

APPENDIX A

DATA COMPILATION AND EVALUATION OF BEDROCK ELEVATIONS AND HYDRAULIC TESTS FOR NUMERICAL MODEL DEVELOPMENT IN THE VICINITY OF THE PHELPS DODGE SIERRITA TAILING IMPOUNDMENT

TASK 2.1 OF AQUIFER CHARACTERIZATION PLAN

REVISION 1

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VICINITY OF THE PHELPS DODGE SIERRITA TAILING IMPOUNDMENT**

**TASK 2.1 OF AQUIFER CHARACTERIZATION PLAN
MITIGATION ORDER ON CONSENT DOCKET NO. P-50-06**

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1. INTRODUCTION

An evaluation of available bedrock elevation data and hydraulic test results was performed under Task 2.1 of the Aquifer Characterization plan in the Work Plan (Hydro Geo Chem, Inc. (HGC), 2006) to characterize and mitigate sulfate with respect to drinking water supplies. The purpose of the evaluation was to compile, evaluate, and verify data on the depth and hydraulic properties of the basin fill aquifer. These data are needed to develop and calibrate a numerical groundwater flow model for the site.

The goals of the evaluation were to 1) verify and, if necessary, re-evaluate previously defined bedrock elevations in the vicinity of the Phelps Dodge Sierrita Tailing Impoundment (PDSTI), 2) obtain additional bedrock elevation data to cover the anticipated area of the site numerical flow and transport model, and 3) verify existing hydraulic test interpretations to define the hydraulic properties of the basin fill and bedrock in the vicinity of the PDSTI. The methodology and results of the evaluation are discussed in the following sections.

2. BEDROCK EVALUATION

The purpose of the bedrock evaluation was to develop a bedrock elevation database for the southern portion of the Tucson basin using bore hole data and to construct a bedrock elevation contour map. The contour map will have several uses, including defining the lower boundary of the basin fill within the domain of the site groundwater flow model (which will be smaller than the area of the bedrock map), and development of maps showing saturated thicknesses of the basin fill. The database and contour map will be adjusted as needed based on additional data obtained during execution of the Work Plan (HGC, 2006).

2.1 Bedrock Elevation Database

The bedrock elevation database includes data from boreholes that are located in the southern Tucson basin area and that either penetrated bedrock or deep basin fill. Well data were obtained from the Arizona Department of Water Resources (ADWR) 35- and 55-series imaged records databases, the Phelps Dodge Sierrita Inc. (PDSI) well database, PDSI core hole data, and from Steffens Roberts and Kirsten (SRK) (1985). Data from these sources were reviewed and incorporated as appropriate. Well data compiled in the scope of the search included cadastral well location, registration number, well name (if any), completion date, collar or measuring point elevation, depth drilled, lithology, depth to bedrock if reached, any notations regarding degree of cementation within the basin fill, and Universal Transverse Mercator location coordinates (Tables A.1 and A.2).

Table A.1 lists area wells drilled to bedrock (fully penetrating with respect to basin fill) and Table A.2 lists wells that were not drilled to bedrock (non-fully penetrating). The deeper wells in Table A.2 define elevations below which the bedrock must lie. The locations of the fully penetrating wells are shown in Figures A.1 and A.2 and the locations of non-fully penetrating wells in Figure A.3. Bedrock elevation contours, plotted in Figures A.4 through A.7, are based primarily on the fully penetrating well data (Table A.1). The contours were generated using ordinary linear kriging with a linear variogram. To enhance continuity of the contours along the axis of the basin, in a manner consistent with hand contouring of the data, an anisotropy of 2:1 in the direction N 25 E was specified. In addition to the bedrock contours, Figures A.4 and A.5 show the bedrock elevations associated with the fully penetrating wells, and Figure A.6 the maximum possible bedrock elevations associated with the non-fully penetrating wells. These latter wells were used in the contouring process to constrain the maximum possible bedrock elevation in areas where there are no wells that penetrate to the bedrock. Finally, kriged contours were reconciled to topography and compared with geophysical estimates of bedrock depth as discussed in Section 2.2. Figure A.7 is a map showing bedrock elevation contours on a shaded relief map of the area topography.

Notations from drill logs regarding the degree of cementation or character of the basin fill are included in both Tables A.1 and A.2. Drill logs vary widely in quality and detail, but in most cases were deemed adequate for the purposes of this evaluation. These notations may provide information on the presence of low permeability zones within the basin fill that may coincide with lower basin fill materials such as the Pantano Formation, or that might limit vertical mixing of groundwater.

Bedrock elevation and lithologic data included in the database were compiled from four sources: 1) well logs located through searches of the ADWR 55- and 35-series imaged records databases, 2) IW-, MH-, and M-series well logs included in various hydrology reports (Errol L. Montgomery and Associates (ELMA), 1986a, 1986b, 1991, 1995, 2004a, and 2004b), 3) condemnation and exploration core holes drilled by Duval Corporation in the vicinity of the PDSTI prior to emplacement of tailing, and within an approximately five square mile area north of the PDSTI, and 4) 17 wells and borings in the Twin Buttes Mine area for which logs have not yet been obtained but lithologic, collar elevation, total depth data, and approximate bedrock elevations are available from geologic cross sections through the wells (SRK, 1985).

Surveyed collar or measurement point elevations of wells from the ADWR databases in the bedrock database were obtained from the PDSI database; ELMA (1989, 2004a); and SRK (1985) where available. Collar elevations of other wells were estimated from digital topographic data.

2.2 Comparison of Bedrock Depths from Well Data with Geophysical Survey Estimates

Depth to bedrock and bedrock elevation data obtained from geologic logs of wells were compared to estimated depth to bedrock and bedrock elevation based on two geophysical surveys including 1) a USGS study incorporating magnetic, seismic, and gravity methods (Rystrom, 2003), and 2) a gravity study carried out by HydroGeophysics, Inc. (HydroGeophysics, Inc, 2004). The comparisons were made in order to evaluate the level of agreement between the geophysical estimates and borehole data, and based on the degree of

agreement, to determine whether the geophysical interpretations would be useful in estimating the depth to bedrock in areas where bedrock data from boreholes is sparse or lacking.

2.2.1 USGS Study

Rystrom (2003) uses regional gravity, aeromagnetic and seismic reflection data constrained by surface geology and subsurface borehole data to develop an understanding of the structure of the Tucson Basin, including depth to bedrock. The study area extends from approximately the middle of the eastern margin of the PDSTI northwards towards the city of Tucson. The study area does not include the southernmost end of the PDSTI or the area south of the PDSTI.

Depths to bedrock based on geologic logs of boreholes in the vicinity of the PDSTI and adjacent portions of the southern Tucson Basin were compared to estimated depths to bedrock based on the USGS geophysical study by overlaying the geophysical contours on a depth to bedrock map based on borehole data (Figure A.8). The USGS contour map of bedrock depth below land surface (bls) is contoured in 0.2-kilometer (km) intervals. The metric values were converted to feet (ft) in order to directly compare them with the borehole data.

Reasonably good agreement between geophysical depths and borehole depths to bedrock was found close to the PDSTI. However, to the north of the PDSTI, near the Twin Buttes I-wells, the 0.2 km (656 ft) bls geophysical depth contour does not correlate well with borehole

data. There, well logs indicate the 0.2 km depth bls contour would have to lie further to the east to match known bedrock elevations in that area.

The 0.4 km (1,312 ft) bls depth contour in the Rystrom study falls between wells with bedrock less than 1,312 ft bls and AN-1 with bedrock at 1,960 ft bls, suggesting a good match between the geophysical estimation and the known bedrock depths in this area. One exception is MH-13 which has anomalously deep bedrock compared to other nearby wells.

Two wells, E-3A (D-18-13, section 24) and 74-3 (D-18-13, section 34) (Figure A.1), both located close to the Santa Cruz River channel east and southeast of the PDSTI, intercepted bedrock at 955 ft and 1,185 ft bls, respectively. The locations of these wells are between the 0.4 km (1,312 ft) bls and the 0.6 km (1,968 ft) bls geophysical bedrock depth contours, indicating bedrock is shallower than geophysical data indicates in that area (Figure A.8). The trace of the 0.4 km and 0.6 km geophysical contours indicate a substantial deepening in bedrock to the north of the Twin Buttes Mine complex. Although borehole data here also shows deepening of bedrock to the north, boreholes indicate that the deepening of bedrock occurs further north and at a shallower gradient than indicated by the geophysical depth contours.

On the east side of the basin, along the western flanks of the Santa Rita Mountains, the geophysical depth contours match poorly with borehole and other geological data. The geophysical survey suggests very deep bedrock east of the Santa Cruz River where well data indicate much shallower bedrock. For example, east of the Santa Cruz River at well E-3A, depth to bedrock is 955 ft bls based on borehole data, whereas the geophysical estimate at the location

of well E-3A is approximately 1,600 ft bls. Disparities of greater magnitude are present in the vicinity of wells USDA and 1928, where based on borehole data depth to bedrock is at 85 and 155 ft bls respectively, whereas the geophysical estimate for this area is on the order of 4,500 ft bls (Figure A.8).

2.2.2 HydroGeophysics, Inc. Study

A gravity study by HydroGeophysics, Inc. (2004) was also reviewed. The scope of this study focused on the area between the PDSTI and Interstate 19. Although the bedrock elevation contours reasonably match known bedrock elevations close to the Interceptor Well (IW) well-field along the downgradient (eastern) edge of the tailings, the bedrock elevation contours in the HydroGeophysics study show a greater rate of decrease in bedrock elevation from the PDSTI eastwards towards the center of the basin than is indicated by wells that penetrate bedrock in the area.

2.3 Conclusions

Although the HydroGeophysics study was focused on the PDSTI area and the Rystrom study was more regional in scope, the Rystrom bedrock depths agree more closely with the well data in the immediate PDSTI area. However, away from the PDSTI area, the Rystrom bedrock depths correlate poorly with geologic data from well logs. Because areas away from the PDSTI having low well density were the areas for which the geophysical data were anticipated to be most useful, and because the geophysical data do not appear to be useful in these areas, the

geophysical data were not considered further in generating the bedrock surface. Therefore, the surface presented in Figures A.4 through A.7, which was based entirely on drillhole data, will be used to define the bedrock in the numerical model.

3. HYDRAULIC TEST ANALYSIS AND REVIEW

Hydraulic conductivity data for wells in the vicinity of the PDSTI were compiled and reported in the Work Plan (HGC, 2006). The data and test analysis methods for the hydraulic conductivity data were evaluated for Task 2.1 as a quality assurance check. Also, pumping test data for several wells not reported in HGC (2006) were obtained and evaluated.

Pumping test and slug test data from the BW-, IW-, MH-, and PZ-series wells were obtained from various reports including: ELMA, 1986a; ELMA, 1986b; ELMA, 1991; ELMA, 1994; ELMA and Dames and Moore, 1994; ELMA, 1995; ELMA, 2001; ELMA, 2004a; ELMA, 2004b; ELMA, 2006a; and ELMA, 2006b. Pumping-test data for the GV-series wells, Duval Company wells, and Farmers Investment Company (FICO) wells were obtained from additional sources including Hargis and Montgomery, 1982; Environmental Resources Consultants, 1996; and Schmidt, 2005a.

3.1 Hydraulic Testing Data and Analysis

Pumping and slug test data were generally available as graphs or tables showing drawdown and/or recovery as a function of time. Pumping and slug-test data were analyzed to estimate aquifer properties that included, at a minimum, transmissivity (T) or hydraulic conductivity (K). Pumping test data were analyzed using several methods, with the chosen method(s) dependant on the type of test and available data. Tables A.3 and A.4 provide the estimates from this evaluation.

Pumping tests were typically conducted using either a single, constant discharge rate, or using multiple, increasing discharge rates (constituting a step test). For each test, water-level drawdown and/or recovery measurements were obtained from the pumped well. Most data were available on semi-logarithmic plots showing drawdown and/or recovery versus time. The Cooper-Jacob method was used to analyze data plotted in this fashion provided a straight line could be fit to the data (Cooper and Jacob, 1946).

For cases where a single straight line did not fit all plotted data points, multiple straight lines were fit through different straight-line portions of the data and T estimated for each fit. In these cases, a range of T values, corresponding to different line segments, were then calculated. Changes in slope in the drawdown data on the semi-logarithmic plots could result from aquifer heterogeneities, aquifer boundaries, nearby pumping, or other factors that were not accounted for in the analyses.

Wells for which drawdown and/or recovery, and pumping rate data were available in tables were evaluated by entering the drawdown data into the pumping-test analysis software packages AQTESOLV (HydroSOLVE, Inc, 2000) and/or WHIP (HGC, 1988), a well hydraulics interpretation program developed and marketed by HGC. Values of T were obtained by fitting Cooper-Jacob, Theis, or other appropriate solutions to the drawdown data.

Slug tests were generally conducted at wells having low yields. These wells, which include some of the BW-, M-, MH-, and PZ- series wells, were completed primarily in bedrock

materials. Drawdown data for these tests were typically available as semi-logarithmic plots. Selected data points from straight-line portions of these plots were interpolated and imported into AQTESOLV. Values of K in feet per day were obtained in AQTESOLV by fitting the Bouwer-Rice solution to the drawdown data. Table A.4 summarizes the results of slug test analyses.

3.2 Discussion of Results

In general, the previous estimates of hydraulic properties reported in HGC (2006) were near or within the ranges of the HGC estimates (Tables A.3 and A.4). Test data that were difficult to interpret due to small drawdown or a complicated drawdown pattern were not evaluated for this review. Use of different aquifer models and various line segments in Jacob-Cooper approximations yielded a range in T and K values. The range in hydraulic property estimates is expected given the inherent uncertainties in the analytical methods and the sometimes subjective nature of aquifer test interpretation. The similarity of previously reported hydraulic properties and the hydraulic properties estimated for this data verification indicates the hydraulic property data were developed using appropriate assumptions and are suitable for use in aquifer characterization pursuant to the Work Plan (HGC, 2006). Table A.5 lists the hydraulic conductivity estimates reported by HGC (2006).

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5. LIMITATIONS STATEMENT

The opinions and recommendations presented in this report are based upon the scope of services and information obtained through the performance of the services, as agreed upon by HGC and the party for whom this report was originally prepared. Results of any investigations, tests, or findings presented in this report apply solely to conditions existing at the time HGC's investigative work was performed and are inherently based on and limited to the available data and the extent of the investigation activities. No representation, warranty, or guarantee, express or implied, is intended or given. HGC makes no representation as to the accuracy or completeness of any information provided by other parties not under contract to HGC to the extent that HGC relied upon that information. This report is expressly for the sole and exclusive use of the party for whom this report was originally prepared and for the particular purpose that it was intended. Reuse of this report, or any portion thereof, for other than its intended purpose, or if modified, or if used by third parties, shall be at the sole risk of the user.

