	ND	0.04
Endosulfan sulfate	ND	ND	0.04
Methoxychlor	ND	ND	0.04
Endrin ketone	ND	ND	0.04
Toxaphene	ND	ND	1.0
Sample Date:	03/15/00	03/20/00	
Extraction Date:	03/20/00	03/20/00	
Analysis Date:	04/05/00	04/05/00	
			% Recovery
Surrogate Recoveries:			**Acceptance**
2,4,5,6-tetrachloro-m-xylene	70%	64%	50%-118%
Decachlorobiphenyl	32%(a)	95%	83%-124%

ND Not Detected
(a) Outside of acceptance limits due to matrix effects. An unbreakable emulsion formed during sample preparation.

Dan Hines
Signature of Chemist

QA/QC Review

AGRA
ENGINEERING GLOBAL SOLUTIONS

Project: Rio Salado
Project No.: 0-117-001007
Project Manager: Larry Hansen
Sample Matrix: Water

Service Request No.: AZ000170
Report Date: 04/10/00
Report No.: 00017010
C.O.C. No.: 4755

QC Data Report
Blank Spike Summary
Organochlorine Pesticides by GC/ECD
EPA Methods 3545/8081A
µg/kg(ppb)
As Received Basis

Sample Name: **Lab Code:**	Lab Blank 170-MB	Spike Level (µg/kg)	Blank Spike (BS)	Percent Recovery (BS)	Blank Spike Duplicate (BSD)	Percent Recovery (BSD)	Control Limits	Relative Percent Difference (RPD)
gamma-BHC	<0.04	1.0	0.9	90	0.9	90	70%-130%	<1
Heptachlor	<0.04	1.0	0.9	90	0.8	80	70%-130%	12
Aldrin	<0.04	1.0	0.9	90	0.8	80	70%-130%	12
Dieldrin	<0.04	2.5	2.5	100	2.5	100	70%-130%	<1
Endrin	<0.04	2.5	2.4	96	2.3	92	70%-130%	4
4,4'-DDT	<0.04	2.5	2.3	92	2.3	92	70%-130%	<1
Sample Date:	03/20/00	~	03/20/00	~	03/20/00	~	~	
Extraction Date:	03/20/00	~	03/20/00	~	03/20/00	~	~	
Analysis Date:	04/05/00	~	04/05/00	~	04/05/00	~	~	
Surrogate Recovery:							**Control Limits**	
2,4,5,6-Tetrachloro-m-xylene:	64%	~	70%	~	67%	~	50%-118%	
Decachlorobiphenyl:	95%	~	100%	~	100%	~	83%-124%	

Spike Source: 99-06-32-1

Dan Hires
Signature of Chemist

QA/QC Review

AGRA
ENGINEERING GLOBAL SOLUTIONS

Project: Rio Salado
Project No.: 0-117-001007
Project Manager: Larry Hansen
Sample Matrix: Water

Service Requrst No.: AZ000170
Report Date: 04/10/00
Report No.: 00017011
C.O.C. No.: 4755

QC Data Report - Matrix Spike Recoveries
Organochlorine Pesticides by GC/ECD
EPA Methods 3510/8081A
µg/L(ppb)

Sample Name: **Lab Code:**	Batch QC 175-1	Spike Level (µg/kg)	Matrix Spike (MS)	Percent Recovery (MS)	Matrix Spike Duplicate (MSD)	Percent Recovery (MSD)	Control Limits	Relative Percent Difference (RPD)
gamma-BHC	<0.04	1.0	1.0	100	0.8	80	70%-130%	22
Heptachlor	<0.04	1.0	1.0	100	0.8	80	70%-130%	22
Aldrin	<0.04	1.0	0.9	90	0.8	80	70%-130%	12
Dieldrin	<0.04	2.5	2.6	104	2.3	92	70%-130%	12
Endrin	<0.04	2.5	2.6	104	2.3	92	70%-130%	12
4,4'-DDT	<0.04	2.5	2.4	96	2.2	88	70%-130%	9
Sample Date:	03/15/00	~	03/15/00	~	03/15/00		~	~
Extraction Date:	03/20/00	~	03/20/00	~	03/20/00		~	~
Analysis Date:	04/05/00	~	04/05/00	~	04/05/00		~	~
Surrogate Recovery:								**Control Limits**
2,4,5,6-Tetrachloro-m-xylene:	62%	~	70%	~	64%		~	50%-118%
Decachlorobiphenyl:	26%(a)	~	26%(a)	~	25%(a)		~	83%-124%

Spike Source: 99-06-32-1

(a) Outside of acceptance limits due to matrix effects. An unbreakable emulsion formed during sample preparation.

Dan Hines
Signature of Chemist

QA/QC Review

AGRA
ENGINEERING GLOBAL SOLUTIONS

3/14/00 [redacted] S Gonzalez [redacted] 93884

Analyze same as yesterday list (93886)
No Rush on ~~Ans~~ Nitrates (H.T. Issue only)
Yes - Sample for Sulfide is pres. correctly
Yes - SVL to filter for ND Metals Run

4863

AGRA
ENGINEERING GLOBAL SOLUTIONS
7477 SW Tech Center Drive
Portland, Oregon, U.S.A. 97223-8025
Tel (503)639-3400 Fax (503) 620-7892

CHAIN OF CUSTODY

PROJECT: Rio Salado	PROJECT No.: 0-117-001007
REPORT TO: Sean Gormley	PHONE No.: (503) 639-3400
PROJECT MANGER: Larry Hansen	~~PHONE No.~~ fax 503-620-7892
SAMPLER'S NAME (please print): Tiffany Loof	PHONE No.:
SAMPLER'S SIGNATURE:	

ANALYSIS REQUESTED (circle, check box or write preferred method in box)

SAMPLE I.D.	DATE	TIME	MATRIX	PRESERVATIVE	CONTAINERS No.	CONTAINERS VOL.	BTEX by EPA 602 / 8021	TPH-G	BTEX / TPH-G	TPH-HCID	TPH-D / TPH-D EXTENDED	TPH by EPA 8015 MODIFIED / 8015B	TPH-418.1 MODIFIED	TPH by EPA 418.1	GC / MS EPA 624 / EPA 8260 Volatiles	GC / MS EPA 625 / 8270 Semi-volatiles	VOCS EPA 601 / 602 or EPA 8021	PCBs EPA 608 / 8081 / 8082	LEAD EPA 6010 / EPA 7421 Total / Dissolved	TOTAL METALS	TCLP	See attached list for analytical			
1 B-2-GW	3/14/00	17:30	W	~~[redacted]~~ 1L poly 500ml poly	4																				
2.																									
3.																									
4																									
5.																									
6.																									
7.																									
8.																									
9.																									
10.																									

SAMPLE RECEIPT	LABORATORY	TURNAROUND TIME	QC Reporting Requirements (Add'l charges may apply)	COMMENTS / INSTRUCTIONS
TOTAL # CONTAINERS	SHIPPING I.D. / AIRBILL #	☐ 8 HOUR	☐ LEVEL I	
CONDITION OF CONTAINERS	CARRIER	☐ 24 HOUR	☒ LEVEL II	*
CONDITION OF SEALS	DOT DESIGNATION	☐ 1 WEEK	☐ LEVEL II w/project specific Duplicates/Spikes	Rush Nitrates
		☒ 2 WEEK (standard) *	☐ Level III (Full validation package)	
		☐ OTHER		

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
1. [signature] / TEE/AGX	3/15/00	16:50	1. [signature]	3/16	10:00
2.			2.		
			3.		

PAGE 1 OF 1

AGRA Earth & Environmental, Inc. (10/97)

AZ000170

AGRA
ENGINEERING GLOBAL SOLUTIONS
7477 SW Tech Center Drive
Portland, Oregon, U.S.A. 97223-8025
Tel (503)639-3400 Fax (503) 620-7892

4755

CHAIN OF CUSTODY

PROJECT	PROJECT No.
RIO SALADO	0-117-001007
REPORT TO: TIFFANY LOOFF	PHONE No. (602) 272-6848
PROJECT MANGER: LARRY HANSEN	PHONE No.
SAMPLER'S NAME (please print): TIFFANY LOOFF	PHONE No.
SAMPLER'S SIGNATURE: Tiffany O. Looff	

ANALYSIS REQUESTED (circle, check box or write preferred method in box)

	SAMPLE I.D.	DATE	TIME	MATRIX	PRESERVATIVE	CONTAINERS No.	CONTAINERS VOL.	~~BTEX by EPA 602 / 8021~~	~~TPHG~~ CaCO3 (130.2)	TDS (EPA 160.1)	~~BTEX / TPHG~~	HARDNESS (EPA 200.7)	~~TPH HGID~~	SULFIDE (180.1)	~~TPH-D / TPH-D EXTENDED~~	pH (150.1)	TPH by EPA 8015 MODIFIED / 8015B	TPH-418.1 MODIFIED	TPH by EPA 418.1	~~GC/MS EPA 624 / EPA 8260~~ Biaties	~~GC / MS EPA 625 / 8270 Semi-volatiles~~	VOCS EPA 601 / 602 or EPA 8021	~~PCBs EPA 608 / 8081~~	LEAD EPA 6010 / EPA 7421 Total / Dissolved	TOTAL METALS	TCLP	DISSOLVED METALS	[redacted]	SULFATE, SULFIDES, NITRATES, CHLORIDES
1	B-2-GW	3/14/00	17:30	GW	VARIOUS	13			X	X		X		X		X				X	X		X		X		X	X	X
2.																													
3.																													
4.																													
5.																													
6.																													
7.																													
8.																													
9.																													
10.																													

SAMPLE RECEIPT: See SDF	LABORATORY: See SRDF	TURNAROUND TIME	QC Reporting Requirements (Add'l charges may apply)	COMMENTS / INSTRUCTIONS
TOTAL # CONTAINERS	SHIPPING I.D. / AIRBILL #	☐ 8 HOUR	☐ LEVEL I	METALS: AG, AS, AL, BA, BE, CA, CD, CO, CR, CU, FE, Hg, K, Mg, MN, Na, Ni, Pb, Sb, Se, TL, V, ZN
CONDITION OF CONTAINERS	CARRIER	☐ 24 HOUR	☐ LEVEL II	
CONDITION OF SEALS	DOT DESIGNATION	☐ 1 WEEK	☐ LEVEL II w/project specific Duplicates/Spikes	
		☐ 2 WEEK (standard)	☐ Level III (Full validation package)	
		☐ OTHER ____		

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
1. Tiffany O. Looff / AGRA	3/14/00	18:30	1.		
2.			2.		
3.			3. [signature] / AEE/PDX AZ000170	3/15/00	12:50

RUSH! NITRATES

FILTER DISSOLVED METALS

PAGE 1 OF 1

Appendix A

Subcontracted Data

SVL ANALYTICAL, INC.
One Government Gulch ■ P.O. Box 929 ■ Kellogg, Idaho 83837-0929 ■ Phone: (208)784-1258 ■ Fax: (208)783-0891

REPORT OF ANALYTICAL RESULTS

Client: Agra Earth & Environmental

Job No: 93891
Report Date: 3/23/00

Sample ID: B-2-GW
Collected: 3/14/00 17:30 By:
Matrix: WATER

SVL Sample: 229027 | 229028
Received: 3/16/00

PHYSICAL PROPERTIES	TOTAL	DISSOLVED
pH	7.78	
TDS, mg/L	549	
TSS, mg/L		
Conductivity		

NONMETALS (mg/L)	TOTAL	DISSOLVED
Alkalinity as CaCO3	168	
Bicarbonate	168	
Carbonate	<1.0	
Hydroxide		
Chloride	176	
Fluoride		
Nitrate-N	2.66	
Orthophosphate		
Sulfate	94.9	

METALS (mg/L)	TOTAL	DISSOLVED
Aluminum	103	0.049
Antimony	<0.032	<0.032
Arsenic	<0.04	<0.04
Barium	0.842	0.063
Beryllium	0.003	<0.002
Bismuth		
Boron		
Cadmium	0.0025	<0.0024
Calcium	80.5	57.7

METALS (cont'd)	TOTAL	DISSOLVED
Chromium	0.129	<0.005
Cobalt	0.056	0.006
Copper	0.283	<0.003
Gallium		
Iron	75.8	0.04
Lanthanum		
Lead	<0.04	<0.04
Lithium		
Magnesium	53.1	24.0
Manganese	6.35	0.306
Mercury	0.0003	<0.0002
Molybdenum		
Nickel	0.187	<0.023
Phosphorus		
Potassium	16.2	5.4
Scandium		
Selenium	0.14	<0.04
Silica		
Silver	0.007	<0.006
Sodium	104	114
Strontium		
Thallium	<0.1	<0.1
Tin		
Titanium		
Vanadium	0.139	<0.005
Zinc	0.162	<0.003

ADDITIONAL TESTS	TOTAL	DISSOLVED
Hardness	420	
Sulfide	<0.5	

	TOTAL	DISSOLVED
Nitrite-N	<0.25*	

*Elevated detection limit due to matrix interference.

