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SOUTHERN NEVADA WATER AUTHORITY

## Water Resources Division

# 2010 Delamar, Dry Lake, and Cave Valleys Hydrologic Monitoring and Mitigation Plan Status and Data Report

March 2011

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and the DDC Stipulation
Executive Committee

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## ACRONYMS

| | |
|---|---|
| BLM | Bureau of Land Management |
| BRT | Biological Resource Team |
| DDC | Delamar, Dry Lake, and Cave valleys |
| DOI | U.S. Department of the Interior |
| EC | Executive Committee |
| EPA | U.S. Environmental Protection Agency |
| JFA | Joint Funding Agreement |
| NAD83 | North American Datum of 1983 |
| NAVD88 | North American Vertical Datum of 1988 |
| NDOW | Nevada Department of Wildlife |
| NDWR | Nevada Division of Water Resources |
| NOAA | National Oceanic and Atmospheric Administration |
| NRCS | Natural Resources Conservation Service |
| NSE | Nevada State Engineer |
| NWS | National Weather Service |
| SNOTEL | SNOwpack TELemetry |
| SNWA | Southern Nevada Water Authority |
| SR | State Route |
| TRP | Technical Review Panel |
| USDA | U.S. Department of Agriculture |
| USFWS | U.S. Fish and Wildlife Service |
| USGS | U.S. Geological Survey |
| UTM | Universal Transverse Mercator |
| WRCC | Western Regional Climate Center |

## ABBREVIATIONS

| | |
|---|---|
| °C | degrees Celsius |
| afy | acre-feet per year |
| amsl | above mean sea level |
| bgs | below ground surface |
| cfs | cubic feet per second |
| cm | centimeter |
| ft | foot |
| gal | gallon |

## ABBREVIATIONS (CONTINUED)

| | |
|---|---|
| gpm | gallons per minute |
| in. | inch |
| L | liter |
| m | meter |
| mg | milligram |
| mi | mile |
| µg | microgram |
| µm | micrometer |
| µmho | micromho |
| µS | microsiemen |
| pmc | percent modern carbon |

# 1.0 INTRODUCTION

The Southern Nevada Water Authority (SNWA) prepared this report as part of the *Hydrologic Monitoring and Mitigation Plan for Delamar, Dry Lake, and Cave Valleys* (DDCMM Plan) (SNWA, 2009a). The location of the project area associated with this report is presented in Figure 1-1. The report provides the Nevada State Engineer (NSE) hydrologic data associated with the plan collected in 2010 and the current status of each element of the DDCMM Plan. The hydrologic data contained in this report were submitted to the NSE in electronic format.

This report also satisfies the hydrologic data reporting requirements of the U.S. Department of the Interior (DOI) and SNWA Stipulation Agreement. The DDCMM Plan contains all the hydrologic monitoring elements of the Stipulation Agreement as well as monitoring related to existing non-federal water-right holders as was required by the NSE.

This is the fourth hydrologic data report for Delamar, Dry Lake, and Cave valleys (DDC). The first data report documented data collected in 2007 and historical data from selected existing monitor wells (SNWA, 2008). The second data report presented detailed descriptions and historical data up to 2008 from the hydrologic monitoring network, which was revised and expanded to meet the DDCMM Plan objectives (SNWA, 2009). The third report documented data collected in 2009 (SNWA, 2010).

## 1.1 Background

On January 7, 2008 prior to the NSE hearing for applications 53987 to 53992, a Stipulation for Withdrawal of Protests (Stipulation, 2008) was established between SNWA and DOI on behalf of the Bureau of Indian Affairs, the Bureau of Land Management (BLM), the National Park Service, and the U.S. Fish and Wildlife Service (USFWS) (collectively known as the DOI Bureaus). Exhibits A and B of the Stipulation require the development of biologic and hydrologic monitoring plans. As part of the Stipulation, an Executive Committee (EC) was established to oversee the implementation of the agreement. The hydrologic Technical Review Panel (TRP), composed of technical expert representatives of parties to the stipulation, was established to develop and oversee implementation of the monitoring and mitigation plan, review program data, and modify the monitoring plan, if necessary. A Biological Working Group (BWG) was also establish to oversee the development and implementation of the biological monitoring plan.

On July 9, 2008, SNWA was granted groundwater rights in DDC hydrographic areas (HA) 180-182 for municipal and domestic purposes under permits 53987 through 53992. Ruling 5875 required the development of biologic and hydrologic monitoring plans. The hydrologic DDCMM Plan was approved by the NSE on December 22, 2009.

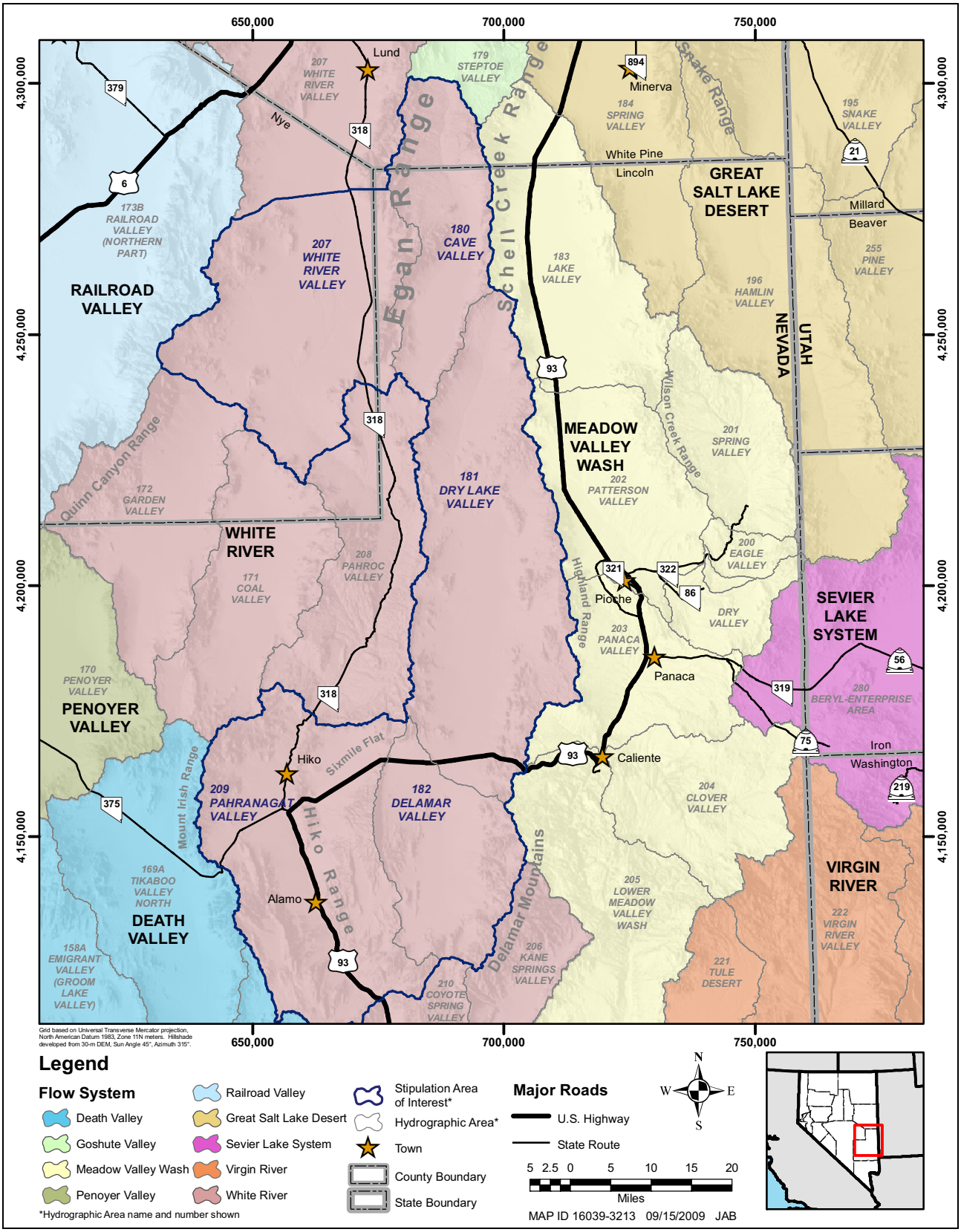


**Figure 1-1**
**Primary Study Area Location**

Since the issuance of Ruling 5875, an opinion by the Nevada Supreme Court concluded that the NSE must re-notice SNWA's original groundwater applications and reopen the protest period (Great Basin Water Network, et. al. v. NSE, et. al., June 17, 2010) (NSC, 2010). Even though NSE Ruling 5875 has been vacated, the Stipulation remains in full effect and requires SNWA to submit an annual report of its monitoring activities in DDC. This report is submitted for the purpose of meeting the Stipulation's annual reporting requirements.

## 1.2 Major Activities Performed in 2010

Major activities associated with the DDCMM Plan performed in 2010 are as follows:

- Implemented the DDCMM Plan.
- Obtained BLM right-of-way access for three future monitor well-locations.
- Provided technical assistance to the Biological Resource Team (BRT).
- Performed physical water-level measurements on monitoring network wells. Maintained continuous water level recording instrumentation at locations specified in the plan.
- Maintained a flume at Hardy Springs which was installed in 2008 by SNWA.
- Maintained a vault, a flow meter, and datalogger instrumentation installed in 2008 by SNWA to measure discharge through the pipeline from Hiko Spring.
- Maintained a flume and continuous monitoring instrumentation on Middle Flag Spring (Flag Spring 2) which was installed in 2009 cooperatively with NDOW and SNWA.
- Completed biannual site visits of the eight local springs located in DDC in spring and fall 2010.
- Maintained the SNWA data-exchange web site accessible by NSE, EC, TRP, and BRT. The web site contains project reports, monitoring network attributes, and hydrologic data. Data were posted on the site within 90 days of collection.

## 1.3 Report Scope

Section 2.0 of this report presents the hydrologic data collected from the groundwater, spring, and precipitation monitoring network associated with the DDCMM Plan. Section 3.0 presents anticipated activities in 2011. Section 4.0 documents report references. Appendix A through Appendix F present tables and graphs of various data discussed in the report. Photos documenting new network flume installations and current DDC spring conditions are also presented.

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# 2.0 DDCMM PLAN STATUS AND DATA

The hydrologic data collected in 2010 and current status of each major element of the DDCMM Plan are presented in this section. Each subsection follows the order of topic presentation in the plan. Historical hydrologic and water chemistry data are presented in previous SNWA annual reports (SNWA, 2008, 2009a, 2010).

## 2.1 Hydrologic Monitoring Program

The DDCMM Plan established a monitoring program and network to collect data for the purposes of defining baseline hydrologic conditions prior to SNWA withdrawals in DDC and evaluating the influence of these withdrawals. The network includes monitor wells and springs located within DDC and adjacent hydrographic areas. The monitoring locations are presented on Figure 2-1. The program also includes reporting of available regional precipitation station data with an established historical record.

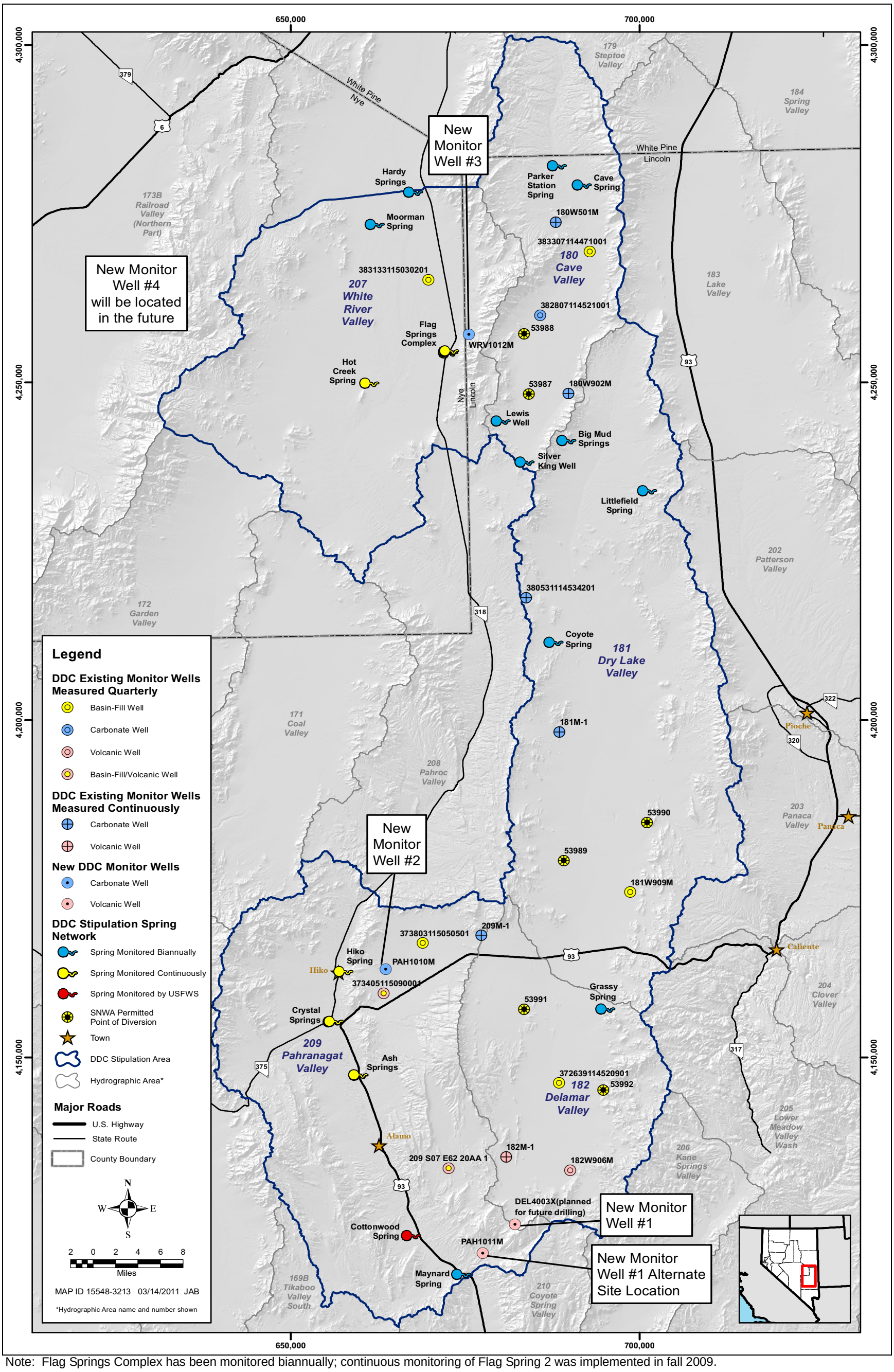
## 2.2 Monitor-Well Network

The DDCMM Plan includes monitoring of existing and new wells completed in the basin-fill, carbonate-rock, and volcanic-rock aquifers at strategic locations to provide representative groundwater data spatially across the program area. Monitor-well locations were selected with consideration of the hydrogeologic conditions at each location. Geologic reconnaissance, stratigraphic and structural field mapping, aerial photo analysis, surface geophysics, and a review of existing hydrogeologic data were performed to assist in well-site selection. This network will provide long-term monitoring and early warning of drawdown propagation, if any, induced by SNWA groundwater development that might adversely affect existing water-right holders and groundwater-dependent areas sustaining critical habitat for endangered and/or threatened species.

### 2.2.1 Existing-Well Monitoring Network

SNWA records periodic water levels quarterly at nine representative monitor wells and continuously at six additional network well locations. This network includes seven SNWA wells, three private wells, four U.S. Geological Survey (USGS-MX) wells, and one BLM well located in DDC and the adjacent White River and Pahranagat hydrographic areas. The locations of the monitor wells in the network are shown on Figure 2-1. Well-location coordinates, elevation, construction attributes, and monitoring frequencies are presented in Table 2-1. A professional survey of location coordinates, ground-surface elevations, and measuring-point elevations of the wells has been completed.

SNWA constructed its seven monitor wells associated with this network in 2005. These consist of four 6-in.-diameter and three 12-in.-diameter monitor wells in DDC. Geologic analysis reports were




Note: Flag Springs Complex has been monitored biannually; continuous monitoring of Flag Spring 2 was implemented in fall 2009.

**Figure 2-1**
**DDC Monitor-Well and Spring Network**

# Table 2-1
# DDC Existing-Well Monitoring Network

| Site Number | Station Local Number | Location[a] | | Surface Elevation (ft amsl) | Completion Date | Drill Depth (ft bgs) | Well Depth (ft bgs) | Well Casing Diameter (in.) | Screened Interval (ft bgs) | Open Interval (ft bgs) | Aquifer | Monitor Frequency |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | UTM Northing (m) | UTM Easting (m) | | | | | | | | | |
| 180W902M | 180W902M | 4,248,355.59 | 689,816.08 | 5,984.89 | 10/19/2005 | 917 | 903 | 12 | 195-882 | 77-917 | Carbonate | Continuous |
| 382807114521001 | 180 N07 E63 14BADD 1 USGS-MX | 4,259,963.15 | 685,737.56 | 6,012.39 | 9/30/1980 | 460 | 460 | 10 | 210-250, 375-435 | 40-460 | Carbonate[b] | Quarterly |
| 383307114471001 | 180 N08 E64 15BCBC1 USBLM (Harris Well) | 4,269,378.23 | 692,859.57 | 6,162.55 | --- | --- | --- | 7 | --- | --- | Basin Fill | Quarterly |
| 180W501M | 180W501M | 4,273,712.79 | 687,971.03 | 6,428.63 | 9/23/2005 | 1,215 | 1,212 | 6 | 788-1,192 | 54-1,215 | Carbonate | Continuous |
| 182W906M | 182W906M | 4,133,304.57 | 690,065.21 | 4,796.96 | 9/2/2005 | 1,735 | 1,703 | 6 | 1,275-1,678 | 130-1,735 | Volcanic | Quarterly |
| 182M-1 | 182M-1 | 4,135,293.37 | 680,867.32 | 4,597.78 | 7/10/2005 | 1,345 | 1,331 | 12 | 1,006-1,290 | 58-1,345 | Volcanic | Continuous |
| 372639114520901 | 182 S06 E63 12AD 1 USGS-MX | 4,146,220.24 | 688,472.41 | 4,706.30 | 5/10/1980 | 1,215 | 1,195 | 10 | 920-980, 1,040-1,180 | 40-1,215 | Basin Fill | Quarterly[c] |
| 181W909M | 181W909M | 4,174,462.59 | 698,676.17 | 4,799.41 | 10/16/2007 | 1,285 | 1,260 | 12 | 637-1,240 | 183-1,285 | Basin Fill | Quarterly |
| 181M-1 | 181M-1 | 4,198,199.90 | 688,534.99 | 4,963.07 | 8/30/2005 | 1,501 | 1,471 | 6 | 765-1,451 | 58-1,501 | Carbonate | Continuous |
| 380531114534201 | 181 N03 E63 27CAA 1 USGS-MX | 4,218,085.09 | 683,720.32 | 5,456.35 | 1/1/1981 | 2,395 | 2,395 | 10 | --- | 775-2,395 | Carbonate | Continuous[c] |
| 209 S07 E62 20AA 1 | 209 S07 E62 20AA 1 (Dean Turley Well) | 4,133,610.32 | 672,648.88 | 4,082.46 | 1/10/1981 | 695 | 695 | 8 | 600-695 | 55-695 | Basin Fill/ Volcanic | Quarterly |
| 373405115090001 | 209 S04 E61 28CD 1 | 4,159,504.38 | 663,314.66 | 4,230.58 | 9/19/1968 | 1,314 | 1,314 | 12 | 1,200-1,300 | 52-1,314 | Basin Fill/ Volcanic | Quarterly |
| 373803115050501 | 209 S04 E61 01AACB1 | 4,166,944.29 | 668,927.03 | 4,528.90 | --- | --- | 700 | 8 | --- | --- | Basin Fill | Quarterly |
| 209M-1 | 209M-1 | 4,168,065.79 | 677,323.46 | 5,097.30 | 8/4/2005 | 1,616 | 1,616 | 6 | 1,274-1,595 | 50-1,616 | Carbonate | Continuous |
| 383133115030201 | 207 N08 E62 30CD 1 USGS-MX | 4,265,229.62 | 669,732.25 | 5,290.20 | --- | --- | 101 | 2 | --- | --- | Basin Fill | Quarterly |

[a]Professional survey complete on location and elevation. All coordinates are Universal Transverse Mercator, North American Datum, 1983, Zone 11.
[b]Carbonate bedrock was encountered at 265 ft bgs according to the well log.
[c]Well is monitored continuously by the USGS.
Well-construction data are based upon best available information from well logs, MX Project Report (Ertec Western Inc., 1981), and direct field measurements.
Monitoring frequency agreed to by the TRP. Additional water-level data in the study area may be collected by SNWA or USGS and reported in future data reports.

completed for each of the seven SNWA monitor wells included in the network (Eastman, 2007a through g). Copies of the reports have been posted on the SNWA shared data-repository web site.

Continuous water-level data were collected at the six designated monitor wells within the network. Site visits were conducted approximately every six weeks to obtain periodic water-level measurements and download continuous data for processing and analysis. Physical measurements of water levels were compared to pressure transducer data to ensure proper function and calibration of the instrumentation.

USGS collects continuous data at two USGS-MX wells within the network (182 S06 E63 12AD 1 USGS-MX [Delamar Well] and 181 N03 E63 27CAA 1 USGS-MX [N. Dry Lake]). USGS also collects continuous data at 181 S03 E64 12AC 1 USGS-MX (S. Dry Lake Well), which is not included in the network.

Periodic water-level measurements collected by SNWA in 2010 are presented in Appendix A. Historical and 2010 hydrographs for the nine existing DDC network wells that are monitored quarterly are also presented in Appendix A. Water-level data collected by SNWA and USGS at the six continuously monitored network wells are presented in Appendix B. Appendix B also includes tables presenting periodic and daily mean continuous water-level data as well as associated 2010 and historical hydrographs. Historical USGS data are presented at the National Water Information System's website at http://waterdata.usgs.gov/nv/nwis/gw.

### 2.2.2 New Monitor Wells

The installation of four new monitor wells is included in the monitoring plan. In 2009, three primary and one contingency site were selected by the TRP and NSE for the installation of three of the monitor wells. The location of the fourth well will be selected after more information is made available on the production well network configuration and baseline data are collected. New well location coordinates and estimated surface elevation and depth to groundwater are presented in Table 2-2. The future monitor well location sites are presented in Figure 2-1.

**Table 2-2**
**New DDC Monitor Wells**

| Well Name | Location[a] | | Estimated Surface Elevation (ft amsl) | Estimated Depth to Water (ft) |
|---|---|---|---|---|
| | UTM Northing (m) | UTM Easting (m) | | |
| WRV1012M | 4,257,087 | 675,519 | 5,794 | 420 |
| PAH1010M | 4,163,098 | 663,576 | 4,380 | 700 |
| DEL4003X | 4,125,223 | 682,153 | 4,738 | 1,450 |
| PAH1011M (alternate site) | 4,121,019 | 677,508 | 3,727 | 635 |

[a]All coordinates are Universal Transverse Mercator, North American Datum, 1983, Zone 11.

The northernmost future monitor well, WRV1012M, is located on the west side of the Egan Range northeast of Flag Spring in White River Valley. This well is anticipated to be completed in the Ely

Springs Dolomite. The location was selected as a monitoring point between Flag Springs Complex and southern Cave Valley. The new well and other existing monitor wells in Cave Valley will provide baseline water-level data to evaluate the hydraulic gradient through Shingle Pass. The depth to groundwater is estimated to be approximately 420 ft bgs at this location.

The second future monitor well, PAH1010M, is located on the east side of the Hiko Range in Sixmile Flat in Pahranagat Valley. The site is located 3.5 mi east of Hiko Spring. The target completion zone is saturated fractured carbonate rocks within the middle to lower units of the Guilmette Formation and possibly the Simonson Dolomite. Carbonate bedrock is anticipated to be encountered within 50 ft of land surface, and it is expected that rocks will be fractured at depth because of the movement along the range-front fault and ancillary normal faults. The depth to water in this area is estimated to be approximately 700 ft bgs.

Both WRV1012M and PAH1010M are located on BLM managed land, and National Environmental Policy Act of 1969 right-of-way applications have been approved by BLM.

The third future monitor well will be installed at the well site of a proposed SNWA exploratory well, DEL4003X, which is located near the southern boundary of Delamar Valley within a structural feature of the Pahranagat Shear Zone. This well is anticipated to be completed in volcanic materials. An alternative site, PAH1011M, was identified and is also located along a major structural feature of the Pahranagat Shear Zone but southwest of the exploratory well site. The right-of-way applications have been approved by BLM for both locations.

### 2.2.3 Exploratory- and Production-Well Monitoring

The exploratory and production well monitoring section of the DDCMM Plan states that SNWA shall record discharge and water levels in all completed SNWA production wells on a continuous basis. SNWA does not currently have any production wells associated with this project; however, continuous measurements will be collected from all future production wells. Water-level measurements are required in all SNWA exploratory wells at least quarterly.

Water-level data were collected from SNWA exploratory and test wells. Two SNWA wells, one 6-in.-diameter monitor well (CAV6002M2) and one 20-in.-diameter test well (CAV6002X), were installed in southern Cave Valley near Monitor Well 180W902M on October 13 and 28, 2007, respectively. Well-construction attributes and the locations of the additional SNWA wells are presented in Table 2-3 and Figure 2-2.

Water-level measurements were regularly collected from the wells in accordance with SNWA field operating procedures. Periodic water-level data and the associated hydrographs from the test and exploratory wells are presented in Appendix C.

### 2.2.4 Well Performance and Aquifer Testing

A constant-rate pumping test will be performed on each future production test well to evaluate aquifer properties. Aquifer-testing results would be used to assess well performance, provide aquifer property

# Table 2-3
# SNWA Exploratory Wells

| Site Number | Station Local Number | Location[a] | | Surface Elevation (ft amsl) | Completion Date | Drill Depth (ft bgs) | Well Depth (ft bgs) | Well Casing Diameter (in.) | Screened Interval (ft bgs) | Open Interval (ft bgs) | Aquifer | Monitor Frequency |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | UTM Northing (m) | UTM Easting (m) | | | | | | | | | |
| CAV6002X | CAV6002X | 4,248,307.58 | 689,819.01 | 5,987.97 | 10/28/2007 | 917 | 901 | 20 | 219-901 | 50-917 | Carbonate | Quarterly |
| CAV6002M2 | CAV6002M2 | 4,248,365.83 | 689,782.96 | 5,982.81 | 10/13/2007 | 893 | 885 | 6 | 159-882 | 50-893 | Carbonate | Quarterly |

[a]Professional survey complete on location and elevation. All coordinates are Universal Transverse Mercator, North American Datum, 1983, Zone 11.
Well-construction data are based upon best available information from well logs.

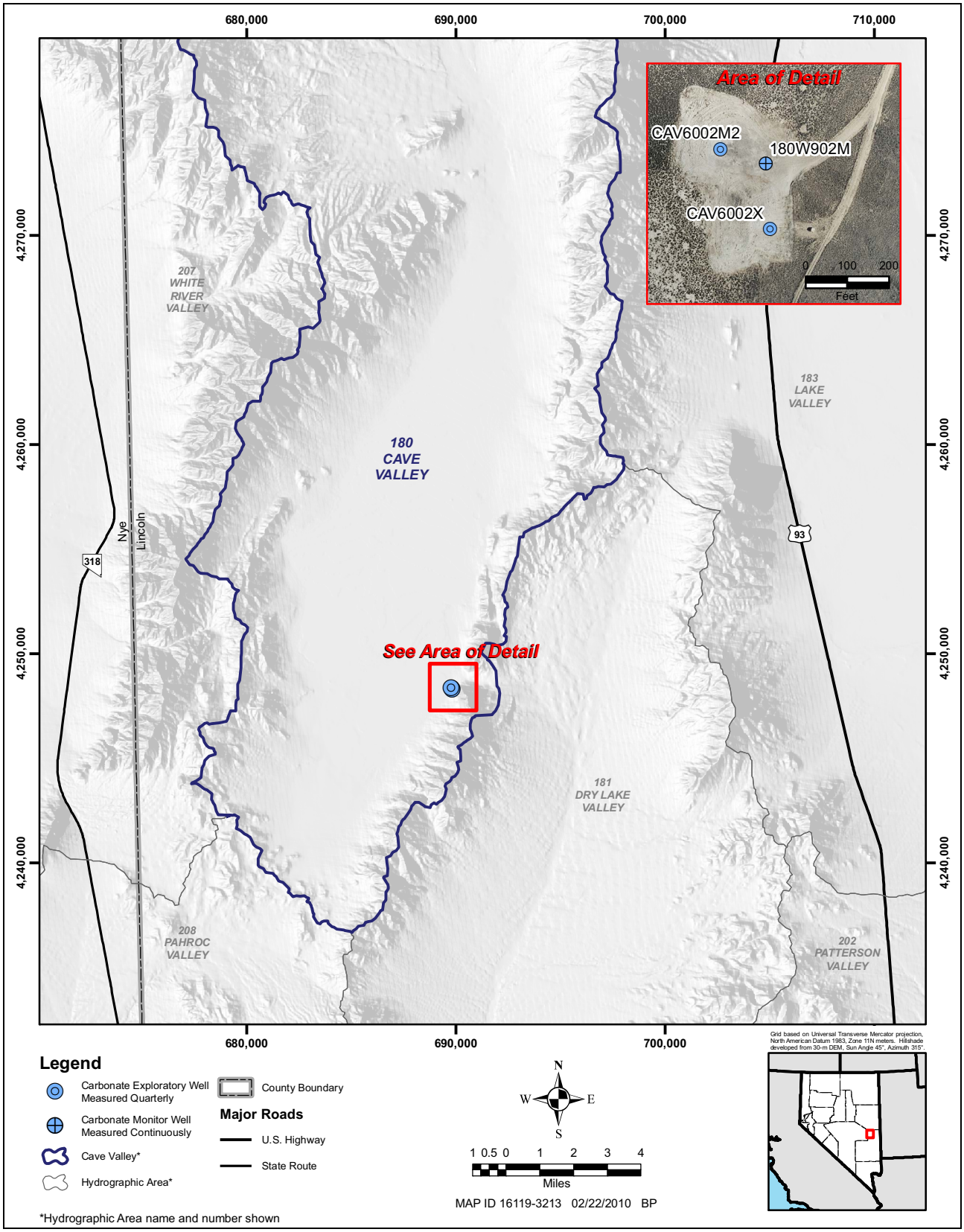



**Figure 2-2**
**SNWA DDC Exploratory Wells**

data for the groundwater flow model, and assist in evaluating potential future pumping influence. Well-performance step tests and 72-hour constant-rate tests have been performed on SNWA Test Well CAV6002X and Monitor Well 180W902M located in Cave Valley.

## 2.3 Spring Monitoring Network

The DDCMM Plan spring monitoring program has two components which were implemented in 2009. The first component consists of nine springs in White River and Pahranagat valleys that are monitored for discharge. The second component consists of eight springs within DDC that are monitored biannually for discharge (if measurable), field water-quality parameters, and general physical conditions. The spring locations and monitoring frequency are listed in Table 2-4 and presented in Figure 2-3. A description of each spring and discharge data collected are presented in this section.

### 2.3.1 White River and Pahranagat Valleys Springs

Nine springs located in White River and Pahranagat valleys are included in the spring monitoring network. Five of these springs are currently being monitored through a joint funding agreement (JFA) between SNWA, the USGS, and the Nevada Division of Water Resources (NDWR). These springs are the Flag Springs Complex, Hot Creek, Moorman, Ash, and Crystal springs. The monitoring frequency of each spring is listed in Table 2-4. Photos of these spring locations were presented in the SNWA (2009b). SNWA will monitor or fund a mutually agreed-upon third party to monitor these locations.

SNWA established spring discharge monitoring sites at Hardy and Hiko springs in 2009. SNWA and NSE worked together to secure property access to install the flume at Hardy Springs, and flow meter and data logger at Hiko Spring. The flow meter provides continuous discharge data on the agricultural diversion pipeline to which Hiko Spring is diverted.

SNWA coordinated with the Nevada Department of Wildlife (NDOW) to install a flume and continuous-monitoring instrumentation at Flag Spring 2 (Middle Flag Spring) in 2009. Flag Springs 1 and 3 continues to be measured biannually.

Maynard Spring will be monitored quarterly by SNWA. SNWA will document conditions at this site dependent upon continued property access. Cottonwood Spring will be monitored by USFWS, and data provided will be included future annual data reports.

#### 2.3.1.1 Flag Springs Complex

The Flag Springs Complex is located in Nye County at the NDOW Headquarters for the Wayne Kirsch Wildlife Management Area approximately 60 mi south of Ely, Nevada, along Nevada State Route (SR) 318 (Figure 2-3). Three primary springs (South, Middle, and North) compose the Flag Springs Complex. Flag Springs discharge into Sunnyside Creek from the source in the NDOW headquarters area, then flows into the Adams-McGill Reservoir, where the water is used for livestock, wildlife, and recreation.

## Table 2-4
## DDC Springs Monitoring Locations and Monitoring Frequency

| Basin Number | Station Number | Station Name | Elevation[a] | Location[b] | | Monitoring Frequency |
|---|---|---|---|---|---|---|
| | | | | UTM Northing (m) | UTM Easting (m) | |
| 180 | 1800101 | Cave Spring | 6,490 | 4,279,249 | 691,760 | Biannual |
| | 1800301 | Parker Station Spring | 6,490 | 4,282,096 | 688,179 | |
| | 381624114540302 | USBLM Silver King Well | 6,230 | 4,238,220 | 683,551 | |
| | 381943114562201 | Lewis Well | 6,260 | 4,244,297 | 680,106 | |
| 181 | 1810301 | Littlefield Spring | 6,150 | 4,233,949 | 701,112 | Biannual |
| | 1810401 | Coyote Spring | 5,220 | 4,211,513 | 687,693 | |
| | 1810501 | Big Mud Springs | 6,430 | 4,241,387 | 689,547 | |
| 182 | 1820101 | Grassy Spring | 5,790 | 4,157,193 | 695,124 | |
| 207 | 2070501 | Hot Creek Spring near Sunnyside, NV | 5,230 | 4,249,926 | 661,290 | Continuous |
| | 2071101 | Moorman Spring | 5,300 | 4,273,440 | 662,053 | Biannual |
| | 2071501 | Hardy Springs | 5,350 | 4,278,196 | 667,553 | |
| 209 | 2090101 | Hiko Spring | 3,880 | 4,162,744 | 657,549 | Continuous |
| | 2090201 | Cottonwood Spring | 3,240 | 4,123,643 | 667,261 | Quarterly[c] |
| | 2090801 | Maynard Spring | 3,110 | 4,117,909 | 674,444 | Biannual[d] |
| **Flag Springs Complex** | | | | | | |
| 207 | 2071301 | Flag Spring 3 (South) | 5,290 | 4,254,416 | 672,579 | Biannual |
| | 2071302 | Flag Spring 2 (Middle) | 5,280 | 4,254,570 | 672,576 | Continuous |
| | 2071303 | Flag Spring 1 (North) | 5,290 | 4,254,696 | 672,719 | Biannual |
| **Crystal Springs** | | | | | | |
| 209 | 09415589 | Crystal Springs Diversion near Hiko, NV | 3,820 | 4,155,336 | 656,011 | Continuous |
| | 2090401 | Crystal Springs near Hiko, NV | 3,800 | 4,155,348 | 656,165 | |
| **Ash Springs** | | | | | | |
| 209 | 09415639 | Ash Springs Diversion at Ash Springs, NV | 3,600 | 4,147,415 | 659,716 | Continuous |
| | 2090501 | Ash Springs | 3,600 | 4,147,460 | 659,684 | |

[a]All elevations are rounded to the nearest 10 ft, North American Vertical Datum, 1988 (NAVD88). High-resolution Global Positioning System (GPS) will be used to determine elevations at a later date.
[b]All coordinates are Universal Transverse Mercator, North American Datum, 1983 (NAD83) Zone 11.
[c]Monitoring performed by USFWS. Data provided to SNWA will be presented in the annual data report.
[d]Monitoring frequency will be increased to quarterly after monitoring points are established with USFWS and BLM.

Monitoring at Flag Springs Complex currently consists of continuous monitoring of Flag Spring 2 (Middle Flag Spring), which was installed through a cooperative project with NDOW and SNWA, in November 2009, and biannual monitoring of Flag Springs 1 and 3 (North and South Flag Spring) orifices.

The earliest reported discharge measurement of 2.5 cfs was taken at Flag Spring 1 in 1949 (Maxey and Eakin, 1949). The USGS, beginning in 1982, measured the discharge of the three springs annually. During 1992, the discharge measurements were increased to a biannual frequency that continued through the end of 1994. No discharge measurements were reported between 1995 and 1996. During 1997, the springs were again measured by the USGS biannually, which continued through 2008, as part of the JFA with SNWA and NDWR. Discharge measurements for 2010 and a historical hydrograph are presented in Appendix D.

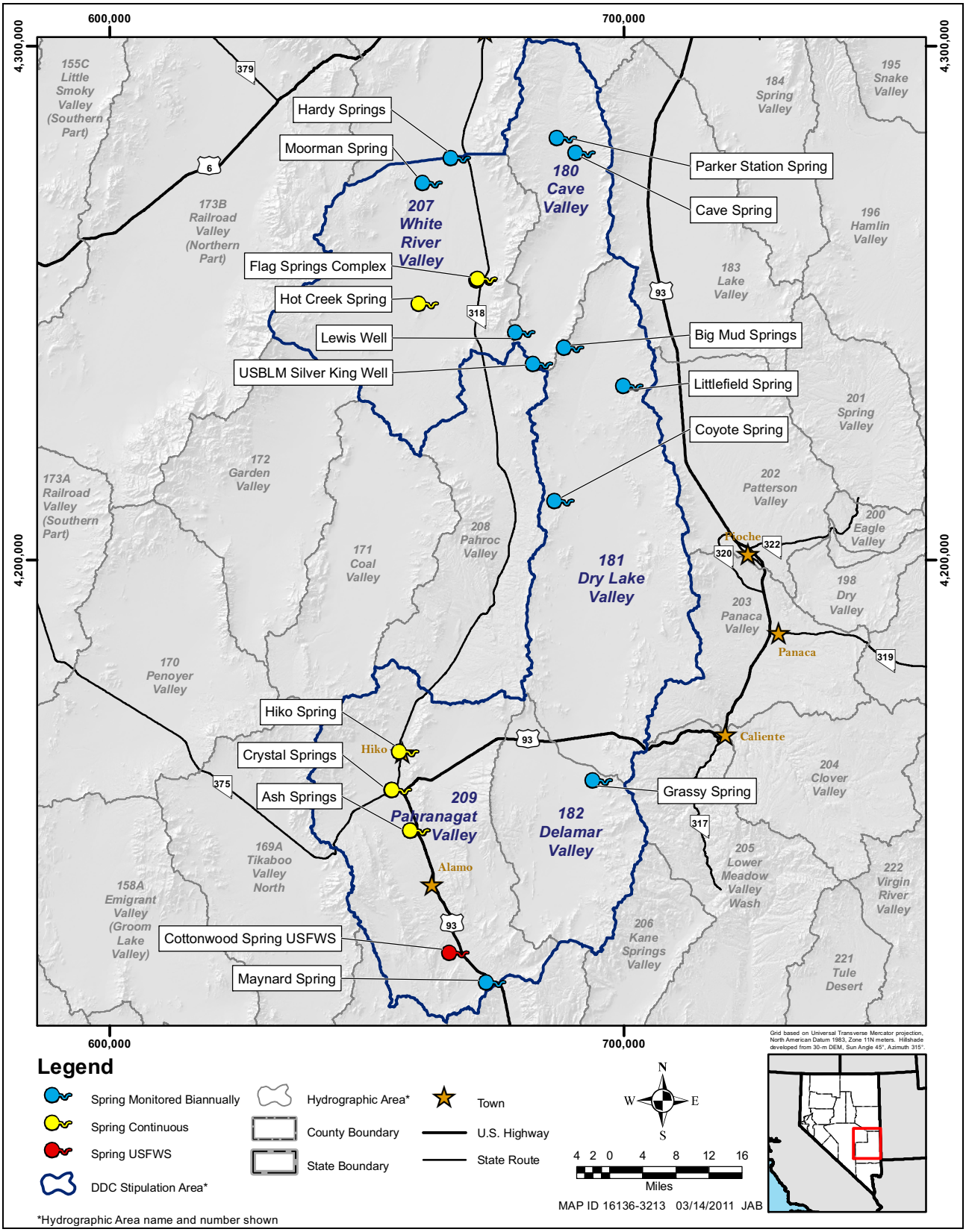



**Figure 2-3**
**Locations of Springs Associated with the DDCMM Plan**

#### 2.3.1.2 Hardy Springs

Hardy Springs is located approximately 16 mi south of Lund, Nevada, and 1.5 mi west of SR 318 in White River Valley in Nye County (Figure 2-3). Hardy Springs is composed of five individual spring orifices that discharge into a main channel that is a tributary to the White River. In August 2009, SNWA installed a new flume to obtain biannual discharge measurements upstream of an old diversion approximately 100 to 150 ft downstream of the confluence of Hardy Springs. Hydrologic data collected in 2010 are presented in Appendix D.

#### 2.3.1.3 Moorman Spring

Moorman Spring is located in White River Valley approximately 20 mi southwest of Lund, Nevada, in Nye County (Figure 2-3). The spring discharges from the alluvium along a fault scarp. The spring forms a small pool, approximately 30 ft long and 15 to 20 ft wide, behind an old irrigation diversion structure. The discharge at Moorman Spring is currently measured biannually through a SNWA, USGS, and NDWR JFA.

In 1935, the reported discharge was 0.22 cfs (Stearns et al., 1937). The extremely low discharge was likely influenced by the extreme drought in the western United States during the mid-1930s. The same 1935 discharge measurement was again reported in Miller et al. (1953). Since 1935, the average discharge at Moorman Spring has been approximately 0.47 cfs, and the historical discharge measurements appear relatively constant. Discharge data collected at Moorman Spring during 2010 and a hydrograph of the historical data are presented in Appendix D.

#### 2.3.1.4 Hot Creek Spring

Hot Creek Spring is located in southern White River Valley, approximately 36 mi southwest of Lund, Nevada, and 2 mi west of Adams-McGill Reservoir in Nye County (Figure 2-3). The spring discharge forms Hot Creek, which flows southeast to the Adams-McGill Reservoir. The spring and reservoir are located on the Wayne Kirch Wildlife Management Area, administered by NDOW. At one time, the flow of Hot Creek could be diverted to the Dacey Reservoir to the northeast. Spring discharge is currently being monitored continuously through a SNWA, USGS, and NDWR JFA.