TABLES

TABLE A.1
Selected Wells and Borings Drilled to Bedrock in the Vicinity of PDSTI

Location (Cadastral)	Owner	Well Name	ADWR Registration Number	Date Completed	Depth of Boring (ft bls)	Altitude of Land Surface (ft amsl)	Depth to Bedrock (ft bls)	Bedrock Elevation (ft amsl)	Bedrock Lithology	Notes	UTME	UTMN
D-16-12												
31aaa	K.Q.Ranch	574624	574624	04/10/00	380	3587	100	3487	unidentified		485960.5	3540199.1
32aaa	Woerner	87398	87398	05/02/81	380	3550	35	3515	granite		487546.0	3540207.5
33aad	Scott	35-29405	35-29405	12/10/71	810	3502	12	3490	granite		489150.5	3540010.3
33bbb	Kantoma	35-29407	35-29407	03/10/80	490	3501	40	3461	granite		487745.3	3540206.8
33ccb	Pennington	35-29408	35-29408	08/15/79	300	3612	30	3582	granite		487726.8	3539001.1
34aca	Machery	35-78250	35-78250	06/24/79	300	3458	26	3432	granite		490346.0	3539784.3
34bdb	Rogers	35-82799	35-82799	12/07/79	300	3490	40	3450	granite		489733.0	3539784.3
34caa	DeLeon	35-48290	35-48290	09/28/77	180	3495	100	3395	granite		489945.4	3539408.0
34dca	Stevens	35-75289	35-75289	11/24/79	380	3487	56	3431	granite		490341.1	3539005.9
D-16-13												
31acb	ASARCO	Asarco PZ-6	567564	05/02/98	743	3167	222	2945	arkose		494967.6	3539826.3
35aaa	ASARCO	Mis 11	35-72449, 607791	08/17/79	835	2910	820	2090	andesite		502018.4	3540295.0
D-17-12												
01daa	ASARCO	Asarco PZ-1	567567	04/11/98	981	3300	25	3275	arkose	arkose reported at 25'; broken, not hard until 603'	493963.7	3537811.6
16ccc	Ashton	86774	86774	02/20/81	440	3310	35	3275	granite		487729.9	3533972.9
33cac	Nolen	561002	561002	12/22/97	200	3988	3	3985	unidentified	fractured rock	488155.0	3529568.8
36ada	PDSI	M-15	561952	06/11/97	280	3,485.18	114	3371	intrusive		494003.7	3530327.5
36adc1	PDSI	M-17	561953	05/12/97	160	3,486.28	96	3390	intrusive		493849.6	3529974.2
36adc2	PDSI	M-18	561954	07/07/97	110	3,486.13	80	3406	intrusive		493849.6	3529965.8
36bac	PDSI	M-14	561951	06/10/97	205	3,539.01	10	3529	intrusive		493141.1	3530339.5
D-17-13												
02abb	Pima Mining Co.	#7	35-30442, 616151	09/25/66	960	2780e	950	1830	green volcanic	short intervals of hard conglomerate	501400.0	3538662.7
06cab	ASARCO	Asarco PZ-2	567562	04/13/98	603	3,285.00	170	3115	arkose		494559.3	3537815.9
06dba	ASARCO	Asarco PZ-3	567563	04/15/98	594	3,230.00	195	3035	arkose		495154.8	3537821.3
10aaa	State of Arizona	#11	35-30446, 616154	05/13/69	600	2875e	565	2310	unidentified	"hard pack, sticky clay" 530-565'	500393.3	3537074.5
10bba	State of Arizona	#16	35-30447, 616155	Jun-70	502	2960e	425	2535	limestone		499180.7	3537057.1
13abb	FICO	S-51	35-39803, 624000	11/24/74	1,255	2710e	1230	1480	granite	cemented gravel above granite 1150-1230'	503017.3	3535471.2
13cdd	Anaconda	35-30460	35-30460, 608520	08/05/67	1,735	2742	1723	1019	unidentified	hard sand and gravel 810-950', and 1606-1723'	502826.6	3534060.2
15aaa	Cyprus Pima	514345	514345	06/11/82	1,764	2910e	150	2760	lithic arenite		500393.4	3535481.3
15add	ASARCO	MW-1	531806	06/06/91	710	2910e	670	2240	sandstone		500395.1	3534873.3
17adc	Bentley	211301	211301	08/08/06	505	3250e	20	3230	unidentified		496989.1	3534839.3
17add	McCouley	516739	516739	02/13/87	380	3220e	260	2960	unidentified	gray soft rock, underlain by granite	497190.8	3534842.7
17cba	Blackwell	507102	507102	02/12/84	380	3220e	270	2950	unidentified	gray rock	495984.4	3534621.9
17cccd	Goretski	518865	518865	10/05/87	465	3200e	450	2750	unidentified		496797.2	3534034.1
18abd	Anderson	542330	542330	02/11/94	405	3300e	230	3070	unidentified		495177.8	3535211.6
18cdb	Roberts	516128	516128	11/30/86	400	3360e	4	3356	shale		494596.4	3534204.5
18dba	Anderson	542329	542329	02/16/94	430	3300e	240	3060	red rock and limestone		495186.7	3534611.4
20ddc	Park Corporation	M-3	085305	08/04/80	700	3,210.20	397	2813	sedimentary rock	Permian sediments, undifferentiated	497000.1	3532375.8
21ada	Kerley Chemical	35-30479	35-30479	03/04/70	668	3060e	80	2980	limestone		496989.1	3534839.3
21bdb	Anamax	1782	506255	03/30/83	686	3080e	510	2570	black limestone	Permian Concha and Rain Valley Formations	498428.2	3532844.8
22baa	Schilling Trust	903933	903933	02/23/06	800	2990e	281	2709	alluvium		499607.1	3533853.6
22cad	Park Corporation	M-2	85304	07/27/80	647	2,992	490	2502	sedimentary rock	Mesozoic, undifferentiated	499583.2	3532755.7
25bab	FICO	S-46	35-28041	01/16/74	1,615	2,772	1580	1192	granite	hard black rock layer 1520-1535'	502575.6	353292.4
25cccd	PDSI	AN-1	608518	07/12/64	2,786	2789	1960	829	arkose	Helmet Fanglomerate above arkose 1300-1960'	502503.0	3530807.6

TABLE A.1
Selected Wells and Borings Drilled to Bedrock in the Vicinity of PDSTI

Location (Cadastral)	Owner	Well Name	ADWR Registration Number	Date Completed	Depth of Boring (ft bsl)	Altitude of Land Surface (ft amsl)	Depth to Bedrock (ft bsl)	Bedrock Elevation (ft amsl)	Bedrock Lithology	Notes	UTME	UTMN
27aab	Park Corporation	M-12	504722	04/19/83	582	2947	570	2377	unidentified		500185.4	3532296.9
27baa	Park Corporation	1758	634392	02/15/78	650	2985	385e	2600	sedimentary rock	Mesozoic, undifferentiated	499677.5	3532099.0
27dcc2	Park Corporation	RT-1	504946	12/08/80	985	2980	930	2050	arkose		499872.0	3530774.6
31bcd	PDSI	M-16	561955	06/12/97	205	3454.89	130	3325	intrusive		494368.1	3529903.5
33aaa	Park Corporation	M-13	508428	08/04/84	753	3077.00	735	2342	sedimentary rock	Mesozoic, undifferentiated	498789.3	3530814.2
33cac	Park Corporation	511894	511894	Sep-85	664	3160e	618	2542	limestone		497833.2	3529618.6
34bdd2	Park Corporation	M-10	501653	11/21/1981	1,050	3004.39	1030	1974	arkose		499720.4	3529946.6
D-18-12												
10cdb	PDSI	PZ-6	561867	06/04/97	80	3765.56	20	3745	intrusive	Ruby Star Granodiorite	489716.9	3526192.0
10dad	PDSI	PZ-5	561868	06/02/97	70	3602.31	0	3602	intrusive	Ruby Star Granodiorite	490931.3	3526148.0
10ddc	PDSI	PZ-4	561869	05/30/97	70	3612.68	0	3613	intrusive	Ruby Star Granodiorite	490637.0	3525902.4
11bbc	PDSI	MH-21	561881	06/03/97	100	3693.67	0	3694	intrusive	Ruby Star Granodiorite	491083.2	3527233.7
11dda	PDSI	PZ-7	561870	06/05/97	155	3546.48	110	3436	intrusive	Ruby Star Granodiorite	492594.4	3526161.0
13bda	PDSI	PZ-9	561859	06/16/97	230	3505.08	210	3295	intrusive	Ruby Star Granodiorite	493241.1	3525372.2
14bdb1	PDSI	BW-3	528095	06/05/90	95	3540.29	25	3515	intrusive	Ruby Star Granodiorite	491456.7	3525376.8
14bdb2	PDSI	BW-4	537576	07/01/93	20	3530.04	7	3523	unidentified		491386.4	3525323.9
14cd1	PDSI	MH-22	561872	06/06/97	20	3511.65	17	3495	andesite	Demetrie Volcanics	491572.2	3525144.1
14cd2	PDSI	MH-23	561871	06/17/97	80	3515.28	7	3508	andesite	Demetrie Volcanics	491575.4	3525167.2
15ada	PDSI	PZ-3	561860	05/29/97	100	3592.89	0	3592	intrusive	Ruby Star	490873.0	3525368.9
15caa	PDSI	PZ-2	561861	05/28/97	110	3759.69	10	3749	intrusive	Ruby Star	489939.4	3524863.0
16dbb	PDSI	PZ-10	561862	07/08/97	150	4011.73	80	3931	volcanic	Ox Frame Volcanics	488613.4	3524969.6
16dbc	PDSI	PZ-11	none	07/11/97	275	4039.23	200	3839	intrusive	quartz latite	488604.1	3524765.3
16ddd	PDSI	BW-1	528096	05/31/90	125	3813.54	6	3807	volcanic	Demetrie Volcanics	489188.4	3524385.4
17cda	PDSI	PZ-12	561846	07/15/97	200	4110.79	40	4070	volcanic	Ox Frame Volcanics	486741.4	3524523.1
19bab	PDSI	MH-17	561873	05/18/97	110	4137.55	0	4137	intrusive	Harris Ranch	484966.7	3524090.6
20dda	PDSI	PZ-16	580712	05/31/00	81	3723.6	12	3711	volcanic	Demetrie Volcanics	487637.9	3522945.1
21acc1	PDSI	PZ-13	561875	06/26/97	30	3701.75	0	3701.75	volcanic	Demetrie Volcanics	488613.0	3523631.6
21acc2	PDSI	PZ-14	561876	06/30/97	84	3711.81	0	3711.81	volcanic	Demetrie Volcanics	488625.0	3523638.6
21acc3	PDSI	PZ-15	561877	06/25/97	130	3719.32	0	3719.32	volcanic	Demetrie Volcanics	488641.7	3523643.3
21dac	PDSI	BW-2	528097	06/01/90	300	3636.47	12	3624	volcanic	Demetrie Volcanics	489039.7	3523082.0
21dda	PDSI	MH-20	561880	05/23/97	180	3609.39	7	3602	volcanic	Demetrie Volcanics	489214.0	3522907.7
24bac	PDSI	PZ-8	561866	06/06/97	280	3477.37	10	3467	volcanic	Demetrie Volcanics	493033.9	3523999.7
D-18-13												
01aab	Robson Ranch	608521	35-25944, 608521	07/27/74	1,800	2564	1705	859	unidentified	first rock reported @ 1635'	503460.8	3528992.3
04acc2	Park Corporation	I-12	608523	08/11/78	1,019	3327.80	945	2383	porphyry		498171.0	3528381.0
04acc3	Park Corporation	I-13	87309	08/26/82	1,167	3226	937	2289	unidentified	"rock" @ 937'; "hard rock" @ 1127'	498256.6	3528308.0
04bdc1	Park Corporation	I-6	608529	10/16/75	950	3110.50	770	2340	arkose		497690.0	3528238.0
04bdc2	Park Corporation	I-7	608528	05/07/76	980	3204.10	780	2424	intrusive		497868.0	3528335.0
04bdc3	Park Corporation	I-9	608526	05/20/76	900	3207	690	2517	arkose		497884.0	3528476.0
04caa	Park Corporation	I-11	608524	01/18/77	1,045	3327	924	2403	arkose		497981.0	3528289.0
04cab1	Park Corporation	I-8	608527	04/28/76	954	3207	730	2477	arkose and quartzite		497840.3	3528190.0
04cab2	Park Corporation	I-10	608525	11/27/76	932	3203.20	763	2440	intrusive		497859.0	3528272.0
09aaa	AZ State Land Dept.	MH-26C	208428	05/17/06	922	3062	810	2252	arkose and quartzite		498926.4	3527610.3
09dda	AZ State Land Dept.	MH-25C	208426	11/10/05	1,121	3069.28	940	2129	sedimentary rock	Mesozoic, undifferentiated	498935.8	3526294.6
16bbb	PDSI	MH-1	803629	11/19/75	524	3176.28	520 est.	2625	arkose	log indicates transition from basin fill to arkose by 520'	497433.6	3525676.4
16bbc	PDSI	IW-21	545564	02/12/95	620	3168.38	520	2648	arkose	layer of Pantano Formation above arkose	497435.7	3525576.8
16bcb	PDSI	IW-20	545563	02/05/95	506	3161.22	470	2691	arkose	layer of Pantano Formation above arkose	497425.9	3525372.3
16bcc2	PDSI	MH-14	528098	06/12/90	561	3150.77	540	2611	arkose	layer of Pantano Formation above arkose	497578.8	3525072.9

