ATTACHMENTS

Attachment A

DWR Annual Report Submittal Tables

Placeholder until Final WY 2023 Annual Report is prepared.

Attachment B

Historical Water Year Types Based on Precipitation at China Lake NAF

(No. 041733)

WY	Annual Precipitation at China Lake NAF, No. 041733 (in/yr)	Water Year Type
1945	4.90	AN
1946	2.77	N
1947	3.81	N
1948	1.97	BN
1949	1.21	D
1950	1.90	BN
1951	0.25	D
1952	4.89	AN
1953	1.75	BN
1954	2.80	N
1955	1.93	BN
1956	1.73	BN
1957	2.10	N
1958	4.45	AN
1959	2.47	N
1960	3.13	N
1961	1.82	BN
1962	3.87	N
1963	4.03	N
1964	1.54	BN
1965	4.74	AN
1966	5.85	AN
1967	2.57	N
1968	4.65	AN
1969	5.29	AN
1970	3.68	N
1971	2.95	N
1972	1.55	BN
1973	3.76	N
1974	5.98	AN
1975	3.39	N
1976	3.64	N
1977	4.01	N
1978	10.96	W
1979	6.53	W
1980	5.66	AN
1981	3.23	N
1982	4.40	AN
1983	10.42	W
1984	4.05	N
1985	2.79	N
1986	4.15	AN
1987	2.82	N
1988	5.40	AN
1989	1.37	BN
1990	1.43	BN
1991	3.84	N
1992	9.11	W
1993	7.12	W
1994	1.08	D
1995	5.23	AN
1996	1.91	BN
1997	2.71	N
1998	6.06	W
1999	1.53	BN
2000	1.76	BN
2001	4.36	AN
2002	0.54	D
2003	4.35	AN
2004	3.22	N
2005	5.88	AN
2006	2.61	N
2007	0.46	D
2008	3.18	N
2009	1.16	D
2010	3.36	N
2011	3.98	N
2012	1.32	BN
2013	0.83	D
2014	1.44	BN
2015	3.67	N
2016	1.38	BN
2017	4.61	AN
2018	1.43	BN
2019	6.13	W
2020	5.57	AN
2021	0.58	D
2022	1.87	BN
2023	8.27	W

Attachment C

Groundwater Monitoring Program Updates

STETSON ENGINEERS INC.

TECHNICAL NOTE

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November 2023

GROUNDWATER MONITORING PROGRAM UPDATES

Groundwater levels have been measured in IWV groundwater basin since the 1920's. Starting in 1989, the Kern County Water Agency (KCWA), the Naval Air Weapons Station (NAWS), and multiple other entities (USGS, BLM, USBR, and IWVWD) collected depth to water (DTW) measurements within the basin. In 1995, the IWV Cooperative Groundwater Management Group was formed to coordinate monitoring and management efforts of groundwater level data across IWV. The management of this program was taken over by the Indian Wells Valley Groundwater Authority (IWVGA) in 2018.

At the time the program was taken over by the IWVGA, KCWA measured 198 DTW levels in 171 groundwater wells and 9 multi-level groundwater wells (27 piezometers)[1]. Wells monitored consists of private and public water production wells and monitoring wells. These data provide a strong foundation for understanding the trends and state of water resources within the Basin.

Since 2018, updates have been made to the monitoring program to assure that the GWMP is representative of current basin monitoring. Depth to water is measured at accessible monitoring wells during Spring (March) and Fall (October) to observe seasonal changes in groundwater levels. The existing WY 2023 program contains 176 monitoring wells throughout the basin including 10 multi-level monitoring wells (30 piezometers), 47 domestic wells, and 60 wells on the Navy base. The wells in the existing WY 2023 GWMP have varying supporting data, with limited well log and construction data. Table 1 summarizes existing wells monitored for groundwater levels by different areas within the IWVGB.

The Water Resource Manager continues an ongoing effort to fill in data gaps and update the monitoring wells included in the GWMP. Table 2 and Table 3 detail wells added to and removed from the GWMP, respectively. Figure 1 shows the current GWMP and changes made since the Water Year 2022 Indian Wells Valley GSP Annual Report.

- *Removal of 5 Wells from the GWMP* – Five wells were removed from the GWMP during the WY 2023 review. Wells removed from the GWMP are listed below.
    1. **25S/38E-35A (Domestic)** – Well 35A is a domestic well monitored by KCWA. KCWA has encountered issues accessing this well dating back to 2002. Both KCWA and the

[1] These wells are described in Section 3.6 of the Groundwater Sustainability Plan (GSP, 2020).

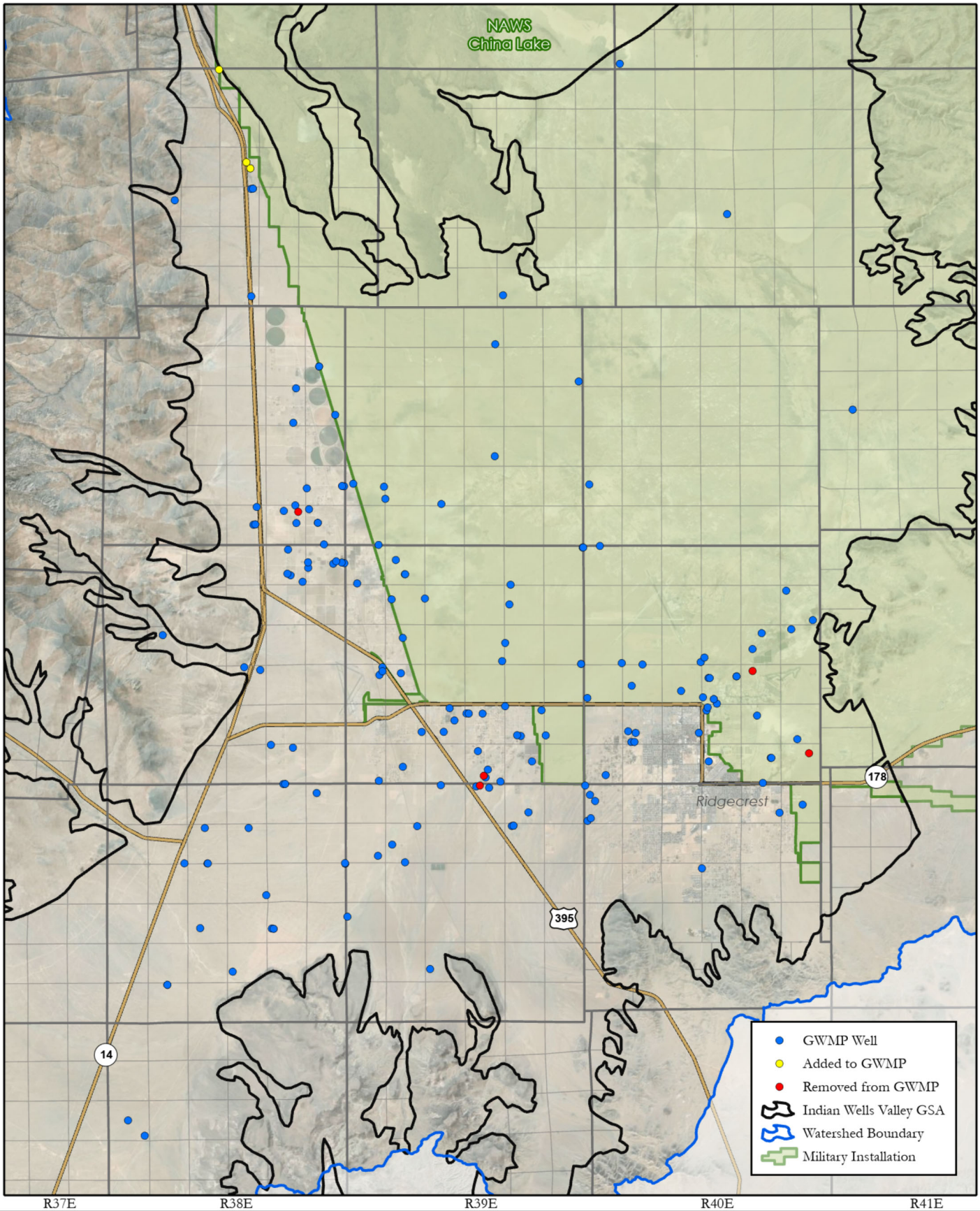
IWVGA have been unable to re-establish contact with the owner of this well, and as a result DTW measurements have been discontinued. The last DTW measurement at this well was in October 2018.

2. **26S/39E-34P04 (Domestic)** – Well 34P04 is a domestic well monitored by KCWA. KCWA has been locked out of this well since 2019. Both KCWA and the IWVGA have been unable to reestablish contact with the owner of this well, and as a result DTW measurements have been discontinued. The last DTW measurement at this well was in October 2018.
3. **26S/40E-23C01 (Navy)** – Well 23C01 is a monitoring well monitored located on NAWS China Lake and monitored by Navy personnel. Well 23C01 has been dry since 2006, and as such, Navy personnel have requested measurements at this well be discontinued.
4. **26S/40E-36A01 (Navy)** – Well 36A01 is a monitoring well monitored located on NAWS China Lake and monitored by Navy personnel. Well 36A01 has been dry since 2010, and as such, Navy personnel have requested it be measurements at this well be discontinued.
5. **27S/39E-03C02 (Domestic)** – Well 03C02 is a domestic well monitored by KCWA. KCWA has encountered issues accessing this well dating back to 2014. Both KCWA and the IWVGA have been unable to re-establish contact with the owner of this well, and as a result DTW measurements have been discontinued. The last DTW measurement at this well was in March 2019.

- *Addition of 3 Wells to the GWMP* – Three wells were added to the GWMP since WY 2022. Wells were added to fill data gaps and provide new groundwater levels. Wells added to the GWMP are detailed below.
    1. **24S/38E-16J (Sawmill Well 1)** – Well Sawmill Well 1 was added to the GWMP in Spring 2023. This well was an existing monitoring well added to fill groundwater level data gaps in the northern basin. A Solinst levelogger has been installed in this well. Groundwater level data and DTW levels in this well will be collected biannually by the IWVGA.
    2. **24S/38E-16 (Sawmill Well 4)** – Sawmill Well 4 was a monitoring well added to the GWMP in Spring 2023. This well was an existing monitoring well added to fill groundwater level data gaps in the northern basin. Groundwater level data and DTW levels in this well will be collected biannually by the IWVGA.
    3. **24S/38E-04D01 (RVS-Mid)** – RVS-Mid was drilled in 2023 in the northern basin area to monitor Rose Valley subflow. A Solinst levelogger has been installed in this well. DTW levels in this well will be collected biannually by the IWVGA.

In WY 2023, 9 domestic wells and 11 monitoring, stock, cathode, or irrigation wells were unable to be accessed in both Fall 2022 and Spring 2023. The IWVGA, with assistance from KCWA, are investigating the possibility of re-establishing access to these wells. In Fall 2022 and Spring 2023, the IWVGA has 1) been unable to contact current well owners; or 2) property ownership has changed, and the IWVGA is attempting to contact new well owners. Changes and updates to the GWMP will continue as new wells are added or removed from the program.

FIGURE X-X



WY 2023
GROUNDWATER MONITORING PROGRAM UPDATES
INDIAN WELLS VALLEY, CA

STETSON ENGINEERS INC.

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Table 1: Indian Wells Valley Groundwater Monitoring Program (GWMP

Blue Text *indicates a column count*

176						60
DBID	State ID	Alternate Well Name	Latitude (NAD83)	Longitude (NAD83)	Well Type	NAVY
1	28S/38E-18R	Black Hills Well	35.49364	-117.92094	Stock	
2	28S/38E-18F01		35.49928	-117.92844	Stock	
5	27S/38E-27M01	USNS-03	35.55387	-117.88132	MW	
6	27S/39E-28L01	Rock Quarry	35.55472	-117.79253	Dom	
7	27S/38E-23F01	USBR 1-S	35.56959	-117.86289	MW	
8	27S/38E-23F02	USBR 1-SM	35.56968	-117.86369	MW	
10	27S/38E-23F04	USBR 1-D	35.56968	-117.86369	MW	
11	27S/38E-21L01	AB303-05	35.56985	-117.89592	MW	
12	27S/39E-19E01	IWV MW #3	35.57400	-117.82969	Stock	
13	27S/38E-15R01	AB303-06	35.58195	-117.86617	MW	
15	27S/40E-15D01	Bucket Well	35.59143	-117.67011	Dom	
16	27S/38E-13A01	Sea Bee Well	35.59345	-117.83060	MW	
17	27S/38E-09Q02	AB303-02	35.59362	-117.89262	MW	
18	27S/38E-09P01	Father Crowley	35.59363	-117.89246	MW	
19	27S/38E-08R01		35.59367	-117.90300	MW	
20	27S/38E-13A02	AB303-01	35.59369	-117.83070	MW	
21	27S/39E-08P02	IWV MW # 2	35.59393	-117.80371	MW	
22	27S/39E-07R01	Inyo	35.59634	-117.81589	MW	
23	27S/39E-08M02	IWV MW #1	35.60045	-117.80947	MW	
24	27S/38E-10B02	AB303-03	35.60662	-117.87407	MW	
25	27S/38E-09C01	AB303-04	35.60665	-117.89378	MW	
26	27S/39E-11D01	USBR 3-S	35.60731	-117.75485	MW	
27	27S/39E-11D02	USBR 3-M	35.60718	-117.75563	MW	
28	27S/39E-11D03	USBR 3-D	35.60718	-117.75563	MW	
30	27S/40E-06D01	Dist. Well 12	35.62198	-117.72253	MW	
31	27S/40E-06N02		35.60898	-117.72155	Dom	
32	27S/40E-06N01		35.60996	-117.72005	Dom	
36	27S/40E-01K02	George Air Corridor	35.61470	-117.62469	MW	
37	27S/40E-06F01		35.61629	-117.71810	Dom	
40	27S/40E-06E01		35.61855	-117.72040	Dom	
41	27S/39E-03B01		35.62127	-117.76580	Dom	
43	27S/39E-03C01		35.62174	-117.77157	Dom	
44	27S/39E-04C01		35.62224	-117.78752	Dom	
46	27S/38E-02C01	USBR 2-S	35.62280	-117.85761	Stock	
47	27S/38E-02C02	USBR 2-M	35.62274	-117.85841	Stock	
48	27S/38E-02C03	USBR 2-D	35.62274	-117.85841	Stock	
50	26S/40E-35Q02	S.E. Line	35.62274	-117.64257	Stock	✓
51	26S/39E-34R02		35.62351	-117.76068	Dom	
53	26S/40E-31K01		35.62580	-117.71330	Dom	
56	26S/39E-34K03		35.62791	-117.76635	Dom	
57	26S/39E-32L01		35.62902	-117.80461	Dom	

Table 1: Indian Wells Valley Groundwater Monitoring Program (GWMP

Blue Text *indicates a column count*

176						60
DBID	State ID	Alternate Well Name	Latitude (NAD83)	Longitude (NAD83)	Well Type	NAVY
58	26S/39E-35G01		35.63079	-117.74730	Irr	
59	26S/39E-31R03	Donna Sue Water Co.	35.62389	-117.81543	Dom	
63	26S/40E-35H01	Satellite Lake 1 (west)	35.63191	-117.63896	Stock	✓
64	26S/40E-35H02	Satellite Lake 2 (east)	35.63191	-117.63869	Stock	✓
72	26S/40E-29N01		35.63792	-117.70175	Dom	
73	26S/40E-29P01		35.63791	-117.70032	Dom	
75	26S/39E-26P01		35.64024	-117.75147	Irr	
76	26S/39E-26P02		35.64052	-117.75313	Irr	
77	26S/39E-29J02		35.64181	-117.79611	Dom	
78	26S/39E-28L02		35.64182	-117.78619	Dom	
80	26S/39E-28G02		35.64601	-117.78135	Dom	
82	26S/40E-26F01		35.64746	-117.64508	Stock	✓
84	26S/39E-27D02	MW 32-SM	35.64852	-117.77493	MW	
85	26S/39E-27D03	MW 32-DM	35.64857	-117.77591	MW	
86	26S/39E-27D04	MW 32-D	35.64857	-117.77591	MW	
87	26S/40E-27D02		35.64941	-117.66785	Stock	✓
88	26S/39E-26A03	USBR 4-SM	35.64966	-117.74213	MW	
90	26S/39E-28B03		35.65050	-117.78352	Dom	
92	26S/40E-27D01		35.65052	-117.66730	Stock	✓
94	26S/39E-20L		35.66560	-117.81374	Stock	
95	26S/40E-22P02	PW Substation 3	35.65191	-117.66313	Stock	✓
97	26S/40E-22P03	PW Substation 1	35.65357	-117.66452	MW	✓
98	26S/40E-22P04	PW Substation 2	35.65357	-117.66452	MW	✓
100	26S/40E-19N02		35.65413	-117.72147	MW	✓
101	26S/40E-22N01		35.65423	-117.66940	Stock	✓
103	26S/40E-21K03		35.65663	-117.67924	Stock	✓
104	26S/40E-20L01		35.65857	-117.70147	Stock	✓
105	26S/40E-22H01		35.66190	-117.65424	Stock	✓
106	26S/40E-22H02		35.66190	-117.65424	Stock	✓
107	26S/40E-22H03		35.66190	-117.65424	Stock	✓
108	26S/39E-20N01	ICSD MW #2	35.66274	-117.81508	MW	
109	26S/39E-20C02		35.66337	-117.80541	Dom	
112	26S/39E-20N02	ICSD MW #3	35.66413	-117.81369	MW	
114	26S/38E-22D		35.66566	-117.87597	MW	
115	26S/39E-13R03	USNS-01	35.66663	-117.72424	Stock	✓
116	26S/39E-13R04		35.66663	-117.72424	MW	✓
117	26S/40E-17N01		35.66690	-117.70591	Stock	✓
118	26S/40E-15N01		35.66718	-117.67035	Stock	✓
119	26S/39E-15J		35.66774	-117.75980	Stock	✓
120	26S/40E-15N02		35.66885	-117.66869	Stock	✓
122	26S/40E-14L01		35.67190	-117.64702	Stock	✓

Table 1: Indian Wells Valley Groundwater Monitoring Program (GWMP

Blue Text *indicates a column count*

176						60
DBID	State ID	Alternate Well Name	Latitude (NAD83)	Longitude (NAD83)	Well Type	NAVY
124	26S/39E-14E01		35.67440	-117.75841	Stock	✓
126	26S/39E-17G02	Kerr McGee	35.67635	-117.80452	MW	✓
127	26S/40E-14B01		35.67774	-117.64285	Stock	✓
129	26S/40E-13C02		35.67913	-117.62952	MW	✓
131	26S/40E-12R01	Chub Med	35.68246	-117.61980	Stock	✓
134	26S/39E-11E02	Sandquist Spa	35.68857	-117.75647	MW	✓
136	26S/39E-08F		35.69051	-117.80952	Stock	✓
137	26S/39E-09E		35.69079	-117.79452	Stock	✓
138	26S/40E-12C		35.69329	-117.63174	Stock	✓
139	26S/39E-02N01		35.69579	-117.75591	Stock	✓
140	26S/39E-06P01		35.69639	-117.82502	Dom	
141	26S/38E-02R01		35.69703	-117.84962	MW	
144	26S/38E-02Q02		35.69941	-117.85503	Dom	
145	26S/38E-02Q01		35.70000	-117.85645	Dom	
146	26S/38E-01M05		35.70215	-117.84707	Dom	
147	26S/38E-01G02		35.70363	-117.83580	Dom	
148	26S/38E-01H03		35.70384	-117.83079	Dom	
149	26S/39E-05F01	Well 23	35.70496	-117.80758	Unk	✓
151	26S/38E-02B01		35.70886	-117.85615	Dom	
152	26S/39E-01A01		35.70940	-117.72341	Stock	✓
153	26S/39E-01A02		35.70940	-117.72313	Stock	✓
154	25S/40E-31P		35.70996	-117.71563	Stock	✓
155	25S/39E-31R01		35.71051	-117.81536	MW	✓
156	25S/38E-36P		35.71076	-117.83996	Dom	
157	25S/38E-34G01	USBR 5-S	35.71813	-117.87090	MW	
158	25S/38E-34G02	USBR 5-M	35.71801	-117.87175	MW	
159	25S/38E-34G03	USBR 05-D	35.71801	-117.87175	Mun	
160	25S/38E-35H		35.71860	-117.85238	Dom	
161	25S/38E-36G01	NR-2 (Shallow)	35.71868	-117.84271	MW	
162	25S/38E-36G02	NR-2 (Middle)	35.71868	-117.84271	MW	
163	25S/38E-36G03	NR-2 (Deep)	35.71868	-117.84271	MW	
165	25S/38E-35C		35.72307	-117.85805	Dom	
166	25S/38E-36D		35.72366	-117.84667	Dom	
168	25S/38E-34A01		35.72453	-117.87024	Dom	
169	25S/38E-35B01		35.72509	-117.85286	MW	
171	25S/39E-28P01	Baker 4-NE	35.72551	-117.78701	Stock	✓
172	25S/39E-29M01		35.73190	-117.81286	Stock	✓
173	25S/38E-25J01	NR 1-S	35.73218	-117.83175	Stock	
174	25S/38E-25J02	NR 1-M	35.73208	-117.83087	Stock	
175	25S/38E-25J03	NR 1-D	35.73218	-117.83175	MW	
176	25S/39E-30E01		35.73301	-117.82675	Stock	✓

Table 1: Indian Wells Valley Groundwater Monitoring Program (GWMP

Blue Text *indicates a column count*

176						60
DBID	State ID	Alternate Well Name	Latitude (NAD83)	Longitude (NAD83)	Well Type	NAVY
183	25S/38E-14Q01		35.75542	-117.85372	Dom	
184	25S/38E-13J01		35.75829	-117.83480	Stock	✓
187	25S/39E-12R01	Charely Tower; Well 22	35.77039	-117.72496	Dom	✓
191	25S/38E-12L01	USBR 6-S	35.77607	-117.84203	MW	✓
192	25S/38E-12L02	USBR 6-M	35.77607	-117.84203	MW	✓
193	25S/38E-12L03	USBR 6-D	35.77607	-117.84203	MW	✓
195	25S/39E-03R01	Baker Range	35.78412	-117.76257	MW	✓
199	24S/39E-34D01	Baker-North	35.80213	-117.75901	MW	✓
202	24S/38E-21A01	USBR 10-S	35.84143	-117.87176	MW	
203	24S/38E-21A02	USBR 10-SM	35.84134	-117.87258	MW	
205	24S/38E-21A04	USBR 10-D	35.84134	-117.87258	MW	
208	25S/38E-25M		35.73135	-117.84767	Dom	
210	25S/40E-30E01	TTBK MW14	35.73254	-117.72033	MW	✓
211	25S/41E-18R01	TTBK MW12	35.75969	-117.60148	MW	✓
212	26S/38E-01E03		35.70417	-117.84716	Dom	
215	26S/38E-01H05		35.70406	-117.83200	Dom	
216	26S/38E-01H06		35.70453	-117.83447	Dom	
218	26S/38E-22B		35.66466	-117.86875	Dom	
219	26S/38E-35B		35.63608	-117.85408	Dom	
220	26S/38E-35D		35.63714	-117.86398	Unk	
223	26S/39E-27C01		35.64849	-117.76864	Unk	
224	26S/39E-34C01		35.63472	-117.77080	Dom	
227	26S/39E-34Q01		35.62502	-117.76733	Dom	
229	26S/40E-28J01	Hospital	35.64121	-117.67128	Mun	
230	26S/40E-29M01		35.64186	-117.70314	Dom	
231	26S/40E-29M02		35.64125	-117.69973	Dom	
233	27S/38E-01C		35.61944	-117.84342	Dom	
234	27S/39E-02K	Asphalt Construction Co.	35.61218	-117.74813	Ind/DC	
235	27S/39E-08A01		35.60721	-117.79818	MW	
237	24S/38E-33J02		35.80190	-117.87258	MW	
238	25S/39E-22J01	S. Baker Ranch	35.74300	-117.76290	MW	✓
239	26S/40E-34F01	City of Ridgecrest	35.63070	-117.66690	Cath	
240	27S/40E-02J01	DMP Cemetery	35.61176	-117.63510	Irr	
241	26S/40E-17Q01	S. Hangar 5; 96030-1	35.66638	-117.69659	MW	✓
244	24S/40E-21K02	TTIWV-MW15	35.83168	-117.65779	MW	✓
245	26S/40E-25P	MK22-MW10	35.63875	-117.62699	MW	✓
246	23S/40E-31N	E. Airport Lake Well	35.887	-117.706	MW	✓
247	24S/38E-19H	Ninemile Well	35.83719	-117.90704	MW	
248	25S/38E-14A01		35.76809	-117.85244	Dom	
249	26S/39E-05L01		35.69973	-117.80355	MW	✓
250	26S/39E-05K01		35.69973	-117.80339	MW	✓

Table 1: Indian Wells Valley Groundwater Monitoring Program (GWMP

Blue Text *indicates a column count*

176						60
DBID	State ID	Alternate Well Name	Latitude (NAD83)	Longitude (NAD83)	Well Type	NAVY
251	26S/40E-22E01	CB Camp Well #1	35.66135	-117.66687	MW	✓
254	25S/39E-29N01		35.72744	-117.81227	MW	✓
255	26S/40E-22E02	CB Camp Well #2	35.66132	-117.66633	MW	✓
301	27S/38E-32C01	EP-01 S	35.54904	-117.91071	MW	
302	27S/38E-32C02	EP-01 M	35.54904	-117.91071	MW	
303	27S/38E-32C03	EP-01 D	35.54904	-117.91071	MW	

Table 2: Wells Added to Indian Wells Valley GWMP

Well additions that occurred from Fall 2022 to Spring 2023

Blue Text *indicates a column count*

3

DBID	State ID	Alternative Well Name	Latitude (NAD83)	Longitude (NAD83)	Well Type	Notes
308	24S/38E-16J	Sawmill Well 1	35.84887	-117.87292	MW	Added to fill groundwater level data gaps in the northern basin
309	24S/38E-16	Sawmill Well 4	35.85113	-117.87469	MW	Added to fill groundwater level data gaps in the northern basin
311	24S/38E-04D01	RVS-Mid	35.88517	-117.88699	MW	Drilled in WY 2023 to monitoring Rose Valley Subflow

Table 3: Wells Removed from Indian Wells Valley GWMP

Measurments discontinued & removed from GWMP in WY 2023

Blue Text *indicates a column count*

5

DBID	State ID	Alternative Well Name	Latitude (NAD83)	Longitude (NAD83)	Well Type	Date First Measured	Date Last Measured	Notes
164	25S/38E-35A		35.72272	-117.85156	Dom	4/16/1998	10/15/2018	Access issues dating back to 2002.
52	26S/39E-34P04		35.62565	-117.76819	Dom	3/23/2010	10/16/2018	Locked out of this well since 2019.
113	26S/40E-23C01		35.66385	-117.64702	Stock	3/23/1995	10/17/2017	Well has been dry since 2006.
66	26S/40E-36A01		35.63357	-117.62174	Stock	3/13/1989	10/15/2018	Well has been dry since 2010.
45	27S/39E-03C02		35.62206	-117.76995	Dom	10/11/2011	3/12/2019	Access issues dating back to 2014.

