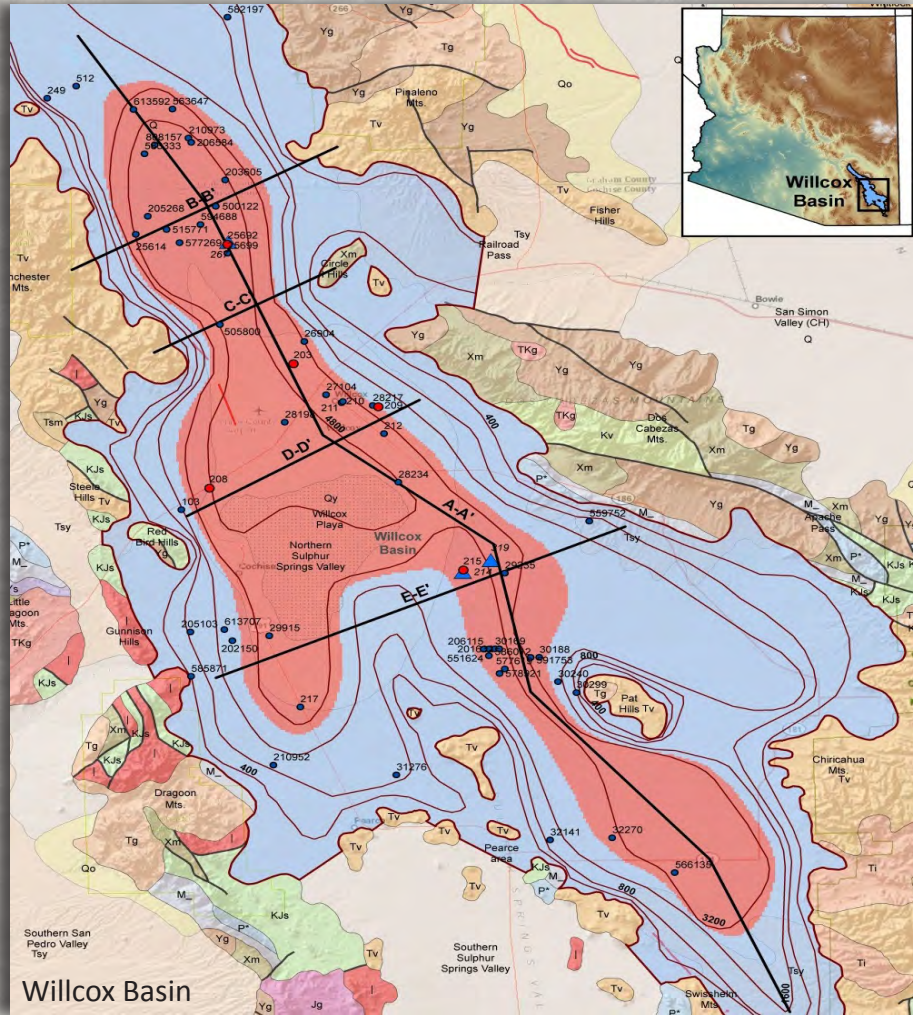


# GEOLOGIC EVALUATION OF THE WILLCOX BASIN FOR CARBON DIOXIDE SEQUESTRATION

Brian F. Gootee  
(Arizona Geological Survey)



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**Arizona Geological Survey**

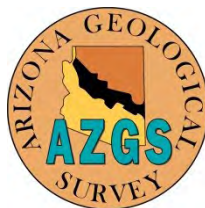
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# **Geologic Evaluation of the Willcox Basin for Carbon Dioxide Sequestration**

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# CONTENT

| <b>Sections</b>                        | <b>Page</b> |
|--|-------------|
| 1 Introduction .....                   | 1           |
| 2 Approach and Methods .....           | 1           |
| 3 Geological Evaluation .....          | 2           |
| <i>Well Data</i> .....                 | 2           |
| <i>Geologic Characterization</i> ..... | 4           |
| <i>Salinity</i> .....                  | 5           |
| 4 Summary and Discussion .....         | 6           |
| 5 References Cited .....               | 7           |

## Figures

- 1 Location map of the Willcox basin
- 2 Geologic cross-section E-E' across the central Willcox basin

## Plates

- 1 Location map of the Willcox basin
- 2 Geologic cross-sections across the Willcox basin

## Appendices

- A Wells used for geologic evaluation
- B Borehole log data used for geologic evaluation
- C Geophysical logs for OG well 203
- D Existing seismic-reflection profiles in the Willcox basin area

## 1 Introduction

The Department of Energy (DOE), including its National Energy Technology Laboratory and West Coast Regional Carbon Sequestration Partnership (WESTCARB), have established national programs to evaluate the technical feasibility of long-term subsurface geologic storage of carbon dioxide (CO<sub>2</sub>) produced by industrial activity. WESTCARB is a consortium of seven western U.S. States and one Canadian Province that is one of seven regional North American partnerships established to evaluate technical aspects of high-volume CO<sub>2</sub> capture and sequestration. Collaborative WESTCARB research programs have included more than 90 public agencies, private companies, and non-profit organizations. The Arizona Geological Survey (AZGS) began work in 2010 on *WESTCARB Phase III – Arizona Geological Characterization*.

As part of *WESTCARB Phase III*, the AZGS is evaluating the potential for CO<sub>2</sub> sequestration in geologic formations that are below a level of 800 meters (m) depth below land surface (bls). Arizona geological characterization is directed at porous and permeable geologic formations with overlying impermeable sealing strata in Cenozoic sedimentary basins in the Basin and Range physiographic and tectonic province, and Paleozoic sedimentary formations in the Colorado Plateau. An initial screening of Cenozoic sedimentary basins with significant depth and volume below the 800 m bls level resulted in ten candidate basins from a total of 88 basins (Spencer, 2011). This report represents a WESTCARB assessment of CO<sub>2</sub> storage potential in the Willcox basin, which is one of ten Cenozoic basins in Arizona identified for future study during the preliminary evaluation (Spencer, 2011), and is part of Tasks 2 and 3 of Arizona WESTCARB Phase III (California Energy Commission Agreement Number 500-10-024). Task 2 consists primarily of characterizing basin structure, stratigraphy, lithology, and the nature of seals or a cap rock. This task also includes determining the storage capacity of permeable sediments below 800 m depth. Task 3 is to determine if, and at what depth, saline groundwater exceeds 10,000 milligrams per liter (mg/L) of total dissolved solids (TDS), criteria necessary for injection and storage of CO<sub>2</sub>. Carbon dioxide storage capacity can be estimated based on the extent of permeable strata underlying impermeable strata that is saturated with groundwater containing a TDS concentration above 10,000 mg/L.

## 2 Approach and Methods

The DOE National Energy Technology Laboratory and Regional Carbon Sequestration Partnerships have developed methodologies for characterizing CO<sub>2</sub> sequestration potential in major geological systems, in particular saline formations (DOE, 2010), which is the focus of this study. The methods outlined herein are intended to collect, analyze and interpret data that meet basic criteria for characterizing a potential for carbon dioxide capture and storage (CCS) in saline aquifers. Although basalt is being considered for future opportunities in CCS, and basalt is likely interbedded with basin-fill sediments in the Willcox basin (Cooper, 1960; Brown and Schumann, 1969), basalt is not the focus of this characterization. Furthermore, no attempt was made to establish criteria based on vicinity to population or infrastructure as part of this assessment.

To meet basic criteria for CCS potential, an initial screening of Cenozoic sedimentary basins in Arizona was performed by Spencer (2011) that included an assessment of the volume of clastic sedimentary formations below a depth of 800 m bls. Although strata and salinity conditions at depths greater than 800 m are not well understood because of sparse data coverage, the large volume of these basins, and the potential for saline conditions and low-permeability caprock such as evaporites or clay, indicate that further study is warranted. Spencer (2011) identified 10 Cenozoic sedimentary basins in Arizona with greater than 400 cubic kilometers (km<sup>3</sup>) of sedimentary material below 800 m bls. These basins, selected for further study, include Willcox basin, with a calculated sediment volume of 405 km<sup>3</sup> below 800 m bls.

Collection, compilation, and quality assurance/quality control of well-log databases and relevant water-quality data were a major effort in this assessment. In addition, numerous published and unpublished previous studies were screened for applicability, acquired, scanned to PDF and in many cases georeferenced into ArcMap project files by Arizona Geological Survey (AZGS) geologists Diane S. Love and Michael Mahan. These data sets were used to modify the existing depth-to-bedrock map (Richard et al., 2007) and build two- and three-dimensional models for constructing geologic cross-sections and basin analysis. A more detailed discussion of approach and methodology is included in a study of the Safford basin (Gootee, 2012)

### 3 Geological Evaluation

The Willcox basin is a northwest-trending, sediment-filled, late Cenozoic structural basin in southeastern Arizona within the Basin and Range tectonic and physiographic province (Figure 1; Plate 1). The basin is bound by a complex assemblage of rock types and structures in the Santa Teresa, Pinaleño, Dos Cabezas and Chiricahua mountains to the northeast, and the Galiuro, Winchester, Little Dragoon, Dragoon, Pearce and Swisshelm mountains to the southwest. The basin covers an area of 3,847 km<sup>2</sup> (1,485 square miles [mi<sup>2</sup>]), with a maximum accumulation of basin-fill sediments reaching 1,800 m (5,800 feet [ft]) thick. The geographic extent of the basin with basin-fill sediment at depths greater than 800 m is 900 km<sup>2</sup> (348 mi<sup>2</sup>), or 23% of the basin (delineated in Plate 1). The Willcox basin is approximately 160 km long (100 mi) and 15 to 45 km (10 to 30 mi) wide and is predominantly a closed basin. Surrounded by topographically higher areas, most drainage in the Willcox basin is internal and terminates in Willcox Playa (Towne and Freark, 2001), which covers an area of 129 km<sup>2</sup> (50 mi<sup>2</sup>) and is located in the center of the basin. Willcox Playa overlies the deepest part of the basin. The volume of basin-fill sediments in the Willcox basin was calculated to be 1,980 km<sup>3</sup> with 405 km<sup>3</sup> (20%) at depths greater than 800 m (Spencer, 2011).

#### *Well Data*

From approximately 4,800 wells drilled in Willcox basin, we identified 58 wells with lithologic borehole data pertinent to this evaluation. Wells used for subsurface geologic evaluation are plotted in Plate 1 and listed in Appendix A. Borehole log data are listed in Appendix B. Only 5 wells in the basin were drilled below 800 m depth. Only 34 of the Arizona Department of Water Resources (ADWR) wells (ADWR, 2011) have lithologic logs for wells below 1,000 ft depth (382 m), a secondary depth-criteria used for the Willcox basin. An additional 12 ADWR wells greater than 382 m encountered salt beds or volcanic rocks interbedded with basin-fill sediments, for a total of 46 ADWR wells used for subsurface evaluation. Twelve (12) relatively deep oil and gas wells (Arizona Oil and Gas Conservation Commission [AZ OGCC] wells) in the Willcox basin contributed scarce yet valuable lithologic data near or below 800 m depth. The deepest oil and gas well in the Willcox basin (OG well 203) was drilled to 2,092 m (6,865 ft), completed in Cretaceous-(?) sedimentary rocks, the only well in the basin with geophysical logs (Appendix C). Thirty-two (32) seismic-reflection profiles were identified within Willcox basin (shown and listed in Appendix D); however, these data remain proprietary and are not included in this evaluation. Only one of these survey lines (WGC1) was completed across the deepest part of the basin.

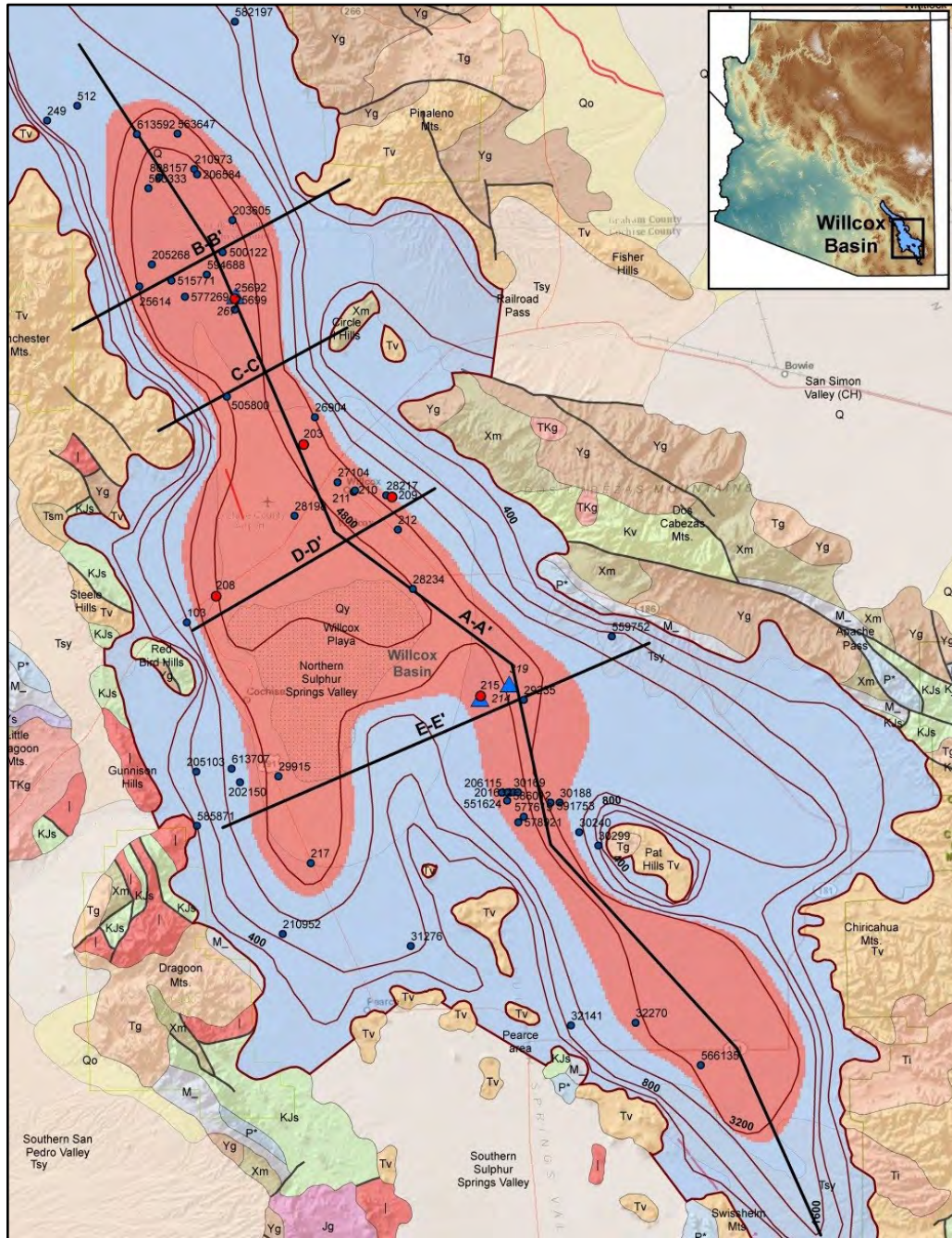


Figure 1. Location map of the Willcox basin copied from Plate 1.

Lithologic data were checked against the existing depth-to-bedrock map (Richard et al., 2007) and minor adjustments were made to each depth-contour that had the effect of enlarging the areas enclosed by the contours (Plate 1). Changes in depth-to-bedrock contours were not considered sufficient to re-calculate volume of basin-fill sediments from Spencer (2011). The presence of volcanic rocks interbedded with basin-fill sediments, identified in recently drilled wells (subsequent to modeled bedrock by Oppenheimer and Sumner, 1981), may result in underestimation of the actual depth-to-bedrock (especially if the volcanic rocks are thick and dense basalts). Thus basin-fill sediments may be thicker than currently modeled. The depth-to-bedrock contours suggest a

predominantly graben structure, and possibly hinged half-graben structure. Two minor Quaternary faults have been mapped along the western basin margin (Machette et al., 1986) (Plate 1).

### *Geologic Characterization*

Based on available well data and lithology logs, five (5) geologic cross-sections were constructed across the Willcox basin (Plate 2). These cross-sections coincide with areas where basin depths exceed 800 m and with published cross-sections (Brown and Schumann, 1969; Witcher, 1982; and Drewes et al., 1985). Basin-fill was divided by Brown and Schumann (1969) into the upper "Unconsolidated alluvium" and lower "Consolidated alluvium", herein informally referred to as the upper and lower basin-fill units, respectively (Figure 2 and Plate 2). Brown and Schumann (1969) differentiated the two basin-fill units based on the degree of consolidation and deformation present in outcrops exposed along the northern, western and southeastern margins of the basin. The upper basin-fill unit represents flat-lying, unconsolidated and non-deformed alluvial deposits, equivalent to geologic map units Q and Qy. The lower basin-fill unit exhibits a higher degree of consolidation and deformation such as tilting and faulting, and also includes interbedded basalt flows (Cooper, 1960). The lower basin-fill unit is equivalent to geologic map unit Tsy; however, these two units may not correlate at depth. An unconformity is present between the upper and lower basin-fill units, where exposed; however, the basin-wide extent and depth of the contact between the upper and lower units is not apparent in driller's logs. This unconformity may be similar in age and genesis to basin-fill sediments in nearby Safford (Houser et al., 1990) and Tucson (Houser et al., 2004) basins; however, existing subsurface data are insufficient to discern this division in the subsurface. The basin-fill stratigraphy, age and structure in the Willcox basin remains poorly understood.

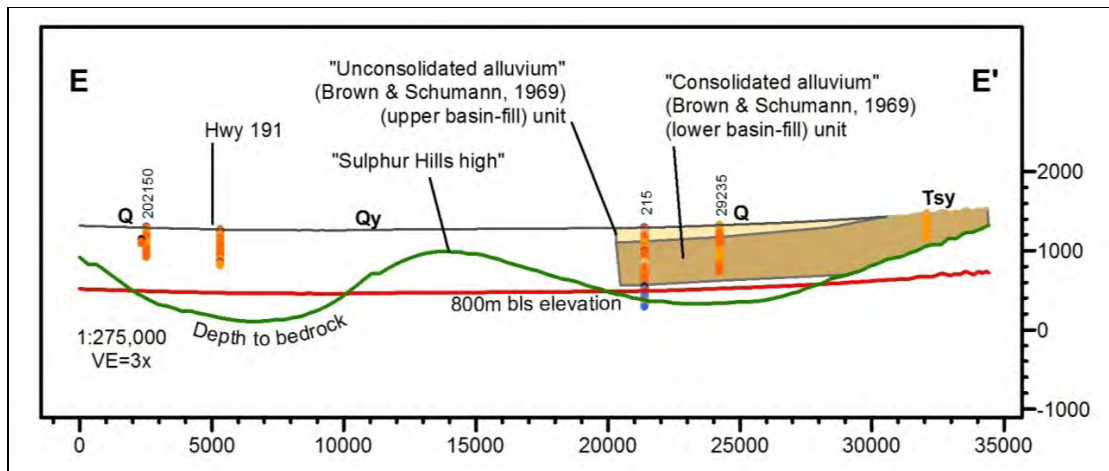


Figure 2. Geologic cross-section E-E' across the central Willcox basin. Wells are projected into cross-section. See Plate 2 for explanation of other symbols, including borehole lithology.

Although the division between the basin-fill units by Brown and Schumann (1969) are added to new cross-sections constructed for this study, well borehole data were grouped into primary lithologic variations such as 'predominantly clay', 'predominantly coarse-clastics', 'evaporite deposits', etc., to discern stratigraphy and lithology. Lithology types in Willcox basin are predominantly siliciclastics derived from a large variety of rock types, but mostly from volcanic and plutonic terrains. Paleozoic and Mesozoic sedimentary limestone, dolostone and sandstone are present along basin margins and likely make up some portion of bedrock underlying basin-fill deposits (shown in one cross section on Plate 2, copied from Drewes et al., 1985). Drewes et al. (1985) infer that bedrock underlying basin-fill sediments in the southern part of Willcox basin consists of folded and faulted Paleozoic and Mesozoic sedimentary rocks, up to several thousand meters thick.

Basin-fill consists primarily of low-gradient, proximal alluvial fan deposits grading into distal alluvial fan and playa deposits towards basin centers. Gypsum and salt are recorded in driller logs, but do not appear to be thick and continuous. Limestone or limey-clastic deposits are present in some wells at depths near and below 800 m depth. Basalt flows are found interbedded with basin-fill deposits in outcrops along basin margins (Cooper, 1960; Brown and Schumann, 1969), interpreted to represent lower basin-fill stratigraphy. Basalt flows have also been encountered in wells, most likely interbedded in lower basin-fill sediments. Basin-fill sediments below the 800 m depth range from approximately 500 to 1,000 m (1,640 to 3,280 ft) thick. Data on the physical properties of basin-fill sediments such as porosity, permeability, fractures, tilted bedding and folding are limited to sparse outcrops along basin margins, and geophysical logs from OG well 203.

Impermeable strata, which consist of largely or entirely clay, halite, and gypsum, were identified from driller logs and are represented in cross-section (Plate 2). Impermeable strata are indicated by confined, semi-confined and unconfined groundwater conditions present in the Willcox basin, above and below the 800 m depth level (Witcher, 1982). No obvious impermeable bodies or extensive sealing conditions appear to be present near or below the 800 m depth level; however, this inference is based on only a small amount of data and could be inaccurate. Thin and discontinuous gypsiferous deposits were identified in only a few deep wells, and only one well encountered halite beds of unknown thickness well above 800 m depth. However, salt could be associated with the gravity lows in the areas of cross section B-B', the southeastern end of A-A', and below the Willcox Playa, which remain untested (Rauzi, 2002). Thus, the existence of sealing bodies and/or sealing conditions in the Willcox basin is uncertain.

Geothermal groundwater, defined as groundwater with surface discharge temperature of 20°C or greater and at least 10°C higher than the mean annual air temperature [Witcher, 1982], is often associated with artesian groundwater flow and has been identified beneath the upper basin-fill unit. Witcher (1982) found that some wells have a lower TDS with increasing geothermal temperature. Both positive and negative geothermal gradients are present in Willcox basin (Witcher, 1982). Geothermal conditions are not well understood and remain untested below depths of 1,000 m. Gas and oil showings were reported in oil and gas well 203 between 1,310 and 1,524 m-bls (4,300 and 5,000 ft-bls). Geothermal groundwater in well 203 increased from 54°C to 87°C (130°F to 188°F) between 800 m and 2,090 m bls. Witcher (1982) reported widespread geothermal conditions (35°C to 50°C), apparently at depths between 500 m and 700 m under confined and semi-confined conditions.

### *Salinity*

Saline groundwater of 10,000 mg/L or greater is considered necessary for injection and storage of CO<sub>2</sub> within permeable strata below 800 m depth. Data regarding chemical characteristics of groundwater near or below 800 m depth are extremely limited in the Willcox basin. Only three of the five wells below 800 m depth have salinity records, all below 320 (mg/L) TDS (USGS NWIS, 2011; Witcher, 1982) (Plate 1). Elevated salinity between 1,000 and 3,000 mg/L characterizes groundwater at shallow depths, predominantly underneath Willcox Playa, and is associated with recharge from irrigation (Towne, 2001). Daniel (1981) indicated salinity increases with depth in the north of the Willcox Playa; however, salinity concentration distribution and salinity with depth remain essentially unknown.



#### **4 Summary and Discussion**

The potential for sequestering CO<sub>2</sub> in saline groundwater within basin-fill sediments, or underlying sedimentary rocks, in the Willcox basin is uncertain. Based on available data, the presence of an extensive seal or capping unit, and of voluminous saline groundwater above 10,000 mg/L, could not be identified. Thus, significant storage capacity in permeable sediments that host saline aquifers underlying an impermeable capping unit could not be identified. The lack of depth, quality and location of well data in the basin preclude adequate geologic characterization to assess favorable or unfavorable conditions for storage of CO<sub>2</sub>. Acquisition and analysis of existing seismic data would be a valuable and practical tool for furthering research of basin-fill stratigraphy and structure. In addition, the deepest parts of the Willcox basin remain undrilled and untested.

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| Well Type | Well ID | Basin         | Elev. (m) | Elev. (ft) | UTMX NAD83 | UTMY NAD83 | Well Depth (ft) | Well Depth (m) | Log Type                    | Comments  |
|-----------|---------|---------------|-----------|------------|------------|------------|-----------------|----------------|-----------------------------|---|
| 35        | 25692   | Willcox Basin | 1296      | 4252       | 601683     | 3583208    | 2730            | 832            | D                           |   |
| 35        | 28217   | Willcox Basin | 1273      | 4176       | 612900     | 3568666    | 2500            | 762            | None                        |   |
| 35        | 28234   | Willcox Basin | 1263      | 4144       | 614873     | 3561737    | 2360            | 719            | D                           | This well was drilled for oil. I am submitting this log because of the heavy flow of artesian water they struck at 1460 ft.   |
| 35        | 25699   | Willcox Basin | 1294      | 4245       | 601690     | 3582407    | 2180            | 664            | D                           | could not pump off- not enough H.P. on engine   |
| 35        | 30240   | Willcox Basin | 1336      | 4383       | 627186     | 3543731    | 2074            | 632            | D                           |   |
| 35        | 27104   | Willcox Basin | 1272      | 4173       | 609302     | 3569633    | 1990            | 607            | G                           |   |
| 35        | 29235   | Willcox Basin | 1326      | 4350       | 623083     | 3553531    | 1925            | 587            | D                           |   |
| 35        | 30188   | Willcox Basin | 1330      | 4363       | 625746     | 3545926    | 1718            | 524            | G                           |   |
| 35        | 25614   | Willcox Basin | 1311      | 4301       | 594613     | 3584116    | 1510            | 460            | D                           |   |
| 35        | 24228   | Willcox Basin | 1268      | 4160       | 577721     | 3612702    | 1501            | 458            | D                           |   |
| 35        | 29915   | Willcox Basin | 1273      | 4176       | 604920     | 3547876    | 1500            | 457            | D                           | measurement taken from ground leve  |
| 35        | 32141   | Willcox Basin | 1322      | 4337       | 626578     | 3529444    | 1100            | 335            | D                           |   |
| 35        | 26904   | Willcox Basin | 1280      | 4199       | 607615     | 3574448    | 925             | 282            | D                           |   |
| 35        | 32270   | Willcox Basin | 1347      | 4419       | 631364     | 3529640    | 805             | 245            | D                           |   |
| 35        | 28198   | Willcox Basin | 1273      | 4176       | 606110     | 3567148    | 714             | 218            | D                           | discharge measurement "wind mill stream". Discharge "hot water small flow at 553". No pump.   |
| 35        | 30169   | Willcox Basin | 1311      | 4301       | 622322     | 3546686    | 710             | 216            | D                           |   |
| 35        | 30299   | Willcox Basin | 1341      | 4400       | 628608     | 3542748    | 620             | 189            | D                           |   |
| 35        | 31276   | Willcox Basin | 1293      | 4242       | 614717     | 3535317    | 475             | 145            | D                           |   |
| 55        | 203605  | Willcox Basin | 1320      | 4331       | 601517     | 3589028    | 1465            | 447            | D                           |   |
| 55        | 210973  | Willcox Basin | 1330      | 4364       | 598684     | 3592812    | 1425            | 434            | D                           |   |
| 55        | 505800  | Willcox Basin | 1286      | 4219       | 601102     | 3575964    | 1350            | 411            | D                           |   |
| 55        | 206584  | Willcox Basin | 1329      | 4360       | 598890     | 3592415    | 1325            | 404            | D                           |   |
| 55        | 577619  | Willcox Basin | 1317      | 4322       | 623088     | 3544882    | 1300            | 396            | D                           |   |
| 55        | 578921  | Willcox Basin | 1315      | 4313       | 622687     | 3544475    | 1300            | 396            | D                           |   |
| 55        | 201632  | Willcox Basin | 1313      | 4308       | 622662     | 3546686    | 1295            | 395            | D                           |   |
| 55        | 586012  | Willcox Basin | 1309      | 4295       | 621854     | 3546674    | 1280            | 390            | D                           |   |
| 55        | 551624  | Willcox Basin | 1310      | 4299       | 621862     | 3546073    | 1203            | 367            | D                           |   |
| 55        | 613592  | Willcox Basin | 1336      | 4382       | 594440     | 3595391    | 1165            | 355            | D                           |   |
| 55        | 583333  | Willcox Basin | 1318      | 4324       | 595283     | 3591380    | 1106            | 337            | D                           |   |
| 55        | 808157  | Willcox Basin | 1322      | 4337       | 596075     | 3592183    | 1100            | 335            | D                           |   |
| 55        | 206115  | Willcox Basin | 1307      | 4288       | 621450     | 3546668    | 1060            | 323            | D                           |   |
| 55        | 515771  | Willcox Basin | 1302      | 4272       | 596989     | 3584554    | 1053            | 321            | D                           |   |
| 55        | 577269  | Willcox Basin | 1299      | 4262       | 597998     | 3583357    | 1022            | 312            | D                           |   |
| 55        | 591753  | Willcox Basin | 1327      | 4354       | 625085     | 3545913    | 1010            | 308            | D                           |   |
| 55        | 594688  | Willcox Basin | 1301      | 4269       | 599612     | 3584999    | 1005            | 306            | D                           |   |
| 55        | 202150  | Willcox Basin | 1303      | 4274       | 602064     | 3547434    | 1000            | 305            | D                           |   |
| 55        | 205268  | Willcox Basin | 1307      | 4289       | 595540     | 3585744    | 1000            | 305            | D                           |   |
| 55        | 500122  | Willcox Basin | 1305      | 4283       | 600790     | 3586642    | 1000            | 305            | D                           |   |
| 55        | 559752  | Willcox Basin | 1477      | 4845       | 629602     | 3558219    | 1000            | 305            | D                           |   |
| 55        | 563647  | Willcox Basin | 1341      | 4401       | 597447     | 3595423    | 1000            | 305            | D                           |   |
| 55        | 613707  | Willcox Basin | 1302      | 4272       | 601448     | 3548435    | 675             | 206            | D                           |   |
| 55        | 582197  | Willcox Basin | 1443      | 4734       | 601685     | 3603719    | 525             | 160            | D                           |   |
| 55        | 205103  | Willcox Basin | 1324      | 4344       | 598827     | 3548221    | 500             | 152            | D                           |   |
| 55        | 210952  | Willcox Basin | 1341      | 4400       | 605230     | 3536205    | 480             | 146            | D                           |   |
| 55        | 585871  | Willcox Basin | 1345      | 4413       | 598879     | 3544209    | 471             | 144            | D                           |   |
| 55        | 566135  | Willcox Basin | 1397      | 4583       | 636202     | 3526495    | 419             | 128            | D                           |   |
| OG        | 2-03    | Willcox Basin | 1280      | 4201       | 606782     | 3572417    | 6865            | 2092           | G, RES, SP, CAL, GAM, CN, T | Waddell-Duncan 1 McComb well. Cretaceous (?) at TD  |
| OG        | 2-08    | Willcox Basin | 1276      | 4185       | 600301     | 3561198    | 4605            | 1404           | G                           | Francis Bros. Oil 1 Proctor well. Partial log - summarized from 'Analysis by Okis Couleem, May 1949'. See detailed descriptions for depths between 100 and 3,340 feet in AZGS files. No log below 3,340 ft; however, Tertiary volcanic rock at TD |
| OG        | 2-15    | Willcox Basin | 1295      | 4250       | 619885     | 3553799    | 3298            | 1005           | D                           | Benedum-Trees Oil 1 Arzberger well. Cenozoic at TD  |
| OG        | 2-09    | Willcox Basin | 1273      | 4175       | 613336     | 3568542    | 2702            | 824            | S                           | Waddell-Duncan 1 Lawson well. Cenozoic volcanic rocks reported at TD. Partial log only from sample descriptions.  |
| OG        | 2-12    | Willcox Basin | 1273      | 4175       | 613766     | 3566126    | 2360            | 719            | D                           | Willcox Oil & Gas Sulphur Springs well. Cenozoic at TD  |
| OG        | 5-12    | Willcox Basin | 1337      | 4385       | 590013     | 3597488    | 1985            | 605            | D                           | Hooker, Sam et al 1 Sierra Bonita well. Cenozoic at TD. Duplicate with 35-25003.  |
| OG        | 249     | Willcox Basin | 1349      | 4425       | 587782     | 3596396    | 1823            | 556            | D                           | Ram Oil 1 Sierra Bonita well. Cenozoic at TD. Duplicate with 35-24980.  |
| OG        | 2-17    | Willcox Basin | 1283      | 4210       | 607311     | 3541450    | 1510            | 460            | D                           | McCall, S.W. 1 State well. Cretaceous at TC   |
| OG        | 5-14    | Willcox Basin | 1280      | 4200       | 577064     | 3612883    | 1501            | 458            | D                           | Waggoner, W.T. 3 Eureka Ranch well.   |
| OG        | 2-10    | Willcox Basin | 1271      | 4170       | 610492     | 3568916    | 770             | 235            | D                           | Geronimo Oil 1 Brunning well. Quaternary/Tertiary at TL   |
| OG        | 103     | Willcox Basin | 1300      | 4265       | 598132     | 3559256    | 668             | 204            | D                           | Hatchett, John 1 State well. Cenozoic at TC   |
| OG        | 2-11    | Willcox Basin | 1271      | 4170       | 610595     | 3569020    | 428             | 130            | D                           | Geronimo Oil 1 Holliday well. Quaternary at TL  |