TABLE A.1
Selected Wells and Borings Drilled to Bedrock in the Vicinity of PDSTI

Location (Cadastral)	Owner	Well Name	ADWR Registration Number	Date Completed	Depth of Boring (ft bls)	Altitude of Land Surface (ft amsl)	Depth to Bedrock (ft bls)	Bedrock Elevation (ft amsl)	Bedrock Lithology	Notes	UTME	UTMN
16bcc3	PDSI	IW-19	545562	01/30/95	544	3152.40	497	2655	arkose	layer of Pantano Formation above arkose	497434.8	3525146.9
16ccb	PDSI	IW-18	545561	01/24/95	508	3168.16	462	2706	arkose		497435.2	3524973.3
16cbc	PDSI	IW-17	545560	01/20/95	502	3157.77	455	2703	arkose		497434.9	3524806.4
16ccb	PDSI	IW-16	545559	01/15/95	473	3159.86	430	2730	arkose		497431.8	3524586.4
16ccc	PDSI	IW-15	545558	01/07/95	550	3149.03	507	2642	arkose	layer of Pantano Formation above arkose	497434.0	3524370.8
16daa	AZ State Land Dept.	MH-12	803638	Feb-77	800	3054.07	780	2274	limestone		498833.3	3525010.5
16ddd	AZ State Land Dept.	MH-11	803637	Feb-77	820	3040.30	750	2290	limestone		498810.6	3524267.2
17aba	AZ State Land Dept.	MH-30	903884	01/21/06	547	3166	460	2706	arkose, siltstone		496750.4	3525913.5
21add	AZ State Land Dept.	MH-13C	90473	03/06/06	1,447	3022.96	1395	1628	calcareous claystone		498858.6	3523596.6
21bbb1	PDSI	MH-4	803631	03/02/76	550	3,136.63	510	2627	micritic limestone		497565.5	3524255.9
21bbb2	PDSI	IW-14	545557	12/18/94	553	3,143.43	509	2634	arkose	Pantano Formation 481-490'	497428.3	3524176.6
21bbc	PDSI	IW-13	545556	12/12/94	499	3,140.36	452	2688	arkose		497425.0	3523970.2
21bcc3	PDSI	IW-6A	545565	11/29/94	498	3,129.27	458	2671	arkose		497442.4	3523512.3
21ccb	PDSI	IW-11	508235	08/24/84	605	3,124.21	563	2561	volcanics and sandstone		497432.6	3523232.4
21cbc3	PDSI	IW-22	200554	12/19/03	592	3125e	550	2575	conglomeratic sandstone		497430.7	3523077.1
21ccb1	PDSI	IW-10	508237	08/15/84	843	3,126.65	730	2396	unidentified	hard maroon and white rock	497431.5	3522925.7
21ccb2	PDSI	IW-23	200555	01/18/04	974	3130e	960	2170	volcanic	Demetrie Volcanics	497430.4	3522774.3
21ccc	PDSI	IW-5	623133	06/13/79	956	3,134.66	550	2585	volcanic	Demetrie Volcanics	497430.7	3522618.4
24ccb	FICO	E-3A	35-30226, 624011	07/15/75	1,100	2,718	955	1763	unidentified		502295.3	3523738.6
28bbb2	PDSI	MH-6	803633	Apr-76	960	3,130.98	590	2540	limestone		497497.9	3522574.0
28bbb3	PDSI	IW-24	200556	01/03/04	884	3132e	870	2262	volcanic	decomposed granodiorite and volcanics, 410-870'	497432.8	3522437.1
28bbc	PDSI	IW-4	623132	07/23/78	946	3,134.07	920	2214	volcanic	mixed variable hard to soft Demetrie Volcanics, intrusive, sediments 490-920	497432.9	3522269.4
28bcc2	PDSI	IW-9	508238	08/06/84	853	3,099.98	740	2247	volcanic	Demetrie Volcanics fractured and altered to clay	497430.9	3521924.3
28ccb1	PDSI	MH-7	803634	04/01/76	1,100	3,108.24	1070	2038	volcanic	Demetrie Volcanics	497424.4	3522011.3
28ccb2	PDSI	IW-8	508236	Aug-84	803	3,119.20	754	2365	volcanic	Demetrie Volcanics	497429.4	3521824.1
28ccb2	PDSI	IW-3A	201732	02/03/04	1,052	3,117	1010	2107	volcanic	top of Demetrie Volcanics (altered) 820-1010'	497427.4	3521526.2
28ccc	PDSI	IW-2	623130	05/18/98	1,035	3,098	1028	2070	siltstone		497546.6	3521164.1
28cccd2	PDSI	MH-2	35-34590	11/26/75	1,040	3,097	1020	2077	basalt		497702.7	3521113.6
29cdd1	PDSI	MH-9	803635	Jul-76	1,400	3159.58	1300	1860	tuffaceous arkose		496499.4	3521056.2
29cdd2	PDSI	IW-7	623135	Sep-79	1,050	3161.00	380	2781	unidentified		496488.7	3521110.1
29cdd	PDSI	IW-1	623129	07/31/78	855	3141	760	2381	volcanic	Demetrie Volcanics	496967.0	3521081.3
29ddc	PDSI	MH-8	35-37551	06/17/76	1,065	3125	1020	2105	volcanic	Demetrie Volcanics	497036.6	3521069.0
30ddd	PDSI	MH-10	803636	Feb-77	600	3184.85	430	2755	arkose		495778.9	3521040.4
34dca	FICO	W-11	35-26757, 624025	02/12/74	1,186	2900e	1185	1715	granite		500124.5	3519733.4

TABLE A.1
Selected Wells and Borings Drilled to Bedrock in the Vicinity of PDSTI

Location (Cadastral)	Owner	Well Name	ADWR Registration Number	Date Completed	Depth of Boring (ft bls)	Altitude of Land Surface (ft amsl)	Depth to Bedrock (ft bls)	Bedrock Elevation (ft amsl)	Bedrock Lithology	Notes	UTME	UTMN
D-18-15												
14aac	Santa Rita Mining Co.	SR Mining	none	06/22/71	203	4260	0	4260	unidentified gray rock		521262.8	3526229.3
15bac	Anamax	1928	501990	02/09/82	185	3894	155	3739	limestone		518831.7	3526241.2
16aad	USDA Forest Service	USDA	none	05/15/70	110	3868	85	3783	granite		518216.7	3526131.9
22cdb	Pallanes	35-41917	35-41917, 640317	06/20/77	600	4218	35	4183	granite		518823.2	3523629.0
27bbb	Lansky	201898	201898	02/16/04	600	4155	150	4005	granite		518421.4	3523225.5
34daa	Anamax	1930	501985	02/14/82	350	4940	0	4940	granite		519836.1	3520802.9
D-19-14												
21ada	Kettenbach	210526	210526	07/28/06	1320	3653	3	3650	granite		508784.7	3514268.6
22aab	Ludwig	594970	594970	04/23/03	320	3862	115	3747	granite		510193.8	3514675.5
22aac	Ludwig	594971	594971	04/25/03	180	3890	170	3720	granite	cemented sand and gravel 118-170'	510192.5	3514473.7
22aad	Ludwig	590963	590963	06/15/02	200	3886	185	3701	granite	broken sandstone above granite 170-185'	510393.7	3514474.3
22dda	Thomasson	540132	540132	08/24/93	150	4051	120	3931	granite		510386.6	3513468.0
27cad	Barber	585087	585087	10/08/01	210	4134	40	4094	granite		509392.1	3512060.6
28dad	La Sierra Ranch	212561	212561	07/14/06	200	4017	90	3927	granite		508794.7	3512064.5
30ccd	Desmond	552649	552649	Jan-96	525	3420	0	3420	granite		504223.2	3511668.1
Twin Buttes Area Well Data, SRK (1985) ¹												
D-18-13												
3a	Park Corporation	A-462			1516	2981	1231	1750	sedimentary rock	Mesozoic, undifferentiated	499897.3	3528822.1
4a	Park Corporation	1393			1363	3293	793	2500	sedimentary rock	Mesozoic, undifferentiated	498179.4	3528819.5
4b	Park Corporation	CH-15			1351	3220	595	2625	sedimentary rock	Mesozoic, undifferentiated	497938.7	3528555.7
D-17-13												
21c	Park Corporation	1308			1160	3133.5	133.5	3000	limestone		497854.7	3532838.2
22c	Park Corporation	1790			620	3041.3	391.3	2650	sedimentary rock	Mesozoic, undifferentiated	498961.0	3532798.4
22c	Park Corporation	1781			600	2982.6	482.6	2500	sedimentary rock	Mesozoic, undifferentiated	499667.2	3532748.1
22d	Park Corporation	71-1			500	2958	408	2550	sedimentary rock	Mesozoic, undifferentiated	500015.7	3533084.4
22d	Park Corporation	1789			620	2935.9	535.9	2400	sedimentary rock	Mesozoic, undifferentiated	500305.1	3532373.7
27c	Park Corporation	CH-8			955	3042	617	2425	sedimentary rock	Mesozoic, undifferentiated	499119.4	3530854.7
27d	Park Corporation	A-486			2040	2980	905	2075	sedimentary rock	Mesozoic, undifferentiated	499797.0	3531138.8
27d	Park Corporation	P-866			1175	2983.3	933.3	2050	sedimentary rock	Mesozoic, undifferentiated	499822.3	3530791.5
28b	Park Corporation	A-421			925	3122	672	2450	limestone		498013.6	3532299.3
28c	Park Corporation	A-944			1430	3135	510	2625	sedimentary rock	Mesozoic, undifferentiated	498001.0	3531051.6
28cc	Park Corporation	CH-2			609	3185	585	2600	sedimentary rock	Permian, undifferentiated	497334.1	3530797.1
28d	Park Corporation	A-952			1436	3081.6	581.6	2500	sedimentary rock	Mesozoic, undifferentiated	498601.6	3531023.4
28d	Park Corporation	CH-1			620	3107	557	2550	sedimentary rock	Mesozoic, undifferentiated	498320.2	3530840.6
33b	Park Corporation	2118			666	3120	620	2500	sedimentary rock	Mesozoic, undifferentiated	497967.3	3530736.6
Altitude of Bedrock from Selected Core Holes in and Adjacent to the PDSTI (ELMA, 1989)												
D-18-12												
24aac	PDSI	S-1	none			3350	170	3180			493897.1	3523864.0
24acc	PDSI	561	none			3400	25	3375			493369.0	3523459.9
24ada	PDSI	D-3	none			3350	330	3020			494022.9	3523276.1
24dca	PDSI	S-4	none			3350	95	3255			493534.1	3522832.9
25aaa	PDSI	D-14	none	Sep-65		3331	262	3069	andesite		494092.0	3522432.0
36aa	PDSI	D-17	none			3300	135	3165			494057.0	3520889.0

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Selected Wells and Borings Drilled to Bedrock in the Vicinity of PDSTI

Location (Cadastral)	Owner	Well Name	ADWR Registration Number	Date Completed	Depth of Boring (ft bsl)	Altitude of Land Surface (ft amsl)	Depth to Bedrock (ft bsl)	Bedrock Elevation (ft amsl)	Bedrock Lithology	Notes	UTME	UTMN
D-18-13												
7acc	PDSI	A-986	none			3385	139	3246			495055.1	3526797.0
7adc	PDSI	A-402	none			3355	406	2949			495527.1	3526800.9
7bcc	PDSI	A-403	none			3460	95	3365			494243.0	3526824.8
7cbb	PDSI	A-478	none			3420	103	3317			494280.9	3526593.0
7ddc	PDSI	Z-5	none			3330	219	3111			495425.9	3525972.1
8aba	PDSI	A-419	none			3262	550	2712			496638.1	3527324.1
8acb	PDSI	166	none			3415	540	2875			496561.9	3526921.0
8adb	PDSI	A-407	none			3240	610	2630			496993.2	3526861.0
8bbb	PDSI	288	none			3336	299	3037			495856.0	3527325.8
8bca	PDSI	A-454	none			3495	619	2876			496025.1	3526948.2
8bcd	PDSI	165	none			3540	519	3021			496127.0	3526656.0
8cad	PDSI	574-X	none			3320	310	3010			496411.1	3526418.0
8ccb	PDSI	Z-6	none			3298	341	2957			495915.9	3526122.1
8ccd	PDSI	1195	none			3303	300	3003			496026.9	3525949.9
9aaa	PDSI	P-7	none			3071	810	2261			498906.1	3527407.0
9aba	PDSI	1226	none			3110	760	2350			498456.0	3527369.1
9baa	PDSI	P-2	none			3120	700	2420			498142.1	3527358.9
9bbb	PDSI	P-1	none			3190	555	2635			497424.9	3527435.1
9bca	PDSI	1324	none			3173	631	2542			497667.1	3526962.9
9bdb	PDSI	13	none			3170	667	2503			497804.1	3526874.0
9bdd	PDSI	1087	none			3142	700	2442			498072.0	3526924.1
9cab	PDSI	1240	none			3170	645	2525			497874.1	3526512.0
9dba	PDSI	1257	none			3100	760	2340			498442.1	3526554.1
16aca	PDSI	P-12	none			3070	804	2266			498476.1	3525329.7
16baa	PDSI	P-10	none			3130	674	2456			498057.1	3525733.6
16bab	PDSI	P-11	none			3150	703	2447			497847.6	3525733.6
17aba	PDSI	D-1	none			3039	310	2729			496844.0	3525763.9
17bab	PDSI	569	none			3275	355	2920			496280.0	3525790.0
17bcb	PDSI	CFI-3	none			3310	299	3011			495740.1	3525361.8
17bdd	PDSI	Z-3	none			3225	410	2815			496447.1	3525199.9
17ccc	PDSI	D-6	none			3267	448	2819			495781.9	3524246.9
17dab	PDSI	4	none			3165	460	2705			497074.2	3524906.9
17dca	PDSI	551	none			3170	356	2814			496930.1	3524552.0
18aab	PDSI	572	none			3340	295	3045			495398.1	3525779.1
18aca	PDSI	Z-2	none			3330	211	3119			495237.0	3525360.0
18acb	PDSI	26	none			3350	191	3159			495004.9	3525258.1

TABLE A.1
Selected Wells and Borings Drilled to Bedrock in the Vicinity of PDSTI

Location (Cadastral)	Owner	Well Name	ADWR Registration Number	Date Completed	Depth of Boring (ft bls)	Altitude of Land Surface (ft amsl)	Depth to Bedrock (ft bls)	Bedrock Elevation (ft amsl) ¹	Bedrock Lithology	Notes	UTME	UTMN
18cdb	PDSI	16	none			3350	225	3125			494609.1	3524389.1
18ccdd	PDSI	D-5	none			3350	225	3125			494871.1	3524250.0
19abc	PDSI	25	none			3300	207	3093			495024.1	3523821.0
19acc	PDSI	10	none			3300	260	3040			494969.1	3523549.9
19acd	PDSI	D-2	none			3280	234	3046			495216.9	3523415.9
19ada	PDSI	558	none			3250	263	2987			495709.9	3523667.1
19bac	PDSI	36	none			3320	232	3088			494670.0	3523888.8
19bbc	PDSI	8	none			3350	200	3150			494293.1	3523853.9
19bda	PDSI	557	none			3300	263	3037			494779.0	3523627.1
19cac	PDSI	28	none			3300	206	3094			494582.1	3523069.0
19ccb	PDSI	563	none			3350	323	3027			494325.1	3523379.9
19cdb	PDSI	560	none			3310	200	3110			494615.9	3522853.9
19dbc	PDSI	18	none			3275	210	3065			495020.0	3523185.1
19dbd	PDSI	2	none			3260	353	2907			495343.1	3523057.1
19dcbb	PDSI	11	none			3280	215	3065			495010.1	3522953.0
19dcc1	PDSI	12	none			3272	228	3044			495140.9	3522596.9
19dda	PDSI	20	none			3225	281	2944			495780.1	3522920.0
19ddd	PDSI	19	none			3219	258	2961			495762.1	3522626.1
20adc	PDSI	7	none			3150	445	2705			497084.1	3523493.1
20bbc	PDSI	30	none			3250	265	2985			495799.0	3523892.1
20bca	PDSI	6	none			3240	300	2940			495979.9	3523674.9
20bda	PDSI	37	none			3200	335	2865			496441.1	3523696.9
20cac	PDSI	D-20	none			3190	316	2874			496277.0	3523098.0
20cca	PDSI	D-4	none			3210	300	2910			496067.9	3522906.0
20cda	PDSI	23	none			3175	337	2838			496492.1	3522843.0
20daa	PDSI	553	none			3110	613	2497			497286.8	3523331.0
29baa	PDSI	3	none			3200	376	2824			496498.1	3522541.0
29bbd	PDSI	38	none			3200	330	2870			496150.9	3522412.0
29bca	PDSI	D-7	none			3200	331	2869			496032.1	3522124.1
29bda	PDSI	D-21	none			3150	331	2819			496521.0	3522188.0
29cdb	PDSI	555	none			3190	700	2490			496343.0	3521379.9
29ddb	PDSI	39	none			3140	400	2740			496803.1	3521745.9
29ddb	PDSI	D-18	none			3120	1197	1923			497100.4	3521313.2
30aab	PDSI	31	none			3250	237	3013			495446.9	3522540.1
30aad	PDSI	22	none			3220	263	2957			495797.0	3522287.9
30abb	PDSI	9	none			3270	184	3086			494978.9	3522580.9
30bda	PDSI	556	none			3275	253	3022			494870.9	3522097.1
30bcc	PDSI	559	none			3280	373	2907			494268.1	3521820.0
30cda	PDSI	14	none			3250	168	3082			494953.1	3521324.9
30dad	PDSI	D-8	none			3200	345	2855			495659.9	3521498.1
30dbc	PDSI	565	none			3250	373	2877			495171.1	3521597.9
31aaa	PDSI	D-9	none			3200	330	2870			495720.0	3520921.1

Notes:

ft bls = feet below surface

ft amsl = feet above mean sea level. Measuring point elevations are reported for some PDSI wells.