Attachment D

WY 2023 Groundwater Level Data

						Fall 2022			Spring 2023		
182			33			142			149		
DBID	State ID	Alternate Well Name	CASGEM	(NAD83)	(NAD83)	Date	(ft, bgs)	(ft, amsl)	Date	(ft, bgs)	(ft, amsl)
1	28S/38E-18R	Black Hills Well	X	35.49364	-117.92094	10/3/2022	197.70	2819.30	3/7/2023	193.80	2819.90
2	28S/38E-18F01			35.49928	-117.92844	10/3/2022	213.22	2813.55	3/7/2023	214.50	2815.15
5	27S/38E-27M01	USNS-03	X	35.55387	-117.88132	10/3/2022	193.60	2679.59	3/8/2023	196.28	2680.61
6	27S/39E-28L01	Rock Quarry		35.55472	-117.79253	10/3/2022	287.60	2532.40	3/7/2023	287.70	2532.30
7	27S/38E-23F01	USBR 1-S	X	35.56959	-117.86289	10/4/2022	182.24	2668.26	3/8/2023	185.61	2668.35
8	27S/38E-23F02	USBR 1-SM	X	35.56968	-117.86369	10/4/2022	179.85	2670.65	3/8/2023	185.27	2668.61
10	27S/38E-23F04	USBR 1-D		35.56968	-117.86369	10/4/2022	182.25	2668.25	3/8/2023	185.27	2668.44
11	27S/38E-21L01	AB303-05	X	35.56985	-117.89592	10/3/2022	358.78	2665.38	3/9/2023	360.60	2665.27
12	27S/39E-19E01	IWV MW #3		35.57400	-117.82969	10/3/2022	204.00	2435.49	3/7/2023	207.60	2434.89
13	27S/38E-15R01	AB303-06		35.58195	-117.86617	10/3/2022	273.32	2658.67	3/7/2023	277.30	2658.29
15	27S/40E-15D01	Bucket Well		35.59143	-117.67011				3/7/2023	Dry	
16	27S/38E-13A01	Sea Bee Well		35.59345	-117.83060	10/4/2022	224.93	2429.06	3/8/2023	227.49	2428.95
17	27S/38E-09Q02	AB303-02		35.59362	-117.89262	10/3/2022	419.20	2685.80	3/9/2023	422.54	2686.06
18	27S/38E-09P01	Father Crowley		35.59363	-117.89246	10/3/2022	417.80	2694.32	3/9/2023	423.83	2691.29
19	27S/38E-08R01			35.59367	-117.90300	10/3/2022	505.80	2697.54			
20	27S/38E-13A02	AB303-01		35.59369	-117.83070	10/3/2022	223.31	2426.69	3/8/2023	226.81	2425.69
21	27S/39E-08P02	IWV MW # 2		35.59393	-117.80371	10/3/2022	440.80	2140.16	3/7/2023	445.30	2138.66
22	27S/39E-07R01	Inyo		35.59634	-117.81589	10/3/2022	425.80	2138.30	3/8/2023	Dry	
23	27S/39E-08M02	IWV MW #1		35.60045	-117.80947	10/3/2022	415.60	2137.83	3/7/2023	418.40	2136.03
24	27S/38E-10B02	AB303-03		35.60662	-117.87407	10/4/2022	427.84	2467.16	3/7/2023	429.00	2469.60
25	27S/38E-09C01	AB303-04		35.60665	-117.89378	10/3/2022	282.85	2787.15	3/7/2023	385.30	2688.50
26	27S/39E-11D01	USBR 3-S	X	35.60731	-117.75485	10/4/2022	371.91	2138.49	3/8/2023	371.60	2141.76
27	27S/39E-11D02	USBR 3-M	X	35.60718	-117.75563	10/4/2022	363.56	2146.84	3/8/2023	366.46	2146.86
28	27S/39E-11D03	USBR 3-D	X	35.60718	-117.75563	10/4/2022	346.72	2163.68	3/8/2023	347.98	2165.13
30	27S/40E-06D01	Dist. Well 12		35.62198	-117.72253	10/4/2022	284.55	2122.45			
31	27S/40E-06N02			35.60898	-117.72155	10/4/2022	352.00	2121.73	3/7/2023	348.80	2124.93
32	27S/40E-06N01			35.60996	-117.72005	10/4/2022	350.10	2121.49	3/7/2023	348.70	2122.89
36	27S/40E-01K02	George Air Corridor	X	35.61470	-117.62469	10/3/2022	163.51	2159.13	3/9/2023	164.76	2159.38
37	27S/40E-06F01			35.61629	-117.71810	10/4/2022	318.70	2120.86	3/9/2023	318.29	2122.27
40	27S/40E-06E01			35.61855	-117.72040	10/4/2022	313.90	2118.99	3/7/2023	311.30	2121.59
41	27S/39E-03B01			35.62127	-117.76580						
43	27S/39E-03C01			35.62174	-117.77157						
44	27S/39E-04C01			35.62224	-117.78752				3/7/2023	351.70	2149.40
45	27S/39E-03C02			35.62206	-117.76995						
46	27S/38E-02C01	USBR 2-S	X	35.62280	-117.85761	10/3/2022	281.76	2373.19	3/7/2023	284.30	2373.19
47	27S/38E-02C02	USBR 2-M	X	35.62274	-117.85841	10/3/2022	273.82	2381.13	3/7/2023	276.10	2381.23
48	27S/38E-02C03	USBR 2-D	X	35.62274	-117.85841	10/3/2022	281.87	2373.08	3/7/2023	283.90	2373.38
50	26S/40E-35Q02	S.E. Line		35.62274	-117.64257	10/4/2022	94.63	2158.20	3/7/2023	98.32	2158.01
51	26S/39E-34R02			35.62351	-117.76068				3/9/2023	324.50	2127.21
52	26S/39E-34P04			35.62565	-117.76819						
53	26S/40E-31K01			35.62580	-117.71330						
56	26S/39E-34K03			35.62791	-117.76635	10/4/2022	329.50	2146.12	3/7/2023	329.80	2146.82
57	26S/39E-32L01			35.62902	-117.80461	10/3/2022	342.60	2149.44	3/7/2023	346.00	2147.04
58	26S/39E-35G01			35.63089	-117.74645						
59	26S/39E-31R03			35.62389	-117.81543						
63	26S/40E-35H01	Satellite Lake 1 (west)		35.63191	-117.63896	10/4/2022	90.73	2161.62	3/7/2023	92.14	2161.41
64	26S/40E-35H02	Satellite Lake 2 (east)		35.63191	-117.63869	10/4/2022	98.52	2153.51	3/7/2023	100.89	2153.54
66	26S/40E-36A01			35.63357	-117.62174						
72	26S/40E-29N01			35.63792	-117.70175						
73	26S/40E-29P01			35.63791	-117.70032	10/4/2022	208.10	2122.59	3/8/2023	198.50	2133.19

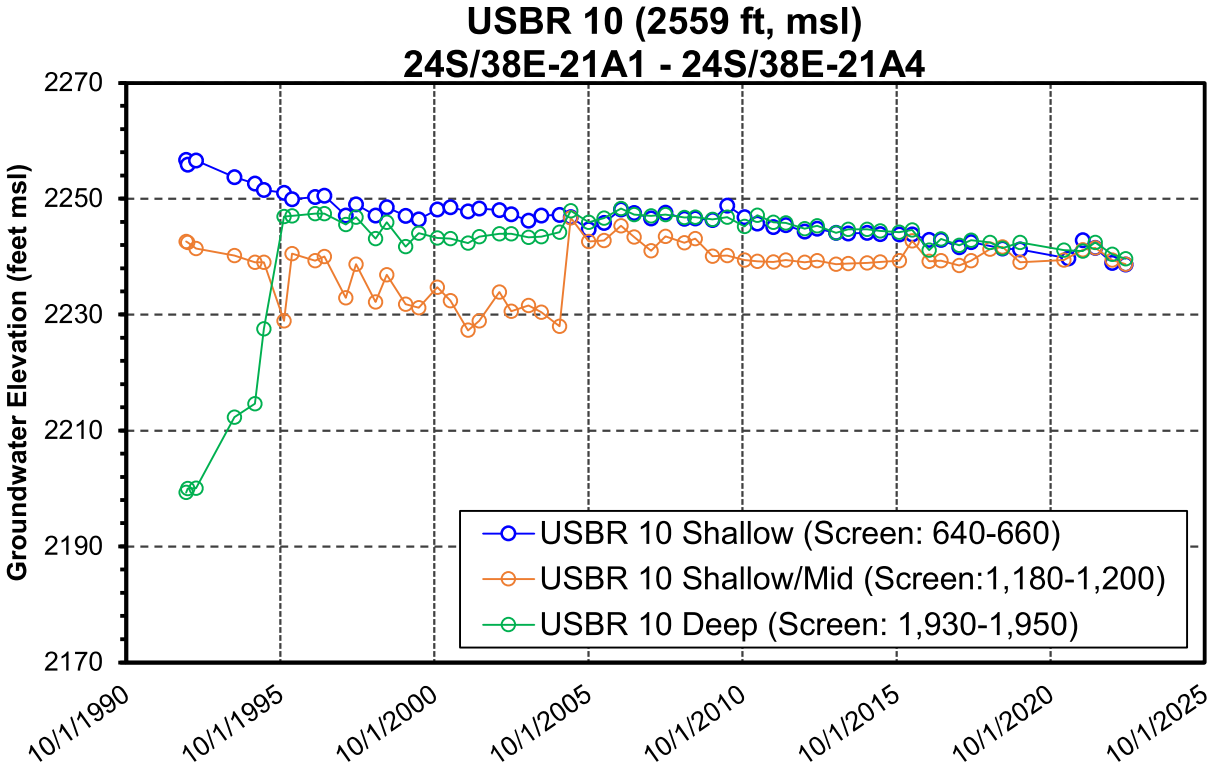
75	26S/39E-26P01			35.64024	-117.75147	10/3/2022	266.70	2136.63	3/7/2023	264.10	2140.23
76	26S/39E-26P02			35.64052	-117.75313	10/3/2022	269.60	2136.66	3/7/2023	267.30	2139.96
77	26S/39E-29J02			35.64181	-117.79611	10/3/2022	304.70	2124.30	3/7/2023	304.10	2124.90
78	26S/39E-28L02			35.64182	-117.78619						
80	26S/39E-28G02			35.64601	-117.78135	10/4/2022	286.40	2146.62	3/7/2023	287.20	2146.82
82	26S/40E-26F01			35.64746	-117.64508	10/4/2022	59.37	2173.43	3/7/2023	62.68	2173.12
84	26S/39E-27D02	MW 32-SM	X	35.64852	-117.77493	10/4/2022	301.22	2117.31	3/7/2023	280.51	2141.06
85	26S/39E-27D03	MW 32-DM	X	35.64857	-117.77591	10/4/2022	291.88	2126.65	3/7/2023	280.73	2140.84
86	26S/39E-27D04	MW 32-D	X	35.64857	-117.77591	10/4/2022	280.57	2137.96	3/7/2023	280.76	2140.42
87	26S/40E-27D02			35.64941	-117.66785	10/4/2022	45.92	2220.83	3/7/2023	46.98	2220.67
88	26S/39E-26A03	USBR 4	X	35.64966	-117.74213	10/3/2022	252.25	2124.84	3/9/2023	248.55	2130.39
90	26S/39E-28B03			35.65050	-117.78352	10/3/2022	250.30	2176.35	3/7/2023	251.20	2176.45
92	26S/40E-27D01			35.65052	-117.66730	10/4/2022	72.22	2195.82	3/7/2023	71.52	2195.52
94	26S/39E-20L			35.66560	-117.81374	10/3/2022	241.10	2186.89	3/7/2023	242.70	2187.19
95	26S/40E-22P02	PW Substation 3		35.65191	-117.66313	10/4/2022	65.64	2201.58	3/7/2023	69.32	2201.60
97	26S/40E-22P03	PW Substation 1		35.65357	-117.66452	10/4/2022	113.38	2145.50	3/7/2023	112.40	2147.48
98	26S/40E-22P04	PW Substation 2		35.65357	-117.66452	10/4/2022	53.37	2205.38	3/7/2023	53.83	2205.92
100	26S/40E-19N02			35.65413	-117.72147	10/3/2022	209.00	2128.43	3/7/2023	208.92	2129.51
101	26S/40E-22N01			35.65423	-117.66940				3/7/2023	92.98	2171.38
103	26S/40E-21K03			35.65663	-117.67924	10/4/2022	100.28	2166.51	3/7/2023	102.06	2167.53
104	26S/40E-20L01			35.65857	-117.70147	10/4/2022	145.92	2150.93	3/7/2023	149.71	2150.74
105	26S/40E-22H01			35.66190	-117.65424	10/4/2022	33.03	2195.12	3/7/2023	35.51	2195.54
106	26S/40E-22H02			35.66190	-117.65424	10/4/2022	33.01	2195.37	3/7/2023	36.12	2195.56
107	26S/40E-22H03			35.66190	-117.65424	10/4/2022	33.06	2194.68	3/7/2023	35.65	2195.09
108	26S/39E-20N01	ICSD MW #2		35.66274	-117.81508						
109	26S/39E-20C02			35.66337	-117.80541	10/3/2022	241.50	2149.36	3/7/2023	242.30	2149.56
112	26S/39E-20N02	ICSD MW #3		35.66413	-117.81369						
113	26S/40E-23C01			35.66385	-117.64702						
114	26S/38E-22D			35.66566	-117.87597	10/3/2022	57.50	2790.75	3/7/2023	58.30	2790.95
115	26S/39E-13R03	USNS-01		35.66663	-117.72424	10/4/2022	152.74	2166.61	3/7/2023	154.25	2166.40
116	26S/39E-13R04			35.66663	-117.72424	10/4/2022	197.63	2122.18	3/7/2023	193.71	2127.60
117	26S/40E-17N01			35.66690	-117.70591	10/4/2022	142.82	2152.26	3/7/2023	144.62	2152.26
118	26S/40E-15N01			35.66718	-117.67035	10/4/2022	58.20	2186.58	3/7/2023	60.94	2186.44
119	26S/39E-15J			35.66774	-117.75980	10/4/2022	203.80	2143.99	3/6/2023	210.45	2144.34
120	26S/40E-15N02			35.66885	-117.66869	10/4/2022	51.23	2185.14	3/7/2023	54.43	2185.14
121	26S/40E-17J01			35.67107	-117.69480						
122	26S/40E-14L01			35.67190	-117.64702	10/4/2022	21.72	2183.95	3/7/2023	23.11	2185.46
124	26S/39E-14E01			35.67440	-117.75841	10/4/2022	170.39	2164.94	3/6/2023	171.75	2164.58
126	26S/39E-17G02	Kerr McGee		35.67635	-117.80452	10/3/2022	210.10	2146.44	3/6/2023	209.95	2148.09
127	26S/40E-14B01			35.67774	-117.64285	10/4/2022	9.68	2181.37	3/7/2023	10.64	2182.41
129	26S/40E-13C02			35.67913	-117.62952	10/4/2022	10.07	2178.29	3/7/2023	10.74	2178.62
131	26S/40E-12R01	Chub Med		35.68246	-117.61980	10/4/2022	2.77	2182.56	3/7/2023	4.88	2182.35
134	26S/39E-11E02	Sandquist Spa	X	35.68857	-117.75647	10/3/2022	136.51	2170.79	3/6/2023	138.05	2170.25
136	26S/39E-08F			35.69051	-117.80952	10/4/2022	168.40	2150.92	3/6/2023	169.96	2150.36
137	26S/39E-09E			35.69079	-117.79452	10/4/2022	173.13	2139.38	3/6/2023	172.60	2142.41
138	26S/40E-12C			35.69329	-117.63174	10/4/2022	5.48	2160.65	3/6/2023	6.92	2160.71
139	26S/39E-02N01			35.69579	-117.75591	10/3/2022	114.40	2172.23	3/6/2023	115.65	2171.98
140	26S/39E-06P01			35.69639	-117.82502	10/3/2022	163.00	2157.00	3/7/2023	164.40	2157.00
141	26S/38E-02R01			35.69703	-117.84962						
144	26S/38E-02Q02			35.69941	-117.85503	10/3/2022	275.00	2134.50	3/7/2023	253.00	2158.60
145	26S/38E-02Q01			35.70000	-117.85645	10/3/2022	255.80	2153.44	3/7/2023	254.30	2155.94
146	26S/38E-01M05			35.70215	-117.84707	10/5/2022	215.41	2158.02	3/7/2023	214.40	2160.03
147	26S/38E-01G02			35.70363	-117.83580	10/3/2022	180.70	2157.81	3/7/2023	179.50	2160.01
148	26S/38E-01H03			35.70384	-117.83079				3/7/2023	184.00	2135.82
149	26S/39E-05F01			35.70496	-117.80758	10/4/2022	113.62	2163.98	3/6/2023	113.32	2164.28
151	26S/38E-02B01			35.70886	-117.85615	10/3/2022	215.10	2157.76	3/7/2023	214.90	2159.16

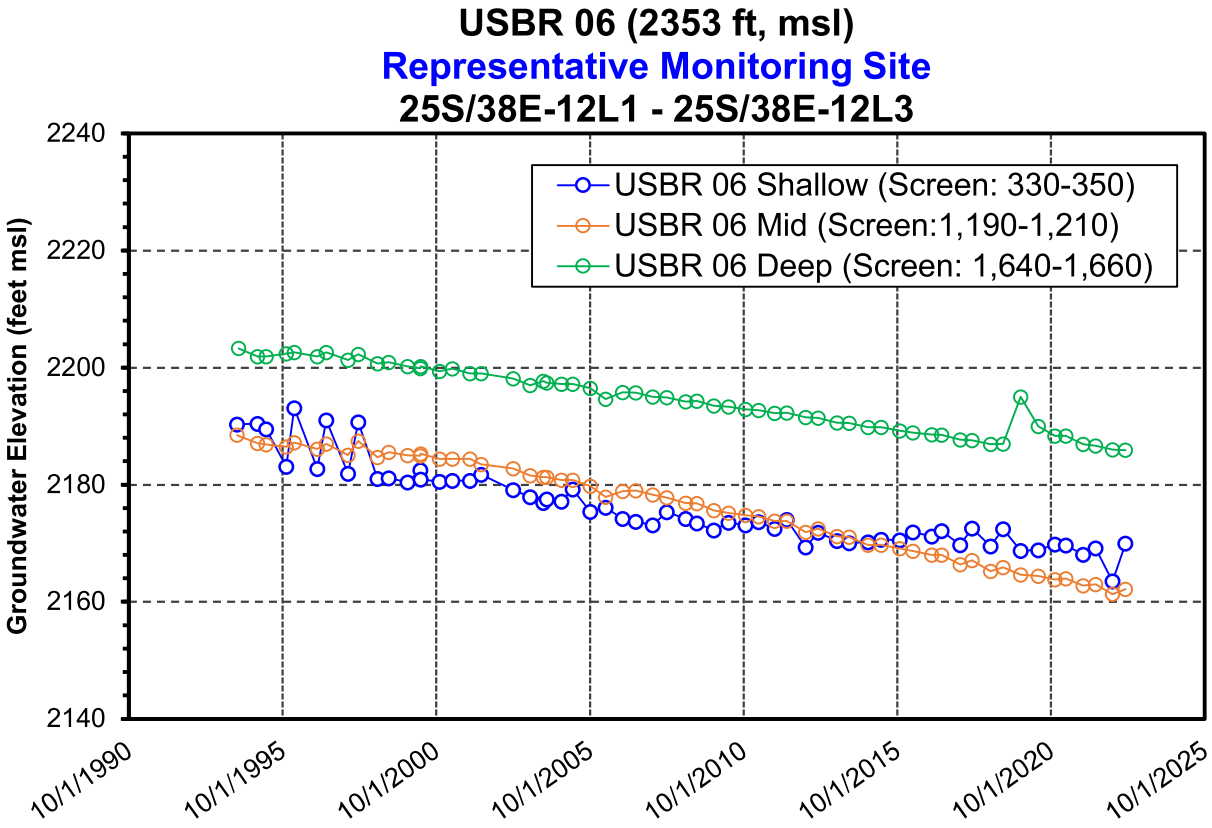
152	26S/39E-01A01			35.70940	-117.72341	10/3/2022	42.12	2175.52	3/6/2023	43.90	2175.34
153	26S/39E-01A02			35.70940	-117.72313	10/3/2022	43.16	2174.77	3/6/2023	45.83	2174.60
154	25S/40E-31P			35.70996	-117.71563	10/3/2022	18.93	2172.81	3/6/2023	21.05	2172.99
155	25S/39E-31R01			35.71051	-117.81536	10/4/2022	92.13	2169.72	3/6/2023	94.64	2169.71
156	25S/38E-36P			35.71076	-117.83996	10/3/2022	170.20	2158.80			
157	25S/38E-34G01	USBR 5-S	X	35.71813	-117.87090	10/3/2022	361.02	2159.40	3/7/2023	363.94	2159.06
158	25S/38E-34G02	USBR 5-M	X	35.71801	-117.87175	10/3/2022	368.52	2151.90	3/7/2023	371.05	2151.75
159	25S/38E-34G03	USBR 05-D	X	35.71801	-117.87175	10/3/2022	372.17	2148.25	3/7/2023	372.26	2150.29
160	25S/38E-35H			35.71860	-117.85238				3/7/2023	199.40	2158.36
161	25S/38E-36G01	NR-2 (Shallow)	X	35.71868	-117.84271						
162	25S/38E-36G02	NR-2 (Middle)	X	35.71868	-117.84271						
163	25S/38E-36G03	NR-2 (Deep)	X	35.71868	-117.84271						
164	25S/38E-35A			35.72272	-117.85156						
165	25S/38E-35C			35.72307	-117.85805	10/3/2022	265.00	2158.52	3/7/2023	264.50	2160.02
166	25S/38E-36D			35.72366	-117.84667	10/3/2022	187.00	2156.72	3/7/2023	184.70	2159.52
168	25S/38E-34A01			35.72453	-117.87024	10/3/2022	364.83	2163.95	3/7/2023	364.00	2165.78
169	25S/38E-35B01			35.72509	-117.85286	10/4/2022	239.09	2157.15	3/7/2023	239.94	2158.16
170	25S/38E-36B01	WELL 27		35.72496	-117.83675						
171	25S/39E-28P01	Baker 4-NE		35.72551	-117.78701	10/4/2022	54.08	2174.96	3/6/2023	50.48	2179.56
172	25S/39E-29M01			35.73190	-117.81286	10/4/2022	49.56	2182.74	3/6/2023	60.76	2172.54
173	25S/38E-25J01	NR 1-S		35.73218	-117.83175	10/3/2022	114.60	2162.35	3/7/2023	117.30	2162.45
174	25S/38E-25J02	NR 1-M		35.73208	-117.83087	10/3/2022	117.40	2158.30	3/7/2023	120.70	2157.80
175	25S/38E-25J03	NR 1-D		35.73218	-117.83175	10/3/2022	134.70	2141.00	3/7/2023	136.10	2142.40
176	25S/39E-30E01			35.73301	-117.82675	10/4/2022	54.48	2194.13	3/6/2023	55.55	2195.26
183	25S/38E-14Q01			35.75542	-117.85372				3/7/2023	227.50	2165.00
184	25S/38E-13J01			35.75829	-117.83480	10/4/2022	127.96	2164.01	3/6/2023	129.69	2166.08
187	25S/39E-12R01	Charely Tower; Well 22		35.77039	-117.72496	10/3/2022	25.01	2177.36	3/6/2023	26.13	2177.24
191	25S/38E-12L01	USBR 6-S	X	35.77607	-117.84203	10/4/2022	189.41	2163.51	3/6/2023	184.75	2169.96
192	25S/38E-12L02	USBR 6-M	X	35.77607	-117.84203	10/4/2022	191.59	2161.33	3/6/2023	192.22	2162.16
193	25S/38E-12L03	USBR 6-D	X	35.77607	-117.84203	10/4/2022	166.95	2185.97	3/6/2023	168.09	2185.91
195	25S/39E-03R01	Baker Range	X	35.78412	-117.76257	10/3/2022	51.42	2174.85	3/6/2023	52.68	2174.59
199	24S/39E-34D01	Baker-North		35.80213	-117.75901	10/3/2022	47.42	2179.61	3/6/2023	49.21	2179.42
202	24S/38E-21A01	USBR 10-S	X	35.84143	-117.87176	10/3/2022	320.49	2238.90	3/9/2023	325.68	2238.63
203	24S/38E-21A02	USBR 10-SM	X	35.84134	-117.87258	10/3/2022	319.95	2239.44	3/9/2023	325.50	2238.70
205	24S/38E-21A04	USBR 10-D	X	35.84134	-117.87258	10/3/2022	318.96	2240.43	3/9/2023	324.28	2239.65
207	25S/38E-03B			35.79546	-117.87382	10/4/2022	291.46	2164.89	3/8/2023	293.58	2164.37
208	25S/38E-25M			35.73135	-117.84767						
210	25S/40E-30E01	TTBK MW14	X	35.73254	-117.72033	10/3/2022	14.89	2176.15	3/6/2023	18.25	2176.00
211	25S/41E-18R01	TTBK MW12	X	35.75969	-117.60148	10/3/2022	22.16	1981.06	3/6/2023	25.35	1981.12
212	26S/38E-01E03			35.70417	-117.84716						
215	26S/38E-01H05			35.70406	-117.83200						
216	26S/38E-01H06			35.70453	-117.83447				3/7/2023	172.00	2148.20
218	26S/38E-22B	Ostrich Ranch		35.66466	-117.86875	10/3/2022	432.20	2234.08	3/7/2023	434.00	2233.28
219	26S/38E-35B			35.63608	-117.85408	10/3/2022	343.40	2231.15	3/7/2023	343.00	2231.55
220	26S/38E-35D			35.63714	-117.86398	10/3/2022	449.20	2236.03	3/7/2023	451.10	2235.53
223	26S/39E-27C01			35.64849	-117.76864						
224	26S/39E-34C01			35.63472	-117.77080						
227	26S/39E-34Q01			35.62502	-117.76733	10/4/2022	338.61	2134.49	3/8/2023	338.10	2134.90
229	26S/40E-28J01	Hospital		35.64121	-117.67128	10/3/2022	136.60	2154.32	3/7/2023	136.10	2155.82
230	26S/40E-29M01			35.64186	-117.70314	10/4/2022	207.60	2123.04	3/8/2023	206.80	2124.84
231	26S/40E-29M02			35.64125	-117.69973	10/4/2022	197.60	2127.04	3/8/2023	196.20	2129.44
233	27S/38E-01C			35.61944	-117.84342						
234	27S/39E-02K	Asphalt Construction Co.		35.61218	-117.74813	10/4/2022	316.60	2141.82	3/8/2023	316.40	2142.02
235	27S/39E-08A01			35.60721	-117.79818	10/4/2022	396.68	2137.51	3/8/2023	398.85	2136.64
237	24S/38E-33J02			35.80190	-117.87258						
238	25S/39E-22J01	S. Baker Ranch		35.74300	-117.76290	10/4/2022	42.53	2176.24	3/6/2023	43.73	2176.04