This report has been checked and is certified to be accurate.

Signed: Kirby Gray Date: 3/23/00
3/23/00 11:48

SVL ANALYTICAL, INC. Quality Control Report

Part I Prep Blank and Laboratory Control Sample

Client :Agra Earth & Environmental SVL JOB No. :93891

Analyte	Method	Matrix	Units	Prep Blank	True—LCS—Found		LCS %R	Analysis Date
Silver	200.7	WATER	mg/L	<0.006	1.00	0.965	96.5	3/22/00
Aluminum	200.7	WATER	mg/L	<0.024	1.00	0.933	93.3	3/22/00
Arsenic	200.7	WATER	mg/L	<0.04	1.00	0.93	93.0	3/22/00
Barium	200.7	WATER	mg/L	<0.002	1.00	0.952	95.2	3/22/00
Beryllium	200.7	WATER	mg/L	<0.002	1.00	0.929	92.9	3/22/00
Calcium	200.7	WATER	mg/L	<0.013	20.0	18.9	94.5	3/22/00
Cadmium	200.7	WATER	mg/L	<0.0024	1.00	0.928	92.8	3/22/00
Cobalt	200.7	WATER	mg/L	<0.005	1.00	0.966	96.6	3/22/00
Chromium	200.7	WATER	mg/L	<0.005	1.00	0.945	94.5	3/22/00
Copper	200.7	WATER	mg/L	<0.003	1.00	0.940	94.0	3/22/00
Iron	200.7	WATER	mg/L	<0.02	10.0	9.79	97.9	3/22/00
Hardness	200.7	WATER	mg/L	<0.18	132	123	93.2	3/22/00
Potassium	200.7	WATER	mg/L	<1.7	30.0	26.7	89.0	3/22/00
Magnesium	200.7	WATER	mg/L	<0.035	20.0	18.5	92.5	3/22/00
Manganese	200.7	WATER	mg/L	<0.002	1.00	0.954	95.4	3/22/00
Sodium	200.7	WATER	mg/L	<0.088	20.0	18.1	90.5	3/22/00
Nickel	200.7	WATER	mg/L	<0.023	1.00	0.901	90.1	3/22/00
Lead	200.7	WATER	mg/L	<0.04	1.00	0.90	90.0	3/22/00
Antimony	200.7	WATER	mg/L	<0.032	1.00	0.950	95.0	3/22/00
Selenium	200.7	WATER	mg/L	<0.04	1.00	0.96	96.0	3/22/00
Thallium	200.7	WATER	mg/L	<0.1	1.0	0.9	90.0	3/22/00
Vanadium	200.7	WATER	mg/L	<0.005	1.00	0.969	96.9	3/22/00
Zinc	200.7	WATER	mg/L	<0.003	1.00	0.945	94.5	3/22/00
Mercury	245.1	WATER	mg/L	<0.0002	0.0050	0.0052	104.0	3/21/00
Chloride	300.0	WATER	mg/L	<0.2	54.2	54.8	101.1	3/16/00
Nitrite-N	300.0	WATER	mg/L	<0.05	3.65	3.69	101.1	3/16/00
Nitrate-N	300.0	WATER	mg/L	<0.05	19.4	19.2	99.0	3/16/00
Sulfate, SO4	300.0	WATER	mg/L	<0.3	5.1	5.2	102.0	3/16/00
Alkalinity,CaCO3	310.1	WATER	mg/L	<1.0	40.9	43.7	106.8	3/20/00
CO3, CaCO3	310.1	WATER	mg/L		N/A		N/A	/ /
HCO3, CaCO3	310.1	WATER	mg/L		N/A		N/A	/ /
pH	150.1	WATER		4.55	9.07	8.65	95.4	3/20/00
Sulfide	376.1	WATER	mg/L		N/A		N/A	3/17/00
TDS	160.1	WATER	mg/L	<10	231	220	95.2	3/16/00

LEGEND:

LCS = Laboratory Control Sample LCS %R = LCS Percent Recovery N/A = Not Applicable

SVL ANALYTICAL, INC.

Quality Control Report

Part II Duplicate and Spike Analysis

Client :Agra Earth & Environmental

SVL JOB No :93891

Test	Method	Matrix	QC SAMPLE ID Units	Result	Duplicate Result	RPD%	Matrix Spike Result	SPK ADD		%R	Test Date
Ag	200.7	WATER	1 mg/L	0.007	0.007	0.0	0.949	1.00		94.2	3/22/00
[redacted]	200.7	WATER	2 mg/L	<0.006	<0.006	UDL	0.961	1.00	A	96.1	3/22/00
[redacted]	200.7	WATER	1 mg/L	103	103	0.0	139	1.00		R >4S	3/22/00
Al	200.7	WATER	2 mg/L	0.049	<0.024	200.0	0.943	1.00		89.4	3/22/00
[redacted]	200.7	WATER	1 mg/L	<0.04	<0.04	UDL	0.95	1.00		95.0	3/22/00
[redacted]	200.7	WATER	2 mg/L	<0.04	<0.04	UDL	0.97	1.00		97.0	3/22/00
Ba	200.7	WATER	1 mg/L	0.842	0.833	1.1	1.79	1.00		94.8	3/22/00
Ba	200.7	WATER	2 mg/L	0.063	0.062	1.6	0.986	1.00		92.3	3/22/00
[redacted]	200.7	WATER	1 mg/L	0.003	0.003	0.0	0.900	1.00		89.7	3/22/00
[redacted]	200.7	WATER	2 mg/L	<0.002	<0.002	UDL	0.910	1.00		91.0	3/22/00
Ca	200.7	WATER	1 mg/L	80.5	80.5	0.0	98.0	20.0		87.5	3/22/00
[redacted]	200.7	WATER	2 mg/L	57.7	57.0	1.2	73.2	20.0	A	77.5	3/22/00
[redacted]	200.7	WATER	1 mg/L	0.0025	0.0033	27.6	0.903	1.00		90.1	3/22/00
Cd	200.7	WATER	2 mg/L	<0.0024	<0.0024	UDL	0.981	1.00		98.1	3/22/00
Co	200.7	WATER	1 mg/L	0.056	0.054	3.6	0.969	1.00		91.3	3/22/00
[redacted]	200.7	WATER	2 mg/L	0.006	0.006	0.0	0.962	1.00		95.6	3/22/00
[redacted]	200.7	WATER	1 mg/L	0.129	0.131	1.5	1.05	1.00		92.1	3/22/00
Cr	200.7	WATER	2 mg/L	<0.005	<0.005	UDL	0.946	1.00		94.6	3/22/00
[redacted]	200.7	WATER	1 mg/L	0.283	0.280	1.1	1.28	1.00		99.7	3/22/00
[redacted]	200.7	WATER	2 mg/L	<0.003	<0.003	UDL	0.944	1.00		94.4	3/22/00
Fe	200.7	WATER	1 mg/L	75.8	75.1	0.9	87.7	10.0		119.0	3/22/00
Fe	200.7	WATER	2 mg/L	0.04	<0.02	200.0	9.75	10.0		97.1	3/22/00
[redacted]ns	200.7	WATER	1 mg/L	420	420	0.0	561	132		106.8	3/22/00
K	200.7	WATER	1 mg/L	16.2	16.1	0.6	43.6	30.0		91.3	3/22/00
K	200.7	WATER	2 mg/L	5.4	5.8	7.1	32.6	30.0		90.7	3/22/00
[redacted]	200.7	WATER	1 mg/L	53.1	53.1	0.0	76.8	20.0		118.5	3/22/00
[redacted]	200.7	WATER	2 mg/L	24.0	23.7	1.3	39.7	20.0		78.5	3/22/00
Mn	200.7	WATER	1 mg/L	6.35	6.17	2.9	7.00	1.00		R >4S	3/22/00
[redacted]	200.7	WATER	2 mg/L	0.306	0.301	1.6	1.21	1.00		90.4	3/22/00
[redacted]	200.7	WATER	1 mg/L	104	107	2.8	119	20.0		75.0	3/22/00
Na	200.7	WATER	2 mg/L	114	115	0.9	115	20.0		R >4S	3/22/00
Ni	200.7	WATER	1 mg/L	0.187	0.199	6.2	1.08	1.00		89.3	3/22/00
[redacted]	200.7	WATER	2 mg/L	<0.023	0.028	200.0	0.944	1.00		94.4	3/22/00
[redacted]	200.7	WATER	1 mg/L	<0.04	<0.04	UDL	0.88	1.00		88.0	3/22/00
Pb	200.7	WATER	2 mg/L	<0.04	<0.04	UDL	0.94	1.00		94.0	3/22/00
[redacted]	200.7	WATER	1 mg/L	<0.032	<0.032	UDL	0.906	1.00	A	90.6	3/22/00
[redacted]	200.7	WATER	2 mg/L	<0.032	<0.032	UDL	0.922	1.00		92.2	3/22/00
Se	200.7	WATER	1 mg/L	0.14	0.12	15.4	1.02	1.00		88.0	3/22/00
Se	200.7	WATER	2 mg/L	<0.04	<0.04	UDL	0.92	1.00		92.0	3/22/00
[redacted]	200.7	WATER	1 mg/L	<0.1	<0.1	UDL	0.8	1.00	A	80.0	3/22/00
Tl	200.7	WATER	2 mg/L	<0.1	<0.1	UDL	0.8	1.00		80.0	3/22/00
V	200.7	WATER	1 mg/L	0.139	0.134	3.7	1.07	1.00		93.1	3/22/00
[redacted]	200.7	WATER	2 mg/L	<0.005	<0.005	UDL	0.961	1.00		96.1	3/22/00
[redacted]	200.7	WATER	1 mg/L	0.162	0.161	0.6	1.09	1.00		92.8	3/22/00

LEGEND:

[redacted]D% = (|SAM - DUP|/((SAM + DUP)/2) * 100) M in Duplicate indicates MSD. UDL = Both SAM & DUP not detected.