¹ bedrock elevations estimated to the nearest 25' based on cross sections by SRK (1985)

TABLE A.2
Selected Wells Completed in Basin Fill in the Vicinity of PDSTI (Not Drilled to Bedrock)

Location (Cadastral)	Owner	Well Name	ADWR Registration Number	Date Completed	Depth Drilled (ft bbls)	Altitude of Land Surface (ft amsl)	Maximum Elevation of Bedrock (ft amsl)	Lithology at Total Depth	Selected Notes from Well Completion Reports	UTME	UTMN
D-16-13											
26aaa	ASARCO	SX-1	35-67750, 55-607792	03/01/76	825	2688	< 1863	clay		502014.9	3541911.5
26add	ASARCO	SX-2	35-66751, 55-607793	07/12/76	744	2701	< 1957	clay		502016.9	3541305.5
26caa	ASARCO	SX-3	35-67752, 55-607794	10/01/75	739	2743	< 2004	conglomerate		501209.3	3541105.8
34aab	ASARCO	ASARCO M-5	607785	10/16/71	935	2820	< 1885	hard clay and gravel	cemented conglomerate and hard clay and gravel 674-933'	500201.2	3540291.3
35bbb	ASARCO	ASARCO M-6	35-67755, 55-607787	03/09/60	500	2790	< 2290	conglomerate	265-420'; conglomerate 420-500'	500603.4	3540297.4
35bdd	ASARCO	ASARCO M-10	607790	10/02/72	835	2771	< 1936	conglomerate with clay layers		501205.1	3539682.2
35bab	ASARCO	ASARCO M-7	35-67754, 55-607788	04/28/60	500	2770	< 2270	gravel and clay	cemented, caliche 330-445', tight clay and gravel, 445-500'	501007.9	3540297.1
36baa	ASARCO	529538	529538	01/17/91	860	2725	< 1865	sand and gravel		502815.0	3540298.2
36bdc	ASARCO	ASARCO M-14	532046	08/17/91	900	2710	< 1810	basin fill		502615.6	3539686.8
D-16-14											
30dbd	Lee Moore Ranch	35-29585	35-29585	Apr-71	251	2650	< 2599	red sandy clay	cemented sand intervals 165-235'	504799.8	3540893.8
30ccc	ASARCO	35-32068	35-32068, 55-607797	04/23/76	397	2657	< 2260	sticky clay	hard conglomerate 270-290'	503805.6	3540505.5
30ccdd	ASARCO	35-29580	3529580	10/2/1972	835	2656	< 1821	conglomerate with clay layers		504002.6	3540506.0
31dcdd	FICO	Sah. #6	35-29598	Jul-1914	248	2670	< 2422	hard, dry clay	hard clay w/gravel 228-248'	504799.8	3538876.0
31aad	Roisland Farms	35-29589	35-29589, 55-607815	Feb-61	475	2660	< 2185	red sticky clay	cemented gravel 185-200; 295-315'	505189.7	3540106.7
31cda	Rancho Oro Verde	35-29596	35-29596	Jul-1914	346	2667	< 2321	loose sand	interbedded clay and cemented sand 215-334'	504408.7	3539077.8
31ddd	FICO	Sah. #5	35-29599	Jul-1914	462	2673	< 2211	clay		505190.9	3538876.0
32abd	Levis	35-29300	35-29300	01/12/58	355	2671	< 2316	sticky red clay	sticky red clay 240-300'	506396.2	3540107.9
32bdd	Griffen	35-29603	35-29303	Sep-47	253	2667	< 2414	sticky red clay		505996.4	3539683.2
33bdd	City of Tucson	35-29610	35-29610	04/03/73	826	2696	< 1870	sticky red clay	sticky clay with occasional gypsum 620-826'	507614.3	3539683.2
D-16-15											
06bbb	MUM Agency	SE 13-75	35-29615	10/17/75	932	2819	< 1887	clay	soft to dense to chippy clay 566-932'	513415.9	3548509.1
08ccc	MUM Agency	SE 5-75	35-29617	11/12/75	1,103	2869	< 1766	clay	soft to dense to chippy clay 712-1103'	514988.9	3545741.7
09bbb	City of Tucson	35-29618	35-29618, 55-619870	10/12/67	1,000	2911	< 1911	clay, sand and gravel		516673.9	3547165.8
10ccc	City of Tucson	35-29619	35-29619	05/02/66	2,998	2969	< 29	well cemented multi-lithic conglomerate		518192.1	3545723.3
13ccc	MUM Agency	SE 7-75	35-40029	02/10/76	1,020	3082	< 2062	sandy clay		521384.8	3544092.9
14cab	So. Ariz. International Livestock Association	35-29622	35-29622	05/31/66	905	3040	< 2135	sticky clay		520188.2	3544721.1
16bbb	MUM Agency	SE 6-75	35-29623	11/29/75	870	2921	< 2051	clay	dense clay and fine sand 550-736', mostly well-cemented; soft to dense clay w/ minor sand 736-870', strongly cemented towards bottom of well	516577.4	3545542.2
22bbb	MUM Agency	SE 9-75	35-33978	12/10/75	892	2983	< 2091	clayey conglomerate	tightly cemented clayey sandy conglomerate 535-892'	518186.9	3543937.2
23bbb	MUM Agency	SE 10-75	35-33969	09/09/75	1,055	3031	< 1976	well-cemented gravelly sand	tightly cemented with no production capacity below 580'	519783.3	3543937.2
26ddd	MUM Agency	SE 14-75	35-29629	02/19/75	1,117	3137	< 2020	conglomerate	water production from loose conglomerate 357-560'; polyolithic tight conglomerate 560-1116'	521184.6	3540957.1
28ddd	MUM Agency	SE 8-75	35-33977	03/19/76	1,015	3003	< 1988	clayey sand	clayey sand 747-1015'	517984.4	3540945.2
29aaa	MUM Agency	SE 11-75	35-40030	01/16/76	843	2933	< 2090	clay and gravelly sand		516383.2	3542334.0
30ddd	MUM Agency	SE 12-75	35-40032	03/12/76	1,007	2890	< 1883	dense to sandy clay	strongly cemented dense to sandy clay 970-1007'	514782.0	3540945.2
34aaa	Spring Valley Water Co.	35-29635	35-29635, 55-619865	01/31/63	704	3080	< 2376	firm conglomerate	firm conglomerate 690-703'	519681.8	3540721.7

TABLE A.2
Selected Wells Completed in Basin Fill in the Vicinity of PDSTI (Not Drilled to Bedrock)

Location (Cadastral)	Owner	Well Name	ADWR Registration Number	Date Completed	Depth Drilled (ft bbls)	Altitude of Land Surface (ft amsl)	Maximum Elevation of Bedrock (ft amsl)	Lithology at Total Depth	Selected Notes from Well Completion Reports	UTME	UTMN
D-17-12											
24dcc	Sombrero Land & Cattle	571048	571048	01/21/99	1,300	3483	< 2183	basin fill		493413.6	3532405.2
26b	Las Quintas Serenas	na			407	3672	< 3265			491308.8	3531892.4
33dac	Nolen	561002	561002	12/22/97	350	3952	< 3602	clay conglomerate		488155.0	3529568.8
D-17-13											
01acc	Pima Mining Co.	PMC #14	611142	10/09/70	1,135	2700	< 1565	hard conglomerate	hard conglomerate 1133-1135'	503413.8	3536870.3
02aaa	Pima Mining Co.	PMC #6	35-30441, 55-616150	07/07/66	1,000	2,749	< 1749	basin fill	cemented gravel 975-990'	502007.3	3538664.8
02add	Pima Mining Co.	PMC #8	35-30443, 55-616152	12/15/66	1,154	2,760	< 1606	hard conglomerate	13-15' intervals of cemented sand/gravel @ 280-305' and 560-573'; hard conglomerate 1140-1154'	502009.0	3538070.1
02ddd	Pima Mining Co.	PMC #9	35-30444, 55-616153	04/26/68	1,256	2,775	< 1519	clay	rock layer 1240-1241'	502011.2	3537277.5
03cad		1788			600	2,997	< 2397	Pantano Formation	Pantano Formation ~ 500'		
11ddc	Rancho Sahuarita Water	562962	562962	09/26/97	500	2820	< 2320	basin fill		501619.6	3535675.2
11dd	Sahuarita School District	605342	35-84499, 55-605342	06/01/80	808	2785	< 1977	basin fill		501924.2	3535773.5
20ccdd	Park Corporation	M-4	085306	08/08/80	609	3257	< 2648	basin fill	alluvium 0-325'; conglomerate w/water 305-609'; top of Pantano Formation ~350'	496424.0	3532387.3
22aaa	Graham	635296	35-30482, 55-635296	11/09/73	447	2927	< 2480	basin fill	gravel 355-447'	500399.1	3533862.8
24acc	FICO	S-25A	623985	01/14/76	1,100	2725	< 1625	basin fill	hard conglomerate layers 600-800' and 1002-1090'	503037.2	3533247.8
24ddb	FICO	S-53	35-30017, 55-624002	12/02/74	2,000	2733	< 733	conglomerate	lightly cemented 660-1280' and 1740-2000'	503453.0	3532634.9
25add	FICO	S-22A	35-30230, 55-623983	03/19/75	1,175	2742	< 1567	conglomerate		503659.8	3531620.7
25bcc	FICO	S-55	35-81631, 55-624004	06/09/80	1,495	2792	< 1297	conglomerate	cemented 530-680'	502244.8	3531635.5
25cd	FICO	S-54	35-41208, 55-624003	09/28/77	1,300	2762	< 1462	conglomerate		503256.0	3530815.8
26cad	LQS Water Co.	ST-6	806901	07/20/71	837	2853	< 2016	sand and gravel	alluvial sand and gravel	501309.5	3531156.2
26cbd	Perry	582748	582748	08/02/01	500	2890	< 2390	basin fill		500832.7	3531245.3
26ccd2	LQS Water Co.	ST-7	566940	05/14/98	922	2885	< 1963	basin fill	moderately lithified 900-916'	500839.6	3530839.1
27caa	Park Corporation	1759	634393	02/21/78	650	2987	< 2337	basin fill		499491.5	3531309.8
27dca	Park Corporation	M-1	85228	06/02/05	932	2958	< 2026	basin fill	alluvium 0-932'	500116.0	3530966.7
34aab	Park Corporation	M-11	501654	07/09/82	635	2938.40	< 2303	basin fill		500328.7	3530561.2
34acd2	Park Corporation	M-9	501652	11/30/81	660	2970.96	< 2311	basin fill		500045.5	3530107.4
34baa	Park Corporation	M-5	087387	07/25/81	665	2996	< 2331	basin fill	formation becomes denser 450'-TD with localized caliche and cementation	499701.8	3530602.7
34bad	Park Corporation	1225	634394	02/06/70	650	2998	< 2348	basin fill		499727.2	3530408.5
34bdd1	Park Corporation	M-6	87388	07/23/81	660	3003	< 2343	basin fill	lightly cemented 505-660'	499720.8	3530105.4
34caa	Park Corporation	M-7	87389	07/15/81	670	3008	< 2338	basin fill	dense and cemented 550-670'	499720.4	3529800.6
34cda	Park Corporation	M-8	87390	07/02/81	670	2998	< 2328	basin fill		499720.3	3529495.7
D-17-14											
01baa	City of Tucson	619904	35-30534, 55-619904	01/08/73	1,545	2831	< 1286	basin fill, clay with gypsum	Fort Lowell Formation 0-434'; Tinaja Formation 434-1460'; Pantano Formation 1460-1545'	512465.4	3538683.7
03baa	City of Tucson	619902	35-30538, 55-619902	04/10/73	655	2740	< 2085	basin fill, dense clay, trace gypsum		509226.8	3538699.2
06abb	FICO	S-50	35-39804, 55-623999	11/01/74	2,000	2670	< 670	basin fill	lightly cemented basaltic boulders 1390-2000'	504990.6	3538694.9
06acd	FICO	S-49	35-27989, 55-623998	08/08/74	1,200	2681	< 1481	basin fill	"light" 1100-1200'	504793.4	3538083.2
18acd	FICO	534922	534922	04/05/93	1,500	2706	< 1206	basin fill	cemented clay and gravel 795-959'	504806.1	3534852.5
18adc	FICO	623991	35-30589, 55-623991	02/15/58	1,525	2713	< 1188	sand		505004.3	3534850.7
19bdb	FICO	S-45	35-30601, 55-623995	10/01/74	2,000	2737	< 737	basin fill		504834.3	3532831.3
30ccc	FICO	S-44	35-30645, 55-623994	06/08/74	1,200	2762	< 1562	conglomerate	cemented sand and gravel 845-985'	503858.6	3530810.6