239	26S/40E-34F01	City of Ridgecrest		35.63070	-117.66690							
240	27S/40E-02J01	DMP Cemetery		35.61176	-117.63510	10/3/2022	154.50	2150.55	3/7/2023	155.00	2150.55
241	26S/40E-17Q01	S. Hangar 5; 96030-1	X	35.66638	-117.69659	10/4/2022	144.46	2132.64	3/7/2023	143.31	2136.04
244	24S/40E-21K02	TTIWV-MW15		35.83168	-117.65779	10/3/2022	50.58	2192.42	3/6/2023	52.68	2188.62
245	26S/40E-25P	MK22-MW10		35.63875	-117.62699	10/4/2022	87.05	2155.65	3/7/2023	89.52	2155.15
246	23S/40E-31N	E. Airport Lake Well		35.88700	-117.70600	10/3/2022	105.97	2192.13	3/6/2023	109.47	2191.96
247	24S/38E-19H	Ninemile Well		35.83719	-117.90704	10/4/2022	14.09	2957.16	3/7/2023	8.06	2963.21
248	25S/38E-14A01			35.76809	-117.85244	10/3/2022	234.91	2140.09	3/8/2023	232.00	2162.10
249	26S/39E-05L01			35.69973	-117.80355	10/3/2022	131.38	2162.48	3/6/2023	133.18	2162.54
250	26S/39E-05K01			35.69973	-117.80339	10/3/2022	129.39	2164.36	3/6/2023	131.37	2164.13
251	26S/40E-22E01	CB Camp Well #1		35.66135	-117.66687	10/3/2022	98.87	2144.81	3/7/2023	101.51	2144.95
254	25S/39E-29N01			35.72740	-117.81212				3/6/2023	66.89	2174.21
255	26S/40E-22E02	CB Camp Well #2		35.66132	-117.66633				3/7/2023	92.46	2154.19
301	27S/38E-32C01	EP-01 S		35.54904	-117.91071	10/4/2022	272.82	2689.84	3/8/2023	275.13	2689.99
302	27S/38E-32C02	EP-01 M		35.54904	-117.91071	10/4/2022	279.38	2683.28	3/8/2023	281.61	2683.41
303	27S/38E-32C03	EP-01 D		35.54904	-117.91071	10/4/2022	273.88	2688.78	3/8/2023	275.83	2689.04
304	26S/39E-35B01			35.63444	-117.74635						
305	26S/38E-17C01	Indian Wells Canyon		35.67749	-117.91262	10/5/2022	79.36	3389.14	3/7/2023	81.19	3386.63
306	26S/39E-27C01			35.65120	-117.78538						
307	26S/39E-25K01			35.64041	-117.74023	10/4/2022	267.74	2120.96	3/9/2023	265.07	2123.93
		Lumbermill Well #4							3/9/2023	343.64	
	25S/40E-32	TTBKMW05							3/6/2023	13.3	

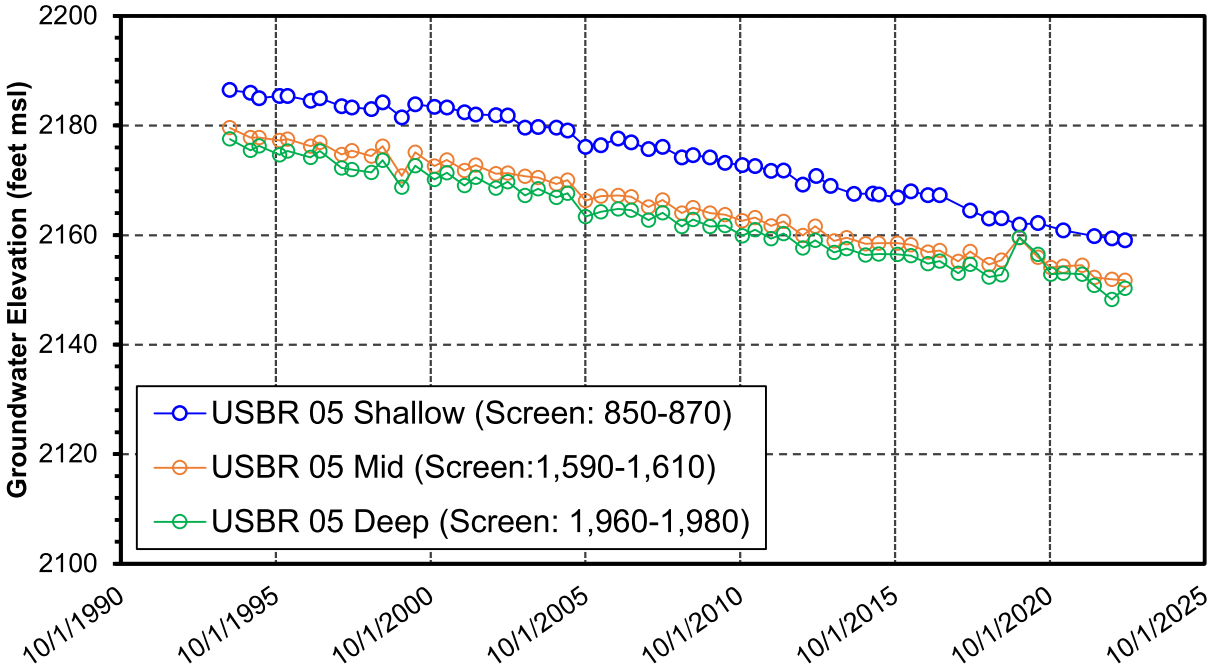
Attachment E

Hydrographs for Select Monitoring Wells

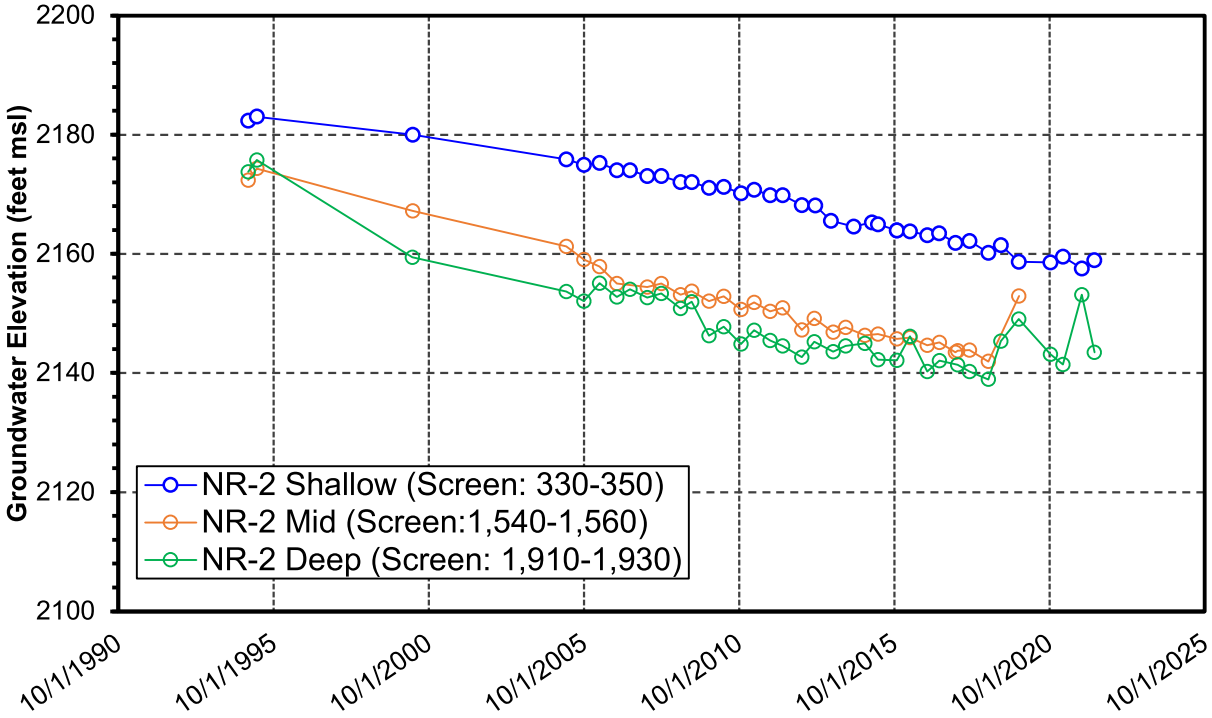

USBR 10 (2559 ft, msl)
24S/38E-21A1 - 24S/38E-21A4
Groundwater Elevation (feet msl)
2270
2250
2230
2210
2190
2170
10/1/1990
10/1/1995
10/1/2000
10/1/2005
10/1/2010
10/1/2015
10/1/2020
10/1/2025
USBR 10 Shallow (Screen: 640-660)
USBR 10 Shallow/Mid (Screen:1,180-1,200)
USBR 10 Deep (Screen: 1,930-1,950)


USBR 06 (2353 ft, msl)
Representative Monitoring Site
25S/38E-12L1 - 25S/38E-12L3
Groundwater Elevation (feet msl)
2240
2220
2200
2180
2160
2140
10/1/1990
10/1/1995
10/1/2000
10/1/2005
10/1/2010
10/1/2015
10/1/2020
10/1/2025
USBR 06 Shallow (Screen: 330-350)
USBR 06 Mid (Screen:1,190-1,210)
USBR 06 Deep (Screen: 1,640-1,660)

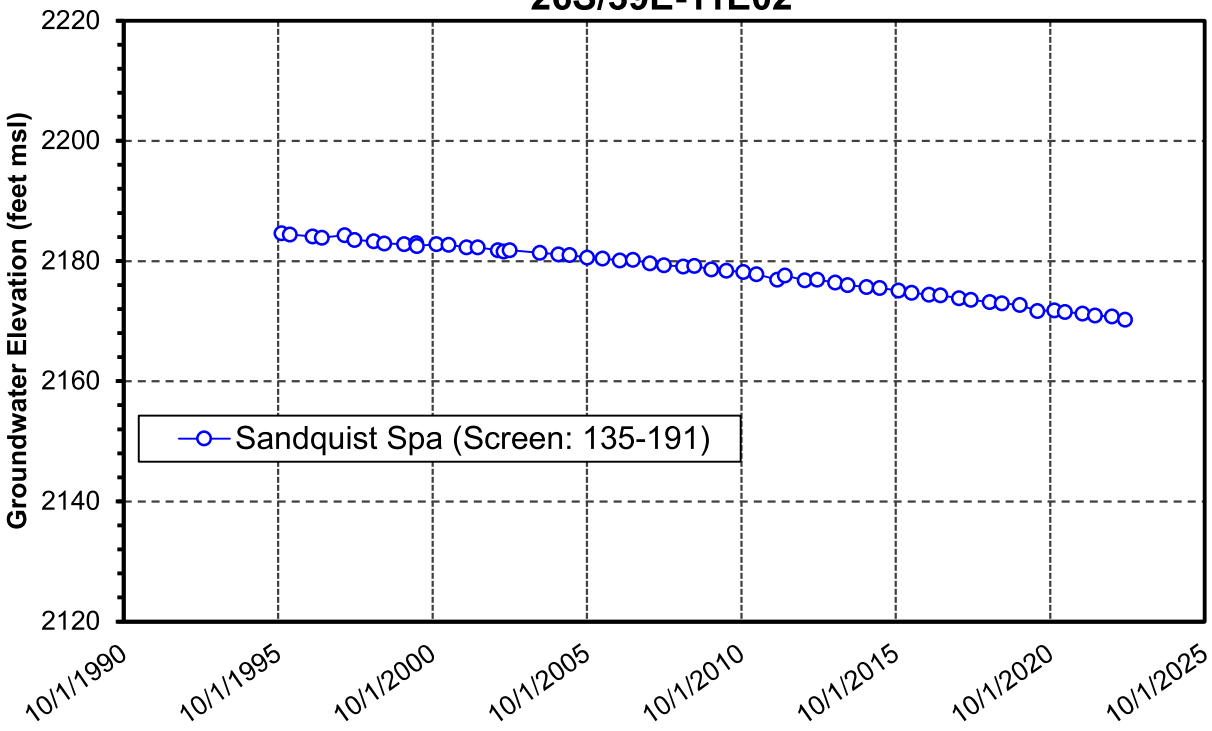
USBR 05 (2520 ft, msl)
Representative Monitoring Site
25S/38E-34G1 - 25S/38E-34G3



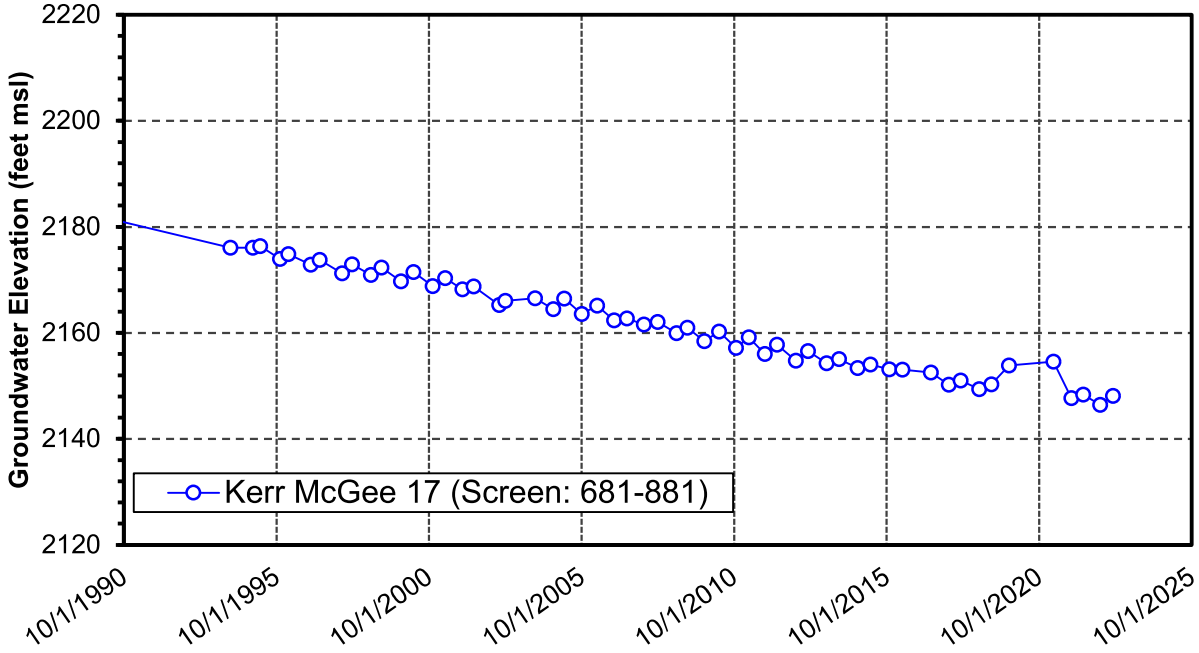
NR-2 (2315 ft, msl)
25S/38E-36G1 - 25S/38E-36G3



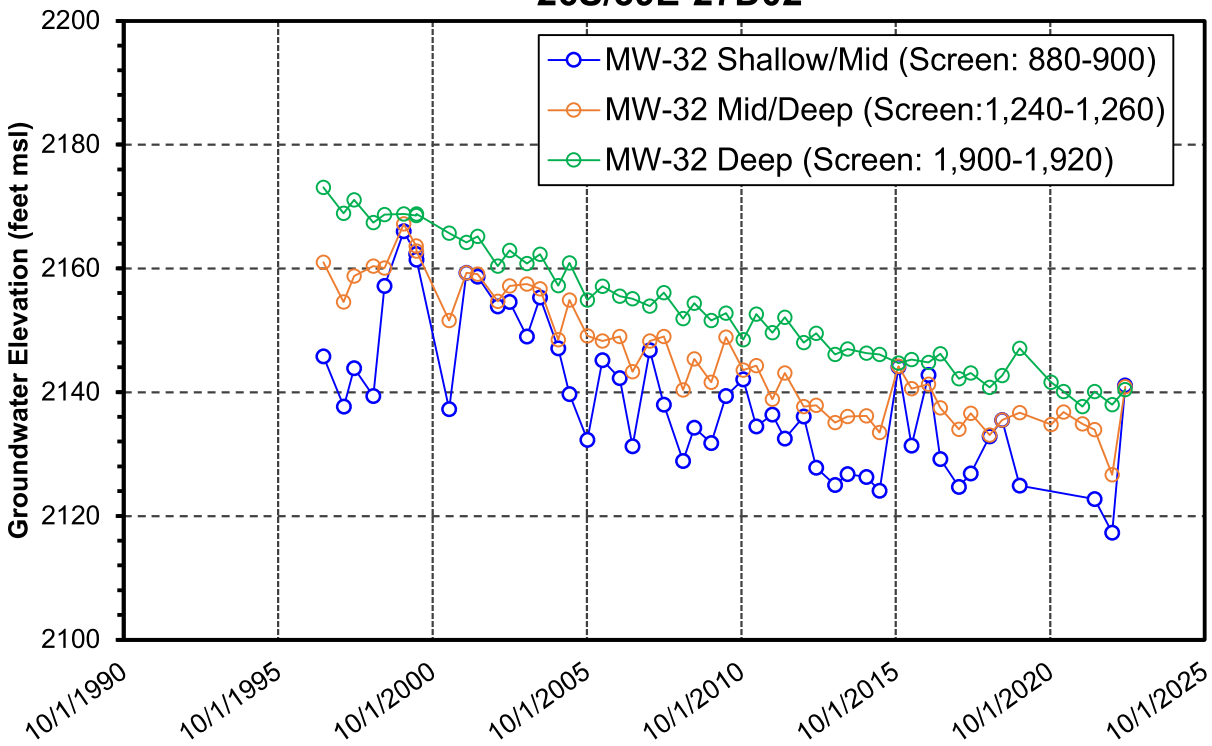
Sandquist Spa (2307 ft, msl)
Representative Monitoring Site
26S/39E-11E02



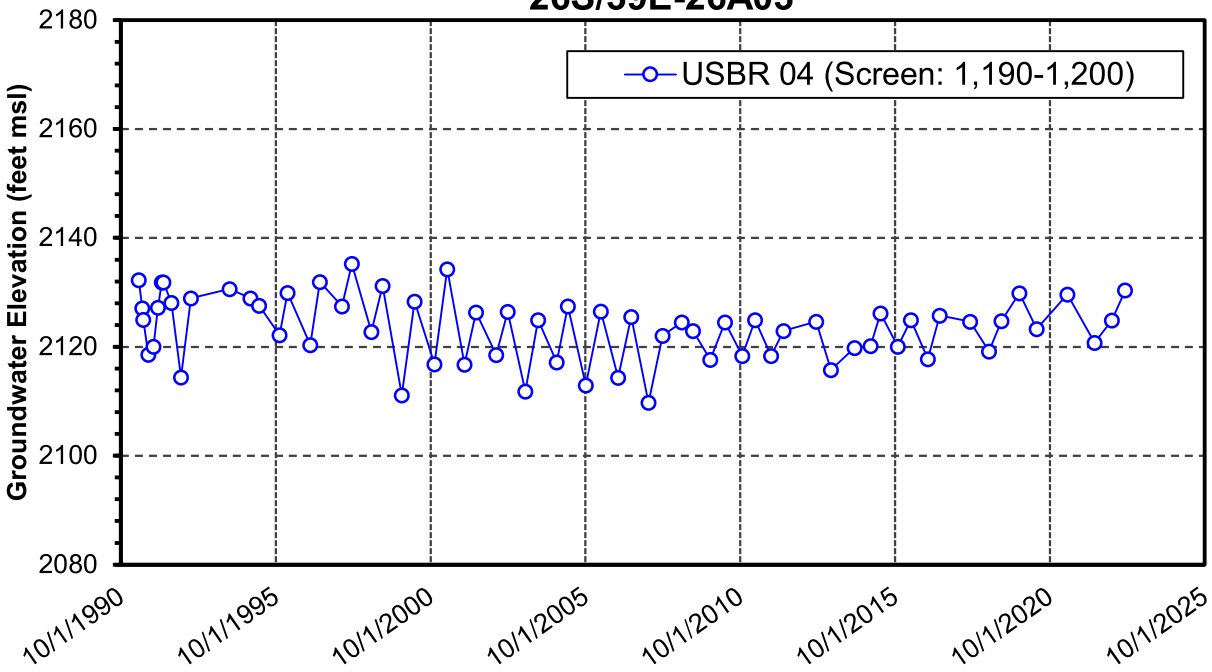
Kerr McGee 17 (2357 ft, msl)
Representative Monitoring Site
26S/39E-17G02



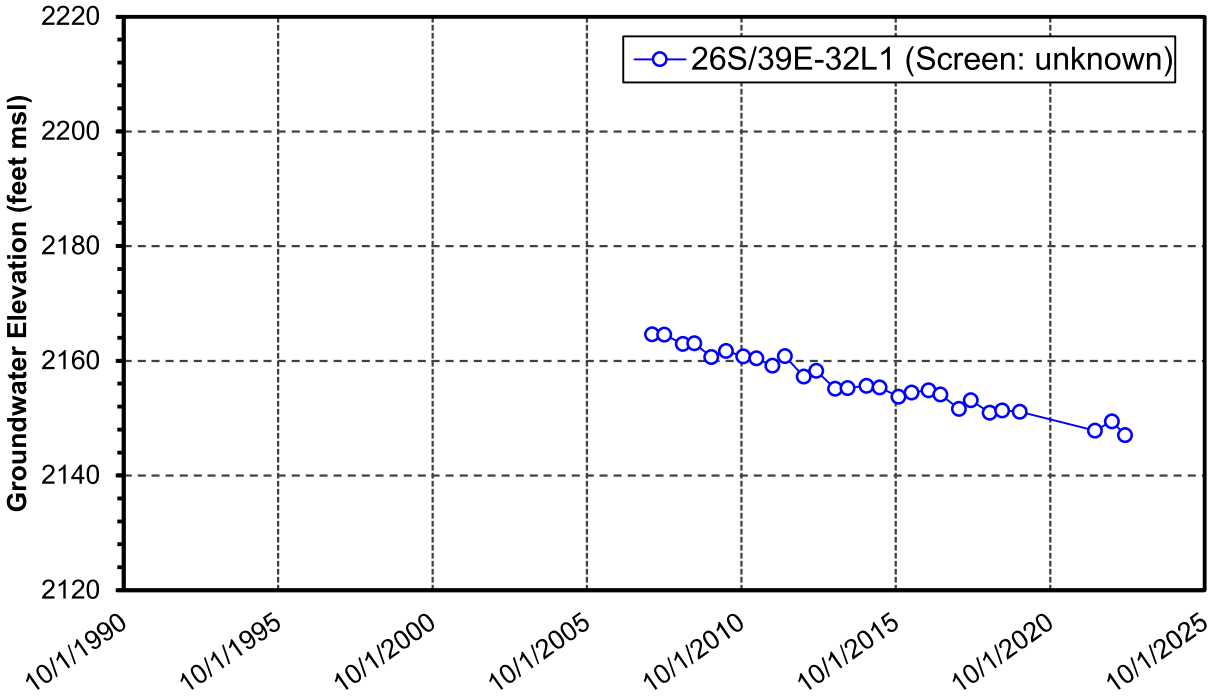
MW-32 (2419 ft, msl)
Representative Monitoring Site
26S/39E-27D02



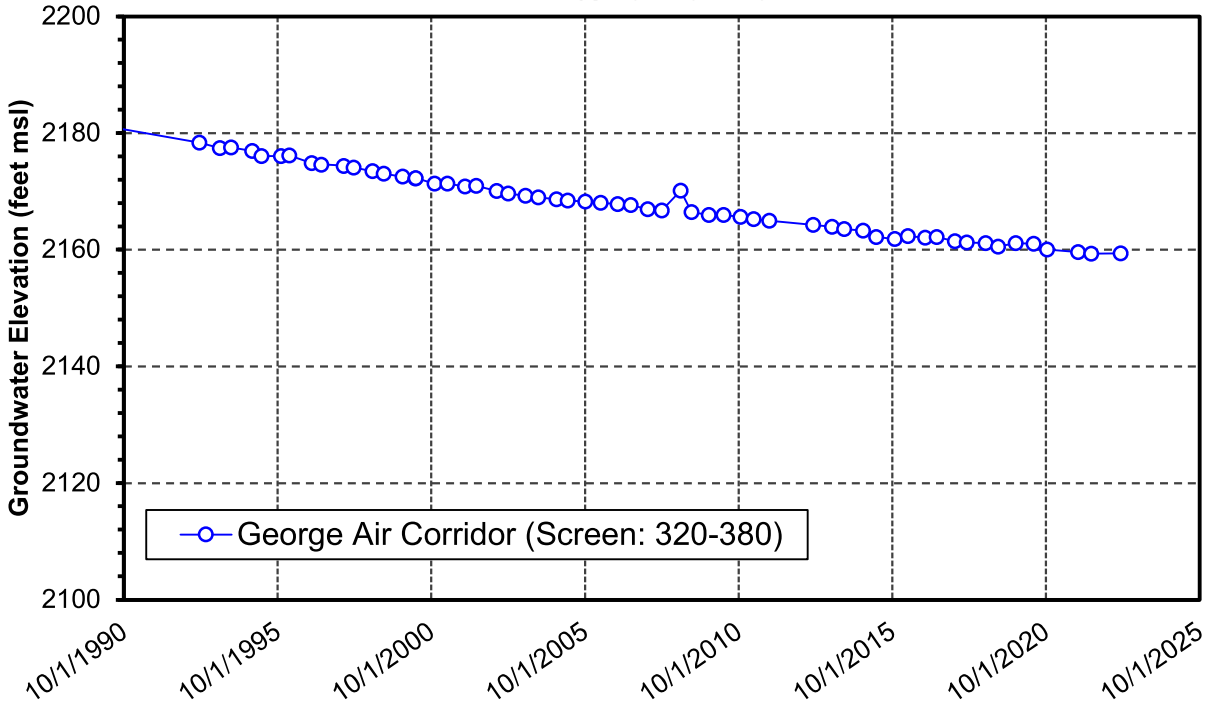
USBR 04 (2377 ft, msl)
Representative Monitoring Site
26S/39E-26A03