SPIKE ADD column, A = Post Digest Spike; %R = Percent Recovery N/A = Not Analyzed; R > 4S = Result more than 4X the Spike Added

QC Sample 1: SVL SAM No.: 229027 Client Sample ID: B-2-GW ^T

[redacted]C Sample 2: SVL SAM No.: 229028 Client Sample ID: B-2-GW ^D

[redacted]

3/23/00 11:49

SVL ANALYTICAL, INC. Quality Control Report

Part II Duplicate and Spike Analysis

Client :Agra Earth & Environmental SVL JOB No :93891

Test	Method	Matrix	QC SAMPLE ID Units	Result	Duplicate Result	RPD%	Matrix Spike Result	SPK ADD	%R	Test Date
Zn	200.7	WATER	2 mg/L	<0.003	<0.003	UDL	0.995	1.00	99.5	3/22/00
B	245.1	WATER	1 mg/L	0.0003	0.0003	0.0	0.0013	0.0010	100.0	3/21/00
B	245.1	WATER	2 mg/L	<0.0002	<0.0002	UDL	0.0012	0.0010	120.0	3/21/00
Cl	300.0	WATER	1 mg/L	176	180	2.2	228	50.0	104.0	3/16/00
NO2-N	300.0	WATER	1 mg/L	<0.25*	<0.25*	UDL	10.3	10.0	103.0	3/16/00
NO3-N	300.0	WATER	1 mg/L	2.66	2.67	0.4	4.58	2.00	96.0	3/16/00
SO4	300.0	WATER	1 mg/L	94.9	95.4	0.5	147	50.0	104.2	3/16/00
ALK	310.1	WATER	1 mg/L	168	170	1.2	N/A	N/A	N/A	3/20/00
CO3	310.1	WATER	1 mg/L	<1.0	<1.0	UDL	N/A	N/A	N/A	3/20/00
HCO3	310.1	WATER	1 mg/L	168	170	1.2	N/A	N/A	N/A	3/20/00
pH	150.1	WATER	1	7.78	7.74	0.5	N/A	N/A	N/A	3/20/00
TDS	160.1	WATER	1 mg/L	549	560	2.0	N/A	N/A	N/A	3/16/00

LEGEND:

RPD% = (|SAM - DUP|/((SAM + DUP)/2) * 100) M in Duplicate indicates MSD. UDL = Both SAM & DUP not detected.

SPIKE ADD column, A = Post Digest Spike; %R = Percent Recovery N/A = Not Analyzed; R > 4S = Result more than 4X the Spike Added

QC Sample 1: SVL SAM No.: 229027 Client Sample ID: B-2-GW ^T

QC Sample 2: SVL SAM No.: 229028 Client Sample ID: B-2-GW ^D

AGRA
ENGINEERING GLOBAL SOLUTIONS
7477 SW Tech Center Drive
Portland, Oregon, U.S.A. 97223-8025
Tel (503)639-3400 Fax (503) 620-7892

4863

CHAIN OF CUSTODY

PROJECT: RIO Salado
PROJECT No.: 0-117-001007
REPORT TO: Sean Gormley
PHONE No.: (503) 639-3400
PROJECT MANGER: Larry Hansen
PHONE No.: fax 503-620-7892
SAMPLER'S NAME (please print): Tiffany Loof
PHONE No.:
SAMPLER'S SIGNATURE:

ANALYSIS REQUESTED (circle, check box or write preferred method in box)

SAMPLE I.D	DATE	TIME	MATRIX	PRESERVATIVE	CONTAINERS No.	CONTAINERS VOL.	BTEX by EPA 602 / 8021	TPH-G	BTEX / TPH-G	TPH-HCID	TPH-D / TPH-D EXTENDED	TPH by EPA 8015 MODIFIED / 8015B	TPH-418.1 MODIFIED	TPH by EPA 418.1	GC / MS EPA 624 / EPA 8260 Volatiles	GC / MS EPA 625 / 8270 Semi-volatiles	VOCS EPA 601 / 602 or EPA 8021	PCBs EPA 608 / 8081 / 8082	LEAD EPA 6010 / EPA 7421 Total / Dissolved	TOTAL METALS	TCLP	See attached list for analytical		
1 B-2-GW	3/14/00	17:30	W	1L poly 500ml poly	4																			
2																								
3																								
4																								
5																								
6																								
7																								
8																								
9																								
10																								

SAMPLE RECEIPT	LABORATORY	TURNAROUND TIME	QC Reporting Requirements (Add'l charges may apply)	COMMENTS / INSTRUCTIONS
TOTAL # CONTAINERS	SHIPPING I.D / AIRBILL #	☐ 8 HOUR	☐ LEVEL I	*
CONDITION OF CONTAINERS	CARRIER	☐ 24 HOUR	☒ LEVEL II	Rush
CONDITION OF SEALS	DOT DESIGNATION	☐ 1 WEEK	☐ LEVEL II w/project specific Duplicates/Spikes	Nitrates
		☒ 2 WEEK (standard) *	☐ Level III (Full validation package)	
		☐ OTHER		

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
1 [signature] / AEE/AGX	3/15/00	16:00	1.		
2			2.		
3			3.		

PAGE 1 OF 1

AGRA Earth & Environmental, Inc. (10/97)

AZ000170

Project: Rio Salado
Project No.: 0-117-001007
Project Manager: Larry Hansen
Sample Matrix: Water

Service Request No.: AZ000175
Report Date: 03/21/00
Report No.: 00017501
C.O.C. No.: 4756

Volatile Organic Compounds by GC/MSD
EPA Methods 5030B/8260B
µg/L(ppb)

Sample Name:	B-3-GW	B-4-GW	TB-1	Lab Blank	**Reporting**
Lab Code:	175-1	175-2	175-3	175-MB	**Limit**
Dichlorodifluoromethane	ND	ND	ND	ND	1.0
Chloromethane	ND	ND	ND	ND	5.0
Vinyl Chloride	ND	ND	ND	ND	1.0
Bromomethane	ND	ND	ND	ND	1.0
Chloroethane	ND	ND	ND	ND	1.0
Trichlorofluoromethane	ND	ND	ND	ND	1.0
1,1-Dichloroethene	ND	ND	ND	ND	1.0
Acetone	ND	ND	ND	ND	20
Carbon Disulfide	ND	ND	ND	ND	1.0
Methylene Chloride	ND	ND	ND	ND	5.0
trans-1,2-Dichloroethene	ND	ND	ND	ND	1.0
MTBE	ND	ND	ND	ND	1.0
1,1-Dichloroethane	ND	ND	ND	ND	1.0
2,2-Dichloropropane	ND	ND	ND	ND	1.0
cis-1,2-Dichloroethene	ND	ND	ND	ND	1.0
2-Butanone(MEK)	ND	ND	ND	ND	10
Bromochloromethane	ND	ND	ND	ND	1.0
Chloroform	ND	ND	ND	ND	1.0
1,1,1-Trichloroethane	ND	ND	ND	ND	1.0
Carbon Tetrachloride	ND	ND	ND	ND	1.0
1,1-Dichloropropene	ND	ND	ND	ND	1.0
Benzene	ND	ND	ND	ND	1.0
1,2-Dichloroethane	ND	ND	ND	ND	1.0
Trichloroethene	ND	ND	ND	ND	1.0
1,2-Dichloropropane	ND	ND	ND	ND	1.0
Dibromomethane	ND	ND	ND	ND	1.0
Bromodichloromethane	ND	ND	ND	ND	1.0
cis-1,3-Dichloropropene	ND	ND	ND	ND	1.0
4-Methyl-2-Pentanone(MIBK)	ND	ND	ND	ND	10
Toluene	ND	ND	ND	ND	1.0
trans-1,3-Dichloropropene	ND	ND	ND	ND	1.0
1,1,2-Trichloroethane	ND	ND	ND	ND	1.0
Tetrachloroethene	ND	ND	ND	ND	1.0
2-Hexanone	ND	ND	ND	ND	10
1,3-Dichloropropane	ND	ND	ND	ND	1.0
Dibromochloromethane	ND	ND	ND	ND	1.0
1,2-Dibromoethane	ND	ND	ND	ND	1.0
Chlorobenzene	ND	ND	ND	ND	1.0
1,1,1,2-Tetrachloroethane	ND	ND	ND	ND	1.0
Ethylbenzene	ND	ND	ND	ND	1.0
m,p-Xylene	ND	ND	ND	ND	2.0
o-Xylene	ND	ND	ND	ND	1.0
Styrene	ND	ND	ND	ND	1.0

ND Not Detected

AGRA
ENGINEERING GLOBAL SOLUTIONS

Project: Rio Salado
Project No.: 0-117-001007
Project Manager: Larry Hansen
Sample Matrix: Water

Service Request No.: AZ000175
Report Date: 03/21/00
Report No.: 00017501b
C.O.C. No.: 4756

Volatile Organic Compounds by GC/MSD
EPA Methods 5030B/8260B
µg/L(ppb)

Sample Name:	B-3-GW	B-4-GW	TB-1	Lab Blank	**Reporting**
Lab Code:	175-1	175-2	175-3	175-MB	**Limit**
Bromoform	ND	ND	ND	ND	5.0
Isopropylbenzene	ND	ND	ND	ND	1.0
Bromobenzene	ND	ND	ND	ND	1.0
1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	1.0
1,2,3-Trichloropropane	ND	ND	ND	ND	1.0
n-Propylbenzene	ND	ND	ND	ND	1.0
2-Chlorotoluene	ND	ND	ND	ND	1.0
4-Chlorotoluene	ND	ND	ND	ND	1.0
1,3,5-Trimethylbenzene	ND	ND	ND	ND	1.0
tert-Butylbenzene	ND	ND	ND	ND	1.0
1,2,4-Trimethylbenzene	ND	ND	ND	ND	1.0
sec-Butylbenzene	ND	ND	ND	ND	1.0
1,3-Dichlorobenzene	ND	ND	ND	ND	1.0
4-Isopropyltoluene	ND	ND	ND	ND	1.0
1,4-Dichlorobenzene	ND	ND	ND	ND	1.0
1,2-Dichlorobenzene	ND	ND	ND	ND	1.0
n-Butylbenzene	ND	ND	ND	ND	5.0
,2-Dibromo-3-Chloropropane	ND	ND	ND	ND	5.0
1,2,4-Trichlorobenzene	ND	ND	ND	ND	25
Hexachlorobutadiene	ND	ND	ND	ND	25
Naphthalene	ND	ND	ND	ND	25
1,2,3-Trichlorobenzene	ND	ND	ND	ND	25
Vinyl Acetate	ND	ND	ND	ND	1.0
2-Chloroethylvinyl Ether	ND	ND	ND	ND	1.0
Sample Date:	03/15/00	03/15/00	03/15/00	03/20/00	
Analysis Date:	03/20/00	03/20/00	03/20/00	03/20/00	
Surrogate Recoveries:					**Control Limits**
Dibromofluoromethane:	109%	107%	107%	111%	81%-115%
Toluene-d_8:	98%	97%	97%	98%	88%-106%
4-Bromofluorobenzene:	108%	107%	104%	106%	88%-111%

ND Not Detected

Signature of Chemist

QA/QC Review

AGRA
ENGINEERING GLOBAL SOLUTIONS

Project: Rio Salado
Project No.: 0-117-001007
Project Manager: Larry Hansen
Sample Matrix: Water

Service Request No.: AZ000175
Report Date: 03/21/00
Report No.: 00017502
C.O.C. No.: 4756

QC Data Report
MS/MSD Summary
Volatile Organic Compounds by GC/MSD
EPA Methods 5030B/8260B
µg/L(ppb)

Sample Name: **Lab Code:**	Batch QC 147-1	Spike Level (µg/L)	Matrix Spike	Percent Recovery (MS)	Matrix Spike Duplicate	Percent Recovery (MSD)	% Recovery Control Criteria	Relative Percent Difference (RPD)
1,1 - Dichloroethene	<1.0	50.0	59.5	119	58.3	117	84% - 136%	2
Benzene	<1.0	50.0	51.0	102	51.4	103	92% - 112%	<1
Trichloroethene	8.34	50.0	57.4	98	58.8	101	86% - 116%	2
Toluene	<1.0	50.0	49.4	99	49.1	98	79% - 116%	<1
Chlorobenzene	<1.0	50.0	50.8	102	51.3	103	90% - 111%	<1
Sample Date:	03/08/00	~	03/08/00	~	03/08/00	~		
Analysis Date:	03/20/00	~	03/20/00	~	03/20/00	~		
Surrogate Recovery:							**Control Limits**	
Dibromofluoromethane:	110%	~	108%	~	105%	~	81%-115%	
Toluene-d_8:	97%	~	97%	~	97%	~	88%-106%	
4-Bromofluorobenzene:	105%	~	107%	~	107%	~	88%-111%	

ND Not Detected
Spike Source: Ultra Scientific, CLP-100N, Lot M-1791.