A detailed description, site photos, and discussion of historical measurements at Hot Creek Spring are presented in SNWA (2009b). Data collected in 2010, along with historical data and mean daily discharge data from 2006 to 2010 are displayed in Appendix D. Historical data that are possibly anomalous are highlighted. Discharge measurements prior to 2006 were measured below the current gage, 50 to 60 ft below the ponded swimming area.

#### 2.3.1.5 Ash Springs

Ash Springs is located in Ash Springs, Nevada, approximately 600 ft east of U.S. Highway 93 (Figure 2-3). The spring is used for irrigation, domestic supply, and recreation and is composed of many orifices that extend more than a quarter mile along the north-south-trending Hiko Fault. The spring area was developed in the 1970s and through the 1980s as a privately owned resort. The main

orifice is on public land administered by the BLM and has a large picnic area and swimming pool. Ash Springs discharge and irrigation diversion is currently measured through a SNWA, USGS, and NDWR JFA.

A detailed description, photos, and discussion of historical data collected at Ash Springs are presented in SNWA (2009b). Hydrologic data collected during the 2010 water year, historical mean daily discharge, and a 30-day moving average of mean daily discharge values for Ash Springs are presented in Appendix D.

#### 2.3.1.6 Crystal Springs

Crystal Springs is located approximately a quarter mile west of the SR 318/SR 375 junction and a half mile west of the U.S. Highway 93/SR 318 junction in Lincoln County. Crystal Springs is approximately 4 mi south of Hiko, Nevada, and 5 mi north of Ash Springs, Nevada (Figure 2-3). This locale, used as a watering location and campsite, was the principal stopover on the Mormon Trail alternate route (State of Nevada, 2004). The main channel of the spring and irrigation diversion discharge is currently monitored through a SNWA, USGS, and NDWR JFA.

A detailed description and photo documentation of Crystal Springs are presented in SNWA (2009b), including a discussion of the historical data collected at the spring complex. Hydrologic data collected during the 2010 water year, historical mean daily discharge, days of diversion, and annual discharge data are presented in Appendix D.

#### 2.3.1.7 Hiko Spring

Hiko Spring is located on the Cannon Ranch approximately a half mile northeast of Hiko, Nevada, in the north end of Pahranagat Valley (Figure 2-3) and has historically provided water for various uses. Hiko Spring discharges from the base of the Hiko Range and currently provides water for domestic, agricultural, and wildlife purposes.

SNWA monitors discharge at Hiko Spring continuously using a flow meter and data logger installed on the 18-in.-diameter pipe located approximately 0.5 miles southwest of the spring. The monitoring station was constructed in cooperation with the Hiko Spring Irrigation District and the owners of the Cannon and Whipple Ranches. All work was completed June 2009.

The Hiko Irrigation Company uses a perpetual calendar which assigns irrigation times to each of the twelve members of the company. One complete rotation of the 12 users equates to 11.5 days. There are periods during each rotation when water is diverted above the gage. Daily discharge rates vary between 4.3 to 8.3 cfs depending upon the season and irrigation needs of the individual users. Data will be further evaluated as more information is collected.

A detailed description and photo documentation of Hiko Spring are presented in SNWA (2009b), including a discussion of the historical data collected at the spring complex. Hydrologic data collected during the 2010 water year and a historical hydrograph are presented in Appendix D.

#### 2.3.1.8 Maynard Spring

Maynard Spring is located off of U.S. Highway 93 about 14 mi southeast of Alamo, Nevada, and 2.5 mi southeast of Lower Pahranagat Lake on BLM land in Pahranagat Valley (Figure 2-3). The spring is composed of two springheads, referred to as North Maynard Spring and South Maynard Spring, which are separated by a distance of roughly 400 ft. Photos of Maynard Spring in May and November 2010 are presented in Figures E-1 and E-2. SNWA will continue to coordinate with BLM and USFWS to establish water level monitoring points at Maynard Spring.

Both North and South Maynard springs are located within the Pahranagat Shear Zone and in Quaternary and Tertiary basin fill with welded ash-flow tuff, thin basalt flows and cinder cones nearby. According to Water-Rights Applications 62432 and 62433, both of the springs were observed on July 16, 1993, discharging at an estimated rate of 0.20 cfs (90 gpm) each. However, observations in 2010 indicated no measurable flow.

#### 2.3.1.9 Cottonwood Spring

Cottonwood Spring is approximately 9.5 mi south of Alamo, Nevada, 1 mi west of U.S. Highway 93 on the USFWS Pahranagat Wildlife Refuge (Figure 2-3), and 1.5 mi south of the Refuge Headquarters along the Corn Creek/Alamo Road. As per Exhibit A of the Stipulation, USFWS is to provide data collected from Cottonwood Spring to the TRP. SNWA will work with USFWS to obtain and present the data in the annual data report. The water at Cottonwood Spring is used for wildlife. Photo documentation and historical data reported for Cottonwood Spring is presented in SNWA (2009b).

### 2.3.2 DDC Springs Biannual Monitoring

Eight spring monitoring locations were selected within the DDC valleys by the TRP in consultation with the NSE. These springs are generally characterized as being sourced in the mountain block and as having no hydraulic connection to the regional aquifer. However, biannual baseline monitoring is being performed to document variability in spring conditions.

Springs included in the program are Grassy Spring in Delamar Valley; Coyote, Big Mud, and Littlefield springs in Dry Lake; Parker Station and Cave springs in northern Cave Valley; and Lewis Well and Silver King Well in southern Cave Valley. Spring locations are presented in Figure 2-3. Several of the springs (Grassy, Big Mud, Coyote, and Lewis Well) have been modified in the past with a collector system to transmit water to distribution points away from the spring. Silver King Well is a shallow dug well with a gravity discharge line to a stock water area.

Field visits to the sites are conducted in the spring and fall of each year when site access conditions permit. Wetted area and discharge (if measurable) are be documented. Field water-quality is measured, including pH, electrical conductivity, and temperature. Photographs are taken to document site conditions.

Physical descriptions, photos, and historical hydrologic and water-chemistry data for the springs are presented in SNWA (2009b).

A site visit was performed in May and November 2010. Data collected during the visit and photo documentation are presented in Appendices D and E, respectively.

#### 2.3.2.1 Cave Spring

Cave Spring is located at the far southwest corner of a low northeast-southwest-trending hill approximately 3 mi southeast of Parker Station, Nevada, and 65 mi northwest of Bristol Wells, Nevada (Figure 2-3). The decrease in discharge rates during the summer months and the cold temperature of the water indicate that this spring is fed solely by local recharge. Biannual discharge measurements and conditions are being documented at the spring with permission from Cave Valley Ranch.

A detailed description and photo documentation of Cave Spring are presented in SNWA (2009b), including a discussion of historical data collected at the spring. Hydrologic data collected during the 2010 water year are presented in Appendix D. A photo of the spring, taken in May 2010, during high discharge is presented in Figure E-3. The spring photo taken in November 2010 is presented in Figure E-4 and shows that the spring was dry at that time. This is consistent with photo documenting conditions in 2009 (SNWA, 2010).

Currently, no active diversions exist at the spring. Historically, it appears that a small, hand-dug well was placed in the stream channel and was used to divert water by pump. The water now flows freely down the channel into a small reservoir in the center of the valley where it is used for livestock watering.

#### 2.3.2.2 Parker Station

Parker Station is in north-central Cave Valley, approximately 16 mi southeast of Lund, Nevada. Parker Station was once used as a stagecoach station. This site is located in Lincoln County, nearly a mile south of the White Pine/Lincoln County line.

Parker Station Spring lies on Cave Valley Ranch, LLC, property. Biannual discharge measurements and a description of the physical conditions will be documented at the flowing well and nearby spring with access permission from Cave Valley Ranch. Photos of spring discharge in the Parker Station Area in May and November 2010 are presented in Figures E-5 and E-6 respectively.

#### 2.3.2.3 Lewis Well

The Lewis Well is located in southern Cave Valley, approximately 36 mi south of Lund, Nevada, and 6 mi east of SR 318 (Figure 2-3). It is located at the base of the Egan Range on the eastern slope. The well was reportedly constructed in 1925 and was completed with a 42-in. steel casing to a depth of 26 ft.

Biannual discharge measurements and conditions will be documented. Photos of the springhead area for Lewis Well taken in May and November 2010 are presented in Figures E-7 and E-8 respectively.

#### 2.3.2.4 Silver King Well

Silver King Well is a hand-dug well located within Lincoln County, Nevada, in southern Cave Valley. It lies approximately 40 mi southeast of Lund, Nevada, and 34 mi northwest of Pioche, Nevada (Figure 2-3). The dug well may have been a modification to a historic spring. Water is discharged from the Silver King Well by gravity drainage through approximately 600 ft of 2-in. pipe into a partially buried trough. Photos of the Silver King Well and discharge area are presented in SNWA (2009b). Photos taken May and November 2010 are presented in Figures E-9 to E-11.

Water-level data collected at the Silver King Well is limited. Prior to SNWA monitoring program, two data points were available. A depth-to-water level on March 21, 1990, was reported as 8.90 ft bgs. The second depth-to-water measurement was made on August 25, 2003, and was reported as 7.95 ft bgs. A depth-to-water measurement on November 9, 2010, was 10.10 ft bgs.

#### 2.3.2.5 Coyote Spring

Coyote Spring is approximately 8 mi west-southwest of Bristol Wells, Nevada (Figure 2-3), and lies at the center of an abandoned homestead compound. Two spring orifices exist at the site. Photos of Coyote Spring and the discharge area are presented in SNWA (2009b). Photos taken in May and November 2010 are presented in Figures E-12 and E-13, respectively.

Coyote Spring discharges from the base of a scarp approximately 15 ft high in volcanic rocks. The spring discharge is collected and piped to a large concrete tank. Discharge from Coyote Spring was measured at 5 gpm in 1912 and at 0.9 gpm in August 1979. On June 3, 2004, discharge was measured at 0.11 gpm. On June 21, 2004, the discharge rate was 0.02 gpm. Discharge on the May 10, 2010, field visit was 1.2 gpm. Discharge during the November 8, 2010 field visit was 0.44 gpm.

#### 2.3.2.6 Big Mud Springs

Big Mud Springs is located in northern Dry Lake Valley nearly 40 mi southeast of Lund, Nevada, and 33 mi northwest of Pioche (Figure 2-3). The springs are located in the Schell Creek Range along Big Mud Pass approximately 7 mi north of Silver King Mountain. A wood fence is present at the springs. The area is surrounded by dense vegetation, such as junipers, willows, and wild roses. A collection basin is in place to help divert the spring discharge for stock watering.

Currently, two rubber tubes convey water from Big Mud Springs to a holding tank 0.25 mi to the south. The discharge from each hose was measured volumetrically using a quart bottle at the storage tank. A discharge of 2.49 gpm was measured at the storage tank on May 8, 2008.

Photos of Big Mud Springs and water storage tanks are presented in SNWA (2009b). Photos of the springhead taken in May and November19 2010 are presented in Figures E-14 and E-15, respectively.

#### 2.3.2.7 Littlefield Spring

Littlefield Spring is located approximately 3 mi south of Meloy Spring on the east side of Dry Lake Valley (Figure 2-3). A photo of the spring discharge area taken in May 2010 is presented in Figure E-16. Photos taken in November 2010 of the spring area and discharge measuring point are presented in Figures E-17 and E-18. Discharge data collected on May 10 and November 8, 2010 were 0.04 and 0.05 cfs, respectively.

Littlefield Spring discharges from the alluvium near an outcrop of volcanic rock. This spring had a reported discharge of 0.02 cfs in May 1980 (Bunch and Harrill, 1984). No diversions exist near the spring. The spring head for little field spring is undiverted but was restored in 2004.

#### 2.3.2.8 Grassy Spring

Grassy Spring is located in Delamar Valley approximately 40 mi south of Bristol Wells, Nevada, along the western flank of the Delamar Mountains (Figure 2-3). Photos of Grassy Spring taken in May and November 2010 are presented in Figures E-19 to E-21. Grassy Spring is currently used for stock watering. The discharge is captured at the source and is transferred to livestock-watering tanks through black polyvinyl tubing.

The spring discharges from alluvial sediments in close contact with volcanic rocks. During a field investigation on June 2, 2004, the discharge of the spring was measured at 0.5 gpm. The discharge was measured volumetrically at the livestock tank, approximately 300 ft west of the spring. No standing water was observed during the May 2010 site visit, 0.45 gpm was measured on November 8, 2010.

### 2.4 Precipitation Station Network

Precipitation-station data from selected network sites which are currently operating and have an established historical record in the vicinity of the study area were compiled and are presented in Appendix F. The precipitation network will assist in assessing climate variability in the vicinity of the project basins and discerning pumping effects from natural variability. The precipitation network stations are listed in Table 2-5 and presented on Figure 2-4.

The precipitation-station network includes the following:

- Eight high-altitude precipitation stations maintained and operated by USGS through a JFA with SNWA and NDWR.

- Nine National Oceanic and Atmospheric Administration, National Weather Service (NOAA/NWS) Stations. Data were obtained through the Western Regional Climate Center (WRCC).

**Table 2-5**
**DDC Precipitation-Station Locations**

| Station Name | Location[a] | | Surface Elevation[b] (ft amsl) | Data Source |
|---|---|---|---|---|
| | UTM Northing (m) | UTM Easting (m) | | |
| Blue Eagle Ranch Hank | 4,264,579 | 626,889 | 4,780 | WRCC |
| Caliente | 4,166,217 | 719,251 | 4,400 | WRCC |
| Cave Mountain | 4,337,545 | 706,107 | 10,650 | USGS |
| Elgin | 4,136,286 | 717,627 | 3,420 | WRCC |
| Highland Peak | 4,196,772 | 712,963 | 9,330 | USGS |
| Hiko | 4,158,266 | 656,900 | 3,900 | WRCC |
| Lund | 4,303,974 | 672,091 | 5,546 | WRCC |
| McGill | 4,365,043 | 691,693 | 6,270 | WRCC |
| Mount Irish | 4,168,657 | 641,846 | 8,607 | USGS |
| Mount Washington | 4,309,377 | 732,764 | 10,440 | USGS |
| Mount Wilson | 4,236,084 | 728,118 | 9,200 | USGS |
| Pahranagat Wildlife Refuge | 4,126,390 | 666,716 | 3,400 | WRCC |
| Quinn Canyon Range | 4,228,799 | 620,297 | 9,050 | USGS |
| Spring Valley State Park | 4,214,070 | 747,476 | 5,950 | WRCC |
| Sunnyside | 4,254,668 | 672,599 | 5,297 | WRCC |
| Unnamed Peak in South Delamar Mountains | 4,135,352 | 701,473 | 7,800 | USGS |
| Unnamed Peak South of Chokecherry Peak | 4,154,830 | 700,904 | 7,800 | USGS |
| Ward Mountain | 4,333,184 | 676,331 | 9,200 | NRCS (SnoTel) |

[a]All coordinates in Universal Transverse Mercator, North American Datum, 1983 (NAD83), Zone 11.
[b]Elevations are North American Vertical Datum, 1988 (NAVD88).

- One U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) SNOwpack TELemetry (SNOTEL) site located in the Egan Range. This site provides precipitation and snow-accumulation data.

Provisional 2010 precipitation data for the sites, along with historical data and statistics, are presented in Appendix F. SNWA will continue to compile and report precipitation data from these sites as long as the data are made available and the stations are in operation.

Data sources for precipitation information presented in this report are as follows:

- USGS data is cited from USGS National Water Information System (USGS, 2011)
- SNOTEL data is cited from USDA Natural Resources Conservation Service (USDA, 2010)
- National Weather Service data is cited from Western Regional Climate Center (WRCC, 2011)

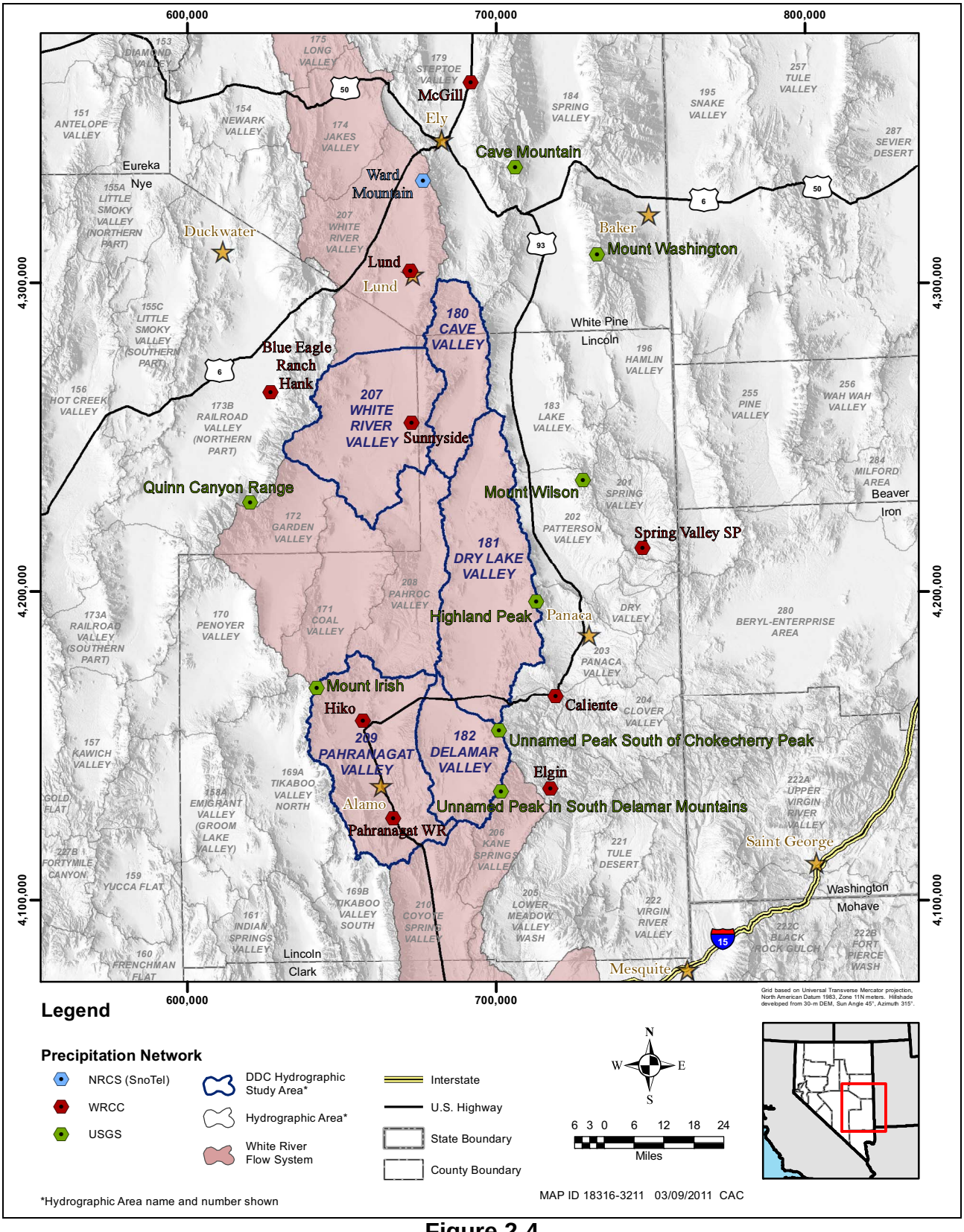



**Figure 2-4**
**DDC Precipitation-Station Locations**

## 2.5 Water Chemistry

A summary of water-chemistry results from program wells and springs of the DDC monitoring network were presented in SNWA (2009b). The results represent samples collected by SNWA, USGS, and Desert Research Institute as well as those reported in historical reports dated as far back as 1912 (Carpenter, 1915). On July 2, 2009, water samples were collected from Hiko and Hardy springs and analyzed for a suite of chemical constituents. The results for these samples were presented in (SNWA, 2010).

Spring field measurements of the water-quality parameters were performed using the *National Field Manual for the Collection of Water-Quality Data* (USGS, 2008). All measurement equipment was calibrated according to the manufacturers' calibration procedures.

The Technical Review Panel (TRP) held a conference call on March 31, 2010 to discuss the water-chemistry sampling programs required by the DDC Stipulation Hydrologic Monitoring, Management, and Mitigation Plans. The Stipulation Agreement for DDC requires that two rounds of water-chemistry sampling at 10 locations be completed within three years from the approval date of the agreement (January 7, 2008). The DDC hydrologic monitoring networks include new monitor wells which will not be installed in time to meet the water-chemistry sampling requirements set forth in the agreements. The TRP evaluated various implementation alternatives for the water-chemistry programs, including: (1) sampling this year and next year from the existing network without the planned new monitor wells; (2) delaying the sampling until the monitor wells are installed, and then sampling from the complete monitoring network; or (3) some combination of these ideas. The TRP reached a consensus agreement as to the preferred course of action which is summarized below.

For DDC, the EC approved the TRP recommendation that the water-chemistry sampling program be postponed and implemented after the three future monitor wells specified in the DDCMM Plan have been installed. Implementation of the program will include collection of two rounds of water-chemistry samples six months apart at 10 locations selected by the TRP. SNWA will collect and submit samples for chemical analysis for the water-chemistry parameters listed in Table 2-6. Subsequent sampling will be performed once every five years following the start of groundwater production by SNWA.

## 2.6 Data Reporting

A data-exchange web site accessible by the NSE, EC, TRP, and BRT members was implemented in April 2008. The data-exchange web site is used to distribute SVMM Plan monitoring data to the TRP within 90 days of collection. Data will also be submitted directly to the NSE on a quarterly basis in electronic format.

A data and status report will be submitted annually to the TRP and NSE.

**Table 2-6**
**Water-Chemistry Parameters**

| Field Parameters | Major Ions | Isotopes | Minor and Trace Elements |
|---|---|---|---|
| Water temperature | TDS | Oxygen-18 | Arsenic |
| Air temperature | Calcium | Deuterium | Barium |
| pH | Sodium | Tritium | Cadmium |
| Electrical conductivity | Potassium | Chlorine-36[a] | Chromium |
| Dissolved oxygen | Chloride | Carbon-14[a] | Lead |
| | Bromide | Carbon-13[a] | Mercury |
| | Fluoride | Strontium-87[a] | Selenium |
| | Nitrate | Uranium-238[a] | Silver |
| | Phosphate | | Manganese |
| | Sulfate | | Aluminum |
| | Alkalinity | | Iron |
| | Silica | | Bromide |
| | Magnesium | | Fluoride |

[a]These parameters shall be included only in the first sampling event and shall not be included in any further water-chemistry sampling performed pursuant to this plan.

## *2.7 Proposed Schedule of Groundwater Withdrawals*

No groundwater production is scheduled for the next two years with the exception of short-term development, well-performance testing, and aquifer testing of any new wells drilled during this time-frame. The duration of well-performance testing is usually one day. The duration of the constant-rate aquifer testing is usually under one week.

# 3.0 ANTICIPATED 2011 SNWA DDCMM PLAN ACTIVITIES

Anticipated DDCMM Plan-related activities in 2011 are summarized below.

- Continue to collect required quarterly and continuous water-level measurements at appropriate locations throughout 2011.
- Continue spring discharge measurements at network springs. Develop or refine monitoring methods for the DDC mountain-block and local springs.
- Coordinate activities and provide technical assistance to the BRT as requested.
- Data will be reported quarterly to the TRP through the SNWA data-exchange web site. Data will be submitted to NSE in an approved electronic format and included in the annual data report to be submitted in March 2012.

SNWA will continue to work with the NSE and TRP participants to implement the DDCMM Plan and identify and address technical issues related to the program.

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# 4.0 REFERENCES

Bunch, R.L., and Harrill J.R., 1984, Compilation of selected hydrologic data from the MX missile-siting investigation, east-central Nevada and western Utah: U.S. Geological Survey Open-File Report 84-702, 123 p.

Carpenter, E., 1915, Ground water in southeastern Nevada: U.S. Geological Survey Water-Supply Paper 365, 86 p.

Eastman, H.S., 2007a, Geologic data analysis report for Monitor Well 180W501M in Cave Valley: Southern Nevada Water Authority, Las Vegas, Nevada, Doc. No. RDS-ED-0004, 29 p.

Eastman, H.S., 2007b, Geologic data analysis report for Monitor Well 180W902M in Cave Valley: Southern Nevada Water Authority, Las Vegas, Nevada, Doc. No. RDS-ED-0003, 31 p.

Eastman, H.S., 2007c, Geologic data analysis report for Monitor Well 181M-1 in Dry Lake Valley: Southern Nevada Water Authority, Las Vegas, Nevada, Doc. No. RDS-ED-0005, 28 p.

Eastman, H.S., 2007d, Geologic data analysis report for Monitor Well 181W909M in Dry Lake Valley: Southern Nevada Water Authority, Las Vegas, Nevada, Doc. No. RDS-ED-0007, 30 p.

Eastman, H.S., 2007e, Geologic data analysis report for Monitor Well 182M-1 in Delamar Valley: Southern Nevada Water Authority, Las Vegas, Nevada, Doc. No. RDS-ED-0002, 29 p.

Eastman, H.S., 2007f, Geologic data analysis report for Monitor Well 182W906M in Delamar Valley: Southern Nevada Water Authority, Las Vegas, Nevada, Doc. No. RDS-ED-0001, 30 p.

Eastman, H.S., 2007g, Geologic data analysis report for Monitor Well 209M-1 in Pahranagat Valley: Southern Nevada Water Authority, Las Vegas, Nevada, Doc. No. RDS-ED-0006, 29 p.

Ertec Western Inc., 1981, MX siting investigation—geotechnical evaluation—verification study—Cave Valley, Nevada, Volume II: Ertec Western, Inc., Long Beach, California, Report E-TR-27-CV-II, 102 p.

Maxey, G.B., and Eakin, T.E., 1949, Ground water in White River Valley, White Pine, Nye, and Lincoln counties, Nevada: State of Nevada, Office of the State Engineer, Water Resources Bulletin No. 8, 59 p.

Miller, M.R., Hardman, G., and Mason, H.G., 1953, Irrigation waters of Nevada: University of Nevada, Reno, Agricultural Experiment Station Bulletin No. 187, 63 p.

NSC, see Nevada Supreme Court

Nevada Supreme Court, 2010, Great Basin Water Network v. State Engineer, 126 Nev., Ad. Op. No. 20, June 17, 2010.

SNWA, see Southern Nevada Water Authority.

Southern Nevada Water Authority, 2008, Delamar, Dry Lake, and Cave Valley stipulation agreement hydrologic monitoring plan status and data report: Southern Nevada Water Authority, Las Vegas, Nevada, Doc. No. WRD-ED-0002, 31 p.

Southern Nevada Water Authority, 2009a, Hydrologic monitoring and mitigation plan for Delamar, Dry Lake, and Cave valleys: Southern Nevada Water Authority, Las Vegas, Nevada, Doc. No. WRD-ED-0006, 38 p.

Southern Nevada Water Authority, 2009b, Delamar, Dry Lake, and Cave valleys stipulation agreement hydrologic monitoring plan status and historical data report: Southern Nevada Water Authority, Las Vegas, Nevada, Doc. No. WRD-ED-0005, 162 p.

Southern Nevada Water Authority, 2010, 2009 Delamar, Dry Lake, and Cave Valleys hydrologic monitoring and mitigation plan status and data report: Southern Nevada Water Authority, Las Vegas, Nevada, Doc. No. WRD-ED0008, 117 p.

State of Nevada, 2004, Department of Cultural Affairs, State Historic Preservation Office, Nevada, Crystal Springs–Historical Marker 205 [Internet], [accessed July 14, 2005], available from http://nvshpo.org.

Stearns, N.D., Stearns, H.T., and Waring, G.A., 1937, Thermal springs in the United States: U.S. Geological Survey Water-Supply Paper 679-B, 206 p.

Stipulation for Withdrawal of Protests: U.S. Bureau of Indian Affairs, U.S. Bureau of Land Management, U.S. Fish and Wildlife Service, National Park Service, Southern Nevada Water Authority. (Jan. 7, 2008).

USDA, see U.S. Department of Agriculture.

U.S Department of Agriculture, 2010, Natural Resources Center Service (NRCS) National Water & Climate Center (WCC) [Internet], [accessed January 2010], available from http://www.wcc.nrcs.usda.gov.

U.S. Geological Survey, 2008, National field manual for the collection of water-quality data, U.S. Geological Survey Techniques of Water-Resources Investigations, Book 9, chaps. A1-A9, available from http://pubs.water.usgs.gov/twri9A.

U.S. Geological Survey, 2011, National Water Information System (NWIS Web) [Internet], [accessed January 2011], available from http://waterdata.usgs.gov/nwis.

USGS, see U.S. Geological Survey.

Western Regional Climate Center (WRCC), 2011, Historical Climate Information [Internet], [accessed January 2011], available from http://www.wrcc.dri.edu.

WRCC, see Western Regional Climate Center.

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# Appendix A

# Periodic Water-Level Measurement Data from the DDC Existing-Well Monitoring Network

## Table A-1
## Periodic Water-Level Measurement Data from the DDC Existing-Well Monitoring Network
(Page 1 of 3)

| Site Number | Station Local Number | Well Depth (ft bgs) | Surface Elevation (ft amsl) | Water Level | | | |
|---|---|---|---|---|---|---|---|
| | | | | Date | Depth to Water (ft bgs) | Well Status[a] | Measurement Method[b] |
| 180W902M[c] | 180W902M | 903 | 5,984.89 | 1/6/2010 | 141.55 | S | T |
| | | | | 2/9/2010 | 141.34 | S | T |
| | | | | 3/15/2010 | 141.52 | S | T |
| | | | | 6/22/2010 | 141.49 | S | T |
| | | | | 8/2/2010 | 141.56 | S | T |
| | | | | 9/14/2010 | 141.72 | S | T |
| | | | | 10/26/2010 | 141.84 | S | T |
| 382807114521001 | 180 N07 E63 14BADD 1 USGS-MX | 460 | 6,012.39 | 5/3/2010 | 217.72 | S | T |
| | | | | 8/2/2010 | 217.57 | S | T |
| | | | | 10/26/2010 | 217.55 | S | T |
| 383307114471001 | 180 N08 E64 15BCBC1 USBLM | --- | 6,162.55 | 2/9/2010 | 262.03 | S | T |
| | | | | 5/4/2010 | 262.33 | S | T |
| | | | | 8/2/2010 | 262.47 | S | T |
| | | | | 10/26/2010 | 262.28 | S | T |
| 180W501M[c] | 180W501M | 1,212 | 6,428.63 | 1/6/2010 | 1055.36 | S | T |
| | | | | 5/4/2010 | 1055.66 | S | T |
| | | | | 6/22/2010 | 1055.81 | S | T |
| | | | | 8/2/2010 | 1055.95 | S | T |
| | | | | 9/14/2010 | 1056.22 | S | T |
| | | | | 10/26/2010 | 1056.42 | S | T |
| 182W906M | 182W906M | 1,703 | 4,796.96 | 1/4/2010 | 1316.18 | S | T |
| | | | | 2/8/2010 | 1315.69 | S | T |
| | | | | 3/15/2010 | 1316.26 | S | T |
| | | | | 4/13/2010 | 1315.35 | S | T |
| | | | | 4/20/2010 | 1315.55 | S | T |
| | | | | 5/3/2010 | 1316.35 | S | T |
| | | | | 6/22/2010 | 1315.92 | S | T |
| | | | | 8/4/2010 | 1315.98 | S | T |
| | | | | 9/14/2010 | 1315.98 | S | T |
| | | | | 10/25/2010 | 1315.53 | S | T |
| 182M-1[c] | 182M-1 | 1,331 | 4,597.78 | 1/4/2010 | 827.14 | S | T |
| | | | | 2/8/2010 | 827.17 | S | T |
| | | | | 3/15/2010 | 827.35 | S | T |
| | | | | 5/3/2010 | 827.25 | S | T |
| | | | | 6/22/2010 | 827.15 | S | T |
| | | | | 8/4/2010 | 827.11 | S | T |
| | | | | 8/30/2010 | 827.12 | S | T |
| | | | | 9/14/2010 | 827.13 | S | T |
| | | | | 10/25/2010 | 827.12 | S | T |

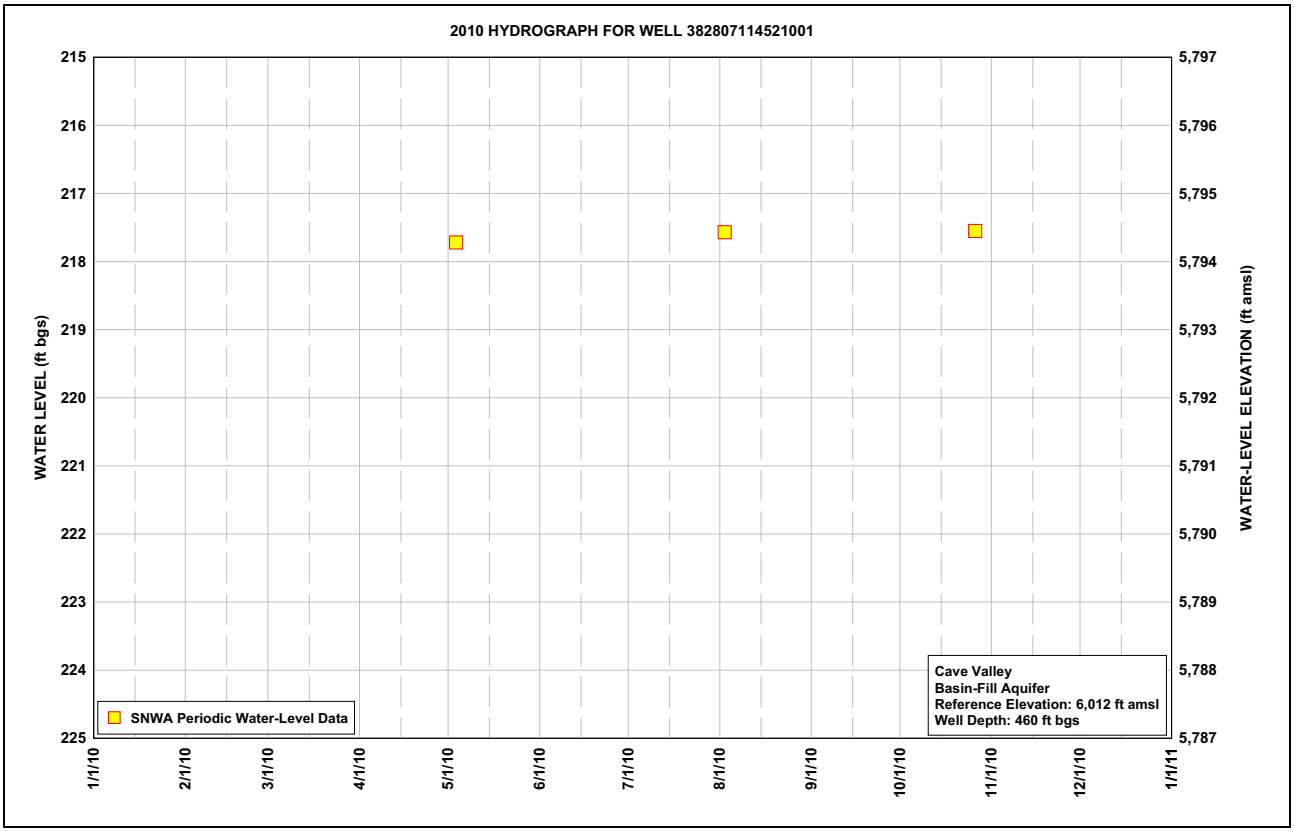
# Table A-1
# Periodic Water-Level Measurement Data from the DDC Existing-Well Monitoring Network
(Page 2 of 3)

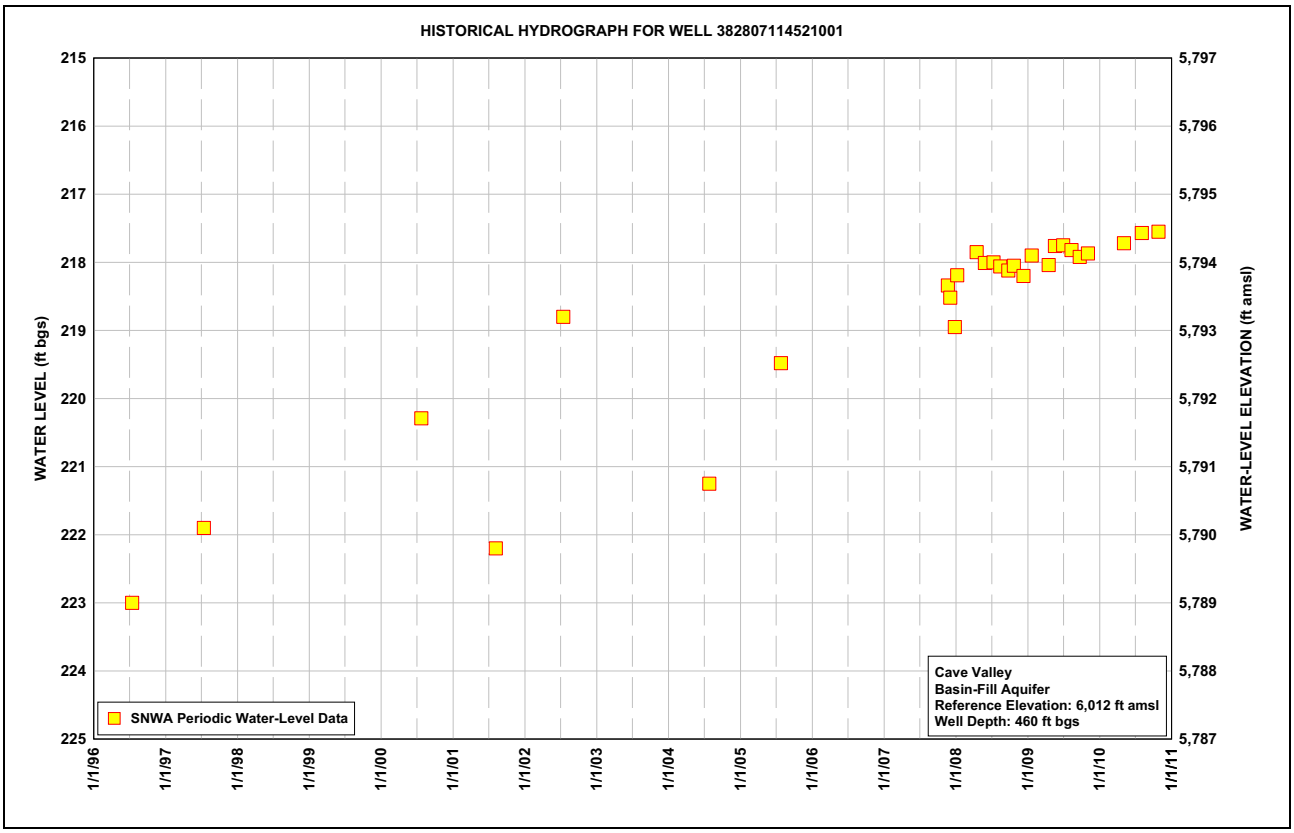
| Site Number | Station Local Number | Well Depth (ft bgs) | Surface Elevation (ft amsl) | Water Level | | | |
|---|---|---|---|---|---|---|---|
| | | | | Date | Depth to Water (ft bgs) | Well Status[a] | Measurement Method[b] |
| 181W909M | 181W909M | 1,260 | 4,799.41 | 1/4/2010 | 497.32 | S | T |
| | | | | 2/8/2010 | 497.13 | S | T |
| | | | | 3/15/2010 | 497.48 | S | T |
| | | | | 5/3/2010 | 497.38 | S | T |
| | | | | 6/22/2010 | 497.39 | S | T |
| | | | | 8/4/2010 | 497.44 | S | T |
| | | | | 9/14/2010 | 497.47 | S | T |
| | | | | 10/26/2010 | 497.31 | S | T |
| 181M-1[c] | 181M-1 | 1,472 | 4,963.07 | 1/4/2010 | 675.41 | S | T |
| | | | | 2/8/2010 | 675.39 | S | T |
| | | | | 3/15/2010 | 675.26 | S | T |
| | | | | 5/3/2010 | 675.41 | S | T |
| | | | | 6/22/2010 | 675.34 | S | T |
| | | | | 8/4/2010 | 675.20 | S | T |
| | | | | 9/14/2010 | 675.28 | S | T |
| | | | | 10/26/2010 | 675.23 | S | T |
| 380531114534201[c] | 181 N03 E63 27CAA 1 USGS-MX | 2,395 | 5,456.35 | 2/8/2010 | 845.53 | S | T |
| | | | | 5/3/2010 | 845.67 | S | T |
| | | | | 8/4/2010 | 845.29 | S | T |
| | | | | 10/26/2010 | 845.16 | S | T |
| 209 S07 E62 20AA 1[d] | 209 S07 E62 20AA 1 | 695 | 4,082.49 | 2/8/2010 | 600.00 | S | T |
| | | | | 5/4/2010 | 599.93 | S | T |
| | | | | 8/4/2010 | 599.92 | S | T |
| | | | | 10/25/2010 | 599.90 | S | T |
| 373405115090001 | 209 S04 E61 28CD 1 | 980 | 4,230.58 | 2/8/2010 | 586.15 | S | T |
| | | | | 5/4/2010 | 586.22 | S | T |
| | | | | 8/4/2010 | 586.05 | S | T |
| | | | | 10/25/2010 | 586.48 | S | T |
| 373803115050501 | 209 S04 E61 01AACB1 | 700 | 4,528.90 | 2/8/2010 | 785.48 | S | T |
| | | | | 5/4/2010 | 785.62 | S | T |
| | | | | 8/4/2010 | 785.34 | S | T |
| | | | | 10/25/2010 | 785.24 | S | T |
| 209M-1[c] | 209M-1 | 1,616 | 5,097.30 | 1/4/2010 | 1200.22 | S | T |
| | | | | 1/21/2010 | 1199.51 | S | T |
| | | | | 2/8/2010 | 1200.13 | S | T |
| | | | | 3/15/2010 | 1200.51 | S | T |
| | | | | 5/4/2010 | 1200.10 | S | T |
| | | | | 6/22/2010 | 1200.16 | S | T |
| | | | | 8/4/2010 | 1199.93 | S | T |
| | | | | 9/14/2010 | 1200.10 | S | T |
| | | | | 10/25/2010 | 1200.02 | S | T |

