Hydrogeologic Analysis of Needle Point Spring
Fillmore Field Office, Utah

(Revised final)

by
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July 27, 2001

Introduction:

Needle Point Spring is a low flowing spring that occurs at the northern tip of the Needle Point Mountain, a north-south trending outcrop of dolomite hills about one mile east of the Nevada state line, in Millard County, Utah. It is located in the upper part of Snake Valley, with Hamlin Valley adjacent to the west in Nevada.

The spring has a long history of existence. It was documented as early as 1939 by the Civilian Conservation Corps (CCC) work crew, who did improvements at the spring. Flow was measured at 6 gallons per minute (gpm) by Robert Wilkins and Robert Elliot, CCC camp engineers, on Sept. 22, 1939. The spring was developed by digging into the alluvium about 10 ft. and installing a 6 ft. diameter circular steel tank which is perforated to allow water to flow into the tank. An outlet pipe feeds water to a nearby trough and a surface pond for easy access by stock and wild horses. Water at the spring has been used for watering stock and wild horses for several decades. BLM filed a diligence water right on the spring on May 30, 1986 for .0133 cfs of water. The spring is noted on the master title plat as a Public Water Reserve 107. The diligence claim asserts that the water was being used for public land management purposes prior to 1903.

The Army Map Service plotted the spring on their topographic map of 1956. The spring was mentioned in a U.S. Geological Survey report on the area (Snyder, 1963), and the spring was visited during a study by the Las Vegas Valley Water District (1993).

Flows measured at the spring have remained steady since the first known measurement in 1939. The following flow measurements have been recorded since 1939 :

Sept. 24, 1992 flow 6 gpm measured by Fillmore BLM staff.

Feb. 16, 1994 flow 7 gpm measured by Fillmore BLM staff.

July 11, 1997 flow 7 gpm measured by Fillmore BLM staff.

June 6, 2001 flow 2.4 gpm measured by Fillmore BLM staff, and state office BLM.

Late June, 2001: Water level drops below outlet pipe of spring box and flow to the watering trough and surface pond ceases.
A local rancher has told BLM that in the 40 yrs. he has been ranching out there, Needle Point

Spring has never gone dry.

The spring didn't actually go dry in the sense that the water supply is now gone. The water level in the alluvium dropped to a level below the outflow pipe in the steel tank, and water ceased to flow out of the buried inflow tank. The alluvium likely remains saturated in the vicinity of the spring.

Ground Water Conditions

Needle Point Spring is located in the alluvium that overlies fractured dolomite that forms Needle Point Mountain south of the spring (Whitebread, 1969). The spring likely was originally evident as a seep where water flowed from the fractured dolomites into the alluvium, creating a wet area on the alluvial slope. The seep was likely noted to be perennial, and prompted the development of an inflow structure to increase flow of the water supply.

Alluvial basin fill is extensive in the area, and extends from the mountain front along the Snake Range in Nevada about 5 miles to the west, eastward into Utah to the Burbank Hills and the Mountain Home Range, a distance of about 6 miles east of the spring. The alluvial basin fill is recharged by precipitation in the Snake Range, and provides a large amount of recharge water to the alluvium in Hamlin Valley just west of the spring. The alluvium is also recharged by the flow of Big Spring, a high flowing spring (3,700 gpm) issuing from near the base of the Snake Range. Water flows from the spring northward, forming Big Spring Creek, a major drainage that flows along the center of Hamlin Valley, an alluvial basin about 2 miles west of Needle Point Spring.

Ground water flows from the recharge area in mountain front alluvial fans along the Snake Range eastward into Utah, then northward towards Great Salt Lake (Brothers, et al., 1993, and Hood and Rush, 1965). The water level at the spring is at about 5445 ft. elevation, which is about the same elevation as water in the deep irrigation well 4500 feet northwest of the spring, and about the same elevation as water in a well 3.5 miles to the east (sec. 3, T. 24 S., R. 19 E.) which was drilled into the alluvial basin fill. Needle Point Spring is located along the hydraulic gradient from west to east, and likely represents the potentiometric level of the deep aquifer in the alluvial basin fill.

Ground water saturates the alluvial basin fill in Hamlin Valley (1 mile west of the spring), and a few flowing springs occur in this area, indicating that there is considerable upward movement of ground water under confined conditions. The alluvium is a widespread aquifer, extending over the entire alluvial basin, from Hamlin Valley eastward to the Burbank hills in Utah. The alluvial aquifer is comprised of a shallow unconfined aquifer and a deep confined aquifer that forces water upward, with a water level higher than the shallow aquifer. The deep confined aquifer appears to be the source of water for the irrigation wells west of Needle Point Spring, based on well depths, and possibly the source of water for Needle Point Spring.

Some water likely issues from the dolomite rocks of Needle Point Mountain into the alluvium near Needle Point Spring, as the water quality analysis at the spring shows that sulfate is slightly elevated, likely from thin gypsum beds present in the the dolomite of Needle Point Mountain (Hintze, 1986). This is not considered a major source of water to the system. The temperature of the water at the spring, 15^0 C in 1992 (BLM measurement), and 12.5 ^{0}C in 1991 (Brothers, et al, 1993) indicates that the water source for the spring is not a deep regional aquifer, as the water is

too cool. The water is more from a local system, and is likely recharge from the Snake Range to the west in Nevada. Because of the extensive fracturing of dolomites in Needle Point Mountain, water is likely flowing through the fractured rocks into the alluvium, near the spring.

Information from drillers logs of the wells indicates that the wells in Nevada and Utah are 16-inch diameter wells. A well of this diameter is designed for high capacity irrigation pumping. Although pump test information is not available on all of the wells, one well test on the Nevada side was at 750 gpm. It is expected that all the wells would be capable of at least 500 gpm. Water right applications for two wells on the Utah side (in T. 24 S., R. 20 W., sec. 2) are for high capacity pumping. One application stated 3 cfs (about 1300 gpm) and another well has applied for 2 cfs (about 900 gpm).