D = Drillers log  
 G = Geologist log  
 S = samples  
 CAL = caliper  
 RES = resistivity  
 SP = spontaneous potential  
 CN = compensated neutron -formation density  
 GAM = gamma ray activity  
 T = temperature

| Well Type | Well ID | Elev. (m) | Elev. (ft) | From Depth (ft) | To Depth (ft) | From Depth (m) | To Depth (m) | Top Elev. (m) | Bottom Elev. (m) | HGUID | HGU Code | Lithology                | Log Type | Comments                                      |
|-----------|---------|-----------|------------|-----------------|---------------|----------------|--------------|---------------|------------------|-------|----------|--------------------------|----------|---|
| 35        | 25614   | 1311      | 4301       | 0               | 95            | 0              | 29           | 1311          | 1282             | 10    | UNK      | [unknown]                | D        |   |
| 35        | 25614   | 1311      | 4301       | 95              | 96            | 29             | 29           | 1282          | 1282             | 1     | PC       | Sand                     | D        |   |
| 35        | 25614   | 1311      | 4301       | 96              | 265           | 29             | 81           | 1282          | 1230             | 3     | CL       | Clay                     | D        |   |
| 35        | 25614   | 1311      | 4301       | 265             | 275           | 81             | 84           | 1230          | 1227             | 1     | PC       | Good sand                | D        |   |
| 35        | 25614   | 1311      | 4301       | 275             | 333           | 84             | 101          | 1227          | 1210             | 3     | CL       | Clay                     | D        |   |
| 35        | 25614   | 1311      | 4301       | 333             | 335           | 101            | 102          | 1210          | 1209             | 1     | PC       | Sand                     | D        |   |
| 35        | 25614   | 1311      | 4301       | 335             | 530           | 102            | 162          | 1209          | 1149             | 3     | CL       | Clay                     | D        |   |
| 35        | 25614   | 1311      | 4301       | 530             | 535           | 162            | 163          | 1149          | 1148             | 1     | PC       | Gravel                   | D        |   |
| 35        | 25614   | 1311      | 4301       | 535             | 552           | 163            | 168          | 1148          | 1143             | 3     | CL       | Clay                     | D        |   |
| 35        | 25614   | 1311      | 4301       | 552             | 555           | 168            | 169          | 1143          | 1142             | 1     | PC       | Sand                     | D        |   |
| 35        | 25614   | 1311      | 4301       | 555             | 790           | 169            | 241          | 1142          | 1070             | 3     | CL       | Clay                     | D        |   |
| 35        | 25614   | 1311      | 4301       | 790             | 800           | 241            | 244          | 1070          | 1067             | 1     | PC       | Sand                     | D        |   |
| 35        | 25614   | 1311      | 4301       | 800             | 880           | 244            | 268          | 1067          | 1043             | 2     | PF       | Clay and sand            | D        |   |
| 35        | 25614   | 1311      | 4301       | 880             | 980           | 268            | 299          | 1043          | 1012             | 1     | PC       | Sand and clay            | D        |   |
| 35        | 25614   | 1311      | 4301       | 980             | 990           | 299            | 302          | 1012          | 1009             | 1     | PC       | Good sand                | D        |   |
| 35        | 25614   | 1311      | 4301       | 990             | 995           | 302            | 303          | 1009          | 1008             | 3     | CL       | Clay                     | D        |   |
| 35        | 25614   | 1311      | 4301       | 995             | 1000          | 303            | 305          | 1008          | 1006             | 1     | PC       | Fine sand                | D        |   |
| 35        | 25614   | 1311      | 4301       | 1000            | 1130          | 305            | 344          | 1006          | 967              | 1     | PC       | Shell sand               | D        |   |
| 35        | 25614   | 1311      | 4301       | 1130            | 1135          | 344            | 346          | 967           | 965              | 4     | LM       | Hard lime                | D        |   |
| 35        | 25614   | 1311      | 4301       | 1135            | 1165          | 346            | 355          | 965           | 956              | 4     | LM       | Shell                    | D        |   |
| 35        | 25614   | 1311      | 4301       | 1165            | 1170          | 355            | 357          | 956           | 954              | 3     | CL       | Clay                     | D        |   |
| 35        | 25614   | 1311      | 4301       | 1170            | 1175          | 357            | 358          | 954           | 953              | 1     | PC       | Sand and shell           | D        |   |
| 35        | 25614   | 1311      | 4301       | 1175            | 1190          | 358            | 363          | 953           | 948              | 3     | CL       | Clay                     | D        |   |
| 35        | 25614   | 1311      | 4301       | 1190            | 1202          | 363            | 366          | 948           | 945              | 4     | LM       | Lime and shell           | D        |   |
| 35        | 25614   | 1311      | 4301       | 1202            | 1210          | 366            | 369          | 945           | 942              | 4     | LM       | Lime and shell           | D        |   |
| 35        | 25614   | 1311      | 4301       | 1210            | 1215          | 369            | 370          | 942           | 941              | 4     | LM       | Hard shell               | D        |   |
| 35        | 25614   | 1311      | 4301       | 1215            | 1245          | 370            | 379          | 941           | 932              | 4     | LM       | Lime and shell           | D        |   |
| 35        | 25614   | 1311      | 4301       | 1245            | 1265          | 379            | 386          | 932           | 925              | 1     | PC       | Sand and shell           | D        |   |
| 35        | 25614   | 1311      | 4301       | 1265            | 1280          | 386            | 390          | 925           | 921              | 3     | CL       | Clay                     | D        |   |
| 35        | 25614   | 1311      | 4301       | 1280            | 1295          | 390            | 395          | 921           | 916              | 3     | CL       | Clay and shell           | D        |   |
| 35        | 25614   | 1311      | 4301       | 1295            | 1300          | 395            | 396          | 916           | 915              | 3     | CL       | Clay                     | D        |   |
| 35        | 25614   | 1311      | 4301       | 1300            | 1305          | 396            | 398          | 915           | 913              | 4     | LM       | Hard shell               | D        |   |
| 35        | 25614   | 1311      | 4301       | 1305            | 1325          | 398            | 404          | 913           | 907              | 1     | PC       | Sand and gravel          | D        |   |
| 35        | 25614   | 1311      | 4301       | 1325            | 1354          | 404            | 413          | 907           | 898              | 3     | CL       | Clay                     | D        |   |
| 35        | 25614   | 1311      | 4301       | 1354            | 1410          | 413            | 430          | 898           | 881              | 1     | PC       | Sand and clay            | D        |   |
| 35        | 25614   | 1311      | 4301       | 1410            | 1465          | 430            | 447          | 881           | 864              | 3     | CL       | Clay and little sand     | D        |   |
| 35        | 25614   | 1311      | 4301       | 1465            | 1468          | 447            | 447          | 864           | 864              | 4     | LM       | Hard lime                | D        |   |
| 35        | 25614   | 1311      | 4301       | 1468            | 1475          | 447            | 450          | 864           | 861              | 3     | CL       | Clay                     | D        |   |
| 35        | 25614   | 1311      | 4301       | 1475            | 1477          | 450            | 450          | 861           | 861              | 4     | LM       | Hard lime                | D        |   |
| 35        | 25614   | 1311      | 4301       | 1477            | 1510          | 450            | 460          | 861           | 851              | 3     | CL       | Clay                     | D        |   |
| 35        | 25692   | 1296      | 4252       | 0               | 10            | 0              | 3            | 1296          | 1293             | 3     | CL       | top soil                 | D        |   |
| 35        | 25692   | 1296      | 4252       | 10              | 400           | 3              | 122          | 1293          | 1174             | 3     | CL       | clay                     | D        |   |
| 35        | 25692   | 1296      | 4252       | 100             | 1100          | 30             | 335          | 1266          | 961              | 3     | CL       | clay                     | D        |   |
| 35        | 25692   | 1296      | 4252       | 400             | 600           | 122            | 183          | 1174          | 1113             | 2     | PF       | streaks of sand and clay | D        |   |
| 35        | 25692   | 1296      | 4252       | 600             | 900           | 183            | 274          | 1113          | 1022             | 3     | CL       | clay                     | D        |   |
| 35        | 25692   | 1296      | 4252       | 900             | 1000          | 274            | 305          | 1022          | 991              | 2     | PF       | sandy clay               | D        |   |
| 35        | 25692   | 1296      | 4252       | 1100            | 1300          | 335            | 396          | 961           | 900              | 1     | PC       | boulders                 | D        |   |
| 35        | 25692   | 1296      | 4252       | 1300            | 1500          | 396            | 457          | 900           | 839              | 3     | CL       | clay                     | D        |   |
| 35        | 25692   | 1296      | 4252       | 1500            | 2730          | 457            | 832          | 839           | 464              | 9     | ROCK     | rock (water in rock)     | D        |   |
| 35        | 25699   | 1294      | 4245       | 0               | 10            | 0              | 3            | 1294          | 1291             | 3     | CL       | top soil                 | D        | could not pump off- not enough H.P. on engine |
| 35        | 25699   | 1294      | 4245       | 10              | 400           | 3              | 122          | 1291          | 1172             | 3     | CL       | clay                     | D        |   |
| 35        | 25699   | 1294      | 4245       | 400             | 600           | 122            | 183          | 1172          | 1111             | 2     | PF       | streaks of sand and clay | D        |   |
| 35        | 25699   | 1294      | 4245       | 600             | 900           | 183            | 274          | 1111          | 1020             | 3     | CL       | clay                     | D        |   |

| Well Type | Well ID | Elev. (m) | Elev. (ft) | From Depth (ft) | To Depth (ft) | From Depth (m) | To Depth (m) | Top Elev. (m) | Bottom Elev. (m) | HGUID | HGU Code  | Lithology   | Log Type | Comments   |
|-----------|---------|-----------|------------|-----------------|---------------|----------------|--------------|---------------|------------------|-------|-----------|---|----------|--|
| 35        | 25699   | 1294      | 4245       | 900             | 1000          | 274            | 305          | 1020          | 989              | 2     | PF        | sandy clay  | D        |  |
| 35        | 25699   | 1294      | 4245       | 1000            | 1100          | 305            | 335          | 989           | 959              | 3     | CL        | clay  | D        |  |
| 35        | 25699   | 1294      | 4245       | 1100            | 1300          | 335            | 396          | 959           | 898              | 1     | PC        | boulders  | D        |  |
| 35        | 25699   | 1294      | 4245       | 1300            | 1500          | 396            | 457          | 898           | 837              | 3     | CL        | clay  | D        |  |
| 35        | 25699   | 1294      | 4245       | 1500            | 2180          | 457            | 664          | 837           | 630              | 9     | ROCK      | rock (water in rock)  | D        |  |
| 35        | 26904   | 1280      | 4199       | 0               | 116           | 0              | 35           | 1280          | 1245             | 1     | PC        | water - sand  | D        |  |
| 35        | 26904   | 1280      | 4199       | 116             | 126           | 35             | 38           | 1245          | 1242             | 1     | PC        | blue sand   | D        |  |
| 35        | 26904   | 1280      | 4199       | 126             | 145           | 38             | 44           | 1242          | 1236             | 3     | CL        | clay  | D        |  |
| 35        | 26904   | 1280      | 4199       | 145             | 155           | 44             | 47           | 1236          | 1233             | 1     | PC        | sand  | D        |  |
| 35        | 26904   | 1280      | 4199       | 155             | 200           | 47             | 61           | 1233          | 1219             | 2     | PF        | clay and sand   | D        |  |
| 35        | 26904   | 1280      | 4199       | 200             | 215           | 61             | 66           | 1219          | 1214             | 1     | PC        | sand  | D        |  |
| 35        | 26904   | 1280      | 4199       | 215             | 300           | 66             | 91           | 1214          | 1189             | 1     | PC        | gravel and clay mix   | D        |  |
| 35        | 26904   | 1280      | 4199       | 300             | 700           | 91             | 213          | 1189          | 1067             | 1     | PC        | conglomerate  | D        |  |
| 35        | 26904   | 1280      | 4199       | 700             | 875           | 213            | 267          | 1067          | 1013             | 8     | LAVA FLOW | red malapai rock  | D        |  |
| 35        | 26904   | 1280      | 4199       | 875             | 890           | 267            | 271          | 1013          | 1009             | 8     | LAVA FLOW | was hard, did not bale anything out for 15 feet, this is where water is | D        |  |
| 35        | 26904   | 1280      | 4199       | 890             | 925           | 271            | 282          | 1009          | 998              | 8     | LAVA FLOW | malapai rock  | D        |  |
| 35        | 28198   | 1273      | 4176       | 0               | 250           | 0              | 76           | 1273          | 1197             | 1     | PC        | sand and gravel water   | D        |  |
| 35        | 28198   | 1273      | 4176       | 250             | 680           | 76             | 207          | 1197          | 1066             | 7     | SALT      | salt beds at 553 but small flows of artesian hot water                  | D        | discharge measurement "wind mill stream". Discharge "hot water small flow at 553". No pump. [original to-depth 350 feet, changed to 680 based on comment, BFG] |
| 35        | 28198   | 1273      | 4176       | 680             | 714           | 207            | 218          | 1066          | 1055             | 3     | CL        | clay beds   | D        |  |
| 35        | 28234   | 1263      | 4144       | 0               | 55            | 0              | 17           | 1263          | 1246             | 2     | PF        | Yellow clay, sand   | D        | This well was drilled for oil. I am submitting this log because of the heavy flow of artesian water they struck at 1460 ft.                                    |
| 35        | 28234   | 1263      | 4144       | 55              | 68            | 17             | 21           | 1246          | 1242             | 1     | PC        | Salt water, sand  | D        |  |
| 35        | 28234   | 1263      | 4144       | 68              | 350           | 21             | 107          | 1242          | 1156             | 3     | CL        | Blue clay   | D        |  |
| 35        | 28234   | 1263      | 4144       | 350             | 485           | 107            | 148          | 1156          | 1115             | 2     | PF        | Sticky shale  | D        |  |
| 35        | 28234   | 1263      | 4144       | 485             | 615           | 148            | 187          | 1115          | 1076             | 1     | PC        | Conglomerate  | D        |  |
| 35        | 28234   | 1263      | 4144       | 615             | 645           | 187            | 197          | 1076          | 1066             | 2     | PF        | Sandy shale   | D        |  |
| 35        | 28234   | 1263      | 4144       | 645             | 745           | 197            | 227          | 1066          | 1036             | 1     | PC        | Conglomerate  | D        |  |
| 35        | 28234   | 1263      | 4144       | 745             | 760           | 227            | 232          | 1036          | 1031             | 1     | PC        | Fresh water sand  | D        |  |
| 35        | 28234   | 1263      | 4144       | 760             | 860           | 232            | 262          | 1031          | 1001             | 1     | PC        | Cement, Gravel  | D        |  |
| 35        | 28234   | 1263      | 4144       | 860             | 910           | 262            | 277          | 1001          | 986              | 8     | LAVA FLOW | Red bed   | D        |  |
| 35        | 28234   | 1263      | 4144       | 910             | 1025          | 277            | 312          | 986           | 951              | 1     | PC        | Conglomerate  | D        |  |
| 35        | 28234   | 1263      | 4144       | 1025            | 1115          | 312            | 340          | 951           | 923              | 1     | PC        | Sand and gravel   | D        |  |
| 35        | 28234   | 1263      | 4144       | 1115            | 1200          | 340            | 366          | 923           | 897              | 1     | PC        | Conglomerate  | D        |  |
| 35        | 28234   | 1263      | 4144       | 1200            | 1238          | 366            | 377          | 897           | 886              | 4     | LM        | Sandy lime  | D        |  |
| 35        | 28234   | 1263      | 4144       | 1238            | 1310          | 377            | 399          | 886           | 864              | 1     | PC        | Conglomerate  | D        |  |
| 35        | 28234   | 1263      | 4144       | 1310            | 1360          | 399            | 415          | 864           | 848              | 2     | PF        | Yellow clay, gravel   | D        |  |
| 35        | 28234   | 1263      | 4144       | 1360            | 1390          | 415            | 424          | 848           | 839              | 1     | PC        | Red sandstone   | D        |  |
| 35        | 28234   | 1263      | 4144       | 1390            | 1410          | 424            | 430          | 839           | 833              | 1     | PC        | Hard coarse sand  | D        |  |
| 35        | 28234   | 1263      | 4144       | 1410            | 1445          | 430            | 440          | 833           | 823              | 1     | PC        | Conglomerate  | D        |  |
| 35        | 28234   | 1263      | 4144       | 1445            | 1460          | 440            | 445          | 823           | 818              | 1     | PC        | Quick sand, gravel, large flow of hot water                             | D        |  |
| 35        | 28234   | 1263      | 4144       | 1460            | 1905          | 445            | 581          | 818           | 682              | 1     | PC        | Red sand water  | D        |  |
| 35        | 28234   | 1263      | 4144       | 1905            | 2360          | 581            | 719          | 682           | 544              | 10    | UNK       | Bottom of well, no water below 1905                                     | D        |  |
| 35        | 29235   | 1326      | 4350       | 0               | 315           | 0              | 96           | 1326          | 1230             | 2     | PF        | gravelly clay   | D        |  |
| 35        | 29235   | 1326      | 4350       | 315             | 320           | 96             | 98           | 1230          | 1228             | 1     | PC        | sand and gravel   | D        |  |
| 35        | 29235   | 1326      | 4350       | 320             | 385           | 98             | 117          | 1228          | 1209             | 1     | PC        | conglomerate  | D        |  |
| 35        | 29235   | 1326      | 4350       | 385             | 390           | 117            | 119          | 1209          | 1207             | 1     | PC        | gravel  | D        |  |
| 35        | 29235   | 1326      | 4350       | 390             | 485           | 119            | 148          | 1207          | 1178             | 1     | PC        | conglomerate  | D        |  |

| Well Type | Well ID | Elev. (m) | Elev. (ft) | From Depth (ft) | To Depth (ft) | From Depth (m) | To Depth (m) | Top Elev. (m) | Bottom Elev. (m) | HGUID | HGU Code  | Lithology                             | Log Type | Comments                            |
|-----------|---------|-----------|------------|-----------------|---------------|----------------|--------------|---------------|------------------|-------|-----------|---------------------------------------|----------|-------------------------------------|
| 35        | 29235   | 1326      | 4350       | 485             | 495           | 148            | 151          | 1178          | 1175             | 1     | PC        | gravel                                | D        |                                     |
| 35        | 29235   | 1326      | 4350       | 495             | 500           | 151            | 152          | 1175          | 1174             | 1     | PC        | conglomerate                          | D        |                                     |
| 35        | 29235   | 1326      | 4350       | 500             | 510           | 152            | 155          | 1174          | 1171             | 1     | PC        | gravel                                | D        |                                     |
| 35        | 29235   | 1326      | 4350       | 510             | 580           | 155            | 177          | 1171          | 1149             | 1     | PC        | conglomerate                          | D        |                                     |
| 35        | 29235   | 1326      | 4350       | 580             | 585           | 177            | 178          | 1149          | 1148             | 1     | PC        | gravel                                | D        |                                     |
| 35        | 29235   | 1326      | 4350       | 585             | 745           | 178            | 227          | 1148          | 1099             | 1     | PC        | conglomerate                          | D        |                                     |
| 35        | 29235   | 1326      | 4350       | 745             | 755           | 227            | 230          | 1099          | 1096             | 1     | PC        | gravel and boulders                   | D        |                                     |
| 35        | 29235   | 1326      | 4350       | 755             | 1010          | 230            | 308          | 1096          | 1018             | 1     | PC        | conglomerate                          | D        |                                     |
| 35        | 29235   | 1326      | 4350       | 1010            | 1680          | 308            | 512          | 1018          | 814              | 2     | PF        | heavy sticky shale                    | D        |                                     |
| 35        | 29235   | 1326      | 4350       | 1680            | 1765          | 512            | 538          | 814           | 788              | 1     | PC        | conglomerate                          | D        |                                     |
| 35        | 29235   | 1326      | 4350       | 1765            | 1820          | 538            | 555          | 788           | 771              | 1     | PC        | conglomerate                          | D        |                                     |
| 35        | 29235   | 1326      | 4350       | 1820            | 1830          | 555            | 558          | 771           | 768              | 9     | ROCK      | rock layers                           | D        |                                     |
| 35        | 29235   | 1326      | 4350       | 1830            | 1925          | 558            | 587          | 768           | 739              | 1     | PC        | conglomerate                          | D        |                                     |
| 35        | 29915   | 1273      | 4176       | 0               | 20            | 0              | 6            | 1273          | 1267             | 1     | PC        | surface sand                          | D        | measurement taken from ground level |
| 35        | 29915   | 1273      | 4176       | 20              | 60            | 6              | 18           | 1267          | 1255             | 1     | PC        | sand                                  | D        |                                     |
| 35        | 29915   | 1273      | 4176       | 60              | 125           | 18             | 38           | 1255          | 1235             | 1     | PC        | pea gravel                            | D        |                                     |
| 35        | 29915   | 1273      | 4176       | 125             | 190           | 38             | 58           | 1235          | 1215             | 3     | CL        | bentonite                             | D        |                                     |
| 35        | 29915   | 1273      | 4176       | 190             | 360           | 58             | 110          | 1215          | 1163             | 2     | PF        | bentonite with streaks of gravel      | D        |                                     |
| 35        | 29915   | 1273      | 4176       | 360             | 470           | 110            | 143          | 1163          | 1130             | 1     | PC        | well rounded gravel with sand streaks | D        |                                     |
| 35        | 29915   | 1273      | 4176       | 470             | 540           | 143            | 165          | 1130          | 1108             | 2     | PF        | clay & gravel streaks                 | D        |                                     |
| 35        | 29915   | 1273      | 4176       | 540             | 565           | 165            | 172          | 1108          | 1101             | 1     | PC        | gravel                                | D        |                                     |
| 35        | 29915   | 1273      | 4176       | 565             | 610           | 172            | 186          | 1101          | 1087             | 1     | PC        | gravel with clay streaks              | D        |                                     |
| 35        | 29915   | 1273      | 4176       | 610             | 650           | 186            | 198          | 1087          | 1075             | 1     | PC        | gravel & sand                         | D        |                                     |
| 35        | 29915   | 1273      | 4176       | 650             | 840           | 198            | 256          | 1075          | 1017             | 1     | PC        | gravel with clay streaks              | D        |                                     |
| 35        | 29915   | 1273      | 4176       | 840             | 900           | 256            | 274          | 1017          | 999              | 1     | PC        | well rounded gravel                   | D        |                                     |
| 35        | 29915   | 1273      | 4176       | 900             | 1055          | 274            | 322          | 999           | 951              | 1     | PC        | gravel & sand                         | D        |                                     |
| 35        | 29915   | 1273      | 4176       | 1055            | 1210          | 322            | 369          | 951           | 904              | 1     | PC        | gravel with clay streaks              | D        |                                     |
| 35        | 29915   | 1273      | 4176       | 1210            | 1355          | 369            | 413          | 904           | 860              | 2     | PF        | clay with gravel streaks              | D        |                                     |
| 35        | 29915   | 1273      | 4176       | 1355            | 1415          | 413            | 431          | 860           | 842              | 3     | CL        | very hard clay                        | D        |                                     |
| 35        | 29915   | 1273      | 4176       | 1415            | 1500          | 431            | 457          | 842           | 816              | 2     | PF        | clay with thin streaks of sand        | D        |                                     |
| 35        | 30169   | 1311      | 4301       | 0               | 15            | 0              | 5            | 1311          | 1306             | 6     | GYP       | soil & gypsum                         | D        |                                     |
| 35        | 30169   | 1311      | 4301       | 15              | 161           | 5              | 49           | 1306          | 1262             | 2     | PF        | clay & sandy clay                     | D        |                                     |
| 35        | 30169   | 1311      | 4301       | 161             | 190           | 49             | 58           | 1262          | 1253             | 1     | PC        | sand & gravel                         | D        |                                     |
| 35        | 30169   | 1311      | 4301       | 190             | 210           | 58             | 64           | 1253          | 1247             | 1     | PC        | boulders & gravel                     | D        |                                     |
| 35        | 30169   | 1311      | 4301       | 210             | 270           | 64             | 82           | 1247          | 1229             | 1     | PC        | gravel & clay-streaks                 | D        |                                     |
| 35        | 30169   | 1311      | 4301       | 270             | 280           | 82             | 85           | 1229          | 1226             | 1     | PC        | boulders                              | D        |                                     |
| 35        | 30169   | 1311      | 4301       | 280             | 385           | 85             | 117          | 1226          | 1194             | 1     | PC        | sand, gravel & clay                   | D        |                                     |
| 35        | 30169   | 1311      | 4301       | 385             | 520           | 117            | 158          | 1194          | 1153             | 1     | PC        | sand & gravel                         | D        |                                     |
| 35        | 30169   | 1311      | 4301       | 520             | 550           | 158            | 168          | 1153          | 1143             | 1     | PC        | boulders                              | D        |                                     |
| 35        | 30169   | 1311      | 4301       | 550             | 645           | 168            | 197          | 1143          | 1114             | 8     | LAVA FLOW | malapai                               | D        |                                     |
| 35        | 30169   | 1311      | 4301       | 645             | 710           | 197            | 216          | 1114          | 1095             | 2     | PF        | clay & gravel                         | D        |                                     |
| 35        | 30240   | 1336      | 4383       | 0               | 240           | 0              | 73           | 1336          | 1263             | 1     | PC        | sand, gravel & water                  | D        |                                     |
| 35        | 30240   | 1336      | 4383       | 240             | 400           | 73             | 122          | 1263          | 1214             | 1     | PC        | sand, gravel, clay & water            | D        |                                     |
| 35        | 30240   | 1336      | 4383       | 400             | 1000          | 122            | 305          | 1214          | 1031             | 1     | PC        | sand, boulders, clay & water          | D        |                                     |
| 35        | 30240   | 1336      | 4383       | 1000            | 1400          | 305            | 427          | 1031          | 909              | 2     | PF        | clay & boulders                       | D        |                                     |
| 35        | 30240   | 1336      | 4383       | 1400            | 2074          | 427            | 632          | 909           | 704              | 1     | PC        | basal conglomerate (water @ 1500')    | D        |                                     |
| 35        | 30299   | 1341      | 4400       | 0               | 3             | 0              | 1            | 1341          | 1340             | 1     | PC        | soil                                  | D        |                                     |
| 35        | 30299   | 1341      | 4400       | 3               | 6             | 1              | 2            | 1340          | 1339             | 1     | PC        | gravel                                | D        |                                     |
| 35        | 30299   | 1341      | 4400       | 6               | 12            | 2              | 4            | 1339          | 1337             | 1     | PC        | clay                                  | D        |                                     |
| 35        | 30299   | 1341      | 4400       | 12              | 70            | 4              | 21           | 1337          | 1320             | 1     | PC        | gravel with clay streaks              | D        |                                     |
| 35        | 30299   | 1341      | 4400       | 70              | 140           | 21             | 43           | 1320          | 1298             | 1     | PC        | sand, gravel & clay streaks           | D        |                                     |
| 35        | 30299   | 1341      | 4400       | 140             | 185           | 43             | 56           | 1298          | 1285             | 1     | PC        | medium hard brown sand                | D        |                                     |
| 35        | 30299   | 1341      | 4400       | 185             | 275           | 56             | 84           | 1285          | 1257             | 1     | PC        | brown sand & gravel (water @ 265')    | D        |                                     |