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Location (Cadastral)	Owner	Well Name	ADWR Registration Number	Date Completed	Depth Drilled (ft bbls)	Altitude of Land Surface (ft amsl)	Maximum Elevation of Bedrock (ft amsl)	Lithology at Total Depth	Selected Notes from Well Completion Reports	UTME	UTMN
D-17-15											
02dcd	Spring Valley Water Co.	SVW Co	none	09/20/62	849	3195	<2346	sand and gravel		521046.6	3537856.8
06dda	Sanders	588266	588266	10/31/01	435	2930	<2495	sand and gravel		514995.3	3538041.5
07bdb	Grady	505121	505121	07/21/83	400	2898	<2498	clay		513915.2	3537257.8
09aad	Hansen	560251	560251	12/13/96	600	3080	<2480	conglomerate	fractured conglomerate 560-600'	518210.7	3537471.3
09acb	Torzala	556737	556737	12/29/96	585	3058	<2473	conglomerate	fractured conglomerate 560-585'	517608.5	3537266.4
23daa	Brew	203396	203396	01/25/06	760	3485	<2725	conglomerate	hard conglomerate 500-760'	521455.5	3533643.6
23adb	Gerard and Sons Custom Homes	206094	206094	03/05/05	975	3400	<2425	conglomerate	cemented conglomerate 0-300'; soft rock 300-700'; cemented sand and rocks w/ fractures 700-975'	521253.4	3534041.1
30ddd	Scattini	206340	206340	02/02/05	570	3178	<2608	conglomerate	clay conglomerate 20-480'; conglomerate 480-570'	515012.3	3531425.8
D-18-12											
19cdb	PDSI	PZ-1	561865	05/14/97	255	4068	<3813	sandy gravel, gravelly sand	Formation of Tinaja Peak	485077.7	3522800.3
21ccc	PDSI	MH-19	561878	05/22/97	75	3650	<3575	sandy gravel w/ tuffaceous layers	Formation of Tinaja Peak	487726.5	3522636.5
D-18-13											
01cbc	Robson Ranch/Anaconda	AN-2	1/24/3566	05/26/67	2,060	2802	< 742	hard sand and gravel	hard sand and gravel 1836-2064'	502257.0	3527993.5
01ccc	Community Water Co.	CW-5	627484	11/29/73	800	2800	< 2000	basin fill		502260.4	3527589.8
02aac	Community Water Co.	CW-4	none	04/01/64	501	2835	<2334	conglomerate	very hard conglomerate 488-501'	501849.1	3528776.9
02bdd	Community Water Co.	CW-9	588121	12/15/01	1,000	2860	< 1860	basin fill		501133.2	3528544.3
02dca	Country Club of Green Valley	501760	501760	08/27/82	955	2590	<1635	alluvium	cemented 390-430, 660-700'	501655.5	3527792.9
03dcg	Community Water Co.	CW-7	502546	06/28/82	1,065	2980	< 1915	conglomerate	well cemented conglomerate 1056-1060'	499721.0	3527897.7
09aaa	AZ State Land Dept.	MH-26	201527	12/18/03	545	3063	< 2518			498850.7	3527387.5
09dda	AZ State Land Dept.	MH-25	201528	12/17/03	545	3068	< 2523			498841.3	3526165.8
10aac	PDSI	ESP-3	623104	11/30/56	1,043	2932	< 1889	Helmet Fanglomerate		500295.2	3527180.8
10adc	PDSI	ESP-2	623103	11/30/57	1,044	2934	< 1890	basin fill		500302.8	3526728.2
10dca	PDSI	ESP-1	632102	Feb-57	1020	2953	< 1933	Helmet Fanglomerate		500030.9	3526252.2
10dcd	PDSI	ESP-4	623105	03/15/67	1045	2955.61	< 1911	sandstone	sandstone at bottom of well is logged as Helmet Fanglomerate (Pantano Formation)	499978.0	3525936.6
11dcd	Green Valley Investors	504970	504970	03/30/83	800	2650	< 1850	basin fill	cemented sand and gravel 570-750'; hard conglomerate 700-730'	502069.0	3525941.1
11add	PDSI	ESP-5	623106	02/28/70	950	2817.06	< 1867	Helmet Fanglomerate		502069.0	3526885.8
12dac	FICO	E12A	35-28660	06/29/74	1110	2815.00	< 1705	conglomerate		503499.0	3526356.0
13aac	FICO	E-13	35-30228, 55-624020	04/12/75	1100	2819	< 1719	conglomerate		503490.1	3525557.9
14acd	FICO	C-4	35-30227, 55-624010	02/28/75	1200	2825.00	< 1625	conglomerate	lightly cemented boulders and gravel 1120'-TD	501679.9	3525137.5
14bdb2	Community Water Co.	CW-6	627485	05/09/77	837	2670	< 1833	conglomerate		500952.2	3525579.8
15acc2	Community Water Co.	CW-8	543600	06/21/94	1200	2970	< 1770	basin fill		499859.7	3525464.7
18cca	PDSI	EMW-1	807584	05/30/05	310	3361	< 3051	Pantano Formation		494455.7	3524503.9
21bcb	PDSI	IW-12	545555	12/06/94	625	3,135.19	< 2510.19	Pantano Formation		497426.1	3523773.4
21bcc1	PDSI	MH-5	803632	Mar-76	640	3,120.48	< 2480.48	basin fill		497538.5	3523528.9
21cbd1	PDSI	MH-15W	528093	06/15/90	466	3,114.08	< 2648.08	basin fill	rock layers logged within basin fill	497585.3	3523078.6
21cbd2	PDSI	MH-15E	528094	06/22/90	467	3,108.38	< 2641.38	basin fill		497646.0	3523077.9
22aca	Community Water Co.	CW-3	627483	03/16/64	501	2,943	< 2442	conglomerate	hard conglomerate 456'-TD	500092.8	3523516.9
23aaa	FICO	FICO	na	05/01/59	520	2861	< 2341	gravel	hard cemented gravel 500-520'	500591.9	3524141.8
23bad	FICO	W-9	35-30229, 55-624024	05/01/75	1,175	2,854	< 1679	conglomerate		501332.4	3523935.8
23cac	Community Water Co.	CW-10	207982	08/18/05	1,140	2,840	< 1700	basin fill		500974.5	3523259.1
26dbd	FICO	E-16	35-30225, 55-210420	03/19/75	1,200	2,890	< 1690	alluvium	cemented sand and boulders 730'-TD	501715.3	3521517.8
27acc	Green Valley Water	GV-1	603428	09/23/77	645	2,940	< 2295	basin fill	hard conglomerate 623'-TD	499874.0	3522057.9
27cad	Green Valley Water	GV-2	603429	09/20/77	560	2,940	< 2380	conglomerate		499859.1	3521654.0
27daa	FICO	W-12	35-30223, 55-624026	02/16/75	1,300	2,890	< 1590	conglomerate	tight and cemented 828-1300'	500058.0	3521713.8
27ddc	Par for the Course/FICO	543409	543409	12/09/94	840	2,884	< 2044	conglomerate	hard conglomerate 540'-TD	500313.6	3521115.8
28cba	PDSI	MH-16E	528100	07/01/90	460	3,094.73	< 2634.73	basin fill		497637.9	3521673.8
28cbb3	PDSI	MH-16W	528099	06/29/90	460	3,097.25	< 2637.25	basin fill		497577.3	3521674.4
35cba	FICO	E-11A	35-40364, 55-624018	11/24/76	1,000	2875	< 1875	conglomerate		500924.0	3520130.8

TABLE A.2
Selected Wells Completed in Basin Fill in the Vicinity of PDSTI (Not Drilled to Bedrock)

Location (Cadastral)	Owner	Well Name	ADWR Registration Number	Date Completed	Depth Drilled (ft bls)	Altitude of Land Surface (ft amsl)	Maximum Elevation of Bedrock (ft amsl)	Lithology at Total Depth	Selected Notes from Well Completion Reports	UTME	UTMN
D-18-14											
06dba	Anamax	35-28659	35-28659, 55-608522	08/12/74	2,004	2,656	< 652	basin fill		504848.9	3528183.3
08add	Bull	608598	608598	02/15/62	565	2,976	< 2411	red sticky clay	cemented gravel 300-325'	506851.5	3526787.1
08bba	Bull	608597	608597	Sep-52	502	2,926	< 2424	red sticky clay	hard cemented gravel 375-382'	505848.3	3526980.8
17ccc	Bull	616213	616213	May-62	350	3,000	< 2650	red sandy clay		505468.4	3524366.8
19cccd	Continental School Dist	35-83512	35-83512, 55-601769	May-80	505	3,005	< 2500	soft sandstone	470-505' soft sandstone	504110.3	3522745.1
26dbc	Green Valley Water Co.	35-46805	35-46805	09/26/77	645	3,455	< 2810	conglomerate	hard conglomerate 623-645'; small cemented intervals 550-611'	511039.9	3521585.9
26cdd	Green Valley Water Co.	35-46804	35-46904	09/26/77	560	3,460	< 2900	conglomerate	cemented conglomerate 540-550'; hard conglomerate 550-560'	510810.6	3521193.9
30baa	University of Arizona	540451	540451	10/10/1993	500	3030	<2530	granite?	"hard cemented sand or weathered granite" 360-500'; bedrock uncertain	504490.1	3522551.6
D-19-12											
36cda	Wriglesworth	527712	527712	05/18/90	240	3,126	< 2886	basin fill		493116.6	3510180.7
36caa	Ybarra	533386	533386	12/06/91	230	3,115	< 2885	basin fill	cemented gravel 180-230'	493321.3	3510580.9
36cac	Amado	35-83004	35-83004	01/04/90	240	3120	< 2880	basin fill	cemented gravel 200-240'	493116.2	3510381.1
36cca	Stewart Title and Trust	35-82900	35-82900, 55-630904	12/12/79	240	3133	< 2893	basin fill	cemented gravel 182-240'	492910.8	3510181.2
36ddd	Kinsley	63ddd	none	01/21/47	500	3072	< 2572	basin fill	conglomerate 180-500'	494145.8	3509978.0
D-19-13											
03adc	FICO	E-15	35-30224, 55-624022	04/09/75	1,200	2913	< 1713	basin fill		500333.3	3518794.1
03acc	PDSI	Sierrita 1	623111	09/01/68	783	2916	< 2133	basin fill		499797.8	3518888.6
05cbc	Sagers	35-47764	35-47764, 55-602180	10/3/77	424	3150	< 2726	basin fill		495920.2	3518399.9
05bdb	Green Valley Water Co.	GV-7	603504	06/14/72	1,060	3087	< 2027	conglomerate	well-cemented conglomerate 1050-1060'	496938.9	3518513.7
06aaa	Sweeney	35-82543	35-82543, 55-635288	12/28/79	401	3115	< 2714	basin fill		495720.6	3519311.3
07dbc	Higuera	35-83299	35-83299, 55-604209	02/20/80	400	3144	< 2744	basin fill		495141.7	3516829.3
09acc	PDSI	35-44176	35-44176, 55-623117	05/07/77	400	2941	< 2541	basin fill	"concrete rock" 252-260'	498328.4	3517255.8
10bcb	PDSI	Sierrita 2	632112	05/31/69	793	2938	< 2145	conglomerate		499023.7	3517379.4
16bad	PDSI	Sierrita 3	623113	07/19/79	811	2,944	< 2133	basin fill		498184.2	3516092.6
22aad	Stewart	35-23478	35-32478	08/29/75	400	3,088	< 2688	basin fill		500555.8	3514429.1
23acb	Allen	35-45127	35-45127, 55-633967	02/14/78	385	3,147	< 2762	basin fill		501564.8	3514224.8
24ccb	Johnson-Hoye	35-71983	35-71983, 55-635317	12/14/79	447	3,192	< 2745	basin fill		502373.1	3513818.2
29cba	PDSI	Sierrita 6	35-32479, 55-623116	11/16/68	900	3,001	< 2101	basin fill		496324.4	3512172.4
D-19-14											
21bbd	Kettenbach	210529	210529	08/17/06	1,170	3860	< 2690	basin fill	well-cemented throughout	507581.2	3514459.0

Notes:

ft bbls = feet below surface

ft amsl = feet above mean sea level. Measuring point elevations are reported for some PDSI wells.

TABLE A.3
Pumping Test Analyses

Well	Range of Estimated Transmissivity (ft ² /d)	Saturated Thickness* (ft)	Range of Horizontal Hydraulic Conductivity (ft/day)	Hydraulic Conductivity in Appendix B of HGC (2006) (ft/day)
Basin Fill				
IW-2	4968 - 24839	710	6.9 - 34	16
IW-3A	3168 - 4862	488	6.5 - 10	13.4
IW-4	3776 - 6567	564	6.5 - 11	13.3
IW-5	4249 - 6675	585	6.8 - 11	9.4
IW-6	822 - 7399	132	5.7 - 51	67
IW-6A	1669 - 2140	144	12 - 15	13
IW-10	3470	332	9	12
IW-12	1371 - 2057	193	7.1 - 11	11
IW-13	1333 - 1556	131	10 - 12	11
IW-14	791 - 1450	142	5.6 - 10	9.4
IW-15	242 - 695	169	1.4 - 4.1	6.3
IW-16	224 - 1174	95	2.4 - 12	13
IW-17	1007 - 2013	98	10 - 21	22
IW-18	881 - 1298	96	9.2 - 14	17
IW-19	1177 - 5138	150	7.9 - 34	21
IW-20	783 - 1879	104	7.5 - 18	21
IW-21	829 - 2349	164	5.1 - 14	12
MH-13A	3312 - 16560	630	5.3 - 26	17.4
MH-13B	7190 - 9310	630	11 - 15	13.4
MH-13C	6.7 - 11.2	300	0.02 - 0.04	0.023
MH-15W	2020 - 7575	95	21 - 80	56
MH-16W	4850 - 23556	119	41 - 198	100
MH-19	75 - 312	46	1.6 - 6.8	1.71
MH-25A	1914 - 37100	450	4.3 - 82	53.5
MH-25C	16200 - 18321	450	36 - 41	50.8
MH-26A	2114 - 16912	410	5.2 - 41	41.4
MH-26B	6201 - 31005	410	15 - 76	64.2
MH-30	395 - 658	24	17 - 26	38.8
Duval #7	27360	765	36	35
FICO E6	11140	685	16	19
GV Golf	14100	388	36	59.6
GV-1	6824 - 7773	458	15 - 17	NAV
GV-2	13740	395	35	NAV
GV-3	5038 - 5936	400	13 - 15	NAV
GV-7 (CW-7)	29562 - 56437	630	47 - 90	99
Granodiorite				
BW-3	5 - 92	63	0.08 - 1.5	0.08 - 1.1

Notes:

ft = feet

ft²/d = feet²/day

ft/d = feet/day

NAV = Not Available for HGC (2006)

*Saturated thickness based on information in original data source cited by HGC (2006)

TABLE A.4
Slug Test Analyses

Well	Estimated Hydraulic Conductivity (ft/d)	Hydraulic Conductivity in Appendix B of HGC (2006) (ft/day)
Demetrie Volcanics		
BW-1	0.04	0.04 - 0.08
BW-2	0.13	0.16 - 0.21
MH-20	0.0001	0.000007 - 0.000013
MH-23	0.004	0.001 - 0.002
PZ-13	0.003	0.003
PZ-15	0.0003	0.00008 - 0.0008
PZ-16	0.003	0.002
Granodiorite		
M-14	0.00011	0.00007
M-15	0.01	0.007 - 0.011
M-17	0.001	0.001 - 0.002
MH-21	0.01	0.009 - 0.011
PZ-3	0.02	0.006 - 0.009
PZ-7	0.82	0.45 - 0.51
PZ-9	0.53	0.32 - 0.47

Notes:

ft^2/d = feet^2/day

K = hydraulic conductivity

TABLE A.5
Summary of Reported Hydraulic Conductivity Estimates from HGC (2006)