Water Level Declines

The water level decline at Needle Point Spring is about 2.5 ft., (measured from the top of the steel tank intake) which is enough to drop the water level below the out flow pipe, resulting in cessation of flow to the watering trough and pond. The water level in the spring intake structure dropped from 11.6 inches on June 6 (measured by BLM hydrologists) to 29.5 inches on July 18, 2001. However, from the discovery date of the wild horse mortalities, the spring likely stopped flowing into the trough about the last week of June, so the water level decline was rather rapid, dropping 1.5 feet in about 2-3 weeks, but the water level may have dropped more than 1.5 ft, as there may have been some decline prior to the June 6th field visit by BLM.

The recent decline in ground water level at Needle Point Spring is likely due to increased irrigation pumping with center pivot sprinkler systems about a mile to the west. A related factor could be that precipitation has been less than normal. The lower precipitation is not documented in this area by rain gages, but reports from local ranchers suggest that precipitation is generally less than in the past. This factor is not regarded as being the cause of the decline of the spring, because the decline was abrupt, and seemed to coincide with the onset of the 2001 irrigation season. The most likely explanation for the spring going dry is the irrigation pumping. There are about 13 center pivots in Hamlin Valley to the west (2 miles away); some of the center pivots are in Utah and some are across the line in Nevada, extending south for about 4 miles. Water is used for crops from April to October. The exact pumping cycle applied to the crops is not known.

Because the basin fill alluvium extends from the area of the irrigation wells to Needle Point Spring, a hydraulic connection exists between the area being pumped for irrigation and the spring. A predictive analysis of drawdown due to pumping of planned wells in Snake Valley by the Las Vegas Valley water District in 1993 indicated that drawdown would extend throughout the extent of Snake Valley including the area of Needle Point Spring after pumping until steady state is reached, a period of several years.

A predictive analysis of the potential drawdown at Needle Point Spring as a result of the irrigation pumping is difficult because of the lack of actual pumping data, including the rate of pumping and the duration. An estimate of the possible magnitude of drawdown was made, using pumping rates as applied for in the water right applications, and assuming a period of use which is unconfirmed. Using an analytical model, the Theis analysis for confined aquifers, it is estimated that drawdown at the spring of 7.2 ft. could occur for a well pumping at 1300 gpm 4500 ft. away from the spring, assuming a pumping duration of 90 days continuous. The actual

pumping may be less than this so drawdown would be less. Also, actual aquifer conditions might be different than those assumed in the model.

Although the exact magnitude of pumping drawdown at the spring can not be predicted because of a lack of specific data, the field reconnaissance and geological analysis suggests a hydraulic connection exists between the spring and the aquifer being pumped for irrigation. In addition, the analytical model shows that an aquifer response at the spring is possible after only a short period of pumping. This response to pumping could cause a rapid decline in water level at the spring and result in the condition that now exists.

The relationship of irrigation pumping to the water level decline at Needle Point Spring will become more evident when the irrigation season ends in early October. If the water level recovers at the spring within a few weeks after pumping is ended, the connection between pumping and spring flow would be established with greater confidence.

Recommendations

A monitoring well should be installed near the spring development to monitor fluctuations of the water table in the immediate vicinity of the spring. This would be useful for long-term monitoring of aquifer conditions in the area, and to improve our ability to correlate water level declines with increased pumping in the area. Because of the extremely remote location of the spring, a continuous recording sensor should be installed in the well so that personnel would not have to come out to measure the water level. The cost savings of installing such a device can be considerable, and the data collection is vastly improved, as measurements can be made every day or several time a day, which could show fluctuations in the water level due to pumping. The cost for a monitoring well and a sensor would not exceed $3,000.

Literature Cited

Brothers, Kay, Buqo, Thomas S., and James Tracy, 1993, Hydrology and Steady State Ground-Water Model of Snake Valley, East-Central Nevada, and West-Central Utah: Las Vegas Valley Water District Cooperative Water Project, Report 9.

Hintze, Lehi F., 1986, Geologic Map of the Morman Gap and Tweedy Wash Quadrangles, Millard County, Utah, and Lincoln and White Pine Counties, Nevada: U.S. Geological Survey Miscellaneous Field Studies Map MF-1872.

Hood, James W., and F. Eugene Rush, 1965, Water Resources Appraisal of the Snake Valley Area, Utah and Nevada: State of Nevada, Dept. of Conservation and Natural Resources, Water Resources Reconnaissance Series Report 34 (published also as Utah State Engineer Technical Publication 14).

Snyder, Charles T., 1963, Hydrology of Stock Water Development on the Public Domain of Western Utah: U.S. Geological Survey Water-Supply Paper 1475-N.

Whitebread, Donald H., 1969, Geologic Map of the Wheeler Peak and Garrison Quadrangles, Nevada and Utah: U.S. Geological Survey Miscellaneous Investigations Map I-578.