| Well Type | Well ID | Elev. (m) | Elev. (ft) | From Depth (ft) | To Depth (ft) | From Depth (m) | To Depth (m) | Top Elev. (m) | Bottom Elev. (m) | HGUID | HGU Code  | Lithology  | Log Type | Comments |
|-----------|---------|-----------|------------|-----------------|---------------|----------------|--------------|---------------|------------------|-------|-----------|--|----------|----------|
| 35        | 30299   | 1341      | 4400       | 275             | 365           | 84             | 111          | 1257          | 1230             | 1     | PC        | black gravel   | D        |          |
| 35        | 30299   | 1341      | 4400       | 365             | 405           | 111            | 123          | 1230          | 1218             | 1     | PC        | brown sand   | D        |          |
| 35        | 30299   | 1341      | 4400       | 405             | 485           | 123            | 148          | 1218          | 1193             | 1     | PC        | brown sand, gravel & boulders                                  | D        |          |
| 35        | 30299   | 1341      | 4400       | 485             | 535           | 148            | 163          | 1193          | 1178             | 1     | PC        | brown sand, gravel & malapai                                   | D        |          |
| 35        | 30299   | 1341      | 4400       | 535             | 545           | 163            | 166          | 1178          | 1175             | 8     | LAVA FLOW | black malapai  | D        |          |
| 35        | 30299   | 1341      | 4400       | 545             | 560           | 166            | 171          | 1175          | 1170             | 1     | PC        | black boulders   | D        |          |
| 35        | 30299   | 1341      | 4400       | 560             | 590           | 171            | 180          | 1170          | 1161             | 1     | PC        | gray sand & gravel with clay stringers                         | D        |          |
| 35        | 30299   | 1341      | 4400       | 590             | 610           | 180            | 186          | 1161          | 1155             | 1     | PC        | brown sand & gravel  | D        |          |
| 35        | 30299   | 1341      | 4400       | 610             | 620           | 186            | 189          | 1155          | 1152             | 1     | PC        | hard, black malapai gravel                                     | D        |          |
| 35        | 31276   | 1293      | 4242       | 0               | 6             | 0              | 2            | 1293          | 1291             | 3     | CL        | top soil   | D        |          |
| 35        | 31276   | 1293      | 4242       | 6               | 21            | 2              | 6            | 1291          | 1287             | 3     | CL        | red clay   | D        |          |
| 35        | 31276   | 1293      | 4242       | 21              | 60            | 6              | 18           | 1287          | 1275             | 3     | CL        | brown clay   | D        |          |
| 35        | 31276   | 1293      | 4242       | 60              | 102           | 18             | 31           | 1275          | 1262             | 2     | PF        | clay & boulders  | D        |          |
| 35        | 31276   | 1293      | 4242       | 102             | 171           | 31             | 52           | 1262          | 1241             | 2     | PF        | white shale with sandy streaks                                 | D        |          |
| 35        | 31276   | 1293      | 4242       | 171             | 200           | 52             | 61           | 1241          | 1232             | 2     | PF        | red clay shale with sandy streaks                              | D        |          |
| 35        | 31276   | 1293      | 4242       | 200             | 226           | 61             | 69           | 1232          | 1224             | 1     | PC        | clay boulders with sandy streaks                               | D        |          |
| 35        | 31276   | 1293      | 4242       | 226             | 237           | 69             | 72           | 1224          | 1221             | 2     | PF        | clay with sand streaks   | D        |          |
| 35        | 31276   | 1293      | 4242       | 237             | 475           | 72             | 145          | 1221          | 1148             | 8     | LAVA FLOW | malapai  | D        |          |
| 35        | 32141   | 1322      | 4337       | 0               | 100           | 0              | 30           | 1322          | 1292             | 1     | PC        | surface soil, sand and gravel                                  | D        |          |
| 35        | 32141   | 1322      | 4337       | 100             | 160           | 30             | 49           | 1292          | 1273             | 1     | PC        | sand and gravel (water at 100)                                 | D        |          |
| 35        | 32141   | 1322      | 4337       | 160             | 510           | 49             | 155          | 1273          | 1167             | 1     | PC        | sand and gravel  | D        |          |
| 35        | 32141   | 1322      | 4337       | 510             | 580           | 155            | 177          | 1167          | 1145             | 1     | PC        | coarse gravel  | D        |          |
| 35        | 32141   | 1322      | 4337       | 580             | 690           | 177            | 210          | 1145          | 1112             | 8     | LAVA FLOW | basalt or andesite   | D        |          |
| 35        | 32141   | 1322      | 4337       | 690             | 760           | 210            | 232          | 1112          | 1090             | 1     | PC        | coarse sand and fine gravel                                    | D        |          |
| 35        | 32141   | 1322      | 4337       | 760             | 880           | 232            | 268          | 1090          | 1054             | 1     | PC        | conglomerate   | D        |          |
| 35        | 32141   | 1322      | 4337       | 880             | 1000          | 268            | 305          | 1054          | 1017             | 1     | PC        | conglomerate with pea gravel                                   | D        |          |
| 35        | 32141   | 1322      | 4337       | 1000            | 1100          | 305            | 335          | 1017          | 987              | 10    | UNK       | [unknown]  | D        |          |
| 35        | 32270   | 1347      | 4419       | 0               | 100           | 0              | 30           | 1347          | 1317             | 10    | UNK       | overburden   | D        |          |
| 35        | 32270   | 1347      | 4419       | 100             | 460           | 30             | 140          | 1317          | 1207             | 1     | PC        | med fine sand, 1/4" gravel, sandy clay                         | D        |          |
| 35        | 32270   | 1347      | 4419       | 460             | 500           | 140            | 152          | 1207          | 1195             | 1     | PC        | coarse sand 1/4" gravel  | D        |          |
| 35        | 32270   | 1347      | 4419       | 500             | 540           | 152            | 165          | 1195          | 1182             | 8     | LAVA FLOW | solid hard andesite  | D        |          |
| 35        | 32270   | 1347      | 4419       | 540             | 600           | 165            | 183          | 1182          | 1164             | 8     | LAVA FLOW | fractures and hard andesite                                    | D        |          |
| 35        | 32270   | 1347      | 4419       | 600             | 700           | 183            | 213          | 1164          | 1134             | 5     | EVAP      | ss, med fine sand, gypsum                                      | D        |          |
| 35        | 32270   | 1347      | 4419       | 700             | 805           | 213            | 245          | 1134          | 1102             | 1     | PC        | angular rock chips, rounded gravel, coarse sand - all cemented | D        |          |
| 55        | 201632  | 1313      | 4308       | 0               | 100           | 0              | 30           | 1313          | 1283             | 3     | CL        | red clay   | D        |          |
| 55        | 201632  | 1313      | 4308       | 100             | 600           | 30             | 183          | 1283          | 1130             | 1     | PC        | clay conglomerate  | D        |          |
| 55        | 201632  | 1313      | 4308       | 600             | 1225          | 183            | 373          | 1130          | 940              | 1     | PC        | conglomerate   | D        |          |
| 55        | 201632  | 1313      | 4308       | 1225            | 1295          | 373            | 395          | 940           | 918              | 8     | LAVA FLOW | malapai rock   | D        |          |
| 55        | 202150  | 1303      | 4274       | 0               | 50            | 0              | 15           | 1303          | 1288             | 3     | CL        | clay   | D        |          |
| 55        | 202150  | 1303      | 4274       | 50              | 70            | 15             | 21           | 1288          | 1281             | 1     | PC        | clay with gravel   | D        |          |
| 55        | 202150  | 1303      | 4274       | 70              | 80            | 21             | 24           | 1281          | 1278             | 1     | PC        | sand and gravel  | D        |          |
| 55        | 202150  | 1303      | 4274       | 80              | 110           | 24             | 34           | 1278          | 1269             | 2     | PF        | clay some gravel   | D        |          |
| 55        | 202150  | 1303      | 4274       | 110             | 120           | 34             | 37           | 1269          | 1266             | 2     | PF        | clay some sand   | D        |          |
| 55        | 202150  | 1303      | 4274       | 120             | 130           | 37             | 40           | 1266          | 1263             | 3     | CL        | clay   | D        |          |
| 55        | 202150  | 1303      | 4274       | 130             | 180           | 40             | 55           | 1263          | 1248             | 1     | PC        | clay sand gravel   | D        |          |
| 55        | 202150  | 1303      | 4274       | 180             | 190           | 55             | 58           | 1248          | 1245             | 1     | PC        | sand gravel  | D        |          |
| 55        | 202150  | 1303      | 4274       | 190             | 230           | 58             | 70           | 1245          | 1233             | 2     | PF        | clay sand gravel   | D        |          |
| 55        | 202150  | 1303      | 4274       | 230             | 240           | 70             | 73           | 1233          | 1230             | 2     | PF        | clay sand some gravel  | D        |          |
| 55        | 202150  | 1303      | 4274       | 240             | 250           | 73             | 76           | 1230          | 1227             | 2     | PF        | clay sand gravel   | D        |          |
| 55        | 202150  | 1303      | 4274       | 250             | 280           | 76             | 85           | 1227          | 1217             | 2     | PF        | clay sand some gravel  | D        |          |



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|-----------|---------|-----------|------------|-----------------|---------------|----------------|--------------|---------------|------------------|-------|-----------|---|----------|----------|
| 55        | 202150  | 1303      | 4274       | 280             | 290           | 85             | 88           | 1217          | 1214             | 2     | PF        | clay with slight gravel                 | D        |          |
| 55        | 202150  | 1303      | 4274       | 290             | 300           | 88             | 91           | 1214          | 1211             | 2     | PF        | clay sand some gravel                   | D        |          |
| 55        | 202150  | 1303      | 4274       | 300             | 310           | 91             | 94           | 1211          | 1208             | 2     | PF        | clay some gravel                        | D        |          |
| 55        | 202150  | 1303      | 4274       | 310             | 320           | 94             | 98           | 1208          | 1205             | 2     | PF        | clay gravel and sand                    | D        |          |
| 55        | 202150  | 1303      | 4274       | 320             | 340           | 98             | 104          | 1205          | 1199             | 2     | PF        | clay sand and gravel                    | D        |          |
| 55        | 202150  | 1303      | 4274       | 340             | 350           | 104            | 107          | 1199          | 1196             | 2     | PF        | clay, gravel and rock                   | D        |          |
| 55        | 202150  | 1303      | 4274       | 350             | 360           | 107            | 110          | 1196          | 1193             | 2     | PF        | clay, sand and gravel                   | D        |          |
| 55        | 202150  | 1303      | 4274       | 360             | 380           | 110            | 116          | 1193          | 1187             | 1     | PC        | sand, clay and gravel                   | D        |          |
| 55        | 202150  | 1303      | 4274       | 380             | 400           | 116            | 122          | 1187          | 1181             | 1     | PC        | sand, clay and gravel                   | D        |          |
| 55        | 202150  | 1303      | 4274       | 400             | 540           | 122            | 165          | 1181          | 1138             | 1     | PC        | sand and gravel                         | D        |          |
| 55        | 202150  | 1303      | 4274       | 540             | 580           | 165            | 177          | 1138          | 1126             | 1     | PC        | sand, gravel, and some clay             | D        |          |
| 55        | 202150  | 1303      | 4274       | 580             | 620           | 177            | 189          | 1126          | 1114             | 1     | PC        | sand gravel clay                        | D        |          |
| 55        | 202150  | 1303      | 4274       | 620             | 630           | 189            | 192          | 1114          | 1111             | 2     | PF        | clay, sand and gravel                   | D        |          |
| 55        | 202150  | 1303      | 4274       | 630             | 760           | 192            | 232          | 1111          | 1071             | 2     | PF        | clay and sand                           | D        |          |
| 55        | 202150  | 1303      | 4274       | 760             | 800           | 232            | 244          | 1071          | 1059             | 2     | PF        | clay, some sand                         | D        |          |
| 55        | 202150  | 1303      | 4274       | 800             | 900           | 244            | 274          | 1059          | 1028             | 2     | PF        | clay, sand and gravel                   | D        |          |
| 55        | 202150  | 1303      | 4274       | 900             | 940           | 274            | 287          | 1028          | 1016             | 1     | PC        | sand, gravel, and some clay             | D        |          |
| 55        | 202150  | 1303      | 4274       | 940             | 950           | 287            | 290          | 1016          | 1013             | 1     | PC        | sand, gravel, and some clay             | D        |          |
| 55        | 202150  | 1303      | 4274       | 950             | 960           | 290            | 293          | 1013          | 1010             | 1     | PC        | sand, gravel, and clay                  | D        |          |
| 55        | 202150  | 1303      | 4274       | 960             | 970           | 293            | 296          | 1010          | 1007             | 1     | PC        | sand, gravel, and some clay             | D        |          |
| 55        | 202150  | 1303      | 4274       | 970             | 980           | 296            | 299          | 1007          | 1004             | 1     | PC        | sand and gravel                         | D        |          |
| 55        | 202150  | 1303      | 4274       | 980             | 990           | 299            | 302          | 1004          | 1001             | 1     | PC        | sand, gravel, and clay                  | D        |          |
| 55        | 202150  | 1303      | 4274       | 990             | 1000          | 302            | 305          | 1001          | 998              | 1     | PC        | sand, and some clay                     | D        |          |
| 55        | 202150  | 1303      | 4274       | 1000            | 1010          | 305            | 308          | 998           | 995              | 1     | PC        | sand Lt. and some clay                  | D        |          |
| 55        | 202150  | 1303      | 4274       | 1010            | 1050          | 308            | 320          | 995           | 983              | 1     | PC        | sand some clay                          | D        |          |
| 55        | 202150  | 1303      | 4274       | 1050            | 1080          | 320            | 329          | 983           | 974              | 1     | PC        | sand, gravel, and some clay             | D        |          |
| 55        | 202150  | 1303      | 4274       | 1080            | 1090          | 329            | 332          | 974           | 971              | 1     | PC        | sand, and clay                          | D        |          |
| 55        | 202150  | 1303      | 4274       | 1090            | 1100          | 332            | 335          | 971           | 968              | 1     | PC        | sand, gravel, and clay                  | D        |          |
| 55        | 202150  | 1303      | 4274       | 1100            | 1120          | 335            | 341          | 968           | 961              | 1     | PC        | sand, gravel, and some clay             | D        |          |
| 55        | 202150  | 1303      | 4274       | 1120            | 1190          | 341            | 363          | 961           | 940              | 1     | PC        | sand, gravel, and clay                  | D        |          |
| 55        | 202150  | 1303      | 4274       | 1190            | 1200          | 363            | 366          | 940           | 937              | 1     | PC        | sand and gravel                         | D        |          |
| 55        | 202150  | 1303      | 4274       | 1200            | 1220          | 366            | 372          | 937           | 931              | 1     | PC        | sand, gravel, and some clay             | D        |          |
| 55        | 202150  | 1303      | 4274       | 1220            | 1230          | 372            | 375          | 931           | 928              | 1     | PC        | sand and gravel                         | D        |          |
| 55        | 202150  | 1303      | 4274       | 1230            | 1240          | 375            | 378          | 928           | 925              | 1     | PC        | sand, gravel, and some clay             | D        |          |
| 55        | 202150  | 1303      | 4274       | 1240            | 1250          | 378            | 381          | 925           | 922              | 1     | PC        | sand and gravel                         | D        |          |
| 55        | 203605  | 1320      | 4331       | 1               | 10            | 0              | 3            | 1320          | 1317             | 3     | CL        | top soil                                | D        |          |
| 55        | 203605  | 1320      | 4331       | 10              | 30            | 3              | 9            | 1317          | 1311             | 3     | CL        | clay                                    | D        |          |
| 55        | 203605  | 1320      | 4331       | 30              | 870           | 9              | 265          | 1311          | 1055             | 2     | PF        | streaks of clay and fine sand           | D        |          |
| 55        | 203605  | 1320      | 4331       | 870             | 1465          | 265            | 447          | 1055          | 874              | 2     | PF        | clay and streaks of fine to coarse sand | D        |          |
| 55        | 205103  | 1324      | 4344       | 0               | 140           | 0              | 43           | 1324          | 1281             | 1     | PC        | sands and gravels with clay             | D        |          |
| 55        | 205103  | 1324      | 4344       | 140             | 420           | 43             | 128          | 1281          | 1196             | 1     | PC        | sands and gravels                       | D        |          |
| 55        | 205103  | 1324      | 4344       | 420             | 500           | 128            | 152          | 1196          | 1172             | 8     | LAVA FLOW | sands and gravels, hard basalt          | D        |          |
| 55        | 205268  | 1307      | 4289       | 0               | 190           | 0              | 58           | 1307          | 1249             | 10    | UNK       | overburden                              | D        |          |
| 55        | 205268  | 1307      | 4289       | 190             | 200           | 58             | 61           | 1249          | 1246             | 1     | PC        | sand                                    | D        |          |
| 55        | 205268  | 1307      | 4289       | 200             | 240           | 61             | 73           | 1246          | 1234             | 3     | CL        | clay                                    | D        |          |
| 55        | 205268  | 1307      | 4289       | 240             | 245           | 73             | 75           | 1234          | 1233             | 1     | PC        | gravel                                  | D        |          |
| 55        | 205268  | 1307      | 4289       | 245             | 430           | 75             | 131          | 1233          | 1176             | 3     | CL        | clay                                    | D        |          |
| 55        | 205268  | 1307      | 4289       | 430             | 440           | 131            | 134          | 1176          | 1173             | 1     | PC        | sand                                    | D        |          |
| 55        | 205268  | 1307      | 4289       | 440             | 700           | 134            | 213          | 1173          | 1094             | 3     | CL        | clay                                    | D        |          |
| 55        | 205268  | 1307      | 4289       | 700             | 710           | 213            | 216          | 1094          | 1091             | 1     | PC        | sand                                    | D        |          |
| 55        | 205268  | 1307      | 4289       | 710             | 1000          | 216            | 305          | 1091          | 1003             | 3     | CL        | clay                                    | D        |          |
| 55        | 206115  | 1307      | 4288       | 0               | 5             | 0              | 2            | 1307          | 1306             | 2     | PF        | top soil                                | D        |          |
| 55        | 206115  | 1307      | 4288       | 5               | 130           | 2              | 40           | 1306          | 1267             | 1     | PC        | streaks of clay and gravel              | D        |          |

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|-----------|---------|-----------|------------|-----------------|---------------|----------------|--------------|---------------|------------------|-------|-----------|--|----------|----------|
| 55        | 206115  | 1307      | 4288       | 130             | 150           | 40             | 46           | 1267          | 1261             | 1     | PC        | gravel   | D        |          |
| 55        | 206115  | 1307      | 4288       | 150             | 500           | 46             | 152          | 1261          | 1155             | 1     | PC        | streaks of clay and gravel                                       | D        |          |
| 55        | 206115  | 1307      | 4288       | 500             | 750           | 152            | 229          | 1155          | 1078             | 1     | PC        | conglomerate   | D        |          |
| 55        | 206115  | 1307      | 4288       | 750             | 890           | 229            | 271          | 1078          | 1036             | 8     | LAVA FLOW | rock - Malapai   | D        |          |
| 55        | 206115  | 1307      | 4288       | 890             | 950           | 271            | 290          | 1036          | 1017             | 1     | PC        | conglomerate   | D        |          |
| 55        | 206115  | 1307      | 4288       | 950             | 1050          | 290            | 320          | 1017          | 987              | 4     | LM        | limestone  | D        |          |
| 55        | 206584  | 1329      | 4360       | 0               | 150           | 0              | 46           | 1329          | 1283             | 2     | PF        | clay and sand  | D        |          |
| 55        | 206584  | 1329      | 4360       | 150             | 350           | 46             | 107          | 1283          | 1222             | 1     | PC        | clay with streaks of conglomerate                                | D        |          |
| 55        | 206584  | 1329      | 4360       | 350             | 950           | 107            | 290          | 1222          | 1039             | 1     | PC        | conglomerate with streaks of clay (10' - 20' in depth)           | D        |          |
| 55        | 206584  | 1329      | 4360       | 950             | 1200          | 290            | 366          | 1039          | 963              | 1     | PC        | harder conglomerate - broken formation with thin streaks of clay | D        |          |
| 55        | 206584  | 1329      | 4360       | 1200            | 1325          | 366            | 404          | 963           | 925              | 1     | PC        | very hard conglomerate - broken formation                        | D        |          |
| 55        | 210952  | 1341      | 4400       | 0               | 20            | 0              | 6            | 1341          | 1335             | 3     | CL        | dirt and clay  | D        |          |
| 55        | 210952  | 1341      | 4400       | 20              | 340           | 6              | 104          | 1335          | 1237             | 3     | CL        | clay   | D        |          |
| 55        | 210952  | 1341      | 4400       | 340             | 360           | 104            | 110          | 1237          | 1231             | 1     | PC        | clay conglomerate  | D        |          |
| 55        | 210952  | 1341      | 4400       | 360             | 480           | 110            | 146          | 1231          | 1195             | 8     | LAVA FLOW | malapai rock   | D        |          |
| 55        | 210973  | 1330      | 4364       | 0               | 100           | 0              | 30           | 1330          | 1300             | 3     | CL        | adobe clay - red   | D        |          |
| 55        | 210973  | 1330      | 4364       | 100             | 110           | 30             | 34           | 1300          | 1297             | 1     | PC        | gravel   | D        |          |
| 55        | 210973  | 1330      | 4364       | 110             | 650           | 34             | 198          | 1297          | 1132             | 1     | PC        | conglomerate   | D        |          |
| 55        | 210973  | 1330      | 4364       | 650             | 680           | 198            | 207          | 1132          | 1123             | 1     | PC        | rock with traces of sand   | D        |          |
| 55        | 210973  | 1330      | 4364       | 680             | 706           | 207            | 215          | 1123          | 1115             | 1     | PC        | conglomerate   | D        |          |
| 55        | 210973  | 1330      | 4364       | 706             | 711           | 215            | 217          | 1115          | 1113             | 1     | PC        | rock with traces of sand   | D        |          |
| 55        | 210973  | 1330      | 4364       | 711             | 948           | 217            | 289          | 1113          | 1041             | 1     | PC        | conglomerate   | D        |          |
| 55        | 210973  | 1330      | 4364       | 948             | 962           | 289            | 293          | 1041          | 1037             | 1     | PC        | rock with traces of sand   | D        |          |
| 55        | 210973  | 1330      | 4364       | 962             | 1065          | 293            | 325          | 1037          | 1006             | 1     | PC        | conglomerate   | D        |          |
| 55        | 210973  | 1330      | 4364       | 1065            | 1072          | 325            | 327          | 1006          | 1003             | 1     | PC        | rock with traces of sand   | D        |          |
| 55        | 210973  | 1330      | 4364       | 1072            | 1293          | 327            | 394          | 1003          | 936              | 1     | PC        | conglomerate   | D        |          |
| 55        | 210973  | 1330      | 4364       | 1293            | 1301          | 394            | 397          | 936           | 934              | 2     | PF        | white and brown rock   | D        |          |
| 55        | 210973  | 1330      | 4364       | 1301            | 1306          | 397            | 398          | 934           | 932              | 3     | CL        | clay   | D        |          |
| 55        | 210973  | 1330      | 4364       | 1306            | 1314          | 398            | 401          | 932           | 930              | 1     | PC        | rock and sand  | D        |          |
| 55        | 210973  | 1330      | 4364       | 1314            | 1342          | 401            | 409          | 930           | 921              | 3     | CL        | clay (very sticky - water saturated)                             | D        |          |
| 55        | 210973  | 1330      | 4364       | 1342            | 1425          | 409            | 434          | 921           | 896              | 3     | CL        | clay with 1 to 2' streaks of rock                                | D        |          |
| 55        | 500122  | 1305      | 4283       | 0               | 5             | 0              | 2            | 1305          | 1304             | 3     | CL        | top soil   | D        |          |
| 55        | 500122  | 1305      | 4283       | 5               | 60            | 2              | 18           | 1304          | 1287             | 3     | CL        | clay   | D        |          |
| 55        | 500122  | 1305      | 4283       | 60              | 70            | 18             | 21           | 1287          | 1284             | 1     | PC        | sand   | D        |          |
| 55        | 500122  | 1305      | 4283       | 70              | 120           | 21             | 37           | 1284          | 1269             | 3     | CL        | clay   | D        |          |
| 55        | 500122  | 1305      | 4283       | 120             | 180           | 37             | 55           | 1269          | 1251             | 2     | PF        | sandy clay   | D        |          |
| 55        | 500122  | 1305      | 4283       | 180             | 188           | 55             | 57           | 1251          | 1248             | 1     | PC        | sand   | D        |          |
| 55        | 500122  | 1305      | 4283       | 188             | 260           | 57             | 79           | 1248          | 1226             | 3     | CL        | clay   | D        |          |
| 55        | 500122  | 1305      | 4283       | 260             | 330           | 79             | 101          | 1226          | 1205             | 1     | PC        | sand and clay  | D        |          |
| 55        | 500122  | 1305      | 4283       | 330             | 345           | 101            | 105          | 1205          | 1200             | 1     | PC        | sand   | D        |          |
| 55        | 500122  | 1305      | 4283       | 345             | 375           | 105            | 114          | 1200          | 1191             | 3     | CL        | joint clay   | D        |          |
| 55        | 500122  | 1305      | 4283       | 375             | 405           | 114            | 123          | 1191          | 1182             | 2     | PF        | sandy clay   | D        |          |
| 55        | 500122  | 1305      | 4283       | 405             | 420           | 123            | 128          | 1182          | 1177             | 1     | PC        | sand   | D        |          |
| 55        | 500122  | 1305      | 4283       | 420             | 460           | 128            | 140          | 1177          | 1165             | 3     | CL        | clay   | D        |          |
| 55        | 500122  | 1305      | 4283       | 460             | 468           | 140            | 143          | 1165          | 1163             | 1     | PC        | sand   | D        |          |
| 55        | 500122  | 1305      | 4283       | 468             | 528           | 143            | 161          | 1163          | 1144             | 2     | PF        | sandy clay   | D        |          |
| 55        | 500122  | 1305      | 4283       | 528             | 578           | 161            | 176          | 1144          | 1129             | 3     | CL        | clay   | D        |          |
| 55        | 500122  | 1305      | 4283       | 578             | 585           | 176            | 178          | 1129          | 1127             | 1     | PC        | sand   | D        |          |
| 55        | 500122  | 1305      | 4283       | 585             | 648           | 178            | 198          | 1127          | 1108             | 3     | CL        | clay   | D        |          |
| 55        | 500122  | 1305      | 4283       | 648             | 656           | 198            | 200          | 1108          | 1105             | 1     | PC        | sand   | D        |          |
| 55        | 500122  | 1305      | 4283       | 656             | 728           | 200            | 222          | 1105          | 1083             | 2     | PF        | sandy clay   | D        |          |
| 55        | 500122  | 1305      | 4283       | 728             | 778           | 222            | 237          | 1083          | 1068             | 3     | CL        | hard clay  | D        |          |
| 55        | 500122  | 1305      | 4283       | 778             | 784           | 237            | 239          | 1068          | 1066             | 1     | PC        | sand   | D        |          |