Signature of Chemist

QA/QC Review

AGRA
ENGINEERING GLOBAL SOLUTIONS

Project: Rio Salado
Project No.: 0-117-001007
Project Manager: Larry Hansen
Sample Matrix: Water

Service Request No.: AZ000175
Report Date: 04/10/00
Report No.: 00017510
C.O.C. No.: 4756

Semivolatile Organic Compounds by GC/MSD
EPA Methods 3510C/8270C
µg/L(ppb)

Sample Name:	B-3-GW	B-4-GW	Lab Blank	Lab Blank	**Reporting**
Lab Code:	175-1	175-2	175-MB1	175-MB2	**Limit**
Pyridine	ND	ND	ND	ND	25
N-Nitrosodimethylamine	ND	ND	ND	ND	25
Aniline	ND	ND	ND	ND	25
Phenol	ND	ND	ND	ND	10
Bis(2-chloroethyl) Ether	ND	ND	ND	ND	10
2-Chlorophenol	ND	ND	ND	ND	10
1,3-Dichlorobenzene	ND	ND	ND	ND	10
1,4-Dichlorobenzene	ND	ND	ND	ND	10
Benzyl Alcohol	ND	ND	ND	ND	10
1,2-Dichlorobenzene	ND	ND	ND	ND	10
2-Methylphenol	ND	ND	ND	ND	10
Bis(2-chloroisopropyl) Ether	ND	ND	ND	ND	10
3- and 4- Methylphenol*	ND	18	ND	ND	10
N-Nitrosodi-n-propylamine	ND	ND	ND	ND	10
Hexachloroethane	ND	ND	ND	ND	10
Nitrobenzene	ND	ND	ND	ND	10
Isophorone	ND	ND	ND	ND	10
2-Nitrophenol	ND	ND	ND	ND	10
2,4-Dimethylphenol	ND	ND	ND	ND	10
Bis(2-chloroethoxy) methane	ND	ND	ND	ND	10
Benzoic Acid	ND	ND	ND	ND	50
2,4-Dichlorophenol	ND	ND	ND	ND	10
1,2,4-Trichlorobenzene	ND	ND	ND	ND	10
Naphthalene	ND	ND	ND	ND	10
4-Chloroaniline	ND	ND	ND	ND	10
2,6-Dichlorophenol	ND	ND	ND	ND	10
Hexachlorobutadiene	ND	ND	ND	ND	10
4-Chloro-3-methylphenol	ND	ND	ND	ND	10
2-Methylnaphthalene	ND	ND	ND	ND	10
1-Methylnaphthalene	ND	ND	ND	ND	10
Hexachlorocyclopentadiene	ND	ND	ND	ND	10
2,4,6-Trichlorophenol	ND	ND	ND	ND	10
2,4,5-Trichlorophenol	ND	ND	ND	ND	10
2-Chloronaphthalene	ND	ND	ND	ND	10
2-Nitroaniline	ND	ND	ND	ND	10
Dimethyl Phthalate	ND	ND	ND	ND	10
Acenaphthylene	ND	ND	ND	ND	10
2,6-Dinitrotoluene	ND	ND	ND	ND	10
3-Nitroaniline	ND	ND	ND	ND	10

ND Not Detected
* Quantified as 4-Methylphenol

AGRA
ENGINEERING GLOBAL SOLUTIONS

Project: Rio Salado
Project No.: 0-117-001007
Project Manager: Larry Hansen
Sample Matrix: Water

Service Request No.: AZ000175
Report Date: 04/10/00
Report No.: 00017510b
C.O.C. No.: 4756

Semivolatile Organic Compounds by GC/MSD
EPA Methods 3510C/8270C
µg/L(ppb)

Sample Name:	B-3-GW	B-4-GW	Lab Blank	Lab Blank	**Reporting**
Lab Code:	175-1	175-2	175-MB1	175-MB2	**Limit**
Acenaphthene	ND	ND	ND	ND	10
2,4-Dinitrophenol	ND	ND	ND	ND	25
4-Nitrophenol	ND	ND	ND	ND	25
Dibenzofuran	ND	ND	ND	ND	10
2,4-Dinitrotoluene	ND	ND	ND	ND	10
2,3,4,6-Tetrachlorophenol	ND	ND	ND	ND	10
Diethyl Phthalate	ND	ND	ND	ND	10
Fluorene	ND	ND	ND	ND	10
4-Chlorophenyl Phenyl Ether	ND	ND	ND	ND	10
4-Nitroaniline	ND	ND	ND	ND	10
Azobenzene	ND	ND	ND	ND	10
2-Methyl-4,6-dinitrophenol	ND	ND	ND	ND	25
N-Nitrosodiphenylamine	ND	ND	ND	ND	10
4-Bromophenyl Phenyl Ether	ND	ND	ND	ND	10
Hexachlorobenzene	ND	ND	ND	ND	10
Pentachlorophenol (PCP)	ND	ND	ND	ND	25
Phenanthrene	ND	ND	ND	ND	10
Anthracene	ND	ND	ND	ND	10
Carbazole	ND	ND	ND	ND	10
Di-n-butyl Phthalate	ND	ND	ND	ND	10
Fluoranthene	ND	ND	ND	ND	10
Benzidine	ND	ND	ND	ND	50
Pyrene	ND	ND	ND	ND	10
Butyl Benzyl Phthalate	ND	ND	ND	ND	10
Benzo(a)anthracene	ND	ND	ND	ND	10
3,3'-Dichlorobenzidine	ND	ND	ND	ND	10
Chrysene	ND	ND	ND	ND	10
Bis(2-ethylhexyl) Phthalate	ND	ND	ND	ND	10
Di-n-octyl Phthalate	ND	ND	ND	ND	10
Benzo(b)fluoranthene	ND	ND	ND	ND	10
Benzo(k)fluoranthene	ND	ND	ND	ND	10
Benzo(a)pyrene	ND	ND	ND	ND	10
Indeno(1,2,3-c,d)pyrene	ND	ND	ND	ND	10
Dibenzo(a,h)anthracene	ND	ND	ND	ND	10
Benzo(g,h,i)perylene	ND	ND	ND	ND	10
Sample Date:	03/15/00	03/15/00	03/20/00	03/22/00	
Extraction Date:	03/20/00	03/22/00	03/20/00	03/22/00	
Analysis Date:	03/22/00	03/23/00	03/22/00	03/23/00	

ND Not Detected

AGRA
ENGINEERING GLOBAL SOLUTIONS

Project: Rio Salado
Project No.: 0-117-001007
Project Manager: Larry Hansen
Sample Matrix: Water

Service Request No.: AZ000175
Report Date: 04/10/00
Report No.: 00017510c
C.O.C. No.: 4756

Semivolatile Organic Compounds by GC/MSD
EPA Methods 3510C/8270C
µg/L(ppb)

Surrogate Recoveries:

Sample Name:	B-3-GW	B-4-GW	Lab Blank	Lab Blank	
Lab Code:	175-1	175-2	175-MB1	175-MB2	
Analysis Date:	03/22/00	03/23/00	03/22/00	03/23/00	**Control Limits**
2-Fluorophenol:	11%(a)	41%(a)	50%	48%	46%-77%
Phenol-d5:	7%(a)	29%(a)	33%(b)	33%(b)	55%-78%
Nitrobenzene-d5:	72%	75%	81%	79%	65%-92%
2-Fluorobiphenyl:	74%	77%	82%	84%	67%-110%
2,4,6-Tribromophenol:	36%(a)	67%	71%	66%	54%-105%
p-Terphenyl-d14:	89%	73%(a)	107%	79%(b)	80%-121%

(a) Outside of acceptance limits due to matrix effects. An unbreakable emulsion formed during sample preparation.
(b) Outside of acceptance limits. USEPA Method 8270 allows one surrogate from each fraction to be outside acceptance limits without affecting acceptability of the data.

Signature of Chemist

QA/QC Review

AGRA
ENGINEERING GLOBAL SOLUTIONS

Project: Rio Salado
Project No.: 0-117-001007
Project Manager: Larry Hansen
Sample Matrix: Water

Service Request No.: AZ000175
Report Date: 04/10/00
Report No.: 00017511
C.O.C.: 4756

QC Data Report
Blank Spike Summary
Semivolatile Organic Compounds by GC/MS
EPA Methods 3510C/8270C
µg/L(ppb)

Sample Name:	Lab Blank	Spike Level	Blank Spike	Percent Recovery	Blank Spike Duplicate	Percent Recovery	AEE % Recovery Acceptance Criteria	Relative Percent Difference
Lab Code:	175-MB1	(µg/L)		(BS)		(BSD)		(RPD)
Phenol	<10	80	37	46(a)	38	48(a)	56%-72%	3
2-Chlorophenol	<10	80	71	89(a)	70	88(a)	64%-81%	1
4-Chloro-3-methylphenol	<10	80	76	95	78	97	61%-97%	3
4-Nitrophenol	<25	80	26	32(a)	33	41(a)	42%-65%	24
Pentachlorophenol	<25	80	70	88	79	99	24%-109%	12
1,4-Dichlorobenzene	<10	40	31	78(a)	33	82(a)	61%-76%	6
N-Nitrosodi-n-propylamine	<10	40	37	92(a)	40	100(a)	63%-85%	8
1,2,4-Trichlorobenzene	<10	40	34	85(a)	36	90(a)	64%-84%	6
Acenaphthene	<10	40	37	92	40	100	75%-96%	8
2,4-Dinitrotoluene	<10	40	36	90	40	100	52%-107%	11
Pyrene	<10	40	40	100	43	108	93%-111%	7
Sample Date:	03/20/00	~	03/20/00	~	03/20/00	~	~	
Extraction Date:	03/20/00	~	03/20/00	~	03/20/00	~	~	
Analysis Date:	03/22/00	~	03/22/00	~	03/22/00	~	~	
Surrogate Recovery:							**Acceptance Limits**	
2-Fluorophenol:	50%	~	49%	~	49%	~	46%-77%	
Phenol-d5:	33%(b)	~	34%(b)	~	33%(b)	~	55%-78%	
Nitrobenzene-d5:	81%	~	80%	~	84%	~	65%-92%	
2-Fluorobiphenyl:	82%	~	78%	~	87%	~	67%-100%	
2,4,6-Tribromophenol:	71%	~	70%	~	74%	~	54%-105%	
p-Terphenyl-d14:	107%	~	100%	~	107%	~	80%-121%	

Spike Source: AEE 97-03-79-4

(a) Outside of AEE acceptance limits. Since the recovery is within USEPA method specified guidance limits, it is the opinion of the laboratory that usability of the data has not been adversely affected.

(b) Outside of acceptance limits. USEPA Method 8270 allows one surrogate from each fraction to be outside acceptance limits without affecting acceptability of the data.