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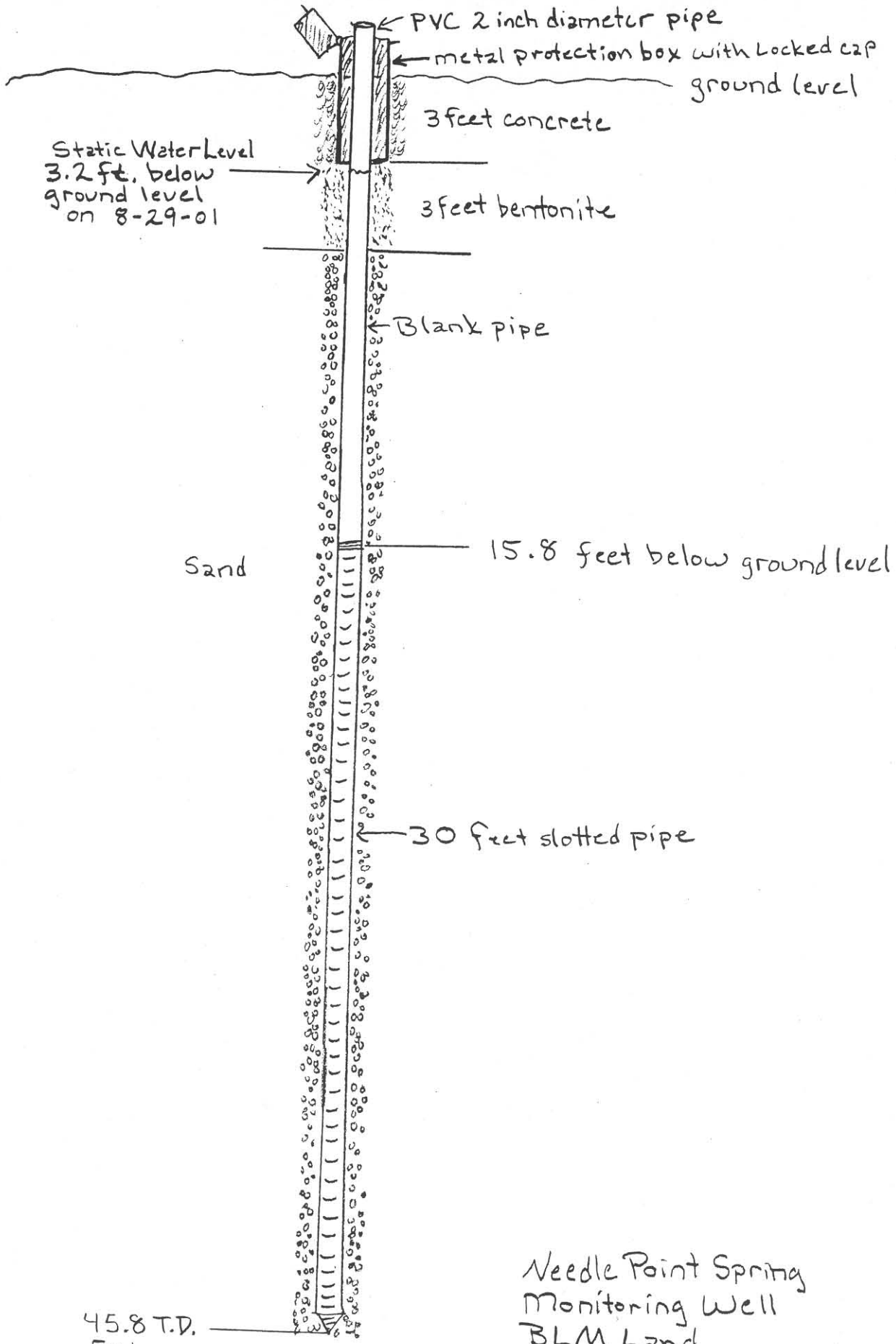
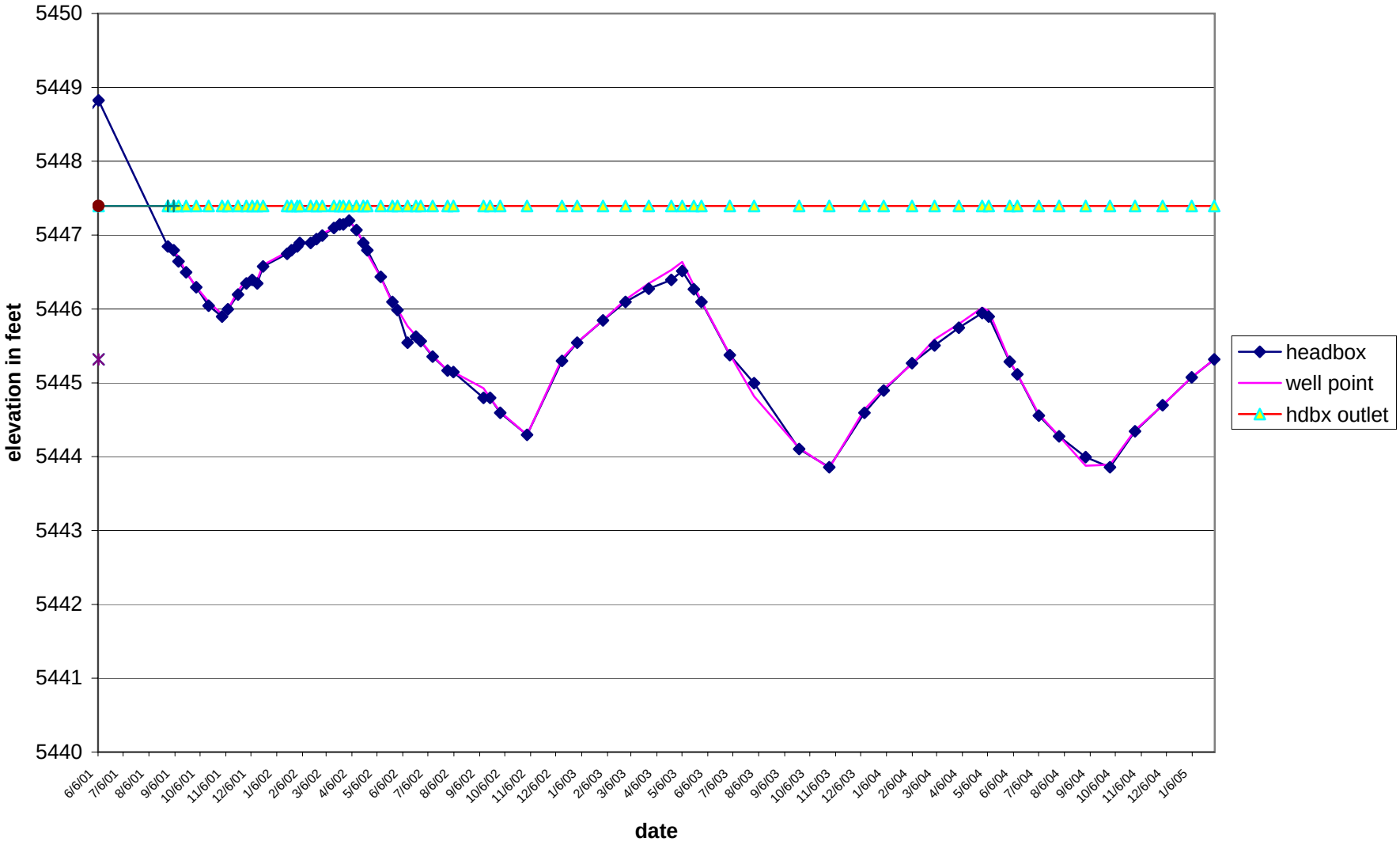
Figures:

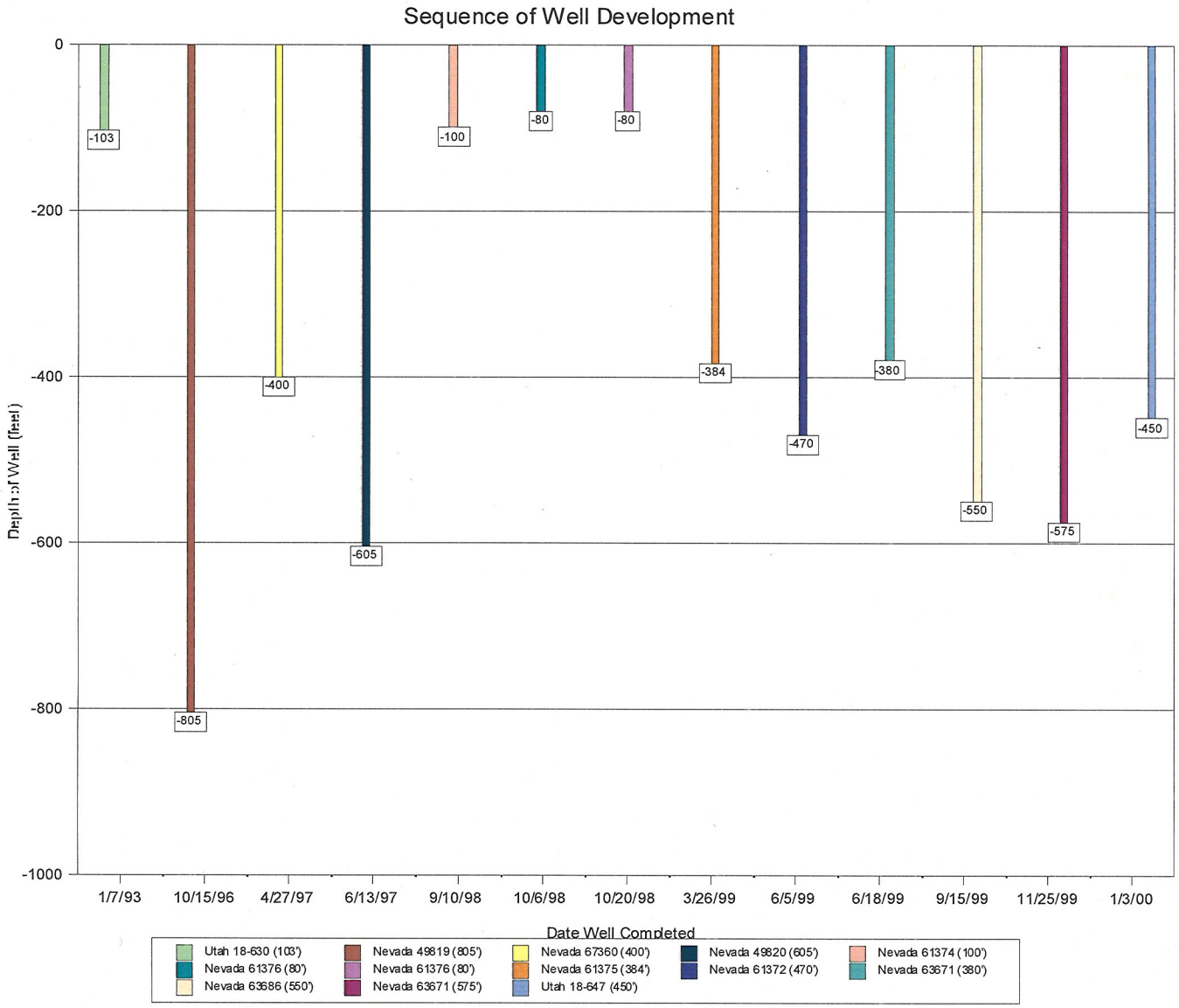
Tables:

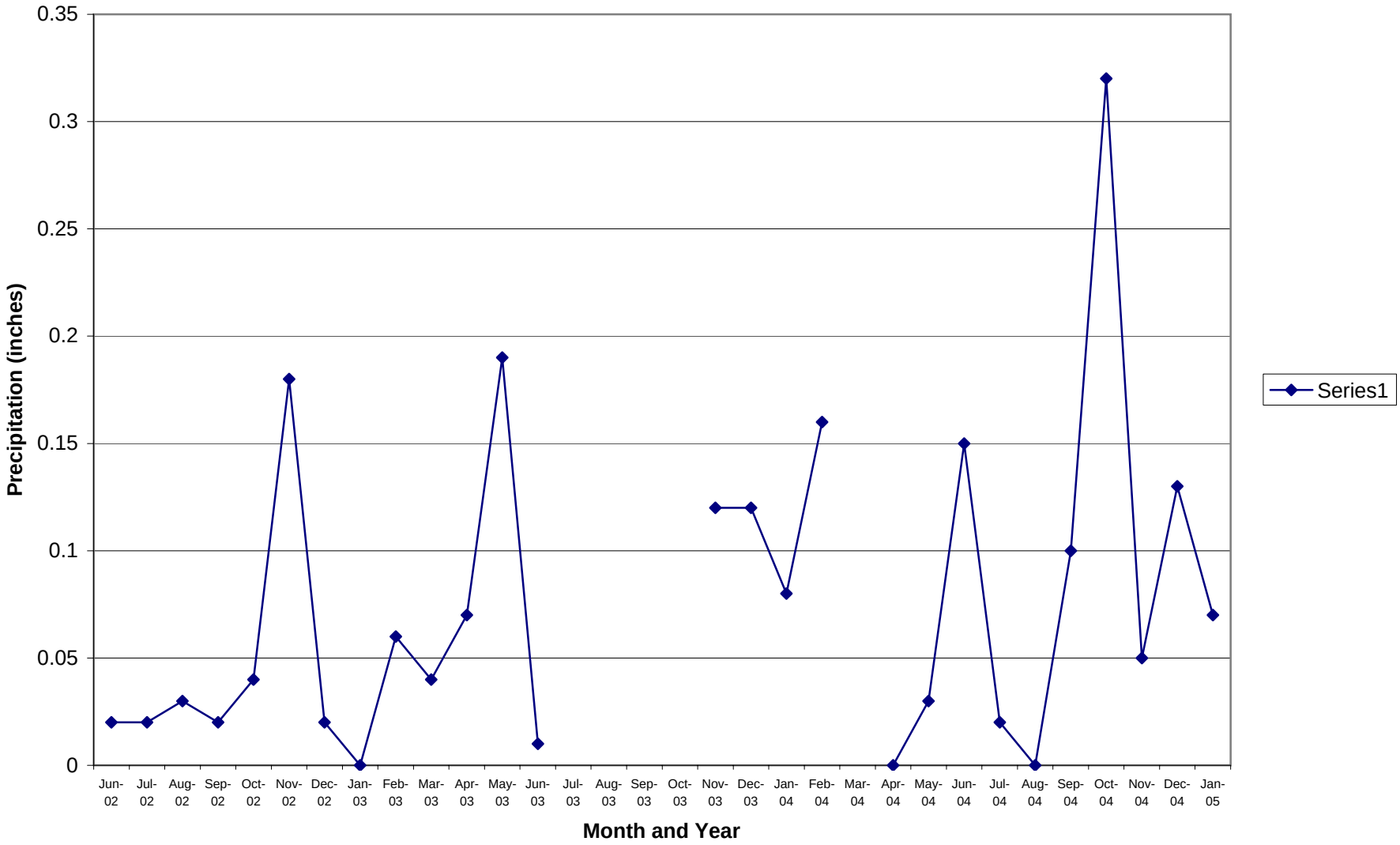


Needle Point Spring
Monitoring Well
BLM Land
T24S R20W Sec. 1 (S.L. Base)
E4 S600 ft. W1200 ft.

Needle Point Spring Water Levels




Sequence of Well Development
Depth of Well (feet)
0
-200
-400
-600
-800
-1000
-103
-805
-400
-605
-100
-80
-80
-384
-470
-380
-550
-575
-450
1/7/93
10/15/96
4/27/97
6/13/97
9/10/98
10/6/98
10/20/98
3/26/99
6/5/99
6/18/99
9/15/99
11/25/99
1/3/00
Date Well Completed
Utah 18-630 (103')
Nevada 61376 (80')
Nevada 63686 (550')
Nevada 49819 (805')
Nevada 61376 (80')
Nevada 63671 (575')
Nevada 67360 (400')
Nevada 61375 (384')
Utah 18-647 (450')
Nevada 49820 (605')
Nevada 61372 (470')
Nevada 61374 (100')
Nevada 63671 (380')


Needle Point Spring Rain-can Precipitation
Precipitation (inches)
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
Jun-02
Jul-02
Aug-02
Sep-02
Oct-02
Nov-02
Dec-02
Jan-03
Feb-03
Mar-03
Apr-03
May-03
Jun-03
Jul-03
Aug-03
Sep-03
Oct-03
Nov-03
Dec-03
Jan-04
Feb-04
Mar-04
Apr-04
May-04
Jun-04
Jul-04
Aug-04
Sep-04
Oct-04
Nov-04
Dec-04
Jan-05
Month and Year
Series1

Needle Point Spring

3-10-94

(11)

Well Driller Logs
For Granite Peak Properties (Knudson) Wells In Nevada

Nevada Water Right Number (Permit Number)	Location and Date Completed	Casing Size (inches)	Depth (feet of casing)	Work Performed	Proposed Use	Well Test Data	Other
49820	NWNE 25, T10NR70E June 13, 1997	20	42	New Well	Irrigation	950 gpm w. 200' drawdown/20hrs.	Location ?
A		14	400				
A		6 5/8	605				
61372	NESW 25, T10NR70E June 5, 1999	16	470	Replace	Irrigation	No test	
61374	SENW 24, T10NR70E Sept. 10, 1998	16	100	Replace	Irrigation	No data	Location ?
49819	NWNE 25, T10NR70E October 15, 1996	14	805	New Well	Irrigation	866 gpm @ 405' w. 371' drawdown/3 hrs.	
61375	SWN?, 24, T10NR70E March 26, 1999	16	383' 7"	Replace	Irrigation	about 900 gpm; not a good test	Location ?
67360	NWNE 24 T10NR70E April 27, 1997	6 5/8	400	New Well	Domestic	200 gpm w. 352' drawdown/1hr.	
61376	SWNE 24, T10NR70E Oct. 20, 1998	16	80	Replace	Irrigation	None	#1 per 61376; location ?
61376	SWNE 24, T10NR70E Oct. 6, 1998	16	80	Replace	Irrigation	None	#2 per 61376; location ?
63671	Lot 3, 24, T10NR70E June 18, 1999	16	380	New Well	Irrigation	No Test	#1 per 63671; location ?
63671	SWS? 24, T10NR70E Nov. 25, 1999	16	575	New Well	Irrigation	No Test	#2 per 63671; location ?
63686	SWNE 24, T10NR70E Sept. 15, 1999	16	550	New Well	Irrigation	No Test	Location ?