Well or Boring	Test Date	Type of Test	Aquifer Material	Hydraulic Conductivity (ft/day)
BASIN FILL				
Basin Fill				
AN-1 (CW-11)	01/01/68	Pumping	Basin Fill	8.2
AN-2	No Date	Pumping	Basin Fill	4.8
AN-4	No Date	Pumping	Basin Fill	7.2
CW-7	07/06/82	Pumping	Basin Fill	99
ESP-5	02/26/70	Pumping	Basin Fill	20
I-6	Jan-76	Pumping	Basin Fill	57.5
I-7	06/04/76	Pumping	Basin Fill	60
IW-2	04/30/86	Pumping	Basin Fill	16
IW-6	10/21/93	Pumping	Basin Fill	67
IW-6A	01/30/95	Pumping	Basin Fill	13
IW-10	05/07/86	Pumping	Basin Fill	12
IW-11	05/09/86	Pumping	Basin Fill	24
IW-12	02/03/95	Pumping	Basin Fill	11
IW-13	02/09/95	Pumping	Basin Fill	11
IW-14	02/13/95	Pumping	Basin Fill	9.4
IW-15	02/17/95	Pumping	Basin Fill	6.3
IW-17	02/27/95	Pumping	Basin Fill	22
IW-18	03/03/95	Pumping	Basin Fill	17
IW-19	03/09/95	Pumping	Basin Fill	21
IW-20	03/13/95	Pumping	Basin Fill	21
IW-21	03/17/95	Pumping	Basin Fill	12
IW-23	02/13/04	Pumping	Basin Fill	49
M-5	07/25/81	Pumping	Basin Fill	1.7
M-6	07/22/81	Pumping	Basin Fill	6.7
M-7	07/15/81	Pumping	Basin Fill	18.7
M-10	04/09/82	Pumping	Basin Fill	16
M-11	07/20/82	Pumping	Basin Fill	21
MH-13A	04/28/06	Pumping	Basin Fill	17.4
MH-13B	04/24/06	Pumping	Basin Fill	13.4
MH-13C	04/12/06	Pumping	Basin Fill	0.023
MH-14	08/28/90	Pumping	Basin Fill	43
MH-15W	08/22/90	Pumping	Basin Fill	56
MH-16W	08/25/90	Pumping	Basin Fill	100
MH-25	12/30/03	Pumping	Basin Fill	6.3
MH-25A	01/09/06	Pumping	Basin Fill	53.5
MH-25B	12/17/05	Pumping	Basin Fill	41.4
MH-25C	2/16/2006	Pumping	Basin Fill	50.8
MH-26	12/31/03	Pumping	Basin Fill	118
MH-26A	01/02/06	Pumping	Basin Fill	41.4
MH-26B	01/04/06	Pumping	Basin Fill	64.2
MH-26C	1/11/2006	Pumping	Basin Fill	65.5
MH-30	3/3/2006	Pumping	Basin Fill	38.8
RT-1	01/31/81	Pumping	Basin Fill	18.7
MH-18	06/19/97	Pumping	Basin Fill	0.01
MH-19	07/15/97	Pumping	Basin Fill	1.71
PZ-1	06/18/97	Pumping	Basin Fill	0.1
GV golf course	02/27/66	Pumping	Basin Fill	59.6
FICO E-4	03/08/66	Pumping	Basin Fill	33.4
FICO W-7	03/14/66	Pumping	Basin Fill	93.7
FICO E-6	03/15/66	Pumping	Basin Fill	19
Duval Mine #7	09/11/67	Pumping	Basin Fill	35
Geometric Mean for Basin Fill				15.05
Maximum				118
Minimum				0.01

TABLE A.5
Summary of Reported Hydraulic Conductivity Estimates from HGC (2006)

Well or Boring	Test Date	Type of Test	Aquifer Material	Hydraulic Conductivity (ft/day)
Basin Fill and Demetrie Volcanics				
IW-3A	03/04/04	Pumping	Basin Fill and Demetrie Volcanics	13.4
IW-4	04/29/86	Pumping	Basin Fill and Demetrie Volcanics	13.3
IW-5	05/01/86	Pumping	Basin Fill and Demetrie Volcanics	9.4
IW-8	05/06/86	Pumping	Basin Fill and Demetrie Volcanics	9.4
IW-16	02/23/95	Pumping	Basin Fill and Demetrie Volcanics	13
IW-22	01/14/04	Pumping	Basin Fill and Demetrie Volcanics	15
IW-24	01/24/04	Pumping	Basin Fill and Demetrie Volcanics	11
Geometric Mean for Basin Fill and Demetrie Volcanics				11.9
				Maximum 15.0
				Minimum 9.4
Basin Fill and Granodiorite				
M-16	no date	Slug	Basin Fill and Granodiorite	0.011
M-16	no date	Slug	Basin Fill and Granodiorite	0.011
M-18	no date	Slug	Basin Fill and Granodiorite	0.020
M-18	no date	Slug	Basin Fill and Granodiorite	0.011
Geometric Mean for Granodiorite and Basin Fill				0.013
				Maximum 0.020
				Minimum 0.011
BEDROCK COMPLEX				
Demetrie Volcanics				
MH-20	12/16/97	Slug	Demetrie Volcanics	0.000013
MH-20	12/16/97	Slug	Demetrie Volcanics	0.000007
MH-22	06/24/97	Pumping	Demetrie Volcanics	151
MH-23	06/24/97	Slug	Demetrie Volcanics	0.0023
MH-23	06/24/97	Slug	Demetrie Volcanics	0.0011
PZ-2	06/18/97	Slug	Demetrie Volcanics	0.0017
PZ-2	06/18/97	Slug	Demetrie Volcanics	0.0012
PZ-13	08/01/97	Slug	Demetrie Volcanics	0.0027
PZ-13	08/01/97	Slug	Demetrie Volcanics	0.0027
PZ-14	08/01/97	Pumping	Demetrie Volcanics	0.081
PZ-15	12/16/97	Slug	Demetrie Volcanics	0.0008
PZ-15	12/16/97	Slug	Demetrie Volcanics	0.00008
PZ-16	06/18/00	Slug	Demetrie Volcanics	0.002
PZ-16	06/18/00	Slug	Demetrie Volcanics	0.002
BW-1	08/16/90	Slug	Demetrie Volcanics	0.04
BW-1	08/16/90	Slug	Demetrie Volcanics	0.08
BW-2	08/17/90	Slug	Demetrie Volcanics	0.16
BW-2	08/17/90	Slug	Demetrie Volcanics	0.21
Geometric Mean for Demetrie Volcanics				0.00467
				Maximum 151
				Minimum 0.000007

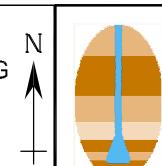
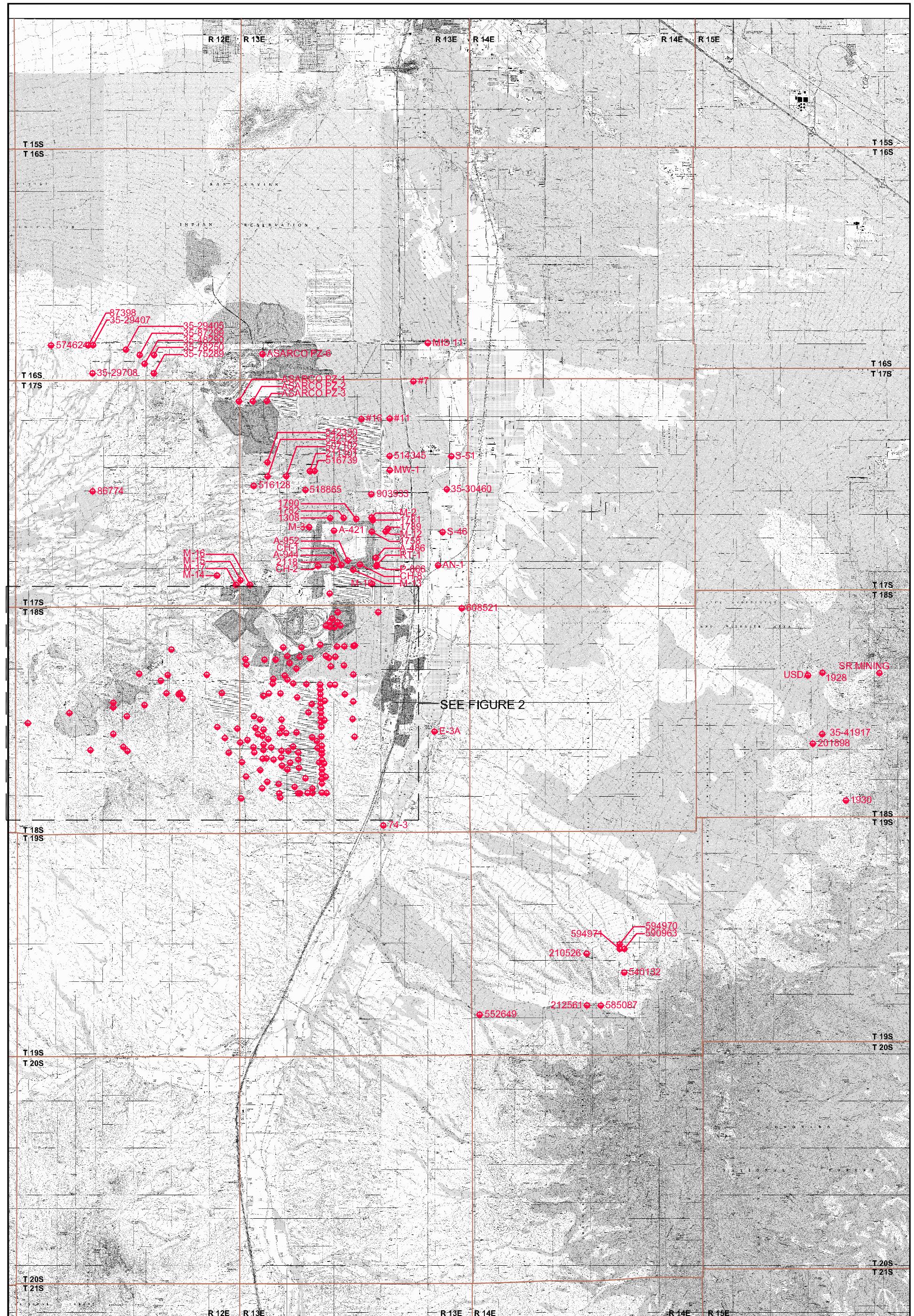
TABLE A.5
Summary of Reported Hydraulic Conductivity Estimates from HGC (2006)

Well or Boring	Test Date	Type of Test	Aquifer Material	Hydraulic Conductivity (ft/day)
Cretaceous Sedimentary Rock				
MH-25D	02/20/06	Pumping	Cretaceous Sediments	0.067
		Geometric Mean for Cretaceous Sedimentary Rock		0.067
		Maximum		0.067
		Minimum		0.067
Brecciated Volcanics				
B3-3 (23'-26')	no date	Packer	Brecciated Andesite	0.0019
B3-3 (23'-26')	no date	Packer	Brecciated Andesite	0.011
B3-5 (15.5'-21.5')	no date	Packer	Brecciated Andesite	0.087
		Geometric Mean for Brecciated Andesite		0.012
		Maximum		0.087
		Minimum		0.002
Intrusive Rocks				
BS-4 (40'-60')	no date	Packer	Granite	0.367
BS-4 (50'-60')	no date	Packer	Granite	0.434
BS-5 (60'-70')	no date	Packer	Granite	0.445
M-14	no date	Slug	Granodiorite	0.00007
M-14	no date	Slug	Granodiorite	0.00007
M-15	no date	Slug	Granodiorite	0.0067
M-15	no date	Slug	Granodiorite	0.0110
M-17	no date	Slug	Granodiorite	0.0011
M-17	no date	Slug	Granodiorite	0.0020
MH-21	06/27/97	Slug	Granodiorite	0.0107
MH-21	06/27/97	Slug	Granodiorite	0.0093
PZ-3	06/25/97	Slug	Granodiorite	0.0094
PZ-3	06/25/97	Slug	Granodiorite	0.006
PZ-4	06/23/97	Pumping	Granodiorite	2.18
PZ-5	08/13/97	Slug	Granodiorite	0.005
PZ-5	08/13/97	Slug	Granodiorite	0.004
PZ-6	07/02/97	Slug	Granodiorite	0.027
PZ-6	07/02/97	Slug	Granodiorite	0.029
PZ-7	07/31/97	Slug	Granodiorite	0.45
PZ-7	07/31/97	Slug	Granodiorite	0.51
PZ-9	08/26/97	Slug	Granodiorite	0.32
PZ-9	08/26/97	Slug	Granodiorite	0.47
BW-3	08/27/90	Packer	Granodiorite	0.08
BW-3	08/27/90	Packer	Tertiary Intrusives	0.11
MH-17	06/18/97	Slug	Quartz Monzonite	0.47
MH-17	06/18/97	Slug	Quartz Monzonite	0.47
		Geometric Mean for Intrusive Rocks		0.031
		Maximum		2.18
		Minimum		0.000067

TABLE A.5
Summary of Reported Hydraulic Conductivity Estimates from HGC (2006)

Well or Boring	Test Date	Type of Test	Aquifer Material	Hydraulic Conductivity (ft/day)
Meta-Rhyolite and Rhyolite				
BS-6 A (40'-70')	no date	Packer	Meta-Rhyolite	0.43
BS-6 (50'-70')	no date	Packer	Meta-Rhyolite	0.89
BS-6 (63'-70')	no date	Packer	Meta-Rhyolite	1.07
B5-3 (9'-16')	no date	Packer	Rhyolite	0.03
B5-3 (14'-21')	no date	Packer	Rhyolite	0.04
B5-5 (5'-12')	no date	Packer	Rhyolite	0.05
B5-5 (5'-12')	no date	Packer	Rhyolite	0.09
B5-5 (14.5'-20')	no date	Packer	Rhyolite	0.05
B5-7 (15'-22')	no date	Packer	Rhyolite	0.03
B5-8 (22'-30')	no date	Packer	Rhyolite	Negligible
Geometric Mean for Meta-Rhyolite and Rhyolite				0.12
Maximum				1.07
Minimum				0.03