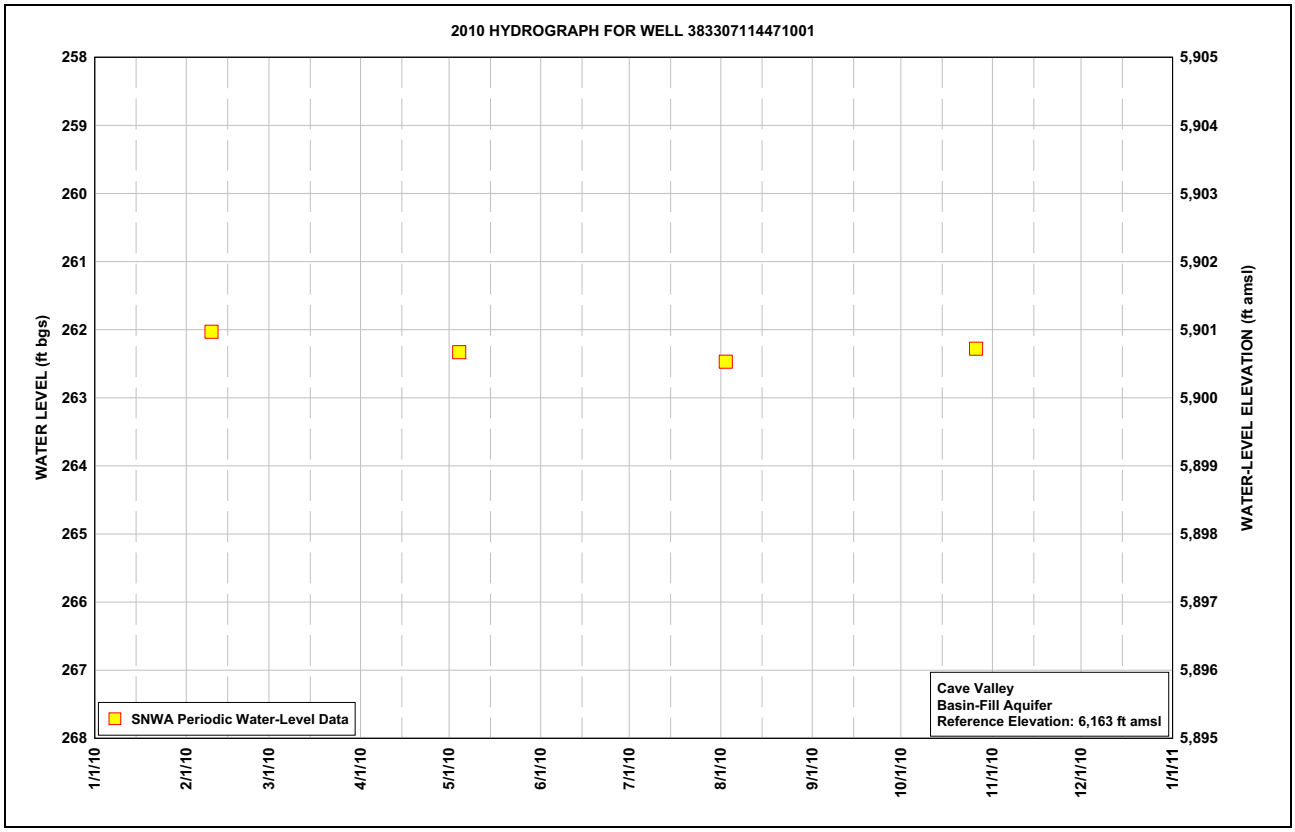
## Table A-1
## Periodic Water-Level Measurement Data from the DDC Existing-Well Monitoring Network
(Page 3 of 3)

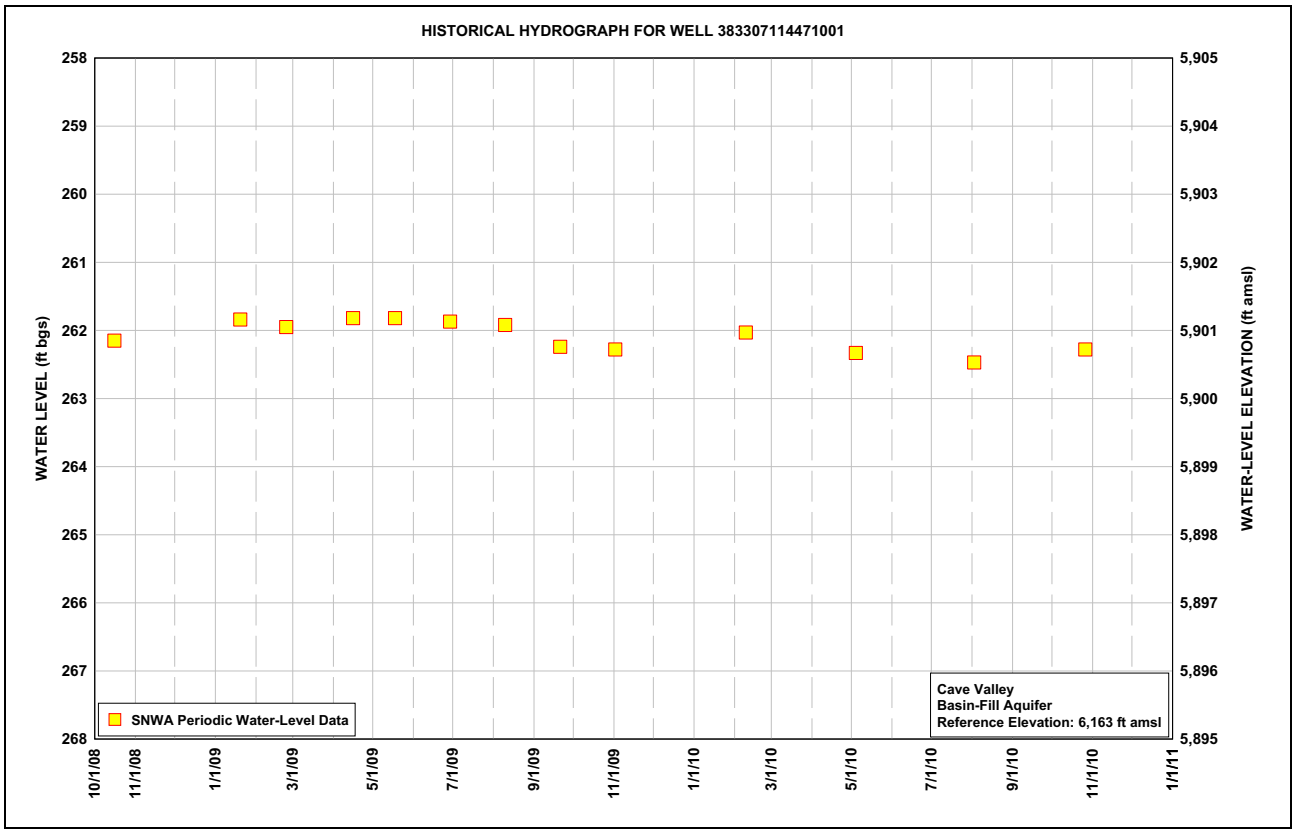
| Site Number | Station Local Number | Well Depth (ft bgs) | Surface Elevation (ft amsl) | Water Level | | | |
|---|---|---|---|---|---|---|---|
| | | | | Date | Depth to Water (ft bgs) | Well Status[a] | Measurement Method[b] |
| 383133115030201 | 207 N08 E62 30CD 1 | 101 | 5,290.20 | 2/9/2010 | 64.40 | S | T |
| | | | | 5/4/2010 | 64.30 | S | T |
| | | | | 8/2/2010 | 64.28 | S | T |
| | | | | 10/25/2010 | 64.37 | S | T |
| 372639114520901 | 182 S06 E63 12AD 1 USGS-MX | 1,195 | 4,706.30 | 2/8/2010 | 863.27 | S | T |
| | | | | 5/3/2010 | 863.55 | S | T |
| | | | | 8/4/2010 | 863.48 | S | T |
| | | | | 10/25/2010 | 863.32 | S | T |

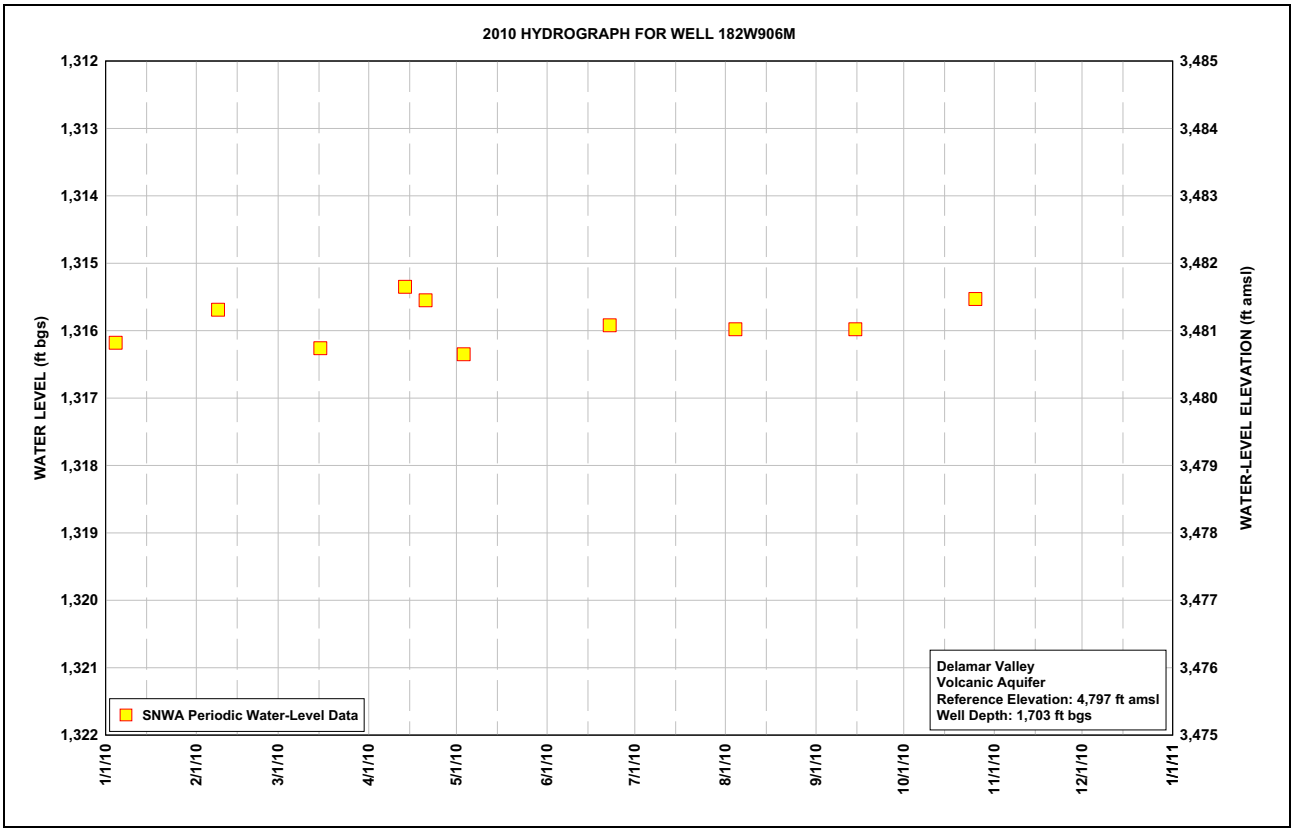
[a]S = Static conditions
[b]T = Electric tape measurement, S = Steel tape measurement
[c]2010 and historical hydrographs with periodic and continuous data are presented in Appendix B.
[d]No hydrograph presented due to limited data.
Note: SNWA tape calibration program started in August 2008.

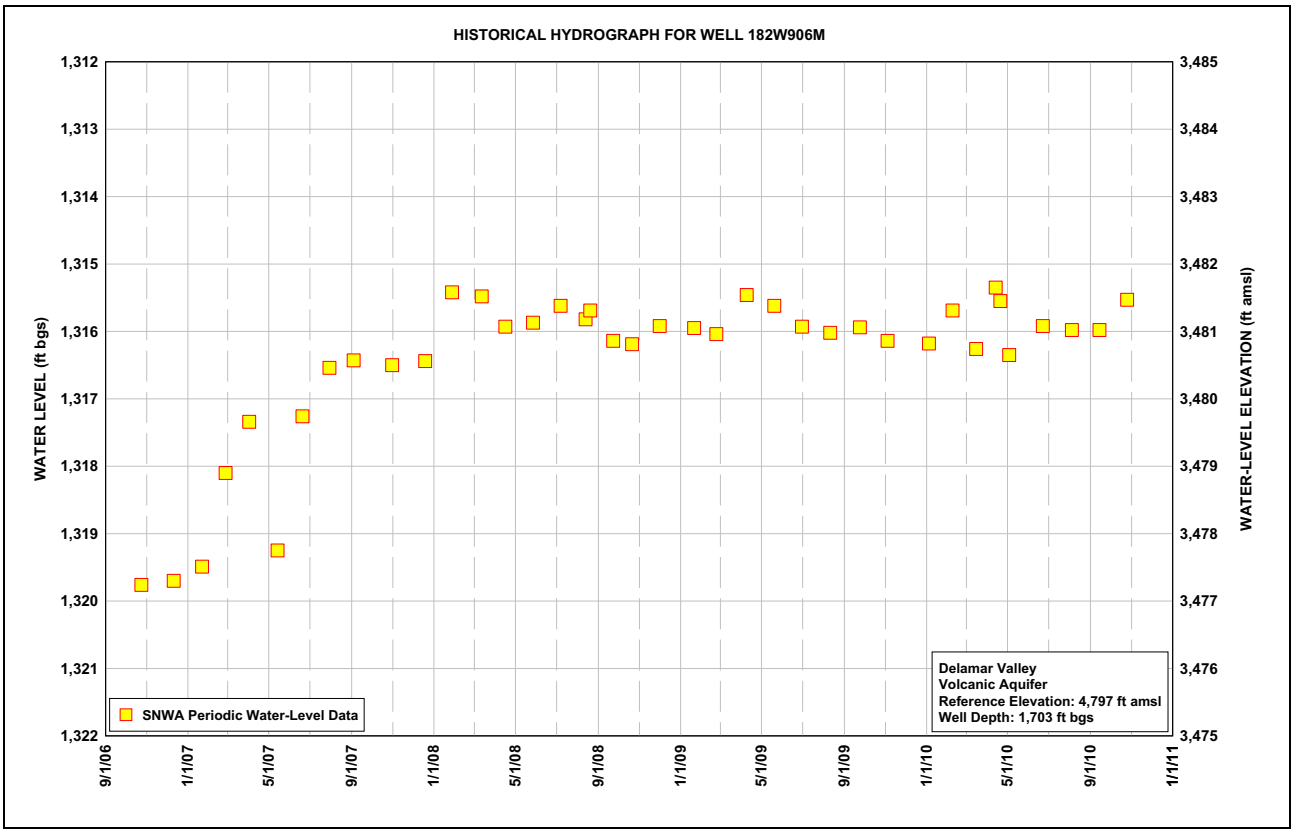

2010 HYDROGRAPH FOR WELL 382807114521001
WATER LEVEL (ft bgs)
WATER-LEVEL ELEVATION (ft amsl)
215
216
217
218
219
220
221
222
223
224
225
5,797
5,796
5,795
5,794
5,793
5,792
5,791
5,790
5,789
5,788
5,787
1/1/10
2/1/10
3/1/10
4/1/10
5/1/10
6/1/10
7/1/10
8/1/10
9/1/10
10/1/10
11/1/10
12/1/10
1/1/11
SNWA Periodic Water-Level Data
Cave Valley
Basin-Fill Aquifer
Reference Elevation: 6,012 ft amsl
Well Depth: 460 ft bgs

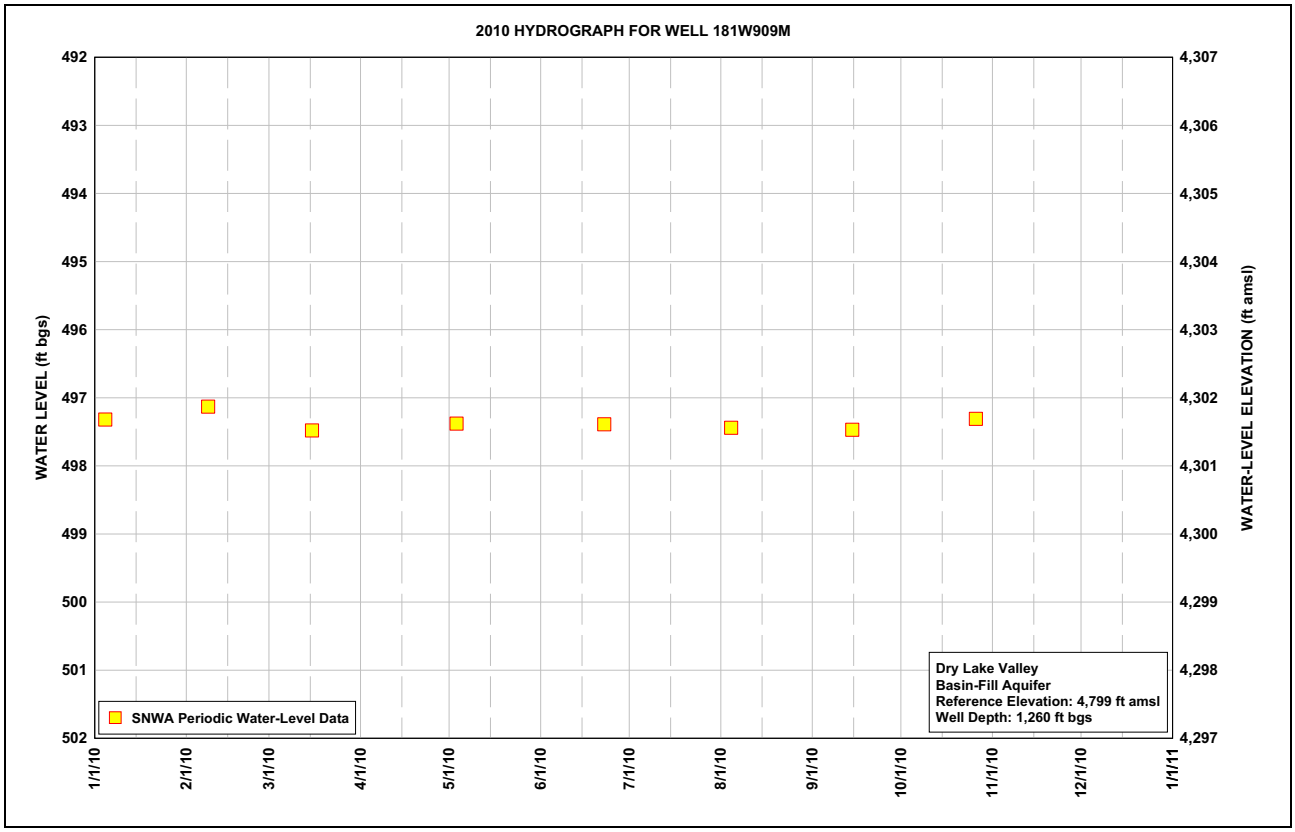

HISTORICAL HYDROGRAPH FOR WELL 382807114521001
WATER LEVEL (ft bgs)
WATER-LEVEL ELEVATION (ft amsl)
215
216
217
218
219
220
221
222
223
224
225
5,797
5,796
5,795
5,794
5,793
5,792
5,791
5,790
5,789
5,788
5,787
1/1/96
1/1/97
1/1/98
1/1/99
1/1/00
1/1/01
1/1/02
1/1/03
1/1/04
1/1/05
1/1/06
1/1/07
1/1/08
1/1/09
1/1/10
1/1/11
SNWA Periodic Water-Level Data
Cave Valley
Basin-Fill Aquifer
Reference Elevation: 6,012 ft amsl
Well Depth: 460 ft bgs

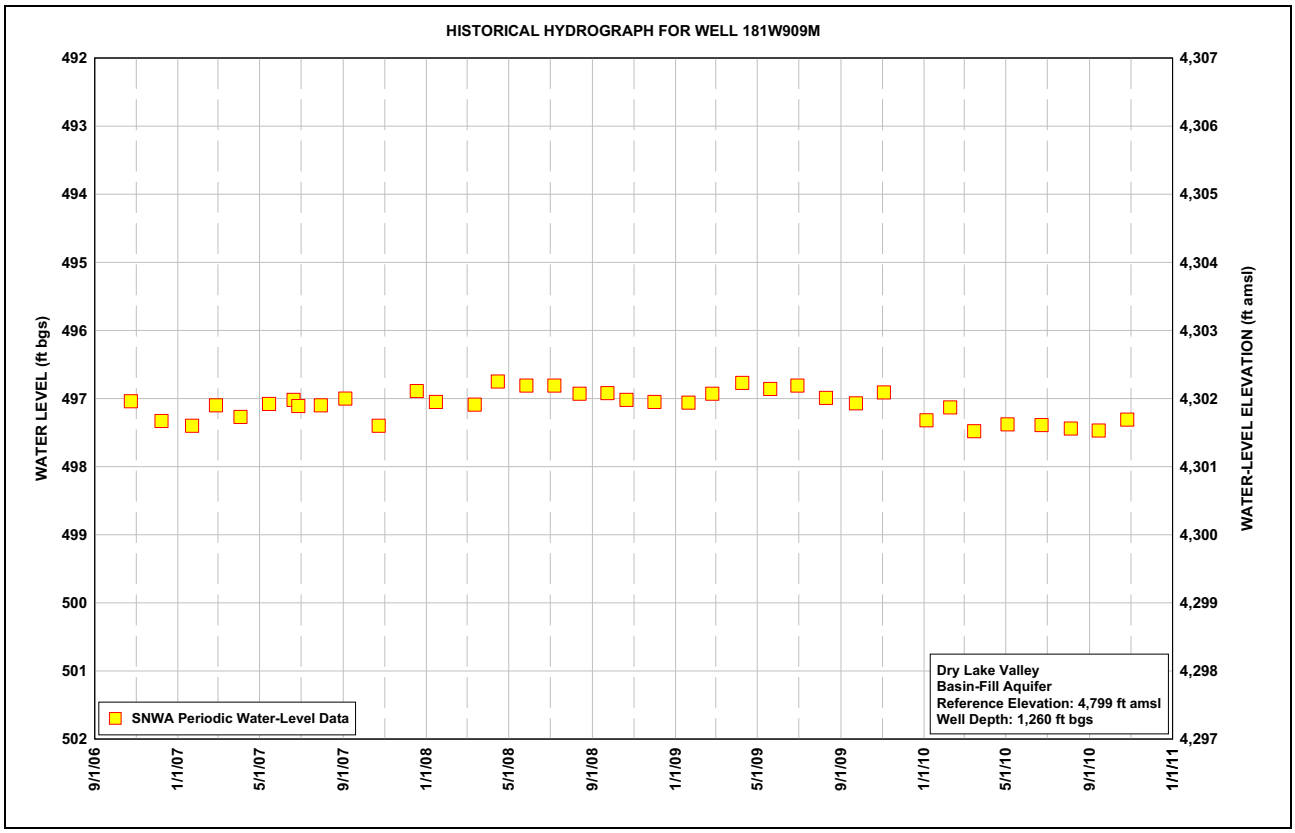

2010 HYDROGRAPH FOR WELL 383307114471001
WATER LEVEL (ft bgs)
WATER-LEVEL ELEVATION (ft amsl)
258
259
260
261
262
263
264
265
266
267
268
5,905
5,904
5,903
5,902
5,901
5,900
5,899
5,898
5,897
5,896
5,895
1/1/10
2/1/10
3/1/10
4/1/10
5/1/10
6/1/10
7/1/10
8/1/10
9/1/10
10/1/10
11/1/10
12/1/10
1/1/11
SNWA Periodic Water-Level Data
Cave Valley
Basin-Fill Aquifer
Reference Elevation: 6,163 ft amsl

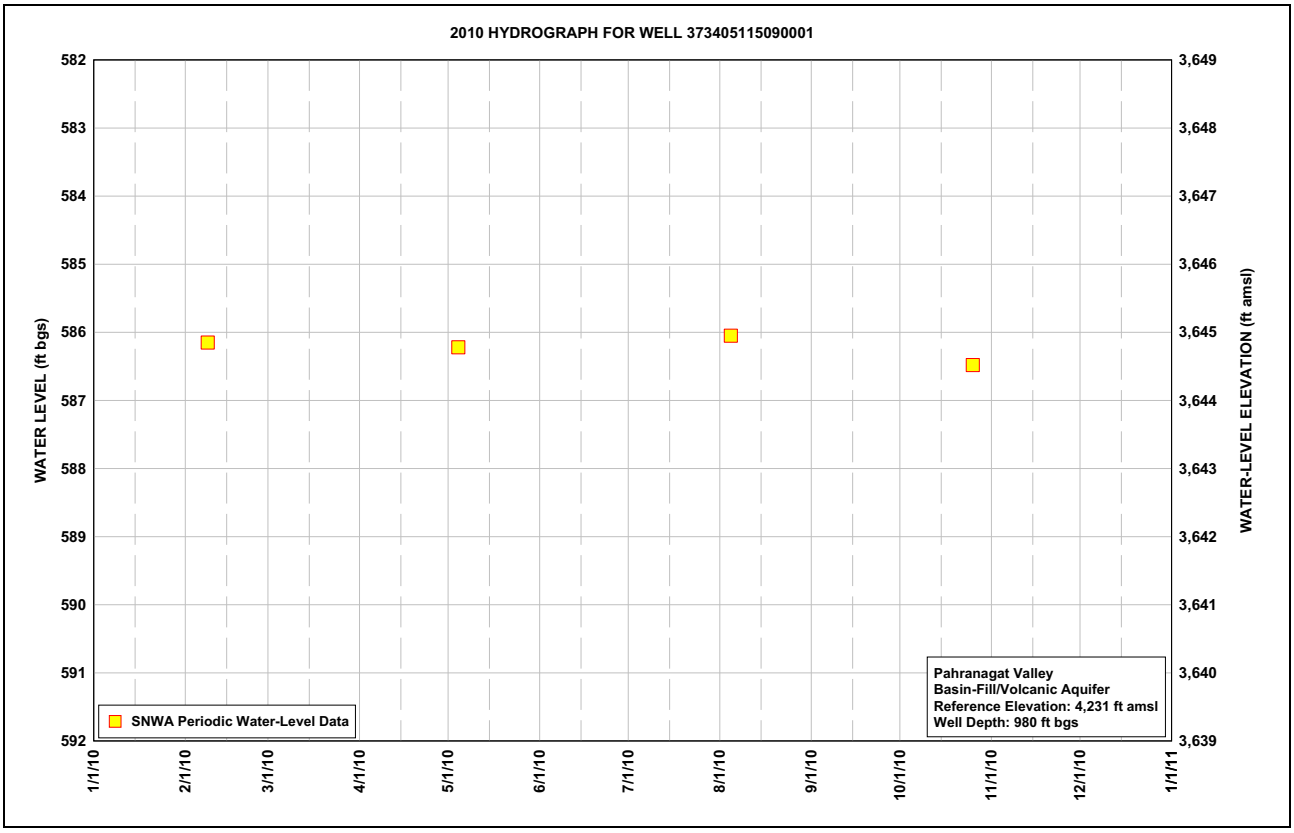

HISTORICAL HYDROGRAPH FOR WELL 383307114471001
WATER LEVEL (ft bgs)
WATER-LEVEL ELEVATION (ft amsl)
258
259
260
261
262
263
264
265
266
267
268
5,905
5,904
5,903
5,902
5,901
5,900
5,899
5,898
5,897
5,896
5,895
10/1/08
11/1/08
1/1/09
3/1/09
5/1/09
7/1/09
9/1/09
11/1/09
1/1/10
3/1/10
5/1/10
7/1/10
9/1/10
11/1/10
1/1/11
SNWA Periodic Water-Level Data
Cave Valley
Basin-Fill Aquifer
Reference Elevation: 6,163 ft amsl

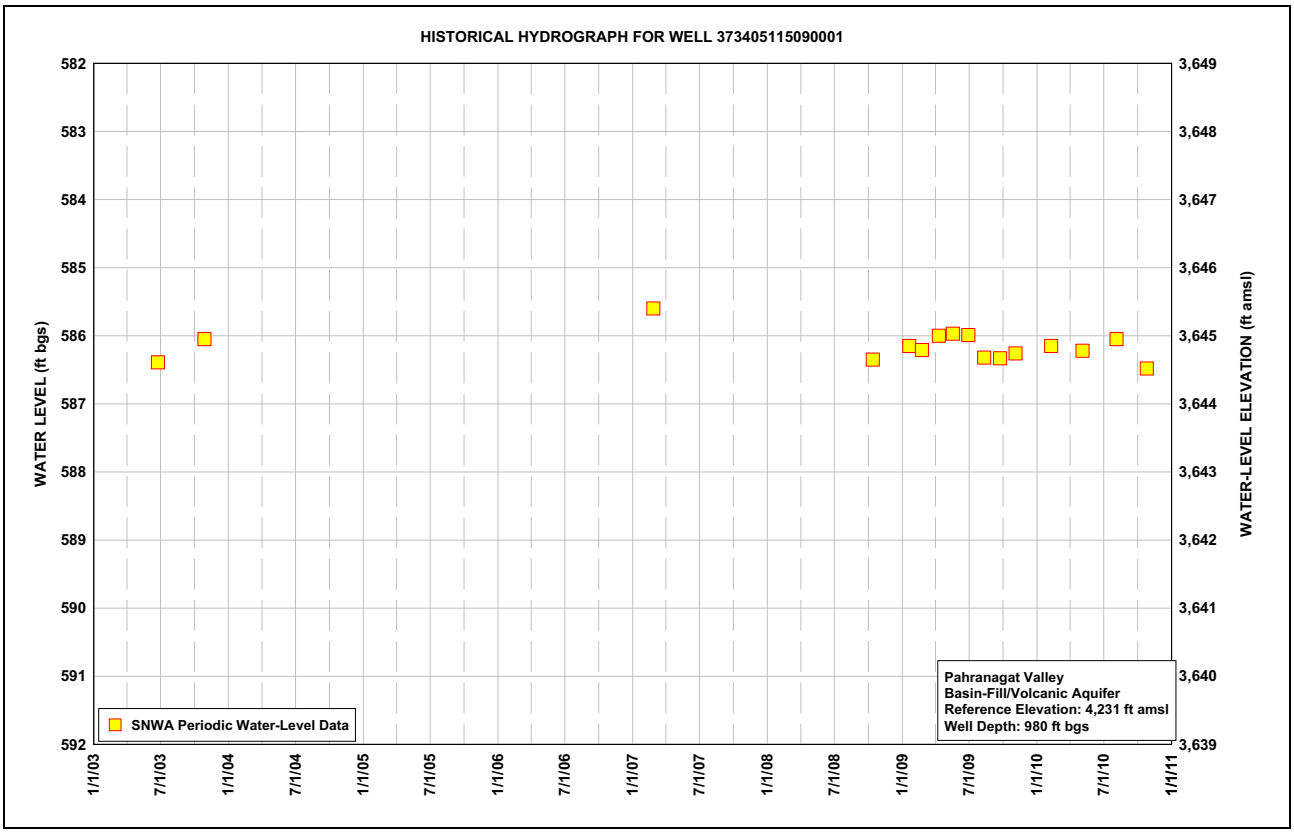

2010 HYDROGRAPH FOR WELL 182W906M
WATER LEVEL (ft bgs)
WATER-LEVEL ELEVATION (ft amsl)
1,312
1,313
1,314
1,315
1,316
1,317
1,318
1,319
1,320
1,321
1,322
3,485
3,484
3,483
3,482
3,481
3,480
3,479
3,478
3,477
3,476
3,475
1/1/10
2/1/10
3/1/10
4/1/10
5/1/10
6/1/10
7/1/10
8/1/10
9/1/10
10/1/10
11/1/10
12/1/10
1/1/11
SNWA Periodic Water-Level Data
Delamar Valley
Volcanic Aquifer
Reference Elevation: 4,797 ft amsl
Well Depth: 1,703 ft bgs

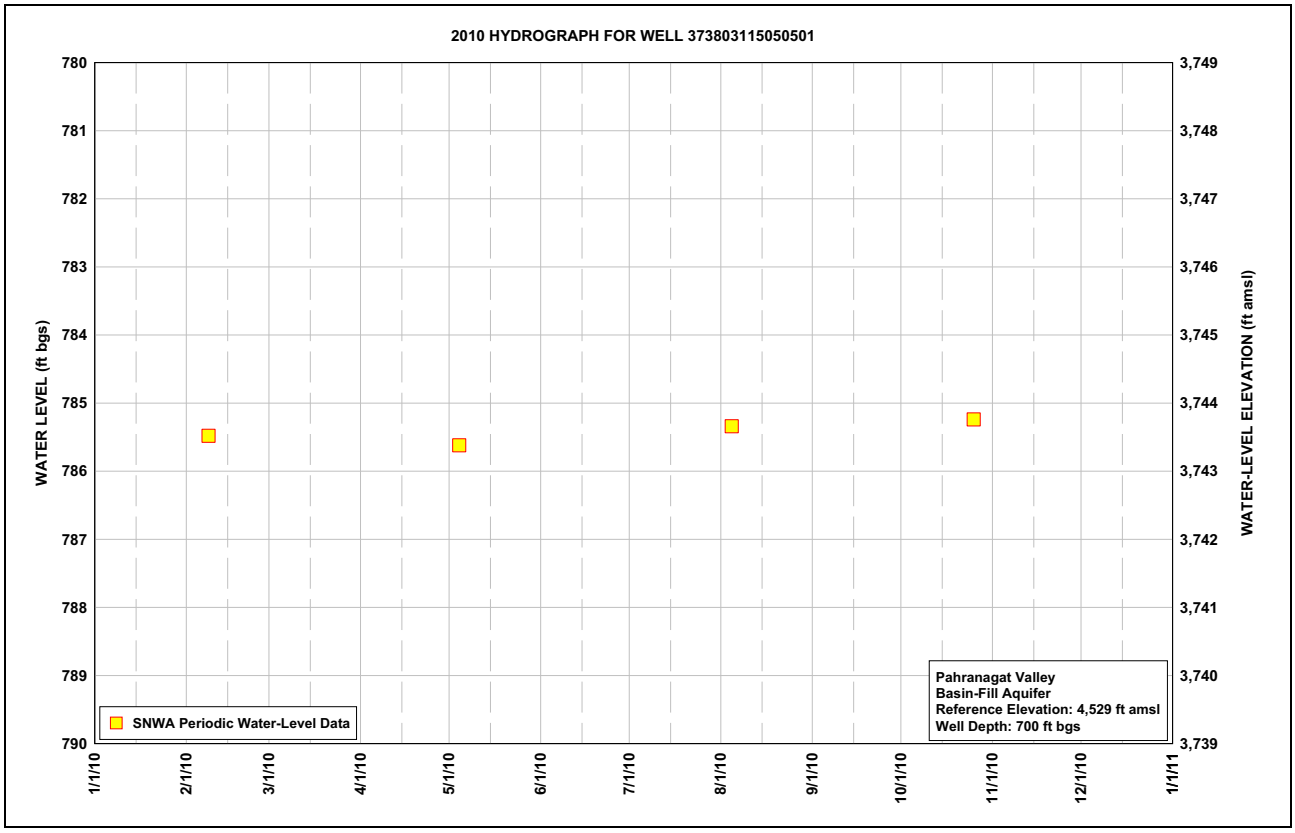

HISTORICAL HYDROGRAPH FOR WELL 182W906M
WATER LEVEL (ft bgs)
WATER-LEVEL ELEVATION (ft amsl)
1,312
1,313
1,314
1,315
1,316
1,317
1,318
1,319
1,320
1,321
1,322
3,485
3,484
3,483
3,482
3,481
3,480
3,479
3,478
3,477
3,476
3,475
9/1/06
1/1/07
5/1/07
9/1/07
1/1/08
5/1/08
9/1/08
1/1/09
5/1/09
9/1/09
1/1/10
5/1/10
9/1/10
1/1/11
SNWA Periodic Water-Level Data
Delamar Valley
Volcanic Aquifer
Reference Elevation: 4,797 ft amsl
Well Depth: 1,703 ft bgs

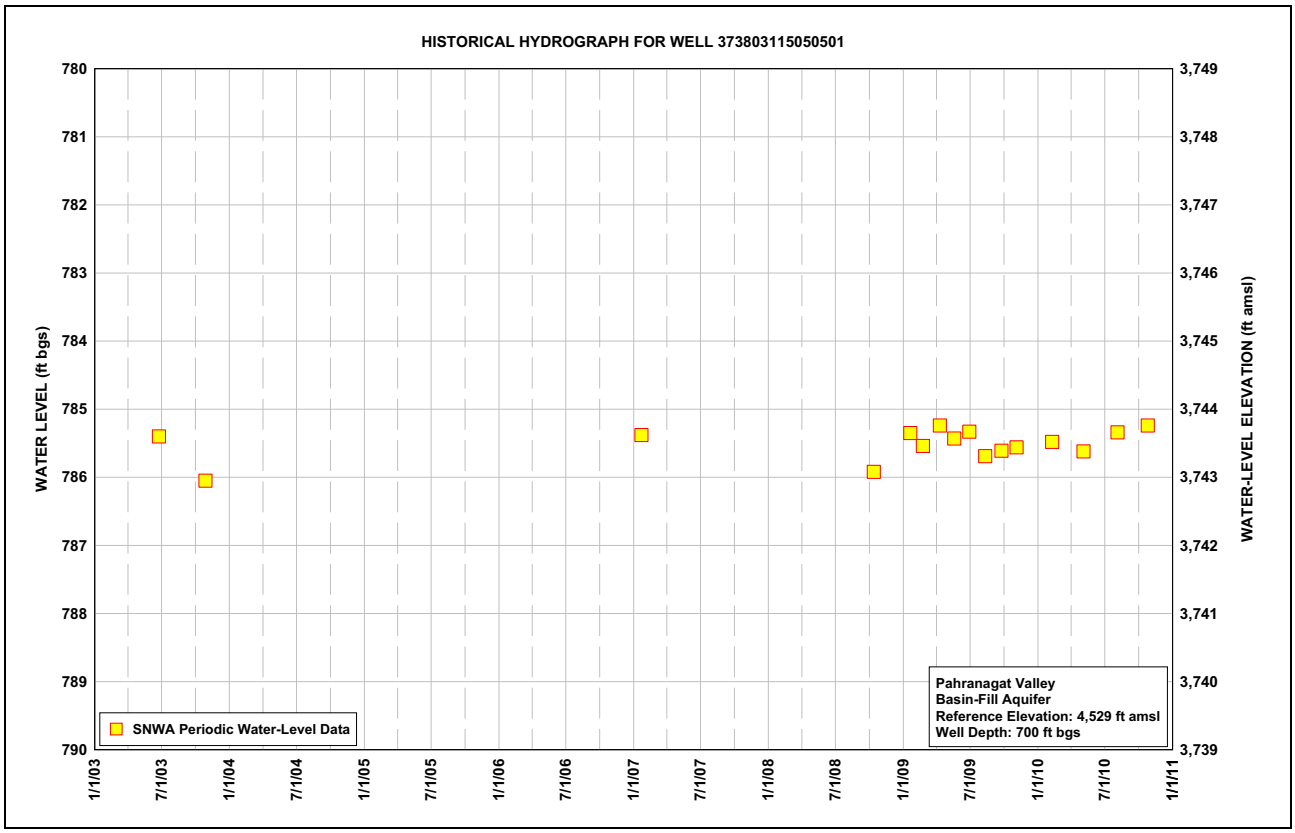

2010 HYDROGRAPH FOR WELL 181W909M
WATER LEVEL (ft bgs)
WATER-LEVEL ELEVATION (ft amsl)
492
493
494
495
496
497
498
499
500
501
502
4,307
4,306
4,305
4,304
4,303
4,302
4,301
4,300
4,299
4,298
4,297
1/1/10
2/1/10
3/1/10
4/1/10
5/1/10
6/1/10
7/1/10
8/1/10
9/1/10
10/1/10
11/1/10
12/1/10
1/1/11
SNWA Periodic Water-Level Data
Dry Lake Valley
Basin-Fill Aquifer
Reference Elevation: 4,799 ft amsl
Well Depth: 1,260 ft bgs

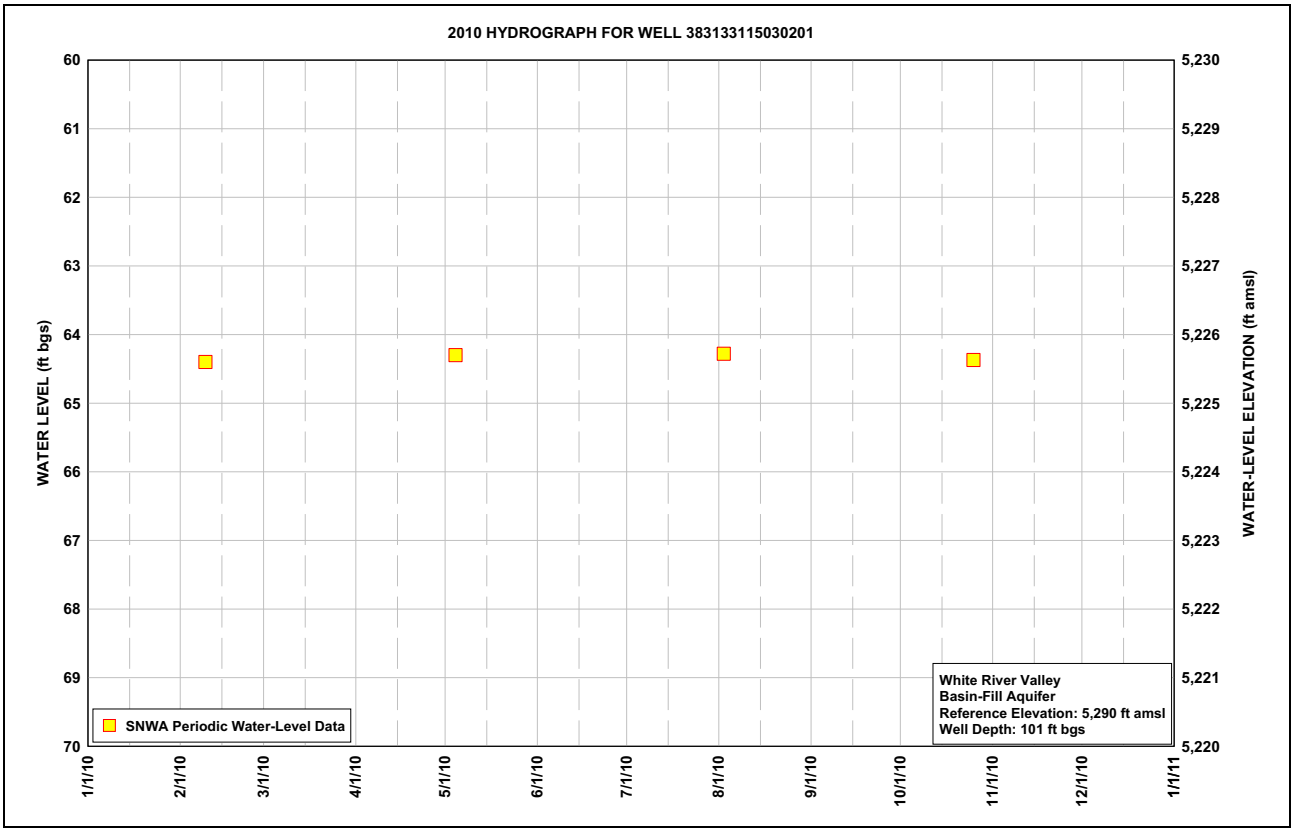

HISTORICAL HYDROGRAPH FOR WELL 181W909M
WATER LEVEL (ft bgs)
WATER-LEVEL ELEVATION (ft amsl)
492
493
494
495
496
497
498
499
500
501
502
4,307
4,306
4,305
4,304
4,303
4,302
4,301
4,300
4,299
4,298
4,297
9/1/06
1/1/07
5/1/07
9/1/07
1/1/08
5/1/08
9/1/08
1/1/09
5/1/09
9/1/09
1/1/10
5/1/10
9/1/10
1/1/11
SNWA Periodic Water-Level Data
Dry Lake Valley
Basin-Fill Aquifer
Reference Elevation: 4,799 ft amsl
Well Depth: 1,260 ft bgs