Knudson Wells in Utah - Summary

1. 18-628 (A65949) filed by Millsap and Zitting - 3 cfs, 8" well 60' deep for 160 acres irrigation, 31 livestock, and 30 persons located South 1450 feet West 220 feet from NE corner Sec. 2, T. 24 S., R. 20 W.

Filed Feb. 25, 1992.
Protested by BLM on May 12, 1992. Hearing requested.
Hearing held July 22, 1992.
Approved August 28, 1992.

Memo Decision states "On July 30, 1992, the flow was measured by representatives of the State Engineer at about 6 gpm. It appears that little underground water development has occurred in the vicinity of the applicants proposed well site and that water should be available for this appropriation. It is unclear as to what the source of the spring is or if interference with the spring will occur by development of this well. Due to the distance between the spring and the well, it seems unlikely that impairment of rights in Needlepoint Spring will occur. It is also possible for the applicants to replace the water for which the protestant is deprived if impairment occurs".

Lapsed Dec. 31, 1995.

2. 18-630 (A66174) originally filed by Millsap and Zitting (now Kenneth Knudson) - 20 acre feet, 3" well 60' deep for 31 cattle and 2 families located South 1300 feet West 100 feet from NE Corner Sec. 2, T. 24 S., R. 20 W.

Filed June 1, 1992.
Advanced permission to drill authorized July 21, 1992
Protested by BLM on November 2, 1992. Hearing requested.
No Hearing held.
Approved Sept. 6, 1996 (limited the 20 acre feet filing to 1.77 acre feet).

Memo Decision states "The application as submitted requested to divert 20 acre feet for the purposes of serving the domestic needs of two families and watering 31 equivalent livestock units. These uses would normally require only about 1.77 acre feet of water per year. If this application is limited to this amount of water and these uses, no impact on Needle Point Spring is likely".

Well drillers log for 18-630 lists Norman Millsap as owner. Drilling started December 26, 1992, and completed well on Jan. 7, 1993 @ South 1300 feet West 100 feet from NE Corner Sec. 2, T. 24 S., R. 20 W.; 8" casing, well depth 103'; test pumped @ 30 gpm (0.67 cfs).

3. 18-647 (A70025) filed by Millsap and Zitting - 3 cfs, 8" well (existing) 60-125' deep for 160 acres irrigation, 50 cattle, and 1 family located South 1450 feet West 220 feet from NE Corner Sec. 2, T. 24 S., R. 20 W.

Filed May 21, 1996.
Legal notice overlooked and no protest submitted by BLM due to extreme range fire load in 1996.
Approved Sept. 11, 1996.

Memo Decision states "The USA Bureau of Land Management has expressed concern about their prior rights in Needle Point Spring which may be affected by an appropriation (Water Filing 18-630) from the same well as discussed herein. Although it does not appear that this application was protested by the BLM, diversions under this application are junior in priority to the rights of the BLM and must not impair those rights. If an impairment does occur, it may be necessary for the applicant to replace or compensate for the water lost by the BLM. However, the records of the State Engineer have been reviewed. It appears that the well is about one mile distant from Needle Point Spring which reduces any likelihood that impairment will occur".

Well drillers log for 18-647 lists Kenneth Knudson as owner. Drilling started July 27, 1999 and completed well on Jan. 3, 2000 @ South 1450 feet West 220 feet from NE Corner Sec. 2, T. 24 S., R. 20 W.; 16" casing, well depth 450': no pump test.

4. 18-667 (A73299) filed by Kenneth Knudson - 2.0 cfs, 22" well (existing) 450' deep for 129 acres irrigation located South 1450 feet West 220 feet from NE Corner Sec. 2, T. 24 S., R. 20 W.

Filed Feb. 6, 2001.
Protested by BLM on March 19, 2001.
Hearing held October 2, 2002.
No Decision as of February 7, 2005.

Needle Point Spring Water Level Measurements

Date	Time	Depth to Water (feet) @ Spring Headbox Measured from Top of Headbox	Elevation of Water (feet) @ Spring Headbox- (Depth in feet subtracted from Elevation of Headbox- 5449.795')	Depth To Water (feet) @ PVC Measured from Top of PVC	Elevation of Water (feet) @ PVC Well Point -(Depth in feet subtracted from Elevation at Top of PVC- (5450.997')	Comments
June 6, 2001	1015	0.97	5448.825			Heidi, Paul, Phil, & Harvey - Spring flow = 2.37 gpm
August 28, 2001		2.95	5446.845			Heidi & Paul
Sept. 4, 2001	1400	3.0	5446.795	4.2	5446.797	Harvey - Irrigation Pumping.
Sept. 10, 2001	1030	3.15	5446.645	4.3	5446.697	Harvey
Sept. 19, 2001	1650	3.30	5446.495	4.5	5446.497	Harvey
Oct. 1, 2001	1504	3.5	5446.295	4.7	5446.297	Harvey
Oct. 16, 2001	1350	3.75	5446.045	4.9	5446.097	Harvey
Nov. 1, 2001	1200	3.9	5445.895	5.07	5445.927	Harvey - Irrigation Ended.
Nov. 8, 2001	0930	3.8	5445.995	5.0	5445.997	Harvey
Nov. 20, 2001	1000	3.6	5446.195	4.75	5446.247	Harvey
Nov. 30, 2001	1124	3.45	5446.345	4.6	5446.397	Harvey - 2" snow
Dec. 7, 2001	1200	3.4	5446.395	4.55	5446.447	Harvey - 2" snow
Dec. 13, 2001	1200	3.45	5446.345	4.6	5446.397	Harvey & Phil - 2" snow
Dec. 20, 2001	1350	3.22	5446.575	4.4	5446.597	Harvey - 2" snow
Jan.. 7, 2002	1414	3.10	5446.695	4.3	5446.697	Harvey - 2" snow
Jan. 18, 2002	1050	3.05	5446.745	4.225	5446.772	Harvey - snow melted
Jan. 23, 2002	1445	3.0	5446.795	4.175	5446.822	Harvey, Billy, Phil & John -trace of snow (Air = 0°C, PVC water = 9°C).
Jan. 30, 2002	1030	2.95	5446.845	4.14	5446.857	Billy - Air = -2° F, 2" new snow.
Feb. 2, 2002	0930	2.9	5446.895	4.1	5446.897	Harvey - 2" snow
Feb. 15, 2002	1130	2.9	5446.895	4.1	5446.897	Harvey - dry
Feb. 22, 2002	1300	2.85	5446.945	4.05	5446.947	Harvey - soil damp
March 1, 2002	1230	2.8	5446.995	3.975	5447.022	Harvey - skiff of snow