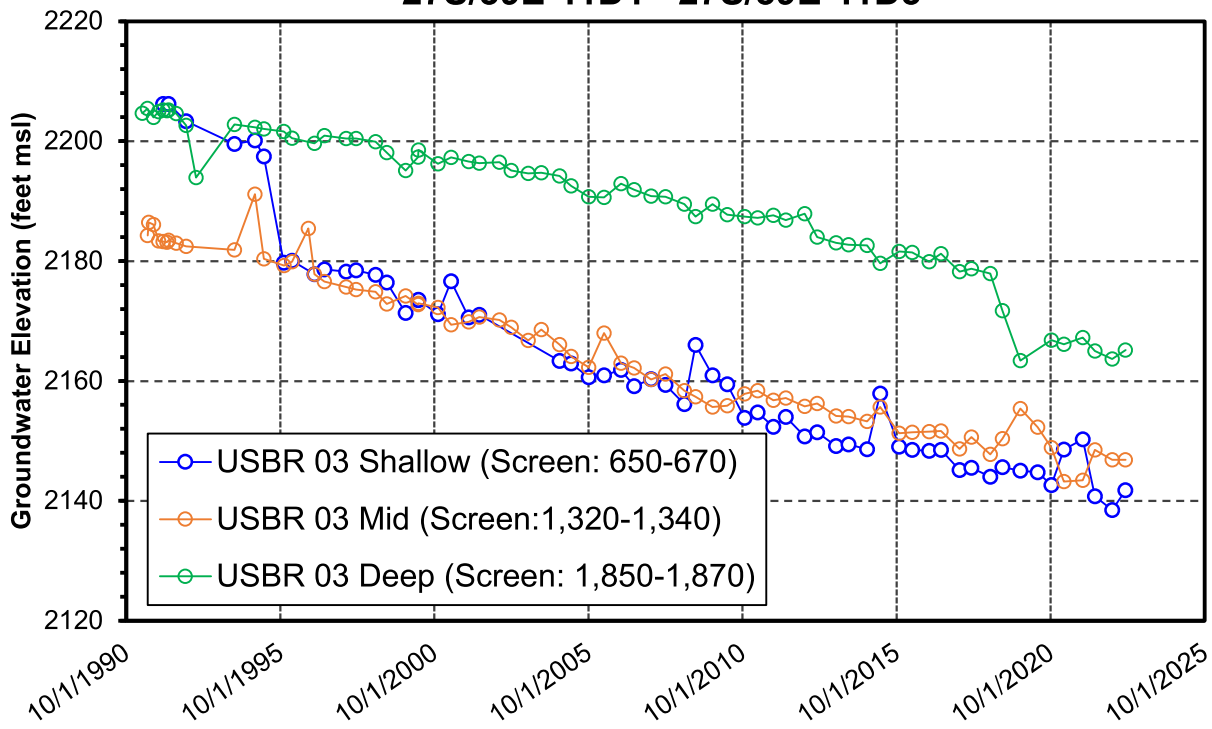
26S/39E-32L1 (2492 ft, msl)



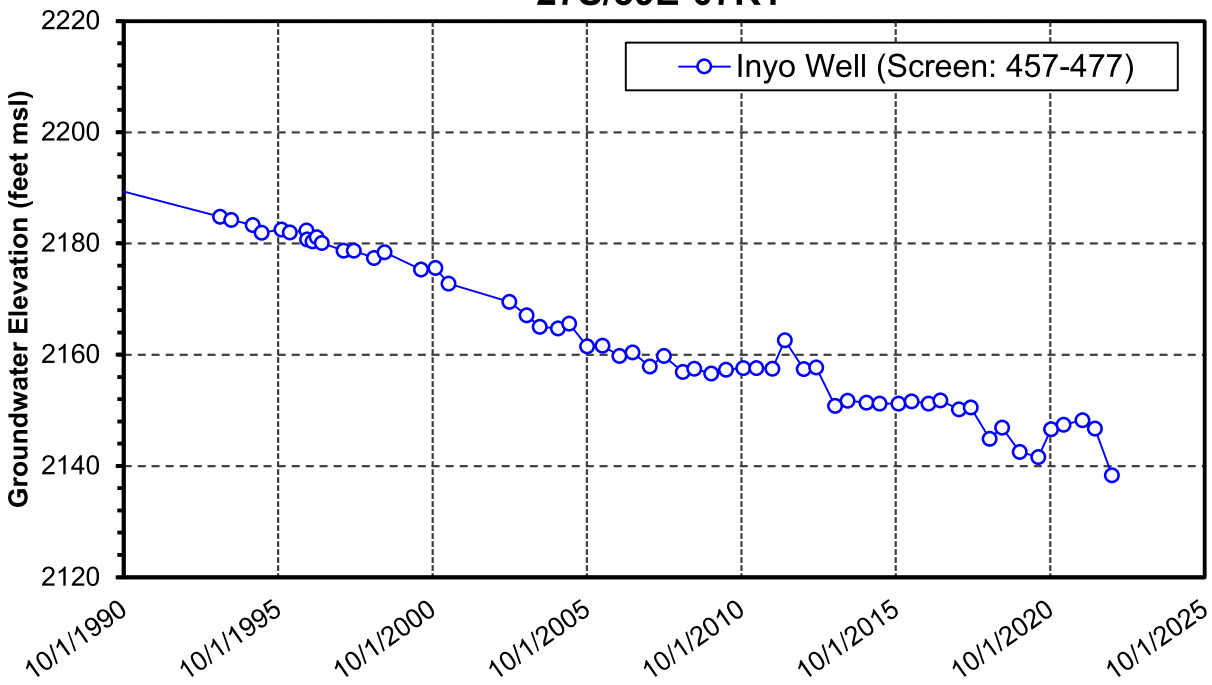
George Air Corridor (2322.64 ft, msl)
Representative Monitoring Site
27S/40E-01K02

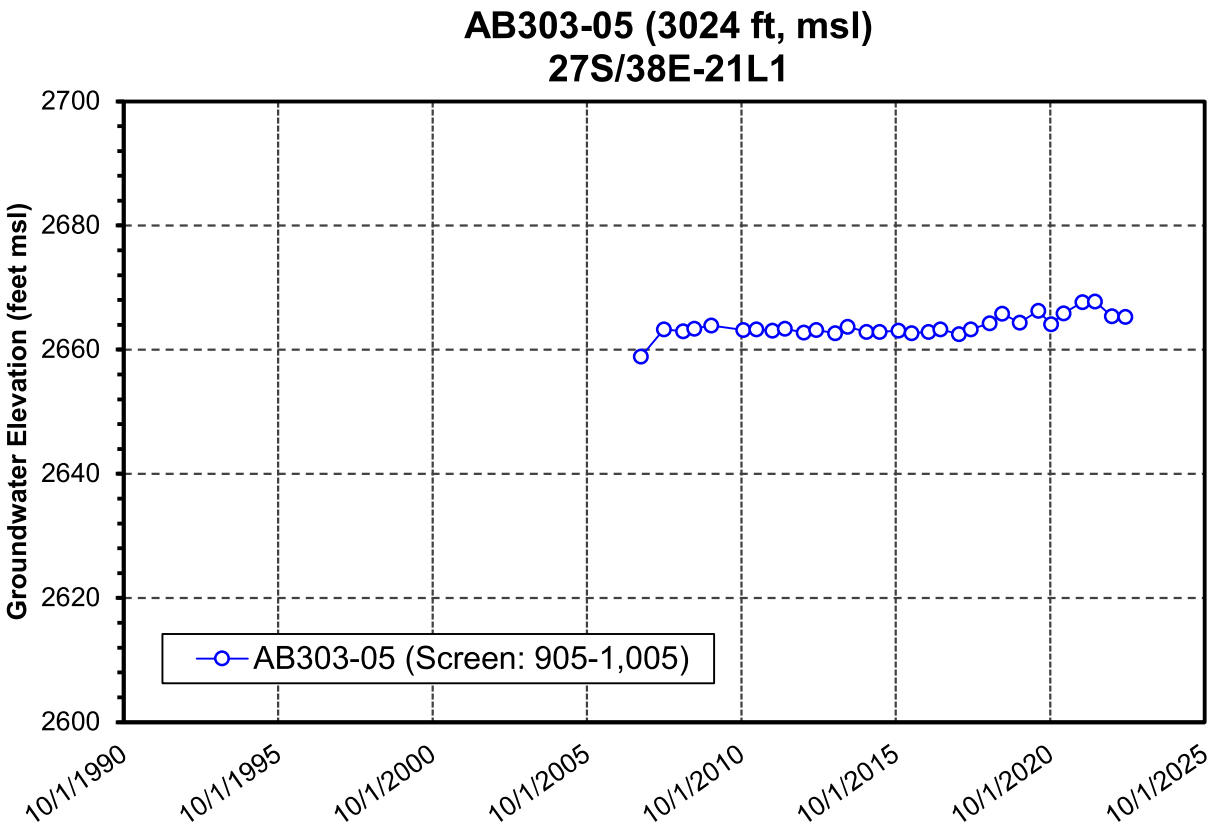


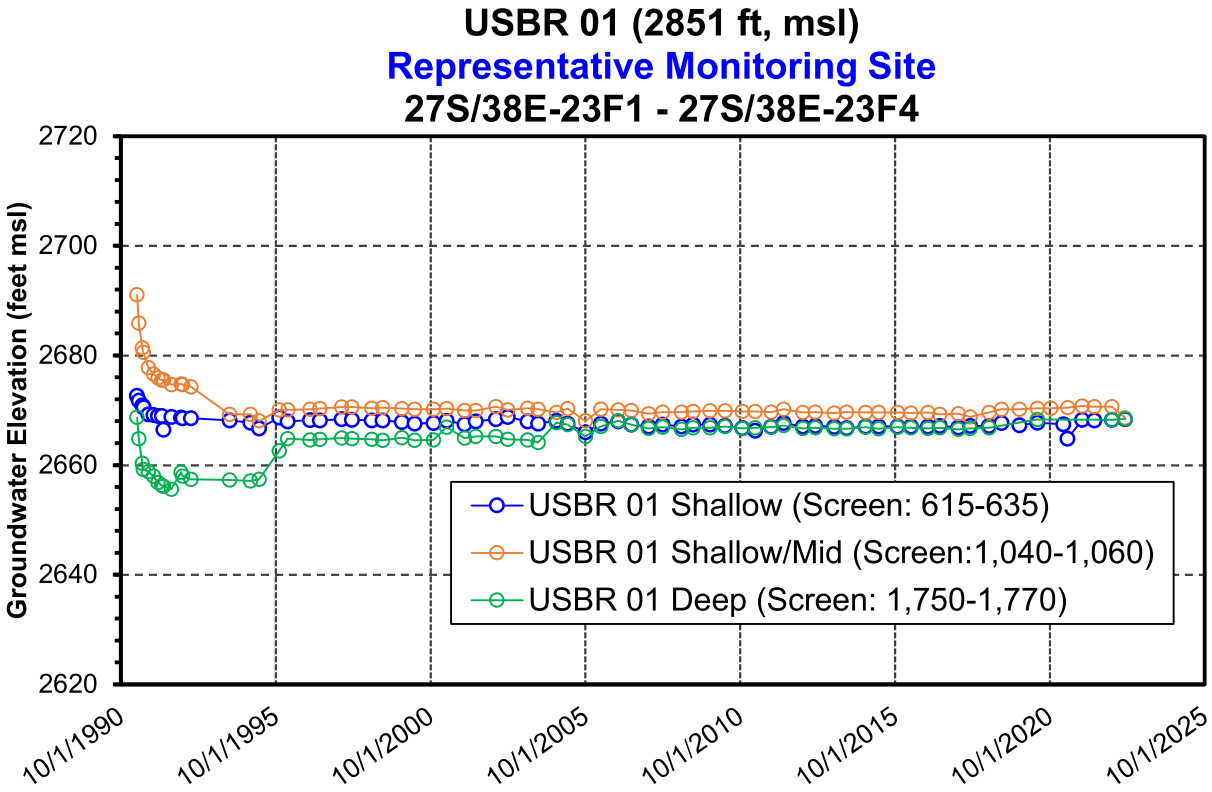
USBR 03 (2510 ft, msl)
Representative Monitoring Site
27S/39E-11D1 - 27S/39E-11D3



Inyo Well (2564 ft, msl)
Representative Monitoring Site
27S/39E-07R1




AB303-05 (3024 ft, msl)
27S/38E-21L1
Groundwater Elevation (feet msl)
2700
2680
2660
2640
2620
2600
10/1/1990
10/1/1995
10/1/2000
10/1/2005
10/1/2010
10/1/2015
10/1/2020
10/1/2025
AB303-05 (Screen: 905-1,005)


USBR 01 (2851 ft, msl)
Representative Monitoring Site
27S/38E-23F1 - 27S/38E-23F4
Groundwater Elevation (feet msl)
2720
2700
2680
2660
2640
2620
10/1/1990
10/1/1995
10/1/2000
10/1/2005
10/1/2010
10/1/2015
10/1/2020
10/1/2025
USBR 01 Shallow (Screen: 615-635)
USBR 01 Shallow/Mid (Screen:1,040-1,060)
USBR 01 Deep (Screen: 1,750-1,770)

Attachment F

Storage Change Estimate Using Thiessen Polygon Method

INDIAN WELLS VALLEY GROUNDWATER BASIN

ESTIMATED GROUNDWATER STORAGE CHANGE

Note: This Storage Change Calculation is for Measured Areas of the IWV Basin

Polygon	State ID T/R-S	Common Name	Basin Area	Specific Yield	Surface Area (acres)	Groundwater Level (Feet, msl) 2015	2016	2017	2018	2019	2022	2023	Change (feet) 2015-2016	2016-2017	2017-2018	2018-2019	2019-2022	2022-2023	*Storage Change (AF) for Measured Area of IWV Basin* WY 2016	WY 2017	WY 2018	WY 2019	2020 to 2022 3-year	2022 Avg Anl	WY 2023	4-Yr Cumm
1	28S/38E-18R	Black Hills Well	EP	0.21	14,609	2,820	2,820	2,820	2,821	2,820	2,820	2,820	0.1	0.2	0.6	-0.4	-0.3	0.0	307	614	1,841	-1,227	-918	-306	0	-918
2	27S/38E-27M01	USNS-03	EP	0.21	2,987	2,679	2,679	2,679	2,679	2,680	2,680	2,681	-0.1	0.2	-0.2	1.2	0.6	0.2	-63	126	-126	753	376	125	138	514
3	27S/38E-23F01	USBR 1-S	EP	0.08	1,967	2,667	2,667	2,667	2,667	2,668	2,668	2,668	0.0	0.1	0.0	0.5	0.5	0.2	0	16	0	79	77	26	32	109
4	27S/38E-21L01	AB303-05	EP	0.21	5,344	2,663	2,663	2,663	2,663	2,666	2,668	2,665	-0.2	0.6	0.0	2.5	2.0	-2.5	-225	673	0	2,806	2,245	748	-2,806	-561
5	27S/38E-15R01	AB303-06	EP	0.21	1,497	2,659	2,658	2,658	2,659	2,659	2,659	2,658	-0.6	-0.1	0.6	0.6	-0.2	-0.8	-189	-31	189	189	-63	-21	-251	-314
6	27S/38E-09P01	Father Crowley	EP	0.21	849	2,694	2,694	2,695	2,695	2,694	2,697	2,691	0.3	0.2	0.1	-0.7	2.5	-5.2	54	36	18	-125	446	149	-933	-487
7	27S/38E-08R01		EP	0.21	3,525	2,697	2,697	2,697	2,697	2,696	2,701	2,701	0.3	0.0	0.0	-1.0	4.3	0.2	222	0	0	-740	3,183	1,061	170	3,354
8	27S/38E-10B02	AB303-03	EP	0.21	1,588	2,469	2,470	2,470	2,469	2,469	2,473	2,470	0.5	0.6	-1.0	-0.1	3.4	-3.1	167	200	-333	-33	1,134	378	-1,034	100
9	27S/38E-09C01	AB303-04	EP	0.21	1,645	2,689	2,689	2,689	2,689	2,689	2,691	2,689	0.4	0.1	-0.6	0.2	2.0	-2.4	138	35	-207	69	691	230	-829	-138
10	27S/39E-19E01	IWV MW #3	IWV	0.08	2,275	2,436	2,435	2,436	2,435	2,435	2,435	2,435	-0.2	0.1	-0.4	0.2	-0.4	-0.1	-36	18	-73	36	-72	-24	-18	-91
11	27S/38E-13A01	Sea Bee Well	IWV	0.08	1,517	2,430	2,430	2,430	2,430	2,430	2,429	2,429	0.0	-0.2	-0.2	0.2	-0.9	0.1	0	-24	-24	24	-107	-36	11	-96
12	27S/39E-08P02	IWV MW # 2	IWV	0.21	3,341	2,150	2,149	2,149	2,147	2,146	2,145	2,139	-0.8	-0.2	-1.5	-1.0	-1.2	-6.3	-561	-140	-1,053	-702	-845	-282	-4,420	-5,265
13	27S/39E-07R01	Inyo	IWV	0.21	631	2,151	2,152	2,152	2,151	2,147	2,147	2,145	0.4	0.2	-1.3	-3.6	-0.2	-1.5	53	27	-172	-477	-27	-9	-199	-225
14	27S/39E-08M02	IWV MW #1	IWV	0.21	468	2,148	2,147	2,146	2,146	2,144	2,140	2,136	-0.7	-0.7	-0.7	-1.9	-3.4	-4.4	-69	-69	-69	-187	-334	-111	-433	-767
15	27S/39E-11D01	USBR 3-S	IWV	0.08	5,027	2,158	2,149	2,149	2,146	2,146	2,141	2,142	1.8	-0.2	-2.5	-7.0	-4.8	1.0	724	-80	-1,005	-2,815	-1,947	-649	394	-1,552
16	27S/40E-06N02		IWV	0.08	4,727	2,119	2,121	2,119	2,122	2,121	2,123	2,125	2.1	-1.6	2.7	-1.4	2.6	1.8	794	-605	1,021	-530	997	332	666	1,663
17	27S/40E-01K02	George Air Corr.	IWV	0.21	1,001	2,162	2,162	2,162	2,161	2,161	2,159	2,159	0.2	-0.2	-0.9	-0.7	-1.2	0.0	42	-42	-189	-147	-253	-84	8	-245
18	27S/40E-06E01		IWV	0.08	975	2,114	2,116	2,115	2,115	2,116	2,119	2,122	1.7	-1.1	0.9	0.4	3.6	2.1	133	-86	70	31	279	93	166	445
19	27S/39E-04C01		IWV	0.21	1,116	2,158	2,157	2,157	2,157	2,154	2,150	2,149	-0.7	-0.5	-0.2	-2.4	-4.3	-0.5	-164	-117	-47	-563	-1,003	-334	-122	-1,125
20	27S/38E-02C01	USBR 2-S	IWV	0.21	1,109	2,373	2,373	2,373	2,372	2,372	2,373	2,373	-0.2	0.5	-1.0	0.0	1.1	0.0	-47	117	-233	0	256	85	-1	256
21	26S/39E-34R02		IWV	0.21	1,379	2,136	2,135	2,134	2,133	2,132	2,128	2,127	-0.8	-1.1	-1.1	-1.1	-3.7	-0.7	-232	-319	-319	-319	-1,074	-358	-200	-1,274
22	26S/40E-31K01		IWV	0.21	1,791	2,113	2,115	2,114	2,115	2,118	2,119	2,119	2.2	-0.7	0.4	2.9	1.4	0.0	828	-263	151	1,091	530	177	1	530
23	26S/39E-32L01		IWV	0.21	3,171	2,155	2,154	2,154	2,153	2,151	2,148	2,147	-0.9	-0.3	-1.0	-1.8	-3.5	-0.8	-599	-200	-666	-1,199	-2,338	-779	-526	-2,864
24	26S/39E-31R03		IWV	0.21	1,376	2,144	2,144	2,144	2,142	2,141	2,138	2,136	-0.5	-0.4	-1.2	-1.4	-3.1	-1.1	-130	-130	-347	-404	-893	-298	-315	-1,208
25	26S/40E-35H02	Satellite Lake2(e)	IWV	0.21	2,609	2,155	2,154	2,154	2,153	2,153	2,154	2,154	-0.4	-0.3	-0.7	-0.3	0.8	-0.4	-219	-164	-384	-164	449	150	-225	224
26	26S/39E-26P02		IWV	0.18	1,070	2,146	2,146	2,145	2,144	2,143	2,140	2,140	-0.6	-0.6	-0.9	-1.4	-2.7	-0.2	-116	-116	-173	-270	-514	-171	-44	-558
27	26S/39E-27D04	MW 32-D	IWV	0.18	1,459	2,146	2,145	2,146	2,143	2,143	2,140	2,140	-0.8	0.9	-3.1	-0.4	-2.6	0.3	-210	236	-814	-105	-684	-228	89	-594
28	26S/39E-26A03	USBR 4	IWV	0.18	1,694	2,126	2,125	2,126	2,125	2,125	2,121	2,130	-1.2	0.8	-1.1	0.1	-4.0	9.6	-366	244	-336	31	-1,219	-406	2,943	1,724
29	26S/40E-22P04	PW Substation 2	IWV	0.21	705	2,187	2,195	2,192	2,191	2,193	2,206	2,206	7.5	-2.5	-0.8	1.2	13.3	0.0	1,110	-370	-118	178	1,970	657	-6	1,964
30	26S/40E-19N02		IWV	0.21	448	2,129	2,129	2,129	2,130	2,132	2,129	2,130	-0.3	0.2	1.4	1.4	-2.8	0.8	-28	19	132	132	-266	-89	75	-191
31	26S/40E-21K03		IWV	0.21	706	2,164	2,165	2,166	2,164	2,165	2,167	2,168	1.1	0.5	-1.9	1.2	2.0	0.6	163	74	-274	174	295	98	94	388
32	26S/40E-20L01		IWV	0.21	812	2,151	2,150	2,151	2,151	2,151	2,151	2,151	-0.1	0.4	-0.1	0.1	-0.2	0.1	-17	68	-14	21	-36	-12	10	-25
33	26S/40E-22H03		IWV	0.21	2,397	2,197	2,196	2,196	2,195	2,195	2,195	2,195	-0.6	-0.3	-0.7	-0.4	0.3	0.3	-302	-151	-337	-222	150	50	131	281
34	26S/39E-20C02		IWV	0.18	1,025	2,157	2,156	2,156	2,154	2,153	2,150	2,150	-0.8	-0.5	-1.5	-1.0	-3.2	-0.7	-148	-92	-277	-185	-591	-197	-129	-720
35	26S/39E-13R04		IWV	0.21	1,793	2,129	2,126	2,126	2,128	2,130	2,125	2,128	-3.4	0.3	1.8	2.0	-5.1	2.9	-1,280	113	689	738	-1,911	-637	1,085	-827
36	26S/40E-17N01		IWV	0.21	1,039	2,151	2,151	2,152	2,152	2,152	2,152	2,152	0.0	0.4	0.1	0.2	0.1	0.0	0	87	31	52	13	4	9	22
37	26S/40E-15N01		IWV	0.21	2,894	2,187	2,187	2,187	2,187	2,187	2,187	2,186	-0.3	0.3	-0.3	0.0	-0.2	-0.2	-182	182	-176	24	-104	-35	-134	-238
38	26S/39E-15J		IWV	0.18	1,688	2,148	2,146	2,147	2,145	2,145	2,144	2,144	-1.9	0.5	-1.2	-0.4	-0.8	0.2	-577	152	-365	-137	-231	-77	49	-182
39	26S/39E-14E01		IWV	0.21	864	2,169	2,169	2,168	2,168	2,167	2,165	2,165	-0.4	-0.9	-0.2	-0.6	-1.9	-0.6	-73	-163	-38	-103	-346	-115	-102	-448
40	26S/39E-17G02	Kerr McGee	IWV	0.18	1,957	2,154	2,153	2,153	2,151	2,150	2,148	2,148	-1.0	-0.5	-1.6	-0.7	-1.9	-0.3	-352	-176	-546	-247	-673	-224	-102	-775
41	26S/39E-11E02	Sandquist Spa	IWV	0.21	987	2,176	2,175	2,174	2,174	2,173	2,171	2,170	-0.8	-0.4	-0.8	-0.6	-2.0	-0.7	-166	-83	-158	-122	-413	-138	-147	-560
42	26S/39E-09E		IWV	0.21	1,733	2,146	2,145	2,145	2,143	2,143	2,142	2,142	-0.5	-0.4	-1.4	-0.4	-0.6	0.2	-182	-146	-521	-157	-234	-78	73	-161
43	26S/40E-12C		IWV	0.21	8,284	2,162	2,162	2,162	2,161	2,162	2,160	2,161	-0.3	0.5	-0.6	0.4	-1.5	0.4	-522	870	-1,096	783	-2,644	-881	659	-1,986
44	26S/39E-02N01		IWV	0.21	2,103	2,176	2,175	2,175	2,174	2,173	2,173	2,172	-0.7	-0.6	-0.6	-0.7	-0.8	-0.5	-309	-265	-269	-292	-333	-111	-234	-567
45	26S/38E-02Q01		IWV	0.21	1,509	2,164	2,164	2,163	2,162	2,160	2,158	2,156	-0.6	-1.1	-0.9	-2.0	-3.6	-2.2	-190	-349	-285	-634	-1,141	-380	-689	-1,830
46	26S/38E-01M05		IWV	0.21	1,520	2,167	2,166	2,165	2,164	2,163	2,161	2,160	-0.6	-0.6	-1.2	-1.2	-2.5	-0.5	-192	-192	-383	-383	-808	-269	-150	-958
47	26S/39E-05F01		IWV	0.21	1,247	2,171	2,170	2,169	2,168	2,166	2,165	2,164	-1.0	-0.5	-0.9	-1.7	-1.5	-0.7	-262	-131	-236	-439	-384	-128	-178	-562
48	26S/38E-02B01		IWV	0.21	519	2,166	2,166	2,165	2,164	2,162	2,157	2,159	-0.8	-0.6	-1.1	-2.2	-4.6	2.0	-87	-65	-120	-240	-497	-166	214	-284
49	26S/39E-01A01		IWV	0.21	2,482	2,170	2,170	2,170	2,170	2,169	2,176	2,175	-0.5	0.0	-0.4	-0.1	6.1	-0.3	-261	0	-203	-37	3,196	1,065	-141	3,055
50	25S/40E-31P		IWV	0.21	3,817	2,171	2,171	2,172	2,171	2,171	2,173	2,173	0.0	0.3	-0.5	0.1	1.6	0.2	0	241	-433	48	1,247	416	136	1,383
51	25S/39E-31R01		IWV	0.21	1,139	2,178	2,178	2,176	2,174	2,173	2,169	2,170	-0.1	-2.2	-2.2	-0.9	-3.7	0.6	-24	-532	-532	-215	-878	-293	139	-739
52	25S/38E-34G03	USBR 05-S	IWV	0.21	983	2,167	2,168	2,167	2,165	2,163	2,160	2,159	0.6	-0.7	-2.8	-1.4	-3.3	-0.8	124	-145	-578	-289	-679	-226	-155	-834
53	25S/38E-36G03	NR-2 (Deep)	IWV	0.21	766	2,142	2,146	2,142	2,140	2,145	2,143	2,143	3.9	-4.1	-1.8	5.1	-1.9	-0.8	627	-659	-290	820	-306	-102	-137	-442
54	25S/38E-34A01		IWV	0.21	1,973	2,183	2,173	2,172	2,171	2,169	2,166	2,166	-10.5	-0.7	-0.6	-2.1	-3.7	0.1	-4,351	-290	-249	-870	-1,521	-507	29	-1,492
55	25S/38E-35B01		IWV	0.21	907	2,166	2,165	2,165	2,163	2,162	2,159	2,158	-1.0	-0.4	-1.3	-1.5	-2.5	-1.0	-191	-76	-248	-286	-478	-159	-196	-674