| Well Type | Well ID | Elev. (m) | Elev. (ft) | From Depth (ft) | To Depth (ft) | From Depth (m) | To Depth (m) | Top Elev. (m) | Bottom Elev. (m) | HGUID | HGU Code  | Lithology                                 | Log Type | Comments |
|-----------|---------|-----------|------------|-----------------|---------------|----------------|--------------|---------------|------------------|-------|-----------|---|----------|----------|
| 55        | 500122  | 1305      | 4283       | 784             | 890           | 239            | 271          | 1066          | 1034             | 3     | CL        | clay                                      | D        |          |
| 55        | 500122  | 1305      | 4283       | 890             | 919           | 271            | 280          | 1034          | 1025             | 2     | PF        | sandy clay                                | D        |          |
| 55        | 500122  | 1305      | 4283       | 919             | 928           | 280            | 283          | 1025          | 1023             | 1     | PC        | sand                                      | D        |          |
| 55        | 500122  | 1305      | 4283       | 928             | 970           | 283            | 296          | 1023          | 1010             | 2     | PF        | sandy clay                                | D        |          |
| 55        | 500122  | 1305      | 4283       | 970             | 978           | 296            | 298          | 1010          | 1007             | 3     | CL        | clay                                      | D        |          |
| 55        | 500122  | 1305      | 4283       | 978             | 1000          | 298            | 305          | 1007          | 1001             | 3     | CL        | clay                                      | D        |          |
| 55        | 505800  | 1286      | 4219       | 0               | 32            | 0              | 10           | 1286          | 1276             | 3     | CL        | top soil red clay                         | D        |          |
| 55        | 505800  | 1286      | 4219       | 32              | 43            | 10             | 13           | 1276          | 1273             | 1     | PC        | dry sand and gravel                       | D        |          |
| 55        | 505800  | 1286      | 4219       | 43              | 132           | 13             | 40           | 1273          | 1246             | 3     | CL        | red clay                                  | D        |          |
| 55        | 505800  | 1286      | 4219       | 132             | 138           | 40             | 42           | 1246          | 1244             | 1     | PC        | sand and gravel; water at 110'            | D        |          |
| 55        | 505800  | 1286      | 4219       | 138             | 178           | 42             | 54           | 1244          | 1232             | 3     | CL        | red clay                                  | D        |          |
| 55        | 505800  | 1286      | 4219       | 178             | 184           | 54             | 56           | 1232          | 1230             | 1     | PC        | sand and gravel                           | D        |          |
| 55        | 505800  | 1286      | 4219       | 184             | 210           | 56             | 64           | 1230          | 1222             | 3     | CL        | red clay                                  | D        |          |
| 55        | 505800  | 1286      | 4219       | 210             | 216           | 64             | 66           | 1222          | 1220             | 1     | PC        | sand and gravel                           | D        |          |
| 55        | 505800  | 1286      | 4219       | 216             | 285           | 66             | 87           | 1220          | 1199             | 3     | CL        | Brown clay                                | D        |          |
| 55        | 505800  | 1286      | 4219       | 285             | 287           | 87             | 87           | 1199          | 1198             | 1     | PC        | sand and gravel                           | D        |          |
| 55        | 505800  | 1286      | 4219       | 287             | 345           | 87             | 105          | 1198          | 1181             | 3     | CL        | Brown clay                                | D        |          |
| 55        | 505800  | 1286      | 4219       | 345             | 352           | 105            | 107          | 1181          | 1179             | 1     | PC        | sand and gravel                           | D        |          |
| 55        | 505800  | 1286      | 4219       | 352             | 408           | 107            | 124          | 1179          | 1162             | 3     | CL        | Brown clay                                | D        |          |
| 55        | 505800  | 1286      | 4219       | 408             | 413           | 124            | 126          | 1162          | 1160             | 1     | PC        | sand and gravel                           | D        |          |
| 55        | 505800  | 1286      | 4219       | 413             | 447           | 126            | 136          | 1160          | 1150             | 3     | CL        | Brown clay                                | D        |          |
| 55        | 505800  | 1286      | 4219       | 447             | 462           | 136            | 141          | 1150          | 1145             | 1     | PC        | sand and gravel                           | D        |          |
| 55        | 505800  | 1286      | 4219       | 462             | 487           | 141            | 148          | 1145          | 1137             | 3     | CL        | Brown clay                                | D        |          |
| 55        | 505800  | 1286      | 4219       | 487             | 492           | 148            | 150          | 1137          | 1136             | 1     | PC        | sand and gravel                           | D        |          |
| 55        | 505800  | 1286      | 4219       | 492             | 512           | 150            | 156          | 1136          | 1130             | 3     | CL        | Brown clay                                | D        |          |
| 55        | 505800  | 1286      | 4219       | 512             | 532           | 156            | 162          | 1130          | 1124             | 3     | CL        | red clay                                  | D        |          |
| 55        | 505800  | 1286      | 4219       | 532             | 547           | 162            | 167          | 1124          | 1119             | 1     | PC        | sand and gravel                           | D        |          |
| 55        | 505800  | 1286      | 4219       | 547             | 596           | 167            | 182          | 1119          | 1104             | 3     | CL        | Brown clay                                | D        |          |
| 55        | 505800  | 1286      | 4219       | 596             | 637           | 182            | 194          | 1104          | 1092             | 3     | CL        | red clay                                  | D        |          |
| 55        | 505800  | 1286      | 4219       | 637             | 648           | 194            | 198          | 1092          | 1088             | 1     | PC        | sand and gravel                           | D        |          |
| 55        | 505800  | 1286      | 4219       | 648             | 940           | 198            | 287          | 1088          | 999              | 3     | CL        | red clay                                  | D        |          |
| 55        | 505800  | 1286      | 4219       | 940             | 1092          | 287            | 333          | 999           | 953              | 3     | CL        | red and barn clay layer to close to check | D        |          |
| 55        | 505800  | 1286      | 4219       | 1092            | 1350          | 333            | 411          | 953           | 874              | 3     | CL        | red clay with white charl layers          | D        |          |
| 55        | 515771  | 1302      | 4272       | 0               | 600           | 0              | 183          | 1302          | 1119             | 10    | UNK       | [unknown]                                 | D        |          |
| 55        | 515771  | 1302      | 4272       | 600             | 625           | 183            | 191          | 1119          | 1112             | 3     | CL        | clay                                      | D        |          |
| 55        | 515771  | 1302      | 4272       | 625             | 630           | 191            | 192          | 1112          | 1110             | 1     | PC        | sand                                      | D        |          |
| 55        | 515771  | 1302      | 4272       | 630             | 645           | 192            | 197          | 1110          | 1106             | 3     | CL        | clay                                      | D        |          |
| 55        | 515771  | 1302      | 4272       | 645             | 650           | 197            | 198          | 1106          | 1104             | 1     | PC        | sand                                      | D        |          |
| 55        | 515771  | 1302      | 4272       | 650             | 830           | 198            | 253          | 1104          | 1049             | 3     | CL        | clay                                      | D        |          |
| 55        | 515771  | 1302      | 4272       | 830             | 845           | 253            | 258          | 1049          | 1045             | 1     | PC        | sand                                      | D        |          |
| 55        | 515771  | 1302      | 4272       | 845             | 920           | 258            | 280          | 1045          | 1022             | 3     | CL        | clay                                      | D        |          |
| 55        | 515771  | 1302      | 4272       | 920             | 1020          | 280            | 311          | 1022          | 991              | 2     | PF        | sand and clay streaks                     | D        |          |
| 55        | 515771  | 1302      | 4272       | 1020            | 1053          | 311            | 321          | 991           | 981              | 3     | CL        | clay                                      | D        |          |
| 55        | 551624  | 1310      | 4299       | 0               | 25            | 0              | 8            | 1310          | 1303             | 1     | PC        | top soil                                  | D        |          |
| 55        | 551624  | 1310      | 4299       | 25              | 35            | 8              | 11           | 1303          | 1300             | 1     | PC        | gravel                                    | D        |          |
| 55        | 551624  | 1310      | 4299       | 35              | 177           | 11             | 54           | 1300          | 1256             | 2     | PF        | clay with some sandstone                  | D        |          |
| 55        | 551624  | 1310      | 4299       | 177             | 220           | 54             | 67           | 1256          | 1243             | 3     | CL        | clay                                      | D        |          |
| 55        | 551624  | 1310      | 4299       | 220             | 232           | 67             | 71           | 1243          | 1240             | 1     | PC        | gravel                                    | D        |          |
| 55        | 551624  | 1310      | 4299       | 232             | 350           | 71             | 107          | 1240          | 1204             | 1     | PC        | sand ( some clay)                         | D        |          |
| 55        | 551624  | 1310      | 4299       | 350             | 440           | 107            | 134          | 1204          | 1176             | 2     | PF        | clay with sand streaks                    | D        |          |
| 55        | 551624  | 1310      | 4299       | 440             | 460           | 134            | 140          | 1176          | 1170             | 1     | PC        | sand                                      | D        |          |
| 55        | 551624  | 1310      | 4299       | 460             | 540           | 140            | 165          | 1170          | 1146             | 2     | PF        | clay with sand streaks                    | D        |          |
| 55        | 551624  | 1310      | 4299       | 540             | 970           | 165            | 296          | 1146          | 1015             | 8     | LAVA FLOW | hard rock with streaks of clay            | D        |          |

| Well Type | Well ID | Elev. (m) | Elev. (ft) | From Depth (ft) | To Depth (ft) | From Depth (m) | To Depth (m) | Top Elev. (m) | Bottom Elev. (m) | HGUID | HGU Code  | Lithology   | Log Type | Comments |
|-----------|---------|-----------|------------|-----------------|---------------|----------------|--------------|---------------|------------------|-------|-----------|---|----------|----------|
| 55        | 551624  | 1310      | 4299       | 970             | 1020          | 296            | 311          | 1015          | 999              | 1     | PC        | gravel and sand                                     | D        |          |
| 55        | 551624  | 1310      | 4299       | 1020            | 1203          | 311            | 367          | 999           | 944              | 8     | LAVA FLOW | hard rock (60,000 lb - drilled - 10 to 15 min / ft) | D        |          |
| 55        | 559752  | 1477      | 4845       | 0               | 1025          | 0              | 312          | 1477          | 1164             | 2     | PF        | alluvial  | D        |          |
| 55        | 563647  | 1341      | 4401       | 0               | 285           | 0              | 87           | 1341          | 1254             | 10    | UNK       | overburden  | D        |          |
| 55        | 563647  | 1341      | 4401       | 285             | 320           | 87             | 98           | 1254          | 1244             | 1     | PC        | sand  | D        |          |
| 55        | 563647  | 1341      | 4401       | 320             | 330           | 98             | 101          | 1244          | 1241             | 3     | CL        | clay  | D        |          |
| 55        | 563647  | 1341      | 4401       | 330             | 390           | 101            | 119          | 1241          | 1222             | 1     | PC        | sand  | D        |          |
| 55        | 563647  | 1341      | 4401       | 390             | 400           | 119            | 122          | 1222          | 1219             | 3     | CL        | clay  | D        |          |
| 55        | 563647  | 1341      | 4401       | 400             | 455           | 122            | 139          | 1219          | 1203             | 1     | PC        | sand  | D        |          |
| 55        | 563647  | 1341      | 4401       | 455             | 475           | 139            | 145          | 1203          | 1197             | 3     | CL        | clay  | D        |          |
| 55        | 563647  | 1341      | 4401       | 475             | 540           | 145            | 165          | 1197          | 1177             | 1     | PC        | sand  | D        |          |
| 55        | 563647  | 1341      | 4401       | 540             | 640           | 165            | 195          | 1177          | 1146             | 2     | PF        | sand and clay                                       | D        |          |
| 55        | 563647  | 1341      | 4401       | 640             | 690           | 195            | 210          | 1146          | 1131             | 1     | PC        | sand  | D        |          |
| 55        | 563647  | 1341      | 4401       | 690             | 1000          | 210            | 305          | 1131          | 1037             | 2     | PF        | clay with sand streaks                              | D        |          |
| 55        | 566135  | 1397      | 4583       | 0               | 419           | 0              | 128          | 1397          | 1269             | 8     | LAVA FLOW | brown andesite, 1st water 340', static 255'         | D        |          |
| 55        | 577269  | 1299      | 4262       | 0               | 210           | 0              | 64           | 1299          | 1235             | 10    | UNK       | overburden  | D        |          |
| 55        | 577269  | 1299      | 4262       | 210             | 225           | 64             | 69           | 1235          | 1231             | 1     | PC        | sand  | D        |          |
| 55        | 577269  | 1299      | 4262       | 225             | 345           | 69             | 105          | 1231          | 1194             | 3     | CL        | clay  | D        |          |
| 55        | 577269  | 1299      | 4262       | 345             | 355           | 105            | 108          | 1194          | 1191             | 1     | PC        | sand  | D        |          |
| 55        | 577269  | 1299      | 4262       | 355             | 520           | 108            | 158          | 1191          | 1141             | 3     | CL        | clay  | D        |          |
| 55        | 577269  | 1299      | 4262       | 520             | 530           | 158            | 162          | 1141          | 1138             | 1     | PC        | sand  | D        |          |
| 55        | 577269  | 1299      | 4262       | 530             | 550           | 162            | 168          | 1138          | 1132             | 3     | CL        | clay  | D        |          |
| 55        | 577269  | 1299      | 4262       | 550             | 565           | 168            | 172          | 1132          | 1127             | 1     | PC        | sand  | D        |          |
| 55        | 577269  | 1299      | 4262       | 565             | 610           | 172            | 186          | 1127          | 1113             | 3     | CL        | clay  | D        |          |
| 55        | 577269  | 1299      | 4262       | 610             | 630           | 186            | 192          | 1113          | 1107             | 1     | PC        | sand  | D        |          |
| 55        | 577269  | 1299      | 4262       | 630             | 765           | 192            | 233          | 1107          | 1066             | 3     | CL        | clay  | D        |          |
| 55        | 577269  | 1299      | 4262       | 765             | 780           | 233            | 238          | 1066          | 1061             | 1     | PC        | sand  | D        |          |
| 55        | 577269  | 1299      | 4262       | 780             | 810           | 238            | 247          | 1061          | 1052             | 3     | CL        | clay  | D        |          |
| 55        | 577269  | 1299      | 4262       | 810             | 820           | 247            | 250          | 1052          | 1049             | 1     | PC        | sand  | D        |          |
| 55        | 577269  | 1299      | 4262       | 820             | 830           | 250            | 253          | 1049          | 1046             | 3     | CL        | clay  | D        |          |
| 55        | 577269  | 1299      | 4262       | 830             | 1022          | 253            | 312          | 1046          | 988              | 1     | PC        | conglomerate  | D        |          |
| 55        | 577619  | 1317      | 4322       | 0               | 20            | 0              | 6            | 1317          | 1311             | 3     | CL        | dirt and clay                                       | D        |          |
| 55        | 577619  | 1317      | 4322       | 20              | 420           | 6              | 128          | 1311          | 1189             | 3     | CL        | clay  | D        |          |
| 55        | 577619  | 1317      | 4322       | 420             | 880           | 128            | 268          | 1189          | 1049             | 1     | PC        | clay conglomerate                                   | D        |          |
| 55        | 577619  | 1317      | 4322       | 880             | 1200          | 268            | 366          | 1049          | 952              | 1     | PC        | hard conglomerate                                   | D        |          |
| 55        | 577619  | 1317      | 4322       | 1200            | 1300          | 366            | 396          | 952           | 921              | 1     | PC        | conglomerate  | D        |          |
| 55        | 578921  | 1315      | 4313       | 0               | 20            | 0              | 6            | 1315          | 1309             | 3     | CL        | dirt and clay                                       | D        |          |
| 55        | 578921  | 1315      | 4313       | 20              | 460           | 6              | 140          | 1309          | 1174             | 3     | CL        | clay  | D        |          |
| 55        | 578921  | 1315      | 4313       | 460             | 880           | 140            | 268          | 1174          | 1046             | 1     | PC        | clay conglomerate                                   | D        |          |
| 55        | 578921  | 1315      | 4313       | 880             | 1200          | 268            | 366          | 1046          | 949              | 1     | PC        | hard conglomerate                                   | D        |          |
| 55        | 578921  | 1315      | 4313       | 1200            | 1300          | 366            | 396          | 949           | 918              | 1     | PC        | conglomerate  | D        |          |
| 55        | 582197  | 1443      | 4734       | 0               | 10            | 0              | 3            | 1443          | 1440             | 2     | PF        | top soil  | D        |          |
| 55        | 582197  | 1443      | 4734       | 10              | 80            | 3              | 24           | 1440          | 1419             | 8     | LAVA FLOW | malapai   | D        |          |
| 55        | 582197  | 1443      | 4734       | 80              | 100           | 24             | 30           | 1419          | 1413             | 8     | LAVA FLOW | cinder  | D        |          |
| 55        | 582197  | 1443      | 4734       | 100             | 140           | 30             | 43           | 1413          | 1400             | 8     | LAVA FLOW | malapai   | D        |          |
| 55        | 582197  | 1443      | 4734       | 140             | 150           | 43             | 46           | 1400          | 1397             | 8     | LAVA FLOW | cinder  | D        |          |
| 55        | 582197  | 1443      | 4734       | 150             | 490           | 46             | 149          | 1397          | 1294             | 8     | LAVA FLOW | malapai   | D        |          |
| 55        | 582197  | 1443      | 4734       | 490             | 525           | 149            | 160          | 1294          | 1283             | 8     | LAVA FLOW | broken and fractured malapai                        | D        |          |
| 55        | 583333  | 1318      | 4324       | 0               | 265           | 0              | 81           | 1318          | 1237             | 10    | UNK       | overburden  | D        |          |

| Well Type | Well ID | Elev. (m) | Elev. (ft) | From Depth (ft) | To Depth (ft) | From Depth (m) | To Depth (m) | Top Elev. (m) | Bottom Elev. (m) | HGUID | HGU Code  | Lithology                             | Log Type | Comments |
|-----------|---------|-----------|------------|-----------------|---------------|----------------|--------------|---------------|------------------|-------|-----------|---------------------------------------|----------|----------|
| 55        | 583333  | 1318      | 4324       | 265             | 345           | 81             | 105          | 1237          | 1213             | 2     | PF        | clay and sand                         | D        |          |
| 55        | 583333  | 1318      | 4324       | 345             | 375           | 105            | 114          | 1213          | 1204             | 1     | PC        | sand                                  | D        |          |
| 55        | 583333  | 1318      | 4324       | 375             | 405           | 114            | 123          | 1204          | 1194             | 3     | CL        | clay                                  | D        |          |
| 55        | 583333  | 1318      | 4324       | 405             | 495           | 123            | 151          | 1194          | 1167             | 1     | PC        | sand and clay                         | D        |          |
| 55        | 583333  | 1318      | 4324       | 495             | 510           | 151            | 155          | 1167          | 1162             | 1     | PC        | gravel and sand                       | D        |          |
| 55        | 583333  | 1318      | 4324       | 510             | 650           | 155            | 198          | 1162          | 1120             | 2     | PF        | clay and sand                         | D        |          |
| 55        | 583333  | 1318      | 4324       | 650             | 670           | 198            | 204          | 1120          | 1114             | 1     | PC        | gravel                                | D        |          |
| 55        | 583333  | 1318      | 4324       | 670             | 750           | 204            | 229          | 1114          | 1089             | 3     | CL        | clay                                  | D        |          |
| 55        | 583333  | 1318      | 4324       | 750             | 760           | 229            | 232          | 1089          | 1086             | 1     | PC        | sand                                  | D        |          |
| 55        | 583333  | 1318      | 4324       | 760             | 1105          | 232            | 337          | 1086          | 981              | 1     | PC        | conglomerate                          | D        |          |
| 55        | 585871  | 1345      | 4413       | 0               | 330           | 0              | 101          | 1345          | 1244             | 1     | PC        | volcanic conglomerate                 | D        |          |
| 55        | 585871  | 1345      | 4413       | 330             | 471           | 101            | 144          | 1244          | 1201             | 8     | LAVA FLOW | andesite, 1st water 370', static 320' | D        |          |
| 55        | 586012  | 1309      | 4295       | 0               | 320           | 0              | 98           | 1309          | 1212             | 3     | CL        | clay                                  | D        |          |
| 55        | 586012  | 1309      | 4295       | 320             | 540           | 98             | 165          | 1212          | 1145             | 1     | PC        | clay conglomerate                     | D        |          |
| 55        | 586012  | 1309      | 4295       | 540             | 850           | 165            | 259          | 1145          | 1050             | 1     | PC        | conglomerate                          | D        |          |
| 55        | 586012  | 1309      | 4295       | 850             | 1280          | 259            | 390          | 1050          | 919              | 1     | PC        | hard conglomerate                     | D        |          |
| 55        | 591753  | 1327      | 4354       | 0               | 395           | 0              | 120          | 1327          | 1207             | 10    | UNK       | overburden                            | D        |          |
| 55        | 591753  | 1327      | 4354       | 395             | 420           | 120            | 128          | 1207          | 1199             | 1     | PC        | gravel                                | D        |          |
| 55        | 591753  | 1327      | 4354       | 420             | 450           | 128            | 137          | 1199          | 1190             | 1     | PC        | gravel and clay                       | D        |          |
| 55        | 591753  | 1327      | 4354       | 450             | 465           | 137            | 142          | 1190          | 1185             | 1     | PC        | gravel                                | D        |          |
| 55        | 591753  | 1327      | 4354       | 465             | 590           | 142            | 180          | 1185          | 1147             | 3     | CL        | clay                                  | D        |          |
| 55        | 591753  | 1327      | 4354       | 590             | 605           | 180            | 184          | 1147          | 1143             | 1     | PC        | sand                                  | D        |          |
| 55        | 591753  | 1327      | 4354       | 605             | 740           | 184            | 226          | 1143          | 1102             | 2     | PF        | clay and gravel                       | D        |          |
| 55        | 591753  | 1327      | 4354       | 740             | 755           | 226            | 230          | 1102          | 1097             | 1     | PC        | gravel                                | D        |          |
| 55        | 591753  | 1327      | 4354       | 755             | 865           | 230            | 264          | 1097          | 1063             | 2     | PF        | clay and gravel                       | D        |          |
| 55        | 591753  | 1327      | 4354       | 865             | 915           | 264            | 279          | 1063          | 1048             | 1     | PC        | conglomerate                          | D        |          |
| 55        | 591753  | 1327      | 4354       | 915             | 925           | 279            | 282          | 1048          | 1045             | 8     | LAVA FLOW | hard rock                             | D        |          |
| 55        | 591753  | 1327      | 4354       | 925             | 1010          | 282            | 308          | 1045          | 1019             | 1     | PC        | conglomerate                          | D        |          |
| 55        | 594688  | 1301      | 4269       | 0               | 230           | 0              | 70           | 1301          | 1231             | 10    | UNK       | overburden                            | D        |          |
| 55        | 594688  | 1301      | 4269       | 230             | 235           | 70             | 72           | 1231          | 1229             | 1     | PC        | sand                                  | D        |          |
| 55        | 594688  | 1301      | 4269       | 235             | 275           | 72             | 84           | 1229          | 1217             | 3     | CL        | clay                                  | D        |          |
| 55        | 594688  | 1301      | 4269       | 275             | 285           | 84             | 87           | 1217          | 1214             | 1     | PC        | sand                                  | D        |          |
| 55        | 594688  | 1301      | 4269       | 285             | 340           | 87             | 104          | 1214          | 1197             | 3     | CL        | clay                                  | D        |          |
| 55        | 594688  | 1301      | 4269       | 340             | 375           | 104            | 114          | 1197          | 1187             | 1     | PC        | sand                                  | D        |          |
| 55        | 594688  | 1301      | 4269       | 375             | 405           | 114            | 123          | 1187          | 1178             | 3     | CL        | clay                                  | D        |          |
| 55        | 594688  | 1301      | 4269       | 405             | 525           | 123            | 160          | 1178          | 1141             | 1     | PC        | sand and clay                         | D        |          |
| 55        | 594688  | 1301      | 4269       | 525             | 570           | 160            | 174          | 1141          | 1127             | 3     | CL        | clay                                  | D        |          |
| 55        | 594688  | 1301      | 4269       | 570             | 585           | 174            | 178          | 1127          | 1123             | 1     | PC        | sand                                  | D        |          |
| 55        | 594688  | 1301      | 4269       | 585             | 845           | 178            | 258          | 1123          | 1044             | 1     | PC        | sand and clay                         | D        |          |
| 55        | 594688  | 1301      | 4269       | 845             | 855           | 258            | 261          | 1044          | 1040             | 1     | PC        | sand                                  | D        |          |
| 55        | 594688  | 1301      | 4269       | 855             | 1005          | 261            | 306          | 1040          | 995              | 2     | PF        | clay and sand streaks                 | D        |          |
| 55        | 613592  | 1336      | 4382       | 500             | 530           | 152            | 162          | 1183          | 1174             | 3     | CL        | clay                                  | D        |          |
| 55        | 613592  | 1336      | 4382       | 530             | 545           | 162            | 166          | 1174          | 1170             | 1     | PC        | sand                                  | D        |          |
| 55        | 613592  | 1336      | 4382       | 545             | 610           | 166            | 186          | 1170          | 1150             | 3     | CL        | clay                                  | D        |          |
| 55        | 613592  | 1336      | 4382       | 610             | 620           | 186            | 189          | 1150          | 1147             | 1     | PC        | gravel                                | D        |          |
| 55        | 613592  | 1336      | 4382       | 620             | 710           | 189            | 216          | 1147          | 1119             | 1     | PC        | sand and clay                         | D        |          |
| 55        | 613592  | 1336      | 4382       | 710             | 870           | 216            | 265          | 1119          | 1071             | 3     | CL        | clay                                  | D        |          |
| 55        | 613592  | 1336      | 4382       | 870             | 1165          | 265            | 355          | 1071          | 981              | 1     | PC        | sand and clay                         | D        |          |
| 55        | 613707  | 1302      | 4272       | 502             | 525           | 153            | 160          | 1149          | 1142             | 3     | CL        | clay                                  | D        |          |
| 55        | 613707  | 1302      | 4272       | 525             | 535           | 160            | 163          | 1142          | 1139             | 1     | PC        | conglomerate                          | D        |          |
| 55        | 613707  | 1302      | 4272       | 535             | 550           | 163            | 168          | 1139          | 1134             | 8     | LAVA FLOW | basalt                                | D        |          |
| 55        | 613707  | 1302      | 4272       | 550             | 556           | 168            | 169          | 1134          | 1133             | 8     | LAVA FLOW | fractured basalt                      | D        |          |

| Well Type | Well ID | Elev. (m) | Elev. (ft) | From Depth (ft) | To Depth (ft) | From Depth (m) | To Depth (m) | Top Elev. (m) | Bottom Elev. (m) | HGUID | HGU Code  | Lithology  | Log Type | Comments       |
|-----------|---------|-----------|------------|-----------------|---------------|----------------|--------------|---------------|------------------|-------|-----------|--|----------|----------------|
| 55        | 613707  | 1302      | 4272       | 556             | 562           | 169            | 171          | 1133          | 1131             | 3     | CL        | clay   | D        |                |
| 55        | 613707  | 1302      | 4272       | 562             | 582           | 171            | 177          | 1131          | 1125             | 8     | LAVA FLOW | basalt   | D        |                |
| 55        | 613707  | 1302      | 4272       | 582             | 590           | 177            | 180          | 1125          | 1122             | 8     | LAVA FLOW | fractured basalt   | D        |                |
| 55        | 613707  | 1302      | 4272       | 590             | 650           | 180            | 198          | 1122          | 1104             | 1     | PC        | sand with streaks of clay                                  | D        |                |
| 55        | 613707  | 1302      | 4272       | 650             | 675           | 198            | 206          | 1104          | 1096             | 1     | PC        | conglomerate   | D        |                |
| 55        | 808157  | 1322      | 4337       | 600             | 660           | 183            | 201          | 1139          | 1121             | 1     | PC        | sand   | D        |                |
| 55        | 808157  | 1322      | 4337       | 660             | 805           | 201            | 245          | 1121          | 1077             | 3     | CL        | clay   | D        |                |
| 55        | 808157  | 1322      | 4337       | 805             | 820           | 245            | 250          | 1077          | 1072             | 1     | PC        | sand   | D        |                |
| 55        | 808157  | 1322      | 4337       | 820             | 910           | 250            | 277          | 1072          | 1045             | 3     | CL        | clay   | D        |                |
| 55        | 808157  | 1322      | 4337       | 910             | 920           | 277            | 280          | 1045          | 1042             | 1     | PC        | sand   | D        |                |
| 55        | 808157  | 1322      | 4337       | 920             | 965           | 280            | 294          | 1042          | 1028             | 3     | CL        | clay   | D        |                |
| 55        | 808157  | 1322      | 4337       | 965             | 975           | 294            | 297          | 1028          | 1025             | 1     | PC        | sand   | D        |                |
| 55        | 808157  | 1322      | 4337       | 975             | 1025          | 297            | 312          | 1025          | 1010             | 3     | CL        | clay   | D        |                |
| 55        | 808157  | 1322      | 4337       | 1025            | 1035          | 312            | 315          | 1010          | 1006             | 1     | PC        | sand   | D        |                |
| 55        | 808157  | 1322      | 4337       | 1035            | 1060          | 315            | 323          | 1006          | 999              | 3     | CL        | clay   | D        |                |
| 55        | 808157  | 1322      | 4337       | 1060            | 1085          | 323            | 331          | 999           | 991              | 1     | PC        | sand   | D        |                |
| 55        | 808157  | 1322      | 4337       | 1085            | 1100          | 331            | 335          | 991           | 987              | 3     | CL        | clay   | D        |                |
| OG        | 103     | 1300      | 4265       | 0               | 6             | 0              | 2            | 1300          | 1298             | 2     | PF        | sandy loam   | D        | Cenozoic at TD |
| OG        | 103     | 1300      | 4265       | 6               | 50            | 2              | 15           | 1298          | 1285             | 1     | PC        | clutch(sp)   | D        |                |
| OG        | 103     | 1300      | 4265       | 50              | 105           | 15             | 32           | 1285          | 1268             | 1     | PC        | clay and boulders red                                      | D        |                |
| OG        | 103     | 1300      | 4265       | 105             | 135           | 32             | 41           | 1268          | 1259             | 3     | CL        | red clay   | D        |                |
| OG        | 103     | 1300      | 4265       | 135             | 146           | 41             | 45           | 1259          | 1255             | 1     | PC        | sand and gravel water                                      | D        |                |
| OG        | 103     | 1300      | 4265       | 146             | 205           | 45             | 62           | 1255          | 1238             | 2     | PF        | grey shale   | D        |                |
| OG        | 103     | 1300      | 4265       | 205             | 280           | 62             | 85           | 1238          | 1215             | 2     | PF        | red clay and boulders                                      | D        |                |
| OG        | 103     | 1300      | 4265       | 280             | 305           | 85             | 93           | 1215          | 1207             | 1     | PC        | sand and gravel water                                      | D        |                |
| OG        | 103     | 1300      | 4265       | 305             | 508           | 93             | 155          | 1207          | 1145             | 8     | LAVA FLOW | chirk (sp.) a pretty red and dam hard                      | D        |                |
| OG        | 103     | 1300      | 4265       | 508             | 658           | 155            | 201          | 1145          | 1099             | 2     | PF        | grey shale   | D        |                |
| OG        | 103     | 1300      | 4265       | 658             | 668           | 201            | 204          | 1099          | 1096             | 4     | LM        | lime grey  | D        |                |
| OG        | 203     | 1280      | 4201       | 0               | 210           | 0              | 64           | 1280          | 1216             | 10    | UNK       | no log   | G        |                |
| OG        | 203     | 1280      | 4201       | 210             | 250           | 64             | 76           | 1216          | 1204             | 1     | PC        | Tan to gray loose arkosic sand, fine to coarse gravel      | G        |                |
| OG        | 203     | 1280      | 4201       | 250             | 280           | 76             | 85           | 1204          | 1195             | 3     | CL        | Blue gray clay with incl'd reddened quartz gravel          | G        |                |
| OG        | 203     | 1280      | 4201       | 280             | 300           | 85             | 91           | 1195          | 1189             | 1     | PC        | Gray loose arkosic sand fine gravel angular to sub rounded | G        |                |
| OG        | 203     | 1280      | 4201       | 300             | 320           | 91             | 98           | 1189          | 1183             | 1     | PC        | Gray muddy loose sand                                      | G        |                |
| OG        | 203     | 1280      | 4201       | 320             | 375           | 98             | 114          | 1183          | 1166             | 1     | PC        | Gray loose arkosic sand, with chert and pyrite             | G        |                |
| OG        | 203     | 1280      | 4201       | 375             | 400           | 114            | 122          | 1166          | 1159             | 3     | CL        | gray green clay, in part sandy                             | G        |                |
| OG        | 203     | 1280      | 4201       | 400             | 500           | 122            | 152          | 1159          | 1128             | 3     | CL        | Gray clay, consolidated in part with incl'd. Sandy gravel  | G        |                |
| OG        | 203     | 1280      | 4201       | 500             | 540           | 152            | 165          | 1128          | 1116             | 10    | UNK       | Samples missing  | G        |                |
| OG        | 203     | 1280      | 4201       | 540             | 550           | 165            | 168          | 1116          | 1113             | 3     | CL        | Gray clay with lime stringers                              | G        |                |
| OG        | 203     | 1280      | 4201       | 550             | 600           | 168            | 183          | 1113          | 1098             | 3     | CL        | Gray clay w/ incl'd qtz., Gr.                              | G        |                |
| OG        | 203     | 1280      | 4201       | 600             | 650           | 183            | 198          | 1098          | 1082             | 1     | PC        | Gray sand with clay cement.                                | G        |                |
| OG        | 203     | 1280      | 4201       | 650             | 680           | 198            | 207          | 1082          | 1073             | 1     | PC        | Gray loose arkosic sand. Fine to pebble size.              | G        |                |
| OG        | 203     | 1280      | 4201       | 680             | 750           | 207            | 229          | 1073          | 1052             | 1     | PC        | Gray to tan loose gravel. Mainly quartz.                   | G        |                |
| OG        | 203     | 1280      | 4201       | 750             | 800           | 229            | 244          | 1052          | 1037             | 1     | PC        | Gray fine to medium quartz sand becoming arkosic           | G        |                |
| OG        | 203     | 1280      | 4201       | 800             | 890           | 244            | 271          | 1037          | 1009             | 1     | PC        | Very fine to very coarse loose sand angular to sub rounded | G        |                |
| OG        | 203     | 1280      | 4201       | 890             | 900           | 271            | 274          | 1009          | 1006             | 3     | CL        | Gray to pink clay  | G        |                |
| OG        | 203     | 1280      | 4201       | 900             | 950           | 274            | 290          | 1006          | 991              | 1     | PC        | tan to brown fine very loose sand with gray clay cement    | G        |                |
| OG        | 203     | 1280      | 4201       | 950             | 1000          | 290            | 305          | 991           | 976              | 1     | PC        | Dark red brown arkosic. High % of granitic material.       | G        |                |
| OG        | 203     | 1280      | 4201       | 1000            | 1400          | 305            | 427          | 976           | 854              | 1     | PC        | Same with limestone pebbles, clay cementing                | G        |                |
| OG        | 203     | 1280      | 4201       | 1400            | 1705          | 427            | 520          | 854           | 761              | 1     | PC        | Dark red brown to purplish granitic sand. Loose.           | G        |                |
| OG        | 203     | 1280      | 4201       | 1705            | 1805          | 520            | 550          | 761           | 730              | 10    | UNK       | Samples missing  | G        |                |
| OG        | 203     | 1280      | 4201       | 1805            | 2020          | 550            | 616          | 730           | 665              | 1     | PC        | Dark red brown granitic sand, loose; fine to coarse.       | G        |                |
| OG        | 203     | 1280      | 4201       | 2020            | 2400          | 616            | 732          | 665           | 549              | 1     | PC        | Same but becoming lighter with gray cast.                  | G        |                |