Needle Point Spring Water Level Measurements

Date	Time	Depth to Water (feet) @ Spring Headbox Measured from Top of Headbox	Elevation of Water (feet) @ Spring Headbox-(Depth in feet subtracted from Elevation of Headbox-5449.795')	Depth To Water (feet) @ PVC Measured from Top of PVC	Elevation of Water (feet) @ PVC Well Point -(Depth in feet subtracted from Elevation at Top of PVC-(5450.997')	Comments
March 15, 2002	1000	2.7	5447.095	3.9	5447.097	Harvey, Glen & Phil - cold, soil damp.
March 22, 2002	1045	2.65	5447.145	3.85	5447.147	Harvey - soil moisture ½" below surface.
March 26, 2002	1241	2.65	5447.145	3.85	5447.147	Harvey - soil moisture ½" below surface
April 2, 2002	1000	2.60	5447.195	3.80	5447.197	Harvey
April 11, 2002	1330	2.725	5447.07	3.925	5447.072	Harvey - 6 center pivots pumping.
April 19, 2002	1327	2.9	5446.895	4.10	5446.897	Harvey - 5 center pivots pumping.
April 24, 2002	0913	3.0	5446.795	4.25	5446.747	Harvey, Billy, Heidi, Paul, Phil - cold, dry: air =10°C, PVC water =10°C: 3 center pivots: hdbx recharge = 0.99gpm.
May 10, 2002	1456	3.36	5446.435	4.57	5446.427	Harvey - 9 center pivots pumping; rain-can placed, 0.22" anti-feeze & oil.
May 24, 2002	1222	3.7	5446.095	4.92	5446.077	Harvey, Heidi, Paul, Jeff, Phil - 7 center pivots (14 cfs est.); pressure transducer installed; 0.22" in rain-can.
May 30, 2002	1708	3.81	5445.985	5.0	5445.997	Harvey - no count of center pivots; 2 center pivots close to spring not operating; 0.22" in rain-can; bottom of pipe in hdbx 16 7/8" above water.
June 11, 2002	1421	4.25	5445.545	5.23	5445.767	Harvey - no count of center pivots; 2 center pivots close to spring not operating: 0.22" in rain-can.
June 21, 2002	1405	4.17	5445.625	5.36	5445.637	Harvey - 9 center pivots; 0.22 A in rain-can.

Needle Point Spring Water Level Measurements

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June 27, 2002	1350	4.23	5445.565	5.43	5445.567	Harvey, Phil - 9 center pivots + wheel lines: 0.24" in rain-can.
July 11, 2002	1215	4.44	5445.355	5.63	5445.367	Harvey - 9 center pivots (1 by trailer): 0.24" in rain-can.
July 29, 2002	1434	4.63	5445.165	5.83	5445.167	Harvey - 7 center pivots: 0.26" in rain-can.
August 5, 2002	1834	4.65	5445.145	5.85	5445.147	Harvey - 11 center pivots: 0.29" in rain-can.
August 29, 2002						Harvey - 0.29" in rain-can: no water level measurements; downloaded pressure transducer data
Sept. 10, 2002	1215	5.00	5444.795	6.07	5444.927	Phil, LaRell - 0.33" in rain-can: 8 center pivots
Sept. 18, 2002	1400	5.00	5444.795	6.2	5444.797	Harvey - 0.34" in rain-can; 5 center pivots.
Sept. 30, 2002	1630	5.2	5444.595	6.39	5444.607	Harvey - 0.35" in rain-can; 9 center pivots.
Nov. 1, 2002	1135	5.5	5444.295	6.7	5444.297	Phil, LaRell - irrigation turned off Oct. 31 per Ladd Davies; 0.39" in rain-can; cold with temp 10º last night.
Dec. 13, 2002	1212	4.5	5445.295	5.67	5445.327	Harvey, Phil - 0.57" in rain-can; dry, no snow on ground.
Dec. 31, 2002	1230	4.25	5445.545	5.45	5445.547	Phil - 0.59" in rain-can; dry, cold, wind, snow flurries, no snow on ground.
Jan. 31, 2003	1150	4.00	5445.845	5.15	5445.847	Phil - 0.58" in rain-can; dry, warm, no snow.
Feb. 27, 2003	1152	3.7	5446.095	4.87	5446.127	Phil - 0.64" in rain-can: skiff of snow, cool.
March 27, 2003	1400	3.52	5446.275	4.65	5446.347	Harvey - 0.68" in rain-can;