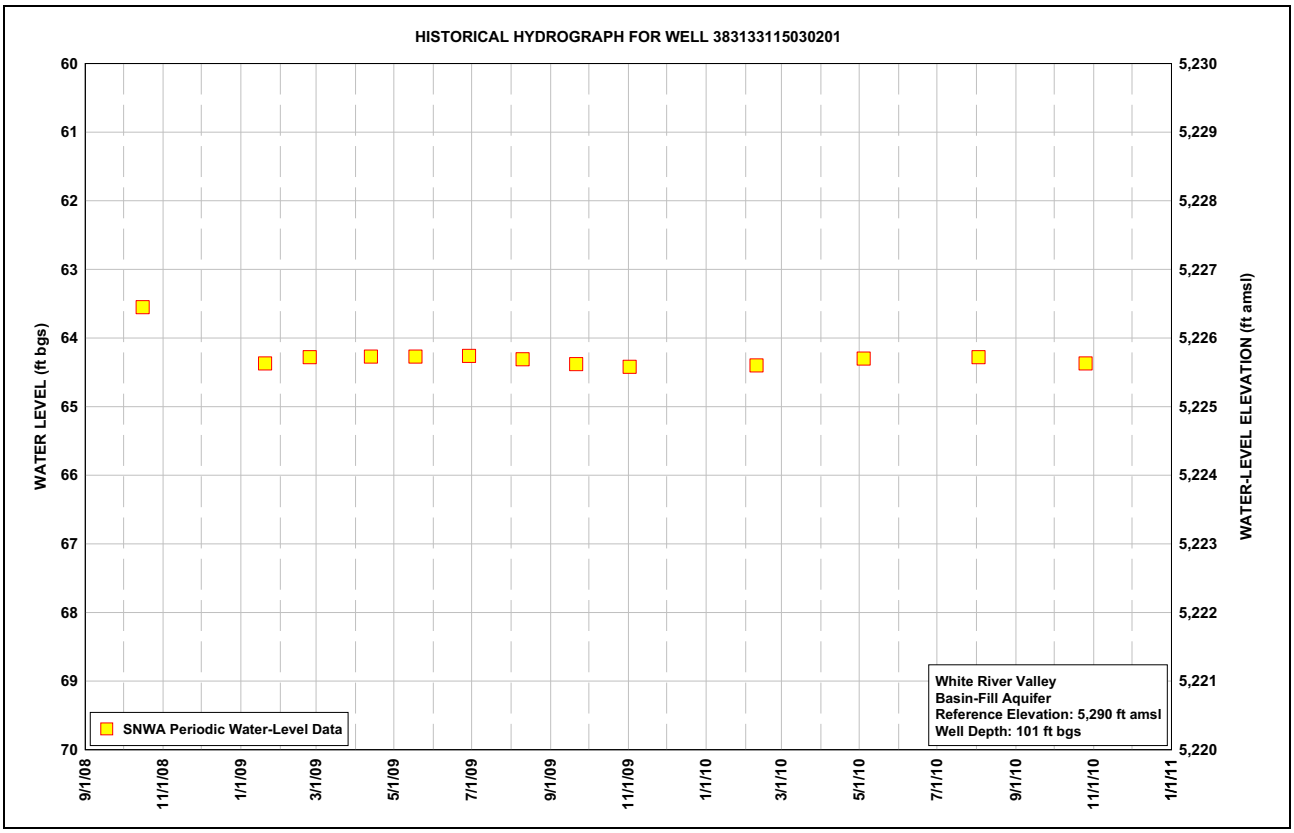

2010 HYDROGRAPH FOR WELL 373405115090001
WATER LEVEL (ft bgs)
WATER-LEVEL ELEVATION (ft amsl)
582
583
584
585
586
587
588
589
590
591
592
3,649
3,648
3,647
3,646
3,645
3,644
3,643
3,642
3,641
3,640
3,639
1/1/10
2/1/10
3/1/10
4/1/10
5/1/10
6/1/10
7/1/10
8/1/10
9/1/10
10/1/10
11/1/10
12/1/10
1/1/11
SNWA Periodic Water-Level Data
Pahranagat Valley
Basin-Fill/Volcanic Aquifer
Reference Elevation: 4,231 ft amsl
Well Depth: 980 ft bgs

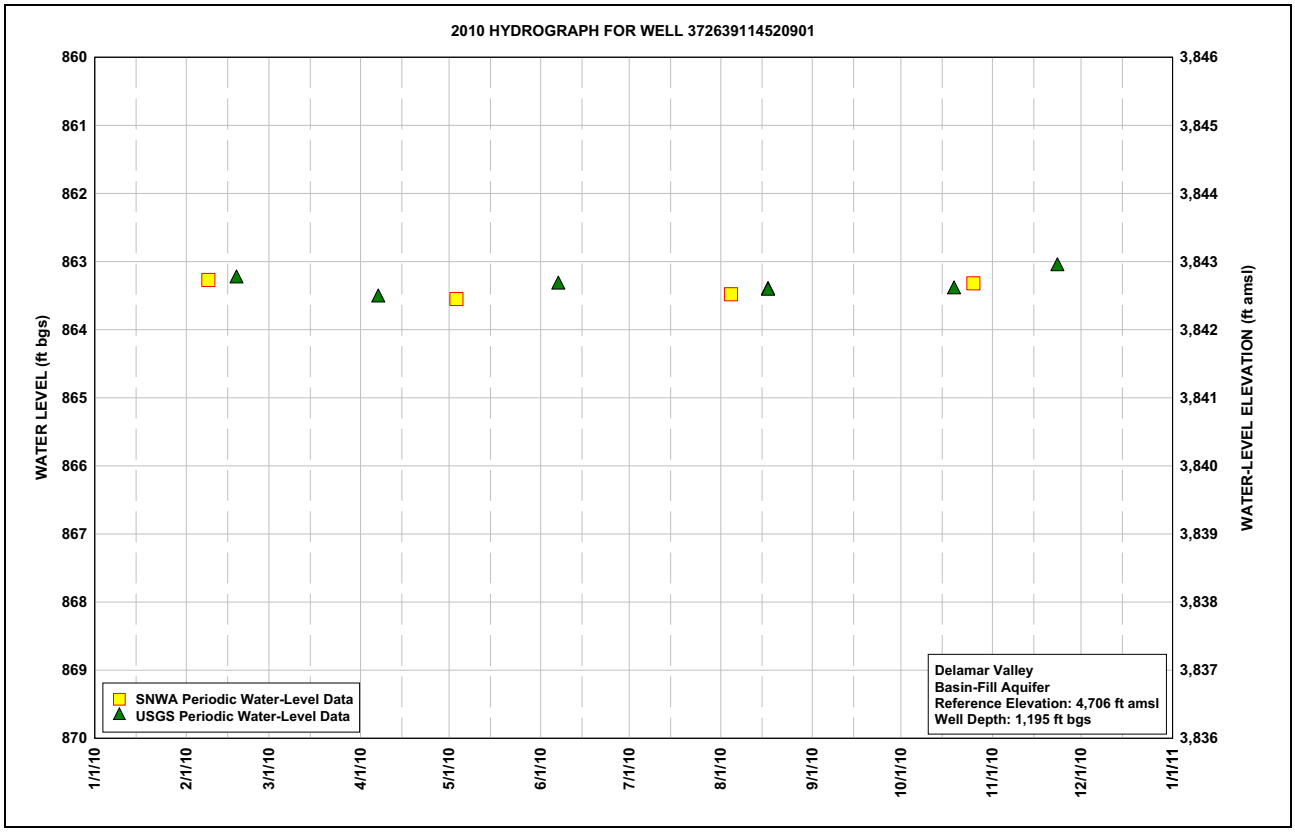

HISTORICAL HYDROGRAPH FOR WELL 373405115090001
WATER LEVEL (ft bgs)
WATER-LEVEL ELEVATION (ft amsl)
582
583
584
585
586
587
588
589
590
591
592
3,649
3,648
3,647
3,646
3,645
3,644
3,643
3,642
3,641
3,640
3,639
1/1/03
7/1/03
1/1/04
7/1/04
1/1/05
7/1/05
1/1/06
7/1/06
1/1/07
7/1/07
1/1/08
7/1/08
1/1/09
7/1/09
1/1/10
7/1/10
1/1/11
SNWA Periodic Water-Level Data
Pahranagat Valley
Basin-Fill/Volcanic Aquifer
Reference Elevation: 4,231 ft amsl
Well Depth: 980 ft bgs

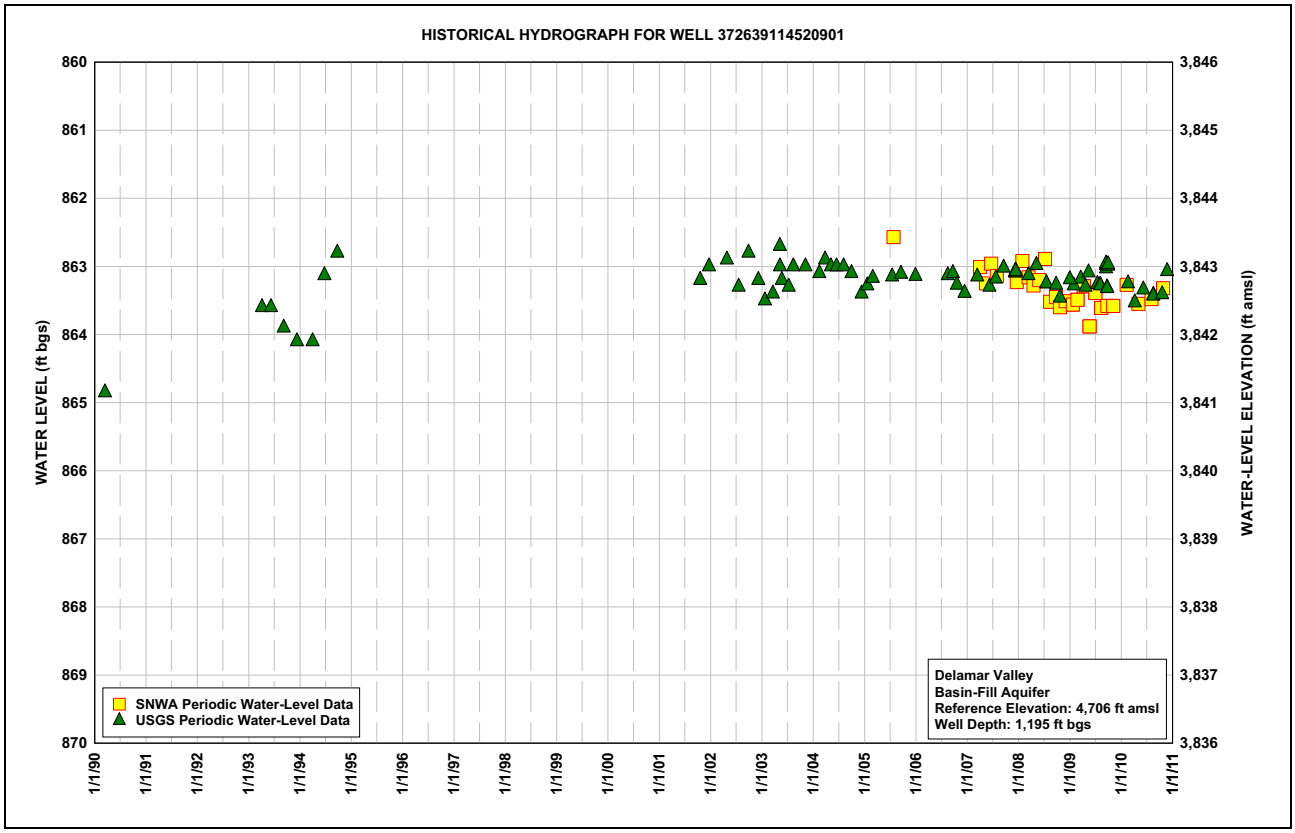

2010 HYDROGRAPH FOR WELL 373803115050501
WATER LEVEL (ft bgs)
WATER-LEVEL ELEVATION (ft amsl)
780
781
782
783
784
785
786
787
788
789
790
3,749
3,748
3,747
3,746
3,745
3,744
3,743
3,742
3,741
3,740
3,739
1/1/10
2/1/10
3/1/10
4/1/10
5/1/10
6/1/10
7/1/10
8/1/10
9/1/10
10/1/10
11/1/10
12/1/10
1/1/11
SNWA Periodic Water-Level Data
Pahranagat Valley
Basin-Fill Aquifer
Reference Elevation: 4,529 ft amsl
Well Depth: 700 ft bgs


HISTORICAL HYDROGRAPH FOR WELL 373803115050501
WATER LEVEL (ft bgs)
WATER-LEVEL ELEVATION (ft amsl)
780
781
782
783
784
785
786
787
788
789
790
3,749
3,748
3,747
3,746
3,745
3,744
3,743
3,742
3,741
3,740
3,739
1/1/03
7/1/03
1/1/04
7/1/04
1/1/05
7/1/05
1/1/06
7/1/06
1/1/07
7/1/07
1/1/08
7/1/08
1/1/09
7/1/09
1/1/10
7/1/10
1/1/11
SNWA Periodic Water-Level Data
Pahranagat Valley
Basin-Fill Aquifer
Reference Elevation: 4,529 ft amsl
Well Depth: 700 ft bgs


2010 HYDROGRAPH FOR WELL 383133115030201
WATER LEVEL (ft bgs)
WATER-LEVEL ELEVATION (ft amsl)
60
61
62
63
64
65
66
67
68
69
70
5,230
5,229
5,228
5,227
5,226
5,225
5,224
5,223
5,222
5,221
5,220
1/1/10
2/1/10
3/1/10
4/1/10
5/1/10
6/1/10
7/1/10
8/1/10
9/1/10
10/1/10
11/1/10
12/1/10
1/1/11
SNWA Periodic Water-Level Data
White River Valley
Basin-Fill Aquifer
Reference Elevation: 5,290 ft amsl
Well Depth: 101 ft bgs


HISTORICAL HYDROGRAPH FOR WELL 383133115030201
WATER LEVEL (ft bgs)
WATER-LEVEL ELEVATION (ft amsl)
60
61
62
63
64
65
66
67
68
69
70
5,230
5,229
5,228
5,227
5,226
5,225
5,224
5,223
5,222
5,221
5,220
9/1/08
11/1/08
1/1/09
3/1/09
5/1/09
7/1/09
9/1/09
11/1/09
1/1/10
3/1/10
5/1/10
7/1/10
9/1/10
11/1/10
1/1/11
SNWA Periodic Water-Level Data
White River Valley
Basin-Fill Aquifer
Reference Elevation: 5,290 ft amsl
Well Depth: 101 ft bgs


2010 HYDROGRAPH FOR WELL 372639114520901
WATER LEVEL (ft bgs)
WATER-LEVEL ELEVATION (ft amsl)
860
861
862
863
864
865
866
867
868
869
870
3,846
3,845
3,844
3,843
3,842
3,841
3,840
3,839
3,838
3,837
3,836
1/1/10
2/1/10
3/1/10
4/1/10
5/1/10
6/1/10
7/1/10
8/1/10
9/1/10
10/1/10
11/1/10
12/1/10
1/1/11
SNWA Periodic Water-Level Data
USGS Periodic Water-Level Data
Delamar Valley
Basin-Fill Aquifer
Reference Elevation: 4,706 ft amsl
Well Depth: 1,195 ft bgs


HISTORICAL HYDROGRAPH FOR WELL 372639114520901
WATER LEVEL (ft bgs)
WATER-LEVEL ELEVATION (ft amsl)
860
861
862
863
864
865
866
867
868
869
870
3,846
3,845
3,844
3,843
3,842
3,841
3,840
3,839
3,838
3,837
3,836
1/1/90
1/1/91
1/1/92
1/1/93
1/1/94
1/1/95
1/1/96
1/1/97
1/1/98
1/1/99
1/1/00
1/1/01
1/1/02
1/1/03
1/1/04
1/1/05
1/1/06
1/1/07
1/1/08
1/1/09
1/1/10
1/1/11
SNWA Periodic Water-Level Data
USGS Periodic Water-Level Data
Delamar Valley
Basin-Fill Aquifer
Reference Elevation: 4,706 ft amsl
Well Depth: 1,195 ft bgs

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# Appendix B

# Continuous Water-Level Measurement Data from the DDC Existing-Well Monitoring Network

# B.1.0 MONITORING PROGRAM WELLS WITH CONTINUOUS TRANSDUCER DATA

Continuous data collection was performed in 2010 for the following monitor wells:

- Cave Valley Well 180W902M
- Cave Valley Well 180W501M
- Delamar Valley Well 182M-1
- Dry Lake Valley Well 181M-1
- Dry Lake Valley Well 380531114534201
- Pahranagat Valley Well 209M-1

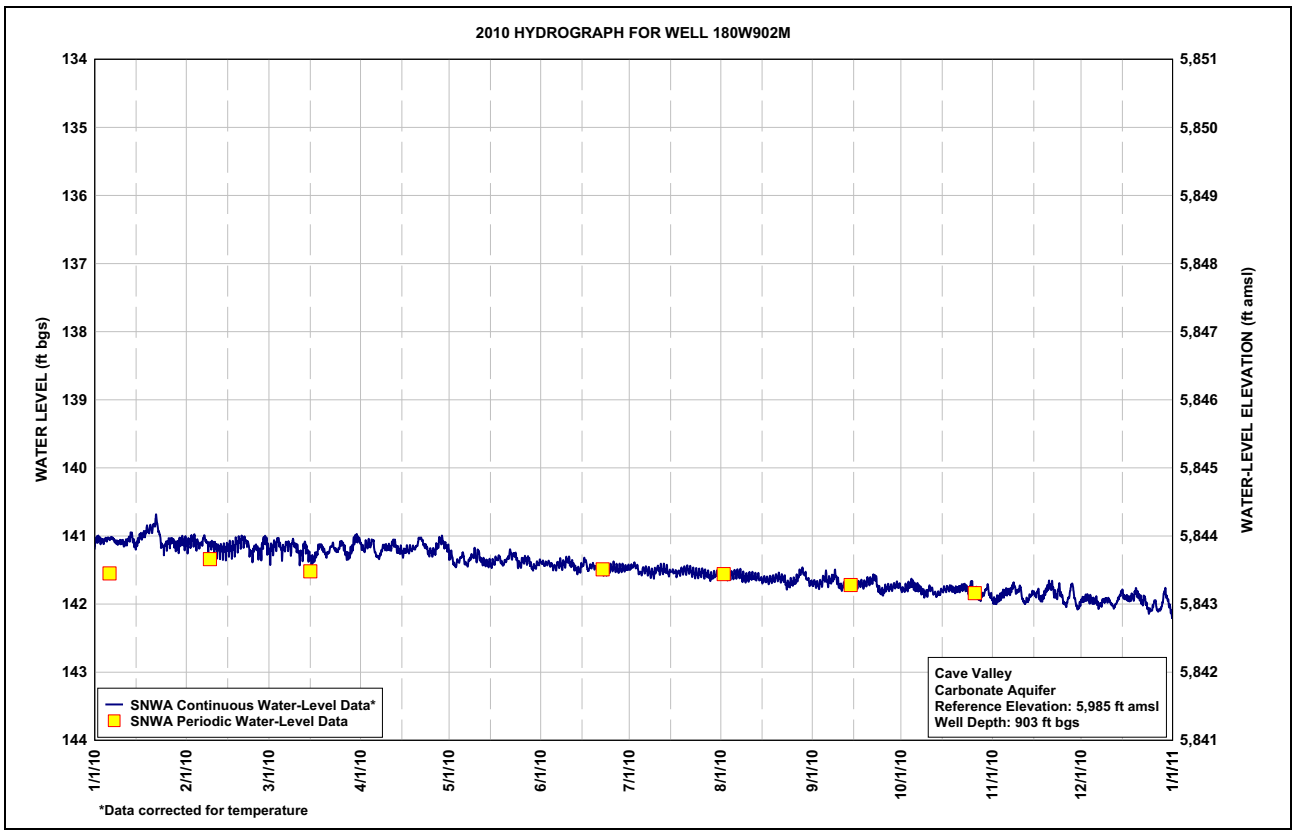
For these sites, two hydrographs are presented that include data collected in 2010 and historically. Continuous data have been corrected for temperature and transducer cable stretch. Additional data processing, including barometric pressure, may be applied in the future.

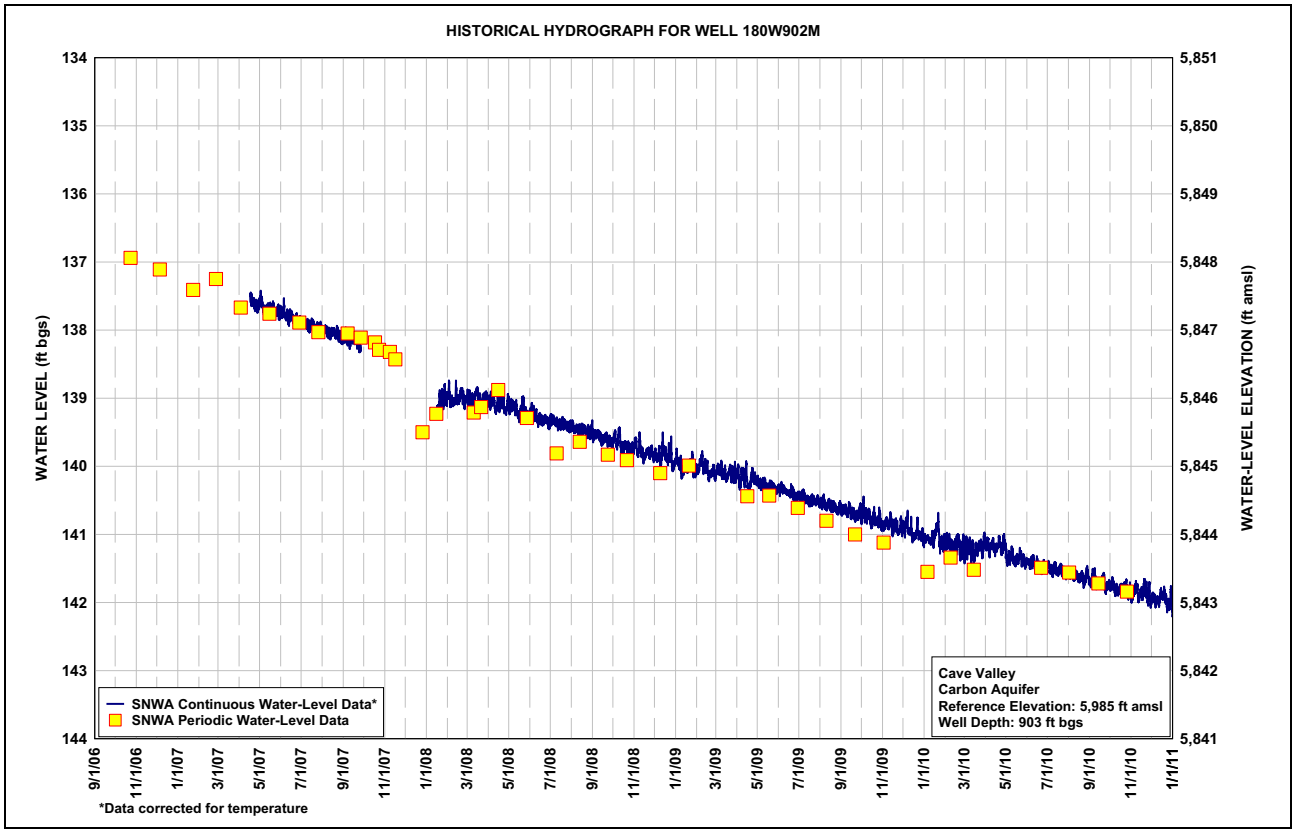
# Table B-1
# Cave Valley Well 180W902M, Calendar Year 2010
# Water-Level Data, Daily Mean Values

| | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 141.06 | 141.11 | 141.23 | 141.15 | 141.30 | 141.39 | 141.47 | 141.56 | 141.69 | 141.79 | 141.95 | 141.94 |
| 2 | 141.05 | 141.07 | 141.16 | 141.17 | 141.38 | 141.41 | 141.43 | 141.59 | 141.72 | 141.77 | 141.94 | 141.91 |
| 3 | 141.07 | 141.05 | 141.12 | 141.13 | 141.41 | 141.40 | 141.45 | 141.60 | 141.71 | 141.75 | 141.90 | 141.91 |
| 4 | 141.06 | 141.10 | 141.10 | 141.12 | 141.36 | 141.42 | 141.54 | 141.58 | 141.66 | 141.70 | 141.86 | 141.93 |
| 5 | 141.04 | 141.13 | 141.21 | 141.13 | 141.28 | 141.45 | 141.51 | 141.56 | 141.61 | 141.74 | 141.82 | 141.95 |
| 6 | 141.04 | 141.08 | 141.16 | 141.29 | 141.39 | 141.44 | 141.49 | 141.56 | 141.67 | 141.76 | 141.81 | 141.98 |
| 7 | 141.06 | 141.05 | 141.12 | 141.29 | 141.39 | 141.40 | 141.52 | 141.56 | 141.64 | 141.78 | 141.78 | 142.01 |
| 8 | 141.10 | 141.12 | 141.16 | 141.18 | 141.31 | 141.43 | 141.55 | 141.60 | 141.58 | 141.83 | 141.74 | 141.96 |
| 9 | 141.09 | 141.12 | 141.11 | 141.17 | 141.27 | 141.39 | 141.54 | 141.62 | 141.65 | 141.84 | 141.81 | 141.94 |
| 10 | 141.10 | 141.14 | 141.17 | 141.17 | 141.29 | 141.36 | [a]--- | 141.61 | 141.74 | 141.79 | 141.79 | 141.95 |
| 11 | 141.10 | 141.18 | 141.28 | 141.15 | 141.32 | 141.41 | 141.49 | 141.59 | 141.74 | 141.79 | 141.95 | 142.01 |
| 12 | 141.05 | 141.19 | 141.22 | 141.11 | 141.38 | 141.46 | 141.49 | 141.60 | 141.72 | 141.85 | 141.96 | 142.03 |
| 13 | 141.00 | 141.20 | 141.16 | 141.19 | 141.40 | 141.50 | 141.50 | 141.60 | 141.70 | 141.85 | 141.91 | 141.94 |
| 14 | 141.12 | 141.20 | 141.27 | 141.21 | 141.40 | 141.48 | 141.55 | 141.64 | 141.70 | 141.83 | 141.85 | 141.84 |
| 15 | 141.10 | 141.17 | 141.35 | 141.25 | 141.41 | 141.40 | [a]--- | 141.64 | 141.72 | 141.79 | 141.86 | 141.88 |
| 16 | 141.00 | 141.19 | 141.31 | 141.20 | 141.37 | 141.41 | 141.53 | 141.64 | 141.72 | 141.78 | 141.84 | 141.91 |
| 17 | 140.98 | 141.15 | 141.22 | 141.20 | 141.33 | 141.47 | 141.54 | 141.65 | 141.70 | 141.77 | 141.92 | 141.92 |
| 18 | 140.92 | 141.10 | 141.15 | 141.19 | 141.36 | 141.44 | 141.52 | 141.64 | 141.71 | 141.78 | 141.86 | 141.89 |
| 19 | 140.91 | 141.07 | 141.21 | 141.18 | 141.40 | 141.46 | 141.50 | 141.61 | 141.68 | 141.79 | 141.78 | 141.83 |
| 20 | 140.89 | 141.06 | 141.27 | 141.09 | 141.35 | 141.46 | 141.50 | 141.61 | 141.66 | 141.78 | 141.73 | 141.88 |
| 21 | 140.79 | 141.10 | 141.21 | 141.04 | 141.26 | 141.47 | 141.50 | 141.63 | 141.64 | 141.76 | 141.77 | 141.95 |
| 22 | 140.89 | 141.20 | 141.14 | 141.12 | 141.29 | 141.52 | 141.53 | 141.64 | 141.64 | 141.75 | 141.87 | 141.93 |
| 23 | 141.09 | 141.24 | 141.20 | 141.19 | 141.29 | 141.51 | 141.55 | 141.72 | 141.78 | 141.78 | 141.79 | 142.05 |
| 24 | 141.16 | 141.17 | 141.20 | 141.24 | 141.41 | 141.48 | 141.56 | 141.69 | 141.82 | 141.74 | 141.88 | 142.10 |
| 25 | 141.11 | 141.22 | 141.11 | 141.24 | 141.40 | 141.46 | 141.54 | 141.68 | 141.79 | 141.76 | 141.99 | 142.00 |
| 26 | 141.08 | 141.20 | 141.18 | 141.20 | 141.35 | 141.48 | 141.55 | 141.65 | 141.76 | 141.80 | 141.95 | 142.02 |
| 27 | 141.08 | 141.06 | 141.29 | 141.10 | 141.35 | 141.49 | 141.57 | 141.57 | 141.76 | 141.92 | 141.78 | 142.09 |
| 28 | 141.13 | 141.15 | 141.25 | 141.07 | 141.40 | 141.48 | 141.60 | 141.52 | 141.75 | 141.88 | 141.82 | 141.99 |
| 29 | 141.12 | --- | 141.13 | 141.13 | 141.46 | 141.48 | 141.59 | 141.57 | 141.72 | 141.82 | 142.02 | 141.83 |
| 30 | 141.08 | --- | 141.04 | 141.17 | 141.44 | 141.48 | 141.57 | 141.64 | 141.74 | 141.78 | 142.02 | 141.96 |
| 31 | 141.10 | --- | 141.05 | --- | 141.39 | --- | 141.54 | 141.70 | --- | 141.89 | --- | 142.11 |
| Max | 141.16 | 141.24 | 141.35 | 141.29 | 141.46 | 141.52 | 141.60 | 141.72 | 141.82 | 141.92 | 142.02 | 142.11 |
| Min | 140.79 | 141.05 | 141.04 | 141.04 | 141.26 | 141.36 | 141.43 | 141.52 | 141.58 | 141.70 | 141.73 | 141.83 |

**Year 2010 Statistics: Year Max 142.11; Year Min 140.79**
Note: Depth in ft bgs

**[a]Insufficient data points to report a daily average**

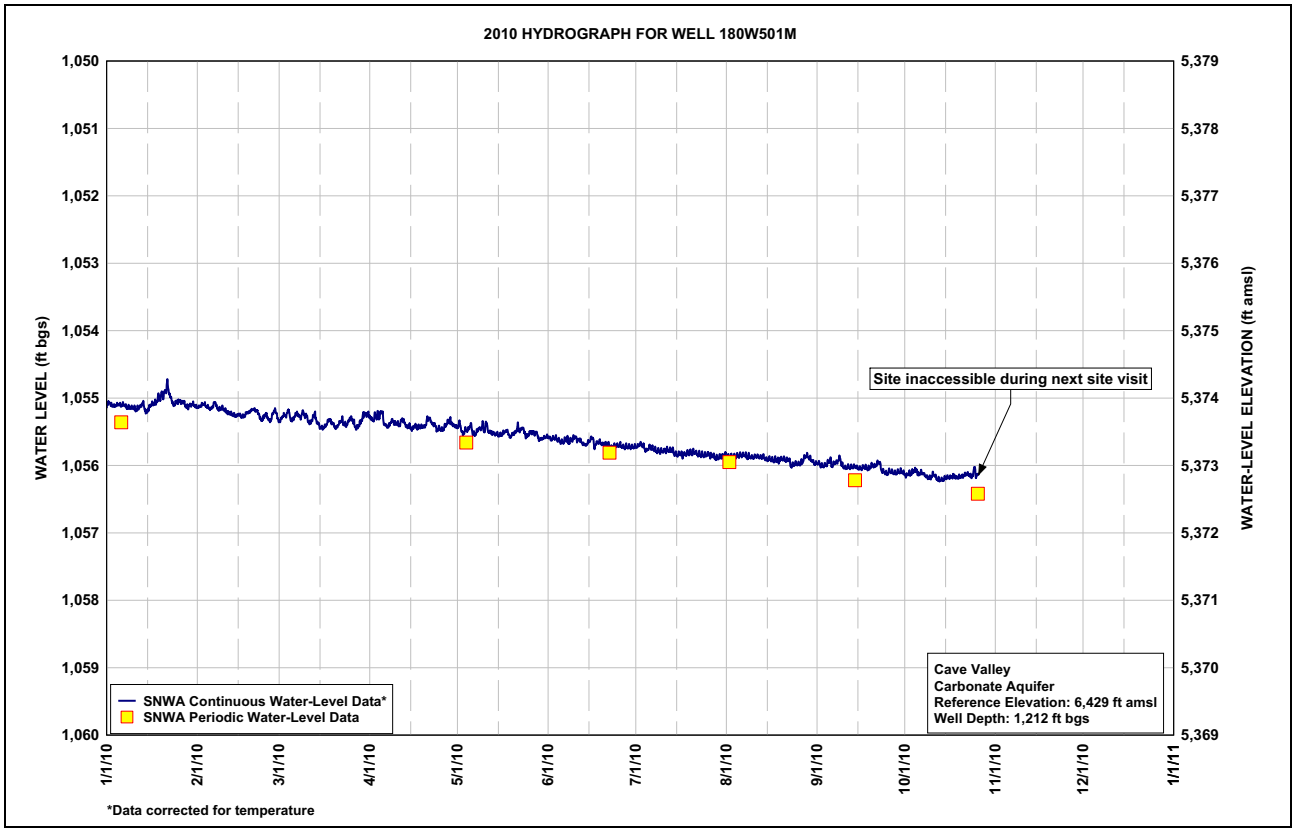

2010 HYDROGRAPH FOR WELL 180W902M
WATER LEVEL (ft bgs)
WATER-LEVEL ELEVATION (ft amsl)
134
135
136
137
138
139
140
141
142
143
144
5,851
5,850
5,849
5,848
5,847
5,846
5,845
5,844
5,843
5,842
5,841
1/1/10
2/1/10
3/1/10
4/1/10
5/1/10
6/1/10
7/1/10
8/1/10
9/1/10
10/1/10
11/1/10
12/1/10
1/1/11
SNWA Continuous Water-Level Data*
SNWA Periodic Water-Level Data
Cave Valley
Carbonate Aquifer
Reference Elevation: 5,985 ft amsl
Well Depth: 903 ft bgs
*Data corrected for temperature

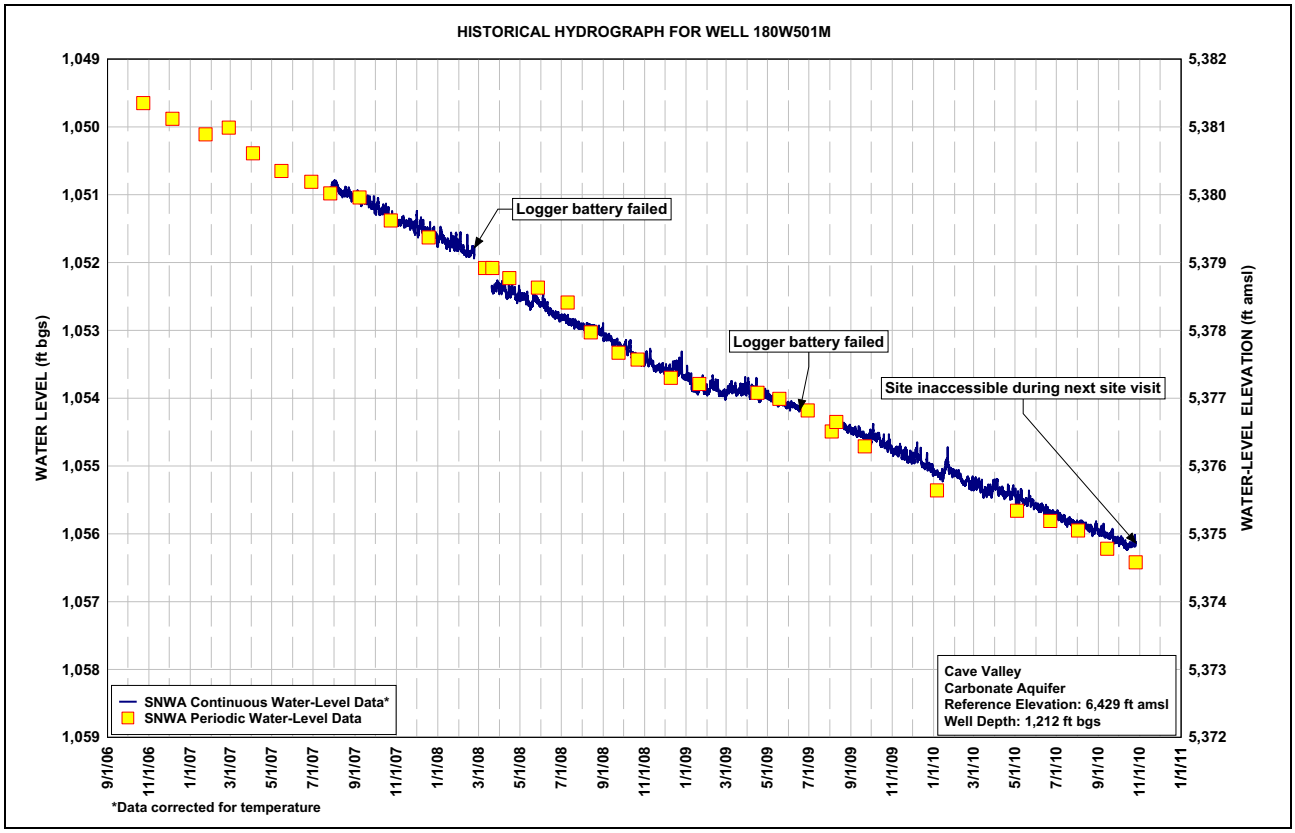

HISTORICAL HYDROGRAPH FOR WELL 180W902M
WATER LEVEL (ft bgs)
WATER-LEVEL ELEVATION (ft amsl)
134
135
136
137
138
139
140
141
142
143
144
5,851
5,850
5,849
5,848
5,847
5,846
5,845
5,844
5,843
5,842
5,841
9/1/06
11/1/06
1/1/07
3/1/07
5/1/07
7/1/07
9/1/07
11/1/07
1/1/08
3/1/08
5/1/08
7/1/08
9/1/08
11/1/08
1/1/09
3/1/09
5/1/09
7/1/09
9/1/09
11/1/09
1/1/10
3/1/10
5/1/10
7/1/10
9/1/10
11/1/10
1/1/11
SNWA Continuous Water-Level Data*
SNWA Periodic Water-Level Data
Cave Valley
Carbon Aquifer
Reference Elevation: 5,985 ft amsl
Well Depth: 903 ft bgs
*Data corrected for temperature

# Table B-2
# Cave Valley Well 180W501M, Calendar Year 2010
# Water-Level Data, Daily Mean Values

| | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1055.08 | 1055.13 | 1055.32 | 1055.30 | 1055.39 | 1055.59 | 1055.72 | 1055.86 | 1055.97 | 1056.14 | [c]--- | [c]--- |
| 2 | 1055.09 | 1055.11 | 1055.26 | 1055.29 | 1055.49 | 1055.60 | 1055.69 | 1055.87 | 1056.00 | 1056.12 | [c]--- | [c]--- |
| 3 | 1055.12 | 1055.10 | 1055.24 | 1055.26 | 1055.49 | 1055.60 | 1055.71 | 1055.87 | 1056.00 | 1056.11 | [c]--- | [c]--- |
| 4 | 1055.10 | 1055.13 | 1055.24 | 1055.25 | 1055.47 | 1055.62 | 1055.77 | 1055.86 | 1055.97 | 1056.07 | [c]--- | [c]--- |
| 5 | 1055.10 | 1055.16 | 1055.32 | 1055.28 | 1055.42 | 1055.65 | 1055.74 | 1055.85 | 1055.94 | 1056.11 | [c]--- | [c]--- |
| 6 | 1055.10 | 1055.11 | 1055.26 | 1055.40 | 1055.53 | 1055.63 | 1055.74 | 1055.85 | 1055.99 | 1056.11 | [c]--- | [c]--- |
| 7 | 1055.12 | 1055.11 | 1055.25 | 1055.41 | 1055.51 | 1055.62 | 1055.77 | 1055.85 | 1055.96 | 1056.13 | [c]--- | [c]--- |
| 8 | 1055.14 | 1055.17 | 1055.27 | 1055.34 | 1055.45 | 1055.64 | 1055.79 | 1055.87 | 1055.90 | 1056.17 | [c]--- | [c]--- |
| 9 | 1055.14 | 1055.15 | 1055.24 | 1055.37 | 1055.43 | 1055.60 | 1055.79 | 1055.88 | 1055.98 | 1056.18 | [c]--- | [c]--- |
| 10 | 1055.15 | 1055.18 | 1055.28 | 1055.38 | 1055.44 | 1055.59 | 1055.79 | 1055.87 | 1056.03 | 1056.14 | [c]--- | [c]--- |
| 11 | 1055.16 | 1055.22 | 1055.36 | 1055.37 | 1055.47 | 1055.62 | 1055.77 | 1055.87 | 1056.03 | 1056.17 | [c]--- | [c]--- |
| 12 | 1055.13 | 1055.23 | 1055.30 | 1055.34 | 1055.51 | 1055.65 | 1055.78 | 1055.88 | 1056.03 | 1056.21 | [c]--- | [c]--- |
| 13 | 1055.09 | 1055.25 | 1055.29 | 1055.41 | 1055.52 | 1055.69 | 1055.78 | 1055.87 | 1056.02 | 1056.21 | [c]--- | [c]--- |
| 14 | 1055.20 | 1055.26 | 1055.39 | 1055.42 | 1055.53 | 1055.67 | 1055.83 | 1055.90 | 1056.03 | 1056.20 | [c]--- | [c]--- |
| 15 | 1055.15 | 1055.25 | 1055.44 | 1055.46 | 1055.55 | 1055.62 | 1055.84 | 1055.91 | 1056.04 | 1056.18 | [c]--- | [c]--- |
| 16 | 1055.09 | 1055.27 | 1055.42 | 1055.42 | 1055.53 | 1055.64 | 1055.84 | 1055.91 | 1056.04 | 1056.18 | [c]--- | [c]--- |
| 17 | 1055.07 | 1055.24 | 1055.36 | 1055.44 | 1055.50 | 1055.68 | 1055.84 | 1055.92 | 1056.03 | 1056.16 | [c]--- | [c]--- |
| 18 | 1055.00 | 1055.21 | 1055.33 | 1055.43 | 1055.53 | 1055.65 | 1055.82 | 1055.93 | 1056.04 | 1056.17 | [c]--- | [c]--- |
| 19 | 1054.98 | 1055.18 | 1055.39 | 1055.42 | 1055.56 | 1055.68 | 1055.82 | 1055.90 | 1056.01 | 1056.17 | [c]--- | [c]--- |
| 20 | 1054.95 | 1055.18 | 1055.43 | 1055.35 | 1055.52 | 1055.68 | 1055.81 | 1055.90 | 1056.01 | 1056.16 | [c]--- | [c]--- |
| 21 | 1054.84 | 1055.20 | 1055.38 | 1055.31 | 1055.44 | 1055.68 | 1055.81 | 1055.92 | 1055.98 | 1056.14 | [c]--- | [c]--- |
| 22 | 1054.93 | 1055.29 | 1055.33 | 1055.38 | 1055.48 | 1055.73 | 1055.83 | 1055.93 | 1055.98 | 1056.13 | [c]--- | [c]--- |
| 23 | 1055.06 | 1055.30 | 1055.39 | 1055.42 | 1055.47 | 1055.72 | 1055.84 | 1056.00 | 1056.08 | 1056.15 | [c]--- | [c]--- |
| 24 | 1055.08 | 1055.25 | 1055.37 | 1055.45 | 1055.56 | 1055.70 | 1055.85 | 1055.98 | 1056.11 | 1056.10 | [c]--- | [c]--- |
| 25 | 1055.05 | 1055.32 | 1055.30 | 1055.47 | 1055.53 | 1055.70 | 1055.84 | 1055.98 | 1056.10 | 1056.13 | [c]--- | [c]--- |
| 26 | 1055.06 | 1055.28 | 1055.36 | 1055.44 | 1055.51 | 1055.72 | 1055.85 | 1055.96 | 1056.09 | [c]--- | [c]--- | [c]--- |
| 27 | 1055.08 | 1055.19 | 1055.44 | 1055.37 | 1055.52 | 1055.72 | 1055.86 | 1055.90 | 1056.11 | [c]--- | [c]--- | [c]--- |
| 28 | 1055.13 | 1055.29 | 1055.39 | 1055.35 | 1055.56 | 1055.73 | 1055.89 | 1055.86 | 1056.10 | [c]--- | [c]--- | [c]--- |
| 29 | 1055.11 | --- | 1055.30 | 1055.40 | 1055.61 | 1055.73 | 1055.88 | 1055.89 | 1056.09 | [c]--- | [c]--- | [c]--- |
| 30 | 1055.09 | --- | 1055.24 | 1055.42 | 1055.59 | 1055.72 | 1055.87 | 1055.94 | 1056.11 | [c]--- | [c]--- | [c]--- |
| 31 | 1055.12 | --- | 1055.24 | --- | 1055.57 | --- | 1055.85 | 1055.97 | --- | [c]--- | --- | [c]--- |
| Max | 1055.20 | 1055.32 | 1055.44 | 1055.47 | 1055.61 | 1055.73 | 1055.89 | 1056.00 | 1056.11 | --- | --- | --- |
| Min | 1054.84 | 1055.10 | 1055.24 | 1055.25 | 1055.39 | 1055.59 | 1055.69 | 1055.85 | 1055.90 | --- | --- | --- |

**Year 2010 Statistics: Year Max ---; Year Min ---**
Note: Depth in ft bgs
[c]Data currently unavailable due to inaccessible site conditions.