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|-----------|---------|-----------|------------|-----------------|---------------|----------------|--------------|---------------|------------------|-------|----------|--|-----------------------------|----------------------|
| OG        | 203     | 1280      | 4201       | 2400            | 2700          | 732            | 823          | 549           | 458              | 1     | PC       | Composed mainly of quartzite, feldspar, with minor amounts of clay, ls. Pebbles and igneous rocks.   | G                           |                      |
| OG        | 203     | 1280      | 4201       | 2700            | 2800          | 823            | 853          | 458           | 427              | 1     | PC       | Dark purple brown quartzitic, angular fragments, medium to coarse grained. Somewhat arkosic and with red brown clay and shale in small amounts.                                  | G                           |                      |
| OG        | 203     | 1280      | 4201       | 2800            | 3420          | 853            | 1042         | 427           | 238              | 1     | PC       | Appears to be reworked older sediments with abundant copper mineralization.  | G                           |                      |
| OG        | 203     | 1280      | 4201       | 3420            | 3670          | 1042           | 1119         | 238           | 162              | 1     | PC       | Dark blue gray calc. quartzite fragments.  | G                           |                      |
| OG        | 203     | 1280      | 4201       | 3670            | 3900          | 1119           | 1189         | 162           | 92               | 1     | PC       | Dark gray reworked quartzitic material; some arkosic material and with red brown shale and clay. Abundant copper minerals. Asphaltic globules. Secondary calc. material.         | G                           |                      |
| OG        | 203     | 1280      | 4201       | 3900            | 4000          | 1189           | 1219         | 92            | 61               | 10    | UNK      | Samples missing  | G                           |                      |
| OG        | 203     | 1280      | 4201       | 4000            | 4200          | 1219           | 1280         | 61            | 0                | 1     | PC       | [appears to be same symbology used to represent 3670-3900]   | G                           |                      |
| OG        | 203     | 1280      | 4201       | 4200            | 4300          | 1280           | 1311         | 0             | -30              | 1     | PC       | Gray quartzitic sand with loose sand in asphaltic globules.  | G                           |                      |
| OG        | 203     | 1280      | 4201       | 4300            | 4950          | 1311           | 1509         | -30           | -228             | 1     | PC       | Reworked older rock. Chiefly quartzite with arkosic material. Some red brown clay.   | G                           |                      |
| OG        | 203     | 1280      | 4201       | 4950            | 5010          | 1509           | 1527         | -228          | -247             | 2     | PF       | Lignite or highly carbon. Black shale seams in above quartzitic material.  | G                           |                      |
| OG        | 203     | 1280      | 4201       | 5010            | 5030          | 1527           | 1533         | -247          | -253             | 2     | PF       | Same with tar globules or balls.   | G                           |                      |
| OG        | 203     | 1280      | 4201       | 5030            | 5100          | 1533           | 1554         | -253          | -274             | 2     | PF       | [appears to be same symbology used to represent 4950-5010]   | G                           |                      |
| OG        | 203     | 1280      | 4201       | 5100            | 5250          | 1554           | 1600         | -274          | -320             | 1     | PC       | Arkosic sandstone, fine to coarse, conglomerate texture. Dark yellow brown color, from limonite. Arkosic sandstone, conglomerate with thin black carbon. S. and graphitic shale. | G                           |                      |
| OG        | 203     | 1280      | 4201       | 5250            | 5330          | 1600           | 1625         | -320          | -344             | 2     | PF       | Black graphitic shale with thin seams of arkosic sandstone, conglomerate.  | G                           |                      |
| OG        | 203     | 1280      | 4201       | 5330            | 5410          | 1625           | 1649         | -344          | -369             | 1     | PC       | Dark brown very fine sandstone. Arkosic material. Dark purplish brown very fine sandstone.   | G                           |                      |
| OG        | 203     | 1280      | 4201       | 5410            | 5450          | 1649           | 1661         | -369          | -381             | 1     | PC       | Same as above becoming coarser grained, higher porosity.   | G                           |                      |
| OG        | 203     | 1280      | 4201       | 5450            | 5800          | 1661           | 1768         | -381          | -487             | 1     | PC       | Same. Very fine grained with variegated colors, gray, purplish brown and cream.  | G                           |                      |
| OG        | 203     | 1280      | 4201       | 5800            | 5840          | 1768           | 1780         | -487          | -500             | 2     | PF       | Black carbonaceous shale. Dark gray to black and green very fine grained quartzitic sandstone with thin bl. Carbon shale.  | G                           |                      |
| OG        | 203     | 1280      | 4201       | 5840            | 5900          | 1780           | 1798         | -500          | -518             | 1     | PC       | Dark gray to black very fine grained sandstone, argillic.  | G                           |                      |
| OG        | 203     | 1280      | 4201       | 5900            | 5970          | 1798           | 1820         | -518          | -539             | 1     | PC       | Dark gray to black arenac.. Shale, calc. in part.  | G                           |                      |
| OG        | 203     | 1280      | 4201       | 5970            | 6100          | 1820           | 1859         | -539          | -579             | 1     | PC       | Dark gray green very fine sandstone, argillic.   | G                           |                      |
| OG        | 203     | 1280      | 4201       | 6100            | 6260          | 1859           | 1908         | -579          | -628             | 1     | PC       | Dark gray to black arenac.. Shale, calc. in part.  | G                           |                      |
| OG        | 203     | 1280      | 4201       | 6260            | 6300          | 1908           | 1920         | -628          | -640             | 1     | PC       | with thin fine grained light sandstone.  | G                           |                      |
| OG        | 203     | 1280      | 4201       | 6300            | 6400          | 1920           | 1951         | -640          | -670             | 2     | PF       | Dark gray to black highly calc. shale  | G                           |                      |
| OG        | 203     | 1280      | 4201       | 6400            | 6430          | 1951           | 1960         | -670          | -679             | 4     | LM       | becoming argillic limestone  | G                           |                      |
| OG        | 203     | 1280      | 4201       | 6430            | 6450          | 1960           | 1966         | -679          | -686             | 1     | PC       | Green fine grained sandstone   | G                           |                      |
| OG        | 203     | 1280      | 4201       | 6450            | 6460          | 1966           | 1969         | -686          | -689             | 4     | LM       | Black argillic limestone   | G                           |                      |
| OG        | 203     | 1280      | 4201       | 6460            | 6500          | 1969           | 1981         | -689          | -701             | 1     | PC       | Light to dark var. sandstone, fine grained.  | G                           |                      |
| OG        | 203     | 1280      | 4201       | 6500            | 6520          | 1981           | 1987         | -701          | -707             | 1     | PC       | Light gray calc. sandstone fine gr.  | G                           |                      |
| OG        | 203     | 1280      | 4201       | 6520            | 6560          | 1987           | 2000         | -707          | -719             | 1     | PC       | Dark fine grained sandstone, argillic. Abundant limonite.  | G                           |                      |
| OG        | 203     | 1280      | 4201       | 6560            | 6590          | 2000           | 2009         | -719          | -728             | 4     | LM       | Dark gray sandy limestone  | G                           |                      |
| OG        | 203     | 1280      | 4201       | 6590            | 6600          | 2009           | 2012         | -728          | -731             | 1     | PC       | Dark red brown arkosic sandstone, conglomerate   | G                           |                      |
| OG        | 203     | 1280      | 4201       | 6600            | 6650          | 2012           | 2027         | -731          | -746             | 1     | PC       | Purple brown arkosic sandstone with calc. streaks  | G                           |                      |
| OG        | 203     | 1280      | 4201       | 6650            | 6690          | 2027           | 2039         | -746          | -759             | 4     | LM       | Cream fine grained loose sand dark gray to black sandy dolo..  | G                           |                      |
| OG        | 203     | 1280      | 4201       | 6690            | 6700          | 2039           | 2042         | -759          | -762             | 1     | PC       | Cream fine gr. Loose sand  | G                           |                      |
| OG        | 203     | 1280      | 4201       | 6700            | 6775          | 2042           | 2065         | -762          | -785             | 4     | LM       | Dark gray to purplish, sandy dolo.. With thin seams of gray with purple mottling, bentonite or tuff.   | G                           |                      |
| OG        | 203     | 1280      | 4201       | 6775            | 6810          | 2065           | 2076         | -785          | -795             | 1     | PC       | Dark red brown sandy shale with thin tan fine grained sandstone. Loose.  | G                           |                      |
| OG        | 203     | 1280      | 4201       | 6810            | 6865          | 2076           | 2092         | -795          | -812             | 1     | PC       | Cu. Minerals. Dark green fine grained sandstone, arkosic and finely conglomerate with red brown mottling (olivine, epidote chief minerals).                                      | G, RES, SP, CAL, GAM, CN, T | Cretaceous (?) at TD |

| Well Type | Well ID | Elev. (m) | Elev. (ft) | From Depth (ft) | To Depth (ft) | From Depth (m) | To Depth (m) | Top Elev. (m) | Bottom Elev. (m) | HGUID | HGU Code  | Lithology  | Log Type | Comments  |
|-----------|---------|-----------|------------|-----------------|---------------|----------------|--------------|---------------|------------------|-------|-----------|--|----------|---|
| OG        | 208     | 1276      | 4185       | 0               | 100           | 0              | 30           | 1276          | 1246             | 10    | UNK       | unknown  | G        | Partial log - summarized from 'Analysis by Okis Couleen, May 1949'. See detailed descriptions for depths between 100 and 3,340 feet in AZGS files. No log below 3,340 ft. |
| OG        | 208     | 1276      | 4185       | 100             | 2465          | 30             | 751          | 1246          | 525              | 1     | PC        | Alluvium, apparently predominantly coarse-clastic sands and gravel, from volcanic, granitic and sedimentary-metamorphic sources.   | G        |   |
| OG        | 208     | 1276      | 4185       | 2465            | 2585          | 751            | 788          | 525           | 488              | 10    | UNK       | unknown  | G        |   |
| OG        | 208     | 1276      | 4185       | 2585            | 2590          | 788            | 789          | 488           | 487              | 1     | PC        | Alluvium, angular to rounded, 60% under 2mm clast size. Quartz pebbles rounded. Quartzite dark to pink in color. Rhyolite light tan ground mass. Fe staining on quartzite.   | G        |   |
| OG        | 208     | 1276      | 4185       | 2590            | 2613          | 789            | 796          | 487           | 480              | 10    | UNK       | unknown  | G        |   |
| OG        | 208     | 1276      | 4185       | 2613            | 2617          | 796            | 798          | 480           | 478              | 1     | PC        | Alluvium similar to 2585 to 2590 interval  | G        |   |
| OG        | 208     | 1276      | 4185       | 2617            | 2634          | 798            | 803          | 478           | 473              | 10    | UNK       | unknown  | G        |   |
| OG        | 208     | 1276      | 4185       | 2634            | 2636          | 803            | 803          | 473           | 473              | 1     | PC        | Alluvium, angular to rounded, 50% over 2mm, 50% under, of clasts predominantly from quartzite sources, some rhyolite. Grains of magnetite, limonite, and epidote(?).   | G        |   |
| OG        | 208     | 1276      | 4185       | 2636            | 2640          | 803            | 805          | 473           | 471              | 10    | UNK       | unknown  | G        |   |
| OG        | 208     | 1276      | 4185       | 2640            | 2650          | 805            | 808          | 471           | 468              | 1     | PC        | Alluvium, angular to rounded of approximately equal percentages of grains over and under 2mm size. Predominantly quartzite sources with some volcanic, "spring deposit", travertine, and sandstone. Limonite, magnetite, quartz, epidote and chlorite alteration noted.  | G        |   |
| OG        | 208     | 1276      | 4185       | 2650            | 2680          | 808            | 817          | 468           | 459              | 10    | UNK       | unknown  | G        |   |
| OG        | 208     | 1276      | 4185       | 2680            | 2800          | 817            | 853          | 459           | 423              | 8     | LAVA FLOW | Rhyolite(?). Nearly aphanitic matrix, few scattered feldspar grains and pyroxene phenocrysts, fine-grained to glassy and light brown. Some pumice. Quartz-lined vugs.  | G        |   |
| OG        | 208     | 1276      | 4185       | 2800            | 2860          | 853            | 872          | 423           | 404              | 1     | PC        | Alluvium, very angular to very well-rounded, light brown. Clasts of predominantly volcanic rocks, tuff, and quartzite(?). Silt has a calcite cement. Sand weakly consolidated. No fines under 2mm present near contact with underlying tuff.   | G        |   |
| OG        | 208     | 1276      | 4185       | 2860            | 2880          | 872            | 878          | 404           | 398              | 8     | LAVA FLOW | Tuff. Fine-grained and glassy with abundant quartz and pyroxenes, gray in color.   | G        |   |
| OG        | 208     | 1276      | 4185       | 2880            | 3080          | 878            | 939          | 398           | 337              | 1     | PC        | Alluvium, angular to well-rounded with fragments consisting of mainly volcanic rocks. Some quartzite, sandstone and intrusive rocks noted, including weathered dike material. Material under 2mm has slight lime cement.   | G        |   |
| OG        | 208     | 1276      | 4185       | 3080            | 3090          | 939            | 942          | 337           | 334              | 8     | LAVA FLOW | Fine-grained intrusive rock(?) and fragments, few volcanic fragments. Some lime cement.  | G        |   |
| OG        | 208     | 1276      | 4185       | 3090            | 3140          | 942            | 957          | 334           | 319              | 1     | PC        | Alluvium, predominantly sand-size particles, angular to well-rounded. Clasts predominantly volcanic, reddish-gray color.   | G        |   |
| OG        | 208     | 1276      | 4185       | 3140            | 3340          | 957            | 1018         | 319           | 258              | 1     | PC        | Alluvium, predominantly pink volcanic rock fragments below 2mm size. Fragments of tuff, quartzite, siltstone (?), and serpentine (?) noted. Aphanitic and glassy texture with pink, red, white and brown colors. Most clasts angular with some sub-rounded. Some large fragments at 3,310 to 3,320 ft have rounded surfaces, indicating rounded gravels. | G        |   |
| OG        | 208     | 1276      | 4185       | 3340            | 4605          | 1018           | 1404         | 258           | -128             | 10    | UNK       | unknown  | G        | Tertiary volcanic rock at TD reported.  |
| OG        | 209     | 1273      | 4175       | 0               | 349           | 0              | 106          | 1273          | 1167             | 10    | UNK       | No samples   | S        | Partial log taken from analysis of random samples from 350 to 2702 feet.  |
| OG        | 209     | 1273      | 4175       | 350             | 351           | 107            | 107          | 1166          | 1166             | 3     | CL        | pale green bentonitic clay, some gypsum quartz and volcanic fragments 10%.   | S        |   |
| OG        | 209     | 1273      | 4175       | 351             | 480           | 107            | 146          | 1166          | 1127             | 10    | UNK       | unknown  | S        |   |
| OG        | 209     | 1273      | 4175       | 480             | 481           | 146            | 147          | 1127          | 1126             | 6     | GYP       | flesh pink gypsum, some clay 10%.  | S        |   |
| OG        | 209     | 1273      | 4175       | 481             | 660           | 147            | 201          | 1126          | 1072             | 10    | UNK       | unknown  | S        |   |
| OG        | 209     | 1273      | 4175       | 660             | 661           | 201            | 201          | 1072          | 1072             | 3     | CL        | light gray clay 60%, gypsum 10%, schist, gneiss volcanics 30%  | S        |   |
| OG        | 209     | 1273      | 4175       | 661             | 680           | 201            | 207          | 1072          | 1066             | 10    | UNK       | unknown  | S        |   |
| OG        | 209     | 1273      | 4175       | 680             | 681           | 207            | 208          | 1066          | 1065             | 1     | PC        | grayish brown, green schist and gneiss 60%, volcanics 35%, trace of clay and gypsum.   | S        |   |
| OG        | 209     | 1273      | 4175       | 681             | 785           | 208            | 239          | 1065          | 1034             | 10    | UNK       | unknown  | S        |   |
| OG        | 209     | 1273      | 4175       | 785             | 786           | 239            | 240          | 1034          | 1033             | 1     | PC        | grayish brown volcanics and graywacke 40%, gypsum 15%, schist and gneiss 20%.  | S        | percentages unknown   |
| OG        | 209     | 1273      | 4175       | 786             | 885           | 240            | 270          | 1033          | 1003             | 10    | UNK       | unknown  | S        |   |



| Well Type | Well ID | Elev. (m) | Elev. (ft) | From Depth (ft) | To Depth (ft) | From Depth (m) | To Depth (m) | Top Elev. (m) | Bottom Elev. (m) | HGUID | HGU Code | Lithology  | Log Type | Comments  |
|-----------|---------|-----------|------------|-----------------|---------------|----------------|--------------|---------------|------------------|-------|----------|--|----------|---|
| OG        | 209     | 1273      | 4175       | 885             | 886           | 270            | 270          | 1003          | 1003             | 2     | PF       | Brownish gray graywacke 80%, volcanics 15%, gypsum 5%.   | S        |   |
| OG        | 209     | 1273      | 4175       | 886             | 980           | 270            | 299          | 1003          | 974              | 10    | UNK      | unknown  | S        |   |
| OG        | 209     | 1273      | 4175       | 980             | 981           | 299            | 299          | 974           | 974              | 2     | PF       | Brownish gray graywacke 70%, volcanics 15%, schist and gneiss 10%, gypsum 5%.  | S        |   |
| OG        | 209     | 1273      | 4175       | 981             | 1080          | 299            | 329          | 974           | 944              | 10    | UNK      | unknown  | S        |   |
| OG        | 209     | 1273      | 4175       | 1080            | 2702          | 329            | 824          | 944           | 449              | 2     | PF       | brownish gray graywacke varying from 85% to 100% Remainder of cuttings consisting of "clay or volcanics and trace amounts of gypsum, quartz, gneiss, schist, shale and iron fragments" | S        | Taken from 17 sample-point intervals between 1080 and 2702 (TD) feet (AZGS OG files). |
| OG        | 210     | 1271      | 4170       | 0               | 1             | 0              | 0            | 1271          | 1271             | 1     | PC       | sand   | D        |   |
| OG        | 210     | 1271      | 4170       | 1               | 4             | 0              | 1            | 1271          | 1270             | 1     | PC       | sandstone  | D        |   |
| OG        | 210     | 1271      | 4170       | 4               | 4.5           | 1              | 1            | 1270          | 1270             | 2     | PF       | brown coarse clay and sand   | D        |   |
| OG        | 210     | 1271      | 4170       | 4.5             | 5             | 1              | 2            | 1270          | 1270             | 2     | PF       | light blue clay and sand   | D        |   |
| OG        | 210     | 1271      | 4170       | 5               | 8             | 2              | 2            | 1270          | 1269             | 3     | CL       | dark brown clay, little sand   | D        |   |
| OG        | 210     | 1271      | 4170       | 8               | 12            | 2              | 4            | 1269          | 1267             | 2     | PF       | light brown clay, some sand and water  | D        |   |
| OG        | 210     | 1271      | 4170       | 12              | 14            | 4              | 4            | 1267          | 1267             | 1     | PC       | quicksand  | D        |   |
| OG        | 210     | 1271      | 4170       | 14              | 15            | 4              | 5            | 1267          | 1266             | 1     | PC       | coarse gravel -water   | D        |   |
| OG        | 210     | 1271      | 4170       | 15              | 52            | 5              | 16           | 1266          | 1255             | 1     | PC       | quicksand - water  | D        |   |
| OG        | 210     | 1271      | 4170       | 52              | 176           | 16             | 54           | 1255          | 1217             | 3     | CL       | light blue clay  | D        |   |
| OG        | 210     | 1271      | 4170       | 176             | 221           | 54             | 67           | 1217          | 1204             | 2     | PF       | blue sticky shale, oil colors  | D        |   |
| OG        | 210     | 1271      | 4170       | 221             | 363           | 67             | 111          | 1204          | 1160             | 3     | CL       | light gray clay  | D        |   |
| OG        | 210     | 1271      | 4170       | 363             | 431           | 111            | 131          | 1160          | 1140             | 3     | CL       | shale and clay   | D        |   |
| OG        | 210     | 1271      | 4170       | 431             | 433           | 131            | 132          | 1140          | 1139             | 4     | LM       | limestone and quartz   | D        |   |
| OG        | 210     | 1271      | 4170       | 433             | 469           | 132            | 143          | 1139          | 1128             | 4     | LM       | limestone  | D        |   |
| OG        | 210     | 1271      | 4170       | 469             | 471           | 143            | 144          | 1128          | 1127             | 4     | LM       | soft lime  | D        |   |
| OG        | 210     | 1271      | 4170       | 471             | 494           | 144            | 151          | 1127          | 1120             | 4     | LM       | limestone  | D        |   |
| OG        | 210     | 1271      | 4170       | 494             | 497           | 151            | 151          | 1120          | 1120             | 4     | LM       | hard rock  | D        |   |
| OG        | 210     | 1271      | 4170       | 497             | 510           | 151            | 155          | 1120          | 1116             | 4     | LM       | soft white lime rock   | D        |   |
| OG        | 210     | 1271      | 4170       | 510             | 548           | 155            | 167          | 1116          | 1104             | 3     | CL       | brown clay and shale   | D        |   |
| OG        | 210     | 1271      | 4170       | 548             | 586           | 167            | 179          | 1104          | 1092             | 2     | PF       | shale, oil colors  | D        |   |
| OG        | 210     | 1271      | 4170       | 586             | 645           | 179            | 197          | 1092          | 1074             | 3     | CL       | brown clay or shale  | D        |   |
| OG        | 210     | 1271      | 4170       | 645             | 650           | 197            | 198          | 1074          | 1073             | 2     | PF       | shale showing oil  | D        |   |
| OG        | 210     | 1271      | 4170       | 650             | 655           | 198            | 200          | 1073          | 1071             | 2     | PF       | variegated colored shale   | D        |   |
| OG        | 210     | 1271      | 4170       | 655             | 700           | 200            | 213          | 1071          | 1058             | 2     | PF       | yellow to tan shale  | D        |   |
| OG        | 210     | 1271      | 4170       | 700             | 735           | 213            | 224          | 1058          | 1047             | 1     | PC       | sand   | D        |   |
| OG        | 210     | 1271      | 4170       | 735             | 740           | 224            | 226          | 1047          | 1045             | 1     | PC       | gravel -water  | D        |   |
| OG        | 210     | 1271      | 4170       | 740             | 767           | 226            | 234          | 1045          | 1037             | 3     | CL       | yellowish clay   | D        |   |
| OG        | 210     | 1271      | 4170       | 767             | 770           | 234            | 235          | 1037          | 1036             | 1     | PC       | hard rock conglomerate; artesian water 100 gpm, temp=98 deg.   | D        | Quaternary/Tertiary at TD   |
| OG        | 211     | 1271      | 4170       | 0               | 11            | 0              | 3            | 1271          | 1268             | 2     | PF       | blue shale, sand   | D        |   |
| OG        | 211     | 1271      | 4170       | 11              | 18            | 3              | 5            | 1268          | 1266             | 2     | PF       | blue shale and oil   | D        |   |
| OG        | 211     | 1271      | 4170       | 18              | 22            | 5              | 7            | 1266          | 1264             | 3     | CL       | yellow clay  | D        |   |
| OG        | 211     | 1271      | 4170       | 22              | 42            | 7              | 13           | 1264          | 1258             | 1     | PC       | coarse gravel and water  | D        |   |
| OG        | 211     | 1271      | 4170       | 42              | 51            | 13             | 16           | 1258          | 1255             | 3     | CL       | yellow clay  | D        |   |
| OG        | 211     | 1271      | 4170       | 51              | 66            | 16             | 20           | 1255          | 1251             | 2     | PF       | blue shale and oil   | D        |   |
| OG        | 211     | 1271      | 4170       | 66              | 73            | 20             | 22           | 1251          | 1249             | 1     | PC       | sand water and oil   | D        |   |
| OG        | 211     | 1271      | 4170       | 73              | 78            | 22             | 24           | 1249          | 1247             | 2     | PF       | blue shale and oil   | D        |   |
| OG        | 211     | 1271      | 4170       | 78              | 93            | 24             | 28           | 1247          | 1243             | 2     | PF       | light blue shale and sand  | D        |   |
| OG        | 211     | 1271      | 4170       | 93              | 100           | 28             | 30           | 1243          | 1241             | 1     | PC       | sandstone  | D        |   |
| OG        | 211     | 1271      | 4170       | 100             | 102           | 30             | 31           | 1241          | 1240             | 2     | PF       | blue shale   | D        |   |
| OG        | 211     | 1271      | 4170       | 102             | 225           | 31             | 69           | 1240          | 1202             | 2     | PF       | dark blue shale  | D        |   |
| OG        | 211     | 1271      | 4170       | 225             | 270           | 69             | 82           | 1202          | 1189             | 2     | PF       | light blue shale   | D        |   |
| OG        | 211     | 1271      | 4170       | 270             | 330           | 82             | 101          | 1189          | 1170             | 4     | LM       | Penn lime - shells 2750278   | D        |   |
| OG        | 211     | 1271      | 4170       | 330             | 340           | 101            | 104          | 1170          | 1167             | 2     | PF       | brown shale  | D        |   |
| OG        | 211     | 1271      | 4170       | 340             | 350           | 104            | 107          | 1167          | 1164             | 4     | LM       | Penn limestone   | D        |   |
| OG        | 211     | 1271      | 4170       | 350             | 392           | 107            | 119          | 1164          | 1152             | 2     | PF       | dark brown shale   | D        |   |
| OG        | 211     | 1271      | 4170       | 392             | 425           | 119            | 130          | 1152          | 1141             | 10    | UNK      | formation change to dark blue or green with gas and oil  | D        |   |