Needle Point Spring Water Level Measurements

						no pumping; cold/dry.
Date	Time	Depth to Water (feet) @ Spring Headbox Measured from Top of Headbox	Elevation of Water (feet) @ Spring Headbox-(Depth in feet subtracted from Elevation of Headbox-5449.795')	Depth To Water (feet) @ PVC Measured from Top of PVC	Elevation of Water (feet) @ PVC Well Point -(Depth in feet subtracted from Elevation at Top of PVC-(5450.997')	Comments
April 23, 2003	1148	3.4	5446.395	4.47	5446.527	Phil - 0.75" in rain-can; no pumping; cloudy, mild; soil surface damp.
May 6, 2003	1110	3.28	5446.515	4.36	5446.637	Harvey, Phil - 0.79" in rain-can; no pumping; warm.
May 20, 2003	1210	3.53	5446.265	4.68	5446.317	Phil - 0.82" in rain-can; 2 center pivots in Utah and 3 in Nevada pumping; warm, dry.
May 29, 2003	1330	3.7	5446.095	4.89	5446.107	Harvey - 0.98" in rain-can; 9 center pivots; dry, cloudy; good green-up on veg.
July 2, 2003	1330	4.42	5445.375	5.61	5445.387	Harvey - 0.97" in rain-can (solution evaporating); 5 center pivots.
July 31, 2003	1200	4.8	5444.995	6.18	5444.817	Phil - 0.68" in rain-can (solution evaporating); 1 center pivot in Utah and 5 center pivots in Nevada.
Sept. 23, 2003	1355	5.69	5444.105	6.88	5444.117	Phil - 0.62" in rain-can (solution evaporating); 2 center pivots in Utah and 3 center pivots in Nevada; baled hay in fields.
Oct, 29, 2003	1330	5.94	5443.855	7.15	5443.847	Harvey, Phil – 0.59” in Rain-can before recharging; 0.12” in rain-can after recharging. Clear, warm, windy. 1 center pivot (Utah).
Dec. 10, 2003	1210	5.2	5444.595	6.36	5444.637	Phil – 0.24” in rain-can. Clear, cold, windy, dry (no snow).
Jan. 2, 2004	1205	4.9	5444.895	6.08	5444.917	Phil – 0.36” in rain-can. Patchy snow, scattered clouds, breezy, cool.
Feb. 5, 2004	1230	4.53	5445.265	5.74	5445.257	Phil – 0.44” in rain-can; 3” new snow, breezy, cool, mostly clear. 2 horses

Needle Point Spring Water Level Measurements

						close to private land at Knudsen well.
Date	Time	Depth to Water (feet) @ Spring Headbox Measured from Top of Headbox	Elevation of Water (feet) @ Spring Headbox- (Depth in feet subtracted from Elevation of Headbox- 5449.795')	Depth To Water (feet) @ PVC Measured from Top of PVC	Elevation of Water (feet) @ PVC Well Point -(Depth in feet subtracted from Elevation at Top of PVC- (5450.997')	Comments
March 3, 2004	1150	4.29	5445.505	5.41	5445.587	Harvey, Phil – 0.62" in rain-can; 6" new snow; foggy, cool.
April 1, 2004	1330	4.05	5445.745	5.2	5445.797	Harvey, Phil – 0.60" in rain-can (solution evaporating), oil added w. new level @ 0.67"; cloudy, cool, windy; no pumps operating in Utah or Nevada.
April 29, 2004	1240	3.85	5445.945	4.98	5446.017	Phil – 0.77" in rain-can; cool with some wind; no wells pumping.
May 7, 2004	1205	3.9	5445.895	5.02	5445.977	Phil – 0.77" in rain-can: overcast, warm, breezy; 1 center pivot in Utah and 6 pivots in Nevada pumping.
June 1, 2004	1225	4.51	5445.285	5.7	5445.297	Phil – 0.80" in rain-can; clear, warm; 1 center pivot in Utah and 4 in Nevada pumping.
June 10, 2004		4.68	5445.115	5.88	5445.117	Paul Summers – re-installed pressure transducer in well point.
July 6, 2004	1200	5.24	5444.555	6.42	5444.577	Phil – 0.95" in rain-can; clear, warm; 1 center pivot in Utah and 3 in Nevada pumping.
July 30, 2004	1300	5.52	5444.275	6.72	5444.277	Phil – 0.97" in rain-can; clear, warm, windy; 4 center pivots in Nevada pumping.
August 31, 2004	1220	5.8	5443.995	7.12	5443.877	Phil – 0.97" in rain-can; warm w. scattered clouds; 5 center pivots in Nevada pumping.

Needle Point Spring Water Level Measurements

Date	Time	Depth to Water (feet) @ Spring Headbox Measured from Top of Headbox	Elevation of Water (feet) @ Spring Headbox- (Depth in feet subtracted from Elevation of Headbox- 5449.795')	Depth To Water (feet) @ PVC Measured from Top of PVC	Elevation of Water (feet) @ PVC Well Point -(Depth in feet subtracted from Elevation at Top of PVC- (5450.997')	Comments
Sept. 29, 2004	1205	5.94	5443.855	7.103	5443.890	Phil – 0.10" in rain-can; warm, partly cloudy, breezy, puddles in road; 1 center pivot in Utah pumping; no pumping in Nevada; some bales in fields in Nevada.
Oct. 29, 2004	1145	5.45	5444.345	6.64	5444.357	Phil – 1.39" in rain-can; clear, breezy, cold; mud puddles on road; no wells pumping; suspect wells have been shut off for awhile.
Dec. 1, 2004	1210	5.1	5444.695	6.3	5444.697	Phil – 1.44" in rain-can. Re-charged rain-can. Clear, cool, breezy. Clemente Najera, one of Anderson's sheep herders said Needle Point Spring went dry when the well in Utah began operation. The wells in Nevada had not impacted the spring. The herder said he had been with the sheep operation for 12 years and had hauled water from the spring right up until it went dry.
Jan. 5, 2005	1210	4.72	5445.075	5.92	5445.077	Phil – 0.58" in rain-can. Clear, cold, breezy, 4" snow. Talked to Clemente Najera again to confirm his story about the dewatering of Needle Point Spring.
Feb. 1, 2005	1210	4.48	5445.315	5.68	5445.317	Phil – 0.65" in rain-can. Cool, windy, dry (a few puddles in road).