Signature of Chemist

QA/QC Review

AGRA
ENGINEERING GLOBAL SOLUTIONS

Project: Rio Salado
Project No.: 0-117-001007
Project Manager: Larry Hansen
Sample Matrix: Water

Service Request No.: AZ000175
Report Date: 04/10/00
Report No.: 00017513
C.O.C.: 4756

QC Data Report
Blank Spike Summary
Semivolatile Organic Compounds by GC/MS
EPA Methods 3510C/8270C
µg/L(ppb)

Sample Name: **Lab Code:**	Lab Blank 175-MB2	Spike Level (µg/L)	Blank Spike	Percent Recovery (BS)	Blank Spike Duplicate	Percent Recovery (BSD)	AEE % Recovery Acceptance Criteria	Relative Percent Difference (RPD)
Phenol	<10	80	33	41(a)	39	49(a)	56%-72%	17
2-Chlorophenol	<10	80	63	79	73	91	64%-81%	15
4-Chloro-3-methylphenol	<10	80	71	89	77	96	61%-97%	8
4-Nitrophenol	<25	80	23	29(a)	28	35(a)	42%-65%	20
Pentachlorophenol	<25	80	48	60	54	68	24%-109%	12
1,4-Dichlorobenzene	<10	40	32	80	31	78	61%-76%	3
N-Nitrosodi-n-propylamine	<10	40	36	90(a)	39	98	63%-85%	8
1,2,4-Trichlorobenzene	<10	40	35	88(a)	34	85	64%-84%	3
Acenaphthene	<10	40	37	93	38	95	75%-96%	3
2,4-Dinitrotoluene	<10	40	31	78	33	82	52%-107%	6
Pyrene	<10	40	40	100	42	105	93%-111%	5
Sample Date:	03/22/00	~	03/22/00	~	03/22/00	~	~	
Extraction Date:	03/22/00	~	03/22/00	~	03/22/00	~	~	
Analysis Date:	03/23/00	~	03/23/00	~	03/23/00	~	~	
Surrogate Recovery:							**Acceptance Limits**	
2-Fluorophenol:	48%	~	45%(a)	~	54%	~	46%-77%	
Phenol-d5:	33%(b)	~	32%(a)	~	37%(b)	~	55%-78%	
Nitrobenzene-d5:	80%	~	79%	~	84%	~	65%-92%	
2-Fluorobiphenyl:	84%	~	81%	~	89%	~	67%-100%	
2,4,6-Tribromophenol:	66%	~	64%	~	73%	~	54%-105%	
p-Terphenyl-d14:	79%	~	79%(a)	~	92%	~	80%-121%	

Spike Source: AEE 97-03-79-4

(a) Outside of AEE acceptance limits. Since the recovery is within USEPA method specified guidance limits, it is the opinion of the laboratory that usability of the data has not been adversely affected.
(b) Outside of acceptance limits. USEPA Method 8270 allows one surrogate from each fraction to be outside acceptance limits without affecting acceptability of the data.

Signature of Chemist

QA/QC Review

AGRA
ENGINEERING GLOBAL SOLUTIONS

Project: Rio Salado
Project No.: 0-117-001007
Project Manager: Larry Hansen
Sample Matrix: Water

Service Request No.: AZ000175
Report Date: 04/10/00
Report No.: 00017512
C.O.C.: 4756

QC Data Report
MS/MSD Summary
Semivolatile Organic Compounds by GC/MS
EPA Methods 3510C/8270C
µg/L(ppb)

Sample Name: **Lab Code:**	Batch QC 162-1	Spike Level (µg/L)	Matrix Spike	Percent Recovery (MS)	Matrix Spike Duplicate	Percent Recovery (MSD)	AEE % Recovery Acceptance Criteria	Relative Percent Difference (RPD)
Phenol	<10	80	28	35(a)	33	41	37%-73%	16
2-Chlorophenol	<10	80	54	68	68	85	38%-92%	23
4-Chloro-3-methylphenol	<10	80	57	71	69	87	71%-88%	19
4-Nitrophenol	<25	80	31	39	30	37	35%-110%	13
Pentachlorophenol	<25	80	32	40(a)	28	35(a)	47%-160%	9
1,4-Dichlorobenzene	<10	40	23	59	31	79	45%-94%	30
N-Nitrosodi-n-propylamine	<10	40	30	75	34	84	39%-91%	12
1,2,4-Trichlorobenzene	<10	40	26	65	35	87	33%-107%	30
Acenaphthene	<10	40	31	78	35	87	58%-103%	12
2,4-Dinitrotoluene	<10	40	33	82	34	85	63%-111%	3
Pyrene	<10	40	37	93	38	94	94%-105%	3
Sample Date:	03/13/00	~	03/13/00	~	03/13/00	~	~	
Extraction Date:	03/20/00	~	03/20/00	~	03/20/00	~	~	
Analysis Date:	03/22/00	~	03/22/00	~	03/22/00	~	~	
Surrogate Recovery:							**Acceptance Limits**	
2-Fluorophenol:	37%(a)	~	37%(a)	~	45%(a)	~	46%-77%	
Phenol-d5:	25%(a)	~	24%(a)	~	30%(a)	~	55%-78%	
Nitrobenzene-d5:	71%	~	60%(a)	~	72%	~	65%-92%	
2-Fluorobiphenyl:	77%	~	68%	~	78%	~	67%-100%	
2,4,6-Tribromophenol:	59%	~	57%	~	63%	~	54%-105%	
p-Terphenyl-d14:	90%	~	87%	~	82%	~	80%-121%	

Spike Source: AEE 97-03-79-4

(a) *Outside of acceptance limits due to matrix effects. An unbreakable emulsion formed during sample preparation.*

Signature of Chemist

QA/QC Review

AGRA
ENGINEERING GLOBAL SOLUTIONS

Project: Rio Salado
Project No.: 0-117-001007
Project Manager: Larry Hansen
Sample Matrix: Water

Service Request No.: AZ000175
Report Date: 03/29/00
Report No.: 00017503
C.O.C. No.: 4756

Polychlorinated Biphenyls (PCBs) as Aroclors by GC/ECD
EPA Methods 3510/8082
µg/L(ppb)

Sample Name:	B-3-GW	B-4-GW	Lab Blank	**Reporting**
Lab Code:	175-1	175-2	175-MB	**Limit**
Aroclor 1016	ND	ND	ND	0.5
Aroclor 1221	ND	ND	ND	1.0
Aroclor 1232	ND	ND	ND	0.5
Aroclor 1242	ND	ND	ND	0.5
Aroclor 1248	ND	ND	ND	0.5
Aroclor 1254	ND	ND	ND	0.5
Aroclor 1260	ND	ND	ND	0.5
Sample Date:	03/15/00	03/15/00	03/20/00	
Extraction Date:	03/20/00	03/20/00	03/20/00	
Analysis Date:	03/24/00	03/24/00	03/24/00	
Surrogate Recoveries:				**%Recovery Acceptance**
Decachlorobiphenyl:	34%(a)	41%(a)	90%	70%-130%

ND Not Detected
(a) Outside of acceptance limits due to matrix effects. An unbreakable emulsion formed during sample preparation.

Dan Hines
Signature of Chemist

QA/QC Review

AGRA
ENGINEERING GLOBAL SOLUTIONS

Project: Rio Salado
Project No.: 0-117-001007
Project Manager: Larry Hansen
Sample Matrix: Water

Service Request No.: AZ000175
Report Date: 03/29/00
Report No.: 00017504
C.O.C.: 4756

QC Data Report
Blank Spike Summary
Polychlorinated Biphenyls (PCBs) as Aroclors by GC/ECD
EPA Methods 3510/8082
µg/L(ppb)

Sample Name:	Lab Blank	Spike Level	Blank Spike	Percent Recovery	Blank Spike Duplicate	Percent Recovery	% Recovery Acceptance Criteria	Relative Percent Difference
Lab Code:	175-MB	(µg/L)		(BS)		(BSD)		(RPD)
Aroclor 1016	<0.5	2.5	2.3	92	2.0	80	70%-130%	14
Aroclor 1260	<0.5	2.5	2.3	92	2.6	104	70%-130%	12
Sample Date:	03/20/00	~	03/20/00	~	03/20/00	~		
Extraction Date:	03/20/00	~	03/20/00	~	03/20/00	~		
Analysis Date:	03/24/00	~	03/24/00	~	03/24/00	~		
Surrogate Recovery:							**Control Limits**	
Decachlorobiphenyl:	90%	~	96%	~	111%	~	70%-130%	

ND Not Detected
Spike Source: AEE #99-06-34-1

Dan Hines
Signature of Chemist

QA/QC Review

AGRA
ENGINEERING GLOBAL SOLUTIONS

Project: Rio Salado
Project No.: 0-117-001007
Project Manager: Larry Hansen
Sample Matrix: Water

Service Request No.: AZ000175
Report Date: 03/29/00
Report No.: 00017505
C.O.C.: 4756

QC Data Report
MS/MSD Summary
Polychlorinated Biphenyls (PCBs) as Aroclors by GC/ECD
EPA Methods 3510/8082
µg/L(ppb)

Sample Name: / **Lab Code:**	B-4-GW 175-2	Spike Level (µg/L)	Matrix Spike	Percent Recovery (MS)	Matrix Spike Duplicate	Percent Recovery (MSD)	% Recovery Acceptance Criteria	Relative Percent Difference (RPD)
Aroclor 1016	<0.5	2.5	2.4	96	2.0	80	70%-130%	18
Aroclor 1260	<0.5	2.5	2.4	96	1.9	76	70%-130%	23
Sample Date:	03/15/00	~	03/15/00	~	03/15/00	~		
Extraction Date:	03/20/00	~	03/20/00	~	03/20/00	~		
Analysis Date:	03/24/00	~	03/24/00	~	03/24/00	~		
Surrogate Recovery:							**Control Limits**	
Decachlorobiphenyl:	41%(a)	~	100%	~	78%	~	70%-130%	

ND Not Detected
Spike Source: AEE #99-06-34-1
(a) Outside of acceptance limits due to matrix effects. An unbreakable emulsion formed during sample preparation.

Dan Hines
Signature of Chemist

QA/QC Review

AGRA
ENGINEERING GLOBAL SOLUTIONS

Project: Rio Salado
Project No.: 0-117-001007
Project Manager: Larry Hansen
Sample Matrix: Water

Service Request No.: AZ000175
Report Date: 04/10/00
Report No.: 00017507
C.O.C. No.: 4756

Organochlorine Pesticides by GC/ECD
EPA Methods 3510/8081A
µg/L(ppb)

Sample Name:	B-3-GW	B-4-GW	Lab Blank	**Reporting**
Lab Code:	175-1	175-2	175-MB	**Limit**
alpha-BHC	ND	ND	ND	0.04
beta-BHC	ND	ND	ND	0.04
gamma-BHC	ND	ND	ND	0.04
delta-BHC	ND	ND	ND	0.04
Heptachlor	ND	ND	ND	0.04
Aldrin	ND	ND	ND	0.04
Heptachlor epoxide	ND	ND	ND	0.04
alpha-Chlordane	ND	ND	ND	0.04
gamma-Chlordane	ND	ND	ND	0.04
Endosulfan I	ND	ND	ND	0.04
4,4'-DDE	ND	ND	ND	0.04
Dieldrin	ND	ND	ND	0.04
Endrin	ND	ND	ND	0.04
4,4'-DDD	ND	ND	ND	0.04
Endosulfan II	ND	ND	ND	0.04
Endrin aldehyde	ND	ND	ND	0.04
4,4'-DDT	ND	ND	ND	0.04
Endosulfan sulfate	ND	ND	ND	0.04
Methoxychlor	ND	ND	ND	0.04
Endrin ketone	ND	ND	ND	0.04
Toxaphene	ND	ND	ND	1.0
Sample Date:	03/15/00	03/15/00	03/20/00	
Extraction Date:	03/20/00	03/20/00	03/20/00	
Analysis Date:	04/05/00	04/05/00	04/05/00	
Surrogate Recoveries:				**% Recovery Acceptance**
2,4,5,6-tetrachloro-m-xylene	62%	73%	64%	50%-118%
Decachlorobiphenyl	26%(a)	35%(a)	95%	83%-124%

ND Not Detected
(a) Outside of acceptance limits due to matrix effects. An unbreakable emulsion formed during sample preparation.