WY 2023

IWV Modified Thiessen Polygon Method

Note: This Storage Change Calculation is for Measured Areas of the IWV Basin

Polygon	State ID T/R-S	Common Name	Basin Area	Specific Yield	Surface Area (acres)	Groundwater Level (Feet, msl) 2015	2016	2017	2018	2019	2022	2023	Change (feet) 2015-2016	2016-2017	2017-2018	2018-2019	2019-2022	2022-2023	*Storage Change (AF) for Measured Area of IWV Basin* WY 2016	WY 2017	WY 2018	WY 2019	2020 to 2022 3-year Avg Anl	WY 2023	4-Yr Cumm
56	25S/39E-28P01	Baker 4-NE	IWV	0.21	2,504	2,185	2,187	2,189	2,188	2,190	2,175	2,180	1.9	1.9	-0.2	1.3	-14.3	4.2	1,015	1,015	-89	673	-7,537	-2,512	2,224	-5,313
57	25S/39E-29M01		IWV	0.21	2,556	2,177	2,177	2,176	2,176	2,175	2,173	2,173	-0.6	-0.5	-0.5	-0.6	-1.8	-0.5	-295	-268	-263	-333	-985	-328	-279	-1,264
58	25S/38E-25J03	NR 1-D	IWV	0.21	1,475	2,158	2,158	2,157	2,156	2,155	2,143	2,142	-0.5	-0.7	-1.4	-0.8	-11.9	-0.5	-155	-217	-434	-248	-3,687	-1,229	-155	-3,842
59	25S/38E-14Q01		IWV	0.21	3,621	2,163	2,168	2,167	2,166	2,165	2,163	2,165	4.8	-0.9	-0.9	-0.9	-2.5	2.5	3,650	-684	-684	-684	-1,878	-626	1,878	0
60	25S/39E-12R01	Charely Tower	IWV	0.21	12,232	2,179	2,179	2,179	2,178	2,178	2,177	2,177	-0.2	-0.2	-0.2	-0.3	-0.7	-0.2	-591	-591	-591	-642	-1,923	-641	-514	-2,436
61	25S/38E-12L03	USBR 6-D	IWV	0.21	6,289	2,190	2,189	2,189	2,188	2,187	2,187	2,186	-0.9	-0.4	-0.9	-0.6	-0.4	-0.7	-1,189	-528	-1,228	-753	-475	-158	-964	-1,440
62	25S/39E-03R01	Baker Range	IWV	0.21	6,159	2,177	2,177	2,177	2,176	2,176	2,175	2,175	-0.4	-0.4	-0.3	-0.4	-1.0	-0.4	-474	-474	-414	-492	-1,304	-435	-466	-1,769
63	24S/38E-21A04	USBR 10-D	IWV	0.21	4,060	2,244	2,244	2,243	2,243	2,241	2,242	2,240	-0.1	-0.9	-0.4	-1.1	0.1	-1.9	-85	-767	-341	-938	85	28	-1,586	-1,500
64	25S/38E-03B		IWV	0.21	2,291	2,172	2,171	2,170	2,170	2,168	2,166	2,164	-0.9	-0.6	-0.4	-1.4	-2.5	-1.4	-433	-289	-193	-674	-1,202	-401	-664	-1,866
65	25S/40E-30E01	TTBK MW14	IWV	0.21	6,169	2,177	2,177	2,177	2,177	2,177	2,176	2,176	-0.1	-0.1	-0.3	-0.2	-0.7	-0.2	-71	-71	-337	-259	-868	-289	-233	-1,101
66	26S/38E-22B	Ostrich Ranch	IWV	0.21	2,465	2,240	2,240	2,236	2,236	2,240	2,237	2,233	-0.2	-4.0	-0.1	4.0	-2.6	-3.8	-104	-2,071	-52	2,071	-1,339	-446	-1,972	-3,311
67	26S/38E-35B		IWV	0.21	1,714	2,233	2,231	2,232	2,233	2,232	2,232	2,232	-1.6	1.5	0.7	-1.0	-0.3	-0.3	-576	540	252	-360	-101	-34	-115	-216
68	26S/38E-35D		IWV	0.21	1,869	2,238	2,238	2,238	2,238	2,237	2,239	2,236	0.1	0.1	-0.3	-0.5	1.7	-3.6	39	39	-118	-196	666	222	-1,413	-747
69	26S/40E-28J01	Hospital	IWV	0.21	569	2,157	2,157	2,156	2,156	2,156	2,157	2,156	0.1	-0.7	-0.1	-0.6	1.0	-0.8	12	-84	-12	-72	120	40	-96	24
70	26S/40E-29M01		IWV	0.21	2,837	2,124	2,130	2,130	2,127	2,131	2,124	2,125	6.4	0.0	-3.2	4.2	-7.7	1.1	3,813	0	-1,907	2,503	-4,562	-1,521	632	-3,930
71	27S/38E-01C		IWV	0.08	1,268	2,200	2,199	2,199	2,199	2,199	2,196	2,195	-0.5	-0.3	-0.3	-0.3	-2.9	-0.6	-51	-30	-30	-30	-294	-98	-61	-355
72	27S/39E-02K	Asphalt Constr	IWV	0.21	2,387	2,151	2,149	2,148	2,147	2,146	2,144	2,142	-1.4	-1.4	-1.4	-0.3	-0.9	-1.5	-711	-711	-711	-150	-451	-150	-750	-1,201
73	27S/39E-08A01		IWV	0.21	1,190	2,148	2,148	2,147	2,147	2,145	2,139	2,137	0.2	-1.1	-0.5	-1.8	-5.7	-2.7	50	-275	-125	-450	-1,423	-474	-665	-2,088
74	24S/38E-33J02		IWV	0.21	3,435	2,175	2,174	2,170	2,173	2,172	2,169	2,169	-1.0	-3.4	2.9	-1.1	-3.3	-0.9	-721	-2,453	2,092	-794	-2,381	-794	-632	-3,012
75	25S/39E-22J01	S. Baker Ranch	IWV	0.21	3,600	2,179	2,178	2,178	2,178	2,177	2,176	2,176	-0.3	-0.3	-0.3	-0.4	-1.1	-0.3	-263	-263	-204	-280	-805	-268	-242	-1,047
76	26S/40E-34F01	City of Ridgecrest	IWV	0.21	926	2,146	2,147	2,147	2,146	2,145	2,145	2,145	0.5	-0.4	-0.6	-0.5	-1.7	-0.1	97	-78	-107	-107	-321	-107	-17	-338
77	27S/40E-02J01	DMP Cemetery	IWV	0.21	2,308	2,162	2,162	2,162	2,161	2,161	2,159	2,151	0.2	-0.2	-0.9	-0.7	-1.2	-8.8	97	-97	-436	-339	-584	-195	-4,259	-4,842
			IWV Main Basin		154,960													IWV Main Basin	-4,791	-12,149	-17,486	-11,107	-47,648	-15,883	-12,370	-60,018
			El Paso Subarea		34,011													El Paso Subarea	412	1,667	1,381	1,770	7,171	2,390	-5,513	1,658
					188,971													Total for measured Area	-4,380	-10,482	-16,105	-9,338	-40,477	-13,492	-17,883	-58,360
																			BN	*AN*	*BN*	*W*	*AN__D__BN*		*W*	

Notes:

Specific Yield values from Appendix 3-H GSP Model Documentation

red: field measurement not available, estimated from hydrograph

Attachment G

Estimated WY 2023 Groundwater Production

Attachment G: WY 2023 Groundwater Production Estimate

Water Use Sector (DWR)	Water User	No Action Baseline WY 2023		Reported Groundwater Pumping WY 2023		Estimated Groundwater Pumping WY 2023	
		note	(AFY)	note	(AFY)	note	(AFY)
Urban	IWVWD	2	6,628	1	4,266	3	5,443
Urban	City/County	2	425	1	35	3	173
Industrial	Searles Valley Minerals	2	2,907	1	2,514	3	2,575
Other - Federal	U.S. Navy	2	2,041	4	1,377	4	1,377
Agriculture	Meadowbrook Farms	2	12,303	1	3,642	1	3,642
Agriculture	Mojave Pistachio	2	6,891	1	3,523	1	3,523
Agriculture	Simmons Farm	2	931	1	0	1	0
Agriculture	Sierra Shadows	2	765	1	114	3	244
Agriculture	Quist Farms	2	685	1	272	3	489
Agriculture	Other Small Ag	2	957	1	151	3	211
Other - Co-Ops/Mutuals/Community Services District	Other - Co-Ops/Mutuals/Community Services District	2	544	1	150	3	634
Other - Domestic	Domestic	2	832		0	2	832
			35,909				19,141

Notes:

1 Production reported to IWVGA for volumetric production fees and/or transient pool records. (Not all required pumpers report production.)

2 Estimated from GSP 'No Action' Baseline analysis.

3 Missing data estimated from best available data sources.

4 Data provided by Navy to the IWVGA via letter on November 7, 2023.

Attachment H

WY 2023 Water Quality Data

Table 1 Well Information, Sampling Methods, & Depth to Water Levels

State ID	Other Name	Latitude	Longitude	Well Type	Total Depth (ft, bgs)	Screen Interval (ft, bgs)	Sampling Method	Date	DTW	Sample Time
25S/38E-14A	Bork	35.76809	-117.85244	DOM	unk	unk	Owner purged	10/3/2022	234.91	10/3/2022 9:35
25S/38E-34A01	Means	35.72453	-117.87024	DOM	480	418.5-479.5	Owner purged	10/3/2022	365.83	10/3/2022 12:30
27S/38E-09C01	AB303-04	35.60665	-117.89378	MW	601	501-581	Hydrasleeve	10/3/2022	386.66	10/4/2022 8:22
27S/38E-13A02	AB303-01	35.59369	-117.8307	MW	690	232-272, 372-472, 630-690	Hydrasleeve	10/3/2022	225.81	10/4/2022 9:20
27S/38E-15R01	AB303-06	35.58195	-117.86617	MW	380	280-340	Hydrasleeve	10/3/2022	276.92	10/4/2022 9:45
27S/38E-21L01	AB303-05	35.56985	-117.89592	MW	1045	905-1005	Hydrasleeve	10/3/2022	360.49	10/4/2022 11:11
27S/39E-08A01	08A01	35.60721	-117.79818	MW	955	550-865, 895-935	Hydrasleeve	10/3/2022	397.98	10/4/2022 11:55
27S/40E-01K02	George Air Corridor	35.6147	-117.62469	MW	400	320-380	Hydrasleeve	10/3/2022	165.01	10/4/2022 12:45
27S/38E-32C01	EP-1-S	35.54904179	-117.9107061	MW	0	450-470	Hydrasleeve	10/4/2022	275.28	10/5/2022 17:50
27S/38E-10B02	AB303-03	35.60662	-117.87407	MW	872	452-552	Hydrasleeve	10/4/2022	431.44	10/5/2022 18:22
25S/38E-35B01	35B01	35.72509	-117.85286	MW	unk	200-298	Hydrasleeve	10/4/2022	240.95	10/5/2022 19:00
25S/38E-03B	03B1	35.79546	-117.87382	MW	360	300-360	Hydrasleeve	10/4/2022	294.11	10/5/2022 19:20
26S/39E-25K01	25K1	35.64041	-117.74023	MW	580	440-540	Hydrasleeve	10/4/2022	267.71	10/5/2022 20:00
26S/38E-01M05	Fields	35.70215	-117.84707	DOM	360	299-359	Owner purged	10/5/2022	216.41	10/5/2022 10:40
26S/38E-01L01	Well G	35.702013	-117.841337	DOM	unk	unk	Owner purged			10/5/2022 8:35
25S/39E-03R01	Baker Range	35.78412	-117.76257	MW,C	185	65-165	Hydrasleeve	10/3/2022	51.42	10/5/2022 7:50
25S/39E-12R01	Charley Tower	35.77039	-117.72496	MW	150	60-140	Hydrasleeve	10/3/2022	25.01	10/5/2022 8:25
26S/39E-05L01	05L01(S)	35.69973	-117.80355	MW	600	160-240	Hydrasleeve	10/3/2022	131.38	10/5/2022 9:50
26S/39E-17G02	Kerr McGee	35.67635	-117.80452	MW	881	681-881	Hydrasleeve	10/3/2022	210.1	10/5/2022 10:35
26S/39E-11E02	Sandquist Spa	35.68857	-117.75647	MW,C	191	135-191	Hydrasleeve	10/3/2022	136.51	10/5/2022 11:15
26S/39E-05K01	05K01(D)	35.69973	-117.80339	MW	605	565-585	Hydrasleeve	10/3/2022	129.39	10/5/2022 14:15
26S/40E-19N02	19N02	35.65413	-117.72147	MW	267	245-265	Hydrasleeve	10/3/2022	209	10/5/2022 14:50
26S/40E-22E01	26S/40E-22E01	35.66135	-117.66687	MW	651.5	531-631	Hydrasleeve	10/3/2022	98.87	10/5/2022 15:30
26S/40E-22E02	26S/40E-22E02	35.66132	-117.66633	MW	650	570-630	Hydrasleeve			10/5/2022 16:00

Well Type

MW: Monitoring Well
C: CASGEM Well
DOM: Domestic

Table 2 Water Quality Summary

Sample ID	State ID	Sample Date	Sample Depth (ft bgs)	Specific Conductance (EC) (µmhos/cm)	Total Filterable Residue/TDS (mg/L)	Calculated TDS/EC (multiplier)	Total Hardness (as $CaCO_3$) (mg/L)	Total Anions (meq/L)	Total Cations (meq/L)	% difference	Odor Threshold (TON)	Turbidity (NTU)	Total Alkalinity ($CaCO_3$) (mg/L)	Bicarbonate HCO_3 (mg/L)	Carbonate CO_3 (mg/L)	pH (Lab) (pH Units)
Maximum Contaminant Level (MCL)				*1,600*	*1,000*	*n/a*	*n/a*	*n/a*	*n/a*	*n/a*	*3*	*5*	*n/a*	*n/a*	*n/a*	*n/a*
14A01	25S/38E-14A	10/3/2022	*ubknown*	700	430	0.61	250	7.6	7.75	2.0	1	0.57	250	300	ND	7.7
34A01	25S/38E-34A01	10/3/2022	418.5-478.5	870	520	0.60	300	10	10	2.1	1	0.59	420	510	ND	7.2
AB303-04	27S/38E-09C01	10/4/2022	557-560	490	290	0.59	65	4.78	5.20	8.4	1	33	100	120	ND	8.0
AB303-01	27S/38E-13A02	10/4/2022	397-400	460	300	0.65	110	4.53	4.56	0.63	1	0.33	130	160	ND	7.7
AB303-06	27S/38E-15R01	10/4/2022	297-300	390	240	0.62	56	3.64	4.16	13	1	0.2	100	120	ND	8.0
AB303-05	27S/38E-21L01	10/4/2022	952-955	260	160	0.62	ND	2.78	2.7	3.1	1	0.44	120	150	ND	9.0
08A01	27S/39E-08A01	10/4/2022	572-575	410	260	0.63	100	3.95	3.92	0.88	1	0.48	110	140	ND	7.5
George Air Corridor	27S/40E-01K02	10/4/2022	247-250	1900	1000	0.53	150	17.3	16.2	6.3	1	0.24	120	140	ND	8.0
EP-1-S	27S/38E-32C01	10/5/2022	457-460	390	250	0.64	69	4.09	4.19	2.4	1	0.22	160	190	ND	7.5
AB303-03	27S/38E-10B02	10/5/2022	497-500	250	160	0.64	190	2.57	6.41	**85**	1	41	97	35	41	9.5
35B01	25S/38E-35B01	10/5/2022	247-250	880	510	0.58	160	9.88	9.5	3.9	1	31	370	450	ND	7.7
03B1	25S/38E-03B	10/5/2022	347-350	930	580	0.62	370	10.6	10.2	3.2	1	1.3	370	450	ND	7.0
25K1	26S/39E-25K01	10/5/2022	497-500	420	260	0.62	110	3.93	4.3	9	1	0.18	110	130	ND	7.8
01M05	26S/38E-01M05	10/5/2022	299-359	880	530	0.60	190	8.94	8.81	1.4	1	0.33	160	190	ND	7.6
Well G	26S/38E-01L01	10/5/2022	*ubknown*	850	520	0.61	170	8.89	8.24	7.6	1	0.2	160	200	ND	7.7
Baker Range	25S/39E-03R01	10/5/2022	97-100	960	610	0.64	260	10.6	10.8	2.1	1	0.17	310	380	ND	7.6
Charley Tower	25S/39E-12R01	10/5/2022	117-120	1100	690	0.63	190	12.30	11.6	5.7	1	1.6	310	380	ND	7.5
05L01(S)	26S/39E-05L01	10/5/2022	197-200	8000	5100	0.64	ND	114	105	8.6	1	0.31	4500	1700	1900	9.8
Kerr McGee	26S/39E-17G02	10/5/2022	697-700	260	170	0.65	18	3.53	2.72	**26**	1	2.7	160	140	26	8.6
Sandquist Spa	26S/39E-11E02	10/5/2022	157-160	580	340	0.59	190	5.98	5.98	0.056	1	ND	140	170	ND	7.7
05K01(D)	26S/39E-05K01	10/5/2022	572-575	31000	19000	0.61	ND	497	523	5.2	5	0.48	20000	6700	8900	9.9
19N02	26S/40E-19N02	10/5/2022	252-255	250	180	0.72	30	2.68	2.79	3.8	2	1.2	120	150	ND	7.4
22E01	26S/40E-22E01	10/5/2022	557-560	2600	1600	0.62	ND	33	28.6	14	3	1.6	1200	1200	140	8.7
22E02	26S/40E-22E02	10/5/2022	597-600	1800	1300	0.72	400	20.7	20.4	1.2	2	0.26	400	480	ND	7.6

n/a - Non applicable to dataset

ND - Analyte not detected at or above the reporting limit

J - Detected below the Reporting Limit; reported concentration is estimated

Table 2 Water Quality Summary

Sample ID	State ID	Sample Date	Sample Depth (ft bgs)	Chloride (mg/L)	Fluoride (mg/L)	Hydroxide (mg/L)	MBAS (LAS Mole. Wt 340.0) (mg/L)	Nitrate as N (mg/L)	Sulfate (mg/L)	Arsenic (µg/L)	Boron (µg/L)	Calcium (mg/L)	Copper (µg/L)	Iron (µg/L)	Magnesium (mg/L)	Manganese (µg/L)	Potassium (mg/L)	Sodium (mg/L)	Zinc (µg/L)
Maximum Contaminant Level (MCL)				*500*	*2*	*n/a*	*0.5*	*10*	*500*	*10*	*n/a*	*n/a*	*1,000*	*300*	*n/a*	*50*	*n/a*	*n/a*	*5,000*
14A01	25S/38E-14A	10/3/2022	*ubknown*	28	0.80	ND	0.048[J]	1.9	89	3.3	250	64	12[J]	200	21	ND	8.4	60	57
34A01	25S/38E-34A01	10/3/2022	418.5-478.5	14	0.61	ND	ND	0.39[J]	63	6.3	480	77	36[J]	21[J]	27	0.83[J]	6.6	84	59
AB303-04	27S/38E-09C01	10/4/2022	557-560	18	0.29	ND	ND	1.8	110	1.3[J]	120	21	8.4[J]	830	3	35	2.8	88	ND
AB303-01	27S/38E-13A02	10/4/2022	397-400	24	0.88	ND	ND	2.3	57	1.9[J]	270	37	ND	ND	4.9	ND	1.8	52	ND
AB303-06	27S/38E-15R01	10/4/2022	297-300	11	0.27	ND	0.054[J]	2.7	65	3.7	110	19	ND	ND	1.9	ND	2	69	ND
AB303-05	27S/38E-21L01	10/4/2022	952-955	2.6	0.40	ND	ND	0.13[J]	11	5.2	100	1.5	ND	ND	ND	2.8[J]	0.56[J]	60	ND
08A01	27S/39E-08A01	10/4/2022	572-575	24	0.81	ND	ND	1.7	45	2.4	330	32	ND	120	5.3	21	2.1	42	ND
George Air Corridor	27S/40E-01K02	10/4/2022	247-250	490	1.9	ND	0.053[J]	0.29[J]	51	44	2800	50	ND	44[J]	5.2	5.3	9.5	300	ND
EP-1-S	27S/38E-32C01	10/5/2022	457-460	15	0.64	ND	0.048[J]	0.74	25	4.8	280	22	ND	ND	3.1	9.8[J]	2.1	64	ND
AB303-03	27S/38E-10B02	10/5/2022	497-500	4.9	0.36	ND	ND	0.15[J]	23	13	110	76	9.1[J]	670	0.72[J]	300	1	58	ND
35B01	25S/38E-35B01	10/5/2022	247-250	44	0.57	ND	ND	0.14[J]	59	5.6	1100	44	ND	3600	13	180	5.3	140	ND
03B1	25S/38E-03B	10/5/2022	347-350	23	0.76	ND	ND	1.2	120	5.1	180	87	7.0[J]	ND	36	ND	7.1	63	ND
25K1	26S/39E-25K01	10/5/2022	497-500	29	0.45	ND	0.051[J]	3.0	46	4.7	250	34	ND	ND	4.8	ND	2.9	49	ND
01M05	26S/38E-01M05	10/5/2022	299-359	80	0.57	ND	ND	0.59	170	1.4[J]	700	57	15[J]	ND	13	1.1[J]	4.1	110	ND
Well G	26S/38E-01L01	10/5/2022	*ubknown*	80	0.42	ND	ND	0.30[J]	160	1.4[J]	820	49	ND	23[J]	11	0.99[J]	3.8	110	ND
Baker Range	25S/39E-03R01	10/5/2022	97-100	50	0.73	ND	0.049[J]	1.10	140	15	1400	45	7.6[J]	ND	36	ND	15	120	ND
Charley Tower	25S/39E-12R01	10/5/2022	117-120	110	0.77	ND	0.065[J]	0.29[J]	140	15	2900	37	ND	180	24	24	15	170	ND
05L01(S)	26S/39E-05L01	10/5/2022	197-200	760	6.2	ND	0.24	ND	75	5.7	89000	4.1[J]	ND	ND	ND	ND	15[J]	2400	ND
Kerr McGee	26S/39E-17G02	10/5/2022	697-700	6	2.60	ND	ND	ND	3	4.7	560	5.7	ND	310	0.94[J]	24	3.8	52	ND
Sandquist Spa	26S/39E-11E02	10/5/2022	157-160	62	0.55	ND	ND	1.9	68	1.7[J]	310	61	ND	ND	8.9	ND	2.7	49	ND
05K01(D)	26S/39E-05K01	10/5/2022	572-575	3200	ND	ND	0.85	0.15[J]	0.74	7.5	500000	ND	ND	ND	ND	ND	42[J]	12000	ND
19N02	26S/40E-19N02	10/5/2022	252-255	6.0	0.77	ND	0.070[J]	ND	0.72	1.7[J]	220	9.5	ND	14[J]	1.6	6.0[J]	8.8	45	ND
22E01	26S/40E-22E01	10/5/2022	557-560	280	7.1	ND	0.070[J]	0.15[J]	21	3.1	23000	3.0[J]	ND	ND	ND	9.4[J]	7.8[J]	650	ND
22E02	26S/40E-22E02	10/5/2022	597-600	19	3.8	ND	0.083[J]	ND	580	330	2300	70	8.8[J]	ND	54	24	29	270	ND

n/a - Non applicable to dataset

ND - Analyte not detected at or above the reporting limit

J - Detected below the Reporting Limit; reported concentration is estimated

Attachment I
IWV Model Configuration Item List

IWV-Model Configuration Item (CI) List

CI Request Number	CI Request Date	CI Summary	Importance Rank 1 (low) 5 (high)	Priority 1 (low) 5 (high)	Origin of CI (IWVGA, TAC, Navy, etc.)	Date Complete review order
1	10/27/22	Discussing changes to groundwater in storage and compare the model results to a Thiessen Polygon method.			TMG	TMG 12/15/22 Group discussion
2	1/19/23	Dr. Ryan Smith a. Discussion of how to approach AEM data analysis (SkyTEM Survey Data Report) b. Additional data to provide for AEM interpretation			TMG	TMG 2/14/23 Group discussion
3	3/23/23	DRI to present the first proposed GSP Model changes: a. Simulation period: October 1, 1920 through September 30, 2022. b. Stress period: annual stress period from October 1, 1920 to September 30, 1995; monthly stress period from October 1, 1995 to September 30, 2022. c. Six model layers d. Depth and thickness of each model layer based on Monasttero et al. (2002); Shah et al. (2018) and AEM data (2019) e. Hydraulic conductivity f. Pumping g. Recharge	5	5	TMG	TMG 8/17/23 Group discussion
4	5/24/23	Group meeting a. Seismic depth to basement analysis b. Clay plug analysis			TMG	TMG 5/24/23 Group discussion
5	6/14/23	Group meeting a. Depth to basement analysis b. Sedimentary thickness analysis			TMG	TMG 6/14/23 Group discussion
6	6/30/23	Group meeting a. Preliminary model layer delineation			TMG	TMG 6/30/23 Group discussion
7	7/21/23	a. Discussed methodology for discretizing model grid in basalt flow area below Rose Valley, and planned to delineate an aquifer property zone for the White Hills formation. b. DRI will continue work on model grid discretization using SkyTEM and well log data. DRI will complete the preliminary model discretization, define faults to be simulated, and analyze clay fraction in the clay plug to present at the next modeling group meeting.			TMG	TMG 7/21/23 Group discussion
8	9/25/23	Steve Bacon, September 25, 2023. Development of a Tectonic Block Model in Support of the Hydrogeology Conceptual Framework of IWV (2025 GSP Update)	5	5	TMG	TMG 9/25/23 Plan outside AEM review

Attachment J

WY 2023 Precipitation and Stream Gage Data

DRAFT MEMORANDUM

785 Grand Avenue, Suite 202 • Carlsbad, California • 94901
TEL: (760) 730-0701 FAX: (415) 457-1638 e-mail: stever@stetsonengineers.com

TO:	File	DATE:	November 22, 2023
FROM:	Stetson Engineers Inc.	JOB NO:	2652
RE:	Chimney Peak Weather Station – Annual Report of Precipitation, Water Year 2023		

This memorandum serves as an annual summary of station operation and reporting of approved data records associated with the Chimney Peak Weather Station. IWVGA operation of this station is done under legal agreement with the Bureau of Land Management to occupy and operate the station inside of the BLM Chimney Peak Fire Station property boundary.