FIGURES



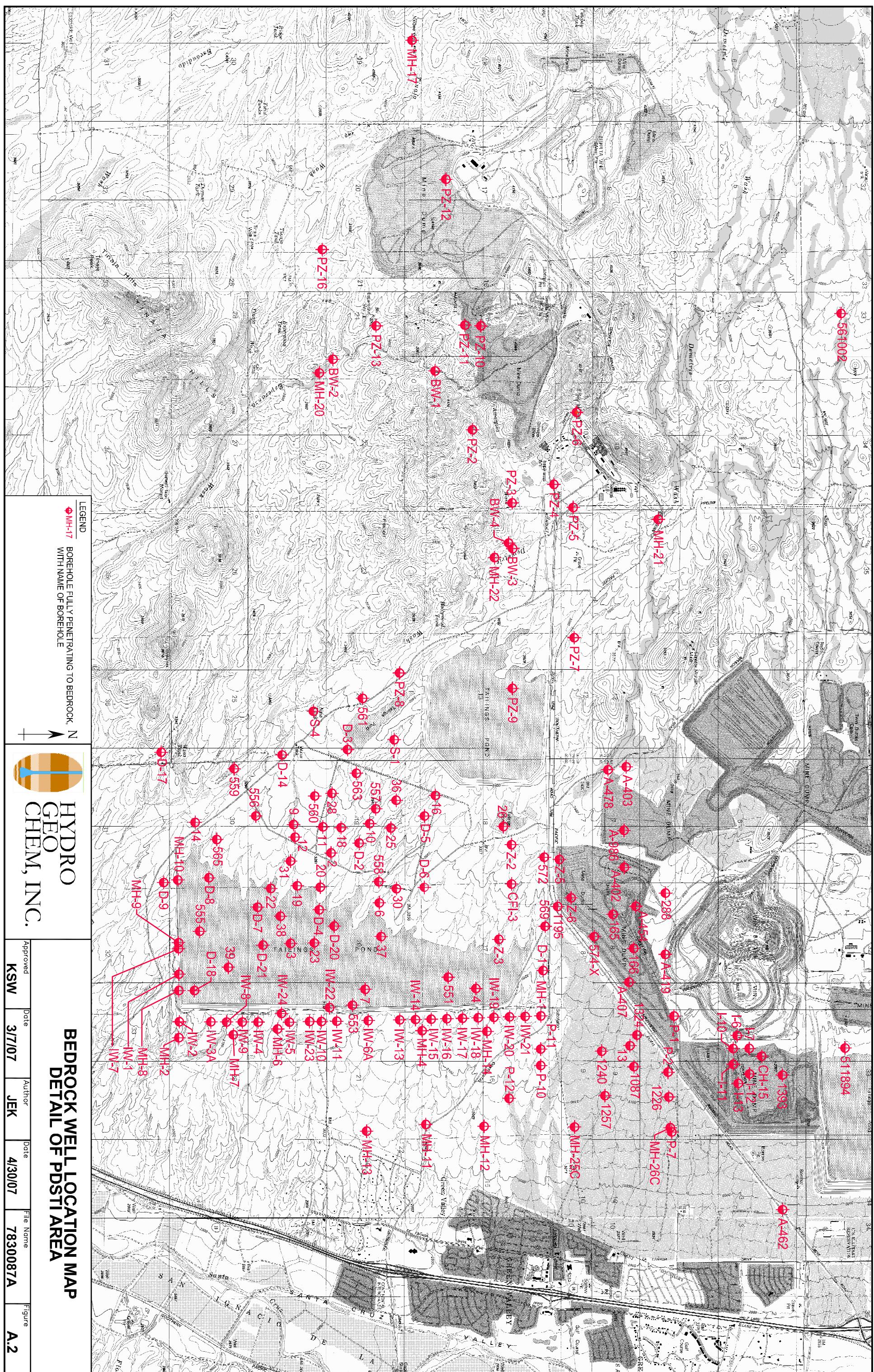
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CHEM, INC.**

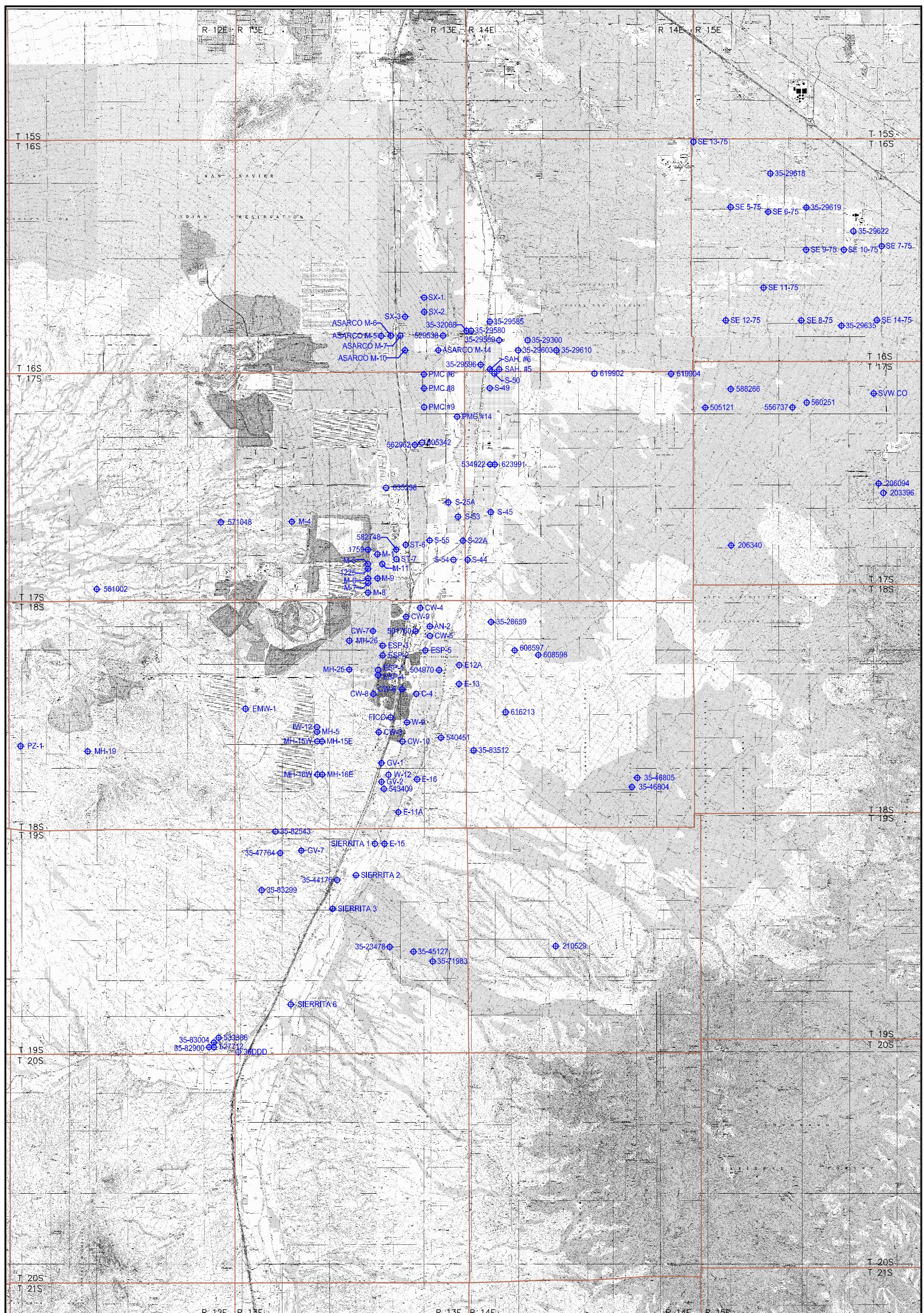
BEDROCK WELL LOCATION MAP PDSTI REGION

LEGEND

 **MH-17** BOREHOLE FULLY PENETRATING
TO BEDROCK

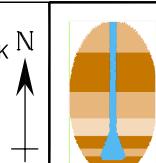
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LEGEND

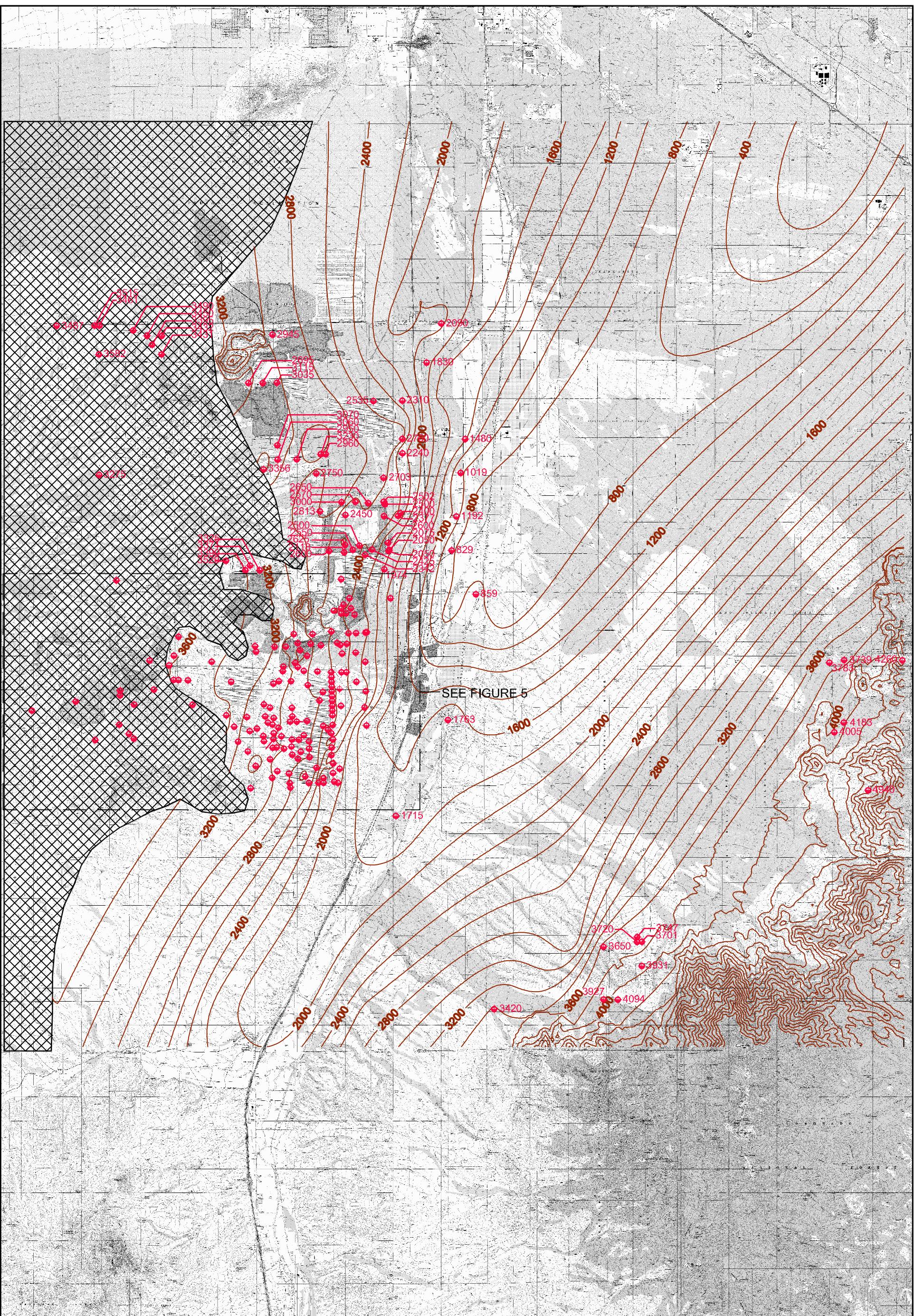
⊕ W-9 WELL NOT FULLY PENETRATING TO BEDROCK



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**LOCATION MAP OF BASIN FILL WELLS
NOT DRILLED TO BEDROCK
PDSTI REGION**

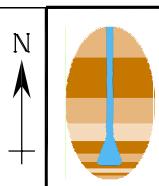
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LEGEND

- ◆ 1715 BOREHOLE FULLY PENETRATING TO BEDROCK WITH BEDROCK ELEVATION
- KRIGED BEDROCK ELEVATION (FT AMSL¹)
- ◆ BEDROCK SURFACE NOT DEFINED