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|-----------|---------|-----------|------------|-----------------|---------------|----------------|--------------|---------------|------------------|-------|----------|---|----------|------------------|
| OG        | 211     | 1271      | 4170       | 425             | 428           | 130            | 130          | 1141          | 1141             | 1     | PC       | sand - oil  | D        | Quaternary at TD |
| OG        | 212     | 1273      | 4175       | 0               | 55            | 0              | 17           | 1273          | 1256             | 2     | PF       | yellow clay and sand                              | D        |                  |
| OG        | 212     | 1273      | 4175       | 55              | 68            | 17             | 21           | 1256          | 1252             | 1     | PC       | salt water and water sand                         | D        |                  |
| OG        | 212     | 1273      | 4175       | 68              | 85            | 21             | 26           | 1252          | 1247             | 3     | CL       | yellow clay                                       | D        |                  |
| OG        | 212     | 1273      | 4175       | 85              | 90            | 26             | 27           | 1247          | 1245             | 1     | PC       | water sand  | D        |                  |
| OG        | 212     | 1273      | 4175       | 90              | 350           | 27             | 107          | 1245          | 1166             | 3     | CL       | blue clay   | D        |                  |
| OG        | 212     | 1273      | 4175       | 350             | 450           | 107            | 137          | 1166          | 1135             | 2     | PF       | sticky shale                                      | D        |                  |
| OG        | 212     | 1273      | 4175       | 450             | 454           | 137            | 138          | 1135          | 1134             | 4     | LM       | lime shell  | D        |                  |
| OG        | 212     | 1273      | 4175       | 454             | 485           | 138            | 148          | 1134          | 1125             | 2     | PF       | sticky shale                                      | D        |                  |
| OG        | 212     | 1273      | 4175       | 485             | 510           | 148            | 155          | 1125          | 1117             | 1     | PC       | conglomerate                                      | D        |                  |
| OG        | 212     | 1273      | 4175       | 510             | 515           | 155            | 157          | 1117          | 1116             | 2     | PF       | yellow shale                                      | D        |                  |
| OG        | 212     | 1273      | 4175       | 515             | 519           | 157            | 158          | 1116          | 1114             | 4     | LM       | lime shell  | D        |                  |
| OG        | 212     | 1273      | 4175       | 519             | 560           | 158            | 171          | 1114          | 1102             | 1     | PC       | red bed and gravel                                | D        |                  |
| OG        | 212     | 1273      | 4175       | 560             | 568           | 171            | 173          | 1102          | 1099             | 4     | LM       | sandy lime  | D        |                  |
| OG        | 212     | 1273      | 4175       | 568             | 576           | 173            | 176          | 1099          | 1097             | 2     | PF       | red mud   | D        |                  |
| OG        | 212     | 1273      | 4175       | 576             | 580           | 176            | 177          | 1097          | 1096             | 4     | LM       | lime shell: showing oil                           | D        |                  |
| OG        | 212     | 1273      | 4175       | 580             | 613           | 177            | 187          | 1096          | 1086             | 10    | UNK      | red bed   | D        |                  |
| OG        | 212     | 1273      | 4175       | 613             | 618           | 187            | 188          | 1086          | 1084             | 2     | PF       | sandy shale                                       | D        |                  |
| OG        | 212     | 1273      | 4175       | 618             | 621           | 188            | 189          | 1084          | 1083             | 4     | LM       | lime shell  | D        |                  |
| OG        | 212     | 1273      | 4175       | 621             | 630           | 189            | 192          | 1083          | 1081             | 2     | PF       | sandy shale                                       | D        |                  |
| OG        | 212     | 1273      | 4175       | 630             | 635           | 192            | 194          | 1081          | 1079             | 1     | PC       | hard sand   | D        |                  |
| OG        | 212     | 1273      | 4175       | 635             | 645           | 194            | 197          | 1079          | 1076             | 1     | PC       | red bed and gravel                                | D        |                  |
| OG        | 212     | 1273      | 4175       | 645             | 745           | 197            | 227          | 1076          | 1045             | 1     | PC       | conglomerate                                      | D        |                  |
| OG        | 212     | 1273      | 4175       | 745             | 760           | 227            | 232          | 1045          | 1041             | 1     | PC       | fresh water sand                                  | D        |                  |
| OG        | 212     | 1273      | 4175       | 760             | 860           | 232            | 262          | 1041          | 1010             | 1     | PC       | cement gravel                                     | D        |                  |
| OG        | 212     | 1273      | 4175       | 860             | 870           | 262            | 265          | 1010          | 1007             | 10    | UNK      | red bed   | D        |                  |
| OG        | 212     | 1273      | 4175       | 870             | 896           | 265            | 273          | 1007          | 999              | 1     | PC       | cement gravel                                     | D        |                  |
| OG        | 212     | 1273      | 4175       | 896             | 906           | 273            | 276          | 999           | 996              | 10    | UNK      | red bed   | D        |                  |
| OG        | 212     | 1273      | 4175       | 906             | 916           | 276            | 279          | 996           | 993              | 1     | PC       | sandy gravel                                      | D        |                  |
| OG        | 212     | 1273      | 4175       | 916             | 1025          | 279            | 312          | 993           | 960              | 1     | PC       | conglomerate                                      | D        |                  |
| OG        | 212     | 1273      | 4175       | 1025            | 1062          | 312            | 324          | 960           | 949              | 4     | LM       | red chalk   | D        |                  |
| OG        | 212     | 1273      | 4175       | 1062            | 1115          | 324            | 340          | 949           | 933              | 1     | PC       | sand and gravel                                   | D        |                  |
| OG        | 212     | 1273      | 4175       | 1115            | 1125          | 340            | 343          | 933           | 930              | 1     | PC       | water sand  | D        |                  |
| OG        | 212     | 1273      | 4175       | 1125            | 1130          | 343            | 344          | 930           | 928              | 4     | LM       | lime shell; showing oil                           | D        |                  |
| OG        | 212     | 1273      | 4175       | 1130            | 1145          | 344            | 349          | 928           | 924              | 1     | PC       | sandstone   | D        |                  |
| OG        | 212     | 1273      | 4175       | 1145            | 1200          | 349            | 366          | 924           | 907              | 1     | PC       | conglomerate                                      | D        |                  |
| OG        | 212     | 1273      | 4175       | 1200            | 1210          | 366            | 369          | 907           | 904              | 3     | CL       | yellow clay                                       | D        |                  |
| OG        | 212     | 1273      | 4175       | 1210            | 1220          | 369            | 372          | 904           | 901              | 1     | PC       | sandstone   | D        |                  |
| OG        | 212     | 1273      | 4175       | 1220            | 1231          | 372            | 375          | 901           | 897              | 4     | LM       | sandy lime  | D        |                  |
| OG        | 212     | 1273      | 4175       | 1231            | 1238          | 375            | 377          | 897           | 895              | 1     | PC       | sandstone   | D        |                  |
| OG        | 212     | 1273      | 4175       | 1238            | 1273          | 377            | 388          | 895           | 885              | 1     | PC       | conglomerate                                      | D        |                  |
| OG        | 212     | 1273      | 4175       | 1273            | 1282          | 388            | 391          | 885           | 882              | 1     | PC       | sandstone   | D        |                  |
| OG        | 212     | 1273      | 4175       | 1282            | 1290          | 391            | 393          | 882           | 879              | 4     | LM       | sandy lime  | D        |                  |
| OG        | 212     | 1273      | 4175       | 1290            | 1295          | 393            | 395          | 879           | 878              | 1     | PC       | sandstone   | D        |                  |
| OG        | 212     | 1273      | 4175       | 1295            | 1310          | 395            | 399          | 878           | 873              | 1     | PC       | water sand  | D        |                  |
| OG        | 212     | 1273      | 4175       | 1310            | 1335          | 399            | 407          | 873           | 866              | 1     | PC       | conglomerate                                      | D        |                  |
| OG        | 212     | 1273      | 4175       | 1335            | 1340          | 407            | 408          | 866           | 864              | 2     | PF       | yellow clay and gravel                            | D        |                  |
| OG        | 212     | 1273      | 4175       | 1340            | 1350          | 408            | 411          | 864           | 861              | 4     | LM       | lime shell  | D        |                  |
| OG        | 212     | 1273      | 4175       | 1350            | 1360          | 411            | 415          | 861           | 858              | 2     | PF       | yellow clay and gravel                            | D        |                  |
| OG        | 212     | 1273      | 4175       | 1360            | 1390          | 415            | 424          | 858           | 849              | 1     | PC       | red sandstone and clay                            | D        |                  |
| OG        | 212     | 1273      | 4175       | 1390            | 1410          | 424            | 430          | 849           | 843              | 1     | PC       | hard coarse sand; show of oil                     | D        |                  |
| OG        | 212     | 1273      | 4175       | 1410            | 1445          | 430            | 440          | 843           | 832              | 1     | PC       | conglomerate                                      | D        |                  |
| OG        | 212     | 1273      | 4175       | 1445            | 1460          | 440            | 445          | 832           | 828              | 1     | PC       | quicksand and gravel. Flowing hot water; oil show | D        |                  |
| OG        | 212     | 1273      | 4175       | 1460            | 1475          | 445            | 450          | 828           | 823              | 1     | PC       | brown sand rock                                   | D        |                  |

| Well Type | Well ID | Elev. (m) | Elev. (ft) | From Depth (ft) | To Depth (ft) | From Depth (m) | To Depth (m) | Top Elev. (m) | Bottom Elev. (m) | HGUID | HGU Code | Lithology   | Log Type | Comments       |
|-----------|---------|-----------|------------|-----------------|---------------|----------------|--------------|---------------|------------------|-------|----------|---|----------|----------------|
| OG        | 212     | 1273      | 4175       | 1475            | 1520          | 450            | 463          | 823           | 809              | 2     | PF       | yellow clay and gravel                                  | D        |                |
| OG        | 212     | 1273      | 4175       | 1520            | 1530          | 463            | 466          | 809           | 806              | 1     | PC       | hard, sharp sandstone                                   | D        |                |
| OG        | 212     | 1273      | 4175       | 1530            | 1560          | 466            | 475          | 806           | 797              | 2     | PF       | yellow clay and gravel                                  | D        |                |
| OG        | 212     | 1273      | 4175       | 1560            | 1575          | 475            | 480          | 797           | 792              | 1     | PC       | hard brown sand   | D        |                |
| OG        | 212     | 1273      | 4175       | 1575            | 1630          | 480            | 497          | 792           | 776              | 1     | PC       | yellow conglomerate                                     | D        |                |
| OG        | 212     | 1273      | 4175       | 1630            | 1645          | 497            | 501          | 776           | 771              | 1     | PC       | pink sand   | D        |                |
| OG        | 212     | 1273      | 4175       | 1645            | 1650          | 501            | 503          | 771           | 770              | 2     | PF       | yellow clay and gravel                                  | D        |                |
| OG        | 212     | 1273      | 4175       | 1650            | 1660          | 503            | 506          | 770           | 767              | 1     | PC       | hard red sand   | D        |                |
| OG        | 212     | 1273      | 4175       | 1660            | 1665          | 506            | 507          | 767           | 765              | 2     | PF       | yellow clay and gravel                                  | D        |                |
| OG        | 212     | 1273      | 4175       | 1665            | 1680          | 507            | 512          | 765           | 760              | 1     | PC       | pink sandstone  | D        |                |
| OG        | 212     | 1273      | 4175       | 1680            | 1785          | 512            | 544          | 760           | 728              | 1     | PC       | red sand rock   | D        |                |
| OG        | 212     | 1273      | 4175       | 1785            | 1810          | 544            | 552          | 728           | 721              | 2     | PF       | brown shale and sand                                    | D        |                |
| OG        | 212     | 1273      | 4175       | 1810            | 1830          | 552            | 558          | 721           | 715              | 1     | PC       | red sand  | D        |                |
| OG        | 212     | 1273      | 4175       | 1830            | 1840          | 558            | 561          | 715           | 712              | 2     | PF       | blue and brown shale                                    | D        |                |
| OG        | 212     | 1273      | 4175       | 1840            | 1885          | 561            | 575          | 712           | 698              | 1     | PC       | blood-red sandstone                                     | D        |                |
| OG        | 212     | 1273      | 4175       | 1885            | 1905          | 575            | 581          | 698           | 692              | 1     | PC       | red water sand  | D        |                |
| OG        | 212     | 1273      | 4175       | 1905            | 2010          | 581            | 613          | 692           | 660              | 1     | PC       | brown sand  | D        |                |
| OG        | 212     | 1273      | 4175       | 2010            | 2065          | 613            | 629          | 660           | 643              | 1     | PC       | yellow sand   | D        |                |
| OG        | 212     | 1273      | 4175       | 2065            | 2070          | 629            | 631          | 643           | 642              | 1     | PC       | red sand  | D        |                |
| OG        | 212     | 1273      | 4175       | 2070            | 2170          | 631            | 661          | 642           | 611              | 1     | PC       | brown sandstone   | D        |                |
| OG        | 212     | 1273      | 4175       | 2170            | 2173          | 661            | 662          | 611           | 610              | 10    | UNK      | water seepage   | D        |                |
| OG        | 212     | 1273      | 4175       | 2173            | 2235          | 662            | 681          | 610           | 591              | 1     | PC       | brown sandstone   | D        |                |
| OG        | 212     | 1273      | 4175       | 2235            | 2250          | 681            | 686          | 591           | 587              | 1     | PC       | sand, gravel and water                                  | D        |                |
| OG        | 212     | 1273      | 4175       | 2250            | 2300          | 686            | 701          | 587           | 572              | 1     | PC       | red and brown sandstone                                 | D        |                |
| OG        | 212     | 1273      | 4175       | 2300            | 2340          | 701            | 713          | 572           | 559              | 1     | PC       | sand and shale  | D        |                |
| OG        | 212     | 1273      | 4175       | 2340            | 2360          | 713            | 719          | 559           | 553              | 1     | PC       | red sand and gravel; showing of oil                     | D        | Cenozoic at TD |
| OG        | 215     | 1295      | 4250       | 0               | 40            | 0              | 12           | 1295          | 1283             | 3     | CL       | yellow clay   | D        |                |
| OG        | 215     | 1295      | 4250       | 40              | 83            | 12             | 25           | 1283          | 1270             | 2     | PF       | white shale   | D        |                |
| OG        | 215     | 1295      | 4250       | 83              | 103           | 25             | 31           | 1270          | 1264             | 1     | PC       | water sand  | D        |                |
| OG        | 215     | 1295      | 4250       | 103             | 105           | 31             | 32           | 1264          | 1263             | 3     | CL       | yellow clay   | D        |                |
| OG        | 215     | 1295      | 4250       | 105             | 110           | 32             | 34           | 1263          | 1262             | 3     | CL       | clay  | D        |                |
| OG        | 215     | 1295      | 4250       | 110             | 125           | 34             | 38           | 1262          | 1257             | 1     | PC       | gravel -water   | D        |                |
| OG        | 215     | 1295      | 4250       | 125             | 150           | 38             | 46           | 1257          | 1250             | 3     | CL       | white and yellow clay                                   | D        |                |
| OG        | 215     | 1295      | 4250       | 150             | 165           | 46             | 50           | 1250          | 1245             | 2     | PF       | red shale, sandy  | D        |                |
| OG        | 215     | 1295      | 4250       | 165             | 180           | 50             | 55           | 1245          | 1241             | 2     | PF       | soft red shale  | D        |                |
| OG        | 215     | 1295      | 4250       | 180             | 250           | 55             | 76           | 1241          | 1219             | 5     | EVAP     | red shale and gyp                                       | D        |                |
| OG        | 215     | 1295      | 4250       | 250             | 255           | 76             | 78           | 1219          | 1218             | 2     | PF       | red shale   | D        |                |
| OG        | 215     | 1295      | 4250       | 255             | 260           | 78             | 79           | 1218          | 1216             | 4     | LM       | hard shells   | D        |                |
| OG        | 215     | 1295      | 4250       | 260             | 265           | 79             | 81           | 1216          | 1215             | 2     | PF       | red shale   | D        |                |
| OG        | 215     | 1295      | 4250       | 265             | 283           | 81             | 86           | 1215          | 1209             | 5     | EVAP     | hard shells and gyp                                     | D        |                |
| OG        | 215     | 1295      | 4250       | 283             | 287           | 86             | 87           | 1209          | 1208             | 2     | PF       | red shale   | D        |                |
| OG        | 215     | 1295      | 4250       | 287             | 295           | 87             | 90           | 1208          | 1205             | 6     | GYP      | gyp   | D        |                |
| OG        | 215     | 1295      | 4250       | 295             | 305           | 90             | 93           | 1205          | 1202             | 2     | PF       | red shale and sand, not sure about water - 20" broke in | D        |                |
| OG        | 215     | 1295      | 4250       | 305             | 355           | 93             | 108          | 1202          | 1187             | 5     | EVAP     | gyp, shells and red shale                               | D        |                |
| OG        | 215     | 1295      | 4250       | 355             | 360           | 108            | 110          | 1187          | 1186             | 1     | PC       | gravel  | D        |                |
| OG        | 215     | 1295      | 4250       | 360             | 398           | 110            | 121          | 1186          | 1174             | 1     | PC       | red sand and gravel                                     | D        |                |
| OG        | 215     | 1295      | 4250       | 398             | 400           | 121            | 122          | 1174          | 1173             | 1     | PC       | gravel  | D        |                |
| OG        | 215     | 1295      | 4250       | 400             | 408           | 122            | 124          | 1173          | 1171             | 1     | PC       | red sand and gravel                                     | D        |                |
| OG        | 215     | 1295      | 4250       | 408             | 412           | 124            | 126          | 1171          | 1170             | 4     | LM       | hard shell, very sharp                                  | D        |                |
| OG        | 215     | 1295      | 4250       | 412             | 419           | 126            | 128          | 1170          | 1168             | 1     | PC       | gravel and boulders                                     | D        |                |
| OG        | 215     | 1295      | 4250       | 419             | 585           | 128            | 178          | 1168          | 1117             | 1     | PC       | sand and gravel, very hard                              | D        |                |
| OG        | 215     | 1295      | 4250       | 585             | 590           | 178            | 180          | 1117          | 1116             | 3     | CL       | sandy shale, very sticky                                | D        |                |
| OG        | 215     | 1295      | 4250       | 590             | 615           | 180            | 187          | 1116          | 1108             | 2     | PF       | pink sandy shale  | D        |                |
| OG        | 215     | 1295      | 4250       | 615             | 635           | 187            | 194          | 1108          | 1102             | 2     | PF       | red sandy shale   | D        |                |

| Well Type | Well ID | Elev. (m) | Elev. (ft) | From Depth (ft) | To Depth (ft) | From Depth (m) | To Depth (m) | Top Elev. (m) | Bottom Elev. (m) | HGUID | HGU Code | Lithology                                       | Log Type | Comments |
|-----------|---------|-----------|------------|-----------------|---------------|----------------|--------------|---------------|------------------|-------|----------|---|----------|----------|
| OG        | 215     | 1295      | 4250       | 635             | 665           | 194            | 203          | 1102          | 1093             | 2     | PF       | pink sandy shale and gravel                     | D        |          |
| OG        | 215     | 1295      | 4250       | 665             | 695           | 203            | 212          | 1093          | 1084             | 2     | PF       | red and pink sandy shale with streaks of gravel | D        |          |
| OG        | 215     | 1295      | 4250       | 695             | 700           | 212            | 213          | 1084          | 1082             | 2     | PF       | pink sandy shale and gravel                     | D        |          |
| OG        | 215     | 1295      | 4250       | 700             | 715           | 213            | 218          | 1082          | 1077             | 1     | PC       | sandy gravel with pink shale breaks.            | D        |          |
| OG        | 215     | 1295      | 4250       | 715             | 755           | 218            | 230          | 1077          | 1065             | 2     | PF       | pink shale and sandy gravel                     | D        |          |
| OG        | 215     | 1295      | 4250       | 755             | 805           | 230            | 245          | 1065          | 1050             | 2     | PF       | pink shale and gravel                           | D        |          |
| OG        | 215     | 1295      | 4250       | 805             | 840           | 245            | 256          | 1050          | 1039             | 3     | CL       | pink shale very sticky                          | D        |          |
| OG        | 215     | 1295      | 4250       | 840             | 856           | 256            | 261          | 1039          | 1035             | 2     | PF       | pink shale                                      | D        |          |
| OG        | 215     | 1295      | 4250       | 856             | 880           | 261            | 268          | 1035          | 1027             | 2     | PF       | pink shale, sand and gravel, soft               | D        |          |
| OG        | 215     | 1295      | 4250       | 880             | 940           | 268            | 287          | 1027          | 1009             | 2     | PF       | pink shale and sand                             | D        |          |
| OG        | 215     | 1295      | 4250       | 940             | 955           | 287            | 291          | 1009          | 1004             | 2     | PF       | pink shale                                      | D        |          |
| OG        | 215     | 1295      | 4250       | 955             | 1015          | 291            | 309          | 1004          | 986              | 3     | CL       | pink shale very sticky                          | D        |          |
| OG        | 215     | 1295      | 4250       | 1015            | 1045          | 309            | 319          | 986           | 977              | 2     | PF       | pink shale                                      | D        |          |
| OG        | 215     | 1295      | 4250       | 1045            | 1065          | 319            | 325          | 977           | 971              | 3     | CL       | pink shale, sticky                              | D        |          |
| OG        | 215     | 1295      | 4250       | 1065            | 1100          | 325            | 335          | 971           | 960              | 2     | PF       | pink shale, sandy                               | D        |          |
| OG        | 215     | 1295      | 4250       | 1100            | 1125          | 335            | 343          | 960           | 953              | 1     | PC       | red sand  | D        |          |
| OG        | 215     | 1295      | 4250       | 1125            | 1140          | 343            | 347          | 953           | 948              | 1     | PC       | very hard brown gravel                          | D        |          |
| OG        | 215     | 1295      | 4250       | 1140            | 1230          | 347            | 375          | 948           | 921              | 1     | PC       | brown sand and gravel                           | D        |          |
| OG        | 215     | 1295      | 4250       | 1230            | 1245          | 375            | 379          | 921           | 916              | 1     | PC       | shale, sand and gravel                          | D        |          |
| OG        | 215     | 1295      | 4250       | 1245            | 1250          | 379            | 381          | 916           | 914              | 1     | PC       | hard brown gravel                               | D        |          |
| OG        | 215     | 1295      | 4250       | 1250            | 1260          | 381            | 384          | 914           | 911              | 1     | PC       | sand and gravel                                 | D        |          |
| OG        | 215     | 1295      | 4250       | 1260            | 1300          | 384            | 396          | 911           | 899              | 1     | PC       | brown sand and gravel                           | D        |          |
| OG        | 215     | 1295      | 4250       | 1300            | 1310          | 396            | 399          | 899           | 896              | 1     | PC       | brown sand, carries water                       | D        |          |
| OG        | 215     | 1295      | 4250       | 1310            | 1325          | 399            | 404          | 896           | 892              | 1     | PC       | brown sand                                      | D        |          |
| OG        | 215     | 1295      | 4250       | 1325            | 1340          | 404            | 408          | 892           | 887              | 1     | PC       | brown sand, hard                                | D        |          |
| OG        | 215     | 1295      | 4250       | 1340            | 1365          | 408            | 416          | 887           | 879              | 1     | PC       | brown sand with hard shells through it          | D        |          |
| OG        | 215     | 1295      | 4250       | 1365            | 1385          | 416            | 422          | 879           | 873              | 1     | PC       | brown sand and shale                            | D        |          |
| OG        | 215     | 1295      | 4250       | 1385            | 1395          | 422            | 425          | 873           | 870              | 1     | PC       | sand, gravel, and shale                         | D        |          |
| OG        | 215     | 1295      | 4250       | 1395            | 1408          | 425            | 429          | 870           | 866              | 2     | PF       | shale, red                                      | D        |          |
| OG        | 215     | 1295      | 4250       | 1408            | 1410          | 429            | 430          | 866           | 866              | 3     | CL       | sticky red shale                                | D        |          |
| OG        | 215     | 1295      | 4250       | 1410            | 1415          | 430            | 431          | 866           | 864              | 2     | PF       | red shale                                       | D        |          |
| OG        | 215     | 1295      | 4250       | 1415            | 1430          | 431            | 436          | 864           | 860              | 1     | PC       | sand and shale                                  | D        |          |
| OG        | 215     | 1295      | 4250       | 1430            | 1435          | 436            | 437          | 860           | 858              | 2     | PF       | red shale                                       | D        |          |
| OG        | 215     | 1295      | 4250       | 1435            | 1460          | 437            | 445          | 858           | 850              | 6     | GYP      | gyp   | D        |          |
| OG        | 215     | 1295      | 4250       | 1460            | 1465          | 445            | 447          | 850           | 849              | 2     | PF       | red shale                                       | D        |          |
| OG        | 215     | 1295      | 4250       | 1465            | 1540          | 447            | 469          | 849           | 826              | 6     | GYP      | gyp   | D        |          |
| OG        | 215     | 1295      | 4250       | 1540            | 1588          | 469            | 484          | 826           | 811              | 6     | GYP      | gyp with gray shale                             | D        |          |
| OG        | 215     | 1295      | 4250       | 1588            | 1592          | 484            | 485          | 811           | 810              | 1     | PC       | quick sand, dark brown-water                    | D        |          |
| OG        | 215     | 1295      | 4250       | 1592            | 1598          | 485            | 487          | 810           | 808              | 5     | EVAP     | gyp and gray shale                              | D        |          |
| OG        | 215     | 1295      | 4250       | 1598            | 1620          | 487            | 494          | 808           | 802              | 1     | PC       | red sand  | D        |          |
| OG        | 215     | 1295      | 4250       | 1620            | 1680          | 494            | 512          | 802           | 783              | 2     | PF       | white shale                                     | D        |          |
| OG        | 215     | 1295      | 4250       | 1680            | 1690          | 512            | 515          | 783           | 780              | 1     | PC       | conglomerate                                    | D        |          |
| OG        | 215     | 1295      | 4250       | 1690            | 1750          | 515            | 533          | 780           | 762              | 1     | PC       | yellow conglomerate                             | D        |          |
| OG        | 215     | 1295      | 4250       | 1750            | 1775          | 533            | 541          | 762           | 754              | 1     | PC       | red conglomerate                                | D        |          |
| OG        | 215     | 1295      | 4250       | 1775            | 1788          | 541            | 545          | 754           | 750              | 1     | PC       | gray conglomerate and sandy                     | D        |          |
| OG        | 215     | 1295      | 4250       | 1788            | 1798          | 545            | 548          | 750           | 747              | 1     | PC       | red conglomerate                                | D        |          |
| OG        | 215     | 1295      | 4250       | 1798            | 1843          | 548            | 562          | 747           | 734              | 1     | PC       | gray conglomerate, hard                         | D        |          |
| OG        | 215     | 1295      | 4250       | 1843            | 1875          | 562            | 572          | 734           | 724              | 1     | PC       | dark gray water sand                            | D        |          |
| OG        | 215     | 1295      | 4250       | 1875            | 1905          | 572            | 581          | 724           | 715              | 1     | PC       | dark gray grit with small bits of bentonite     | D        |          |
| OG        | 215     | 1295      | 4250       | 1905            | 1975          | 581            | 602          | 715           | 693              | 1     | PC       | gray grit with gray shale streaks               | D        |          |
| OG        | 215     | 1295      | 4250       | 1975            | 1980          | 602            | 604          | 693           | 692              | 1     | PC       | gray sand -hole full water                      | D        |          |
| OG        | 215     | 1295      | 4250       | 1980            | 1995          | 604            | 608          | 692           | 687              | 2     | PF       | gray shale with streaks of sand                 | D        |          |
| OG        | 215     | 1295      | 4250       | 1995            | 2000          | 608            | 610          | 687           | 686              | 1     | PC       | dark gray sand                                  | D        |          |
| OG        | 215     | 1295      | 4250       | 2000            | 2006          | 610            | 611          | 686           | 684              | 1     | PC       | gray sand and shale                             | D        |          |

| Well Type | Well ID | Elev. (m) | Elev. (ft) | From Depth (ft) | To Depth (ft) | From Depth (m) | To Depth (m) | Top Elev. (m) | Bottom Elev. (m) | HGUID | HGU Code  | Lithology                                | Log Type | Comments |
|-----------|---------|-----------|------------|-----------------|---------------|----------------|--------------|---------------|------------------|-------|-----------|--|----------|----------|
| OG        | 215     | 1295      | 4250       | 2006            | 2010          | 611            | 613          | 684           | 683              | 1     | PC        | gray sand                                | D        |          |
| OG        | 215     | 1295      | 4250       | 2010            | 2018          | 613            | 615          | 683           | 680              | 2     | PF        | gray shale with sand                     | D        |          |
| OG        | 215     | 1295      | 4250       | 2018            | 2060          | 615            | 628          | 680           | 668              | 1     | PC        | gray sand                                | D        |          |
| OG        | 215     | 1295      | 4250       | 2060            | 2080          | 628            | 634          | 668           | 661              | 1     | PC        | sand water                               | D        |          |
| OG        | 215     | 1295      | 4250       | 2080            | 2100          | 634            | 640          | 661           | 655              | 1     | PC        | gray sand, very fine                     | D        |          |
| OG        | 215     | 1295      | 4250       | 2100            | 2105          | 640            | 642          | 655           | 654              | 1     | PC        | water sand                               | D        |          |
| OG        | 215     | 1295      | 4250       | 2105            | 2115          | 642            | 645          | 654           | 651              | 1     | PC        | water sand gray, hard and very fine      | D        |          |
| OG        | 215     | 1295      | 4250       | 2115            | 2150          | 645            | 655          | 651           | 640              | 1     | PC        | gray sand, soft                          | D        |          |
| OG        | 215     | 1295      | 4250       | 2150            | 2190          | 655            | 668          | 640           | 628              | 1     | PC        | dark gray sand                           | D        |          |
| OG        | 215     | 1295      | 4250       | 2190            | 2200          | 668            | 671          | 628           | 625              | 1     | PC        | gray sand                                | D        |          |
| OG        | 215     | 1295      | 4250       | 2200            | 2215          | 671            | 675          | 625           | 620              | 2     | PF        | pink shale and sand                      | D        |          |
| OG        | 215     | 1295      | 4250       | 2215            | 2225          | 675            | 678          | 620           | 617              | 1     | PC        | shale streaks in gray sand               | D        |          |
| OG        | 215     | 1295      | 4250       | 2225            | 2290          | 678            | 698          | 617           | 597              | 1     | PC        | gray sand, hard water 2285 to 2290       | D        |          |
| OG        | 215     | 1295      | 4250       | 2290            | 2320          | 698            | 707          | 597           | 588              | 1     | PC        | gray sand                                | D        |          |
| OG        | 215     | 1295      | 4250       | 2320            | 2325          | 707            | 709          | 588           | 587              | 1     | PC        | gray sand and red shale, drill very slow | D        |          |
| OG        | 215     | 1295      | 4250       | 2325            | 2348          | 709            | 716          | 587           | 580              | 1     | PC        | gray sand                                | D        |          |
| OG        | 215     | 1295      | 4250       | 2348            | 2360          | 716            | 719          | 580           | 576              | 1     | PC        | dark brown sand, very hard               | D        |          |
| OG        | 215     | 1295      | 4250       | 2360            | 2380          | 719            | 725          | 576           | 570              | 1     | PC        | dark brown sand with brown shale streaks | D        |          |
| OG        | 215     | 1295      | 4250       | 2380            | 2395          | 725            | 730          | 570           | 565              | 1     | PC        | dark brown sand, very hard               | D        |          |
| OG        | 215     | 1295      | 4250       | 2395            | 2415          | 730            | 736          | 565           | 559              | 1     | PC        | brown sand                               | D        |          |
| OG        | 215     | 1295      | 4250       | 2415            | 2425          | 736            | 739          | 559           | 556              | 4     | LM        | red sandy lime                           | D        |          |
| OG        | 215     | 1295      | 4250       | 2425            | 2450          | 739            | 747          | 556           | 549              | 4     | LM        | brown sandy lime, very hard at bottom    | D        |          |
| OG        | 215     | 1295      | 4250       | 2450            | 2475          | 747            | 754          | 549           | 541              | 4     | LM        | brown sandy lime                         | D        |          |
| OG        | 215     | 1295      | 4250       | 2475            | 2520          | 754            | 768          | 541           | 527              | 8     | LAVA FLOW | red volcanic mud and cinders             | D        |          |
| OG        | 215     | 1295      | 4250       | 2520            | 2545          | 768            | 776          | 527           | 520              | 8     | LAVA FLOW | red volcanic mud                         | D        |          |
| OG        | 215     | 1295      | 4250       | 2545            | 2568          | 776            | 783          | 520           | 513              | 1     | PC        | red sand and shale                       | D        |          |
| OG        | 215     | 1295      | 4250       | 2568            | 2620          | 783            | 799          | 513           | 497              | 4     | LM        | gray sand with small showing of lime     | D        |          |
| OG        | 215     | 1295      | 4250       | 2620            | 2640          | 799            | 805          | 497           | 491              | 1     | PC        | brown sand                               | D        |          |
| OG        | 215     | 1295      | 4250       | 2640            | 2655          | 805            | 809          | 491           | 486              | 1     | PC        | gray sand                                | D        |          |
| OG        | 215     | 1295      | 4250       | 2655            | 2680          | 809            | 817          | 486           | 479              | 4     | LM        | red shale with sand shells               | D        |          |
| OG        | 215     | 1295      | 4250       | 2680            | 2700          | 817            | 823          | 479           | 472              | 4     | LM        | red sandy shale and shells               | D        |          |
| OG        | 215     | 1295      | 4250       | 2700            | 2720          | 823            | 829          | 472           | 466              | 4     | LM        | red sandy lime, hard                     | D        |          |
| OG        | 215     | 1295      | 4250       | 2720            | 2735          | 829            | 834          | 466           | 462              | 4     | LM        | red sandy lime, very hard                | D        |          |
| OG        | 215     | 1295      | 4250       | 2735            | 2755          | 834            | 840          | 462           | 456              | 4     | LM        | red sandy lime, hard                     | D        |          |
| OG        | 215     | 1295      | 4250       | 2755            | 2770          | 840            | 844          | 456           | 451              | 4     | LM        | brown shale and very hard shells         | D        |          |
| OG        | 215     | 1295      | 4250       | 2770            | 2780          | 844            | 847          | 451           | 448              | 4     | LM        | red shale and shells                     | D        |          |
| OG        | 215     | 1295      | 4250       | 2780            | 2810          | 847            | 856          | 448           | 439              | 4     | LM        | red mud with very thin hard shells       | D        |          |
| OG        | 215     | 1295      | 4250       | 2810            | 2830          | 856            | 863          | 439           | 433              | 4     | LM        | red mud and brown hard shells            | D        |          |
| OG        | 215     | 1295      | 4250       | 2830            | 2855          | 863            | 870          | 433           | 425              | 4     | LM        | red mud with thin hard shells            | D        |          |
| OG        | 215     | 1295      | 4250       | 2855            | 2945          | 870            | 898          | 425           | 398              | 4     | LM        | red mud with hard brown shells           | D        |          |
| OG        | 215     | 1295      | 4250       | 2945            | 2955          | 898            | 901          | 398           | 395              | 1     | PC        | 6 BPH water in brown grit                | D        |          |
| OG        | 215     | 1295      | 4250       | 2955            | 2965          | 901            | 904          | 395           | 392              | 1     | PC        | brown grit                               | D        |          |
| OG        | 215     | 1295      | 4250       | 2965            | 2985          | 904            | 910          | 392           | 386              | 4     | LM        | brown sand and shells                    | D        |          |
| OG        | 215     | 1295      | 4250       | 2985            | 2990          | 910            | 911          | 386           | 384              | 4     | LM        | brown shale and shells                   | D        |          |
| OG        | 215     | 1295      | 4250       | 2990            | 3015          | 911            | 919          | 384           | 376              | 4     | LM        | brown sandy lime, hard shells            | D        |          |
| OG        | 215     | 1295      | 4250       | 3015            | 3030          | 919            | 924          | 376           | 372              | 2     | PF        | brown shale                              | D        |          |
| OG        | 215     | 1295      | 4250       | 3030            | 3035          | 924            | 925          | 372           | 370              | 1     | PC        | hard brown sand                          | D        |          |
| OG        | 215     | 1295      | 4250       | 3035            | 3045          | 925            | 928          | 370           | 367              | 2     | PF        | brown shale                              | D        |          |
| OG        | 215     | 1295      | 4250       | 3045            | 3075          | 928            | 937          | 367           | 358              | 4     | LM        | brown sandy lime                         | D        |          |
| OG        | 215     | 1295      | 4250       | 3075            | 3100          | 937            | 945          | 358           | 351              | 4     | LM        | brown shale with thin hard shells        | D        |          |
| OG        | 215     | 1295      | 4250       | 3100            | 3125          | 945            | 953          | 351           | 343              | 4     | LM        | brown sandy lime                         | D        |          |
| OG        | 215     | 1295      | 4250       | 3125            | 3150          | 953            | 960          | 343           | 335              | 4     | LM        | brown shale and thin hard shells         | D        |          |
| OG        | 215     | 1295      | 4250       | 3150            | 3165          | 960            | 965          | 335           | 331              | 4     | LM        | brown sandy lime                         | D        |          |