Signature of Chemist

QA/QC Review

AGRA
ENGINEERING GLOBAL SOLUTIONS

Project: Rio Salado
Project No.: 0-117-001007
Project Manager: Larry Hansen
Sample Matrix: Water

Service Request No.: AZ000175
Report Date: 04/10/00
Report No.: 00017508
C.O.C. No.: 4756

QC Data Report
Blank Spike Summary
Organochlorine Pesticides by GC/ECD
EPA Methods 3545/8081A
µg/kg(ppb)
As Received Basis

Sample Name:	Lab Blank	Spike Level	Blank Spike	Percent Recovery	Blank Spike Duplicate	Percent Recovery	Control Limits	Relative Percent Difference
Lab Code:	175-MB	(µg/kg)	(BS)	(BS)	(BSD)	(BSD)		(RPD)
gamma-BHC	<0.04	1.0	0.9	90	0.9	90	70%-130%	<1
Heptachlor	<0.04	1.0	0.9	90	0.8	80	70%-130%	12
Aldrin	<0.04	1.0	0.9	90	0.8	80	70%-130%	12
Dieldrin	<0.04	2.5	2.5	100	2.5	100	70%-130%	<1
Endrin	<0.04	2.5	2.4	96	2.3	92	70%-130%	4
4,4'-DDT	<0.04	2.5	2.3	92	2.3	92	70%-130%	<1
Sample Date:	03/20/00	~	03/20/00	~	03/20/00	~	~	
Extraction Date:	03/20/00	~	03/20/00	~	03/20/00	~	~	
Analysis Date:	04/05/00	~	04/05/00	~	04/05/00	~	~	
Surrogate Recovery:							**Control Limits**	
2,4,5,6-Tetrachloro-m-xylene:	64%	~	70%	~	67%	~	50%-118%	
Decachlorobiphenyl:	95%	~	100%	~	100%	~	83%-124%	

Spike Source: 99-06-32-1

Dan Hines
Signature of Chemist

QA/QC Review

AGRA
ENGINEERING GLOBAL SOLUTIONS

Project: Rio Salado
Project No.: 0-117-001007
Project Manager: Larry Hansen
Sample Matrix: Water

Service Requrst No.: AZ000175
Report Date: 04/10/00
Report No.: 00017509
C.O.C. No.: 4756

QC Data Report - Matrix Spike Recoveries
Organochlorine Pesticides by GC/ECD
EPA Methods 3510/8081A
µg/L(ppb)

Sample Name:	B-3-GW	Spike Level	Matrix Spike	Percent Recovery	Matrix Spike Duplicate	Percent Recovery	Control	Relative Percent Difference
Lab Code:	175-1	(µg/kg)	(MS)	(MS)	(MSD)	(MSD)	Limits	(RPD)
gamma-BHC	<0.04	1.0	1.0	100	0.8	80	70%-130%	22
Heptachlor	<0.04	1.0	1.0	100	0.8	80	70%-130%	22
Aldrin	<0.04	1.0	0.9	90	0.8	80	70%-130%	12
Dieldrin	<0.04	2.5	2.6	104	2.3	92	70%-130%	12
Endrin	<0.04	2.5	2.6	104	2.3	92	70%-130%	12
4,4'-DDT	<0.04	2.5	2.4	96	2.2	88	70%-130%	9
Sample Date:	03/15/00	~	03/15/00	~	03/15/00		~	~
Extraction Date:	03/20/00	~	03/20/00	~	03/20/00		~	~
Analysis Date:	04/05/00	~	04/05/00	~	04/05/00		~	~
Surrogate Recovery:								**Control Limits**
2,4,5,6-Tetrachloro-m-xylene:	62%	~	70%	~	64%		~	50%-118%
Decachlorobiphenyl:	26%(a)	~	26%(a)	~	25%(a)		~	83%-124%

Spike Source: 99-06-32-1

(a) Outside of acceptance limits due to matrix effects. An unbreakable emulsion formed during sample preparation.

Signature of Chemist

QA/QC Review

AGRA
ENGINEERING GLOBAL SOLUTIONS

AGRA Earth & Environmental Portland Chemistry Laboratory
Sample Receipt Documentation Form

Project:	Rio Salado	16.9 Cooler Temperatures	16.9
SR No.:	A8000175		
Date:	3/16/00	17.8	
Time:	12:00		
Temperature of Cooler Upon Receipt (Record to the Right):			
Received By:		18.4	15.7

Section One: Shipping/Delivery Issues

1.	Method of Sample Delivery:	Fed EX		
2.	Airbill or Courier Receipt Number:	8147 1868 0297		
3.	Is a copy of the airbill or courier receipt available to be placed in the job file?	Yes	No	NA

Section Two: Sample Custody Issues

4.	Are custody seals on the shipping container intact?	Yes	No	NA
5.	Is a COC or other sample transmittal document present?	Yes	No	NA
6.	Is the COC complete?	Yes	No	NA
7.	Are the sample seals intact?	Yes	No	NA
8.	Does the COC match the samples received?	Yes	No	NA

Section Three: Sample Integrity Issues

9.	Are all sample containers intact and not leaking?	Yes	No	NA
10.	Are all samples preserved properly?	Yes	No	NA
11.	Are all samples within holding time for the required tests?	Yes	No	NA
12.	*Were all samples received at the proper temperature?	Yes	No	NA
13.	Are samples for volatiles and other headspace sensitive parameters free of headspace or bubbles?	Yes	No	NA

Section Four: Sample Containers Received:

14.	4 oz. glass jars:	19.	2oz. amber (MeOH):
15.	8 oz. glass jars:	20.	Encore samplers:
16.	40ml VOA vials: 9	21.	500ml plastic:
17.	1 liter glass: 10	22.	1liter plastic: 8
18.	Other (describe):		

*Temperatures for: soil and water = 4°C-6°C, MeOH jars = 25°C, air = not required

(9) 1 1L Amber was received not labled. B-4-GW was received 1 1L Amber short - therfore the unlabled sample was assumed to Be B-4-GW.

Reviewed By:

Laboratory Manager or Designee

AGRA
ENGINEERING GLOBAL SOLUTIONS
7477 SW Tech Center Drive
Portland, Oregon, U.S.A. 97223-8025
Tel (503)639-3400 Fax (503) 620-7892

4756

CHAIN OF CUSTODY

PROJECT	PROJECT No.
RIO SALADO	0-117-001007
REPORT TO: TIFFANY LOOFF	PHONE No. (602) 272-6848
PROJECT MANGER: LARRY HANSEN	PHONE No.
SAMPLER'S NAME (please print): TIFFANY LOOFF	PHONE No.
SAMPLER'S SIGNATURE: Tiffany O. Looff	

ANALYSIS REQUESTED (circle, check box or write preferred method in box)

	SAMPLE I.D.	DATE	TIME	MATRIX	PRESERVATIVE	CONTAINERS No.	CONTAINERS VOL.	~~BTEX by EPA 602 / 8021~~ CaCO3 (130.2)	~~TPH~~ TDS (EPA 160.1)	~~BTEX / TPH~~ HARDNESS (200.7)	~~TPH~~ SULFIDE (180.1)	~~TPH~~ pH (150.1)	TPH by EPA 8015 MODIFIED / 8015B	TPH-418.1 MODIFIED	TPH by EPA 418.1	GC / MS EPA 624 / EPA 8260 Volatiles	GC / MS EPA 625 / 8270 Semi-volatiles	VOCS EPA 601 / 602 or EPA 8021	PCBs EPA 608 / 8081	LEAD EPA 6010 / EPA 7421 Total / Dissolved	TOTAL METALS	TCLP	DISSOLVED METALS	PESTICIDES BORA	SULFATE, SULFIDES, NITRATES NITRITES, CHLORIDES (300.0)	
1	1. B-3-GW	3/15/00	12:00	GW	VARIOUS	13		X	X	X	X	X				X	X		X				X	X	X	
2	2. B-4-GW	3/15/00	16:00	GW	Various	13		X	X	X	X	X				X	X		X				X	X	X	
3	3. TB-1	3/15/00	12:00	W	4°C	1										X										
	4.																									
	5.																									
	6.																									
	7.																									
	8.																									
	9.																									
	10.																									

SAMPLE RECEIPT: See SRDF	LABORATORY: See SRDF	TURNAROUND TIME	QC Reporting Requirements (Add'l charges may apply)	COMMENTS / INSTRUCTIONS
TOTAL # CONTAINERS	SHIPPING I.D / AIRBILL #	❑ 8 HOUR	❑ LEVEL I	METALS: AG, AS, AL, BA, BE, CA, CD, CO, CR, CU, FE, HG, K, MG, MN, NA, NI, PB, SB, SE, TL, V, ZN
CONDITION OF CONTAINERS	CARRIER	❑ 24 HOUR	❑ LEVEL II	RUSH! NITRATES
CONDITION OF SEALS	DOT DESIGNATION	❑ 1 WEEK	❑ LEVEL II w/project specific Duplicates/Spikes	FILTER @ LAB FOR DISSOLVED METALS
		❑ 2 WEEK (standard)	❑ Level III (Full validation package)	
		❑ OTHER _____		PAGE 1 OF 1

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
1. Tiffany O. Looff / AGRA	3/15/00	15:10	1. James J. Luepke (JJL) / AGRA	3/15/00	15:10
2. James J. Luepke (JJL) / AGRA	3/15/00	17:40	2.		
3.			3. [signature] / PDX	3/16/00	12:00

A-2000175

Appendix A

Subcontracted Data

SVL ANALYTICAL, INC.
One Government Gulch ■ P.O. Box 929 ■ Kellogg, Idaho 83837-0929 ■ Phone: (208)784-1258 ■ Fax: (208)783-0891

REPORT OF ANALYTICAL RESULTS

Client: Agra Earth & Environmental

Job No: 93900
Report Date: 3/24/00

Sample ID: B-3-GW
Collected: 3/15/00 12:00 By:
Matrix: WATER

SVL Sample: 229109 | 229111
Received: 3/17/00

PHYSICAL PROPERTIES	TOTAL	DISSOLVED
pH	7.71	
TDS, mg/L	410	
TSS, mg/L		
Conductivity		

NONMETALS (mg/L)	TOTAL	DISSOLVED
Alkalinity as CaCO3	143	
Bicarbonate	143	
Carbonate	<1.0	
Hydroxide		
Chloride	103	
Fluoride		
Nitrate-N	1.48	
Orthophosphate		
Sulfate	57.0	

METALS (mg/L)	TOTAL	DISSOLVED
Aluminum	66.9	0.048
Antimony	<0.032	0.034
Arsenic	<0.04	<0.04
Barium	0.959	0.080
Beryllium	0.002	<0.002
Bismuth		
Boron		
Cadmium	<0.0024	<0.0024
Calcium	56.9	40.4

METALS (cont'd)	TOTAL	DISSOLVED
Chromium	0.091	<0.005
Cobalt	0.050	<0.005
Copper	0.280	0.007
Gallium		
Iron	50.0	0.02
Lanthanum		
Lead	<0.04	<0.04
Lithium		
Magnesium	35.4	15.7
Manganese	8.50	1.49
Mercury	<0.0002	<0.0002
Molybdenum		
Nickel	0.258	<0.023
Phosphorus		
Potassium	12.2	5.7
Scandium		
Selenium	0.04	<0.04
Silica		
Silver	<0.006	<0.006
Sodium	82.6	88.0
Strontium		
Thallium	<0.1	0.1
Tin		
Titanium		
Vanadium	0.100	<0.005
Zinc	0.116	<0.003

ADDITIONAL TESTS	TOTAL	DISSOLVED
Hardness	288	
Sulfide	<0.5	

	TOTAL	DISSOLVED
Nitrite-N	<0.05	

This report has been checked and is certified to be accurate.

