

SNWA_EXH_612

Watrus slideshow



Water Resources Division

Technical Memorandum

To: Michael Stanka

From: James Watrus, Sr. Hydrologist, Southern Nevada Water Authority

Date Issued/Revised: June 15, 2017

Subject: Spring Classification

1.0 INTRODUCTION

In response to the Seventh Judicial District Court's remand of the 2011 Nevada State Engineer (NSE) rulings involving Spring, Delamar, Dry Lake, and Cave valleys, Stanka Consulting, LTD prepared a report to document the quantification of the estimated committed groundwater and spring resources within the White River Flow System (Stanka, 2017). This memo is being prepared to document the rationale for which springs may be included in their analysis for quantification purposes.

2.0 CLASSIFICATION OF SPRINGS

Stanka Consulting is using the NSE modified version of the Excel Solver (NSE Exhibit 135) to determine the water available for appropriation within the White River Flow System. The NSE revised solver established water budgets that include recharge and discharge with the discharge being determined by evapotranspiration (ET) in the groundwater discharge area.

For the purposes of water-right classification, springs are classified as "groundwater" or "surface water" based on the source of their discharge. A spring which issues on the valley floor and within the groundwater discharge area, and therefore contributes to the ET of a basin, is considered to discharge groundwater. If water rights appropriate spring flow in the groundwater discharge area then they should be considered groundwater resources in the White River Flow System for accounting purposes. The reason these springs can be considered ground water allocations for this analysis is that the flow from the springs supported the plant ET that was mapped to quantify the water available in the WRFS.

The extent of the potential groundwater discharge areas used in the water-balance method were delineated using information from previous mapping efforts, satellite imagery and field reconnaissance. Further details on the groundwater discharge areas are provided in Burns and Drici (2011, SNWA Exhibit 258 and SNWA Exhibit 452). The extent of the ET areas are found as a geographic information system shapefile in SNWA Exhibit 452 and are shown on [Figure 1](#).

IV. EXISTING RIGHTS

To determine the amount of water available for appropriation in a groundwater basin, the State Engineer must determine the amount of committed groundwater rights in the basin.⁴⁶³ Committed groundwater rights are the portion of groundwater rights that actually deplete water from the groundwater reservoir. The Applicant undertook a complete and comprehensive evaluation of committed groundwater rights in Cave Valley. The Applicant's evaluation was presented through exhibits and the testimony of expert water rights surveyor, Michael Stanka.⁴⁶⁴ The State Engineer also conducted an inventory in Cave Valley pursuant to NRS 533.364.⁴⁶⁵

The results of the two studies are essentially identical, with the Applicant's witness identifying 51.37 afa⁴⁶⁶ of committed groundwater and the State Engineer identifying 50 afa of committed groundwater. The State Engineer finds that the committed groundwater in Cave Valley is 50 afa.⁴⁶⁷ The State Engineer's inventory also analyzed committed spring rights. Springs which issue from the valley floor, within the groundwater discharge areas, are discharging groundwater. To avoid double counting of the groundwater resource, water rights on these springs are deducted from available groundwater. In Cave Valley, only Cave Spring is both located on the valley floor, is within a groundwater discharge area, and has water rights. Permit 4881 was issued for 225.57 acre-feet to irrigate 75.19 acres. The consumptive use in Cave Valley for pasture grass is 3.1 acre-feet per acre, which is greater than the permitted duty; therefore, the consumptive use for Permit 4881 is 225.57 acre-feet. Permit 9001 is for domestic and mining use and is certificated for 31.9 acre-feet. The State Engineer finds that 257.47 afa of consumptively used spring rights in the groundwater discharge areas will be deducted from the available perennial yield. The State Engineer finds that a total of approximately 315 acre-feet of combined groundwater rights and spring rights on the valley floor will be subtracted from the amount of groundwater available for appropriation.

⁴⁶³ NRS 533.370(2); NRS 534.110(3).