2010 HYDROGRAPH FOR WELL 180W501M
WATER LEVEL (ft bgs)
WATER-LEVEL ELEVATION (ft amsl)
1,050
1,051
1,052
1,053
1,054
1,055
1,056
1,057
1,058
1,059
1,060
5,379
5,378
5,377
5,376
5,375
5,374
5,373
5,372
5,371
5,370
5,369
1/1/10
2/1/10
3/1/10
4/1/10
5/1/10
6/1/10
7/1/10
8/1/10
9/1/10
10/1/10
11/1/10
12/1/10
1/1/11
Site inaccessible during next site visit
SNWA Continuous Water-Level Data*
SNWA Periodic Water-Level Data
Cave Valley
Carbonate Aquifer
Reference Elevation: 6,429 ft amsl
Well Depth: 1,212 ft bgs
*Data corrected for temperature

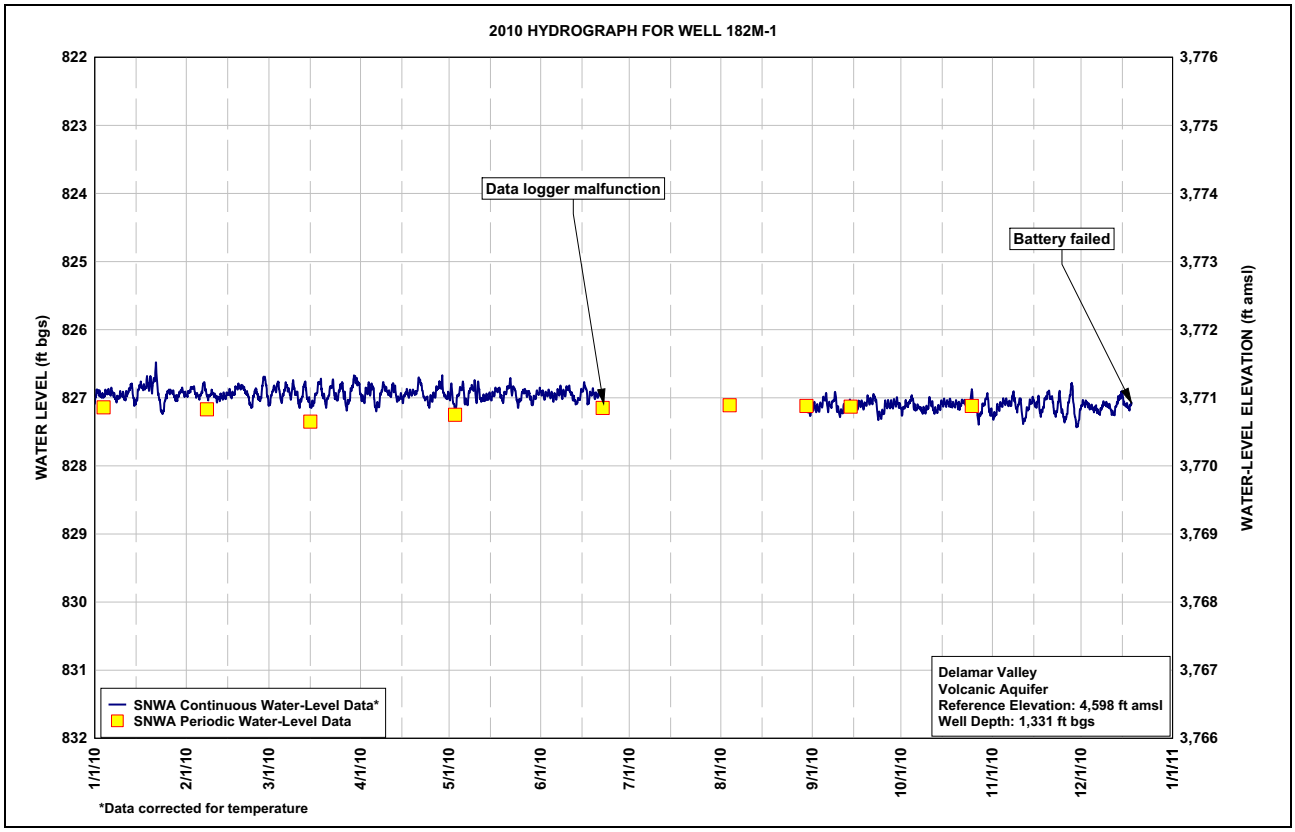

HISTORICAL HYDROGRAPH FOR WELL 180W501M
WATER LEVEL (ft bgs)
WATER-LEVEL ELEVATION (ft amsl)
1,049
1,050
1,051
1,052
1,053
1,054
1,055
1,056
1,057
1,058
1,059
5,382
5,381
5,380
5,379
5,378
5,377
5,376
5,375
5,374
5,373
5,372
9/1/06
11/1/06
1/1/07
3/1/07
5/1/07
7/1/07
9/1/07
11/1/07
1/1/08
3/1/08
5/1/08
7/1/08
9/1/08
11/1/08
1/1/09
3/1/09
5/1/09
7/1/09
9/1/09
11/1/09
1/1/10
3/1/10
5/1/10
7/1/10
9/1/10
11/1/10
1/1/11
Logger battery failed
Logger battery failed
Site inaccessible during next site visit
SNWA Continuous Water-Level Data*
SNWA Periodic Water-Level Data
Cave Valley
Carbonate Aquifer
Reference Elevation: 6,429 ft amsl
Well Depth: 1,212 ft bgs
*Data corrected for temperature

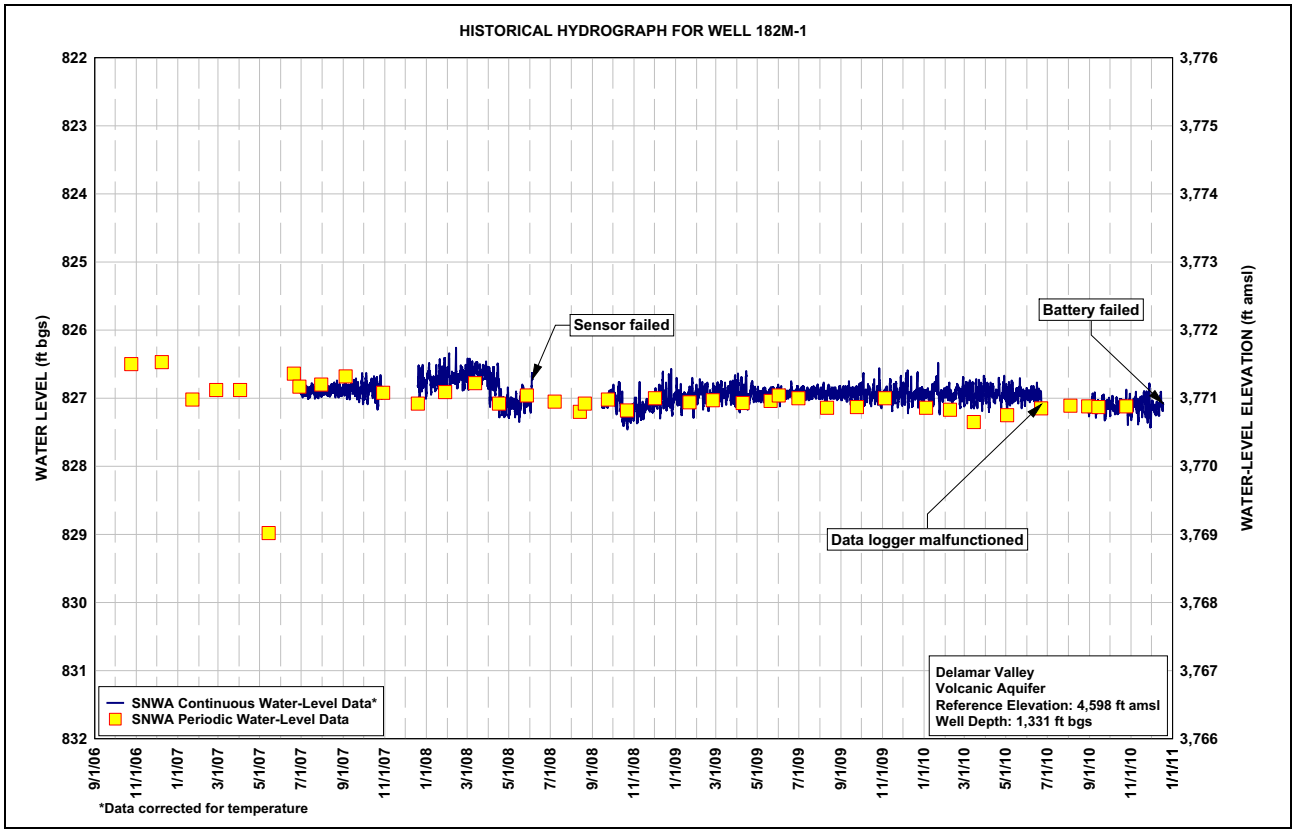
# Table B-3
# Delamar Valley Well 182M-1, Calendar Year 2010
# Water-Level Data, Daily Mean Values

| | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 826.95 | 826.94 | 827.04 | 826.99 | 826.92 | 826.93 | [b]--- | [b]--- | 827.14 | 827.18 | 827.26 | 827.08 |
| 2 | 826.93 | 826.88 | 826.87 | 826.98 | 827.07 | 826.97 | [b]--- | [b]--- | 827.15 | 827.11 | 827.18 | 827.08 |
| 3 | 826.97 | 826.87 | 826.85 | 826.87 | 827.07 | 826.94 | [b]--- | [b]--- | 827.14 | 827.10 | 827.13 | 827.11 |
| 4 | 826.94 | 826.96 | 826.88 | 826.88 | 826.91 | 826.96 | [b]--- | [b]--- | 827.08 | 827.02 | 827.08 | 827.14 |
| 5 | 826.92 | 826.98 | 827.01 | 826.95 | 826.84 | 826.99 | [b]--- | [b]--- | 827.00 | 827.11 | 827.06 | 827.15 |
| 6 | 826.92 | 826.86 | 826.85 | 827.13 | 827.04 | 826.95 | [b]--- | [b]--- | 827.13 | 827.14 | 827.08 | 827.18 |
| 7 | 826.96 | 826.87 | 826.87 | 827.04 | 827.01 | 826.90 | [b]--- | [b]--- | 827.10 | 827.16 | 827.05 | 827.20 |
| 8 | 827.01 | 826.98 | 826.95 | 826.85 | 826.86 | 826.95 | [b]--- | [b]--- | 826.99 | 827.19 | 827.02 | 827.10 |
| 9 | 826.97 | 826.93 | 826.85 | 826.87 | 826.85 | 826.91 | [b]--- | [b]--- | 827.14 | 827.18 | 827.14 | 827.10 |
| 10 | 826.96 | 826.96 | 826.96 | 826.93 | 826.93 | 826.86 | [b]--- | [b]--- | 827.23 | 827.08 | 827.07 | 827.12 |
| 11 | 826.97 | 827.01 | 827.09 | 826.90 | 826.97 | 826.96 | [b]--- | [b]--- | 827.17 | 827.10 | 827.32 | 827.21 |
| 12 | 826.90 | 826.99 | 826.92 | 826.86 | 827.01 | 827.03 | [b]--- | [b]--- | 827.13 | 827.19 | 827.23 | 827.19 |
| 13 | 826.85 | 826.98 | 826.87 | 827.01 | 827.00 | 827.05 | [b]--- | [b]--- | 827.10 | 827.17 | 827.11 | 827.04 |
| 14 | 827.05 | 826.97 | 827.04 | 826.99 | 826.99 | 826.96 | [b]--- | [b]--- | 827.10 | 827.12 | 827.04 | 826.95 |
| 15 | 826.96 | 826.93 | 827.10 | 827.01 | 826.98 | 826.85 | [b]--- | [b]--- | 827.12 | 827.07 | 827.10 | 827.05 |
| 16 | 826.82 | 826.96 | 827.02 | 826.93 | 826.92 | 826.92 | [b]--- | [b]--- | 827.11 | 827.08 | 827.06 | 827.11 |
| 17 | 826.85 | 826.90 | 826.86 | 826.94 | 826.89 | 827.00 | [b]--- | [b]--- | 827.09 | 827.08 | 827.22 | 827.13 |
| 18 | 826.80 | 826.84 | 826.81 | 826.93 | 826.96 | 826.92 | [b]--- | [b]--- | 827.12 | 827.11 | 827.08 | [a]--- |
| 19 | 826.80 | 826.84 | 826.98 | 826.93 | 827.00 | 826.97 | [b]--- | [b]--- | 827.05 | 827.09 | 826.97 | [b]--- |
| 20 | 826.82 | 826.86 | 827.07 | 826.82 | 826.90 | 826.95 | [b]--- | [b]--- | 827.05 | 827.11 | 826.97 | [b]--- |
| 21 | 826.66 | 826.94 | 826.91 | 826.80 | 826.80 | 826.95 | [b]--- | [b]--- | 827.03 | 827.08 | 827.10 | [b]--- |
| 22 | 826.91 | 827.07 | 826.81 | 826.98 | 826.89 | [a]--- | [b]--- | [b]--- | 827.05 | 827.07 | 827.22 | [b]--- |
| 23 | 827.13 | 827.06 | 826.97 | 827.02 | 826.93 | [b]--- | [b]--- | [b]--- | 827.26 | 827.13 | 827.01 | [b]--- |
| 24 | 827.15 | 826.90 | 826.97 | 827.06 | 827.08 | [b]--- | [b]--- | [b]--- | 827.24 | 827.05 | 827.17 | [b]--- |
| 25 | 826.96 | 827.00 | 826.82 | 826.99 | 826.98 | [b]--- | [b]--- | [b]--- | 827.15 | 827.06 | 827.31 | [b]--- |
| 26 | 826.90 | 826.93 | 826.97 | 826.93 | 826.90 | [b]--- | [b]--- | [b]--- | 827.10 | 827.13 | 827.15 | [b]--- |
| 27 | 826.93 | 826.73 | 827.11 | 826.83 | 826.93 | [b]--- | [b]--- | [b]--- | 827.11 | 827.30 | 826.89 | [b]--- |
| 28 | 827.01 | 826.97 | 826.97 | 826.81 | 826.99 | [b]--- | [b]--- | [b]--- | 827.09 | 827.16 | 827.07 | [b]--- |
| 29 | 826.96 | --- | 826.79 | 826.96 | 827.05 | [b]--- | [b]--- | [b]--- | 827.07 | 827.06 | 827.38 | [b]--- |
| 30 | 826.89 | --- | 826.74 | 826.98 | 826.96 | [b]--- | [b]--- | 827.18 | 827.11 | 827.04 | 827.24 | [b]--- |
| 31 | 826.94 | --- | 826.83 | --- | 826.92 | --- | [b]--- | 827.21 | --- | 827.22 | --- | [b]--- |
| Max | 827.15 | 827.07 | 827.11 | 827.13 | 827.08 | 827.05 | --- | 827.21 | 827.26 | 827.30 | 827.38 | 827.21 |
| Min | 826.66 | 826.73 | 826.74 | 826.80 | 826.80 | 826.85 | --- | 827.18 | 826.99 | 827.02 | 826.89 | 826.95 |

**Year 2010 Statistics: Year Max 827.38; Year Min 826.66**
Note: Depth in ft bgs

**[a]Insufficient data points to report a daily average**
**[b]No data available due to equipment malfunction**

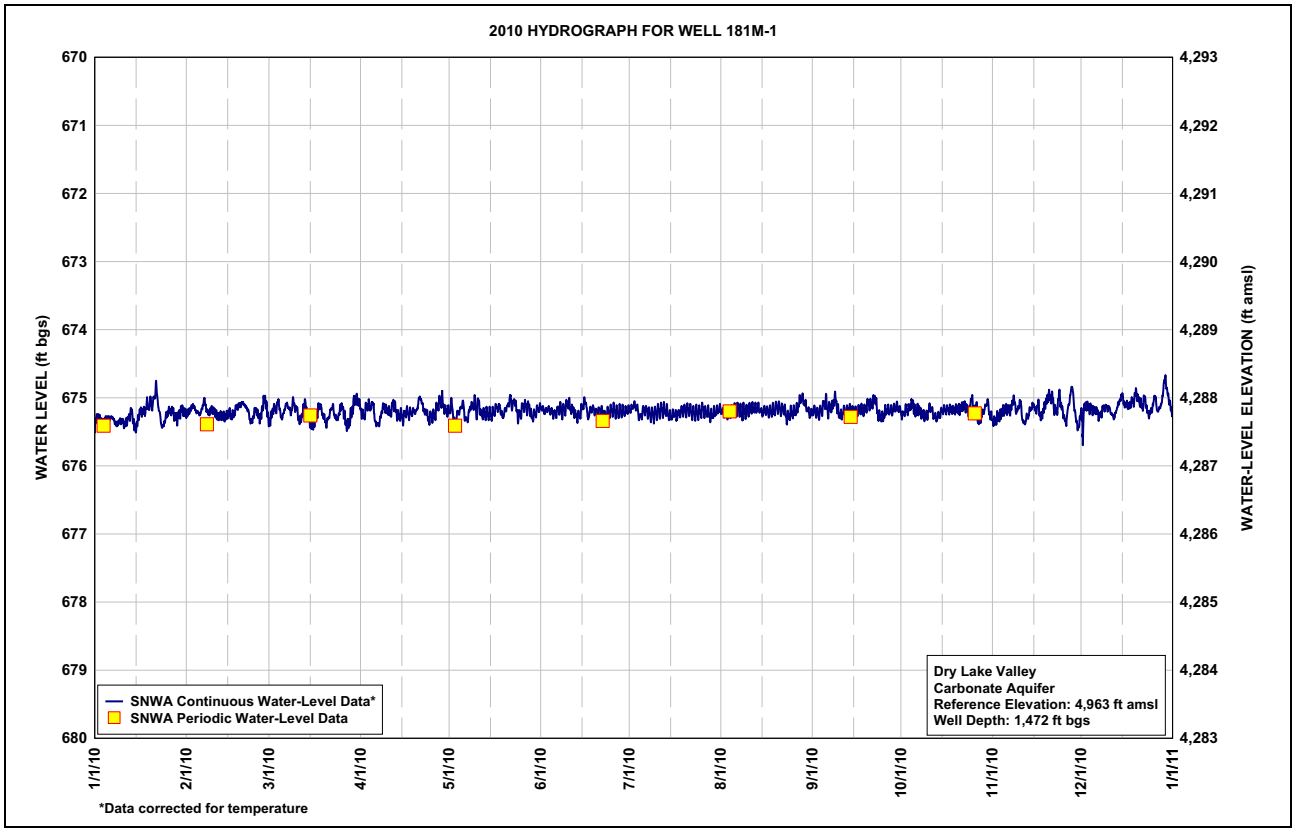

2010 HYDROGRAPH FOR WELL 182M-1
WATER LEVEL (ft bgs)
WATER-LEVEL ELEVATION (ft amsl)
822
823
824
825
826
827
828
829
830
831
832
3,776
3,775
3,774
3,773
3,772
3,771
3,770
3,769
3,768
3,767
3,766
Data logger malfunction
Battery failed
SNWA Continuous Water-Level Data*
SNWA Periodic Water-Level Data
Delamar Valley
Volcanic Aquifer
Reference Elevation: 4,598 ft amsl
Well Depth: 1,331 ft bgs
1/1/10
2/1/10
3/1/10
4/1/10
5/1/10
6/1/10
7/1/10
8/1/10
9/1/10
10/1/10
11/1/10
12/1/10
1/1/11
*Data corrected for temperature

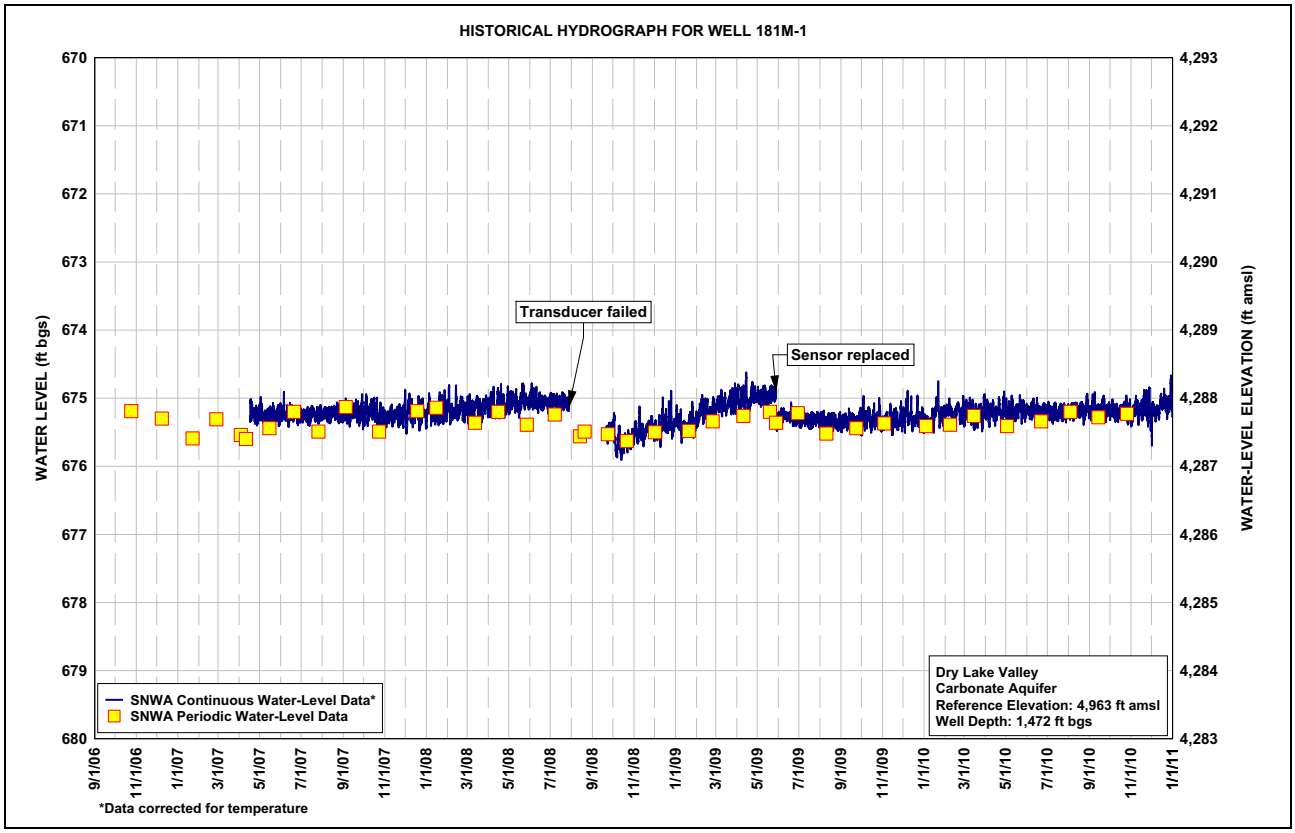

HISTORICAL HYDROGRAPH FOR WELL 182M-1
WATER LEVEL (ft bgs)
WATER-LEVEL ELEVATION (ft amsl)
822
823
824
825
826
827
828
829
830
831
832
3,776
3,775
3,774
3,773
3,772
3,771
3,770
3,769
3,768
3,767
3,766
Sensor failed
Battery failed
Data logger malfunctioned
SNWA Continuous Water-Level Data*
SNWA Periodic Water-Level Data
Delamar Valley
Volcanic Aquifer
Reference Elevation: 4,598 ft amsl
Well Depth: 1,331 ft bgs
9/1/06
11/1/06
1/1/07
3/1/07
5/1/07
7/1/07
9/1/07
11/1/07
1/1/08
3/1/08
5/1/08
7/1/08
9/1/08
11/1/08
1/1/09
3/1/09
5/1/09
7/1/09
9/1/09
11/1/09
1/1/10
3/1/10
5/1/10
7/1/10
9/1/10
11/1/10
1/1/11
*Data corrected for temperature

# Table B-4
# Dry Lake Valley Well 181M-1, Calendar Year 2010
# Water-Level Data, Daily Mean Values

| | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 675.33 | 675.22 | 675.31 | 675.22 | 675.15 | 675.16 | 675.18 | 675.20 | 675.19 | 675.24 | 675.35 | 675.34 |
| 2 | 675.30 | 675.16 | 675.18 | 675.22 | 675.27 | 675.20 | 675.12 | 675.23 | 675.22 | 675.20 | 675.31 | 675.13 |
| 3 | 675.35 | 675.13 | 675.14 | 675.12 | 675.30 | 675.17 | 675.15 | 675.24 | 675.22 | 675.18 | 675.26 | 675.13 |
| 4 | 675.32 | 675.20 | 675.13 | 675.13 | 675.20 | 675.19 | 675.27 | 675.20 | 675.15 | 675.10 | 675.20 | 675.16 |
| 5 | 675.30 | 675.23 | 675.27 | 675.18 | 675.11 | 675.23 | 675.21 | 675.17 | 675.07 | 675.16 | 675.17 | 675.18 |
| 6 | 675.29 | 675.13 | 675.15 | 675.39 | 675.29 | 675.21 | 675.18 | 675.17 | 675.18 | 675.19 | 675.17 | 675.21 |
| 7 | 675.33 | 675.10 | 675.13 | 675.34 | 675.27 | 675.15 | 675.22 | 675.19 | 675.14 | 675.20 | 675.13 | 675.25 |
| 8 | 675.38 | 675.21 | 675.19 | 675.16 | 675.13 | 675.20 | 675.24 | 675.22 | 675.04 | 675.25 | 675.07 | 675.16 |
| 9 | 675.35 | 675.18 | 675.09 | 675.16 | 675.09 | 675.14 | 675.24 | 675.21 | 675.14 | 675.26 | 675.17 | 675.14 |
| 10 | 675.36 | 675.21 | 675.19 | 675.20 | 675.15 | 675.09 | 675.21 | 675.18 | 675.25 | 675.18 | 675.11 | 675.16 |
| 11 | 675.37 | 675.26 | 675.32 | 675.17 | 675.17 | 675.18 | 675.19 | 675.16 | 675.22 | 675.19 | 675.35 | 675.24 |
| 12 | 675.30 | 675.27 | 675.20 | 675.12 | 675.23 | 675.22 | 675.18 | 675.16 | 675.19 | 675.28 | 675.31 | 675.26 |
| 13 | 675.23 | 675.27 | 675.14 | 675.25 | 675.24 | 675.27 | 675.19 | 675.16 | 675.16 | 675.28 | 675.22 | 675.12 |
| 14 | 675.41 | 675.27 | 675.31 | 675.25 | 675.24 | 675.22 | 675.26 | 675.20 | 675.16 | 675.23 | 675.13 | 675.00 |
| 15 | 675.36 | 675.23 | 675.39 | 675.29 | 675.24 | 675.11 | 675.27 | 675.20 | 675.20 | 675.18 | 675.17 | 675.06 |
| 16 | 675.21 | 675.26 | 675.35 | 675.22 | 675.19 | 675.14 | 675.25 | 675.19 | 675.19 | 675.18 | 675.13 | 675.10 |
| 17 | 675.20 | 675.20 | 675.21 | 675.23 | 675.14 | 675.23 | 675.25 | 675.20 | 675.16 | 675.17 | 675.26 | 675.11 |
| 18 | 675.13 | 675.13 | 675.14 | 675.21 | 675.19 | 675.16 | 675.20 | 675.19 | 675.18 | 675.18 | 675.16 | 675.06 |
| 19 | 675.10 | 675.10 | 675.27 | 675.20 | 675.24 | 675.20 | 675.18 | 675.16 | 675.12 | 675.17 | 675.03 | 674.95 |
| 20 | 675.09 | 675.09 | 675.36 | 675.09 | 675.15 | 675.19 | 675.18 | 675.14 | 675.10 | 675.17 | 674.98 | 675.02 |
| 21 | 674.92 | 675.16 | 675.25 | 675.04 | 675.04 | 675.19 | 675.18 | 675.18 | 675.07 | 675.14 | 675.05 | 675.10 |
| 22 | 675.06 | 675.30 | 675.15 | 675.18 | 675.09 | 675.26 | 675.22 | 675.18 | 675.06 | 675.12 | 675.18 | 675.04 |
| 23 | 675.38 | 675.31 | 675.28 | 675.23 | 675.10 | 675.24 | 675.22 | 675.29 | 675.26 | 675.17 | 675.01 | 675.19 |
| 24 | 675.37 | 675.19 | 675.27 | 675.29 | 675.25 | 675.20 | 675.22 | 675.24 | 675.28 | 675.11 | 675.15 | 675.21 |
| 25 | 675.24 | 675.27 | 675.13 | 675.27 | 675.19 | 675.18 | 675.19 | 675.22 | 675.23 | 675.10 | 675.32 | 675.08 |
| 26 | 675.18 | 675.22 | 675.25 | 675.21 | 675.12 | 675.21 | 675.20 | 675.19 | 675.18 | 675.16 | 675.20 | 675.09 |
| 27 | 675.21 | 675.05 | 675.40 | 675.09 | 675.14 | 675.21 | 675.21 | 675.08 | 675.19 | 675.34 | 674.94 | 675.16 |
| 28 | 675.28 | 675.22 | 675.30 | 675.05 | 675.20 | 675.20 | 675.26 | 675.01 | 675.17 | 675.25 | 675.03 | 675.01 |
| 29 | 675.25 | --- | 675.13 | 675.16 | 675.27 | 675.21 | 675.23 | 675.09 | 675.14 | 675.15 | 675.35 | 674.76 |
| 30 | 675.18 | --- | 675.03 | 675.19 | 675.21 | 675.19 | 675.21 | 675.19 | 675.17 | 675.11 | 675.35 | 674.97 |
| 31 | 675.22 | --- | 675.08 | --- | 675.16 | --- | 675.18 | 675.24 | --- | 675.27 | --- | 675.15 |
| Max | 675.41 | 675.31 | 675.40 | 675.39 | 675.30 | 675.27 | 675.27 | 675.29 | 675.28 | 675.34 | 675.35 | 675.34 |
| Min | 674.92 | 675.05 | 675.03 | 675.04 | 675.04 | 675.09 | 675.12 | 675.01 | 675.04 | 675.10 | 674.94 | 674.76 |

**Year 2010 Statistics: Year Max 675.41; Year Min 674.76**
Note: Depth in ft bgs

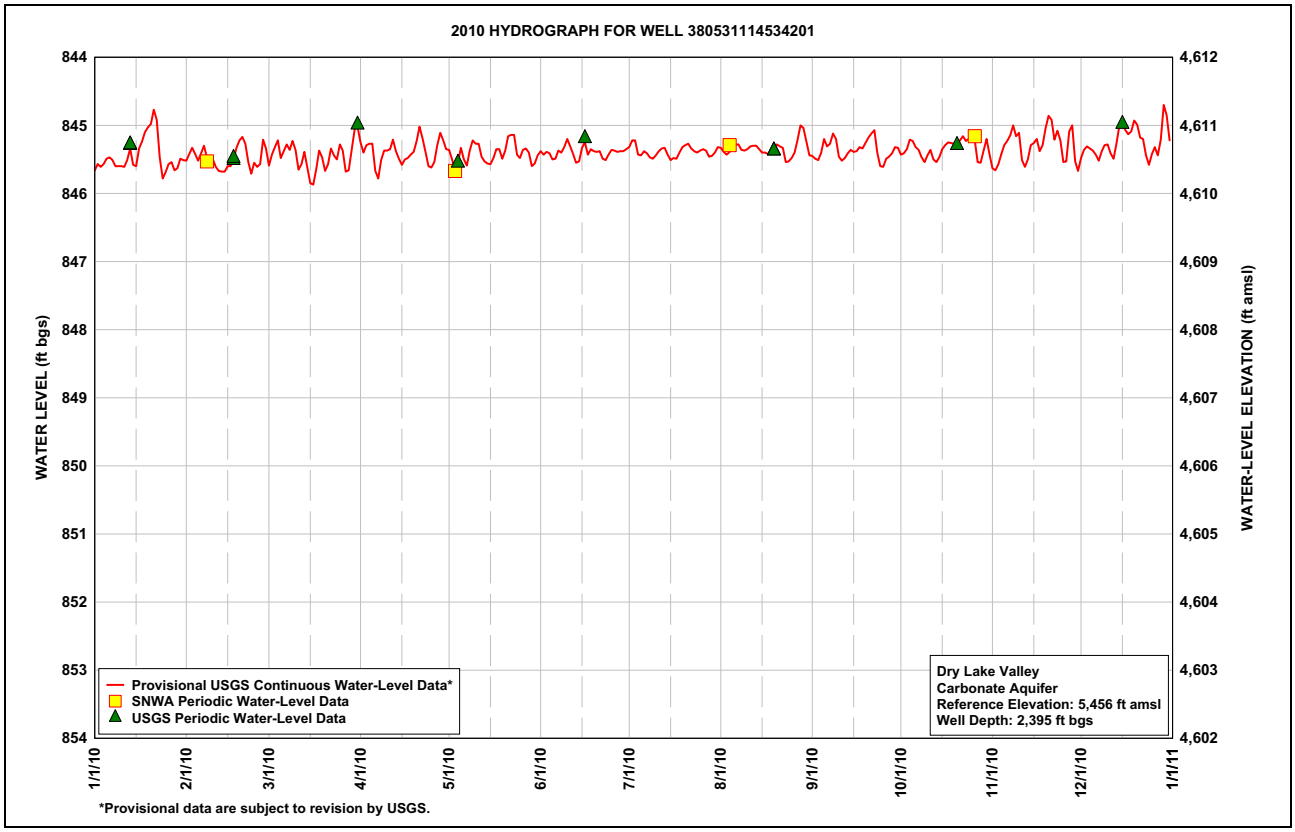

2010 HYDROGRAPH FOR WELL 181M-1
WATER LEVEL (ft bgs)
WATER-LEVEL ELEVATION (ft amsl)
670
671
672
673
674
675
676
677
678
679
680
4,293
4,292
4,291
4,290
4,289
4,288
4,287
4,286
4,285
4,284
4,283
1/1/10
2/1/10
3/1/10
4/1/10
5/1/10
6/1/10
7/1/10
8/1/10
9/1/10
10/1/10
11/1/10
12/1/10
1/1/11
SNWA Continuous Water-Level Data*
SNWA Periodic Water-Level Data
Dry Lake Valley
Carbonate Aquifer
Reference Elevation: 4,963 ft amsl
Well Depth: 1,472 ft bgs
*Data corrected for temperature

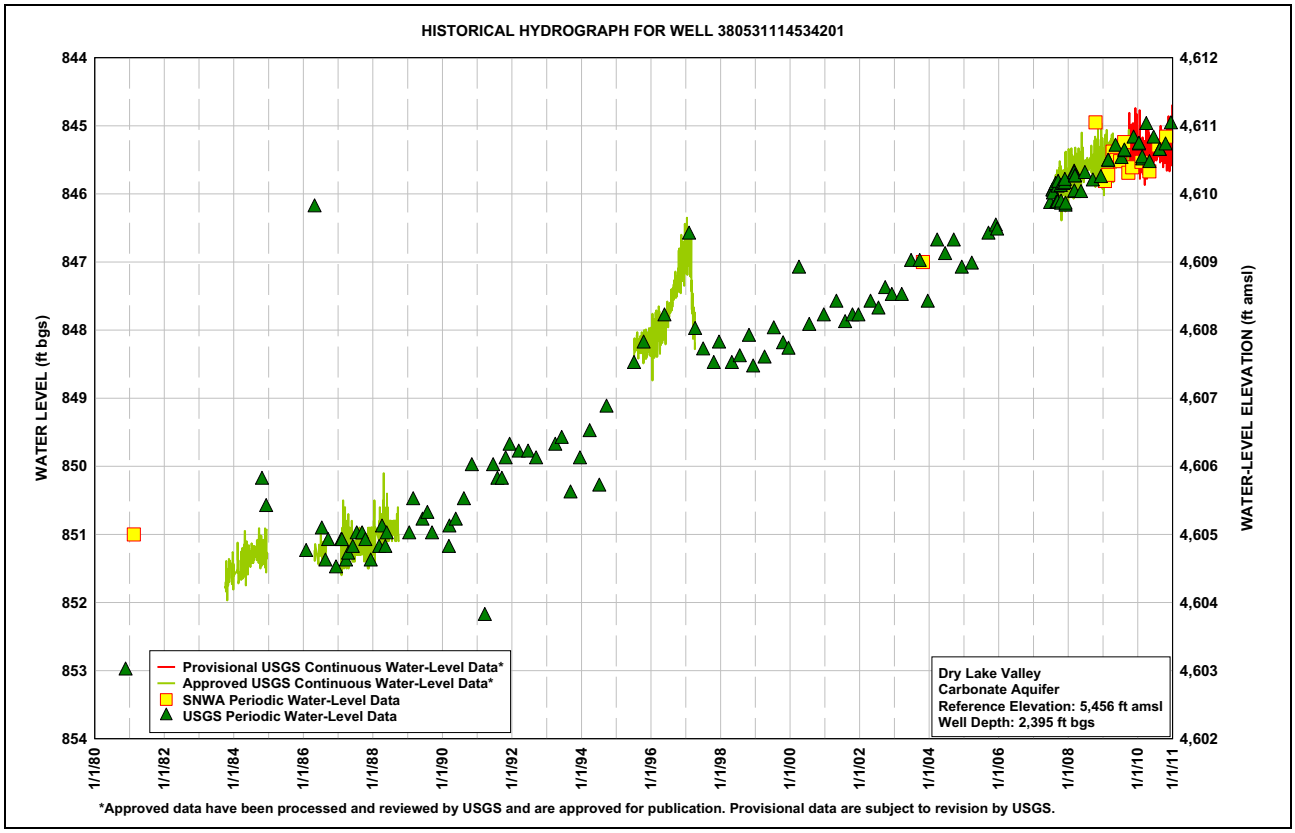

HISTORICAL HYDROGRAPH FOR WELL 181M-1
WATER LEVEL (ft bgs)
WATER-LEVEL ELEVATION (ft amsl)
670
671
672
673
674
675
676
677
678
679
680
4,293
4,292
4,291
4,290
4,289
4,288
4,287
4,286
4,285
4,284
4,283
Transducer failed
Sensor replaced
9/1/06
11/1/06
1/1/07
3/1/07
5/1/07
7/1/07
9/1/07
11/1/07
1/1/08
3/1/08
5/1/08
7/1/08
9/1/08
11/1/08
1/1/09
3/1/09
5/1/09
7/1/09
9/1/09
11/1/09
1/1/10
3/1/10
5/1/10
7/1/10
9/1/10
11/1/10
1/1/11
SNWA Continuous Water-Level Data*
SNWA Periodic Water-Level Data
Dry Lake Valley
Carbonate Aquifer
Reference Elevation: 4,963 ft amsl
Well Depth: 1,472 ft bgs
*Data corrected for temperature