Signed: Kirby Gray Date: 3/24/00
3/24/00 11:47

SVL ANALYTICAL, INC.
ne Government Gulch ■ P.O. Box 929 ■ Kellogg, Idaho 83837-0929 ■ Phone: (208)784-1258 ■ Fax: (208)783-0891

REPORT OF ANALYTICAL RESULTS

Client: Agra Earth & Environmental

Job No: 93900
Report Date: 3/24/00

Sample ID: B-4-GW
Collected: 3/15/00 16:00 By:
Matrix: WATER

SVL Sample: 229110 | 229112
Received: 3/17/00

PHYSICAL PROPERTIES	TOTAL	DISSOLVED
pH	8.00	
TDS, mg/L	504	
TSS, mg/L		
Conductivity		

NONMETALS (mg/L)	TOTAL	DISSOLVED
Alkalinity as CaCO3	179	
Bicarbonate	179	
Carbonate	<1.0	
Hydroxide		
Chloride	105	
Fluoride		
Nitrate-N	<0.05	
Orthophosphate		
Sulfate	98.9	

METALS (mg/L)	TOTAL	DISSOLVED
Aluminum	24.6	<0.024
Antimony	0.033	<0.032
Arsenic	<0.04	<0.04
Barium	0.248	0.069
Beryllium	<0.002	<0.002
Bismuth		
Boron		
Cadmium	<0.0024	<0.0024
Calcium	53.5	47.4

METALS (cont'd)	TOTAL	DISSOLVED
Chromium	0.037	<0.005
Cobalt	0.012	<0.005
Copper	0.074	0.005
Gallium		
Iron	25.5	0.02
Lanthanum		
Lead	<0.04	<0.04
Lithium		
Magnesium	21.1	14.9
Manganese	1.60	0.471
Mercury	<0.0002	<0.0002
Molybdenum		
Nickel	0.035	<0.023
Phosphorus		
Potassium	8.7	6.6
Scandium		
Selenium	<0.04	<0.04
Silica		
Silver	<0.006	<0.006
Sodium	112	117
Strontium		
Thallium	<0.1	<0.1
Tin		
Titanium		
Vanadium	0.042	<0.005
Zinc	0.042	<0.003

ADDITIONAL TESTS	TOTAL	DISSOLVED
Hardness	220	
Sulfide	<0.5	

	TOTAL	DISSOLVED
Nitrite-N	<0.10*	

*Elevated detection limit due to matrix interference.

This report has been checked and is certified to be accurate.

Signed: Kirby Gray Date: 3/24/00
3/24/00 11:47

SVL ANALYTICAL, INC. Quality Control Report

Part I Prep Blank and Laboratory Control Sample

Client :Agra Earth & Environmental SVL JOB No. :93900

Analyte	Method	Matrix	Units	Prep Blank	True—LCS—Found		LCS %R	Analysis Date
Silver	200.7	WATER	mg/L	<0.006	1.00	0.934	93.4	3/23/00
Aluminum	200.7	WATER	mg/L	<0.024	1.00	0.928	92.8	3/23/00
Arsenic	200.7	WATER	mg/L	<0.04	1.00	0.93	93.0	3/23/00
Barium	200.7	WATER	mg/L	<0.002	1.00	0.932	93.2	3/23/00
Beryllium	200.7	WATER	mg/L	<0.002	1.00	0.932	93.2	3/23/00
Calcium	200.7	WATER	mg/L	<0.013	20.0	18.6	93.0	3/23/00
Cadmium	200.7	WATER	mg/L	<0.0024	1.00	0.910	91.0	3/23/00
Cobalt	200.7	WATER	mg/L	<0.005	1.00	0.942	94.2	3/23/00
Chromium	200.7	WATER	mg/L	0.006	1.00	0.915	91.5	3/23/00
Copper	200.7	WATER	mg/L	<0.003	1.00	0.908	90.8	3/23/00
Iron	200.7	WATER	mg/L	<0.02	10.0	9.58	95.8	3/23/00
Hardness	200.7	WATER	mg/L	<0.18	132	120	90.9	3/23/00
Potassium	200.7	WATER	mg/L	<1.7	30.0	26.4	88.0	3/23/00
Magnesium	200.7	WATER	mg/L	<0.035	20.0	18.0	90.0	3/23/00
Manganese	200.7	WATER	mg/L	<0.002	1.00	0.931	93.1	3/23/00
Sodium	200.7	WATER	mg/L	0.110	20.0	18.6	93.0	3/23/00
Nickel	200.7	WATER	mg/L	<0.023	1.00	0.899	89.9	3/23/00
Lead	200.7	WATER	mg/L	<0.04	1.00	0.94	94.0	3/23/00
Antimony	200.7	WATER	mg/L	<0.032	1.00	0.964	96.4	3/23/00
Selenium	200.7	WATER	mg/L	<0.04	1.00	0.94	94.0	3/23/00
Thallium	200.7	WATER	mg/L	<0.1	1.0	0.9	90.0	3/23/00
Vanadium	200.7	WATER	mg/L	<0.005	1.00	0.955	95.5	3/23/00
Zinc	200.7	WATER	mg/L	<0.003	1.00	0.898	89.8	3/23/00
Mercury	245.1	WATER	mg/L	<0.0002	0.0050	0.0052	104.0	3/23/00
Chloride	300.0	WATER	mg/L	<0.2	54.2	55.2	101.8	3/17/00
Nitrite-N	300.0	WATER	mg/L	<0.05	3.65	3.58	98.1	3/17/00
Nitrate-N	300.0	WATER	mg/L	<0.05	19.4	19.1	98.5	3/17/00
Sulfate, SO4	300.0	WATER	mg/L	<0.3	5.1	5.5	107.8	3/17/00
Alkalinity,CaCO3	310.1	WATER	mg/L	<1.0	40.9	43.8	107.1	3/21/00
CO3, CaCO3	310.1	WATER	mg/L		N/A		N/A	3/27/00
HCO3, CaCO3	310.1	WATER	mg/L		N/A		N/A	3/27/00
pH	150.1	WATER		5.04	9.07	8.94	98.6	3/21/00
Sulfide	376.1	WATER	mg/L		N/A		N/A	3/17/00
TDS	160.1	WATER	mg/L	<10	231	242	104.8	3/22/00

LEGEND:

LCS = Laboratory Control Sample LCS %R = LCS Percent Recovery N/A = Not Applicable

SVL ANALYTICAL, INC. Quality Control Report

Part II Duplicate and Spike Analysis

Client :Agra Earth & Environmental SVL JOB No :93900

Test	Method	Matrix	QC SAMPLE ID Units	Result	Duplicate Result	RPD%	Matrix Spike Result	SPK ADD		%R	Test Date
Ag	200.7	WATER	1 mg/L	<0.006	0.007	200.0	0.944	1.00		94.4	3/23/00
[redacted]	200.7	WATER	2 mg/L	<0.006	<0.006	UDL	0.982	1.00	A	98.2	3/23/00
[redacted]	200.7	WATER	1 mg/L	66.9	66.7	0.3	88.4	1.00		R >4S	3/23/00
Al	200.7	WATER	2 mg/L	0.048	<0.024	200.0	0.941	1.00		89.3	3/23/00
[redacted]	200.7	WATER	1 mg/L	<0.04	<0.04	UDL	0.94	1.00		94.0	3/23/00
[redacted]	200.7	WATER	2 mg/L	<0.04	<0.04	UDL	0.98	1.00		98.0	3/23/00
Ba	200.7	WATER	1 mg/L	0.959	0.963	0.4	1.90	1.00		94.1	3/23/00
Ba	200.7	WATER	2 mg/L	0.080	0.079	1.3	0.978	1.00		89.8	3/23/00
[redacted]	200.7	WATER	1 mg/L	0.002	0.002	0.0	0.929	1.00		92.7	3/23/00
[redacted]	200.7	WATER	2 mg/L	<0.002	<0.002	UDL	0.916	1.00		91.6	3/23/00
Ca	200.7	WATER	1 mg/L	56.9	57.4	0.9	75.9	20.0		95.0	3/23/00
[redacted]	200.7	WATER	2 mg/L	40.4	40.5	0.2	59.9	20.0	A	97.5	3/23/00
[redacted]	200.7	WATER	1 mg/L	<0.0024	<0.0024	UDL	0.924	1.00		92.4	3/23/00
Cd	200.7	WATER	2 mg/L	<0.0024	<0.0024	UDL	0.962	1.00		96.2	3/23/00
Co	200.7	WATER	1 mg/L	0.050	0.047	6.2	0.990	1.00		94.0	3/23/00
[redacted]	200.7	WATER	2 mg/L	<0.005	<0.005	UDL	0.942	1.00		94.2	3/23/00
Cr	200.7	WATER	1 mg/L	0.091	0.091	0.0	1.00	1.00		90.9	3/23/00
Cr	200.7	WATER	2 mg/L	<0.005	<0.005	UDL	0.910	1.00		91.0	3/23/00
[redacted]	200.7	WATER	1 mg/L	0.280	0.279	0.4	1.23	1.00		95.0	3/23/00
[redacted]	200.7	WATER	2 mg/L	0.007	<0.003	200.0	0.913	1.00		90.6	3/23/00
Fe	200.7	WATER	1 mg/L	50.0	49.9	0.2	59.8	10.0		98.0	3/23/00
[redacted]	200.7	WATER	2 mg/L	0.02	<0.02	200.0	9.54	10.0		95.2	3/23/00
[redacted]ns	200.7	WATER	1 mg/L	288	290	0.7	425	132		103.8	3/23/00
K	200.7	WATER	1 mg/L	12.2	12.0	1.7	39.4	30.0		90.7	3/23/00
K	200.7	WATER	2 mg/L	5.7	5.7	0.0	32.5	30.0		89.3	3/23/00
[redacted]	200.7	WATER	1 mg/L	35.4	35.5	0.3	57.1	20.0		108.5	3/23/00
[redacted]	200.7	WATER	2 mg/L	15.7	15.7	0.0	32.9	20.0		86.0	3/23/00
Mn	200.7	WATER	1 mg/L	8.50	8.50	0.0	9.23	1.00		R >4S	3/23/00
[redacted]	200.7	WATER	2 mg/L	1.49	1.49	0.0	2.29	1.00		80.0	3/23/00
[redacted]	200.7	WATER	1 mg/L	82.6	83.7	1.3	102	20.0		97.0	3/23/00
Na	200.7	WATER	2 mg/L	88.0	85.6	2.8	100	20.0		R >4S	3/23/00
Ni	200.7	WATER	1 mg/L	0.258	0.251	2.8	1.14	1.00		88.2	3/23/00
[redacted]	200.7	WATER	2 mg/L	<0.023	<0.023	UDL	1.03	1.00		103.0	3/23/00
[redacted]	200.7	WATER	1 mg/L	<0.04	<0.04	UDL	0.93	1.00		93.0	3/23/00
Pb	200.7	WATER	2 mg/L	<0.04	<0.04	UDL	0.93	1.00		93.0	3/23/00
[redacted]	200.7	WATER	1 mg/L	<0.032	<0.032	UDL	0.844	1.00		84.4	3/23/00
[redacted]	200.7	WATER	2 mg/L	0.034	<0.032	200.0	0.985	1.00		95.1	3/23/00
Se	200.7	WATER	1 mg/L	0.04	0.05	22.2	1.01	1.00		97.0	3/23/00
[redacted]	200.7	WATER	2 mg/L	<0.04	<0.04	UDL	1.02	1.00		102.0	3/23/00
[redacted]	200.7	WATER	1 mg/L	<0.1	<0.1	UDL	0.8	1.00		80.0	3/23/00
Tl	200.7	WATER	2 mg/L	0.1	<0.1	200.0	0.9	1.00		80.0	3/23/00
V	200.7	WATER	1 mg/L	0.100	0.098	2.0	1.05	1.00		95.0	3/23/00
[redacted]	200.7	WATER	2 mg/L	<0.005	<0.005	UDL	0.959	1.00		95.9	3/23/00
[redacted]	200.7	WATER	1 mg/L	0.116	0.114	1.7	1.02	1.00		90.4	3/23/00

[redacted]GEND:

[redacted]% = (|SAM - DUP|/((SAM + DUP)/2) * 100) M in Duplicate indicates MSD. UDL = Both SAM & DUP not detected.