| Well Type | Well ID | Elev. (m) | Elev. (ft) | From Depth (ft) | To Depth (ft) | From Depth (m) | To Depth (m) | Top Elev. (m) | Bottom Elev. (m) | HGUID | HGU Code  | Lithology   | Log Type | Comments         |
|-----------|---------|-----------|------------|-----------------|---------------|----------------|--------------|---------------|------------------|-------|-----------|---|----------|------------------|
| OG        | 215     | 1295      | 4250       | 3165            | 3180          | 965            | 969          | 331           | 326              | 2     | PF        | red limy shale  | D        |                  |
| OG        | 215     | 1295      | 4250       | 3180            | 3215          | 969            | 980          | 326           | 315              | 1     | PC        | red shale with lime covered brown boulders  | D        |                  |
| OG        | 215     | 1295      | 4250       | 3215            | 3230          | 980            | 985          | 315           | 311              | 1     | PC        | red gravel - water 7 boilers, water temp is 110   | D        |                  |
| OG        | 215     | 1295      | 4250       | 3230            | 3250          | 985            | 991          | 311           | 305              | 2     | PF        | red shale   | D        |                  |
| OG        | 215     | 1295      | 4250       | 3250            | 3255          | 991            | 992          | 305           | 303              | 2     | PF        | red shale and gravel  | D        |                  |
| OG        | 215     | 1295      | 4250       | 3255            | 3270          | 992            | 997          | 303           | 299              | 2     | PF        | red shale and gravel mixed with brown shale   | D        |                  |
| OG        | 215     | 1295      | 4250       | 3270            | 3275          | 997            | 998          | 299           | 297              | 2     | PF        | red shale and gravel  | D        |                  |
| OG        | 215     | 1295      | 4250       | 3275            | 3285          | 998            | 1001         | 297           | 294              | 4     | LM        | red lime, ran into crevice at 3285  | D        | Cenozoic at TD   |
| OG        | 217     | 1283      | 4210       | 0               | 1350          | 0              | 411          | 1283          | 872              | 10    | UNK       | fill  | D        |                  |
| OG        | 217     | 1283      | 4210       | 1350            | 1470          | 411            | 448          | 872           | 835              | 8     | LAVA FLOW | hard red rock   | D        |                  |
| OG        | 217     | 1283      | 4210       | 1470            | 1510          | 448            | 460          | 835           | 823              | 4     | LM        | lime and shale  | D        | Cretaceous at TD |
| OG        | 249     | 1349      | 4425       | 0               | 23            | 0              | 7            | 1349          | 1342             | 2     | PF        | soft brown clay and cobbles   | D        |                  |
| OG        | 249     | 1349      | 4425       | 23              | 45            | 7              | 14           | 1342          | 1335             | 2     | PF        | brown clay and volcanics  | D        |                  |
| OG        | 249     | 1349      | 4425       | 45              | 55            | 14             | 17           | 1335          | 1332             | 2     | PF        | soft brown clay and cobbles   | D        |                  |
| OG        | 249     | 1349      | 4425       | 55              | 80            | 17             | 24           | 1332          | 1324             | 2     | PF        | brown clay with hard shells   | D        |                  |
| OG        | 249     | 1349      | 4425       | 80              | 90            | 24             | 27           | 1324          | 1321             | 1     | PC        | brown conglomerate  | D        |                  |
| OG        | 249     | 1349      | 4425       | 90              | 140           | 27             | 43           | 1321          | 1306             | 2     | PF        | brown clay and cobbles  | D        |                  |
| OG        | 249     | 1349      | 4425       | 140             | 161           | 43             | 49           | 1306          | 1300             | 2     | PF        | brown clay and cobbles and heavy gravel   | D        |                  |
| OG        | 249     | 1349      | 4425       | 161             | 220           | 49             | 67           | 1300          | 1282             | 2     | PF        | brown clay with gravel streaks  | D        |                  |
| OG        | 249     | 1349      | 4425       | 220             | 224           | 67             | 68           | 1282          | 1280             | 1     | PC        | brown gravel and cobbles  | D        |                  |
| OG        | 249     | 1349      | 4425       | 224             | 231           | 68             | 70           | 1280          | 1278             | 10    | UNK       | gray rock   | D        |                  |
| OG        | 249     | 1349      | 4425       | 231             | 251           | 70             | 77           | 1278          | 1272             | 2     | PF        | gray to brown clay and mostly rock  | D        |                  |
| OG        | 249     | 1349      | 4425       | 251             | 255           | 77             | 78           | 1272          | 1271             | 8     | LAVA FLOW | hard black basalt   | D        |                  |
| OG        | 249     | 1349      | 4425       | 255             | 265           | 78             | 81           | 1271          | 1268             | 1     | PC        | broken basalt and gravel  | D        |                  |
| OG        | 249     | 1349      | 4425       | 265             | 272           | 81             | 83           | 1268          | 1266             | 1     | PC        | black basalt gravel, heavy  | D        |                  |
| OG        | 249     | 1349      | 4425       | 272             | 315           | 83             | 96           | 1266          | 1253             | 2     | PF        | brown clay and gravel streaks   | D        |                  |
| OG        | 249     | 1349      | 4425       | 315             | 336           | 96             | 102          | 1253          | 1246             | 1     | PC        | black gravel with thin brown clay streaks   | D        |                  |
| OG        | 249     | 1349      | 4425       | 336             | 387           | 102            | 118          | 1246          | 1231             | 1     | PC        | gray to black conglomerate, poorly cemented   | D        |                  |
| OG        | 249     | 1349      | 4425       | 387             | 410           | 118            | 125          | 1231          | 1224             | 1     | PC        | gray to black gravel  | D        |                  |
| OG        | 249     | 1349      | 4425       | 410             | 431           | 125            | 131          | 1224          | 1217             | 1     | PC        | gravel with gray clay streaks   | D        |                  |
| OG        | 249     | 1349      | 4425       | 431             | 440           | 131            | 134          | 1217          | 1215             | 1     | PC        | white gravel with dirty lime  | D        |                  |
| OG        | 249     | 1349      | 4425       | 440             | 455           | 134            | 139          | 1215          | 1210             | 4     | LM        | dirty lime with trace basalt  | D        |                  |
| OG        | 249     | 1349      | 4425       | 455             | 469           | 139            | 143          | 1210          | 1206             | 4     | LM        | reddish dirty lime  | D        |                  |
| OG        | 249     | 1349      | 4425       | 469             | 510           | 143            | 155          | 1206          | 1193             | 4     | LM        | white lime(?) with trace of basalt  | D        |                  |
| OG        | 249     | 1349      | 4425       | 510             | 572           | 155            | 174          | 1193          | 1174             | 4     | LM        | white rock with trace of black basalt, trace of calcite and shale   | D        |                  |
| OG        | 249     | 1349      | 4425       | 572             | 630           | 174            | 192          | 1174          | 1157             | 4     | LM        | white rock with traces of shale and calcite, porous, soft   | D        |                  |
| OG        | 249     | 1349      | 4425       | 630             | 707           | 192            | 215          | 1157          | 1133             | 4     | LM        | with rock, hard and soft zones, more red rock with depth. (all of this rock is porous and contains solution cavities) | D        |                  |
| OG        | 249     | 1349      | 4425       | 707             | 715           | 215            | 218          | 1133          | 1131             | 4     | LM        | limestone and chalcedony, and sand, very hard rock at 714'  | D        |                  |
| OG        | 249     | 1349      | 4425       | 715             | 728           | 218            | 222          | 1131          | 1127             | 4     | LM        | very hard gray limestone  | D        |                  |
| OG        | 249     | 1349      | 4425       | 728             | 732           | 222            | 223          | 1127          | 1126             | 10    | UNK       | hard brown rock   | D        |                  |
| OG        | 249     | 1349      | 4425       | 732             | 735           | 223            | 224          | 1126          | 1125             | 10    | UNK       | hard red rock   | D        |                  |
| OG        | 249     | 1349      | 4425       | 735             | 741           | 224            | 226          | 1125          | 1123             | 10    | UNK       | hard brown rock   | D        |                  |
| OG        | 249     | 1349      | 4425       | 741             | 754           | 226            | 230          | 1123          | 1119             | 2     | PF        | hard brown shale  | D        |                  |
| OG        | 249     | 1349      | 4425       | 754             | 764           | 230            | 233          | 1119          | 1116             | 10    | UNK       | hard gray, white, and brown rock  | D        |                  |
| OG        | 249     | 1349      | 4425       | 764             | 772           | 233            | 235          | 1116          | 1113             | 10    | UNK       | mostly brown rock   | D        |                  |
| OG        | 249     | 1349      | 4425       | 772             | 784           | 235            | 239          | 1113          | 1110             | 1     | PC        | water sand and trace basalt, limestone and fish scale @ 780   | D        |                  |
| OG        | 249     | 1349      | 4425       | 784             | 811           | 239            | 247          | 1110          | 1102             | 10    | UNK       | brown and red rock  | D        |                  |
| OG        | 249     | 1349      | 4425       | 811             | 823           | 247            | 251          | 1102          | 1098             | 8     | LAVA FLOW | hard, gray to black basalt  | D        |                  |
| OG        | 249     | 1349      | 4425       | 823             | 827           | 251            | 252          | 1098          | 1097             | 10    | UNK       | black to red rock of medium hardness  | D        |                  |
| OG        | 249     | 1349      | 4425       | 827             | 842           | 252            | 257          | 1097          | 1092             | 8     | LAVA FLOW | black basalt  | D        |                  |
| OG        | 249     | 1349      | 4425       | 842             | 848           | 257            | 258          | 1092          | 1090             | 10    | UNK       | very hard gray rock   | D        |                  |

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|-----------|---------|-----------|------------|-----------------|---------------|----------------|--------------|---------------|------------------|-------|-----------|---|----------|--|
| OG        | 249     | 1349      | 4425       | 848             | 876           | 258            | 267          | 1090          | 1082             | 8     | LAVA FLOW | very hard black rock  | D        |  |
| OG        | 249     | 1349      | 4425       | 876             | 894           | 267            | 272          | 1082          | 1076             | 1     | PC        | brown rock and sand layers of medium hardness   | D        |  |
| OG        | 249     | 1349      | 4425       | 894             | 906           | 272            | 276          | 1076          | 1073             | 10    | UNK       | brown to black rock of medium hardness  | D        |  |
| OG        | 249     | 1349      | 4425       | 906             | 911           | 276            | 278          | 1073          | 1071             | 10    | UNK       | very hard, black to brown rock layers   | D        |  |
| OG        | 249     | 1349      | 4425       | 911             | 915           | 278            | 279          | 1071          | 1070             | 10    | UNK       | hard, red rock (black rock prob. Shale, red rock prob. Sandstone)                             | D        |  |
| OG        | 249     | 1349      | 4425       | 915             | 927           | 279            | 283          | 1070          | 1066             | 10    | UNK       | hard, black and brown rock with medium hardness   | D        |  |
| OG        | 249     | 1349      | 4425       | 927             | 932           | 283            | 284          | 1066          | 1065             | 1     | PC        | soft, brown clayey sand   | D        |  |
| OG        | 249     | 1349      | 4425       | 932             | 934           | 284            | 285          | 1065          | 1064             | 10    | UNK       | hard black rock   | D        |  |
| OG        | 249     | 1349      | 4425       | 934             | 946           | 285            | 288          | 1064          | 1060             | 1     | PC        | brown rock and sand layers of medium hardness, some clay                                      | D        |  |
| OG        | 249     | 1349      | 4425       | 946             | 971           | 288            | 296          | 1060          | 1053             | 1     | PC        | brown sandstone of medium hardness  | D        |  |
| OG        | 249     | 1349      | 4425       | 971             | 1008          | 296            | 307          | 1053          | 1042             | 2     | PF        | hard black shale  | D        |  |
| OG        | 249     | 1349      | 4425       | 1008            | 1015          | 307            | 309          | 1042          | 1039             | 10    | UNK       | hard black rock   | D        |  |
| OG        | 249     | 1349      | 4425       | 1015            | 1036          | 309            | 316          | 1039          | 1033             | 10    | UNK       | very hard gray to black rock, inclusions of red rock and claystone                            | D        |  |
| OG        | 249     | 1349      | 4425       | 1036            | 1062          | 316            | 324          | 1033          | 1025             | 10    | UNK       | hard grayish black rock   | D        |  |
| OG        | 249     | 1349      | 4425       | 1062            | 1071          | 324            | 326          | 1025          | 1022             | 10    | UNK       | a reddish gray rock different than before   | D        |  |
| OG        | 249     | 1349      | 4425       | 1071            | 1075          | 326            | 328          | 1022          | 1021             | 10    | UNK       | red rock  | D        |  |
| OG        | 249     | 1349      | 4425       | 1075            | 1125          | 328            | 343          | 1021          | 1006             | 2     | PF        | brick red shale with streaks of red rock  | D        |  |
| OG        | 249     | 1349      | 4425       | 1125            | 1138          | 343            | 347          | 1006          | 1002             | 1     | PC        | hard, sharp, red rock with quartzitic sand  | D        |  |
| OG        | 249     | 1349      | 4425       | 1138            | 1150          | 347            | 351          | 1002          | 998              | 10    | UNK       | hard black and red rock   | D        |  |
| OG        | 249     | 1349      | 4425       | 1150            | 1170          | 351            | 357          | 998           | 992              | 10    | UNK       | hard red rock   | D        |  |
| OG        | 249     | 1349      | 4425       | 1170            | 1179          | 357            | 359          | 992           | 989              | 1     | PC        | conglomerate rock, shale and sand   | D        |  |
| OG        | 249     | 1349      | 4425       | 1179            | 1182          | 359            | 360          | 989           | 988              | 1     | PC        | red caving sand   | D        |  |
| OG        | 249     | 1349      | 4425       | 1182            | 1195          | 360            | 364          | 988           | 985              | 1     | PC        | red conglomerate, medium hardness   | D        |  |
| OG        | 249     | 1349      | 4425       | 1195            | 1207          | 364            | 368          | 985           | 981              | 1     | PC        | reddish rock and sand with yellowish clay streaks   | D        |  |
| OG        | 249     | 1349      | 4425       | 1207            | 1245          | 368            | 379          | 981           | 969              | 1     | PC        | red, medium, sandy conglomerate   | D        |  |
| OG        | 249     | 1349      | 4425       | 1245            | 1258          | 379            | 383          | 969           | 965              | 1     | PC        | gray, hard, rocky conglomerate  | D        |  |
| OG        | 249     | 1349      | 4425       | 1258            | 1350          | 383            | 411          | 965           | 937              | 3     | CL        | light brown medium clay with streaks of conglomerate  | D        |  |
| OG        | 249     | 1349      | 4425       | 1350            | 1364          | 411            | 416          | 937           | 933              | 1     | PC        | hard red conglomerate   | D        |  |
| OG        | 249     | 1349      | 4425       | 1364            | 1369          | 416            | 417          | 933           | 931              | 3     | CL        | red clay and conglomerate streaks, medium hardness  | D        |  |
| OG        | 249     | 1349      | 4425       | 1369            | 1380          | 417            | 421          | 931           | 928              | 3     | CL        | very sticky red clay, medium  | D        |  |
| OG        | 249     | 1349      | 4425       | 1380            | 1388          | 421            | 423          | 928           | 926              | 10    | UNK       | gray rock hard  | D        |  |
| OG        | 249     | 1349      | 4425       | 1388            | 1393          | 423            | 425          | 926           | 924              | 10    | UNK       | black rock, hard, with streaks of red clay, medium  | D        |  |
| OG        | 249     | 1349      | 4425       | 1393            | 1400          | 425            | 427          | 924           | 922              | 10    | UNK       | red and gray rock conglomerate, hard  | D        |  |
| OG        | 249     | 1349      | 4425       | 1400            | 1407          | 427            | 429          | 922           | 920              | 3     | CL        | very sticky red clay, medium hardness   | D        |  |
| OG        | 249     | 1349      | 4425       | 1407            | 1410          | 429            | 430          | 920           | 919              | 3     | CL        | sticky red clay, medium hardness  | D        |  |
| OG        | 249     | 1349      | 4425       | 1410            | 1422          | 430            | 433          | 919           | 915              | 10    | UNK       | red rock, medium to hard  | D        |  |
| OG        | 249     | 1349      | 4425       | 1422            | 1465          | 433            | 447          | 915           | 902              | 1     | PC        | red conglomerate, rock, shale, medium hardness  | D        |  |
| OG        | 249     | 1349      | 4425       | 1465            | 1485          | 447            | 453          | 902           | 896              | 1     | PC        | brown sandy conglomerate, medium hardness   | D        |  |
| OG        | 249     | 1349      | 4425       | 1485            | 1510          | 453            | 460          | 896           | 889              | 1     | PC        | red conglomerate, medium hardness (hole caving badly)   | D        |  |
| OG        | 249     | 1349      | 4425       | 1510            | 1540          | 460            | 469          | 889           | 879              | 1     | PC        | brown conglomerate, medium hardness   | D        |  |
| OG        | 249     | 1349      | 4425       | 1540            | 1580          | 469            | 482          | 879           | 867              | 1     | PC        | brown and red conglomerate with streaks of yellow clay, medium (slight show of oil @ 1560-62) | D        |  |
| OG        | 249     | 1349      | 4425       | 1580            | 1620          | 482            | 494          | 867           | 855              | 1     | PC        | red conglomerate, medium hardness   | D        |  |
| OG        | 249     | 1349      | 4425       | 1620            | 1645          | 494            | 501          | 855           | 847              | 1     | PC        | conglomerate, red and dark gray streaks, medium hardness                                      | D        |  |
| OG        | 249     | 1349      | 4425       | 1645            | 1665          | 501            | 507          | 847           | 841              | 1     | PC        | red conglomerate, medium hardness   | D        |  |
| OG        | 249     | 1349      | 4425       | 1665            | 1730          | 507            | 527          | 841           | 821              | 1     | PC        | red and brown rock conglomerate, medium hardness  | D        |  |
| OG        | 249     | 1349      | 4425       | 1730            | 1748          | 527            | 533          | 821           | 816              | 1     | PC        | red sandy conglomerate, medium hardness   | D        |  |
| OG        | 249     | 1349      | 4425       | 1748            | 1785          | 533            | 544          | 816           | 805              | 1     | PC        | brown sandy conglomerate (slight show of oil 1780-85)   | D        |  |
| OG        | 249     | 1349      | 4425       | 1785            | 1795          | 544            | 547          | 805           | 802              | 1     | PC        | red conglomerate, sharp and hard  | D        |  |
| OG        | 249     | 1349      | 4425       | 1795            | 1823          | 547            | 556          | 802           | 793              | 1     | PC        | red sand rock and sharp conglomerate  | D        | Cenozoic at TD. Duplicate with 35-24980. |
| OG        | 512     | 1337      | 4385       | 0               | 40            | 0              | 12           | 1337          | 1324             | 3     | CL        | soil and clay   | D        |  |
| OG        | 512     | 1337      | 4385       | 40              | 60            | 12             | 18           | 1324          | 1318             | 1     | PC        | water and gravel  | D        |  |
| OG        | 512     | 1337      | 4385       | 60              | 160           | 18             | 49           | 1318          | 1288             | 3     | CL        | red clay  | D        |  |

| Well Type | Well ID | Elev. (m) | Elev. (ft) | From Depth (ft) | To Depth (ft) | From Depth (m) | To Depth (m) | Top Elev. (m) | Bottom Elev. (m) | HGUID | HGU Code | Lithology                    | Log Type | Comments |
|-----------|---------|-----------|------------|-----------------|---------------|----------------|--------------|---------------|------------------|-------|----------|------------------------------|----------|----------|
| OG        | 512     | 1337      | 4385       | 160             | 180           | 49             | 55           | 1288          | 1282             | 1     | PC       | water gravel                 | D        |          |
| OG        | 512     | 1337      | 4385       | 180             | 240           | 55             | 73           | 1282          | 1263             | 3     | CL       | red clay                     | D        |          |
| OG        | 512     | 1337      | 4385       | 240             | 260           | 73             | 79           | 1263          | 1257             | 1     | PC       | water gravel                 | D        |          |
| OG        | 512     | 1337      | 4385       | 260             | 290           | 79             | 88           | 1257          | 1248             | 2     | PF       | red mud                      | D        |          |
| OG        | 512     | 1337      | 4385       | 290             | 300           | 88             | 91           | 1248          | 1245             | 1     | PC       | sand and gravel              | D        |          |
| OG        | 512     | 1337      | 4385       | 300             | 330           | 91             | 101          | 1245          | 1236             | 2     | PF       | red mud                      | D        |          |
| OG        | 512     | 1337      | 4385       | 330             | 420           | 101            | 128          | 1236          | 1209             | 1     | PC       | water gravel                 | D        |          |
| OG        | 512     | 1337      | 4385       | 420             | 600           | 128            | 183          | 1209          | 1154             | 3     | CL       | red clay with some water     | D        |          |
| OG        | 512     | 1337      | 4385       | 600             | 630           | 183            | 192          | 1154          | 1145             | 1     | PC       | quick sand (160 ft to water) | D        |          |
| OG        | 512     | 1337      | 4385       | 630             | 650           | 192            | 198          | 1145          | 1138             | 1     | PC       | red rock                     | D        |          |
| OG        | 512     | 1337      | 4385       | 650             | 665           | 198            | 203          | 1138          | 1134             | 1     | PC       | cavy sand                    | D        |          |
| OG        | 512     | 1337      | 4385       | 665             | 675           | 203            | 206          | 1134          | 1131             | 1     | PC       | red rock                     | D        |          |
| OG        | 512     | 1337      | 4385       | 675             | 690           | 206            | 210          | 1131          | 1126             | 1     | PC       | cavy sand                    | D        |          |
| OG        | 512     | 1337      | 4385       | 690             | 1010          | 210            | 308          | 1126          | 1029             | 1     | PC       | red rock                     | D        |          |
| OG        | 512     | 1337      | 4385       | 1010            | 1090          | 308            | 332          | 1029          | 1004             | 3     | CL       | yellow clay                  | D        |          |
| OG        | 512     | 1337      | 4385       | 1090            | 1100          | 332            | 335          | 1004          | 1001             | 1     | PC       | red rock                     | D        |          |