# Table B-5
## Dry Lake Valley Well 380531114534201, Calendar Year 2010
## Water-Level Data, Daily Mean Values

| | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 845.66 | 845.52 | 845.59 | 845.25 | 845.36 | 845.38 | 845.32 | 845.33 | 845.45 | 845.43 | 845.63 | 845.48 |
| 2 | 845.57 | 845.42 | 845.43 | 845.40 | 845.50 | 845.43 | 845.22 | 845.39 | 845.49 | 845.41 | 845.66 | 845.36 |
| 3 | 845.61 | 845.33 | 845.32 | 845.29 | 845.68 | 845.39 | 845.22 | 845.43 | 845.51 | 845.35 | 845.57 | 845.31 |
| 4 | 845.57 | 845.42 | 845.22 | 845.27 | 845.55 | 845.41 | 845.43 | 845.39 | 845.40 | 845.21 | 845.42 | 845.34 |
| 5 | 845.49 | 845.52 | 845.48 | 845.27 | 845.33 | 845.50 | 845.44 | 845.32 | 845.20 | 845.23 | 845.29 | 845.37 |
| 6 | 845.47 | 845.41 | 845.38 | 845.67 | 845.50 | 845.49 | 845.38 | 845.28 | 845.31 | 845.32 | 845.23 | 845.43 |
| 7 | 845.51 | 845.30 | 845.28 | 845.78 | 845.59 | 845.37 | 845.41 | 845.28 | 845.27 | 845.36 | 845.15 | 845.52 |
| 8 | 845.60 | 845.47 | 845.36 | 845.51 | 845.37 | 845.40 | 845.47 | 845.36 | 845.12 | 845.47 | 845.00 | 845.38 |
| 9 | 845.60 | 845.46 | 845.23 | 845.37 | 845.22 | 845.32 | 845.49 | 845.37 | 845.20 | 845.54 | 845.16 | 845.29 |
| 10 | 845.60 | 845.50 | 845.36 | 845.37 | 845.27 | 845.20 | 845.44 | 845.35 | 845.46 | 845.44 | 845.11 | 845.28 |
| 11 | 845.61 | 845.61 | 845.65 | 845.35 | 845.27 | 845.31 | 845.38 | 845.31 | 845.52 | 845.36 | 845.51 | 845.41 |
| 12 | 845.51 | 845.67 | 845.57 | 845.21 | 845.46 | 845.42 | 845.34 | 845.30 | 845.48 | 845.50 | 845.61 | 845.49 |
| 13 | 845.34 | 845.68 | 845.39 | 845.38 | 845.53 | 845.55 | 845.33 | 845.30 | 845.41 | 845.54 | 845.50 | 845.27 |
| 14 | 845.58 | 845.68 | 845.62 | 845.49 | 845.56 | 845.53 | 845.43 | 845.35 | 845.36 | 845.47 | 845.29 | 845.00 |
| 15 | 845.60 | 845.60 | 845.85 | 845.58 | 845.57 | 845.33 | 845.51 | 845.40 | 845.39 | 845.35 | 845.26 | 844.97 |
| 16 | 845.34 | 845.60 | 845.87 | 845.50 | 845.48 | 845.25 | 845.48 | 845.40 | 845.38 | 845.29 | 845.20 | 845.07 |
| 17 | 845.24 | 845.50 | 845.64 | 845.48 | 845.35 | 845.43 | 845.49 | 845.42 | 845.32 | 845.25 | 845.38 | 845.13 |
| 18 | 845.10 | 845.33 | 845.37 | 845.43 | 845.35 | 845.35 | 845.40 | 845.40 | 845.34 | 845.26 | 845.29 | 845.09 |
| 19 | 845.03 | 845.22 | 845.47 | 845.39 | 845.49 | 845.38 | 845.32 | 845.33 | 845.26 | 845.27 | 845.04 | 844.93 |
| 20 | 844.98 | 845.17 | 845.67 | 845.23 | 845.37 | 845.39 | 845.29 | 845.28 | 845.18 | 845.26 | 844.86 | 844.99 |
| 21 | 844.77 | 845.27 | 845.57 | 845.02 | 845.16 | 845.38 | 845.27 | 845.31 | 845.12 | 845.22 | 844.92 | 845.18 |
| 22 | 844.92 | 845.54 | 845.34 | 845.19 | 845.14 | 845.49 | 845.34 | 845.33 | 845.07 | 845.16 | 845.21 | 845.20 |
| 23 | 845.47 | 845.71 | 845.44 | 845.39 | 845.14 | 845.51 | 845.38 | 845.54 | 845.40 | 845.23 | 845.08 | 845.44 |
| 24 | 845.78 | 845.55 | 845.50 | 845.60 | 845.43 | 845.43 | 845.40 | 845.53 | 845.60 | 845.20 | 845.22 | 845.58 |
| 25 | 845.69 | 845.61 | 845.28 | 845.62 | 845.48 | 845.36 | 845.37 | 845.48 | 845.61 | 845.12 | 845.54 | 845.42 |
| 26 | 845.57 | 845.57 | 845.37 | 845.54 | 845.36 | 845.37 | 845.35 | 845.40 | 845.49 | 845.22 | 845.53 | 845.32 |
| 27 | 845.54 | 845.21 | 845.68 | 845.29 | 845.34 | 845.39 | 845.37 | 845.21 | 845.46 | 845.54 | 845.09 | 845.44 |
| 28 | 845.66 | 845.34 | 845.66 | 845.11 | 845.40 | 845.38 | 845.46 | 845.00 | 845.41 | 845.55 | 845.00 | 845.21 |
| 29 | 845.63 | -- | 845.36 | 845.22 | 845.60 | 845.38 | 845.45 | 845.04 | 845.32 | 845.37 | 845.53 | 844.70 |
| 30 | 845.49 | -- | 845.06 | 845.35 | 845.56 | 845.35 | 845.40 | 845.24 | 845.33 | 845.20 | 845.67 | 844.85 |
| 31 | 845.51 | -- | 845.02 | -- | 845.44 | -- | 845.32 | 845.44 | -- | 845.42 | -- | 845.22 |
| Max | 845.78 | 845.71 | 845.87 | 845.78 | 845.68 | 845.55 | 845.51 | 845.54 | 845.61 | 845.55 | 845.67 | 845.58 |
| Min | 844.77 | 845.17 | 845.02 | 845.02 | 845.14 | 845.20 | 845.22 | 845.00 | 845.07 | 845.12 | 844.86 | 844.70 |

**Year 2010 Statistics: Year Max 845.877; Year Min 844.70**
Note: Depth in ft bgs

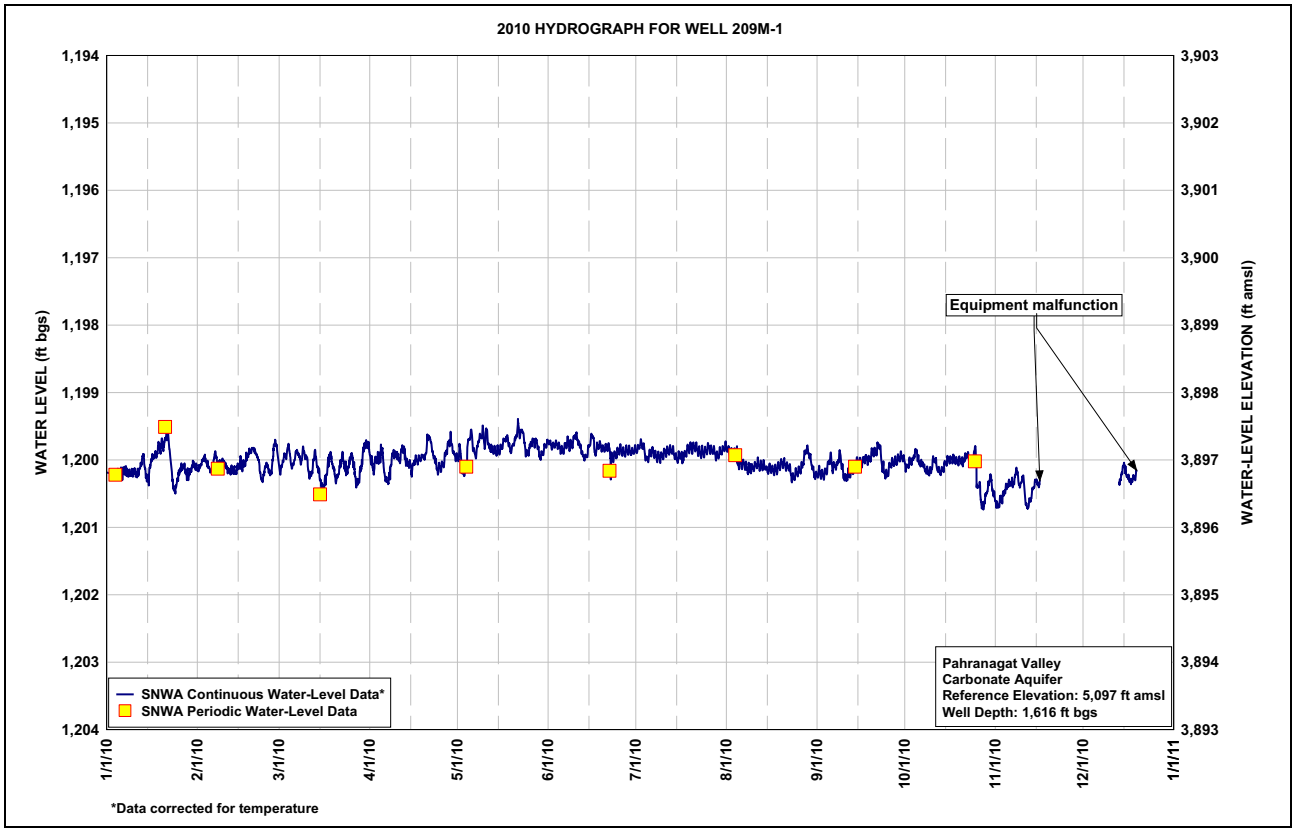

2010 HYDROGRAPH FOR WELL 380531114534201
WATER LEVEL (ft bgs)
WATER-LEVEL ELEVATION (ft amsl)
844
845
846
847
848
849
850
851
852
853
854
4,612
4,611
4,610
4,609
4,608
4,607
4,606
4,605
4,604
4,603
4,602
1/1/10
2/1/10
3/1/10
4/1/10
5/1/10
6/1/10
7/1/10
8/1/10
9/1/10
10/1/10
11/1/10
12/1/10
1/1/11
Provisional USGS Continuous Water-Level Data*
SNWA Periodic Water-Level Data
USGS Periodic Water-Level Data
Dry Lake Valley
Carbonate Aquifer
Reference Elevation: 5,456 ft amsl
Well Depth: 2,395 ft bgs
*Provisional data are subject to revision by USGS.

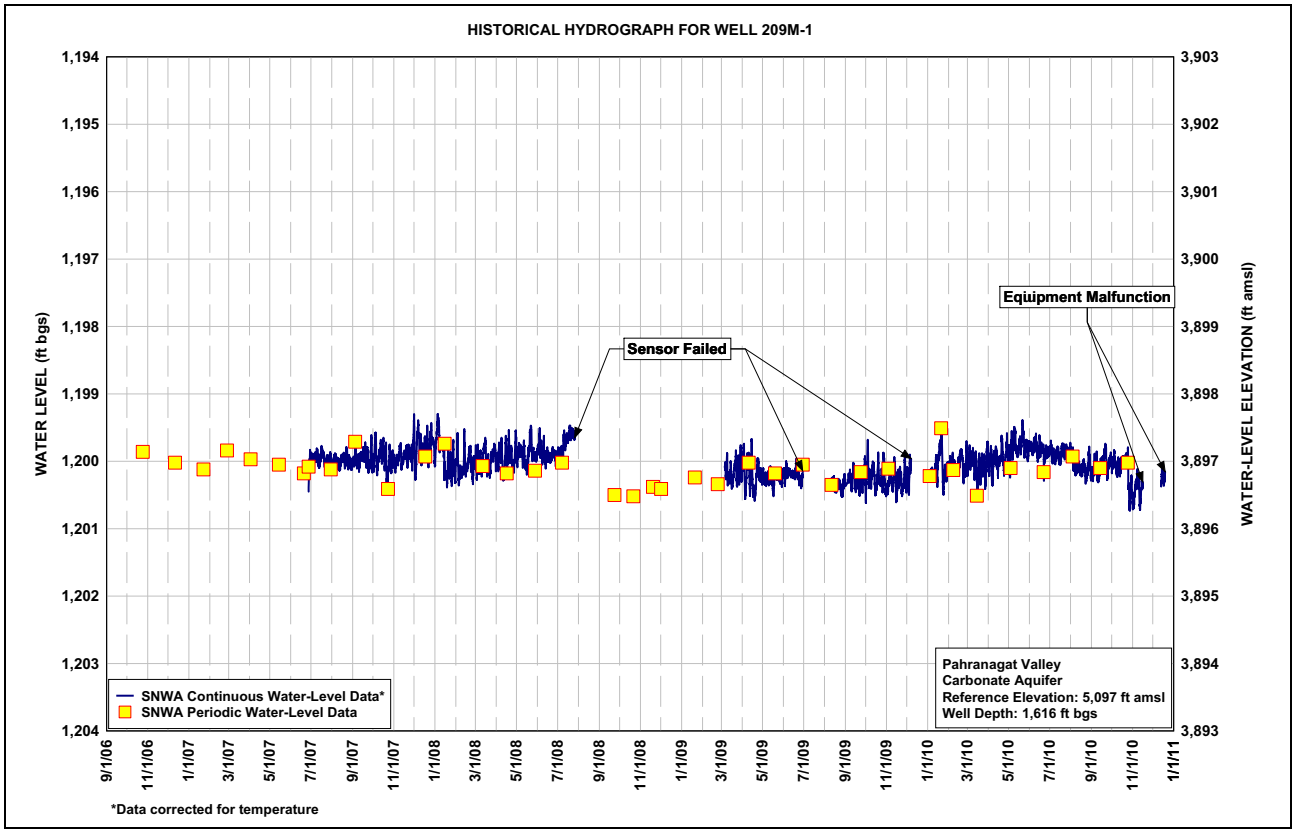

HISTORICAL HYDROGRAPH FOR WELL 380531114534201
WATER LEVEL (ft bgs)
WATER-LEVEL ELEVATION (ft amsl)
844
845
846
847
848
849
850
851
852
853
854
4,612
4,611
4,610
4,609
4,608
4,607
4,606
4,605
4,604
4,603
4,602
1/1/80
1/1/82
1/1/84
1/1/86
1/1/88
1/1/90
1/1/92
1/1/94
1/1/96
1/1/98
1/1/00
1/1/02
1/1/04
1/1/06
1/1/08
1/1/10
1/1/11
Provisional USGS Continuous Water-Level Data*
Approved USGS Continuous Water-Level Data*
SNWA Periodic Water-Level Data
USGS Periodic Water-Level Data
Dry Lake Valley
Carbonate Aquifer
Reference Elevation: 5,456 ft amsl
Well Depth: 2,395 ft bgs
*Approved data have been processed and reviewed by USGS and are approved for publication. Provisional data are subject to revision by USGS.

# Table B-6
# Pahranagat Valley Well 209M-1, Calendar Year 2010
# Water-Level Data, Daily Mean Values

| | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | [b]--- | 1200.13 | 1200.15 | 1200.02 | 1199.92 | 1199.74 | 1199.85 | 1199.84 | 1200.20 | 1200.10 | 1200.66 | [b]--- |
| 2 | [b]--- | 1200.05 | 1200.00 | 1200.11 | 1200.06 | 1199.80 | 1199.77 | 1199.89 | 1200.21 | 1200.05 | 1200.63 | [b]--- |
| 3 | [b]--- | 1199.99 | 1199.92 | 1199.98 | 1200.17 | 1199.77 | 1199.79 | 1199.90 | 1200.21 | 1200.02 | 1200.55 | [b]--- |
| 4 | [a]--- | 1200.08 | 1199.88 | 1199.96 | 1199.85 | 1199.79 | 1199.96 | 1199.94 | 1200.12 | 1199.90 | 1200.44 | [b]--- |
| 5 | 1200.18 | 1200.16 | 1200.09 | 1199.97 | 1199.63 | 1199.85 | 1199.94 | 1200.06 | 1199.99 | 1199.96 | 1200.36 | [b]--- |
| 6 | 1200.17 | 1200.05 | 1199.96 | 1200.28 | 1199.83 | 1199.83 | 1199.88 | 1200.06 | 1200.10 | 1200.05 | 1200.34 | [b]--- |
| 7 | 1200.17 | 1199.97 | 1199.91 | 1200.28 | 1199.88 | 1199.74 | 1199.91 | 1200.08 | 1200.09 | 1200.09 | 1200.30 | [b]--- |
| 8 | 1200.21 | 1200.09 | 1200.01 | 1200.02 | 1199.69 | 1199.78 | 1199.96 | 1200.14 | 1199.96 | 1200.16 | 1200.20 | [b]--- |
| 9 | 1200.20 | 1200.04 | 1199.89 | 1199.92 | 1199.61 | 1199.73 | 1199.96 | 1200.13 | 1200.07 | 1200.18 | 1200.36 | [b]--- |
| 10 | 1200.18 | 1200.07 | 1200.01 | 1199.96 | 1199.69 | 1199.65 | 1199.91 | 1200.10 | 1200.26 | 1200.06 | 1200.29 | [b]--- |
| 11 | 1200.21 | 1200.15 | 1200.23 | 1199.96 | 1199.72 | 1199.76 | 1199.88 | 1200.07 | 1200.25 | 1200.03 | 1200.62 | [b]--- |
| 12 | 1200.11 | 1200.17 | 1200.11 | 1199.85 | 1199.83 | 1199.86 | 1199.86 | 1200.07 | 1200.21 | 1200.15 | 1200.65 | [b]--- |
| 13 | 1199.99 | 1200.17 | 1199.96 | 1200.02 | 1199.86 | 1199.96 | 1199.86 | 1200.07 | 1200.15 | 1200.17 | 1200.51 | 1200.30 |
| 14 | 1200.22 | 1200.16 | 1200.17 | 1200.07 | 1199.86 | 1199.89 | 1199.95 | 1200.12 | 1200.06 | 1200.10 | 1200.35 | 1200.15 |
| 15 | 1200.21 | 1200.09 | 1200.37 | 1200.12 | 1199.85 | 1199.73 | 1199.98 | 1200.15 | 1200.03 | 1200.01 | 1200.35 | 1200.16 |
| 16 | 1200.00 | 1200.11 | 1200.36 | 1200.02 | 1199.77 | 1199.71 | 1199.95 | 1200.14 | 1200.03 | 1199.99 | [a]--- | 1200.26 |
| 17 | 1199.94 | 1200.04 | 1200.14 | 1200.01 | 1199.69 | 1199.86 | 1199.95 | 1200.15 | 1199.98 | 1199.98 | [b]--- | 1200.31 |
| 18 | 1199.86 | 1199.92 | 1199.96 | 1199.98 | 1199.74 | 1199.78 | 1199.86 | 1200.13 | 1200.00 | 1200.00 | [b]--- | 1200.26 |
| 19 | 1199.81 | 1199.87 | 1200.11 | 1199.96 | 1199.84 | 1199.82 | 1199.82 | 1200.07 | 1199.93 | 1200.01 | [b]--- | [a]--- |
| 20 | 1199.78 | 1199.86 | 1200.28 | 1199.81 | 1199.72 | 1199.82 | 1199.82 | 1200.05 | 1199.88 | 1200.02 | [b]--- | [b]--- |
| 21 | 1199.62 | 1199.96 | 1200.17 | 1199.69 | 1199.56 | 1199.81 | 1199.81 | 1200.09 | 1199.85 | 1199.98 | [b]--- | [b]--- |
| 22 | 1199.84 | 1200.17 | 1199.98 | 1199.88 | 1199.60 | 1199.94 | 1199.87 | 1200.11 | 1199.83 | 1199.93 | [b]--- | [b]--- |
| 23 | 1200.27 | 1200.27 | 1200.10 | 1200.03 | 1199.63 | 1199.96 | 1199.89 | 1200.26 | 1200.11 | 1200.01 | [b]--- | [b]--- |
| 24 | 1200.43 | 1200.10 | 1200.15 | 1200.14 | 1199.87 | 1199.90 | 1199.89 | 1200.23 | 1200.21 | 1199.97 | [b]--- | [b]--- |
| 25 | 1200.26 | 1200.16 | 1199.97 | 1200.11 | 1199.85 | 1199.85 | 1199.84 | 1200.18 | 1200.16 | 1200.10 | [b]--- | [b]--- |
| 26 | 1200.14 | 1200.12 | 1200.08 | 1200.02 | 1199.74 | 1199.88 | 1199.84 | 1200.13 | 1200.06 | 1200.40 | [b]--- | [b]--- |
| 27 | 1200.12 | 1199.78 | 1200.33 | 1199.84 | 1199.73 | 1199.88 | 1199.86 | 1199.98 | 1200.04 | 1200.66 | [b]--- | [b]--- |
| 28 | 1200.22 | [a]--- | 1200.25 | 1199.72 | 1199.80 | 1199.86 | 1199.93 | 1199.86 | 1200.00 | 1200.58 | [b]--- | [b]--- |
| 29 | 1200.20 | --- | 1199.99 | 1199.86 | 1199.94 | 1199.88 | 1199.91 | 1199.95 | 1199.96 | 1200.41 | [b]--- | [b]--- |
| 30 | 1200.09 | --- | 1199.79 | 1199.96 | 1199.86 | 1199.86 | 1199.87 | 1200.12 | 1199.98 | 1200.30 | [b]--- | [b]--- |
| 31 | 1200.11 | --- | 1199.81 | --- | 1199.77 | --- | 1199.82 | 1200.23 | --- | 1200.51 | --- | [b]--- |
| Max | 1200.43 | 1200.27 | 1200.37 | 1200.28 | 1200.17 | 1199.96 | 1199.98 | 1200.26 | 1200.26 | 1200.66 | 1200.66 | 1200.31 |
| Min | 1199.62 | 1199.78 | 1199.79 | 1199.69 | 1199.56 | 1199.65 | 1199.77 | 1199.84 | 1199.83 | 1199.90 | 1200.20 | 1200.15 |

**Year 2010 Statistics: Year Max 1,200.66; Year Min 1,199.56**
Note: Depth in ft bgs


2010 HYDROGRAPH FOR WELL 209M-1
WATER LEVEL (ft bgs)
WATER-LEVEL ELEVATION (ft amsl)
1,194
1,195
1,196
1,197
1,198
1,199
1,200
1,201
1,202
1,203
1,204
3,903
3,902
3,901
3,900
3,899
3,898
3,897
3,896
3,895
3,894
3,893
1/1/10
2/1/10
3/1/10
4/1/10
5/1/10
6/1/10
7/1/10
8/1/10
9/1/10
10/1/10
11/1/10
12/1/10
1/1/11
Equipment malfunction
SNWA Continuous Water-Level Data*
SNWA Periodic Water-Level Data
Pahranagat Valley
Carbonate Aquifer
Reference Elevation: 5,097 ft amsl
Well Depth: 1,616 ft bgs
*Data corrected for temperature


HISTORICAL HYDROGRAPH FOR WELL 209M-1
WATER LEVEL (ft bgs)
WATER-LEVEL ELEVATION (ft amsl)
1,194
1,195
1,196
1,197
1,198
1,199
1,200
1,201
1,202
1,203
1,204
3,903
3,902
3,901
3,900
3,899
3,898
3,897
3,896
3,895
3,894
3,893
9/1/06
11/1/06
1/1/07
3/1/07
5/1/07
7/1/07
9/1/07
11/1/07
1/1/08
3/1/08
5/1/08
7/1/08
9/1/08
11/1/08
1/1/09
3/1/09
5/1/09
7/1/09
9/1/09
11/1/09
1/1/10
3/1/10
5/1/10
7/1/10
9/1/10
11/1/10
1/1/11
Sensor Failed
Equipment Malfunction
SNWA Continuous Water-Level Data*
SNWA Periodic Water-Level Data
Pahranagat Valley
Carbonate Aquifer
Reference Elevation: 5,097 ft amsl
Well Depth: 1,616 ft bgs
*Data corrected for temperature

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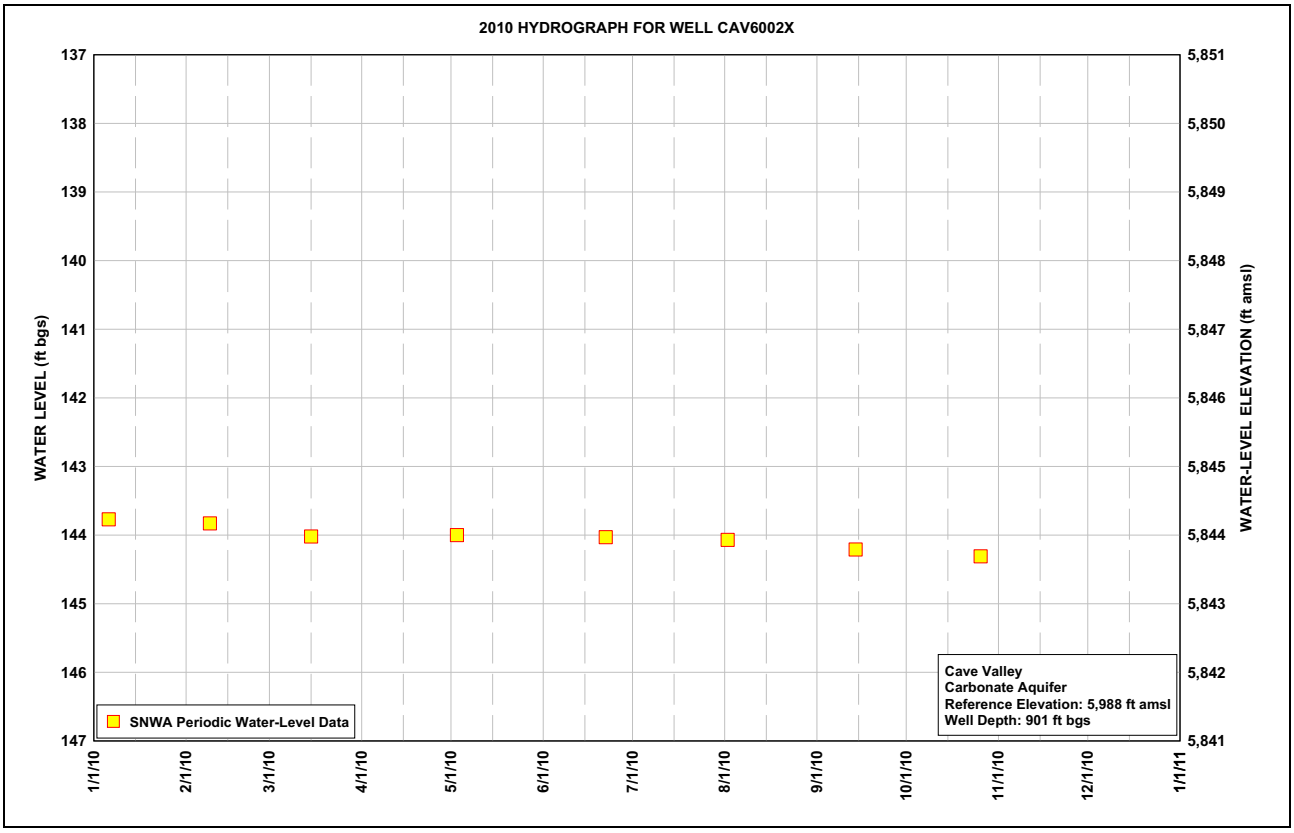
# Appendix C

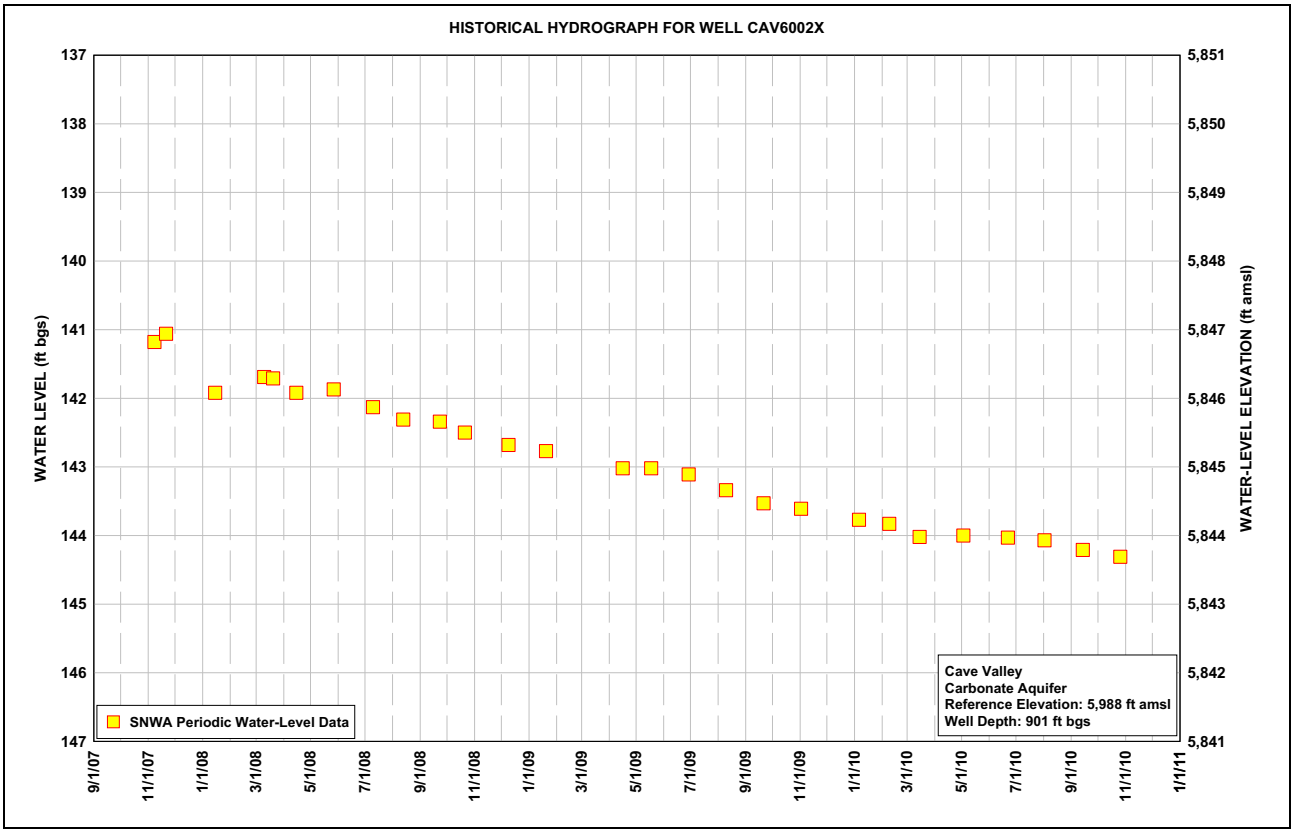
# Periodic Water-Level Measurements and Hydrographs for SNWA Exploratory and Test Wells

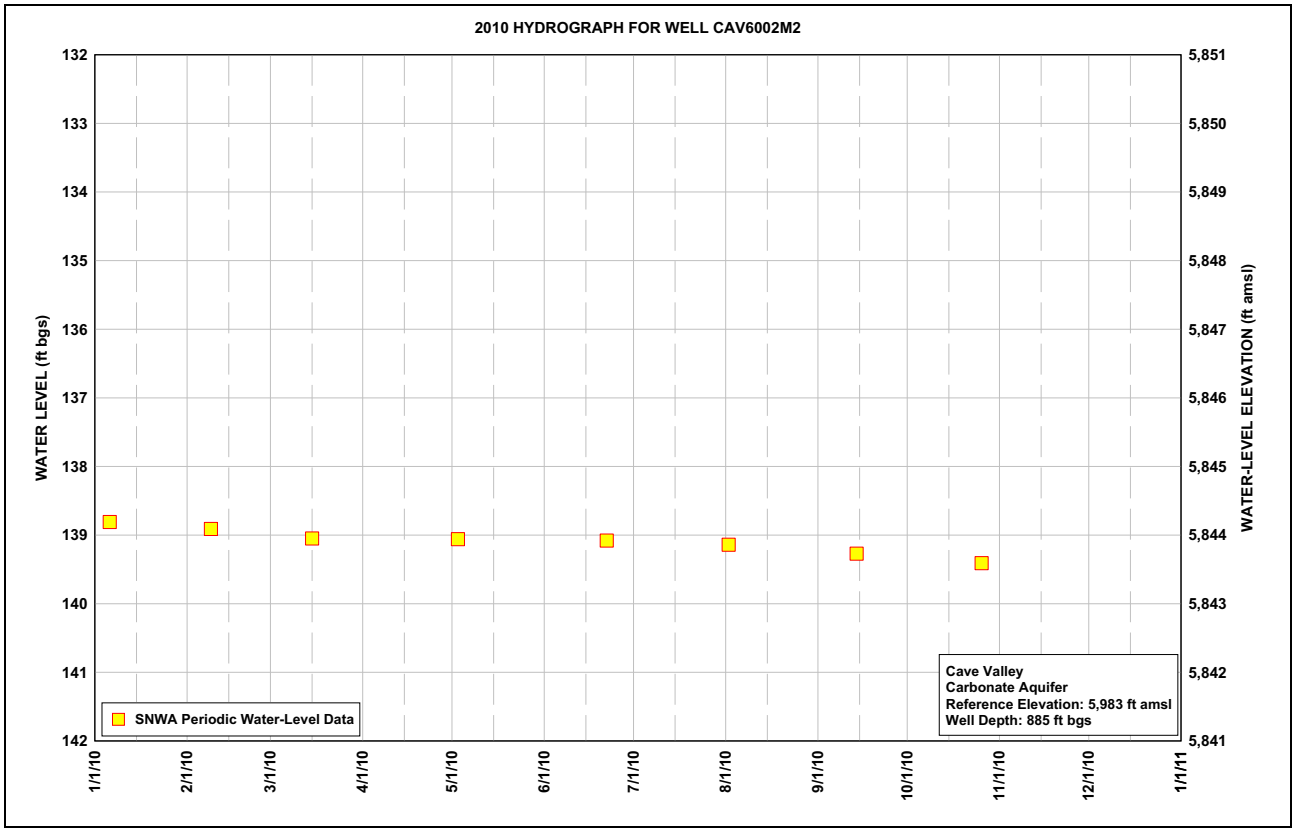
## Table C-1
## Periodic Water-Level Measurements Collected at SNWA Exploratory and Test Wells

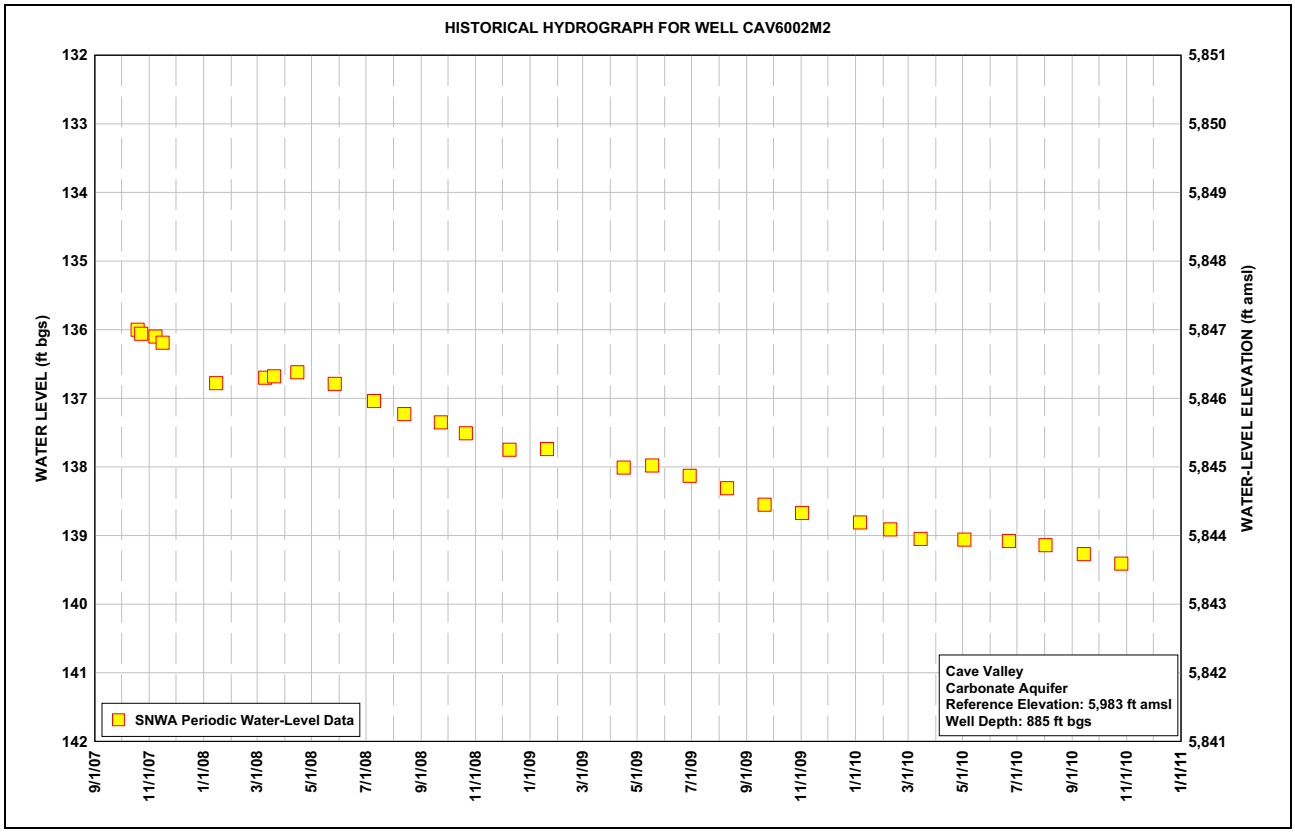
| Site Number | Station Local Number | Well Depth (ft bgs) | Surface Elevation (ft amsl) | Water Level | | | |
|---|---|---|---|---|---|---|---|
| | | | | Date | Depth to Water (ft bgs) | Well Status[a] | Measurement Method[b] |
| CAV6002X | CAV6002X | 901 | 5,987.97 | 1/6/2010 | 143.77 | S | T |
| | | | | 2/9/2010 | 143.83 | S | T |
| | | | | 3/15/2010 | 144.02 | S | T |
| | | | | 5/3/2010 | 144.00 | S | T |
| | | | | 6/22/2010 | 144.03 | S | T |
| | | | | 8/2/2010 | 144.07 | S | T |
| | | | | 9/14/2010 | 144.21 | S | T |
| | | | | 10/26/2010 | 144.31 | S | T |
| CAV6002M2 | CAV6002M2 | 885 | 5,982.81 | 1/6/2010 | 138.81 | S | T |
| | | | | 2/9/2010 | 138.91 | S | T |
| | | | | 3/15/2010 | 139.05 | S | T |
| | | | | 5/3/2010 | 139.06 | S | T |
| | | | | 6/22/2010 | 139.08 | S | T |
| | | | | 8/2/2010 | 139.14 | S | T |
| | | | | 9/14/2010 | 139.27 | S | T |
| | | | | 10/26/2010 | 139.41 | S | T |

[a]S = Static conditions
[b]T = Electric tape measurement


2010 HYDROGRAPH FOR WELL CAV6002X
WATER LEVEL (ft bgs)
WATER-LEVEL ELEVATION (ft amsl)
137
138
139
140
141
142
143
144
145
146
147
5,851
5,850
5,849
5,848
5,847
5,846
5,845
5,844
5,843
5,842
5,841
1/1/10
2/1/10
3/1/10
4/1/10
5/1/10
6/1/10
7/1/10
8/1/10
9/1/10
10/1/10
11/1/10
12/1/10
1/1/11
SNWA Periodic Water-Level Data
Cave Valley
Carbonate Aquifer
Reference Elevation: 5,988 ft amsl
Well Depth: 901 ft bgs


HISTORICAL HYDROGRAPH FOR WELL CAV6002X
WATER LEVEL (ft bgs)
WATER-LEVEL ELEVATION (ft amsl)
137
138
139
140
141
142
143
144
145
146
147
5,851
5,850
5,849
5,848
5,847
5,846
5,845
5,844
5,843
5,842
5,841
9/1/07
11/1/07
1/1/08
3/1/08
5/1/08
7/1/08
9/1/08
11/1/08
1/1/09
3/1/09
5/1/09
7/1/09
9/1/09
11/1/09
1/1/10
3/1/10
5/1/10
7/1/10
9/1/10
11/1/10
1/1/11
SNWA Periodic Water-Level Data
Cave Valley
Carbonate Aquifer
Reference Elevation: 5,988 ft amsl
Well Depth: 901 ft bgs


2010 HYDROGRAPH FOR WELL CAV6002M2
WATER LEVEL (ft bgs)
WATER-LEVEL ELEVATION (ft amsl)
132
133
134
135
136
137
138
139
140
141
142
5,851
5,850
5,849
5,848
5,847
5,846
5,845
5,844
5,843
5,842
5,841
1/1/10
2/1/10
3/1/10
4/1/10
5/1/10
6/1/10
7/1/10
8/1/10
9/1/10
10/1/10
11/1/10
12/1/10
1/1/11
SNWA Periodic Water-Level Data
Cave Valley
Carbonate Aquifer
Reference Elevation: 5,983 ft amsl
Well Depth: 885 ft bgs


HISTORICAL HYDROGRAPH FOR WELL CAV6002M2
WATER LEVEL (ft bgs)
WATER-LEVEL ELEVATION (ft amsl)
132
133
134
135
136
137
138
139
140
141
142
5,851
5,850
5,849
5,848
5,847
5,846
5,845
5,844
5,843
5,842
5,841
9/1/07
11/1/07
1/1/08
3/1/08
5/1/08
7/1/08
9/1/08
11/1/08
1/1/09
3/1/09
5/1/09
7/1/09
9/1/09
11/1/09
1/1/10
3/1/10
5/1/10
7/1/10
9/1/10
11/1/10
1/1/11
SNWA Periodic Water-Level Data
Cave Valley
Carbonate Aquifer
Reference Elevation: 5,983 ft amsl
Well Depth: 885 ft bgs