SUMMARY OF STATION OPERATIONS AND DATA – WY 2023

During WY 2023, three site visits were made to conduct maintenance of the station, October 2022, March 2023, and September 2023. During the March 2023 site visit significant snow accumulation prevented visiting the site, however a visual inspection from outside the fire station was possible to determine that no adverse impacts had occurred as a result of snow accumulation. The September visit further verified that the station had operated without issue throughout the year.

Over the course of the water year 22.19 inches of precipitation was recorded at this station. Total precipitation may have been greater than this as much of the winter time precipitation was as snowfall. Tipping bucket rain gages as are employed at many of the weather station in the area will experience inefficiencies in capturing of precipitation as snowfall due to the design. The following graph shows the accumulated precipitation for Water Year 2023.

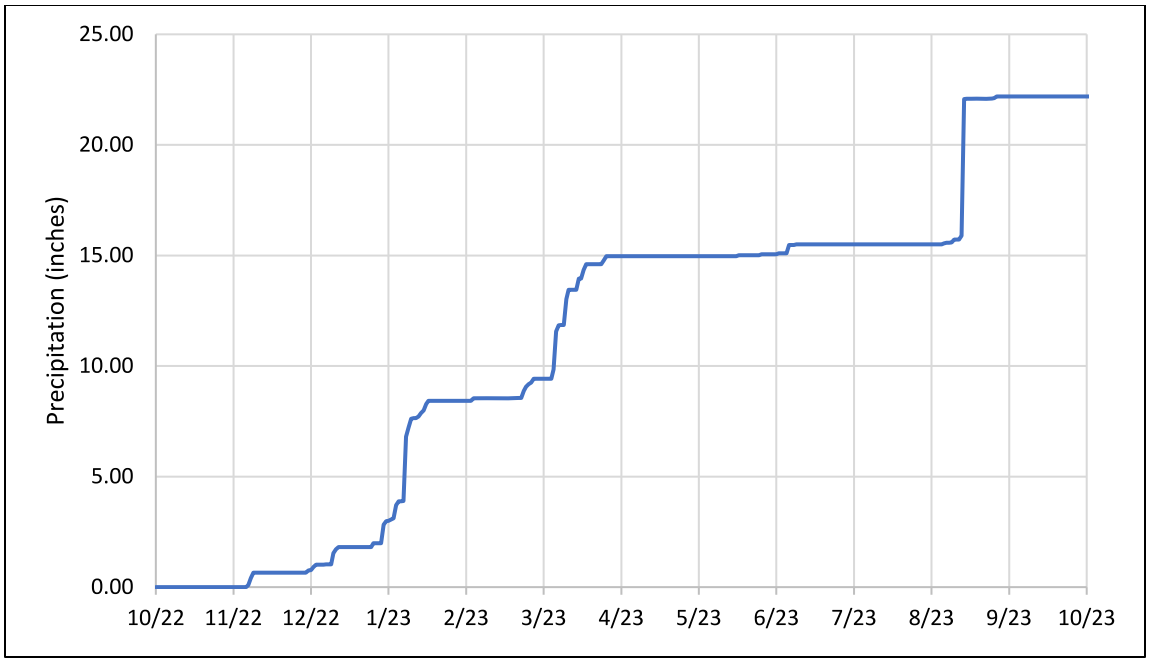


FIGURE 1. CUMULATIVE PRECIPITATION AT CHIMNEY PEAK WEATHER STATION WATER YEAR 2023

The following tables summarize the daily recorded precipitation totals, December 2020 through October 2023, by Water Year. Other parameter data is available on the IWVGSP.com website.

Daily Precipitation Data
Chimney Peak Fire Station, Water Year 2021

Water year	2021
Station Name	Chimney Peak Fire Station
Operating Agency	IWVGA Agent - Stetson Engineers Inc.
Latitude	35°52'08.5" N
Longitude	118°00'42.6" W

	Daily Precipitation (inches)											
	2020			2021								
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	---	---	0	0	0	0	0	0	0	0	0
2	---	---	---	0	0	0	0	0	0	0	0	0
3	---	---	---	0	0	0	0	0	0	0	0	0
4	---	---	---	0	0	0	0	0	0	0	0	0
5	---	---	---	0	0	0	0	0	0	0	0	0
6	---	---	---	0	0	0	0	0	0	0	0	0
7	---	---	---	0	0	0	0	0	0	0	0	0
8	---	---	---	0	0	0	0	0	0	0	0	0
9	---	---	---	0	0	0	0	0	0	0	0	0
10	---	---	---	0	0	0.05	0	0	0	0	0	0.27
11	---	---	---	0	0	0	0	0	0	0.25	0	0
12	---	---	---	0	0.16	0.03	0	0	0	0.13	0	0
13	---	---	---	0	0	0	0	0	0	0.01	0	0
14	---	---	***0.03***	0	0	0	0	0	0	0	0	0
15	---	---	0	0	0	0.01	0	0	0	0	0	0
16	---	---	0	0	0	0	0	0.01	0	0	0	0
17	---	---	0	0	0	0	0	0	0	0	0	0
18	---	---	0	0	0	0	0	0	0.02	0.01	0	0
19	---	---	0	0	0	0	0	0	0	0.18	0	0
20	---	---	0	0	0	0.01	0	0	0	0	0	0
21	---	---	0	0	0	0	0	0	0	0	0	0
22	---	---	0	0	0	0	0.08	0	0	0	0	0
23	---	---	0	0.12	0	0.01	0.01	0	0	0	0	0
24	---	---	0	0	0	0	0	0	0	0	0	0
25	---	---	0	0	0	0	0	0	0	0	0	0
26	---	---	0	0	0	0	0	0	0	0.19	0	0
27	---	---	0.14	0.01	0	0	0	0	0	0	0	0
28	---	---	0.24	0.22	0	0	0	0	0	0	0	0
29	---	---	0.03	0.26		0	0	0	0	0	0	0
30	---	---	0	0.01		0	0	0	0	0	0	0
31	---		0	0		0		0		0.06	0	
Mean	---	---	***0.02***	0.02	0.01	0.00	0.00	0.00	0.00	0.03	0.00	0.01
Max	---	---	***0.24***	0.26	0.16	0.05	0.08	0.01	0.02	0.25	0.00	0.27
Min	---	---	***0.00***	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	---	---	***0.44***	0.62	0.16	0.11	0.09	0.01	0.02	0.83	0.00	0.27

Data Source: IWVGA, Stetson Engineers Inc. Data Management System; via NOAA DCS, DCP - BE100E74

Bold-Italicized data values represent values based on incomplete data sets.

Daily Precipitation Data
Chimney Peak Fire Station, Water Year 2022

Water year	2022
Station Name	Chimney Peak Fire Station
Operating Agency	IWVGA Agent - Stetson Engineers Inc.
Latitude	35°52'08.5" N
Longitude	118°00'42.6" W

	Daily Precipitation (inches)											
	2021			2022								
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0	0	0	0.03	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0.05
4	0	0	0	0	0	0	0	0	0	0	0.03	0
5	0	0	0	0	0	0	0	0	0	0	0.38	0
6	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0.01	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0.51
11	0	0	0	0	0	0	0	0	0	0	0	0.08
12	0	0	0	0	0	0	0	0	0	0	0	0.55
13	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0.31	0	0.01	0	0	0	0	0	0	0
16	0	0	0.52	0	0	0	0	0	0	0	0	0
17	0	0	0.03	0	0	0	0	0	0	0.01	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0
22	0	0	0.15	0	0	0	0	0	0.42	0	0	0
23	0	0	2.11	0	0	0	0	0	0	0	0	0
24	0	0	0.04	0	0.12	0	0	0	0	0	0	0
25	0.35	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0.06	0	0	0	0	0	0	0	0	0
27	0	0	0.01	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0.09	0	0	0	0	0	0
29	0	0	0.06	0		0.01	0	0	0	0.08	0	0
30	0	0	0.58	0		0	0	0	0	0.27	0	0
31	0		0.07	0		0		0		1.09	0	
Mean	0.01	0.00	0.13	0.00	0.00	0.00	0.00	0.00	0.01	0.05	0.01	0.04
Max	0.35	0.00	2.11	0.03	0.12	0.09	0.00	0.00	0.42	1.09	0.38	0.55
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
Total	0.35	0.00	3.95	0.03	0.13	0.10	0.00	0.00	0.42	1.45	0.41	1.19

Data Source: IWVGA, Stetson Engineers Inc. Data Management System; via NOAA DCS, DCP - BE100E74

Bold-Italicized data values represent values based on incomplete data sets.

Daily Precipitation Data
Chimney Peak Fire Station, Water Year 2023

Water year	2023
Station Name	Chimney Peak Fire Station
Operating Agency	IWVGA Agent - Stetson Engineers Inc.
Latitude	35°52'08.5" N
Longitude	118°00'42.6" W

	Daily Precipitation (inches)											
	2022			2023								
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0	0	0.1	0.16	0	0.17	0	0	0	0	0	0.04
2	0	0	0.01	0.01	0	0	0	0	0	0	0	0.07
3	0	0	0.14	0.06	0	0	0	0	0	0	0	0
4	0	0	0.11	0.06	0	0	0	0.01	0	0	0	0
5	0	0	0	0.59	0.11	0	0	0	0	0	0	0
6	0	0	0	0.17	0	0	0	0	0	0	0	0
7	0	0.09	0	0	0	0	0	0	0.03	0	0	0
8	0	0.32	0.01	0.02	0	0	0	0	0	0	0	0
9	0	0.25	0	2.9	0	0.43	0	0	0	0	0	0
10	0	0	0	0.43	0	1.72	0	0	0	0	0	0
11	0	0	0.51	0.39	0	0.27	0	0	0.38	0	0	0
12	0	0	0.17	0.02	0	0.01	0	0	0.01	0	0.04	0
13	0	0	0.1	0	0	0	0	0	0	0	0.03	0
14	0	0	0	0.08	0	1.17	0	0	0.02	0	0	0
15	0	0	0	0.15	0	0.42	0	0	0	0	0.02	0
16	0	0	0	0.12	0	0	0	0	0	0	0.13	0
17	0	0	0	0.29	0	0	0	0	0	0	0	0
18	0	0	0	0.15	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0.51	0	0	0	0	0.17	0
20	0	0	0	0	0	0	0	0	0	0	6.18	0
21	0	0	0	0	0	0.39	0	0	0	0	0.01	0
22	0	0	0	0	0	0.26	0	0.04	0	0	0	0
23	0	0	0	0	0.02	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0.32	0.01	0	0	0	0	0	0
26	0	0	0	0	0.18	0	0	0	0	0	0	0
27	0	0	0.17	0	0.12	0	0	0	0	0	0	0
28	0	0	0	0	0.07	0	0	0	0	0	0	0
29	0	0	0	0		0.17	0	0	0	0	0	0
30	0	0	0.01	0		0.18	0	0	0	0	0	0
31	0		0.84	0		0		0.05		0	0	
Mean	0.00	0.02	0.07	0.18	0.03	0.18	0.00	0.00	0.01	0.00	0.21	0.00
Max	0.00	0.32	0.84	2.90	0.32	1.72	0.00	0.05	0.38	0.00	6.18	0.07
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
Total	0.00	0.66	2.17	5.60	0.82	5.71	0.00	0.10	0.44	0.00	6.58	0.11

Data Source: IWVGA, Stetson Engineers Inc. Data Management System; via NOAA DCS, DCP - BE100E74

Bold-Italicized data values represent values based on incomplete data sets.

CHIMNEY PEAK PRECIPITATION STATION OVERVIEW

Stetson Engineers (Stetson) as acting agent for IWVGA, established this weather station December 2020, with the purpose of collecting regional precipitation data in an area where precipitation data collection has been missing. On December 14th, 2020, Stetson completed the installation of the Chimney Peak Precipitation Station at the Chimney Peak Bureau of Land Management (BLM) Fire Station. The installation was approved and permitted by the BLM with Communications Lease Agreement CACA 058717 and Categorical Exclusion Documentation DOI-BLM-CA-C060-2020-0015-CX. The station was installed inside the Chimney Peak BLM Fire Station facility, in the proposed location, at coordinate position, 35.86902, -118.01185.

The installation is comprised of components to measure and record precipitation, air temperature, and relative humidity measurements, and transmit this data through the NOAA GOES Data Collection System (DCS). The monitoring and telemetry equipment consist of the following listed component parts:

FTS Equipment List:

FTS Serial Number	Manufacture Serial Number	Model Number	Description
NA	NA	GPS-ANTENNA-WP	GPS Antenna
080028	52015405	1032-018	GOES Antenna EON2 Kit2, 401MHz, 6.0dBic
NA	NA	NA	EON2 Amiable Mount
NA	NA	20180	SMA Male to N Female Adapter
NA	NA	20514	Cable, N-Type Bulkhead to SMA M, 10”
118428	NA	LT1-GOES	LT1 Logger/Transceiver 1 GOES
119783	870470.008	21032	Lambrecht Temperature / Humidity Sensor
118802	NA	RG-T-FL	Rain Gage, Pedestal mount, 20 ft armored cable
118884	TS200528030	WS20G6M	20 Watt Solar Panel; SPS-20W-ASC
118884	NA	NA	ASC Battery Charge Regulator, Specialty Concepts, Inc.
NA	NA	12841-3	Charge Regulator to Battery Cable Assembly; MTL 2020-05-06
12220	NA	IT45-12-H	Battery – 12 Volt / 45 Ah
NA	NA	CBL-UC-JB-PWR	Battery to Terminal Cable Assembly; MTL 2020-06-15
1197784	NA	SDI-THPS-LB	Temperature/Humidity Sensor Radiation Shield
NA	NA	WP-ENCL-MINI	Weatherproof Equipment Enclosure, Mini Size
20385	CM106B	Tripod	7-10 ft Tripod with Grounding Kit

Photograph of Installation:

FIGURE 2. CHIMNEY PEAK WEATHER STATION FACING SOUTH-WEST

FIGURE 3. CHIMNEY PEAK WEATHER STATION, FACING SOUTH-WEST

Measurement & Telemetry Programming:

The datalogger / GOES transmitter (LT1) are programmed with the following NOAA DCS settings for data transmission through the NOAA GOES DCS.

Data Collection Platform:	BE100E74
Measurement Interval:	15 minutes
Transmission interval:	One hour
Transmission Offset:	34 minutes, 10 seconds
Parameter Encoding:	SHEF
Measurement Parameters:	VB – Battery Voltage; Volts
	PC – Accumulated Precipitation; Inches
	TA – Instantaneous Air Temperature, Celsius
	RH – Instantaneous Relative Humidity; Percent
	DP – Instantaneous Dew Point; Celsius
	BP – Instantaneous Barometric Pressure; Hectopascal

Stetson has implemented a data retrieval program to collect all environmental monitoring data for the Indian Wells Valley regions, transmitted through NOAA GOES DCS, including this Chimney Peak Precipitation Station. This data is collected and hosted on Indian Wells Valley Groundwater Sustainability Plan website, IWVGSP.com.

DRAFT MEMORANDUM

785 Grand Avenue, Suite 202 • Carlsbad, California • 94901
TEL: (760) 730-0701 FAX: (415) 457-1638 e-mail: stever@stetsonengineers.com

TO:	File	DATE:	November 22, 2023
FROM:	Stetson Engineers Inc.	JOB NO:	2652
RE:	Walker Pass East Weather Station – Annual Report of Precipitation, Water Year 2023		

This memorandum serves as an annual summary of station operation and reporting of approved data records associated with the Walker Pass East Weather Station. IWVGA operation of this station is done under legal agreement with the Bureau of Land Management to occupy and operate the precipitation and telemetry equipment installed on the defunct Walker Pass East BLM RAWS weather station structure.

SUMMARY OF STATION OPERATIONS AND DATA – WY 2023

During WY 2023, in November 2022, this station was inadvertently demobilized by the Bureau of Land Management Southwest RAWS Field Group located in Phoenix Arizona. Subsequently the station equipment was stolen from the Arizona BLM equipment yard. As a result of this data for WY 2023 ends on November 9th, 2022. This loss of equipment and station operation was reported to the IWVGA Board once observed. This station has not been restored.

The following tables summarize the daily recorded precipitation totals, August 2020 through November 2022, by Water Year.

Daily Precipitation Data
Walker Pass East, Water Year 2020

Water year	2020
Station Name	Walker Pass East
Operating Agency	IWVGA Agent - Stetson Engineers Inc.
Latitude	35°39'45.4" N
Longitude	118°01'31.7" W

	Daily Precipitation (inches)											
	2019			2020								
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	---	---	---	---	---	---	---	---	---	---	0
2	---	---	---	---	---	---	---	---	---	---	---	0
3	---	---	---	---	---	---	---	---	---	---	---	0
4	---	---	---	---	---	---	---	---	---	---	---	0
5	---	---	---	---	---	---	---	---	---	---	---	0
6	---	---	---	---	---	---	---	---	---	---	---	0
7	---	---	---	---	---	---	---	---	---	---	---	0
8	---	---	---	---	---	---	---	---	---	---	---	0
9	---	---	---	---	---	---	---	---	---	---	---	0
10	---	---	---	---	---	---	---	---	---	---	---	0
11	---	---	---	---	---	---	---	---	---	---	---	0
12	---	---	---	---	---	---	---	---	---	---	---	0
13	---	---	---	---	---	---	---	---	---	---	---	0
14	---	---	---	---	---	---	---	---	---	---	---	0
15	---	---	---	---	---	---	---	---	---	---	---	0
16	---	---	---	---	---	---	---	---	---	---	---	0
17	---	---	---	---	---	---	---	---	---	---	---	0
18	---	---	---	---	---	---	---	---	---	---	---	0
19	---	---	---	---	---	---	---	---	---	---	---	0
20	---	---	---	---	---	---	---	---	---	---	---	0
21	---	---	---	---	---	---	---	---	---	---	---	0
22	---	---	---	---	---	---	---	---	---	---	---	0
23	---	---	---	---	---	---	---	---	---	---	---	0
24	---	---	---	---	---	---	---	---	---	---	---	0
25	---	---	---	---	---	---	---	---	---	---	---	0
26	---	---	---	---	---	---	---	---	---	---	0	0
27	---	---	---	---	---	---	---	---	---	---	0	0
28	---	---	---	---	---	---	---	---	---	---	0	0
29	---	---	---	---	---	---	---	---	---	---	0	0
30	---	---	---	---	---	---	---	---	---	---	0	0
31	---		---	---		---		---		---	0	
Mean	---	---	---	---	---	---	---	---	---	---	---	0.00
Max	---	---	---	---	---	---	---	---	---	---	---	0.00
Min	---	---	---	---	---	---	---	---	---	---	---	0.00
Total	---	---	---	---	---	---	---	---	---	---	---	0.00

Data Source: IWVGA, Stetson Engineers Inc. Data Management System; via In-Situ HydroVu data platform

Daily Precipitation Data
Walker Pass East, Water Year 2021

Water year	2021
Station Name	Walker Pass East
Operating Agency	IWVGA Agent - Stetson Engineers Inc.
Latitude	35°39'45.4" N
Longitude	118°01'31.7" W

	Daily Precipitation (inches)											
	2020			2021								
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0.12	0	0	0	0	0	0	0	0	0
8	0	0	0.06	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0.02	0	0	0	0	0
10	0	0	0	0	0	0	0.04	0	0	0	0	0
11	0	0	0	0	0	0	0.03	0	0	0	0	0
12	0	0	0	0	0	0	0.01	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0.16	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0.06	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0.06	0
18	0	0	0	0	0.01	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0.04	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0.12	0	0	0	0	0	0	0
23	0	0	0	0	0.04	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0.02	0
26	0	0	0	0.16	0.05	0	0	0	0	0	0	0
27	0	0	0	0.16	0.02	0	0	0	0	0	0	0
28	0	0	0	0	0.35	0	0	0	0	0	0	0
29	0	0	0	0		0	0	0	0	0	0.06	0
30	0	0	0	0		0	0	0	0	0	0.35	0
31	0		0	0		0		0		0	0	
Mean	0.00	0.00	0.01	0.01	0.02	0.01	0.00	0.00	0.00	0.00	0.02	0.00
Max	0.00	0.00	0.12	0.16	0.35	0.16	0.04	0.00	0.00	0.00	0.35	0.00
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
Total	0.00	0.00	0.18	0.38	0.59	0.16	0.14	0.00	0.00	0.00	0.49	0.00

Data Source: IWVGA, Stetson Engineers Inc. Data Management System; via In-Situ HydroVu data platform

Daily Precipitation Data
Walker Pass East, Water Year 2022

Water year	2022
Station Name	Walker Pass East
Operating Agency	IWVGA Agent - Stetson Engineers Inc.
Latitude	35°39'45.4" N
Longitude	118°01'31.7" W

	Daily Precipitation (inches)											
	2021			2022								
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0	0	0	0.01	0	0	0	0	0	0	0.21	0
2	0	0	0	0	0	0	0	0	0	0	1.11	0
3	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0.01	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0.7	0
6	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0.02	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0.06	0	0	0	0	0	0	0	0	0
11	0	0	0.01	0	0	0	0	0	0	0	0	0.01
12	0	0	0	0	0	0	0	0	0	0	0	0.01
13	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0.02	0	0	0	0	0	0	0	0	0
15	0	0	0.4	0	0	0	0	0	0	0	0	0
16	0	0	0.03	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0
22	0	0	0.06	0	0.01	0	0.08	0	0.68	0	0	0
23	0	0	1.63	0	0	0	0	0	0.08	0	0	0
24	0	0	0.38	0	0	0	0	0	0	0	0	0
25	0.35	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0.06	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0.15	0	0	0	0	0	0
29	0	0	0.1	0		0	0	0	0	0	0	0
30	0	0	0.55	0		0	0	0	0	0.38	0	0
31	0		0	0		0		0		1.08	0	
Mean	0.01	0.00	0.11	0.00	0.00	0.01	0.00	0.00	0.03	0.05	0.07	0.00
Max	0.35	0.02	1.63	0.01	0.01	0.15	0.08	0.00	0.68	1.08	1.11	0.01
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
Total	0.35	0.02	3.30	0.01	0.01	0.16	0.08	0.00	0.76	1.46	2.02	0.02

Data Source: IWVGA, Stetson Engineers Inc. Data Management System; via In-Situ HydroVu data platform

Daily Precipitation Data
Walker Pass East, Water Year 2023

Water year	2023
Station Name	Walker Pass East
Operating Agency	IWVGA Agent - Stetson Engineers Inc.
Latitude	35°39'45.4" N
Longitude	118°01'31.7" W

	Daily Precipitation (inches)											
	2022			2023								
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0	0.024	---	---	---	---	---	---	---	---	---	---
2	0	0.157	---	---	---	---	---	---	---	---	---	---
3	0	0	---	---	---	---	---	---	---	---	---	---
4	0	0	---	---	---	---	---	---	---	---	---	---
5	0	0	---	---	---	---	---	---	---	---	---	---
6	0	0	---	---	---	---	---	---	---	---	---	---
7	0	0.134	---	---	---	---	---	---	---	---	---	---
8	0	0	---	---	---	---	---	---	---	---	---	---
9	0	***0.094***	---	---	---	---	---	---	---	---	---	---
10	0	---	---	---	---	---	---	---	---	---	---	---
11	0	---	---	---	---	---	---	---	---	---	---	---
12	0	---	---	---	---	---	---	---	---	---	---	---
13	0	---	---	---	---	---	---	---	---	---	---	---
14	0	---	---	---	---	---	---	---	---	---	---	---
15	0	---	---	---	---	---	---	---	---	---	---	---
16	0	---	---	---	---	---	---	---	---	---	---	---
17	0	---	---	---	---	---	---	---	---	---	---	---
18	0	---	---	---	---	---	---	---	---	---	---	---
19	0	---	---	---	---	---	---	---	---	---	---	---
20	0	---	---	---	---	---	---	---	---	---	---	---
21	0	---	---	---	---	---	---	---	---	---	---	---
22	0	---	---	---	---	---	---	---	---	---	---	---
23	0	---	---	---	---	---	---	---	---	---	---	---
24	0	---	---	---	---	---	---	---	---	---	---	---
25	0	---	---	---	---	---	---	---	---	---	---	---
26	0	---	---	---	---	---	---	---	---	---	---	---
27	0	---	---	---	---	---	---	---	---	---	---	---
28	0	---	---	---	---	---	---	---	---	---	---	---
29	0	---	---	---		---	---	---	---	---	---	---
30	0	---	---	---		---	---	---	---	---	---	---
31	0		---	---		---		---		---	---	
Mean	0.00	---	---	---	---	---	---	---	---	---	---	---
Max	0.00	---	---	---	---	---	---	---	---	---	---	---
Min	0.00	---	---	---	---	---	---	---	---	---	---	---
Total	0.00	***0.41***	---	---	---	---	---	---	---	---	---	---

Data Source: IWVGA, Stetson Engineers Inc. Data Management System; via In-Situ HydroVu data platform

WALKER PASS EAST PRECIPITATION STATION OVERVIEW

Stetson Engineers (Stetson) as acting agent for IWVGA, re-established precipitation monitoring at the defunct BLM Walker Pass East RAWS station. The existing RAWS weather station had become obsolete and is no longer operable when the NOAA DCP platform expired. The installation was approved and permitted by the BLM with Lease Agreement CACA 058727 and Categorical Exclusion Documentation DOI-BLM-CA-D050-2020-0008-CX. Stetson installed a new tipping bucket rain gage and data telemetry system retrofitted to the existing in place RAWS tripod structure, at coordinate position, 35.66261, -118.02548. The monitoring and telemetry equipment consist of the following listed component parts:

Equipment List:

Part Number	Description
HSA: TB4/0.01/T	Tipping bucket rain gauge, 0.2 mm resolution, dual reed switch outputs, measurement range 0-700mm/hr
In Situ: ISR-0000000-VL	VuLink Cellular Telemetry, 4G LTE, Antenna, GPS, 1.5-3.6V Li-MnO2 Battery, built in barometric sensor; HTTPS, FTP, SFTP, SMS, CSV file format

Photograph of Installation:

FIGURE 1.TIPPING BUCKET RAIN GAUGE INSTALLATION AT WALKER PASS EAST RAWS

Measurement & Telemetry Programming:

The datalogger and telemetry device is programmed to record observed rainfall in increments of 0.2 millimeters, with counting interval of 15 minutes. Using the software provided by In-Situ, the telemetry device was programmed to retrieve recorded water level readings from the Level TROLL 400 sensor every 15 minutes. The 15-minute time interval is based on the USGS stream gage standard. Additionally, the telemetry device was programmed to upload the 15-minute readings to In-Situ's FTP server every 24 hours, or 96 readings. The data is then collected from the In-Situ server and hosted on Indian Wells Valley Groundwater Sustainability Plan website, IWVGSP.com.