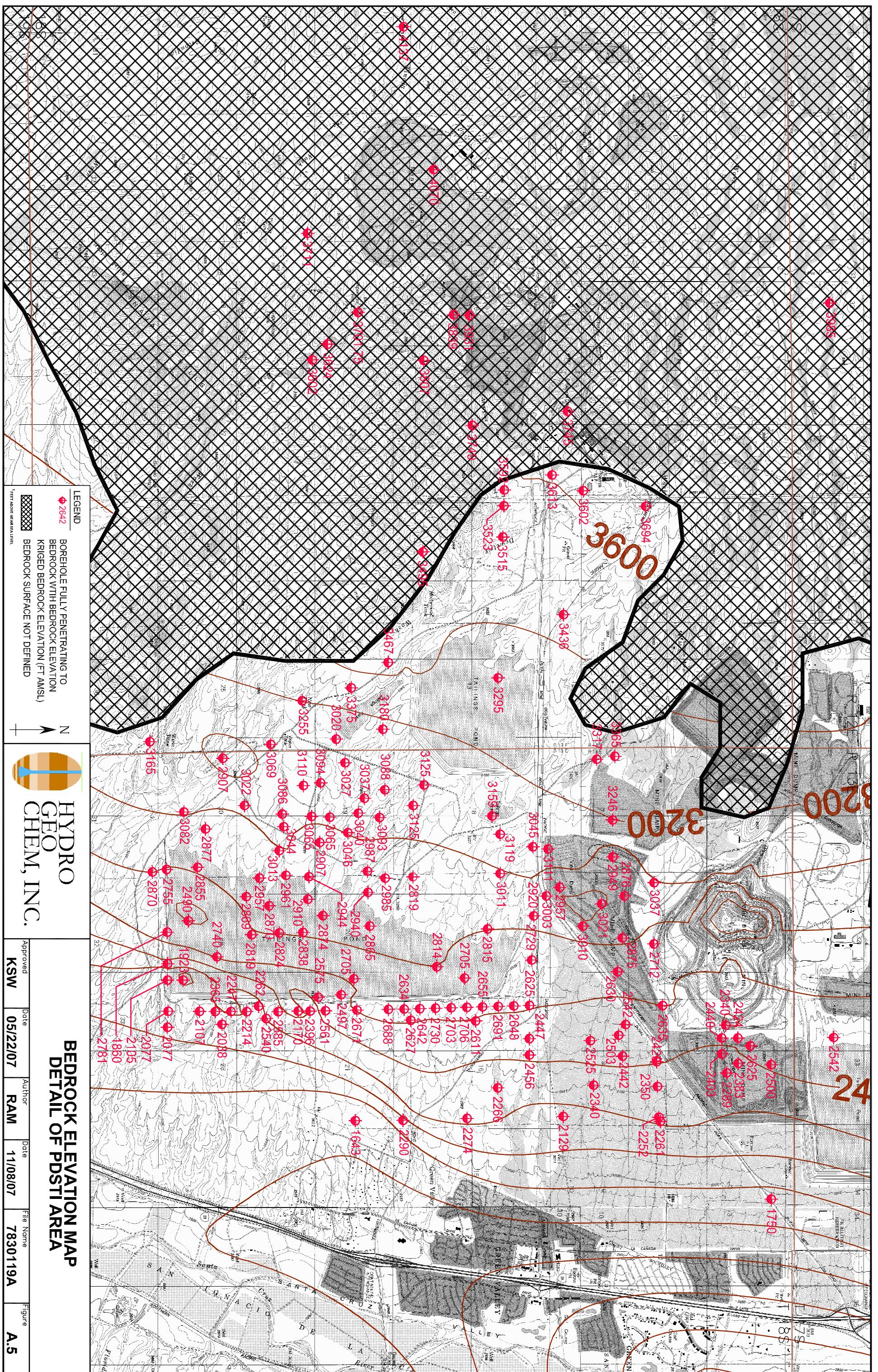
¹FEET ABOVE MEAN SEA LEVEL

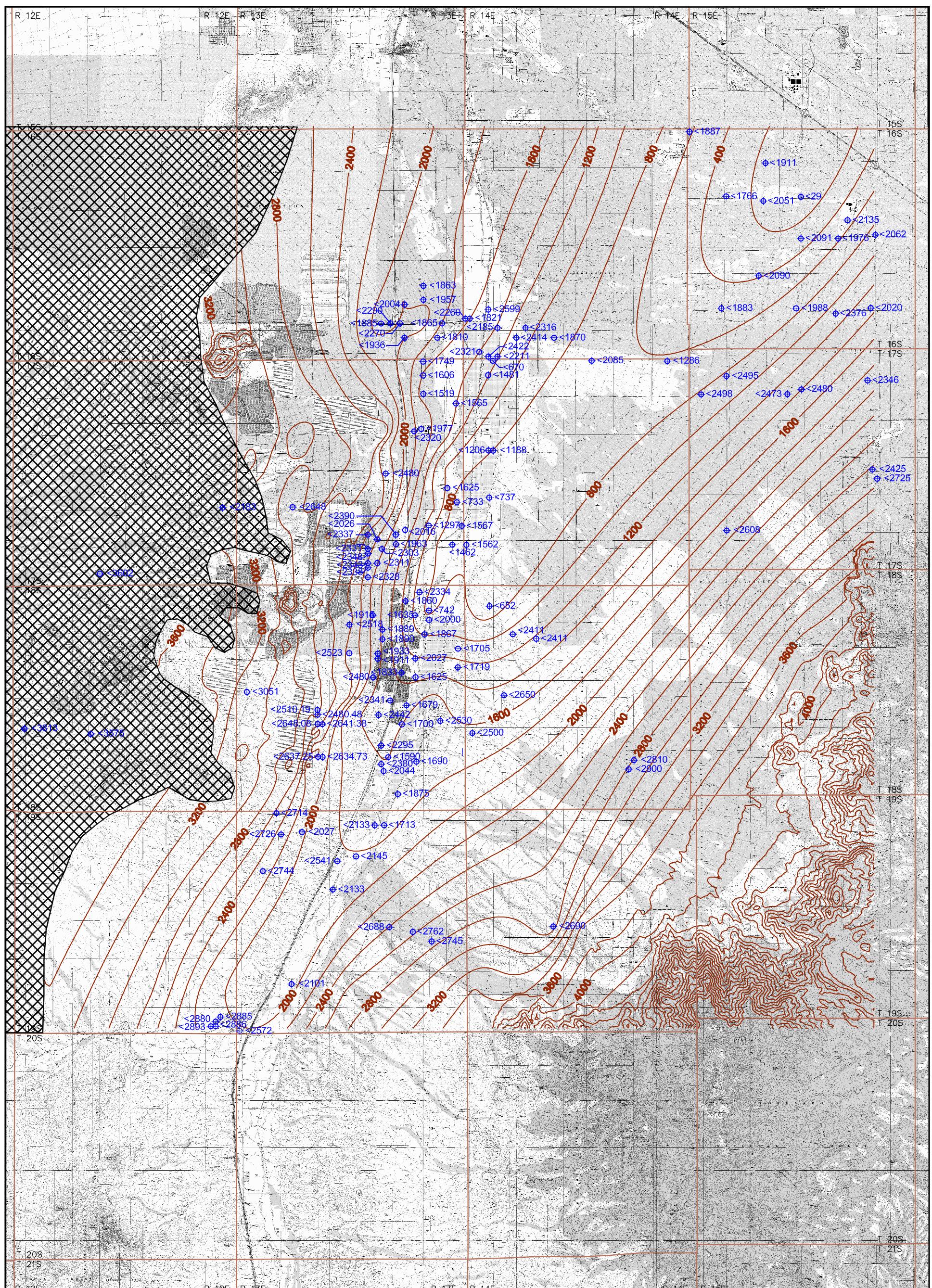


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BEDROCK ELEVATION MAP PDSTI REGION

Approved	Date	Author	Date	File Name	Figure
KSW	05/22/07	RAM	11/08/07	7830121A	A.4

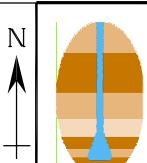




LEGEND

Φ <3602 WELL NOT FULLY PENETRATING TO BEDROCK
SHOWING ELEVATION BELOW WHICH BEDROCK
MUST LIE, BASED ON TOTAL DEPTH OF WELL
KRIGED BEDROCK ELEVATION (FT AMSL')
BEDROCK SURFACE NOT DEFINED

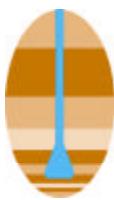
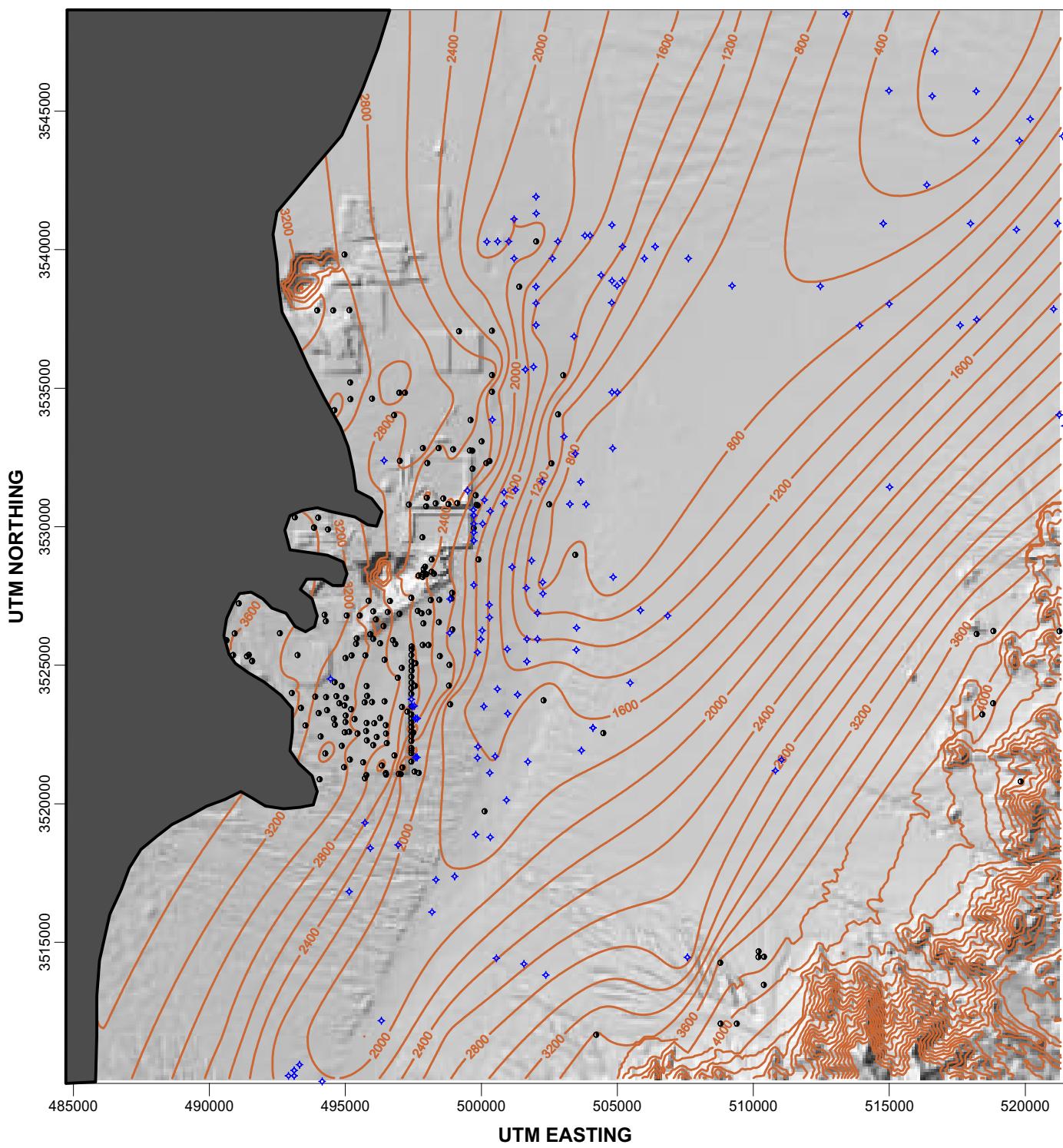
Φ >3602 FT ABOVE MEAN SEA LEVEL



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**BASIN FILL WELLS NOT DRILLED TO BEDROCK
SHOWING ELEVATIONS BELOW WHICH BEDROCK
MUST LIE, OVERLAIN ON BEDROCK CONTOURS**

Approved	Date	Author	Date	File Name	Figure
KSW	05/22/07	RAM	11/08/07	7830120A	A.6



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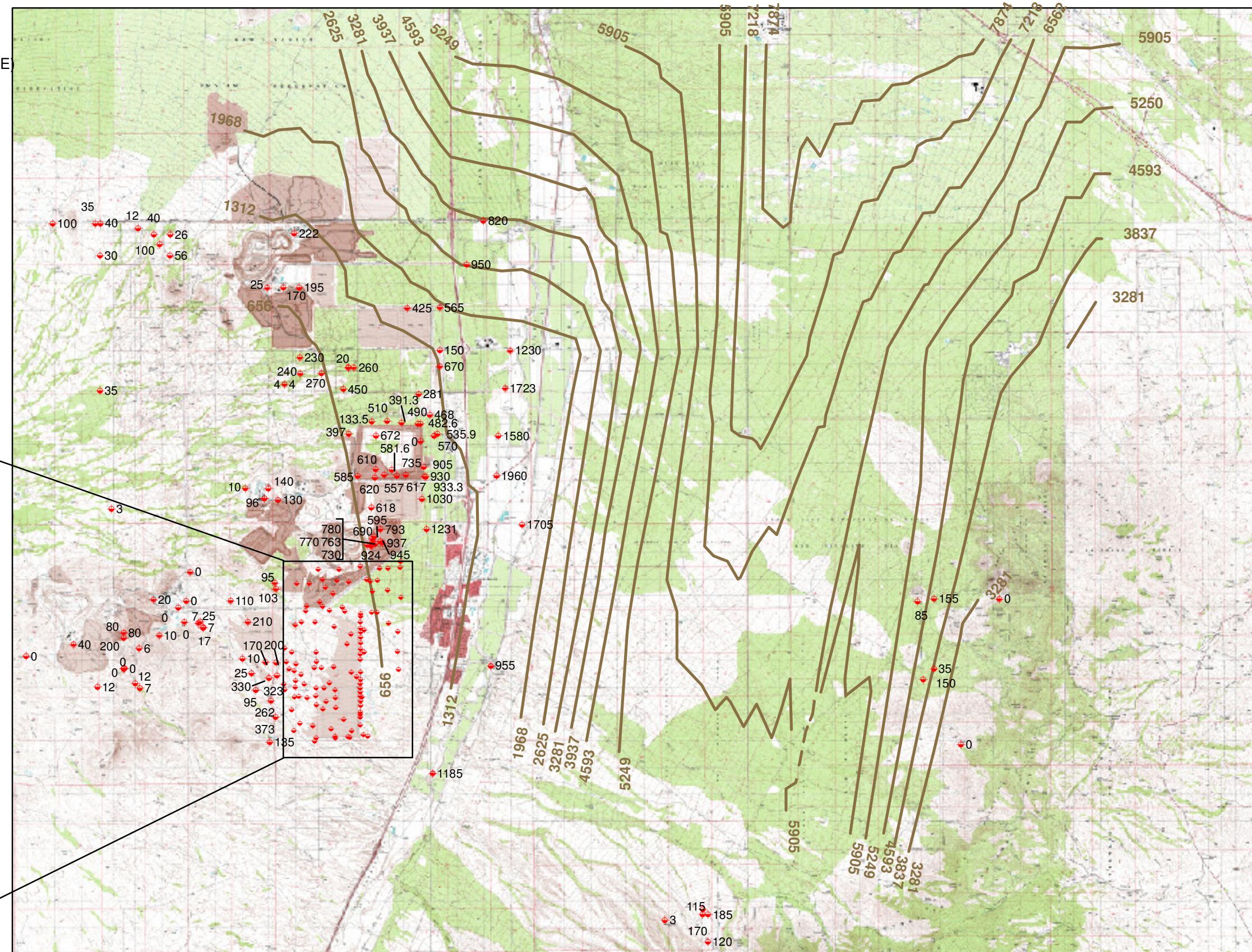
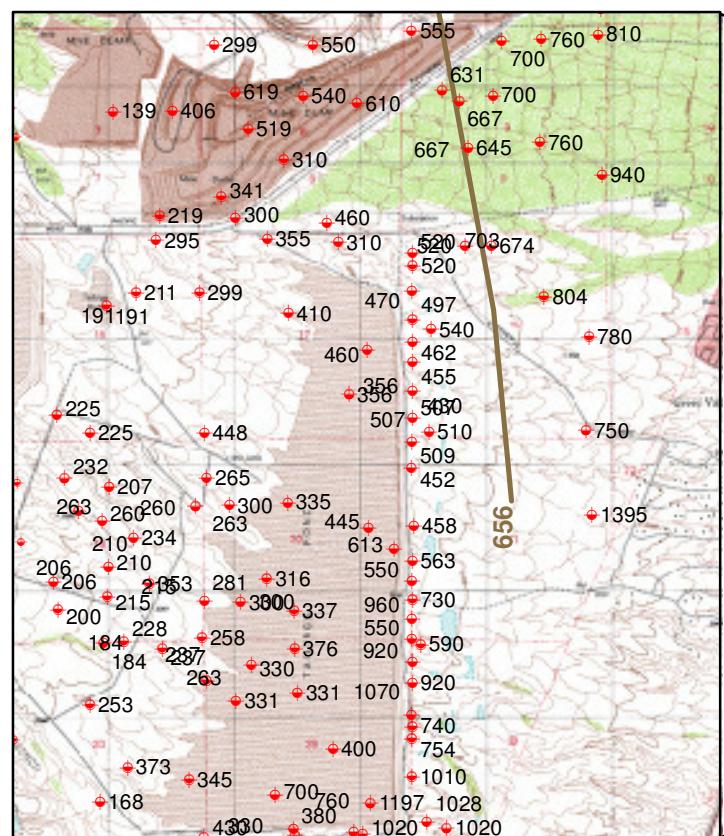
**KRIGED BEDROCK ELEVATIONS (FEET AMSL)
BASED ON BOREHOLE DATA
ON TOPOGRAPHIC SHADED RELIEF**

APPROVED	DATE	REFERENCE	FIGURE
SJS	11/7/07	H:/78300/78306/ PDSTI Data Review/bedrontopo.srf	A.7

Legend

- 299 BOREHOLE FULLY PENETRATING TO BEDROCK,
WITH DEPTH TO BEDROCK (FEET BELOW SURFACE)

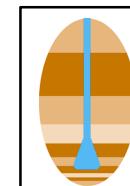
— DEPTH TO BEDROCK CONTOURS BASED ON
GEOPHYSICAL DATA (FEET BELOW SURFACE)



0 10,000 20,000 30,000 40,000
Feet

PROJECTION: UTM ZONE 12N NAD83 METERS

¹Geophysical data from Rystrom, 2003



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COMPARISON OF DEPTH TO BEDROCK BASED ON BOREHOLE DATA WITH ESTIMATED DEPTH TO BEDROCK BASED ON GEOPHYSICAL DATA

Approved KSW	Date 05/14/07	Author RAM	Date 05/14/07	File Name 7830030G	Figure A.8
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