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# Appendix D

# Spring Discharge Measurements and Hydrographs

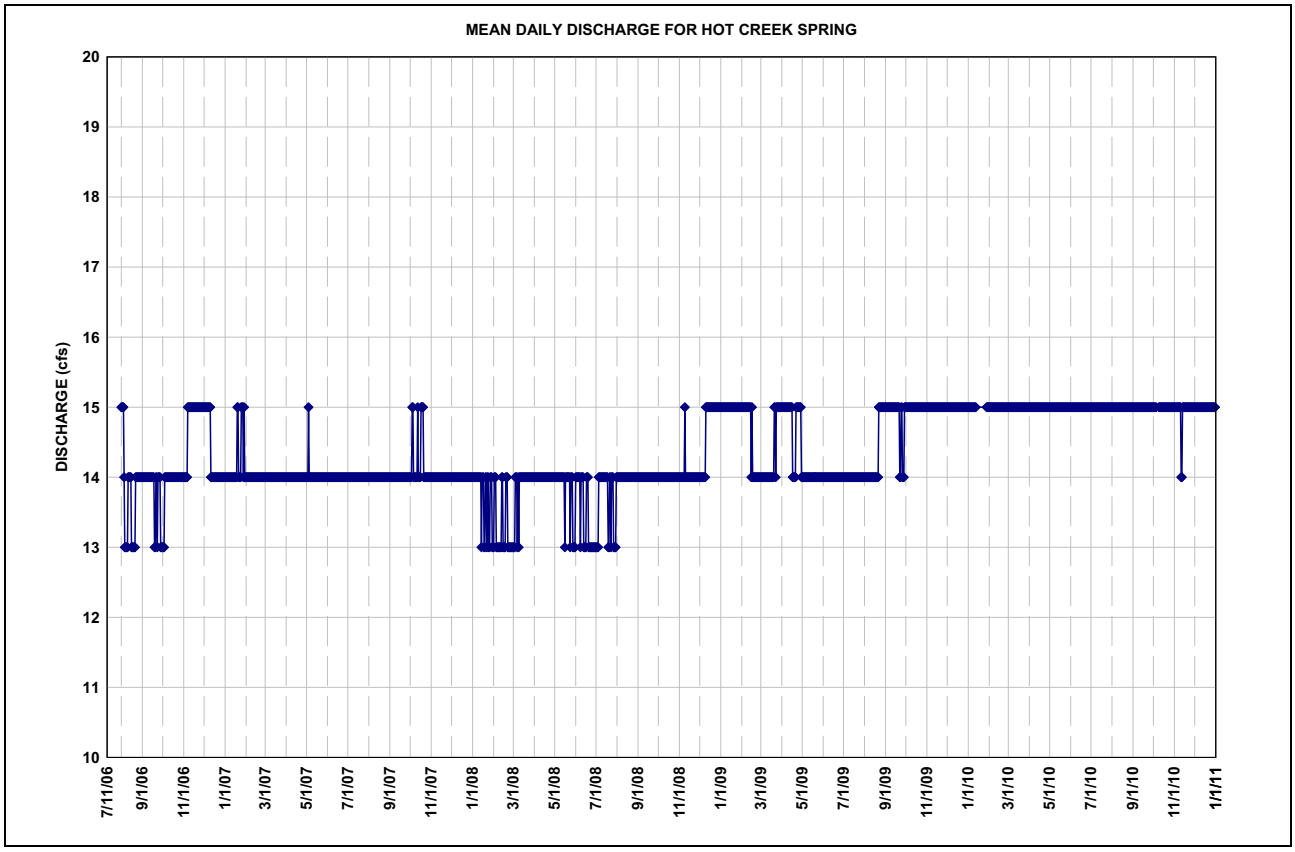
## Table D-1
## Spring Discharge Measurements
(Page 1 of 2)

| Station Name | Primary Name | Date | Discharge (cfs) | Reported Unit |
|---|---|---|---|---|
| Hot Creek Spring near Sunnyside, NV | 09415558 | 1/29/2010 | 15.1 | cfs |
| | | 3/11/2010 | 15.5 | cfs |
| | | 4/28/2010 | 14.7 | cfs |
| | | 5/12/2010 | 14.0[a] | cfs |
| | | 6/16/2010 | 15.0 | cfs |
| | | 6/16/2010 | 15.0 | cfs |
| | | 8/6/2010 | 14.8 | cfs |
| | | 9/21/2010 | 14.8 | cfs |
| | | 10/8/2010 | 14.8 | cfs |
| | | 11/9/2010 | 14.4 | cfs |
| | | 12/7/2010 | 15.3 | cfs |
| | | 12/7/2010 | 14.5 | cfs |
| Moorman Spring | 2071101 | 5/6/2010 | 0.31 | cfs |
| | | 5/6/2010 | 0.29 | cfs |
| | | 10/20/2010 | 0.11 | cfs |
| | | 10/20/2010 | 0.12 | cfs |
| Flag Spring 3 | 2071301 | 5/6/2010 | 1.95 | cfs |
| | | 5/6/2010 | 1.97 | cfs |
| | | 5/12/2010 | 1.81[a] | cfs |
| | | 7/28/2010 | 1.95[a] | cfs |
| | | 9/14/2010 | 1.93 | cfs |
| | | 9/14/2010 | 1.89 | cfs |
| Flag Spring 2 | 2071302 | 1/7/2010 | 2.71[a] | cfs |
| | | 2/25/2010 | 2.73[a] | cfs |
| | | 3/1/2010 | 2.68[a] | cfs |
| | | 4/1/2010 | 2.60[a] | cfs |
| | | 5/6/2010 | 2.85 | cfs |
| | | 5/6/2010 | 2.86 | cfs |
| | | 5/11/2010 | 2.81[a] | cfs |
| | | 5/12/2010 | 2.68[a] | cfs |
| | | 7/28/2010 | 2.84[a] | cfs |
| | | 9/1/2010 | 2.60[a] | cfs |
| | | 9/14/2010 | 2.70 | cfs |
| | | 9/14/2010 | 2.69 | cfs |
| | | 10/12/2010 | 2.36[a] | cfs |
| | | 11/17/2010 | 2.75[a] | cfs |
| Flag Spring 1 | 2071303 | 5/6/2010 | 1.86 | cfs |
| | | 5/6/2010 | 1.93 | cfs |
| | | 5/12/2010 | 2.29[a] | cfs |
| | | 7/28/2010 | 2.36[a] | cfs |
| | | 9/14/2010 | 2.05 | cfs |
| | | 9/14/2010 | 2.12 | cfs |
| Hardy Springs | 2071501 | 5/11/2010 | 0.34[a] | cfs |
| | | 11/17/2010 | 0.31[a] | cfs |

# Table D-1
## Spring Discharge Measurements
(Page 2 of 2)

| Station Name | Primary Name | Date | Discharge (cfs) | Reported Unit |
|---|---|---|---|---|
| Crystal Springs near Hiko, NV | 2090401 | 2/5/2010 | 12.7 | cfs |
| | | 3/30/2010 | 2.78 | cfs |
| | | 4/29/2010 | 2.98 | cfs |
| | | 5/12/2010 | 13.1[a] | cfs |
| | | 5/27/2010 | 13.4 | cfs |
| | | 7/22/2010 | 2.85 | cfs |
| | | 9/3/2010 | 12.3 | cfs |
| | | 10/14/2010 | 13.5 | cfs |
| | | 11/24/2010 | 3.05 | cfs |
| Crystal Springs Diversion near Hiko, NV | 09415589 | 3/30/2010 | 8.70 | cfs |
| | | 4/29/2010 | 8.40 | cfs |
| | | 7/22/2010 | 7.54 | cfs |
| | | 11/24/2010 | 8.32 | cfs |
| Ash Springs Creek below Highway 93 at Ash Springs, NV | 2090501 | 1/28/2010 | 19.0 | cfs |
| | | 3/11/2010 | 17.0 | cfs |
| | | 4/27/2010 | 17.1 | cfs |
| | | 6/3/2010 | 17.6 | cfs |
| | | 7/22/2010 | 17.7 | cfs |
| | | 9/2/2010 | 16.9 | cfs |
| | | 10/14/2010 | 17.8 | cfs |
| | | 11/24/2010 | 16.0 | cfs |
| Ash Springs Diversion at Ash Springs, NV | 09415639 | 1/28/2010 | 1.87 | cfs |
| | | 3/11/2010 | 3.67 | cfs |
| | | 4/27/2010 | 2.07 | cfs |
| | | 6/3/2010 | 2.05 | cfs |
| | | 7/22/2010 | 2.68 | cfs |
| | | 9/2/2010 | 2.36 | cfs |
| | | 10/14/2010 | 1.97 | cfs |
| | | 11/24/2010 | 2.19 | cfs |
| Cave Spring | 1800101 | 5/11/2010 | 3.93[a] | cfs |
| | | 11/9/2010 | 0[a] | cfs |
| Littlefield Spring | 1810301 | 5/10/2010 | 0.04[a] | cfs |
| | | 11/8/2010 | 0.05[a] | cfs |

Note: USGS is the owner agency for the data presented unless otherwise specified.
[a]Data collected by SNWA which is the data owner agency.
[b]No measurement made.


MEAN DAILY DISCHARGE FOR HOT CREEK SPRING
DISCHARGE (cfs)
20
19
18
17
16
15
14
13
12
11
10
7/11/06
9/1/06
11/1/06
1/1/07
3/1/07
5/1/07
7/1/07
9/1/07
11/1/07
1/1/08
3/1/08
5/1/08
7/1/08
9/1/08
11/1/08
1/1/09
3/1/09
5/1/09
7/1/09
9/1/09
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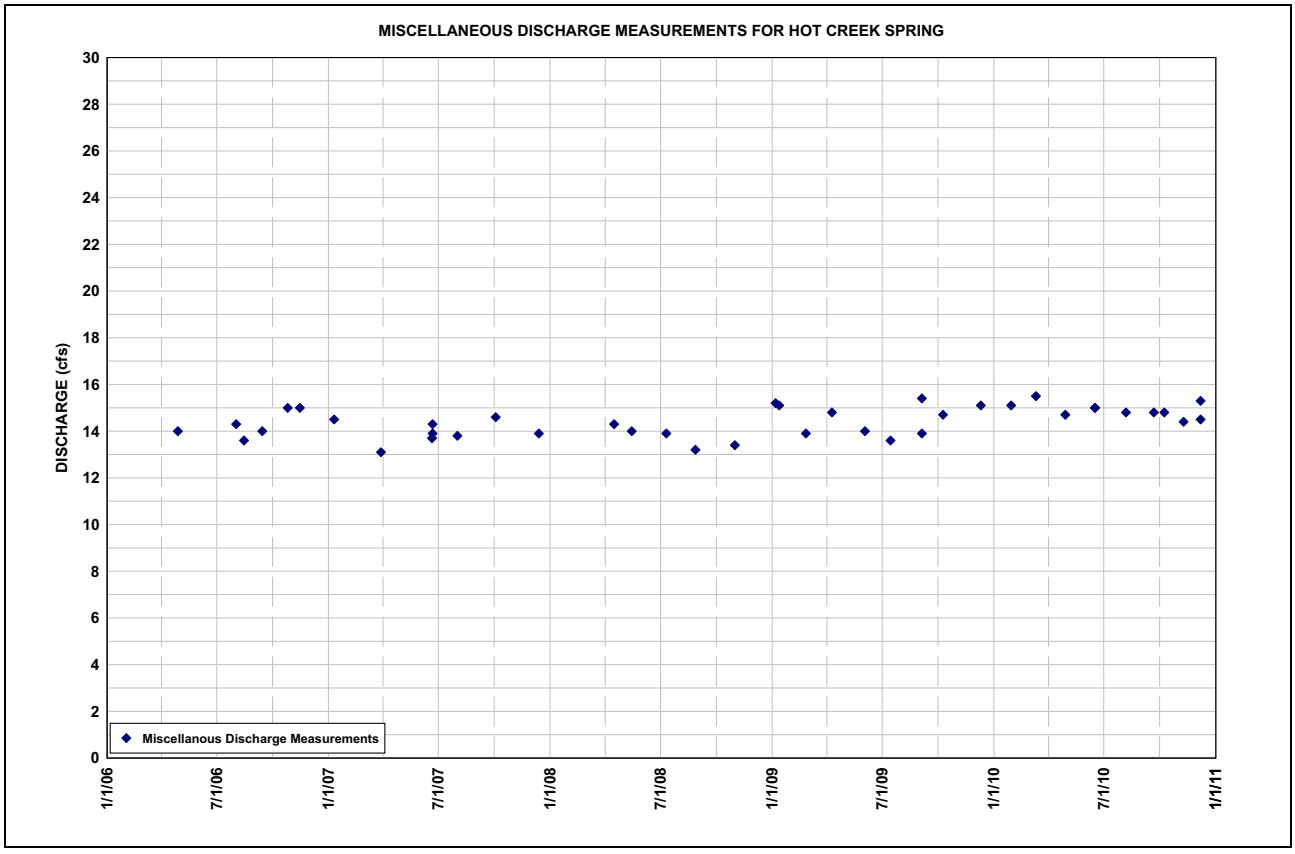
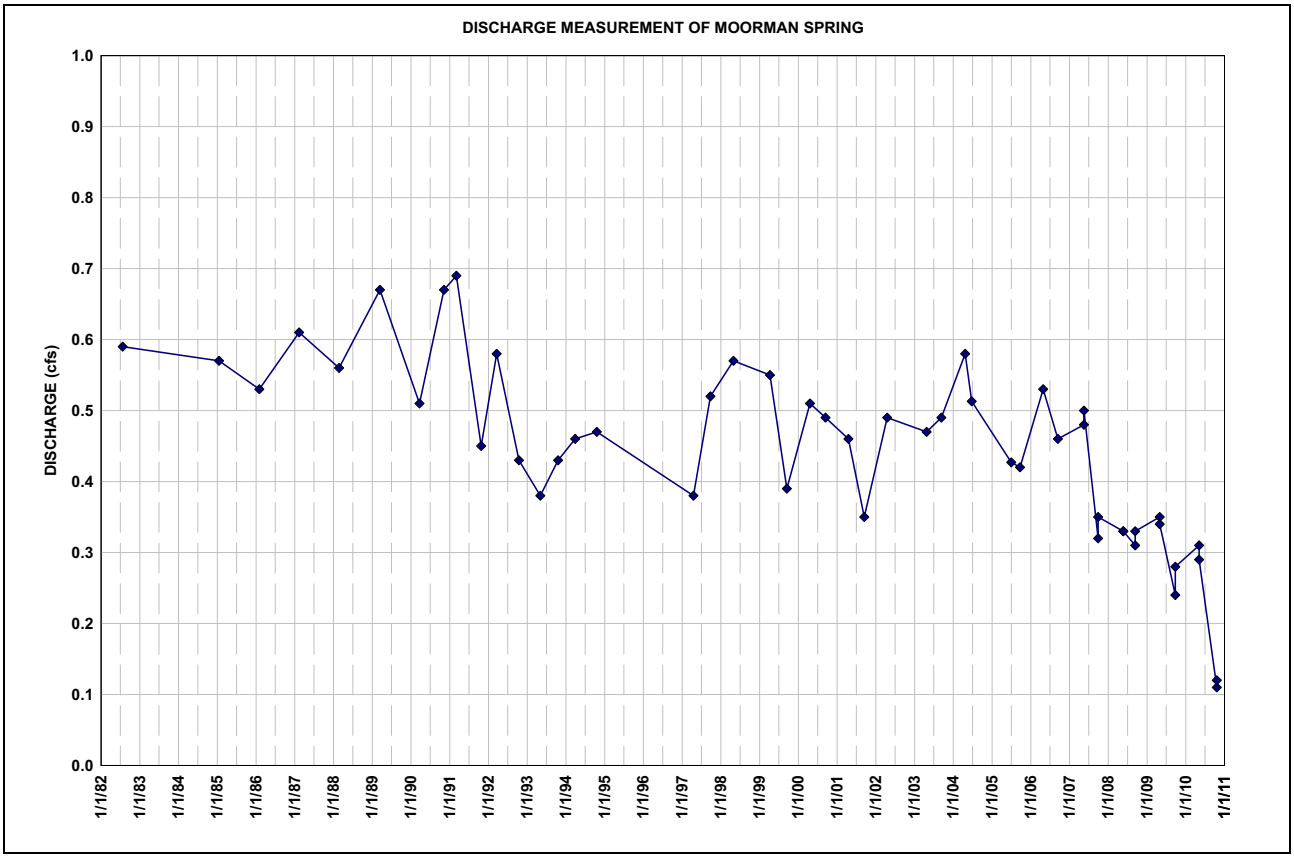
1/1/10
3/1/10
5/1/10
7/1/10
9/1/10
11/1/10
1/1/11

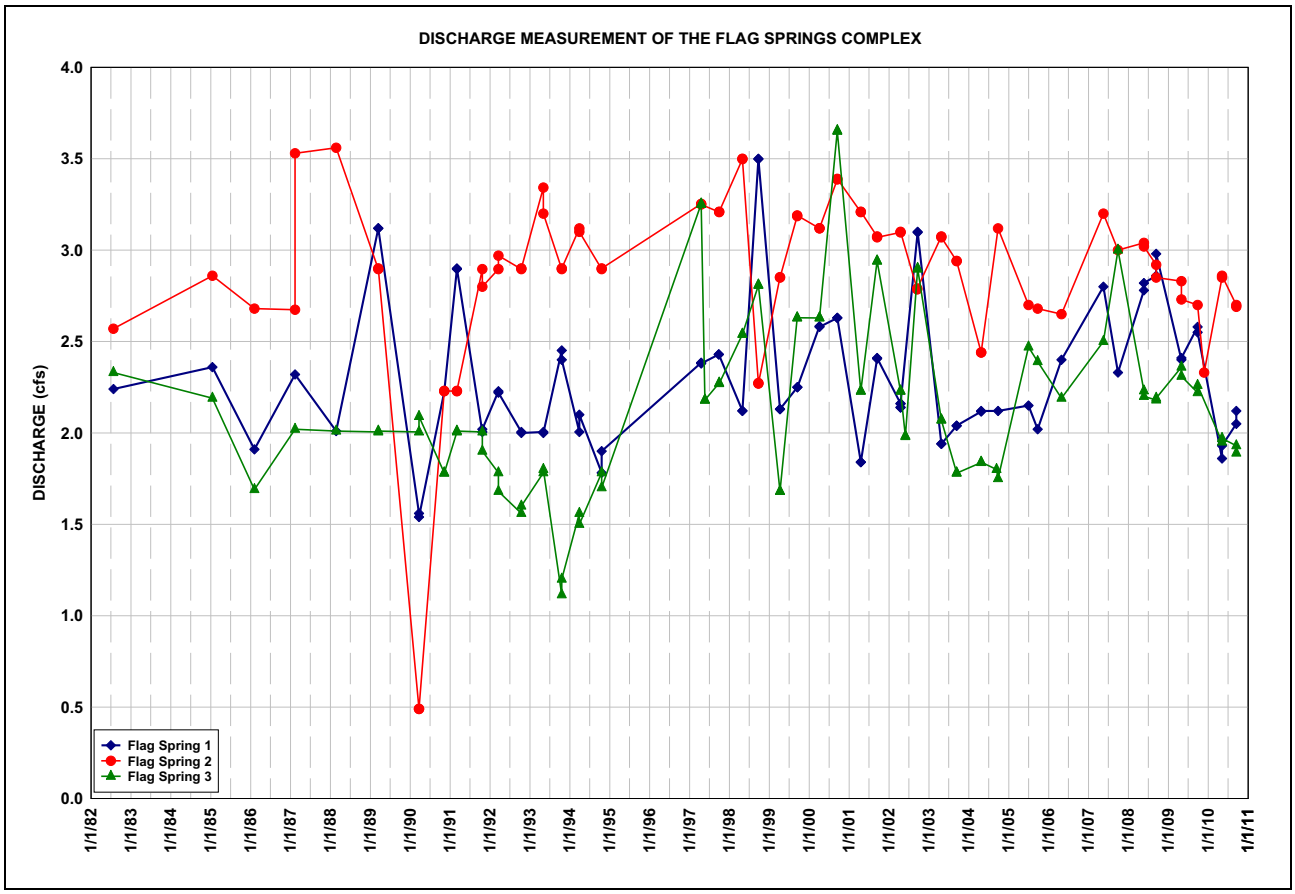

MISCELLANEOUS DISCHARGE MEASUREMENTS FOR HOT CREEK SPRING
DISCHARGE (cfs)
30
28
26
24
22
20
18
16
14
12
10
8
6
4
2
0
Miscellanous Discharge Measurements
1/1/06
7/1/06
1/1/07
7/1/07
1/1/08
7/1/08
1/1/09
7/1/09
1/1/10
7/1/10
1/1/11


DISCHARGE MEASUREMENT OF MOORMAN SPRING
DISCHARGE (cfs)
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
1/1/82
1/1/83
1/1/84
1/1/85
1/1/86
1/1/87
1/1/88
1/1/89
1/1/90
1/1/91
1/1/92
1/1/93
1/1/94
1/1/95
1/1/96
1/1/97
1/1/98
1/1/99
1/1/00
1/1/01
1/1/02
1/1/03
1/1/04
1/1/05
1/1/06
1/1/07
1/1/08
1/1/09
1/1/10
1/1/11

## Table D-2
## Discharge Measurement Summary of Flag Springs Complex

| Spring Name | Average Discharge[a] (cfs) | Minimum Discharge[a] (cfs) | Maximum Discharge[a] (cfs) | Standard Deviation[a] (cfs) | May 2010 Discharge[b,c] (cfs) | July 2010 Discharge[d] (cfs) | September 2010 Discharge[b,c] (cfs) |
|---|---|---|---|---|---|---|---|
| Flag Spring 1 (North) | 2.35 | 1.54 | 3.49 | 0.40 | 1.90 | 2.36 | 2.08 |
| Flag Spring 2 (Middle) | 2.83 | 0.500 | 3.64 | 0.41 | 2.86 | 2.84 | 2.70 |
| Flag Spring 3 (South) | 2.18 | 1.22 | 3.66 | 0.44 | 1.96 | 1.95 | 1.91 |

[a]Period of Record (1982-2010)
[b]2010 Discharge measurements are average of two reported measurements.
[c]Source: USGS (2011)
[d]Source: SNWA data



## Table D-3
## Discharge Measurement Summary of Hardy Springs

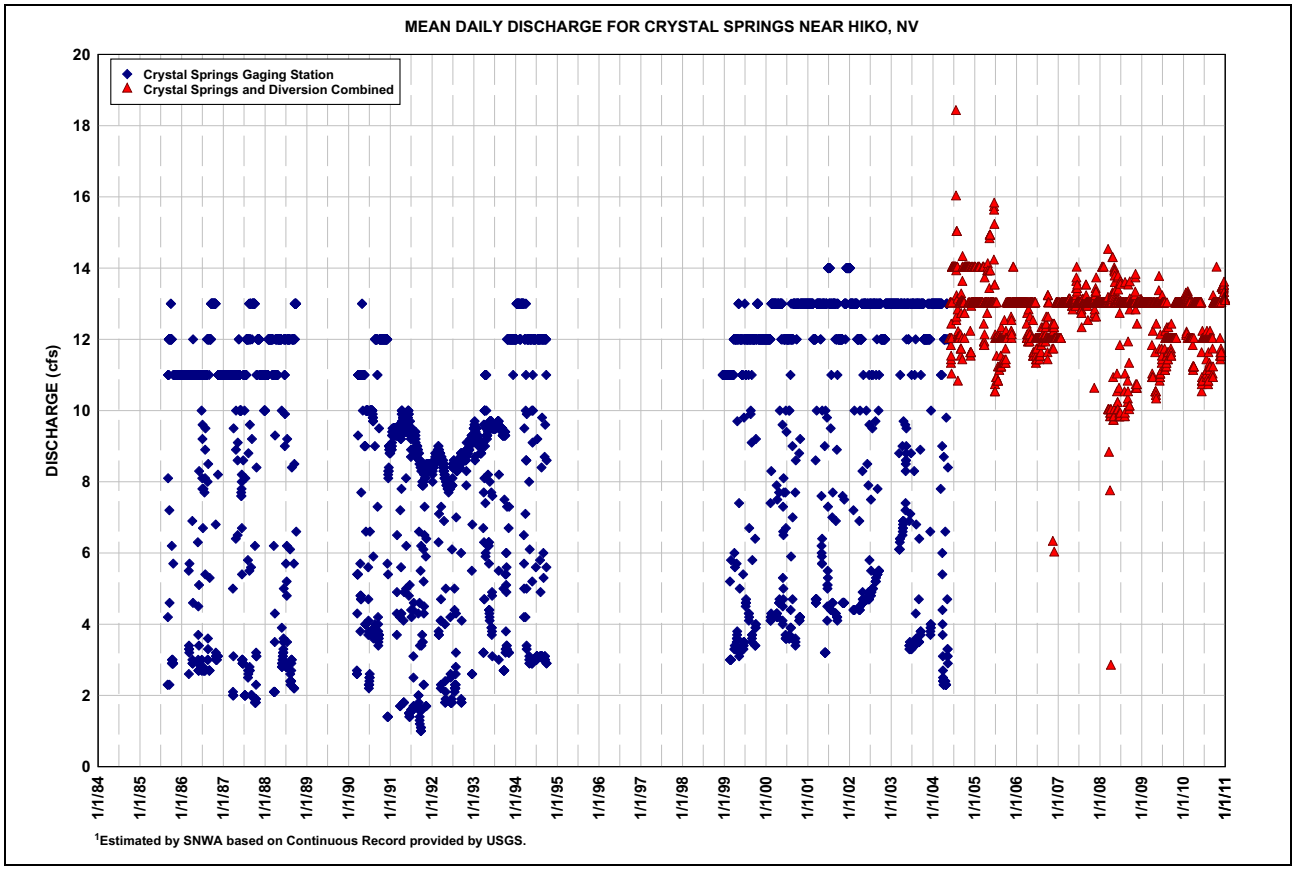
| Spring Name | Average Discharge[a,b] (cfs) | Minimum Discharge[b] (cfs) | Maximum Discharge[b] (cfs) | Standard Deviation (cfs) | November 2010 Discharge[,b] (cfs) |
|---|---|---|---|---|---|
| Hardy Springs | 0.36 | 0.31 | 0.45 | 0.06 | 0.30 |

[a]Average of four measurements obtained in 2004, 2009, and two in 2010.
[b]Source: SNWA data

## Table D-4
## Annual Discharges at Crystal Springs

| Water Year[a,b] | Crystal Springs (09415590) | | Crystal Springs Diversion (09415589) | | | Total Combined Discharge (afy) |
|---|---|---|---|---|---|---|
| | Annual Discharge (afy) | Average Annual Discharge (cfs) | Annual Discharge (afy) | Average Annual Discharge (cfs) | Days Diverted | |
| 2005 | 8,110 | 11.2 | 1,230 | 1.70 | 78 | 9,340 |
| 2006 | 8,190 | 11.3 | 923 | 1.28 | 67 | 9,113 |
| 2007 | 8,230 | 11.4 | 998 | 1.38 | 63 | 9,228 |
| 2008 | 8,100 | 11.2 | 1,020 | 1.40 | 80 | 9,120 |
| 2009 | 8,090 | 11.2 | 987 | 1.36 | 74 | 9,077 |
| 2010[c] | 8,270 | 11.4 | 760 | 1.05 | 52 | 9,030 |
| Average for the period of record[d] | 8,165 | 11.3 | 986 | 1.36 | 69 | 9,151 |

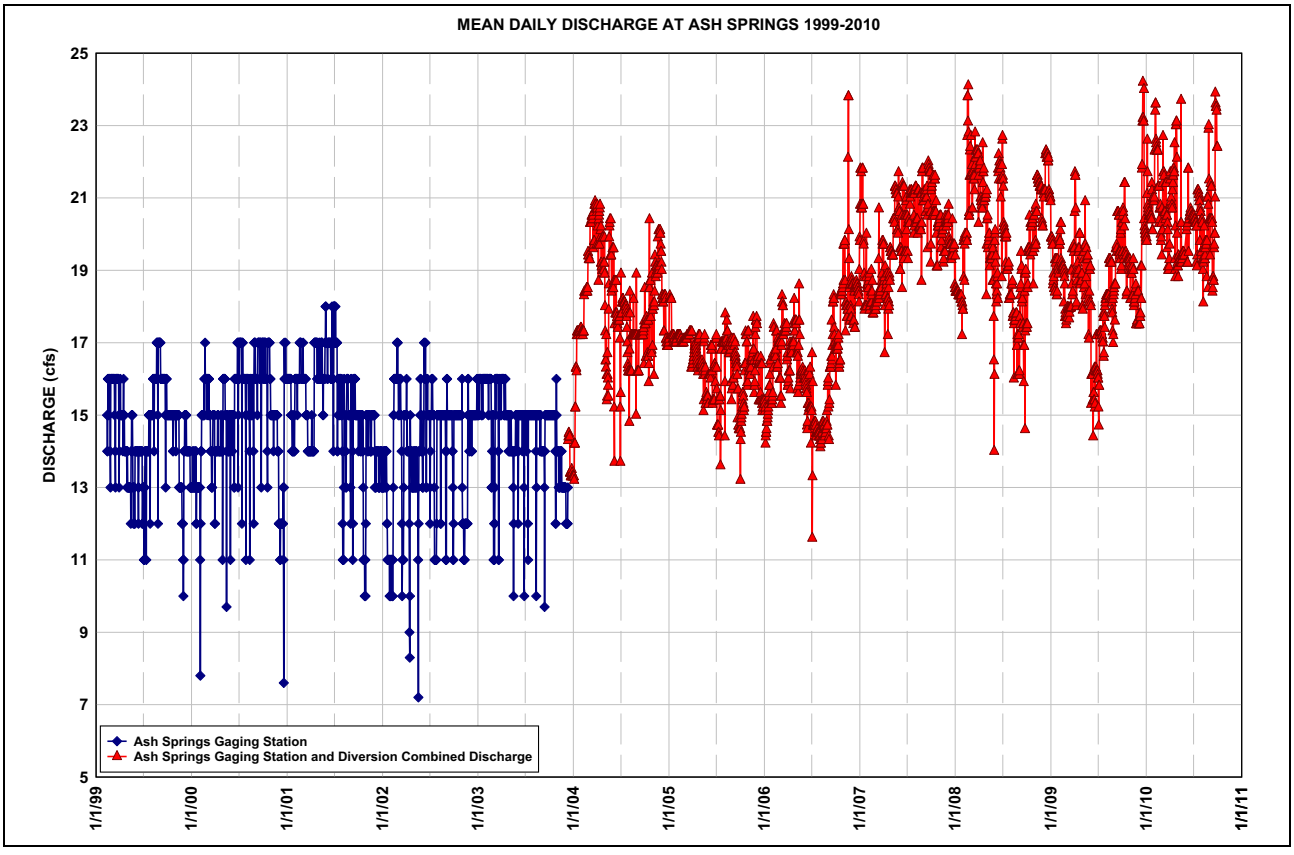
[a]Water years 1990, 1991, 1992, 1993, and 1999 are excluded, as explained in the text.
[b]Data are from USGS Water Resources Data - Nevada water years 2005 through 2010 (USGS, 2011).
[c] Provisional data.
[d]These values are extrapolated from the Crystal Springs gaging station records published by USGS (USGS, 2011).
Source: U.S. Geological Survey, 2011, National water information system (NWIS Web) [Internet], [accessed March 4, 2011], available from http://waterdata.usgs.gov/nwis.

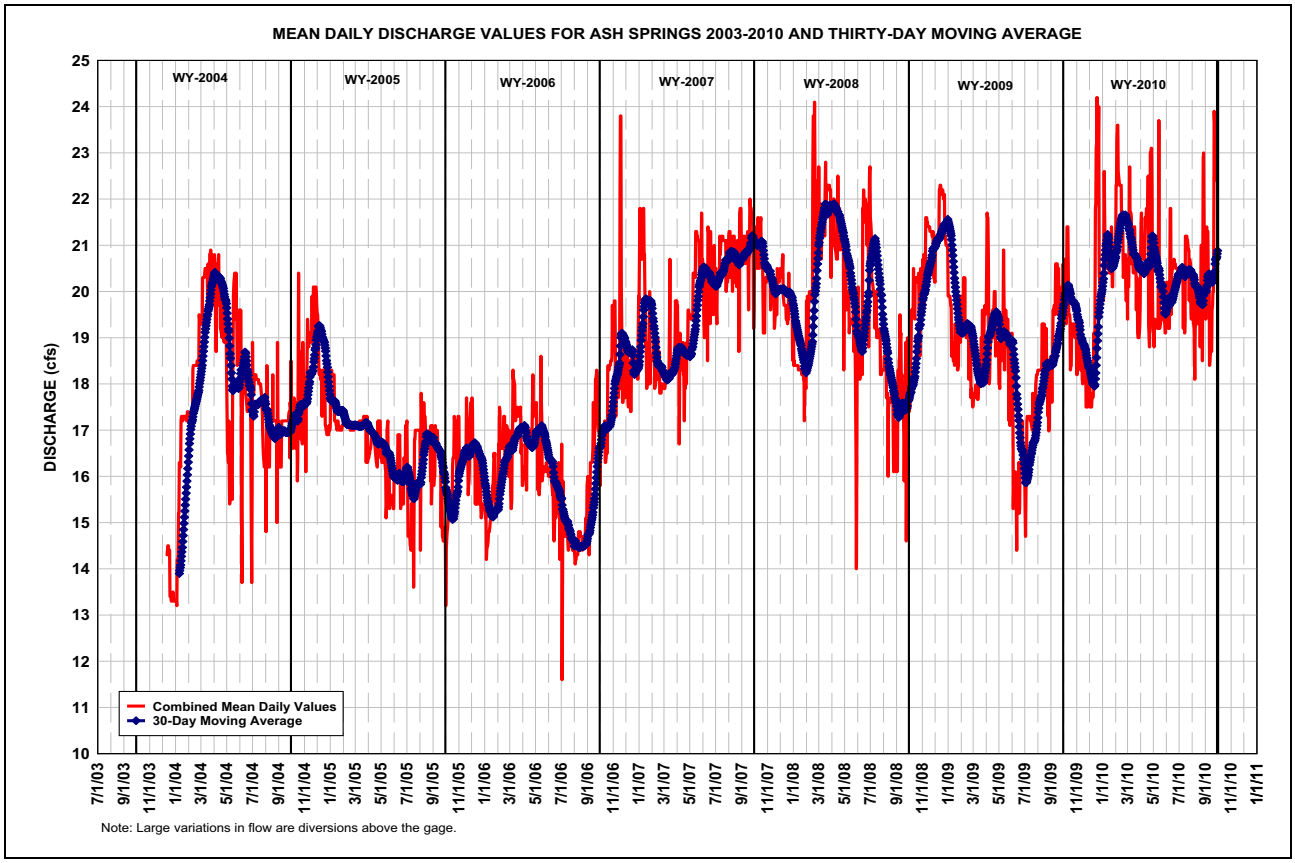

MEAN DAILY DISCHARGE FOR CRYSTAL SPRINGS NEAR HIKO, NV
Crystal Springs Gaging Station
Crystal Springs and Diversion Combined
DISCHARGE (cfs)
0
2
4
6
8
10
12
14
16
18
20
1/1/84
1/1/85
1/1/86
1/1/87
1/1/88
1/1/89
1/1/90
1/1/91
1/1/92
1/1/93
1/1/94
1/1/95
1/1/96
1/1/97
1/1/98
1/1/99
1/1/00
1/1/01
1/1/02
1/1/03
1/1/04
1/1/05
1/1/06
1/1/07
1/1/08
1/1/09
1/1/10
1/1/11
[1]Estimated by SNWA based on Continuous Record provided by USGS.

# Table D-5
# Annual Discharges at Ash Springs

| Water Year[a,b] | Ash Springs (09415640) | | Ash Springs Diversion (09415639) | | | Total Combined Discharge (afy) |
|---|---|---|---|---|---|---|
| | Annual Discharge (afy) | Average Annual Discharge (cfs) | Annual Discharge (afy) | Average Annual Discharge (cfs) | Days Diverted | |
| 2005 | 10,080 | 13.9 | 2,190 | 3.03 | 365 | 12,270 |
| 2006 | 8,780 | 12.1 | 2,810 | 3.88 | 365 | 11,590 |
| 2007 | 11,570 | 16.0 | 2,480 | 3.43 | 365 | 14,050 |
| 2008 | 11,740 | 16.2 | 2,600 | 3.58 | 365 | 14,340 |
| 2009 | 11,900 | 16.4 | 1,860 | 2.57 | 365 | 13,760 |
| 2010[c] | 12,770 | 17.6 | 1,860 | 2.58 | 365 | 14,630 |
| Average for the period of record[d] | 11,140 | 15.4 | 2,300 | 3.18 | 365 | 13,440 |

[a]Data are from USGS Water Resources Data-Nevada water years 2005 through 2010 (USGS, 2011). Period of record for Ash Springs diversion gage is December 12, 2003, to present. The 2004 water year is incomplete.
[b]Data from USGS Water Resources Data - Nevada water years 2005 through 2010 (USGS, 2011).
[c]Provisional data.
[d]These values are extrapolated from the Ash Springs gaging station records published by USGS (USGS, 2011).
Source: U.S. Geological Survey, 2011, National water information system (NWIS Web) [Internet], [accessed March 4, 2011], available from http://waterdata.usgs.gov/nwis.




MEAN DAILY DISCHARGE VALUES FOR ASH SPRINGS 2003-2010 AND THIRTY-DAY MOVING AVERAGE
DISCHARGE (cfs)
WY-2004
WY-2005
WY-2006
WY-2007
WY-2008
WY-2009
WY-2010
Combined Mean Daily Values
30-Day Moving Average
Note: Large variations in flow are diversions above the gage.

# Table D-6
## 2090102 - Hiko Spring at Hiko, NV, Water Year 2009
## Mean Daily Discharge Values, Revised

| | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 6.1e | -- | 7.1 |
| 2 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 6.8 | -- | 6.6 |
| 3 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 6.2 | 6.1 | 6.9 |
| 4 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 5.3 | 6.1 | 5.5 |
| 5 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 4.7 | 6.1 | 5.9 |
| 6 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 5.3 | -- | 6.1 |
| 7 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 5.6 | 7.4e | 6.1 |
| 8 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 5.8 | -- | 6.0 |
| 9 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 5.7 | 6.9 | 6.0 |
| 10 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 5.7 | 5.9 | 6.1 |
| 11 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 6.3 | 5.9 | 6.0 |
| 12 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 6.9 | 5.8 | 7.0 |
| 13 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 6.0 | -- |
| 14 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 7.1 | 6.1 | -- |
| 15 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 6.6 | 6.1 | 7.7 |
| 16 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 5.1 | 6.1 | 6.4 |
| 17 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 5.6 | 6.1 | 5.5 |
| 18 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 5.6 | 7.0 | 5.9 |
| 19 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 5.8 | 6.1 | 5.9 |
| 20 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 5.7 | 7.1 | 5.9 |
| 21 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 5.7 | 7.7 | 5.9 |
| 22 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 5.8 | 6.6 | 5.9 |
| 23 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 5.7 | 5.7 | 5.9 |
| 24 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 7.2 | 5.6 | 6.1 |
| 25 | -- | -- | -- | -- | -- | -- | -- | -- | 6.1 | -- | 5.9 | 6.9 |
| 26 | -- | -- | -- | -- | -- | -- | -- | -- | 6.1 | 7.9 | 6.0 | 8.0 |
| 27 | -- | -- | -- | -- | -- | -- | -- | -- | 6.1 | 7.5 | 6.0 | 7.8 |
| 28 | -- | -- | -- | -- | -- | -- | -- | -- | 6.1 | 5.4 | 6.0 | 7.2 |
| 29 | -- | -- | -- | -- | -- | -- | -- | -- | 7.5 | 5.5 | 6.0 | 6.2 |
| 30 | -- | -- | -- | -- | -- | -- | -- | -- | 5.3e | 5.6 | 6.5 | 5.8 |
| 31 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 8.1 | -- |
| Total | -- | -- | -- | -- | -- | -- | -- | -- | -- | 168 | 171 | 178 |
| Min | -- | -- | -- | -- | -- | -- | -- | -- | -- | 4.7 | 5.6 | 5.5 |
| Max | -- | -- | -- | -- | -- | -- | -- | -- | -- | 7.9 | 8.1 | 8.0 |
| Mean | -- | -- | -- | -- | -- | -- | -- | -- | -- | 6.0 | 6.3 | 6.4 |
| Total (AF) | -- | -- | -- | -- | -- | -- | -- | -- | -- | 333 | 339 | 354 |

Note: Values are in cfs unless noted otherwise.
e = Estimated day.

LOCATION: Latitude 37$^{o}$ 35' 48", longitude 115$^{o}$ 13' 21", in SW1/4 NE1/4 SW1/4 sec. 14, T. 4S., R.60E, Lincoln County, 0.5 mi southwest of the orifice.
DRAINAGE AREA: Indeterminate
PERIOD OF RECORD: June 2009 to current year.
GAGE: Ultra-sonic flow meter. Elevation of the gage is 3,868 ft amsl NAVD88.
REMARKS: Records are fair. Estimated days are rated as poor. Discharge records are affected by both upstream and downstream agricultural diversions.