DRAFT MEMORANDUM

785 Grand Avenue, Suite 202 • Carlsbad, California • 94901
TEL: (760) 730-0701 FAX: (415) 457-1638 e-mail: stever@stetsonengineers.com

TO:	File	DATE:	December 12, 2023
FROM:	Stetson Engineers Inc.	JOB NO:	2652
RE:	Grapevine Canyon Stream Gaging Station – Annual Report of Stream Flows, Water Year 2023		

This memorandum serves as an annual summary of station operation and reporting of approved data records associated with this monitoring station for Water Year (WY) 2023, October 2022 through September 2023. Due to issues with flooding, calculation of rated flows was only possible for a portion of the year. However due to the significance and magnitude of the runoff this year, estimates of flow have been made based on the correlation with the Sand Canyon Gage. With these estimates, the estimated total flow for WY2023 was 1,625 acre-feet. Figure 1 shows the annual streamflow measured at Grapevine Canyon over the period of record of operation.

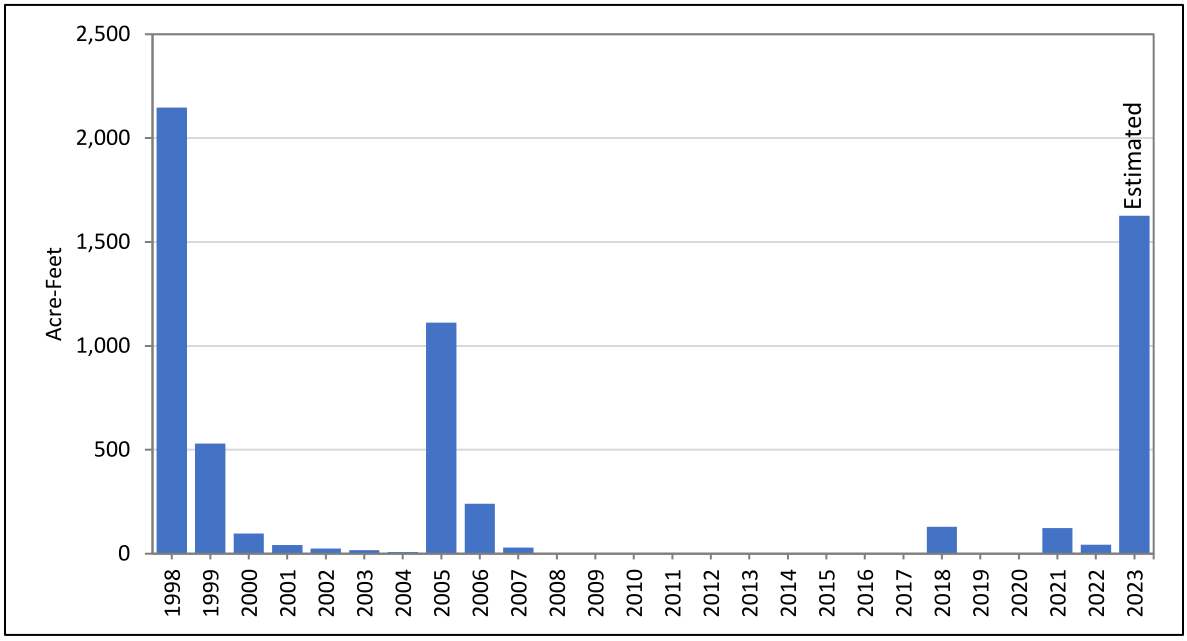


FIGURE 1. GRAPEVINE CANYON ANNUAL FLOW – PERIOD OF RECORD

SUMMARY OF GAGE OPERATIONS AND DATA – WY 2023

During WY 2023, three storm events, in March and August, resulted in significant flows in Grapevine Canyon exceeding the rating of the stream gage and overtopping the channel road crossing on which the station is located. These events resulted in damage to the property of the landowner on which the gage is located. During the flow events the gage weir plates were removed by the property owner to prevent obstruction of culvert structures and allow for maximum flow through the culverts. Stetson, in agreement with the property owner, decided to not pursue maintaining the weir plates in the channel out of an abundance of caution of future flood events causing property damage. At this time the creek channel at the gaging site has no gage equipment in place which would lead to channel obstruction. Monitoring of the stream gage height has continued. Figure 2 is a photograph of the gage location taken by the landowner during the event on March 15th.

FIGURE 2. GRAPEVINE CANYON GAGE STATION – MARCH 15, 2023, FLOW EVENT

The result of these weir operations, as well as the exceedance of the gage rating, is that calculating rated flow for this gage is not possible for WY 2023. This will remain the case until a new rating method is established for this gage location. After initial assessment of the gage location without the weir plates, suggest that developing a rating for this location with open channel flows will be challenging. 1) At the time of inspection, September 2023, significant sediment load was present actively traveling through the culvert creating a dynamic partial obstruction to the channel. 2) The intake pipe of for the stilling well in the channel is located at an elevation partially above the invert elevation of the culverts. During low flows there is potential that water stage height will not be translated from the channel to the stilling well.

In WY 2023 total annual streamflow could not be fully calculated due to the limitations on operations stated above. However, because of the significance of the events of the year, estimated flows have been calculated based on a flow correlation between Grapevine and Sad Canyon gage stations. Figure 3 shows the total monthly flows for WY 2023 with estimated values indicated.

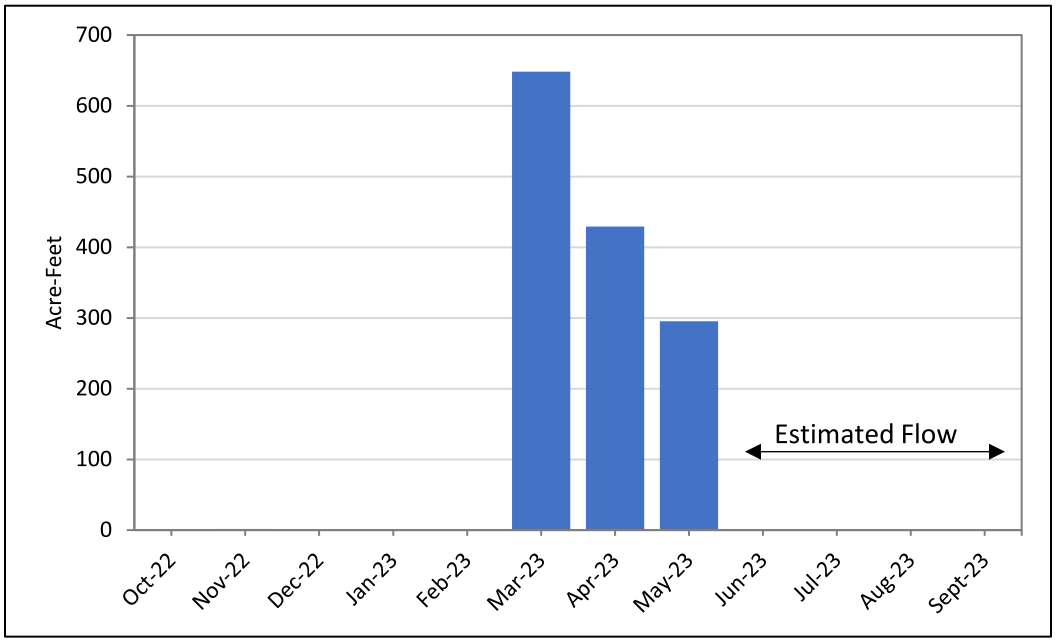


FIGURE 3. GRAPEVINE CANYON MONTHLY FLOW – WATER YEAR 2023

The following tables are provided to serve as reporting of approved daily values of data collected at the Grapevine Canyon gaging station. The tables reflect daily average stream flow rate in cubic feet per second, and total daily flows in acre-feet, by water year. Flows estimated based on Sand Canyon data are not included.

Daily Streamflow Data, Flow Rate
Grapevine Canyon, Water Year 2023

Water year	2023
Station Name	Grapevine Canyon
Operating Agency	IWVGA Agent - Stetson Engineers Inc.
Latitude	35°43'59.4"N
Longitude	117°55'00.4"N

	Daily streamflow (cfs)											
	2022			2023								
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0.02	0.01	0.03	0.01	0.00	0.02	5.72	8.05	---	---	---	---
2	0.02	0.02	0.03	0.01	0.00	0.01	5.65	8.05	---	---	---	---
3	0.01	0.02	0.02	0.01	0.00	0.01	5.69	7.68	---	---	---	---
4	0.02	0.03	0.02	0.01	0.00	0.01	5.47	7.24	---	---	---	---
5	0.01	0.03	0.03	0.01	0.00	0.01	5.29	6.98	---	---	---	---
6	0.01	0.02	0.02	0.01	0.00	0.01	5.19	6.70	---	---	---	---
7	0.01	0.02	0.01	0.01	0.00	0.01	4.97	6.32	---	---	---	---
8	0.01	0.03	0.01	0.01	0.00	0.01	4.95	6.01	---	---	---	---
9	0.01	0.02	0.01	0.02	0.00	0.01	5.15	5.82	---	---	---	---
10	0.01	0.02	0.01	0.02	0.00	0.05	5.47	5.57	---	---	---	---
11	0.01	0.02	0.02	0.01	0.00	**44.99**	6.06	5.38	---	---	---	---
12	0.01	0.02	0.02	0.01	0.00	**27.78**	8.06	5.10	---	---	---	---
13	0.01	0.02	0.02	0.01	0.00	9.42	9.13	4.89	---	---	---	---
14	0.01	0.02	0.02	0.01	0.00	**11.49**	7.81	4.77	---	---	---	---
15	0.01	0.02	0.02	0.02	0.00	**49.54**	7.10	4.61	---	---	---	---
16	0.02	0.02	0.02	0.01	0.00	**38.28**	7.11	4.52	---	---	---	---
17	0.01	0.02	0.02	0.01	0.00	**20.93**	7.93	4.38	---	---	---	---
18	0.01	0.03	0.02	0.01	0.00	15.18	8.53	4.26	---	---	---	---
19	0.01	0.03	0.02	0.01	0.00	14.58	8.17	4.07	---	---	---	---
20	0.01	0.03	0.01	0.01	0.00	11.07	7.92	3.87	---	---	---	---
21	0.01	0.03	0.01	0.01	0.00	10.78	8.24	3.87	---	---	---	---
22	0.01	0.03	0.01	0.01	0.00	9.66	8.32	3.78	---	---	---	---
23	0.01	0.03	0.01	0.01	0.00	8.73	8.48	3.77	---	---	---	---
24	0.02	0.04	0.01	0.01	0.02	8.02	9.50	3.65	---	---	---	---
25	0.01	0.04	0.01	0.01	0.03	7.55	9.48	3.64	---	---	---	---
26	0.01	0.04	0.01	0.01	0.02	7.09	8.95	3.53	---	---	---	---
27	0.01	0.04	0.01	0.01	0.02	6.61	8.22	3.40	---	---	---	---
28	0.02	0.03	0.01	0.01	0.02	6.44	7.96	***3.24***	---	---	---	---
29	0.01	0.03	0.01	0.01		6.44	8.01	---	---	---	---	---
30	0.01	0.03	0.01	0.00		6.16	7.87	---	---	---	---	---
31	0.01		0.01	0.00		5.84		---		---	---	
Mean (cfs)	0.01	0.03	0.02	0.01	0.00	10.54	7.21	***5.11***	---	---	---	---
Max (cfs)	0.02	0.04	0.03	0.02	0.03	49.54	9.50	***8.05***	---	---	---	---
Min (cfs)	0.01	0.01	0.01	0.00	0.00	0.01	4.95	***3.24***	---	---	---	---
Total (ac-ft)	1	2	1	1	0	648	429	***284***	---	---	---	---

Data Source: IWVGA, Stetson Engineers Inc. Data Management System; via NOAA DCS, DCP - BE1000A6

Bold underlined - Values are estimates due to flow exceedance of the stream gage rating table

Italicized - Values are based on incomplete data records

Daily Streamflow Data, Total Flow Volume
Grapevine Canyon, Water Year 2023

Water year	2023
Station Name	Grapevine Canyon
Operating Agency	IWVGA Agent - Stetson Engineers Inc.
Latitude	35°43'59.4"N
Longitude	117°55'00.4"N

	Daily streamflow (AF)											
	2022			2023								
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0.03	0.03	0.06	0.02	0.01	0.03	11.35	15.97	---	---	---	---
2	0.03	0.04	0.05	0.02	0.01	0.02	11.21	15.97	---	---	---	---
3	0.02	0.05	0.05	0.02	0.01	0.01	11.28	15.24	---	---	---	---
4	0.03	0.05	0.04	0.02	0.00	0.02	10.86	14.36	---	---	---	---
5	0.03	0.06	0.05	0.02	0.00	0.02	10.49	13.84	---	---	---	---
6	0.02	0.04	0.04	0.02	0.00	0.02	10.30	13.29	---	---	---	---
7	0.02	0.04	0.02	0.02	0.00	0.02	9.85	12.53	---	---	---	---
8	0.03	0.06	0.02	0.02	0.00	0.02	9.82	11.93	---	---	---	---
9	0.03	0.04	0.02	0.03	0.00	0.02	10.22	11.54	---	---	---	---
10	0.02	0.04	0.02	0.03	0.00	0.09	10.85	11.04	---	---	---	---
11	0.02	0.04	0.04	0.02	0.00	**89.24**	12.02	10.67	---	---	---	---
12	0.02	0.04	0.03	0.01	0.00	**55.10**	15.98	10.11	---	---	---	---
13	0.02	0.04	0.03	0.01	0.00	18.69	18.10	9.70	---	---	---	---
14	0.02	0.04	0.03	0.02	0.00	**22.79**	15.49	9.46	---	---	---	---
15	0.03	0.04	0.03	0.03	0.00	**98.26**	14.08	9.15	---	---	---	---
16	0.04	0.05	0.03	0.03	0.00	**75.92**	14.11	8.97	---	---	---	---
17	0.03	0.05	0.03	0.01	0.00	**41.51**	15.74	8.69	---	---	---	---
18	0.02	0.05	0.03	0.01	0.00	30.10	16.93	8.45	---	---	---	---
19	0.02	0.05	0.03	0.01	0.00	28.92	16.20	8.06	---	---	---	---
20	0.02	0.05	0.03	0.01	0.00	21.95	15.71	7.68	---	---	---	---
21	0.02	0.05	0.03	0.01	0.00	21.38	16.34	7.68	---	---	---	---
22	0.02	0.06	0.03	0.01	0.00	19.16	16.50	7.49	---	---	---	---
23	0.03	0.07	0.03	0.01	0.00	17.32	16.82	7.47	---	---	---	---
24	0.03	0.07	0.03	0.01	0.04	15.90	18.83	7.24	---	---	---	---
25	0.03	0.07	0.03	0.01	0.07	14.98	18.80	7.21	---	---	---	---
26	0.02	0.07	0.03	0.01	0.03	14.06	17.75	7.00	---	---	---	---
27	0.02	0.07	0.02	0.01	0.04	13.11	16.30	6.75	---	---	---	---
28	0.03	0.06	0.02	0.01	0.04	12.78	15.80	***6.42***	---	---	---	---
29	0.02	0.06	0.02	0.01		12.76	15.90	---	---	---	---	---
30	0.02	0.06	0.02	0.01		12.21	15.60	---	---	---	---	---
31	0.02		0.03	0.01		11.59		---		---	---	
Mean (ac-ft)	0.02	0.05	0.03	0.02	0.01	20.90	14.31	***10.14***	---	---	---	---
Max (ac-ft)	0.04	0.07	0.06	0.03	0.07	98.26	18.83	***15.97***	---	---	---	---
Min (ac-ft)	0.02	0.03	0.02	0.01	0.00	0.01	9.82	***6.42***	---	---	---	---
Total (ac-ft)	1	2	1	1	0	648	429	***284***	---	---	---	---

Data Source: IWVGA, Stetson Engineers Inc. Data Management System; via NOAA DCS, DCP - BE1000A6

Bold underlined - Values are estimates due to flow exceedance of the stream gage rating table

Italicized - Values are based on incomplete data records

GRAPEVINE CANYON STREAM GAGING STATION OVERVIEW

Stetson Engineers (Stetson) as acting agent for IWVGA, re-established monitoring activities at the Grapevine Canyon Stream Gaging Station, on August 26, 2020. Prior to this the Station had been in a defunct state following the cessation of Kern County Water Agency monitoring activities in 2019. Kern County Water Agency (KCWA) previously operated this gaging station with permission of the private property owner where the gage is located. Stetson established an operational agreement with the property owner on behalf of the IWVGA, in order to install and operate the stream gaging and telemetry equipment. To re-establish the monitoring station Stetson, rehabilitated the weir structure and installed new monitoring and satellite telemetry components inside the stilling well. This work planning and installation work is summarized as a Memorandum submitted to the State Department of Water Resources, dated August 28, 2020.

The gaging facility consists of a channel spanning split flow weir. The weir is composed of a V-notched weir and a sharp crested rectangular weir. There was no automatic datalogging or telemetry equipment previously installed at this site. Measurement of upstream pool height is accomplished utilizing an existing staff gage and through a stilling well with a mounted steel box for housing gaging instrumentation. The monitoring and telemetry equipment consist of the following listed component parts:

Equipment List:

Part Number	Description
Stevens Water Part No. 93876	SatComm GOES Transmitter
Stevens Water Part No. 51108	GPS Antenna
Stevens Water Part No. 70018	V2TH Satellite Antenna
Stevens Water Part No. 93750-100	DLight Datalogger
Stevens Water Part No. 70217-100	SOLO Solar Charge Regulator
Stevens Water Part No. 93720-135	SDX Pressure Sensor
Stevens Water Part No. 93030-001	Desiccant Cartridge
Third Party Vendor	25 Watt / 12 Volt Solar Panel
Third Party Vendor	12 Volt / 20 Amp-hour Rechargeable Battery

Photographs of Installation:

FIGURE 4. STILLING WELL AND ENCLOSURE WITH MOUNTED SOLAR PANEL AND SATELLITE ANTENNA

FIGURE 5. REHABILITATED SHARP CRESTED WEIR ON THE LEFT CULVERT OPENING.

Data Resolution & Telemetry Programming:

The Stevens datalogger is programmed to measure and record water level readings every 15 minutes. This 15-minute time interval is based on the USGS stream gage standard. From there the Stevens GOES transmitter is programmed with a NOAA assigned satellite transmission assignment (Data Collection Platform: BE1000A6) to transmit data on an hourly basis to the NOAA GOES Data Collection System (DCS). Utilizing DCS data collection scripts Stetson retrieves monitoring data from the DCS daily to integrate into the IWVGSP Data Management System.

Staff Gauge vs. Weir Stage:

During installation it was observed that the existing staff gauge is installed with 1.00 feet equaling the crest of the V-notch Weir. Staff gage readings reported here are reflective of this 1 foot difference, and calculations of weir discharge utilize stage values 1-foot less than the staff readings.

Calculation of Discharge:

Calculation of stream discharge utilizes corrected stage measurements, recorded with the stilling well monitoring equipment, and the following equations (Francis Equation) utilized by Kern County Water Agency. Adjustments have been made reflecting the stage height differences between activation of the two weirs, using elevation measurements obtained after the installation of the rehabilitated weir, Stetson established the stage-discharge relationship which can be seen in Figure 6.

Discharge Equation(s) for Grapevine Canyon Weir Structure

The discharge equation is the sum of the water passing through the v-notch and rectangular weirs as described by the following equations.

***90º V-Notch Weir Component Discharge*:** $Q = 2.49 \times H^{2.48}$

***Rectangular Weir Component Discharge*:** $Q = 3.33 \times (H - 0.35)^{3/2} \times (L - 0.02 \times H)$

Where:

Q = Discharge in cubic feet per second

L = Width of rectangular weir (24 inches)

H = water stage height weir crests (crest height difference of two weirs is 0.47 ft)

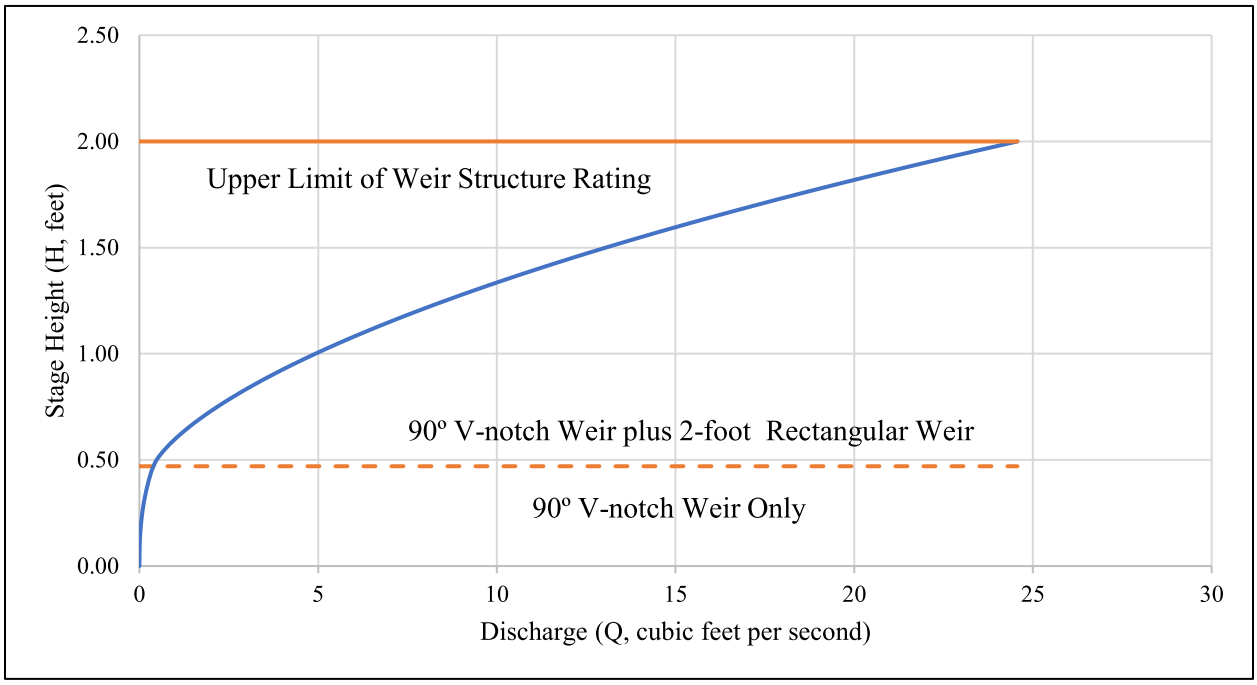


FIGURE 6. RATING CURVE FOR GRAPEVINE CANYON WEIR STRUCTURE

DRAFT MEMORANDUM

785 Grand Avenue, Suite 202 • Carlsbad, California • 94901
TEL: (760) 730-0701 FAX: (415) 457-1638 e-mail: stever@stetsonengineers.com

TO:	File	DATE:	November 22, 2023
FROM:	Stetson Engineers Inc.	JOB NO:	2652
RE:	Sand Canyon Stream Gaging Station – Annual Report of Stream Flows, Water Year 2023		

This memorandum serves as an annual summary of station operation and reporting of approved data records associated with the Sand Canyon Stream Gage monitoring station for Water Year (WY) 2023, October 2022 through September 2023. Water measured during WY 2023 was the second highest recorded volume at this location, equaling 2,529 acre-feet. Figure 1 shows the annual streamflow measured at Sand Canyon over the period of record of operation for this location.