| Well Type | Well ID | Elev. (m) | Elev. (ft) | From Depth (ft) | To Depth (ft) | From Depth (m) | To Depth (m) | Top Elev. (m) | Bottom Elev. (m) | HGUID | HGU Code | Lithology                        | Log Type | Comments                                 |
|-----------|---------|-----------|------------|-----------------|---------------|----------------|--------------|---------------|------------------|-------|----------|----------------------------------|----------|--|
| OG        | 512     | 1337      | 4385       | 1100            | 1120          | 335            | 341          | 1001          | 995              | 3     | CL       | yellow clay                      | D        |  |
| OG        | 512     | 1337      | 4385       | 1120            | 1180          | 341            | 360          | 995           | 977              | 1     | PC       | red rock                         | D        |  |
| OG        | 512     | 1337      | 4385       | 1180            | 1200          | 360            | 366          | 977           | 971              | 3     | CL       | yellow clay                      | D        |  |
| OG        | 512     | 1337      | 4385       | 1200            | 1285          | 366            | 392          | 971           | 945              | 1     | PC       | red rock                         | D        |  |
| OG        | 512     | 1337      | 4385       | 1285            | 1335          | 392            | 407          | 945           | 930              | 1     | PC       | brown sand                       | D        |  |
| OG        | 512     | 1337      | 4385       | 1335            | 1380          | 407            | 421          | 930           | 916              | 2     | PF       | gray sandy shale and clay        | D        |  |
| OG        | 512     | 1337      | 4385       | 1380            | 1420          | 421            | 433          | 916           | 904              | 1     | PC       | red sand                         | D        |  |
| OG        | 512     | 1337      | 4385       | 1420            | 1470          | 433            | 448          | 904           | 889              | 1     | PC       | hard red rock                    | D        |  |
| OG        | 512     | 1337      | 4385       | 1470            | 1490          | 448            | 454          | 889           | 882              | 3     | CL       | sand yellow clay                 | D        |  |
| OG        | 512     | 1337      | 4385       | 1490            | 1510          | 454            | 460          | 882           | 876              | 2     | PF       | grey shale                       | D        |  |
| OG        | 512     | 1337      | 4385       | 1510            | 1610          | 460            | 491          | 876           | 846              | 2     | PF       | brown sandy shale                | D        |  |
| OG        | 512     | 1337      | 4385       | 1610            | 1985          | 491            | 605          | 846           | 732              | 1     | PC       | brown sand                       | D        | Cenozoic at TD. Duplicate with 35-25003. |
| OG        | 514     | 1280      | 4200       | 0               | 27            | 0              | 8            | 1280          | 1272             | 1     | PC       | sand and gravel                  | D        |  |
| OG        | 514     | 1280      | 4200       | 27              | 29            | 8              | 9            | 1272          | 1271             | 3     | CL       | clay                             | D        |  |
| OG        | 514     | 1280      | 4200       | 29              | 44            | 9              | 13           | 1271          | 1267             | 1     | PC       | gravel                           | D        |  |
| OG        | 514     | 1280      | 4200       | 44              | 228           | 13             | 69           | 1267          | 1211             | 3     | CL       | clay                             | D        |  |
| OG        | 514     | 1280      | 4200       | 228             | 232           | 69             | 71           | 1211          | 1209             | 3     | CL       | clay and gravel                  | D        |  |
| OG        | 514     | 1280      | 4200       | 232             | 236           | 71             | 72           | 1209          | 1208             | 3     | CL       | clay                             | D        |  |
| OG        | 514     | 1280      | 4200       | 236             | 244           | 72             | 74           | 1208          | 1206             | 2     | PF       | sand and clay                    | D        |  |
| OG        | 514     | 1280      | 4200       | 244             | 280           | 74             | 85           | 1206          | 1195             | 3     | CL       | sticky red clay                  | D        |  |
| OG        | 514     | 1280      | 4200       | 280             | 360           | 85             | 110          | 1195          | 1170             | 3     | CL       | clay                             | D        |  |
| OG        | 514     | 1280      | 4200       | 360             | 380           | 110            | 116          | 1170          | 1164             | 3     | CL       | red clay                         | D        |  |
| OG        | 514     | 1280      | 4200       | 380             | 488           | 116            | 149          | 1164          | 1131             | 3     | CL       | clay                             | D        |  |
| OG        | 514     | 1280      | 4200       | 488             | 520           | 149            | 158          | 1131          | 1122             | 3     | CL       | clay and gravel                  | D        |  |
| OG        | 514     | 1280      | 4200       | 520             | 730           | 158            | 223          | 1122          | 1058             | 3     | CL       | clay                             | D        |  |
| OG        | 514     | 1280      | 4200       | 730             | 750           | 223            | 229          | 1058          | 1052             | 3     | CL       | clay and gravel                  | D        |  |
| OG        | 514     | 1280      | 4200       | 750             | 852           | 229            | 260          | 1052          | 1020             | 3     | CL       | clay                             | D        |  |
| OG        | 514     | 1280      | 4200       | 852             | 876           | 260            | 267          | 1020          | 1013             | 1     | PC       | cemented sand and gravel         | D        |  |
| OG        | 514     | 1280      | 4200       | 876             | 1000          | 267            | 305          | 1013          | 975              | 1     | PC       | cemented sand                    | D        |  |
| OG        | 514     | 1280      | 4200       | 1000            | 1036          | 305            | 316          | 975           | 964              | 3     | CL       | sticky red clay                  | D        |  |
| OG        | 514     | 1280      | 4200       | 1036            | 1040          | 316            | 317          | 964           | 963              | 3     | CL       | hard red cemented clay           | D        |  |
| OG        | 514     | 1280      | 4200       | 1040            | 1046          | 317            | 319          | 963           | 961              | 3     | CL       | sandy cemented clay              | D        |  |
| OG        | 514     | 1280      | 4200       | 1046            | 1058          | 319            | 322          | 961           | 958              | 3     | CL       | sticky clay                      | D        |  |
| OG        | 514     | 1280      | 4200       | 1058            | 1071          | 322            | 326          | 958           | 954              | 3     | CL       | medium hard clay                 | D        |  |
| OG        | 514     | 1280      | 4200       | 1071            | 1079          | 326            | 329          | 954           | 951              | 3     | CL       | sticky red clay                  | D        |  |
| OG        | 514     | 1280      | 4200       | 1079            | 1085          | 329            | 331          | 951           | 949              | 3     | CL       | hard red clay with burned gravel | D        |  |
| OG        | 514     | 1280      | 4200       | 1085            | 1134          | 331            | 346          | 949           | 935              | 1     | PC       | Mt. conglomerate, hard           | D        |  |
| OG        | 514     | 1280      | 4200       | 1134            | 1138          | 346            | 347          | 935           | 933              | 3     | CL       | hard cemented clay               | D        |  |
| OG        | 514     | 1280      | 4200       | 1138            | 1155          | 347            | 352          | 933           | 928              | 3     | CL       | sticky clay                      | D        |  |
| OG        | 514     | 1280      | 4200       | 1155            | 1175          | 352            | 358          | 928           | 922              | 1     | PC       | Mt. conglomerate, hard           | D        |  |
| OG        | 514     | 1280      | 4200       | 1175            | 1182          | 358            | 360          | 922           | 920              | 3     | CL       | hard blue clay                   | D        |  |
| OG        | 514     | 1280      | 4200       | 1182            | 1190          | 360            | 363          | 920           | 917              | 3     | CL       | sticky brown clay                | D        |  |
| OG        | 514     | 1280      | 4200       | 1190            | 1196          | 363            | 365          | 917           | 916              | 3     | CL       | sticky clay                      | D        |  |
| OG        | 514     | 1280      | 4200       | 1196            | 1201          | 365            | 366          | 916           | 914              | 3     | CL       | medium hard clay                 | D        |  |
| OG        | 514     | 1280      | 4200       | 1201            | 1208          | 366            | 368          | 914           | 912              | 3     | CL       | sticky clay                      | D        |  |
| OG        | 514     | 1280      | 4200       | 1208            | 1213          | 368            | 370          | 912           | 910              | 3     | CL       | medium hard clay                 | D        |  |
| OG        | 514     | 1280      | 4200       | 1213            | 1220          | 370            | 372          | 910           | 908              | 3     | CL       | hard cemented clay               | D        |  |
| OG        | 514     | 1280      | 4200       | 1220            | 1227          | 372            | 374          | 908           | 906              | 3     | CL       | hard clay                        | D        |  |
| OG        | 514     | 1280      | 4200       | 1227            | 1233          | 374            | 376          | 906           | 904              | 3     | CL       | sticky clay                      | D        |  |
| OG        | 514     | 1280      | 4200       | 1233            | 1240          | 376            | 378          | 904           | 902              | 3     | CL       | medium hard brown clay           | D        |  |
| OG        | 514     | 1280      | 4200       | 1240            | 1246          | 378            | 380          | 902           | 900              | 3     | CL       | hard brown clay                  | D        |  |
| OG        | 514     | 1280      | 4200       | 1246            | 1253          | 380            | 382          | 900           | 898              | 3     | CL       | sticky clay                      | D        |  |
| OG        | 514     | 1280      | 4200       | 1253            | 1278          | 382            | 390          | 898           | 891              | 3     | CL       | hard red clay                    | D        |  |

| Well Type | Well ID | Elev. (m) | Elev. (ft) | From Depth (ft) | To Depth (ft) | From Depth (m) | To Depth (m) | Top Elev. (m) | Bottom Elev. (m) | HGUID | HGU Code | Lithology                   | Log Type | Comments |
|-----------|---------|-----------|------------|-----------------|---------------|----------------|--------------|---------------|------------------|-------|----------|-----------------------------|----------|----------|
| OG        | 514     | 1280      | 4200       | 1278            | 1284          | 390            | 391          | 891           | 889              | 3     | CL       | sticky clay                 | D        |          |
| OG        | 514     | 1280      | 4200       | 1284            | 1290          | 391            | 393          | 889           | 887              | 3     | CL       | medium hard clay            | D        |          |
| OG        | 514     | 1280      | 4200       | 1290            | 1293          | 393            | 394          | 887           | 886              | 3     | CL       | hard clay                   | D        |          |
| OG        | 514     | 1280      | 4200       | 1293            | 1297          | 394            | 395          | 886           | 885              | 3     | CL       | hard ledge rock             | D        |          |
| OG        | 514     | 1280      | 4200       | 1297            | 1300          | 395            | 396          | 885           | 884              | 3     | CL       | very hard clay              | D        |          |
| OG        | 514     | 1280      | 4200       | 1300            | 1303          | 396            | 397          | 884           | 883              | 3     | CL       | hard clay                   | D        |          |
| OG        | 514     | 1280      | 4200       | 1303            | 1315          | 397            | 401          | 883           | 879              | 3     | CL       | medium hard and sticky clay | D        |          |
| OG        | 514     | 1280      | 4200       | 1315            | 1368          | 401            | 417          | 879           | 863              | 3     | CL       | sticky clay                 | D        |          |
| OG        | 514     | 1280      | 4200       | 1368            | 1381          | 417            | 421          | 863           | 859              | 3     | CL       | medium hard clay            | D        |          |
| OG        | 514     | 1280      | 4200       | 1381            | 1401          | 421            | 427          | 859           | 853              | 3     | CL       | sticky clay                 | D        |          |
| OG        | 514     | 1280      | 4200       | 1401            | 1405          | 427            | 428          | 853           | 852              | 3     | CL       | very hard clay              | D        |          |
| OG        | 514     | 1280      | 4200       | 1405            | 1411          | 428            | 430          | 852           | 850              | 3     | CL       | hard clay                   | D        |          |
| OG        | 514     | 1280      | 4200       | 1411            | 1423          | 430            | 434          | 850           | 846              | 3     | CL       | sticky clay                 | D        |          |
| OG        | 514     | 1280      | 4200       | 1423            | 1437          | 434            | 438          | 846           | 842              | 3     | CL       | hard clay                   | D        |          |
| OG        | 514     | 1280      | 4200       | 1437            | 1441          | 438            | 439          | 842           | 841              | 3     | CL       | sticky clay                 | D        |          |
| OG        | 514     | 1280      | 4200       | 1441            | 1461          | 439            | 445          | 841           | 835              | 3     | CL       | hard clay                   | D        |          |
| OG        | 514     | 1280      | 4200       | 1461            | 1473          | 445            | 449          | 835           | 831              | 3     | CL       | sticky clay                 | D        |          |
| OG        | 514     | 1280      | 4200       | 1473            | 1485          | 449            | 453          | 831           | 828              | 3     | CL       | very hard clay              | D        |          |
| OG        | 514     | 1280      | 4200       | 1485            | 1489          | 453            | 454          | 828           | 826              | 3     | CL       | hard clay                   | D        |          |
| OG        | 514     | 1280      | 4200       | 1489            | 1501          | 454            | 458          | 826           | 823              | 3     | CL       | sticky clay                 | D        |          |

**HGUID HGU Code**

- 1 PC = Predominantly coarse-grained sediments
- 2 PF = Predominantly fine-grained sediments
- 3 CL = predominantly clay
- 4 LM = Limestone and calcareous deposits undifferentiated
- 5 EVAP = evaporite deposits undifferentiated
- 6 GYP = gypsum and predominantly gypsiferous deposits
- 7 SALT = salt deposits
- 8 LAVA FLOW = lava flows undifferentiated
- 9 ROCK = unknown "rock" type
- 10 UNK = unknown lithology type



# CALIPER LOG

Location **COMPANY WADDELL - DUNCAN**  
 SW Quarter of \_\_\_\_\_ COMPANY \_\_\_\_\_ FILE \_\_\_\_\_  
 SE Quarter \_\_\_\_\_  
 Sec. 23 **WELL Mc COMB #1**  
 Twp 13-S **FIELD Wildcat**  
 Rge 24-E **County Cochise State Arizona**  
 Sec. 23 Twp 13-S Rge 24-E  
 Elev 4205.5'DF Survey \_\_\_\_\_

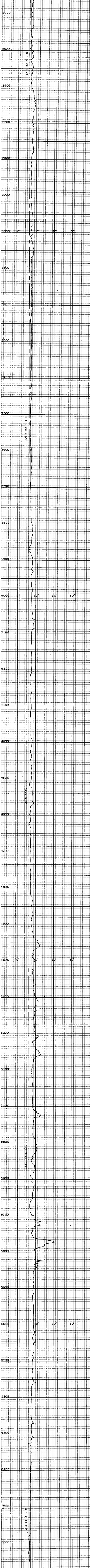
Log Measured From Top of drive bushing Elevation 4207.5'  
 Drilling Measured From Top of drive bushing Elevation 4207.5'  
 Permanent Datum Ground level Elevation 4201'

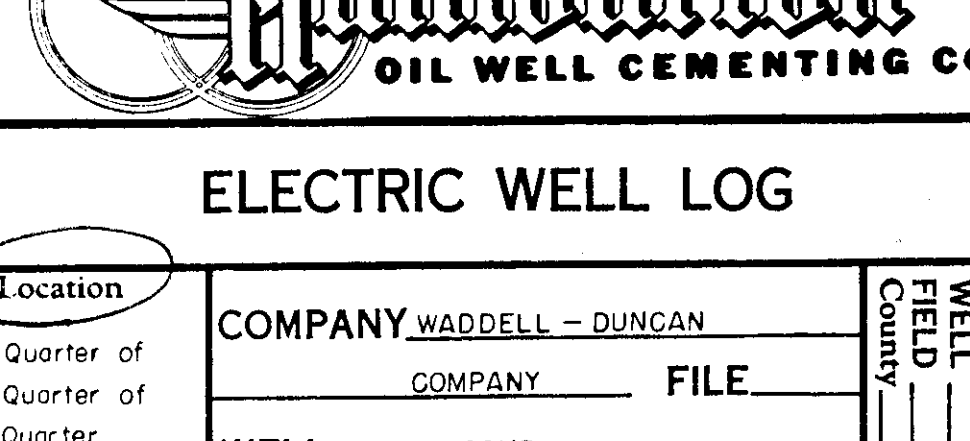
|                      |                 |
|----------------------|-----------------|
| Run No.              | 028             |
| Date                 | 7-19-49         |
| Footage Logged       | 4755            |
| Total Depth, Caliper | 6650            |
| Total Depth, Driller | 6646            |
| Csg Shoe, Driller    | 1895            |
| Csg Shoe, Driller    | 1895            |
| Bit Size             | 7"              |
| Bit Size             | 6 1/4"          |
| Mud Kind             | Water base      |
| Treatment            | Homocogel       |
| Weight               | 95              |
| Viscosity            | 36              |
| PH                   | ---             |
| Resist. Ohms m2m     | 152 @ 70°F @ °F |
| Loss ml/30 min       | ---             |
| Max Temp             | ---             |
| Recorded By          | G.H. Haverstock |
| Witnessed By         | A. Swaddell     |

COMPANY WADDELL - DUNCAN  
 WELL Mc COMB #1  
 FIELD Wildcat  
 County Cochise State Arizona  
 Sec 23 Twp 13-S Rge 24-E  
 Survey \_\_\_\_\_

REMARKS OR OTHER DATA  
 --- Not Available  
 7" Casing 24 #

## AVERAGE DIAMETER IN INCHES

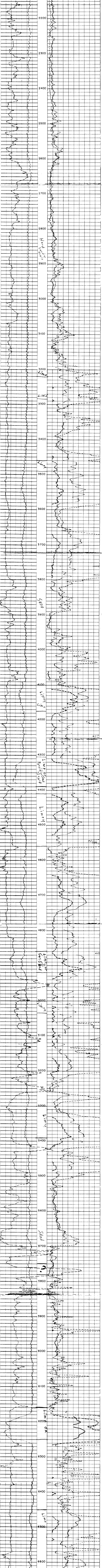




# ELECTRIC WELL LOG

|   |  |  |   |
|---|--|--|---|
| <b>Location</b><br>SW Quarter of<br>SW Quarter of<br>Sec 23<br>Twp 13-S<br>Rge 24-E<br>355' DF  | <b>COMPANY</b> WADDELL - DUNCAN<br><b>WELL</b> Mc COMB # 1<br><b>FIELD</b> Wildcat<br><b>COUNTY</b> Cochise <b>STATE</b> Arizona<br><b>SEC. 23</b> <b>TWP. 13-S</b> <b>RGE</b> 24-E<br><b>SURVEY</b> |  | <b>WELL</b> Mc COMB # 1<br><b>FILE</b> _____<br><b>COUNTY</b> Cochise<br><b>STATE</b> Arizona |
|   | <b>COMPANY</b> WADDELL - DUNCAN<br><b>WELL</b> Mc COMB # 1<br><b>FILE</b> _____  |  |   |
| <b>Measured From</b> Top of drive bushing<br><b>Elevation</b> 4207.5'   | <b>Perming Measured From</b> Top of drive bushing<br><b>Elevation</b> 4207.5'  |  | <b>Permanent Datum</b> Ground level<br><b>Elevation</b> 4201'                                 |
| <b>Run No.</b> One<br><b>Date</b> 7-19-49<br><b>Footage Logged</b> 4755'<br><b>Total Depth, El. Log</b> 6646'<br><b>Csg. Shoe, El. Log</b> 1895'<br><b>Csg. Shoe, Driller</b> 1895'<br><b>Bit Size</b> 6 1/4"                                   |  |  |   |
| <b>Mud Kind</b> Water base<br><b>Treatment</b> Homocogel<br><b>Weight</b> 9.5<br><b>Viscosity</b> 3.6<br><b>Ph</b> _____<br><b>Resist Ohms m<sup>2</sup>m</b> 1.7 @ 70°F @ °F @ °F @ °F<br><b>Loss ml/30 min</b> _____<br><b>Max Temp</b> _____ |  |  |   |
| <b>Electrode Spacing</b><br><b>Short</b> 3 1/2' Point<br><b>Medium</b> 6 1/2' 8' 24' P<br><b>Long</b> _____   |  |  |   |
| <b>Recorded by</b> G.H. Hoversock<br><b>Witnessed by</b> A.S. Waddell   |  |  |   |

**REMARKS OR OTHER DATA**  
 Not Available





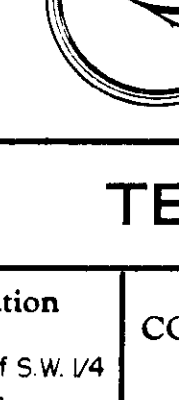
COMPANY: A.S. WADDELL et al. STATE: ARIZ.  
 WELL NO.: 1 FARM: M<sup>c</sup> COMB COUNTY: COCHISE  
 I. 135 R. 24E  
 COMMENTS: 5/15/47  
 COMPLETED: 5/15/47

REMARKS:  
 Csg - 12 1/2" @ 600';  
 8 7/8" @ 1202';  
 7" @ 2027';  
 SW SW SE  
 Hemmenway, Dec. '49

ELEV. (alt.) 4172'  
 PRODUCTION 4205' d.f.

|      |         |   |
|------|---------|---|
| 100  |         | Cable Tools to 2385'<br>Rotary Tools 2385' to TD.   |
| 200  |         | Tan to gray loose Arkosic Sd, fine to coarse gr.  |
| 300  |         | Blue gray clay w/ incl. rdd. qtz. gr.   |
| 400  |         | Gray loose arkosic Sd. fine gr. Ang. to sub rounded.  |
| 500  |         | Gray muddy loose Sand<br>Gray loose arkosic Sand, w/ chert, pyrite  |
| 600  | 12 1/2" | Gray grn. clay<br>in part sdy.  |
| 700  |         | Gray clay, consolidated in part, w/ incl. Sd. gr.   |
| 800  |         | Spls. msg.<br>Gray clay w/ lime stringers<br>Gray clay w/ incl. qtz. gr.  |
| 900  |         | Gray Sd w/ clay cement  |
| 1000 |         | Gray loose arkosic Sand, fine to pebble size  |
| 1100 |         | Gray to tan loose Gravel, mainly qtz.   |
| 1200 | 8 7/8"  | Gray, fine to med qtz. Sd becoming arkosic  |
| 1300 |         | v. fine to v. coarse loose Sand Ang. to sub rounded.  |
| 1400 |         | Gray to pink Clay<br>tan to brown fine v. loose Sd w/ gray clay cement<br>Dk. red brown Arkosic high % of Granitic material   |
| 1500 |         | Same w/ limestone pebbles clay cementing  |
| 1600 |         | Dk. red brown to purplish Granitic Sand, loose  |
| 1700 |         | Spls. msg.  |
| 1800 |         | Dk. red brown granitic Sand, loose, fine to coarse  |
| 1900 |         |   |
| 2000 | 7"      | Same but becoming lighter w/ gray cast.   |
| 2100 |         |   |
| 2200 |         |   |
| 2300 |         |   |
| 2400 |         | Composed mainly of quartzite, feldspar, w/ minor amounts of clay, ls. pebbles & igneous Rck.  |
| 2500 |         |   |
| 2600 |         |   |
| 2700 |         | Dk. purple brown quartzitic Ang. fragments, med to coarse gr. Somewhat arkosic & w/ red brown clay & shale in small amounts   |
| 2800 |         | Appears to be reworked older sediments w/ abundant secondary Cu mineralization  |
| 2900 |         |   |
| 3000 |         |   |
| 3100 |         |   |
| 3200 |         |   |
| 3300 |         |   |
| 3400 |         | Dk. blue gray calc. Quartzite fragments   |
| 3500 |         |   |
| 3600 |         |   |
| 3700 |         | Dk. gray reworked Quartzitic mat. some arkosic mat. & w/ red brown shale & clay. abundant secondary Cu minerals. Asphaltic globules secondary calc. material                    |
| 3800 |         | Spls. msg.  |
| 3900 |         |   |
| 4000 |         |   |
| 4100 |         |   |
| 4200 |         | Gray Quartzitic Sand w/ loose Sand in Asphaltic globules  |
| 4300 |         | Reworked older rock, chiefly Quartzite w/ arkosic material, some red brown clay   |
| 4400 |         |   |
| 4500 |         |   |
| 4600 |         |   |
| 4700 |         |   |
| 4800 |         |   |
| 4900 |         | Same as above w/ Asphaltic globules   |
| 5000 |         | Dk. quartzitic Arkosic black shale, some in above Quartzitic material.  |
| 5100 |         | Same w/ fat globules or balls   |
| 5200 |         | Arkosic Sd, f. to coarse congl. tan to dk. yellow brown color, from limestone<br>Arkosic Sd, congl. w/ thin black carbonaceous & graphitic shale                                |
| 5300 |         | Black graphitic shale w/ thin seams of Arkosic Sd, congl.   |
| 5400 |         | Dk. brown v. fine Sd. Arkosic material. Dk. purplish brown v. fine Sd.  |
| 5500 |         | Same as above becoming coarser gr., higher porosity<br>Same v. fine gr. w/ variegated colors, gray, purplish brown & cream.   |
| 5600 |         |   |
| 5700 |         |   |
| 5800 |         | Black carbonaceous shale<br>Dk. gray to black & grn. v. fine gr. Quartzitic Sd. w/ thin bl. carbon shale<br>Dk. gray to black v. fine gr. Sd. Argillac.                         |
| 5900 |         | Dk. gray to black Arenac. shale, calc. in part.   |
| 6000 |         | Dk. gray grn. v. fine Sd. Argillac.   |
| 6100 |         | Dk. gray to black Arenac. Sd. calc. in part.  |
| 6200 |         | w/ thin fine gr. lt. Sd.  |
| 6300 |         | Dk. gray to black highly calc. shale  |
| 6400 |         | becoming Argill. limestone  |
| 6500 |         | Green fine gr. Sd.<br>Black Argill. ls.<br>lt. to dk. var. Sd, fine gr.   |
| 6600 |         | lt. gray calc. Sd, fine gr.<br>Dk. fine gr. Sd., Argill. abundant limonite<br>Dk. gray Sdy. ls.   |
| 6700 |         | Dk. red brown Arkosic Sd, congl.<br>Purple brown Arkosic Sd w/ calc. streaks<br>Cream fine gr. loose Sand<br>Dk. gray to black Sdy. dol.  |
| 6800 |         | Cream fine gr. loose Sand<br>Dk. gray to purplish. Sdy. dol. w/ thin beams of Gray w/ purple mottling, bentonite or tuffid.   |
| 6900 |         | Dk. red brown Sdy. shale w/ thin tan fine gr. Sd, loose Cu. minerals<br>Dk. green fine gr. Sd. Arkosic & finely congl. w/ red brown mottling (colvite, epidote, chert minerals) |
| 7000 |         | TD 6865'  |

TERTIARY



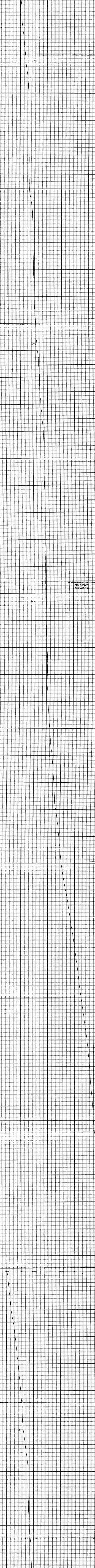
**Holloway**  
OIL WELL CEMENTING CO.

OIL & GAS FIELD SURVEYS  
STATE OF ARIZONA  
4115 W. WASHINGTON AVENUE  
PHOENIX, ARIZONA 85018  
TELEPHONE 271-8511

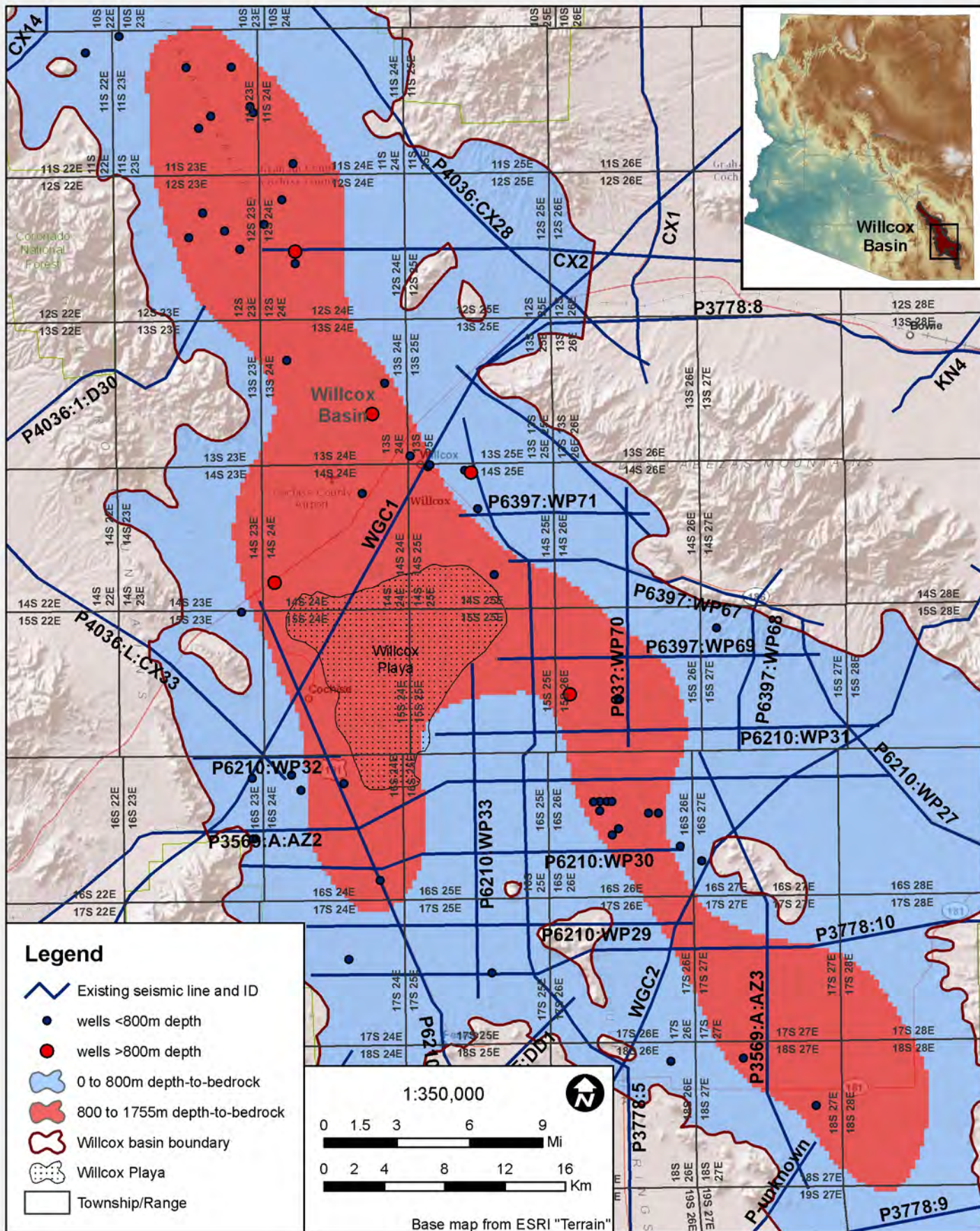
**TEMPERATURE SURVEY**

|   |   |                    |              |                          |
|---|---|--------------------|--------------|--------------------------|
| Location<br>S.W. 1/4 of S.W. 1/4<br>of SE 1/4<br>Sec. 23<br>Twp. 13-S<br>Rge. 24-E<br><br>Elev. 4201' Ground Survey | COMPANY <u>WADDELL - DUNCAN COMPANY</u> |                    | WELL         | COMPANY                  |
|   | FILE                                    |                    | WADDELL      | WADDELL - DUNCAN COMPANY |
|   | WELL                                    | McCOMB # 1         | FIELD        | Wildcat                  |
|   | FIELD                                   | Wildcat            | County       | Cochise                  |
|   | Country                                 | Cochise            | State        | Arizona                  |
|   | Sec.                                    | 23                 | Twp.         | 13-S                     |
|   | Rge.                                    | 24-E               | Start        | 4124.00                  |
|   | Survey                                  |                    | Range        | 34-E                     |
| Log Measured From   | Top of drive bushing                    | Elevation          | 4207.5'      |                          |
| Drilling Measured From  | Top of drive bushing                    | Elevation          | 4207.5'      |                          |
| Permanent Datum   | Ground Level                            | Elevation          | 4201'        |                          |
| Date of Cementing   | Open hole                               | Time               |              |                          |
| Date of Survey  | 7-19-49                                 | Time               | 11:45 A.M.   |                          |
| Amount of Cement  |   | Type               |              |                          |
| Amount of Admix   |   | Type               |              |                          |
| Casing Size   | Casing Depth                            | Diam. of Hole      | Depth        |                          |
| 3 3/8"  | from 0 to                               |                    | from         |                          |
| 8 5/8"  | from 0 to 1202'                         | 1 1/2"             | from         | 1202'                    |
| 7"  | from 0 to 1896'                         | 7/8"               | from         | 1202' to 1896'           |
|   | from                                    | 5 1/4"             | from         | 1896' to 6646'           |
| Survey Begins at  | 20'                                     | Ft. Ends at        | 6650'        | Ft.                      |
| Bottom Hole Temp.   | 188                                     | °F Max. Temp.      | 189          | °F                       |
| Run No.   | One                                     | Approx. Top Cement | 462'         | Ft.                      |
| Recorded by   | G. H. Haverstick                        | Witnessed by       | A. S. Wadell |                          |
| REMARKS OR OTHER DATA   |   |                    |              |                          |
| Not Available   |   |                    |              |                          |

TEMPERATURE IN DEGREES FAHRENHEIT



# Existing seismic reflection profiles in the Willcox Basin area





| Seismic Line Name | Length (km) |
|-------------------|-------------|
| CX13              | 49.5        |
| CX24              | 53.5        |
| CX26              | 18.3        |
| CX14              | 37.5        |
| CX2               | 46.6        |
| P3778:8           | 91.7        |
| WGC2              | 149.2       |
| P4036:CX28        | 60.9        |
| WGC1              | 166.2       |
| P5397-WP72        | 17.2        |
| P3778:5           | 109.8       |
| P4036:L:CX33      | 40.8        |
| P6210:WP28        | 38.7        |
| P6210:WP32        | 9.8         |
| P6397:WP71        | 12.7        |
| P6397:WP67        | 21.8        |
| P6397:WP69        | 21.4        |
| P6210:WP31        | 29.4        |
| P3569:A:AZ3       | 30.6        |
| P6210:WP27        | 20.0        |
| P6210:WP33        | 22.3        |
| P6210:WP30        | 29.7        |
| P6210:WP29        | 25.6        |
| P3778:10          | 52.2        |
| P6397:WP68        | 13.0        |
| P4036:1:D30       | 20.8        |
| P3569:A:AZ2       | 86.2        |
| P4036:E:D12B      | 8.0         |
| P4036:E:DD1       | 26.9        |
| P3778:9           | 35.3        |
| P-unknown         | 63.5        |
| P6397:WP70        | 17.3        |

Seismic line locations provided by Roy Johnson, 2011

P = Conoco - Phillips

CX = Conoco - Phillips

WG = Western Geophysical-?