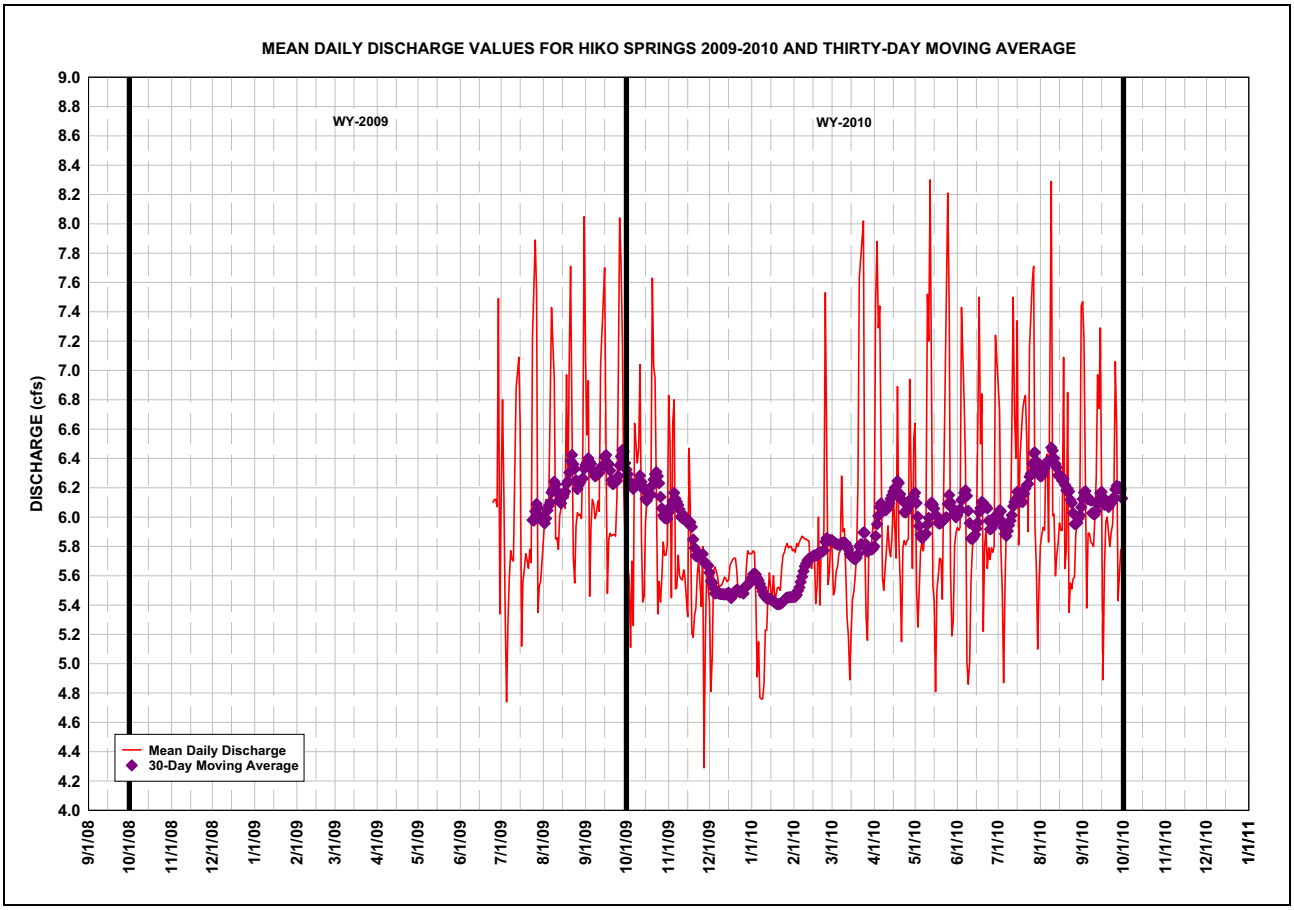
## Table D-7
## 2090102 - Hiko Spring at Hiko, NV, Water Year 2010
## Mean Daily Discharge Values

| | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 5.8 | 6.8 | 5.4 | 5.8 | 5.8 | 5.8 | 5.9 | 6.6 | 5.9 | -- | 5.8 | 7.5e |
| 2 | 5.7 | 6.5 | 4.8 | 5.8 | 5.8 | 5.5 | 7.5 | 5.5 | 5.9 | 6.7 | 5.9 | 7.2e |
| 3 | 5.6 | 5.5 | 5.0 | 5.8 | 5.8 | 5.5 | 7.9e | 5.3 | 5.9 | 5.8 | 5.9 | -- |
| 4 | 5.1 | 6.7 | 5.6 | 5.4 | 5.8 | 5.6 | 7.3 | 5.5 | 7.4 | 5.5 | 5.9 | 5.4 |
| 5 | 5.7 | 6.8 | 5.7 | 4.9 | 5.8 | 5.7 | 7.4 | 5.8 | -- | 4.9 | 6.4 | 5.9 |
| 6 | 5.3 | 5.5 | 5.6 | 5.2 | 5.9 | 5.8 | 6.5 | 5.8 | 6.8e | 5.5 | 6.4 | 5.9 |
| 7 | 6.6 | 5.5 | 5.6 | 4.8 | 5.9 | 5.8 | 5.6 | 5.8 | 6.4 | 6.0 | 5.8e | 5.8 |
| 8 | -- | 5.7 | 5.5 | 4.8 | 5.9 | 6.3 | 5.5 | 5.9 | 5.0 | 6.0 | -- | 5.8 |
| 9 | 6.4e | 5.6 | 5.5 | 4.8 | 5.9 | 5.9e | 5.7 | 6.0 | 4.9 | 6.0 | 8.3 | 5.8 |
| 10 | 6.5 | 5.6 | 5.5 | 4.9 | 5.9 | 5.9 | 5.8 | 7.5 | 5.0 | 5.9 | 6.0 | 6.0 |
| 11 | 7.0 | 5.6 | 5.6 | 5.2 | 5.8 | 5.7 | 5.9 | 7.2e | 5.6 | 6.6 | 6.0 | 6.3 |
| 12 | 5.9 | 5.6 | 5.6 | 5.2 | 5.8 | 5.3 | 5.8 | 8.3e | 5.8 | 7.5e | 5.6 | 7.0 |
| 13 | 5.4 | 5.6 | 5.6 | 5.5 | 5.7 | 5.2 | 5.7 | -- | 5.9 | 6.7e | 5.7 | 6.7e |
| 14 | 5.5 | 5.4 | 5.6 | 5.6 | 5.7 | 4.9 | 5.9 | 5.5 | 5.9 | 6.4e | 5.8 | 7.3e |
| 15 | 6.0 | 5.3e | 5.6 | 5.5 | 5.8 | 5.2 | 6.2 | 5.4 | 5.9 | 7.3 | 6.0 | -- |
| 16 | 6.1 | 6.5 | 5.7 | 5.5 | 5.8 | 5.4 | -- | 4.8 | 6.6 | 5.8 | 5.9 | 4.9 |
| 17 | 6.2 | 6.0 | 5.7 | 5.6 | 5.4 | 5.5 | 5.7e | 5.5 | 7.5 | 6.4 | 5.9 | 5.7 |
| 18 | 6.2 | 5.2 | 5.7 | 5.4 | 5.5 | 5.6 | 6.9 | 5.6 | 6.5e | 6.6 | 7.1 | 6.0 |
| 19 | 6.1 | 5.2 | 5.7 | 5.5 | 6.0 | 5.7 | 5.9 | 5.7 | 6.8 | 6.7 | 5.7e | 6.0 |
| 20 | 7.6 | 5.3 | 5.7 | 5.5 | 5.4 | 6.2 | 5.6 | 5.7 | 5.2 | 6.8 | 5.8e | 5.9 |
| 21 | 7.0e | 5.4 | 5.6 | 5.5 | 5.8 | 7.6 | 5.2 | 5.4 | 5.8 | 6.8 | 6.9 | 5.8 |
| 22 | 7.0e | 5.6 | 5.5 | 5.5 | 5.8 | -- | 5.8 | 6.2 | 5.9 | 6.5 | 5.4 | 5.9 |
| 23 | -- | 5.7 | 5.5 | 5.7 | 5.9 | -- | 5.8 | -- | 5.7 | 5.9 | 5.6 | 6.0 |
| 24 | 5.3 | 5.5 | 5.5 | 5.7 | 7.5e | 8.0 | 5.8 | -- | 5.8 | 7.2 | 5.5 | 6.2 |
| 25 | 5.6 | 5.4 | 5.5 | 5.8 | 6.5 | 5.9 | 5.8 | 8.2 | 5.7 | -- | 5.6 | 7.1 |
| 26 | 5.4 | 5.8 | 5.5 | 5.8 | 5.5 | 5.3 | 5.9 | 7.4 | 5.8 | 7.6e | 5.6 | 6.6e |
| 27 | 5.6 | 4.3e | 5.5 | 5.8 | 5.6 | 5.2 | 6.9 | 5.6 | 5.8 | 7.7 | 5.9 | 5.4e |
| 28 | 5.8 | 5.2 | 5.7 | 5.8 | 5.9 | 5.8e | -- | 5.2 | 5.8 | 5.9 | 6.0 | -- |
| 29 | 5.7 | 5.7 | 5.8 | 5.8 | -- | 5.8 | 5.7e | 5.3 | 7.2 | 5.7 | 5.9 | 5.8 |
| 30 | 5.7 | 5.5 | 5.8 | 5.8 | -- | 5.8 | 6.5 | 5.8 | -- | 5.1 | 6.2 | 5.7 |
| 31 | 5.8 | -- | 5.8 | 5.8 | -- | 5.9 | -- | 5.9 | -- | 5.6 | 7.4 | -- |
| Total | 174 | 170 | 172 | 169 | 164 | 168 | 172 | 169 | 168 | 183 | 182 | 165 |
| Min | 5.1 | 4.3 | 4.8 | 4.8 | 5.4 | 4.9 | 5.2 | 4.8 | 4.9 | 4.9 | 5.4 | 4.9 |
| Max | 7.6 | 6.8 | 5.8 | 5.8 | 7.5 | 8.0 | 7.9 | 8.3 | 7.5 | 7.7 | 8.3 | 7.5 |
| Mean | 6.0 | 5.7 | 5.6 | 5.5 | 5.8 | 5.8 | 6.1 | 6.0 | 6.0 | 6.3 | 6.1 | 6.1 |
| Total (AF) | 344 | 337 | 341 | 336 | 325 | 333 | 341 | 334 | 334 | 363 | 360 | 328 |

**Year 2010 Statistics: Year Min 4.3; Year Max 8.3; Mean 5.9; Total AF 4076**

Note: Values are in cfs unless noted otherwise.
e = Estimated day.

LOCATION: Latitude 37° 35' 48", longitude 115° 13' 21", in SW1/4 NE1/4 SW1/4 sec. 14, T. 4S., R.60E, Lincoln County, 0.5 mi southwest of the orifice.
DRAINAGE AREA: Indeterminate
PERIOD OF RECORD: June 2009 to current year.
GAGE: Ultra-sonic flow meter. Elevation of the gage is 3,868 ft amsl NAVD88.
REMARKS: Records are fair. Estimated days are rated as poor. Discharge records are affected by both upstream and downstream agricultural diversions.

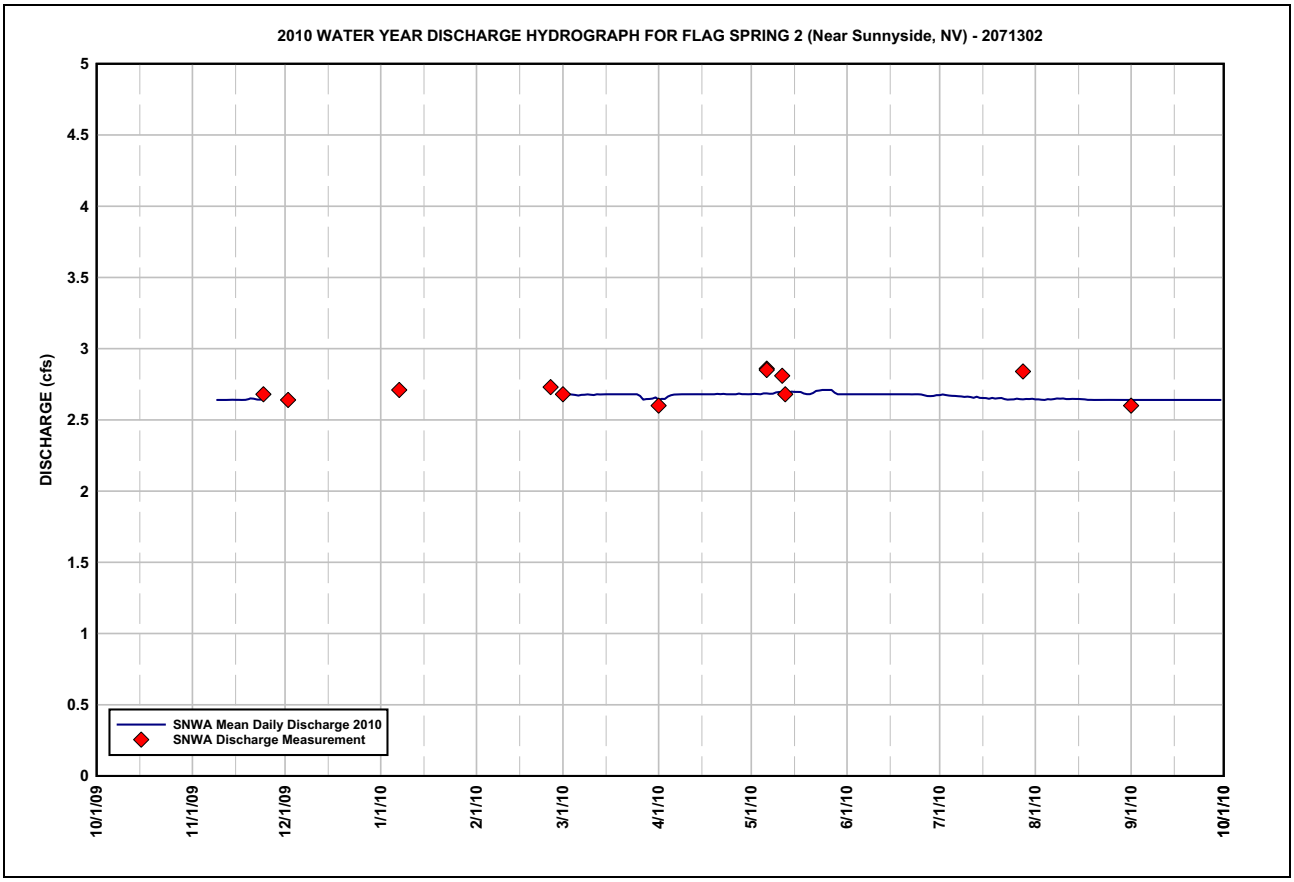

MEAN DAILY DISCHARGE VALUES FOR HIKO SPRINGS 2009-2010 AND THIRTY-DAY MOVING AVERAGE
DISCHARGE (cfs)
WY-2009
WY-2010
Mean Daily Discharge
30-Day Moving Average
9.0
8.8
8.6
8.4
8.2
8.0
7.8
7.6
7.4
7.2
7.0
6.8
6.6
6.4
6.2
6.0
5.8
5.6
5.4
5.2
5.0
4.8
4.6
4.4
4.2
4.0
9/1/08
10/1/08
11/1/08
12/1/08
1/1/09
2/1/09
3/1/09
4/1/09
5/1/09
6/1/09
7/1/09
8/1/09
9/1/09
10/1/09
11/1/09
12/1/09
1/1/10
2/1/10
3/1/10
4/1/10
5/1/10
6/1/10
7/1/10
8/1/10
9/1/10
10/1/10
11/1/10
12/1/10
1/1/11

## Table D-8
## 2071302 - Flag Spring 2 near Sunnyside, NV, Water Year 2010
## Mean Daily Discharge Values

| | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | -- | -- | -- | -- | -- | 2.7e | 2.6 | 2.7 | 2.7 | 2.7 | 2.6 | 2.6 |
| 2 | -- | -- | -- | -- | -- | 2.7 | 2.6 | 2.7 | 2.7 | 2.7 | 2.6 | 2.6 |
| 3 | -- | -- | -- | -- | -- | 2.7 | 2.6 | 2.7 | 2.7 | 2.7 | 2.6 | 2.6 |
| 4 | -- | -- | -- | -- | -- | 2.7 | 2.7 | 2.7 | 2.7 | 2.7 | 2.6 | 2.6 |
| 5 | -- | -- | -- | -- | -- | 2.7 | 2.7 | 2.7 | 2.7 | 2.7 | 2.6 | 2.6 |
| 6 | -- | -- | -- | -- | -- | 2.7 | 2.7 | 2.7 | 2.7 | 2.7 | 2.6 | 2.6 |
| 7 | -- | -- | -- | -- | -- | 2.7 | 2.7 | 2.7 | 2.7 | 2.7 | 2.6 | 2.6 |
| 8 | -- | -- | -- | -- | -- | 2.7 | 2.7 | 2.7 | 2.7 | 2.7 | 2.6 | 2.6 |
| 9 | -- | 2.6e | -- | -- | -- | 2.7 | 2.7 | 2.7 | 2.7 | 2.7 | 2.6 | 2.6 |
| 10 | -- | 2.6 | -- | -- | -- | 2.7 | 2.7 | 2.7 | 2.7 | 2.7 | 2.6 | 2.6 |
| 11 | -- | 2.6 | -- | -- | -- | 2.7 | 2.7 | 2.7 | 2.7 | 2.7 | 2.6 | 2.6 |
| 12 | -- | 2.6 | -- | -- | -- | 2.7 | 2.7 | 2.7 | 2.7 | 2.7 | 2.6 | 2.6 |
| 13 | -- | 2.6 | -- | -- | -- | 2.7 | 2.7 | 2.7 | 2.7 | 2.7 | 2.6 | 2.6 |
| 14 | -- | 2.6 | -- | -- | -- | 2.7 | 2.7 | 2.7 | 2.7 | 2.6 | 2.6 | 2.6 |
| 15 | -- | 2.6 | -- | -- | -- | 2.7 | 2.7 | 2.7 | 2.7 | 2.7 | 2.6 | 2.6 |
| 16 | -- | 2.6 | -- | -- | -- | 2.7 | 2.7 | 2.7 | 2.7 | 2.7 | 2.6 | 2.6 |
| 17 | -- | 2.6 | -- | -- | -- | 2.7 | 2.7 | 2.7 | 2.7 | 2.6 | 2.6 | 2.6 |
| 18 | -- | 2.6 | -- | -- | -- | 2.7 | 2.7 | 2.7 | 2.7 | 2.7 | 2.6 | 2.6 |
| 19 | -- | 2.6 | -- | -- | -- | 2.7 | 2.7 | 2.7 | 2.7 | 2.6 | 2.6 | 2.6 |
| 20 | -- | 2.6 | -- | -- | -- | 2.7 | 2.7 | 2.7 | 2.7 | 2.7 | 2.6 | 2.6 |
| 21 | -- | 2.6 | -- | -- | -- | 2.7 | 2.7 | 2.7 | 2.7 | 2.7 | 2.6 | 2.6 |
| 22 | -- | 2.6 | -- | -- | -- | 2.7 | 2.7 | 2.7 | 2.7 | 2.6 | 2.6 | 2.6 |
| 23 | -- | 2.6 | -- | -- | -- | 2.7e | 2.7 | 2.7 | 2.7 | 2.6 | 2.6 | 2.6 |
| 24 | -- | 2.6e | -- | -- | -- | 2.7e | 2.7 | 2.7 | 2.7 | 2.6 | 2.6 | 2.6 |
| 25 | -- | -- | -- | -- | -- | 2.7e | 2.7 | 2.7 | 2.7 | 2.6 | 2.6 | 2.6 |
| 26 | -- | -- | -- | -- | -- | 2.7e | 2.7 | 2.7 | 2.7 | 2.6 | 2.6 | 2.6 |
| 27 | -- | -- | -- | -- | -- | 2.6 | 2.7 | 2.7 | 2.7 | 2.6 | 2.6 | 2.6 |
| 28 | -- | -- | -- | -- | -- | 2.6 | 2.7 | 2.7 | 2.7 | 2.6 | 2.6 | 2.6 |
| 29 | -- | -- | -- | -- | -- | 2.6 | 2.7 | 2.7 | 2.7 | 2.6 | 2.6 | 2.6 |
| 30 | -- | -- | -- | -- | -- | 2.6 | 2.7 | 2.7 | 2.7 | 2.6 | 2.6 | 2.6 |
| 31 | -- | -- | -- | -- | -- | 2.7 | -- | 2.7 | -- | 2.6 | 2.6 | -- |
| Total | -- | -- | -- | -- | -- | 83.3 | 80.7 | 83.7 | 81 | 82.4 | 80.6 | 78 |
| Mean | -- | -- | -- | -- | -- | 2.7 | 2.7 | 2.7 | 2.7 | 2.7 | 2.6 | 2.6 |
| Max | -- | -- | -- | -- | -- | 2.7 | 2.7 | 2.7 | 2.7 | 2.7 | 2.6 | 2.6 |
| Min | -- | -- | -- | -- | -- | 2.6 | 2.6 | 2.7 | 2.7 | 2.6 | 2.6 | 2.6 |
| Total (AF) | -- | -- | -- | -- | -- | 165 | 160 | 166 | 161 | 163 | 160 | 155 |

Note: Values are in cfs unless noted otherwise.
e = Estimated day.

LOCATION: UTM NAD 1983 Zone 11N (meters), Northing 4,254,570 m, Easting 672,576 m
DRAINAGE AREA: Indeterminate
PERIOD OF RECORD: November 2009 to current year.
GAGE: Bubbler/Pressure sensor. Elevation of the gage is estimated at 5,285 ft amsl NAVD88.
REMARKS: Records are rated as good. Missing and incomplete days are that are estimated days are rated as poor.


2010 WATER YEAR DISCHARGE HYDROGRAPH FOR FLAG SPRING 2 (Near Sunnyside, NV) - 2071302
DISCHARGE (cfs)
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
10/1/09
11/1/09
12/1/09
1/1/10
2/1/10
3/1/10
4/1/10
5/1/10
6/1/10
7/1/10
8/1/10
9/1/10
10/1/10
SNWA Mean Daily Discharge 2010
SNWA Discharge Measurement

## *References*

U.S. Geological Survey, 2011, National water information system (NWIS Web) [Internet], [accessed February 2011], available from http://waterdata.usgs.gov/nwis.

USGS, see U.S. Geological Survey.

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# Appendix E

# 2010 DDC Springs Site Photos

# E.1.0 INTRODUCTION

This appendix presents photos taken during the biannual field visits to document DDC spring conditions. Many of the DDC springs are controlled by collector systems and have been modified from their natural condition. Others, such as Littlefield and Cave Springs, remain in their natural condition.

**Figure E-1**
**Maynard Spring, May 2010**

**Figure E-2**
**Maynard Spring, November 2010**

**Figure E-3**
**Cave Spring, May 2010**

**Figure E-4**
**Cave Spring, November 2010**

**Figure E-5**
**Parker Station, May 2010**

**Figure E-6**
**Parker Station, November 2010**

**Figure E-7**
**Lewis Well, May 2010**

**Figure E-8**
**Lewis Well, November 2010**

**Figure E-9**
**Silver King Well Discharge, May 2010**

**Figure E-10**
**Silver King Well Discharge, May 2010**

**Figure E-11**
**Silver King Well Discharge, November 2010**

**Figure E-12**
**Coyote Spring, May 2010**

**Figure E-13**
**Coyote Spring, November 2010**

**Figure E-14**
**Big Mud Springs, May 2010**

**Figure E-15**
**Big Mud Springs, November 2010**

**Figure E-16**
**Littlefield Spring, May 2010**

**Figure E-17**
**Littlefield Spring, November 2010**

**Figure E-18**
**Littlefield Spring Measurement Point, November 2010**

**Figure E-19**
**Grassy Spring, May 2010**

**Figure E-20**
**Grassy Spring, May 2010**

**Figure E-21**
**Grassy Spring, November 2010**

# Appendix F

# Regional and High-Altitude Precipitation Data

# Table F-1
# 2010 Regional Precipitation Data
(Page 1 of 3)

| Data Type | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Blue Eagle Ranch Hank, NV** | | | | | | | | | | | | | |
| **2010 Data** | 0.69[b] | 0.86 | 0.72 | 1.10 | 1.31[g] | 0.12[c] | 0.23[a] | 0.72[b] | 0.00 | 1.73 | 0.78[d] | 0.52 | 6.95 |
| Period of Record (1978 to Present) | | | | | | | | | | | | | |
| **Mean** | 0.71 | 0.71 | 0.88 | 0.93 | 0.94 | 0.42 | 0.50 | 0.73 | 0.69 | 0.91 | 0.69 | 0.47 | 8.54 |
| **S.D.** | 0.42 | 0.43 | 0.64 | 0.73 | 0.94 | 0.48 | 0.59 | 0.81 | 0.91 | 0.90 | 0.61 | 0.45 | 2.96 |
| **Skew** | 0.63 | 1.09 | 0.64 | 0.71 | 1.00 | 1.05 | 2.34 | 2.26 | 2.11 | 1.81 | 1.00 | 1.06 | 0.77 |
| **Max** | 1.66 | 1.97 | 2.43 | 2.93 | 3.43 | 1.52 | 2.94 | 3.92 | 3.95 | 4.23 | 2.53 | 1.54 | 15.11 |
| **Min** | 0.12 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 4.41 |
| **No. Yrs** | 31 | 31 | 32 | 32 | 32 | 33 | 33 | 33 | 32 | 33 | 32 | 32 | 27 |
| **Caliente, NV** | | | | | | | | | | | | | |
| **2010 Data** | 0.00[z] | 0.00[z] | 0.00[z] | 0.54 | 0.00 | 0.42[a] | 0.29 | 0.88 | 0.00 | 1.23[s] | 0.00[z] | 3.13 | 2.13 |
| Period of Record (1903 to Present) | | | | | | | | | | | | | |
| **Mean** | 0.82 | 0.94 | 1.01 | 0.70 | 0.52 | 0.34 | 0.77 | 0.88 | 0.62 | 0.78 | 0.69 | 0.66 | 8.63 |
| **S.D.** | 0.79 | 0.89 | 0.98 | 0.73 | 0.52 | 0.44 | 0.83 | 0.89 | 0.74 | 0.99 | 0.75 | 0.63 | 3.22 |
| **Skew** | 1.27 | 1.49 | 1.27 | 1.74 | 1.14 | 1.64 | 2.39 | 1.24 | 1.61 | 2.26 | 1.48 | 1.68 | 0.37 |
| **Max** | 3.47 | 3.98 | 4.59 | 3.71 | 2.27 | 1.95 | 5.36 | 4.18 | 3.14 | 5.12 | 3.38 | 3.76 | 18.73 |
| **Min** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.84 |
| **No. Yrs** | 86 | 87 | 84 | 87 | 85 | 85 | 85 | 87 | 88 | 85 | 86 | 87 | 67 |
| **Elgin, NV** | | | | | | | | | | | | | |
| **2010 Data** | 4.24 | 1.87 | 0.00[z] | 0.00[z] | 0.00[z] | 0.00[z] | 0.25 | 0.44 | 0.00[z] | 0.00[z] | 0.00[z] | 0.00[z] | 6.80 |
| Period of Record (1951 to Present) | | | | | | | | | | | | | |
| **Mean** | 1.66 | 2.07 | 1.53 | 1.01 | 0.43 | 0.32 | 0.76 | 0.87 | 0.67 | 0.90 | 0.86 | 0.91 | 12.16 |
| **S.D.** | 1.90 | 1.96 | 1.62 | 0.95 | 0.45 | 0.36 | 1.28 | 1.07 | 0.93 | 1.18 | 1.12 | 0.96 | 5.87 |
| **Skew** | 1.39 | 1.31 | 1.38 | 0.68 | 1.03 | 0.94 | 3.15 | 2.56 | 1.58 | 2.13 | 2.03 | 1.01 | 0.63 |
| **Max** | 6.49 | 8.01 | 6.28 | 3.09 | 1.54 | 1.16 | 6.06 | 5.07 | 3.22 | 5.18 | 4.63 | 3.28 | 24.98 |
| **Min** | 0.00 | 0.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 3.72 |
| **No. Yrs** | 23 | 25 | 25 | 25 | 25 | 24 | 24 | 27 | 26 | 25 | 25 | 22 | 19 |
| **Hiko, NV** | | | | | | | | | | | | | |
| **2010 Data** | 1.61[a] | 1.35 | 0.00[z] | 0.44 | 0.08 | 0.29 | 0.66 | 0.14 | 0.00 | 2.16 | 0.34 | 3.77[c] | 10.84 |
| Period of Record (1989 to Present) | | | | | | | | | | | | | |
| **Mean** | 0.82 | 1.17 | 0.71 | 0.54 | 0.38 | 0.36 | 0.40 | 0.45 | 0.41 | 0.67 | 0.44 | 0.72 | 7.06 |
| **S.D.** | 0.81 | 1.12 | 0.79 | 0.50 | 0.43 | 0.45 | 0.45 | 0.55 | 0.63 | 0.90 | 0.50 | 0.87 | 3.11 |
| **Skew** | 1.28 | 1.05 | 1.54 | 0.47 | 1.50 | 1.58 | 1.38 | 2.62 | 1.93 | 1.64 | 1.31 | 2.19 | 0.71 |
| **Max** | 2.94 | 4.13 | 3.07 | 1.56 | 1.69 | 1.66 | 1.65 | 2.52 | 2.43 | 3.38 | 1.91 | 3.77 | 13.68 |
| **Min** | 0.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.45 |
| **No. Yrs** | 20 | 21 | 20 | 21 | 21 | 21 | 21 | 21 | 22 | 21 | 22 | 22 | 18 |

# Table F-1
# 2010 Regional Precipitation Data
(Page 2 of 3)

| Data Type | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Lund, NV** | | | | | | | | | | | | | |
| **2010 Data** | 0.97[a] | 0.45 | 0.52 | 0.96[a] | 1.16 | 0.01 | 0.18 | 0.76 | 0.00 | 1.51 | 1.16 | 2.91[a] | 10.59 |
| Period of Record (1957 to Present) | | | | | | | | | | | | | |
| **Mean** | 0.79 | 0.85 | 1.02 | 0.98 | 0.94 | 0.85 | 0.65 | 0.88 | 0.76 | 0.91 | 0.70 | 0.74 | 10.09 |
| **S.D.** | 0.64 | 0.58 | 0.86 | 0.76 | 0.85 | 1.02 | 0.70 | 0.90 | 0.87 | 0.80 | 0.61 | 0.65 | 2.91 |
| **Skew** | 0.93 | 0.39 | 1.02 | 0.99 | 1.38 | 2.09 | 1.46 | 2.04 | 2.42 | 1.37 | 1.25 | 1.41 | 0.76 |
| **Max** | 2.78 | 2.22 | 3.44 | 3.44 | 3.45 | 5.37 | 3.05 | 4.58 | 5.01 | 3.66 | 2.62 | 2.91 | 18.83 |
| **Min** | 0.01 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 4.99 |
| **No. Yrs** | 52 | 52 | 51 | 53 | 53 | 53 | 52 | 52 | 53 | 53 | 54 | 53 | 44 |
| **McGill, NV** | | | | | | | | | | | | | |
| **2010 Data** | 1.07 | 0.40 | 0.86 | 1.98 | 1.75 | 0.13[g] | 0.53 | 0.10 | 0.00 | 1.39[a] | 6.64 | 3.05 | 17.77 |
| Period of Record (1892 to Present) | | | | | | | | | | | | | |
| **Mean** | 0.64 | 0.64 | 0.75 | 0.95 | 1.02 | 0.77 | 0.69 | 0.76 | 0.66 | 0.80 | 0.61 | 0.60 | 8.86 |
| **S.D.** | 0.62 | 0.50 | 0.54 | 0.64 | 0.83 | 0.88 | 0.63 | 0.66 | 0.78 | 0.64 | 0.76 | 0.55 | 2.54 |
| **Skew** | 3.07 | 1.22 | 1.18 | 0.78 | 1.03 | 1.71 | 1.17 | 1.25 | 2.88 | 0.94 | 5.16 | 1.58 | 0.51 |
| **Max** | 4.58 | 2.38 | 2.54 | 3.19 | 3.33 | 4.30 | 3.03 | 3.25 | 5.57 | 3.38 | 6.64 | 3.05 | 16.21 |
| **Min** | 0.00 | 0.01 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 3.76 |
| **No. Yrs** | 101 | 102 | 103 | 104 | 102 | 102 | 102 | 101 | 101 | 99 | 102 | 103 | 89 |
| **Paharanagat Wildlife Refuge, NV** | | | | | | | | | | | | | |
| **2010 Data** | 1.68[u] | 1.86[e] | 0.30[d] | 0.4[k] | 0.03[k] | 0.00 | 0.13[u] | 0.13 | 0.00 | 0.35[a] | 1.08 | 0.38[p] | 3.72 |
| Period of Record (1964 to Present) | | | | | | | | | | | | | |
| **Mean** | 0.66 | 0.78 | 0.73 | 0.61 | 0.38 | 0.19 | 0.47 | 0.59 | 0.36 | 0.50 | 0.51 | 0.40 | 6.42 |
| **S.D.** | 0.72 | 0.95 | 0.84 | 0.80 | 0.38 | 0.29 | 0.90 | 0.74 | 0.54 | 0.69 | 0.55 | 0.43 | 2.26 |
| **Skew** | 1.42 | 1.29 | 1.36 | 2.27 | 1.08 | 1.68 | 3.27 | 2.00 | 1.82 | 1.91 | 1.37 | 1.39 | 0.23 |
| **Max** | 3.13 | 3.22 | 3.03 | 4.04 | 1.59 | 1.20 | 4.22 | 3.60 | 2.30 | 3.18 | 2.48 | 1.74 | 11.54 |
| **Min** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.23 |
| **No. Yrs** | 39 | 42 | 44 | 42 | 42 | 45 | 44 | 43 | 46 | 45 | 44 | 41 | 29 |
| **Spring Valley State Park, NV** | | | | | | | | | | | | | |
| **2010 Data** | 1.75[a] | 1.40 | 0.00[z] | 0.72[b] | 0.45[a] | 0.45 | 0.22 | 1.54 | 0.00 | 2.94 | 0.91[m] | 6.62[g] | 9.47 |
| Period of Record (1974 to Present) | | | | | | | | | | | | | |
| **Mean** | 0.91 | 1.22 | 1.36 | 0.96 | 1.09 | 0.44 | 0.91 | 1.29 | 1.22 | 1.20 | 0.67 | 0.66 | 12.15 |
| **S.D.** | 0.94 | 1.17 | 1.17 | 1.00 | 1.01 | 0.58 | 0.83 | 1.16 | 1.79 | 1.15 | 0.81 | 0.63 | 4.49 |
| **Skew** | 1.58 | 0.57 | 0.95 | 1.37 | 1.14 | 1.60 | 1.55 | 1.42 | 3.35 | 1.25 | 1.94 | 0.84 | 0.84 |
| **Max** | 3.81 | 3.65 | 4.30 | 3.92 | 3.70 | 2.14 | 3.68 | 5.41 | 9.72 | 4.95 | 3.43 | 2.37 | 23.48 |
| **Min** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 5.05 |
| **No. Yrs** | 32 | 33 | 33 | 33 | 34 | 35 | 35 | 37 | 35 | 36 | 34 | 32 | 21 |

## Table F-1
## 2010 Regional Precipitation Data
(Page 3 of 3)

| Data Type | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Sunnyside, NV** | | | | | | | | | | | | | |
| **2010 Data** | 1.14 | 0.85 | 0.88 | 0.56 | 0.54 | 0.00[x] | 0.00[z] | 0.00[z] | 0.00[l] | 1.39[b] | 0.05 | 2.57[c] | 7.98 |
| Period of Record (1891 to Present) | | | | | | | | | | | | | |
| **Mean** | 0.69 | 0.82 | 1.01 | 0.80 | 0.81 | 0.48 | 0.76 | 0.82 | 0.85 | 0.93 | 0.56 | 0.70 | 9.41 |
| **S.D.** | 0.53 | 0.74 | 0.96 | 0.78 | 0.74 | 0.65 | 0.87 | 0.77 | 0.90 | 0.91 | 0.73 | 0.71 | 2.98 |
| **Skew** | 1.28 | 1.77 | 1.60 | 1.05 | 1.13 | 1.81 | 1.95 | 1.65 | 1.46 | 1.13 | 2.93 | 1.52 | 0.84 |
| **Max** | 2.64 | 3.55 | 4.82 | 2.81 | 3.23 | 2.79 | 4.37 | 3.89 | 3.69 | 3.76 | 4.19 | 2.80 | 17.11 |
| **Min** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 5.73 |
| **No. Yrs** | 49 | 49 | 50 | 50 | 50 | 51 | 53 | 50 | 48 | 49 | 48 | 44 | 28 |
| **Ward Mountain, NV** | | | | | | | | | | | | | |
| **2010 Data** | 4.60 | 1.50 | 2.80 | 4.20 | 3.70 | 0.20 | 0.30 | 0.60 | 0.20 | 4.90 | 4.20 | 10.70 | 37.90 |
| Period of Record (1978 to Present) | | | | | | | | | | | | | |
| **Mean** | 2.68 | 2.91 | 2.74 | 2.50 | 2.43 | 1.00 | 0.94 | 1.33 | 1.36 | 2.02 | 1.88 | 2.25 | 24.17 |
| **S.D.** | 1.57 | 1.97 | 1.77 | 1.60 | 1.73 | 1.00 | 1.09 | 1.05 | 1.51 | 1.54 | 1.47 | 1.99 | 6.70 |
| **Max** | 6.10 | 9.50 | 8.10 | 5.70 | 7.00 | 3.90 | 4.80 | 4.70 | 7.90 | 6.60 | 7.20 | 10.70 | 39.70 |
| **Min** | 0.50 | 0.40 | 0.30 | 0.00 | 0.10 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 12.80 |
| **No. Yrs.** | 30 | 30 | 30 | 30 | 29 | 29 | 29 | 29 | 29 | 33 | 32 | 31 | 29 |

Precipitation data in inches.
Notes: Provisional data: [a] = 1 day missing, [b] = 2 days missing, [c] = 3 days missing...etc...[z] = 26 or more days missing.
Long-term means based on columns; thus, the monthly row may not sum (or average) to the long-term annual value.
Individual months not used for annual or monthly statistics if more than 5 days are missing.
Individual years not used for annual statistics if any month in that year has more than 5 days missing.

# Table F-2
## Recent (2005-2009) High-Altitude Precipitation Data
(Page 1 of 4)

| Station Name | USGS Site ID | Date | Precipitation (in.) | Comments |
|---|---|---|---|---|
| Unnamed Peak In South Delamar Mountains | 372035114000000 | 7/6/2005 | --- | Could not get to gage due to wildfires. |
| | | 10/20/2005 | 32.50 | --- |
| | | 6/23/2006 | 7.50 | --- |
| | | 10/13/2006 | 1.25 | Add 1 gal Antifreeze. |
| | | 6/11/2007 | 7.25 | No antifreeze added. |
| | | 10/19/2007 | 4.25 | Added 1 gal of antifreeze. |
| | | 6/6/2008 | 6.50 | No antifreeze added. |
| | | 10/16/2008 | 1.50 | Drained and added 2/3 gal mineral oil. |
| | | 6/11/2009 | 9.50 | --- |
| | | 10/2/2009 | 0.75 | --- |
| Unnamed Peak South of Chokecherry Peak | 373107114000000 | 6/21/2005 | 19.00 | Partially drained and added 1 gal of antifreeze. |
| | | 10/18/2005 | 3.50 | --- |
| | | 6/29/2006 | 5.50 | --- |
| | | 10/30/2006 | 3.25 | Added 1 gal of antifreeze. |
| | | 6/5/2007 | 3.00 | Drained and added 1 gal of antifreeze. |
| | | 10/25/2007 | 5.25 | Drained and no antifreeze added. |
| | | 6/10/2008 | 5.25 | Baffle needs to be put back on. |
| | | 10/2/2008 | 4.00 | Drained. Need 3 people to help replace baffle. |
| | | 6/2/2009 | 8.50 | --- |
| | | 10/6/2009 | 2.75 | --- |
| Mount Irish | 373915115000000 | 7/6/2005 | 12.50 | Added 1 gal of antifreeze. |
| | | 10/20/2005 | 3.75 | --- |
| | | 6/23/2006 | 4.50 | --- |
| | | 10/13/2006 | 2.50 | Shut off valve would not stop leaking. Need new o-ring or valve. |
| | | 6/11/2007 | 0.00 | Fixed valve, added 2 gal of antifreeze and 1 gal of water. |
| | | 10/19/2007 | 3.50 | --- |
| | | 6/6/2008 | 5.50 | Added mineral oil. |
| | | 10/16/2008 | 5.75 | Drained and added 2/3 gal of mineral oil. |
| | | 6/11/2009 | 5.50 | --- |
| | | 10/2/2009 | 1.50 | --- |

## Table F-2
## Recent (2005-2009) High-Altitude Precipitation Data
(Page 2 of 4)

| Station Name | USGS Site ID | Date | Precipitation (in.) | Comments |
|---|---|---|---|---|
| Highland Peak | 375337114000000 | 6/21/2005 | 24.00 | Drained and added 1 gal of antifreeze. |
| | | 10/18/2005 | 4.00 | --- |
| | | 6/29/2006 | 13.00 | --- |
| | | 10/30/2006 | 9.50 | --- |
| | | 6/5/2007 | 7.00 | Drained and added 1 gal of antifreeze. |
| | | 10/25/2007 | 6.00 | Drained and added 1 gal of antifreeze. |
| | | 6/10/2008 | 8.50 | --- |
| | | 10/2/2008 | 4.75 | Drained. No antifreeze added. |
| | | 6/2/2009 | 12.75 | --- |
| | | 10/6/2009 | 3.75 | --- |
| Quinn Canyon Range | 381157115000000 | 7/6/2005 | 19.25 | Drained and added 1 gal of antifreeze. |
| | | 10/26/2005 | 4.00 | --- |
| | | 6/23/2006 | 8.50 | Collected 2 samples |
| | | 10/13/2006 | 3.75 | Added 1 gal of antifreeze, collected 2 samples. |
| | | 6/11/2007 | 2.50 | Gage tipped over at a 45 degree. Uprighted gage and secured it. |
| | | 10/19/2007 | 6.50 | Added 1/2 gal of antifreeze. |
| | | 6/6/2008 | 7.75 | No antifreeze added. Collected 2 samples. |
| | | 10/16/2008 | 4.25 | Drained and added 2/3 gal of mineral oil. Collected 2 samples. |
| | | 6/11/2009 | 11.00 | --- |
| | | 10/2/2009 | 3.50 | --- |

## Table F-2
## Recent (2005-2009) High-Altitude Precipitation Data
(Page 3 of 4)

| Station Name | USGS Site ID | Date | Precipitation (in.) | Comments |
|---|---|---|---|---|
| Mount Wilson | 381438114000000 | 6/21/2005 | 42.75 | Drained and added 1 gal of antifreeze. |
| | | 10/18/2005 | 4.25 | Added antifreeze. |
| | | 6/19/2006 | 11.25 | --- |
| | | 10/30/2006 | 9.75 | --- |
| | | 6/5/2007 | 5.25 | Drained and added 1 gal of antifreeze. |
| | | 10/25/2007 | 3.00 | Drained and added 1 gal of antifreeze. |
| | | 6/10/2008 | 14.00 | Baffle needs to be raised on next visit. |
| | | 10/3/2008 | 4.25 | Drained. Needs new baffle. |
| | | 6/2/2009 | 14.00 | --- |
| | | 10/6/2009 | 3.50 | --- |
| Mount Washington | 385409114000000 | 7/12/2005 | 46.00 | Took samples from gage and bucket. |
| | | 11/2/2005 | 6.00 | Replaced isotope collection bucket. |
| | | 7/5/2006 | 17.50 | --- |
| | | 7/6/2006 | 0.00 | Sampled tube. Added 2 gal of antifreeze to precip. Drained and filled bucket and tube. |
| | | 10/19/2006 | 7.00 | Drained and added 1 gal of antifreeze |
| | | 6/5/2007 | 9.75 | Drained, no antifreeze added. |
| | | 10/24/2007 | 2.75 | Added 1 gal of antifreeze and 3/4 gal of oil. |
| | | 6/5/2008 | 12.50 | Drained and added 1 gal of antifreeze. |
| | | 10/15/2008 | 0.00 | Collected 2 samples. |
| | | 5/27/2009 | 18.75 | --- |
| | | 10/23/2009 | 18.50 | --- |

## Table F-2
## Recent (2005-2009) High-Altitude Precipitation Data
(Page 4 of 4)

| Station Name | USGS Site ID | Date | Precipitation (in.) | Comments |
|---|---|---|---|---|
| Cave Mountain | 390946114000000 | 7/20/2005 | 15.25 | --- |
| | | 11/7/2005 | 3.25 | Drained and added 1 gal of antifreeze. |
| | | 6/23/2006 | 18.75 | --- |
| | | 10/19/2006 | 4.25 | Raised wind baffle to just above top of collector, tightened guide wires. Drained and added antifreeze. |
| | | 6/13/2007 | 12.00 | Drained and added 1 gal of antifreeze. |
| | | 10/23/2007 | 3.75 | Did not drain. Added 1 gal of antifreeze. |
| | | 6/5/2008 | 8.50 | Drain and added 1 gal of antifreeze. |
| | | 10/14/2008 | 4.25 | Added 1 gal of antifreeze. |
| | | 5/29/2009 | 17.25 | --- |
| | | 10/22/2009 | 7.75 | --- |

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