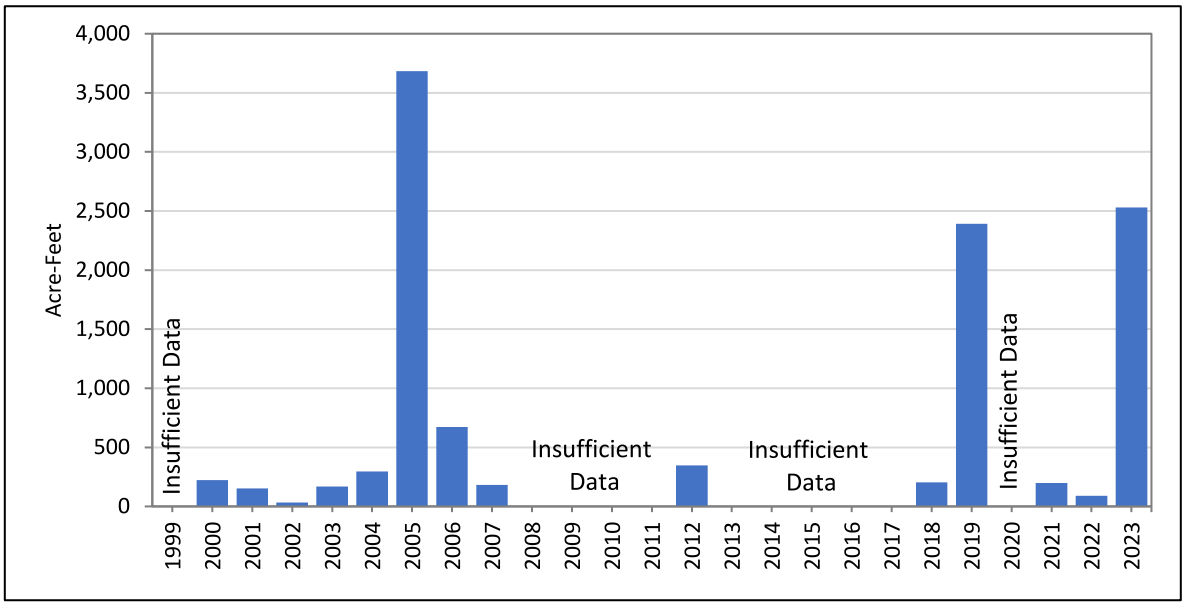


FIGURE 1. SAND CANYON ANNUAL FLOW – PERIOD OF RECORD

SUMMARY OF GAGE OPERATIONS AND DATA – WY 2023

During WY 2023, three site visits were made to conduct manual measurements and maintenance of the gage, October 2022, March 2023, and September 2023. During the October

2022 site visit the stream channel was dry and only maintenance to the monitoring telemetry equipment was conducted. The March 2023 site visit was conducted during low water conditions prior to the major storm runoff events of March. The September 2023 site visit was done at the end of the water year after all runoff events. Standard measurements and maintenance was conducted including the clearing of the weir of vegetation impacting weir operation.

During WY 2023 this gage experienced three storm-runoff events which resulted in stream stage heights exceeding the rated height of the weir. The dates of these occurrences were; March 10th – 12th, March 15th – 16th, and August 20th – 21st. For these periods discharge calculations were based on an extrapolation of the current rating. Measured flow for these dates are recognized as estimates. The following figure shows the total monthly flows for Water Year 2023.

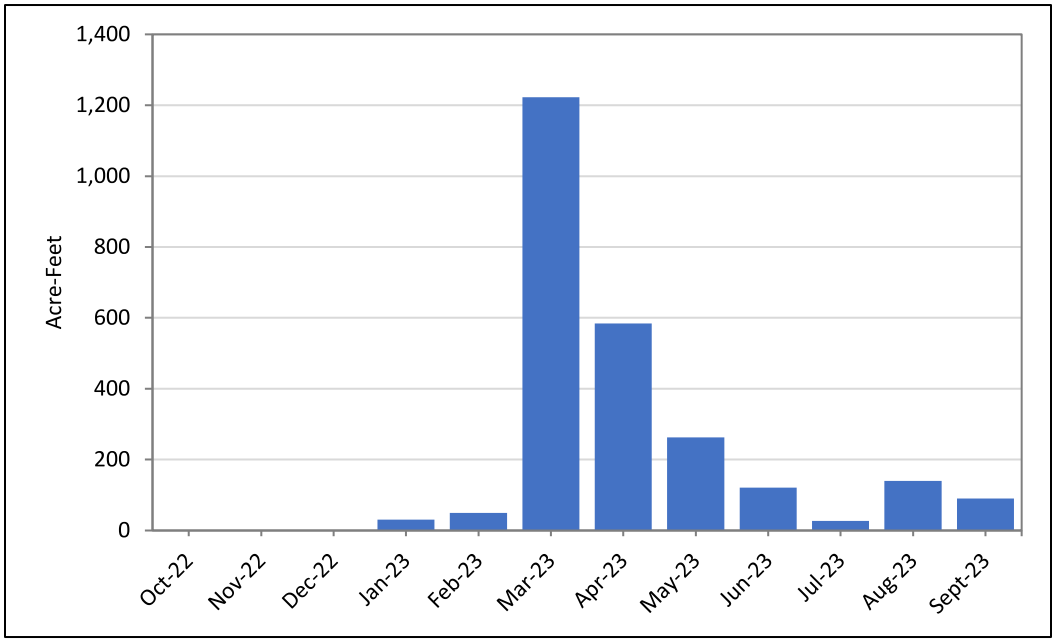


FIGURE 2. SAND CANYON MONTHLY FLOW – WATER YEAR 2023

Since its establishment in August 2020, the Sand Canyon stream gage has experienced seasonal flow, with the channel drying during the summer dry months. During WY2023 the channel remained wetted throughout these normally dry months, which permitted vegetation growth throughout the year, partially impairing the operation of the weir. Minor correction of the stage data was completed to address this influence of the vegetation on the data.

Daily Streamflow Data, Staff Gauge Reading
Sand Canyon, Water Year 2023

Water year	2023
Station Name	Sand Canyon
Operating Agency	IWVGA Agent - Stetson Engineers Inc.
Latitude	35°46'33.6"N
Longitude	117°54'27.4"N

	Average Daily Staff Gauge Reading (Feet)											
	2022			2023								
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0.00	0.00	0.00	0.01	0.19	0.65	1.04	0.93	0.58	0.29	0.10	0.37
2	0.00	0.00	0.00	0.00	0.19	0.56	1.04	0.92	0.56	0.27	0.09	0.41
3	0.00	0.00	0.00	0.00	0.20	0.57	1.03	0.90	0.54	0.25	0.09	0.41
4	0.00	0.00	0.00	0.00	0.21	0.59	1.00	0.90	0.53	0.26	0.09	0.40
5	0.00	0.00	0.00	0.01	0.23	0.59	0.99	0.88	0.53	0.26	0.08	0.39
6	0.00	0.00	0.00	0.00	0.21	0.58	0.98	0.87	0.55	0.26	0.08	0.38
7	0.00	0.00	0.00	0.00	0.21	0.57	0.98	0.85	0.61	0.26	0.09	0.37
8	0.00	0.00	0.00	0.00	0.21	0.58	0.97	0.85	0.58	0.25	0.08	0.36
9	0.00	0.00	0.00	0.02	0.21	0.57	0.97	0.84	0.54	0.25	0.10	0.34
10	0.00	0.00	0.00	0.39	0.22	1.50	0.98	0.83	0.54	0.24	0.10	0.37
11	0.00	0.00	0.00	0.34	0.23	2.02	1.05	0.82	0.58	0.23	0.10	0.42
12	0.00	0.00	0.00	0.02	0.23	1.70	1.15	0.80	0.57	0.21	0.10	0.44
13	0.00	0.00	0.00	0.01	0.23	1.47	1.17	0.79	0.53	0.20	0.11	0.44
14	0.00	0.00	0.00	0.00	0.23	1.53	1.12	0.78	0.52	0.19	0.11	0.43
15	0.00	0.00	0.00	0.58	0.21	2.16	1.08	0.76	0.51	0.17	0.10	0.43
16	0.00	0.00	0.00	0.43	0.20	1.75	1.06	0.75	0.49	0.16	0.10	0.42
17	0.00	0.00	0.00	0.35	0.20	1.56	1.05	0.73	0.47	0.16	0.10	0.42
18	0.00	0.00	0.00	0.26	0.20	1.44	1.05	0.71	0.45	0.15	0.09	0.42
19	0.00	0.00	0.00	0.24	0.21	1.41	1.03	0.69	0.47	0.14	0.16	0.41
20	0.00	0.00	0.00	0.21	0.21	1.32	1.00	0.68	0.46	0.14	0.71	0.43
21	0.00	0.00	0.00	0.19	0.24	1.34	0.99	0.69	0.45	0.13	1.44	0.42
22	0.00	0.00	0.00	0.20	0.23	1.31	0.98	0.69	0.44	0.13	0.90	0.42
23	0.00	0.00	0.00	0.18	0.21	1.23	0.98	0.67	0.43	0.13	0.81	0.43
24	0.00	0.00	0.00	0.17	0.27	1.19	0.98	0.66	0.43	0.13	0.71	0.41
25	0.00	0.00	0.00	0.17	0.78	1.16	0.98	0.65	0.42	0.11	0.62	0.42
26	0.00	0.00	0.00	0.17	0.52	1.13	0.97	0.65	0.41	0.12	0.55	0.39
27	0.00	0.00	0.00	0.19	0.52	1.10	0.96	0.63	0.40	0.10	0.49	0.40
28	0.00	0.00	0.00	0.19	0.61	1.09	0.94	0.62	0.38	0.09	0.45	0.40
29	0.00	0.00	0.00	0.21		1.11	0.93	0.62	0.35	0.09	0.42	0.41
30	0.00	0.00	0.00	0.20		1.09	0.93	0.63	0.33	0.08	0.40	0.43
31	0.00		0.00	0.19		1.05		0.61		0.09	0.39	
Mean (ft)	0.00	0.00	0.00	0.16	0.27	1.16	1.01	0.75	0.49	0.18	0.32	0.41

Data Source: IWVGA, Stetson Engineers Inc. Data Management System; via In-Situ HydroVu data platform

Daily Streamflow Data, Flow Rate
Sand Canyon, Water Year 2023

Water year	2023
Station Name	Sand Canyon
Operating Agency	IWVGA Agent - Stetson Engineers Inc.
Latitude	35°46'33.6"N
Longitude	117°54'27.4"N

	Daily streamflow (cfs)											
	2022			2023								
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0.00	0.00	0.00	0.00	0.44	3.08	10.64	7.35	2.61	0.89	0.13	1.32
2	0.00	0.00	0.00	0.00	0.44	2.47	10.51	6.99	2.51	0.83	0.13	1.53
3	0.00	0.00	0.00	0.00	0.48	2.52	10.25	6.55	2.35	0.74	0.12	1.57
4	0.00	0.00	0.00	0.00	0.52	2.70	9.35	6.35	2.28	0.76	0.12	1.51
5	0.00	0.00	0.00	0.00	0.60	2.68	9.00	5.84	2.29	0.78	0.11	1.42
6	0.00	0.00	0.00	0.00	0.54	2.61	8.76	5.64	2.44	0.76	0.10	1.37
7	0.00	0.00	0.00	0.00	0.51	2.55	8.68	5.28	2.82	0.76	0.10	1.30
8	0.00	0.00	0.00	0.00	0.53	2.58	8.39	5.21	2.59	0.72	0.10	1.25
9	0.00	0.00	0.00	0.02	0.54	2.55	8.34	5.12	2.35	0.73	0.14	1.17
10	0.00	0.00	0.00	2.16	0.57	**39.20**	8.79	4.92	2.37	0.69	0.15	1.32
11	0.00	0.00	0.00	1.31	0.62	**60.17**	10.87	4.70	2.59	0.64	0.15	1.62
12	0.00	0.00	0.00	0.01	0.59	**40.99**	14.56	4.49	2.57	0.55	0.15	1.69
13	0.00	0.00	0.00	0.00	0.60	28.98	15.45	4.30	2.29	0.49	0.17	1.69
14	0.00	0.00	0.00	0.00	0.61	32.34	13.50	4.21	2.21	0.46	0.16	1.66
15	0.00	0.00	0.00	2.69	0.51	**69.88**	12.03	3.99	2.17	0.41	0.15	1.66
16	0.00	0.00	0.00	1.65	0.48	**43.92**	11.20	3.90	2.03	0.35	0.15	1.62
17	0.00	0.00	0.00	1.20	0.49	33.37	10.98	3.74	1.89	0.35	0.13	1.58
18	0.00	0.00	0.00	0.76	0.48	27.23	11.05	3.53	1.81	0.33	0.12	1.57
19	0.00	0.00	0.00	0.64	0.51	26.11	10.24	3.37	1.92	0.28	0.34	1.53
20	0.00	0.00	0.00	0.51	0.54	21.89	9.43	3.34	1.83	0.28	**8.25**	1.66
21	0.00	0.00	0.00	0.44	0.64	22.83	8.99	3.37	1.79	0.26	**30.75**	1.60
22	0.00	0.00	0.00	0.47	0.62	21.42	8.77	3.36	1.75	0.24	6.68	1.59
23	0.00	0.00	0.00	0.41	0.51	17.83	8.72	3.27	1.64	0.24	4.67	1.62
24	0.00	0.00	0.00	0.36	0.81	16.04	8.64	3.17	1.66	0.23	3.66	1.54
25	0.00	0.00	0.00	0.36	4.45	14.90	8.67	3.13	1.61	0.20	2.92	1.60
26	0.00	0.00	0.00	0.37	2.19	13.80	8.49	3.09	1.56	0.20	2.45	1.41
27	0.00	0.00	0.00	0.43	2.18	12.93	8.14	2.94	1.50	0.15	2.05	1.48
28	0.00	0.00	0.00	0.46	2.84	12.41	7.57	2.86	1.41	0.14	1.82	1.49
29	0.00	0.00	0.00	0.52		12.99	7.27	2.86	1.24	0.13	1.63	1.54
30	0.00	0.00	0.00	0.47		12.41	7.26	2.93	1.11	0.11	1.51	1.66
31	0.00		0.00	0.43		11.03		2.83		0.12	1.42	
Mean (cfs)	0.00	0.00	0.00	0.51	0.89	19.88	9.82	4.28	2.04	0.45	2.28	1.52
Max (cfs)	0.00	0.00	0.00	2.69	4.45	69.88	15.45	7.35	2.82	0.89	30.75	1.69
Min (cfs)	0.00	0.00	0.00	0.00	0.44	2.47	7.26	2.83	1.11	0.11	0.10	1.17
Total (ac-ft)	0	0	0	31	49	1,223	584	263	121	27	140	90

Data Source: IWVGA, Stetson Engineers Inc. Data Management System; via In-Situ HydroVu data platform

Bold underlined - Values are estimates due to flow exedance of the stream gage rating table

Daily Streamflow Data, Total Flow Volume
Sand Canyon, Water Year 2023

Water year	2023
Station Name	Sand Canyon
Operating Agency	IWVGA Agent - Stetson Engineers Inc.
Latitude	35°46'33.6"N
Longitude	117°54'27.4"N

	Daily streamflow (AF)											
	2022			2023								
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0.00	0.00	0.00	0.00	0.87	6.11	21.11	14.59	5.19	1.77	0.26	2.62
2	0.00	0.00	0.00	0.00	0.87	4.90	20.85	13.86	4.98	1.64	0.25	3.04
3	0.00	0.00	0.00	0.00	0.95	5.00	20.33	13.00	4.67	1.46	0.24	3.11
4	0.00	0.00	0.00	0.00	1.03	5.36	18.55	12.59	4.52	1.51	0.25	2.99
5	0.00	0.00	0.00	0.00	1.18	5.31	17.85	11.59	4.54	1.55	0.23	2.81
6	0.00	0.00	0.00	0.00	1.06	5.18	17.38	11.18	4.84	1.50	0.20	2.72
7	0.00	0.00	0.00	0.00	1.02	5.05	17.21	10.47	5.58	1.51	0.21	2.58
8	0.00	0.00	0.00	0.00	1.05	5.13	16.64	10.33	5.13	1.43	0.19	2.47
9	0.00	0.00	0.00	0.03	1.07	5.05	16.54	10.15	4.67	1.44	0.27	2.31
10	0.00	0.00	0.00	4.29	1.13	**77.75**	17.44	9.76	4.71	1.38	0.30	2.62
11	0.00	0.00	0.00	2.61	1.24	**119.35**	21.57	9.32	5.14	1.27	0.30	3.21
12	0.00	0.00	0.00	0.02	1.17	**81.30**	28.88	8.90	5.09	1.10	0.29	3.35
13	0.00	0.00	0.00	0.00	1.19	57.48	30.64	8.54	4.55	0.97	0.34	3.35
14	0.00	0.00	0.00	0.00	1.21	64.14	26.78	8.35	4.38	0.91	0.32	3.29
15	0.00	0.00	0.00	5.33	1.02	**138.60**	23.86	7.92	4.30	0.81	0.29	3.30
16	0.00	0.00	0.00	3.27	0.95	**87.12**	22.21	7.73	4.03	0.70	0.29	3.21
17	0.00	0.00	0.00	2.38	0.97	66.18	21.78	7.42	3.76	0.70	0.27	3.13
18	0.00	0.00	0.00	1.50	0.95	54.01	21.91	7.00	3.58	0.65	0.25	3.11
19	0.00	0.00	0.00	1.26	1.02	51.78	20.30	6.69	3.81	0.56	0.68	3.04
20	0.00	0.00	0.00	1.01	1.06	43.42	18.70	6.62	3.63	0.55	**16.37**	3.29
21	0.00	0.00	0.00	0.87	1.26	45.28	17.83	6.69	3.55	0.52	**60.98**	3.18
22	0.00	0.00	0.00	0.94	1.23	42.49	17.40	6.66	3.47	0.48	13.24	3.15
23	0.00	0.00	0.00	0.81	1.01	35.37	17.30	6.49	3.26	0.48	9.26	3.22
24	0.00	0.00	0.00	0.72	1.61	31.82	17.15	6.28	3.30	0.46	7.27	3.05
25	0.00	0.00	0.00	0.72	8.82	29.56	17.20	6.21	3.19	0.39	5.79	3.18
26	0.00	0.00	0.00	0.74	4.34	27.37	16.84	6.13	3.10	0.41	4.86	2.79
27	0.00	0.00	0.00	0.85	4.33	25.64	16.15	5.84	2.98	0.31	4.06	2.93
28	0.00	0.00	0.00	0.91	5.63	24.61	15.02	5.67	2.79	0.28	3.61	2.97
29	0.00	0.00	0.00	1.02		25.76	14.42	5.67	2.46	0.25	3.23	3.06
30	0.00	0.00	0.00	0.93		24.62	14.40	5.81	2.20	0.22	2.99	3.29
31	0.00		0.00	0.85		21.89		5.61		0.25	2.82	
Mean (ac-ft)	0.00	0.00	0.00	1.00	1.76	39.44	19.47	8.49	4.05	0.89	4.51	3.01
Max (ac-ft)	0.00	0.00	0.00	5.33	8.82	138.60	30.64	14.59	5.58	1.77	60.98	3.35
Min (ac-ft)	0.00	0.00	0.00	0.00	0.87	4.90	14.40	5.61	2.20	0.22	0.19	2.31
Total (ac-ft)	0	0	0	31	49	1,223	584	263	121	27	140	90

Data Source: IWVGA, Stetson Engineers Inc. Data Management System; via In-Situ HydroVu data platform

Bold underlined - Values are estimates due to flow exedance of the stream gage rating table

The following attached tables are provided to serve as reporting of approved daily values of data collected at the Sand Canyon gaging station during WY 2023. The tables reflect; daily average staff gauge readings, daily average stream flow rate in cubic feet per second, and total daily flows in acre-feet; by water year.

SAND CANYON STREAM GAGING STATION OVERVIEW

IWVGA operation of this station is done under legal agreement with the Bureau of Land Management to occupy and operate the stream gage location. Stetson Engineers (Stetson) as acting agent for IWVGA, re-established monitoring activities at the Sand Canyon Stream Gaging Station, on August 25, 2020. Prior to this the Station was in a semi-defunct state following the cessation of Kern County Water Agency monitoring activities in 2019. As of the time of installation the station and associated stage measuring equipment was maintained by the Meadowbrook Dairy. The existing equipment being any antiquated paper chart recorder with float and pulley. To re-establish the monitoring station Stetson installed new monitoring and cellular telemetry components inside the stilling well. This work is summarized as a Memorandum submitted to the State Department of Water Resources, dated August 28, 2020.

The gaging station consists of a channel spanning compound rectangular weir. Upstream of the weirs a metal staff gauge is installed to measure weir stage height. Additionally, a perforated intake pipe is installed leading to an off-channel stilling well where the paper chart recorder and new monitoring equipment is installed. The monitoring and telemetry equipment consist of the following listed component parts:

Equipment List:

Part Number	**Description**
In-Situ 0099240	Level TROLL 400, Level Sensor Range – 11m, 35ft,(30 Psia)
In-Situ 0052000-05-01-08-00	Rugged Twist Lock Cable, Non-vented
In-Situ ISR-0000000-VL	VuLink Cellular Telemetry, 4G LTE, Antenna, GPS, 1.5-3.6V Li-MnO2 Battery, built in barometric sensor; HTTPS, FTP, SFTP, SMS, CSV file format
Proxicast ANT-121-002	Omni Antenna, 3G/4G/LTE, 3-5dBi

Photographs of Installation:

FIGURE 3. SAND CANYON STREAM GAGE SITE

Data Resolution & Telemetry Programming:

The In-Situ monitoring equipment, Level Troll 400 and Vulink device are programmed to record measured pressure (water and barometric pressure) values every 15-minutes, with barometric compensation made at the Vulink. The 15-minute time interval is based on the USGS stream gage standard. From there the Vulink cellular telemetry is programmed to upload the 15-minute readings to In-Situ's FTP server every 24 hours, or 96 readings. Stetson then retrieves the data from the FTP server for hosting on the IWVGSP.com web server.

Staff Gauge vs. Weir Stage:

During a December 2020 field visit where a level survey, and other verification measurements were completed, a 0.02-foot difference was recognized between the steel staff gauge and the actual weir crest. The staff gauge is installed with 0.02 feet reading equaling the

weir crest. Staff gage readings reported here are reflective of this 0.02-foot difference, and calculations of weir discharge utilize stage values 0.02 feet less than the staff readings.

Calculation of Discharge:

Calculation of stream discharge utilizes corrected stage measurements, recorded with the stilling well monitoring equipment, and the following equations (Francis Equation) to calculate discharge. These equations have been updated to reflect weir verification measurements taken during installation. The associated stage-discharge rating curve is shown below in Figure 4.

Discharge Equation(s) for Sand Canyon Compound Weir Structure

The discharge equation for the Sand Canyon stream gage includes the sum of the flow through the 2-foot and 12-foot weirs as described below.

***2-foot Weir Component Discharge*:** $Q = 3.33 \times (L_1 - 0.02H_1) \times \left({H_1}^{3/2}\right)$

***12-foot Weir Component Discharge*:** $Q = 3.33 \times \left(L_2 - 0.02(H_2 - 1)\right) \times \left((H_2 - 1)^{3/2}\right)$

Where:

Q = Discharge in cubic feet per second

L_1 = 2 feet; width of 2-foot weir

L_2 = 12 feet; width of 12-foot weir

H_1 = water stage height above 2-foot weir crest, in feet

H_2 = water stage height above 2-foot weir crest, when H is greater than 0.75, in feet

H_{max} = 2.25 feet, height of top of 12-foot high-flow weir

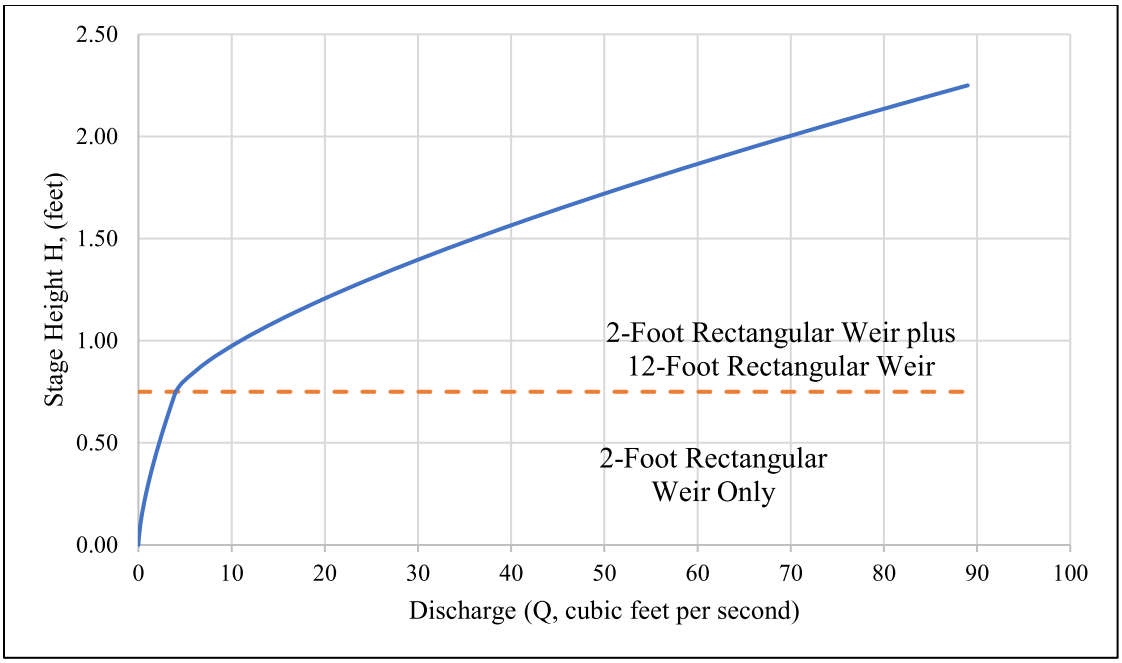


FIGURE 1. STAGE-DISCHARGE RATING CURVE FOR SAND CANYON WEIR STRUCTURE