SPIKE ADD column, A = Post Digest Spike; %R = Percent Recovery N/A = Not Analyzed; R > 4S = Result more than 4X the Spike Added

QC Sample 1: SVL SAM No.: 229109 Client Sample ID: B-3-GW ^T

[redacted] Sample 2: SVL SAM No.: 229111 Client Sample ID: B-3-GW ^D

[redacted]

3/24/00 11:46

SVL ANALYTICAL, INC.

Quality Control Report

Part II Duplicate and Spike Analysis

Client :Agra Earth & Environmental

SVL JOB No :93900

Test	Method	Matrix	QC SAMPLE ID Units	Result	Duplicate Result	RPD%	Matrix Spike Result	SPK ADD	%R	Test Date
Zn	200.7	WATER	2 mg/L	<0.003	<0.003	UDL	0.945	1.00	94.5	3/23/00
[redacted]	245.1	WATER	1 mg/L	<0.0002	<0.0002	UDL	0.0010	0.0010	100.0	3/23/00
[redacted]	245.1	WATER	2 mg/L	<0.0002	<0.0002	UDL	0.0010	0.0010	100.0	3/23/00
Cl	300.0	WATER	1 mg/L	103	104	1.0	154	50.0	102.0	3/17/00
N[redacted]2-N	300.0	WATER	1 mg/L	<0.05	<0.05	UDL	1.82	2.00	91.0	3/17/00
N[redacted]3-N	300.0	WATER	1 mg/L	1.48	1.48	0.0	3.57	2.00	104.5	3/17/00
SO4	300.0	WATER	1 mg/L	57.0	57.0	0.0	110	50.0	106.0	3/17/00
ALK	310.1	WATER	1 mg/L	143	144	0.7	N/A	N/A	N/A	3/21/00
C[redacted]3	310.1	WATER	1 mg/L	<1.0	<1.0	UDL	N/A	N/A	N/A	3/21/00
H[redacted]03	310.1	WATER	1 mg/L	143	144	0.7	N/A	N/A	N/A	3/21/00
pH	150.1	WATER	1	7.71	7.70	0.1	N/A	N/A	N/A	3/21/00
T[redacted]S	160.1	WATER	1 mg/L	410	416	1.5	N/A	N/A	N/A	3/22/00

LEGEND:

RPD% = (|SAM - DUP|/((SAM + DUP)/2) * 100) M in Duplicate indicates MSD. UDL = Both SAM & DUP not detected.

[redacted]KE ADD column, A = Post Digest Spike; %R = Percent Recovery N/A = Not Analyzed; R > 4S = Result more than 4X the Spike Added

QC Sample 1: SVL SAM No.: 229109 Client Sample ID: B-3-GW ^T

QC Sample 2: SVL SAM No.: 229111 Client Sample ID: B-3-GW ^D

3/24/00 11:46

APPENDIX C

LETTER REPORTS

AGRA
ENGINEERING GLOBAL SOLUTIONS

AGRA
ENGINEERING GLOBAL SOLUTIONS

AGRA Earth &
Environmental Inc.
3232 West Virginia Avenue
Phoenix, Arizona 85009
Tel (602) 272-6848
Fax (602) 272-7239
Toll Free 1-800-248-AGRA

February 15, 2000
AGRA Job No. 0-117-001007
Letter No. 1

West Consultants, Inc.
2500 South Lakeshore Drive
Suite 210
Tempe. Arizona 85282-7054

Attention: Dennis L. Richards, P.E.

Gentlemen:

**RE: GEOTECHNICAL INVESTIGATION
DESIGN OF GRADE CONTROL STRUCTURES
PHOENIX, ARIZONA**

As requested, AGRA Earth & Environmental, Inc. (AGRA) has evaluated the stability of the grade control structure and upstream apron planned for the Salt River in the vicinity of the Central Avenue bridge. The analysis is based on the plans for the project developed by T.Y. Lin International (Sheets W-1 through W-8, 90 percent submittal, undated). The grade control structure includes a stepped-down roller compacted concrete (RCC) structure having a nominal thickness of 4 feet with RCC bank protection structures. The upstream apron is a RCC structure with a planned thickness of 4 feet extending about 241 feet upstream from the centerline of the grade control structure, and with a width of 360 feet. The upstream end of the apron will have a toe-down extending to a depth of 10 feet.

The stability analyses considered the following specific considerations:

- the effect of buoyancy on the upstream apron,
- the effect of buoyancy on the grade control structure,
- the potential for sliding of the grade control structure,
- the recommended thickness of the upstream apron, and
- the need for vertical weep holes in both the upstream apron and the grade control structure.

The analyses considered the condition of a storm flow event having occurred, resulting in a ground water level coincident with the elevation of the top the upstream apron at its juncture with the upstream end of the grade control structure (1025.53 feet). At the downstream bottom of the toe-down of the grade control structure (elevation 998.40 feet), the water pressure would be equivalent to 1,693 pounds per square foot (psf), or 27.13 feet. In the analyses, this differential head was distributed over the base of the base control structure, dependent on the elevation of the bottom of the components of the grade control structure.

Considering the effect of buoyancy on the upstream apron, the nominal pressure imposed by the RCC structure is 560 psf, which assumes a RCC unit weight of 140 pounds per cubic foot (pcf). The uplift pressure for the condition assumed is about 250 psf, resulting in a safety factor of 2.24 for the case of uplift, or buoyancy, of the apron. Considering a required factor of safety of 1.5 against uplift, then the required thickness of the apron is about 2.67 feet (2 feet and 8 inches). This would reduce the thickness of the apron by 1.33 feet (1 foot and 4 inches), and the quantity of RCC apron by 33 percent. The analysis also indicates that vertical weep holes in the upstream concrete apron are not required to provide for the stability of the apron.

Analysis of the grade control structure considered its upstream end at Station 101+34.00 (elevation 1015.53 feet) and its downstream end at Station 99+88.00 (elevation 998.40 feet), a distance of 146.00 feet and an elevation difference of 27.13 feet. Considering a cross section along the centerline of the structure (and not considering the bank control structures on either side of the Salt River channel or the connection to the upstream apron), and the groundwater conditions described in the previous paragraph, the weight of the RCC grade control structure (not considering the weight of the backfill to be placed above the structure) is approximately equal to the uplift pressure imposed by the water. Thus, the factor of safety relative to buoyancy is about 1.0, and the factor of safety relative to sliding of the structure (not considering its structural connection to the upstream apron) is less than one, which is not acceptable.

Considering the additional weight of the granular backfill (assumed in-place density of 140 pcf) that will be placed above the grade control structure (top of fill elevation of about 1024.53 feet), the factor of safety relative to buoyancy is increased to 2.1. Additionally, the factor of safety relative to sliding is increased to 3.94. Thus, the stability of the grade control structure, for the conditions assumed, is very dependent on the assumption that the backfill will be placed above the grade control structure and, more important, that the action of the high flow event will result in the scoured backfill being replaced by re-deposition of soil to the elevation of the low flow channel. If this is not the case, then the stability of the grade control structure should be reconsidered, or the placement of weep holes in the grade control structure to relieve water pressures should be considered.

Should you have any questions concerning the recommendations presented in this letter, please do not hesitate in contacting the undersigned.

Respectfully submitted,

AGRA Earth & Environmental, Inc.

Registered Professional Engineer (Civil)
CERTIFICATE NO.
13872
LAWRENCE A
HANSEN
Date Signed 2/15/00
ARIZONA, U.S.A.

Lawrence A. Hansen, Ph.D., P.E.
Senior Vice President

c: Addressee: (3)

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AGRA
ENGINEERING GLOBAL SOLUTIONS

AGRA Earth &
Environmental Inc.
3232 West Virginia Avenue
Phoenix, Arizona 85009
Tel (602) 272-6848
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Toll Free 1-800-248-AGRA

March 3, 2000
AGRA Job No. 0-117-001007
Letter No. 2

West Consultants, Inc.
2500 South Lakeshore Drive
Suite 210
Tempe, Arizona 85282-7054

Attention: Dennis L. Richards, P.E.

Gentlemen:

**RE: GEOTECHNICAL INVESTIGATION
DESIGN OF GRADE CONTROL STRUCTURES
PHOENIX, ARIZONA**

As requested, AGRA Earth & Environmental, Inc. (AGRA) has completed additional evaluations of the stability of the grade control structure and upstream apron planned for the Salt River in the vicinity of the Central Avenue bridge. In our previous correspondence, it was concluded that the factor of safety relative to buoyancy for the grade control structure was about 1.0, if the scoured granular backfill is not re-deposited by the high flow event. However, that analysis considered only the stepped down portion of the grade control structure, and did not include the adjacent bank protection. The present analysis considers all components of the proposed structure.

Based on the plans for the project developed by T. Y. Lin International (Sheets W-1 through W-8, 90 percent submittal, undated), the weights of the various components of the grade control structure were estimated, assuming a unit weight of 140 pounds per cubic foot (pcf) for the roller compacted concrete (RCC). Assuming the same groundwater conditions described in our Letter No. 1, dated February 15, 2000, the buoyant forces acting on the various components of the grade control structure were also determined. These are presented in Table 1, along with the estimated weight of the granular backfill, assuming a fill unit weight of 140 pounds and a top-of-fill elevation of 1024.5 feet.

As discussed in our Letter No. 1, the combined weight of the channel weir and the channel grade control elements (40,000 kips) is about equal to the buoyant force acting on these elements (39,200 kips), resulting in a factor of safety near unity. Thus, considering only these elements of the overall structure, redeposition of the granular fill is required to provided sufficient weight to

offset the buoyant forces that will act on the these elements of the structure as the high flow event recedes. If about one-half the granular fill were redeposited, the factor of safety against buoyancy would be 1.52 and the factor safety against sliding would be 1.65.

However, if the weight of the connecting bank protection elements and the upstream apron are included, the total weight of the combined structure is 77,500 kips, compared to a buoyant force of 55,900 kips, resulting a factor of safety of 1.39. Thus, even without redeposition of the granular fill, the weight of the integral parts of the grade control structure, but excluding the over bank protection, is sufficient to resist the buoyant water forces that may exist for a very short period of time. For this case the factor of safety against sliding is 1.82. Because of the distribution of forces acting on the various parts of the grade control structure, moments and shear forces would need to be resisted by the RCC, particularly at the connection between the channel grade control structure and the weir, and the connections between the channel grade control structure and the bank protection elements.

Relief of the buoyant forces could be accomplished by placing weep holes in the channel grade control structure. Of concern would be the long-term integrity of the weep holes. Although intended to be a passive system, plugging of the weep holes could occur. However, based on the above simplified analysis of buoyancy and sliding, it is concluded that weep holes are not required.

Should you have any questions concerning the analyses or recommendations presented in this letter, please do not hesitate in contacting the undersigned.

Respectfully submitted,

AGRA Earth & Environmental, Inc.

Registered Professional Engineer (Civil)
CERTIFICATE NO.
13872
LAWRENCE A
HANSEN
Date Signed 3/3/00
ARIZONA, U.S.A.

Lawrence A. Hansen, Ph.D., P.E.
Senior Vice President

c: Addressee (3)

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TABLE 1

Estimated Grade Control Structure Weights & Buoyant Water Forces

Structure Element	Weight (1,000 kips)	Buoyant Force (1,000 kips)
Upstream Apron	25.2	11.2
Channel Weir	21.7	9.0
Channel Grade Control	18.3	30.2
Bank Protection	12.3	5.5
Overbank Grade Control	13.6	0.9
Granular Fill	39.2	---