⁴⁶⁴ Mr. Stanka holds professional engineering licenses in Nevada and Florida and is a water rights surveyor in the State of Nevada. He was qualified as an expert in water rights research and quantification. Exhibit No. SNWA_096; Transcript, Vol.2 p. 420:19-21.

⁴⁶⁵ Exhibit No. SNWA_460 (Cave Valley Inventory).

⁴⁶⁶ Exhibit No. SNWA_097, p. 2-12.

⁴⁶⁷ Exhibit No. SNWA_460 (Cave Valley Inventory).

A	B	C	D	E	F	G
1-inch Precipitation Interval	Mean Annual Precipitation Rate (in/yr)	Area (acres)	Area Excluded from Potential Recharge Areas?	Precipitation Volume (afy)	Recharge Efficiency	Recharge Volume (afy)
5 - 6	5.78	45,128	Yes	21,723	0.000	0
6 - 7	6.48	199,364	Yes	107,712	0.000	0
7 - 8	7.50	146,073	Yes	91,268	0.000	0
8 - 9	8.65	45,771	Yes	33,001	0.000	0
9 - 10	9.55	262,403	Yes	208,826	0.000	0
10 - 11	10.55	279,683	Yes	245,794	0.000	0
11 - 12	11.46	117,967	Yes	112,696	0.000	0
12 - 13	12.49	46,954	Yes	48,862	0.000	0
13 - 14	13.49	5,400	Yes	6,068	0.000	0
14 - 15	14.48	273	Yes	329	0.000	0
15 - 16	15.48	36	Yes	46	0.000	0
8 - 9	8.65	142,191	No	102,522	0.000	13
9 - 10	9.55	384,313	No	305,845	0.001	405
10 - 11	10.55	632,844	No	556,163	0.005	2,728
11 - 12	11.46	719,137	No	687,006	0.011	7,424
12 - 13	12.49	563,308	No	586,202	0.021	12,125
13 - 14	13.49	452,321	No	508,304	0.034	17,206
14 - 15	14.48	291,601	No	351,931	0.051	17,820
15 - 16	15.48	190,953	No	246,351	0.071	17,522
16 - 17	16.54	113,689	No	156,662	0.097	15,166
17 - 18	17.52	68,166	No	99,498	0.124	12,377
18 - 19	18.56	42,113	No	65,143	0.158	10,282
19 - 20	19.65	18,795	No	30,771	0.197	6,054
20 - 21	20.53	12,979	No	22,211	0.232	5,151
21 - 22	21.69	9,569	No	17,299	0.282	4,880
22 - 23	22.74	7,101	No	13,455	0.331	4,459
23 - 24	23.49	4,975	No	9,740	0.370	3,602
24 - 25	24.83	1,724	No	3,568	0.443	1,579
25 - 26	25.65	7	No	15	0.490	7
		4,804,836		4,639,011		138,800

error is that he has ignored additional springs that should be considered as committed groundwater and stream rights that are also groundwater which causes an underestimate of committed groundwater rights.

I selected the spring rights shown in Figure 9 within the valley bottom Qal, Qflv, and the Qas for alluvial slope. This added application #s 699, 2420, 4163, 5336, 5337, 69363, V001166, V01170, V01167, V01171, and V01169 to the list of spring rights using groundwater. Including these water rights would add 1787 afa to the total. However, several of the vested water rights probably have a duty listed in the White River Decree, so my estimated amount still would be low.

4.33 Stream Rights as Committed Groundwater

Most WRV surface water depends on spring flow, not runoff. The surface flows would be much more consistent, as may be seen in the hydrograph (Figure 10) for Hot Creek near Sunnyside gage (gage 9415558 on Figure 9). This site is downstream from various springs which in combination created the consistent streamflow seen in Figure 10. Considering the number of large regional springs in WRV (Figure 12), most surface water in the valley bottom would be a sum of spring flow. If surface water depends on spring discharge, as it does in the WRV, stream rights should be considered dependent on groundwater.

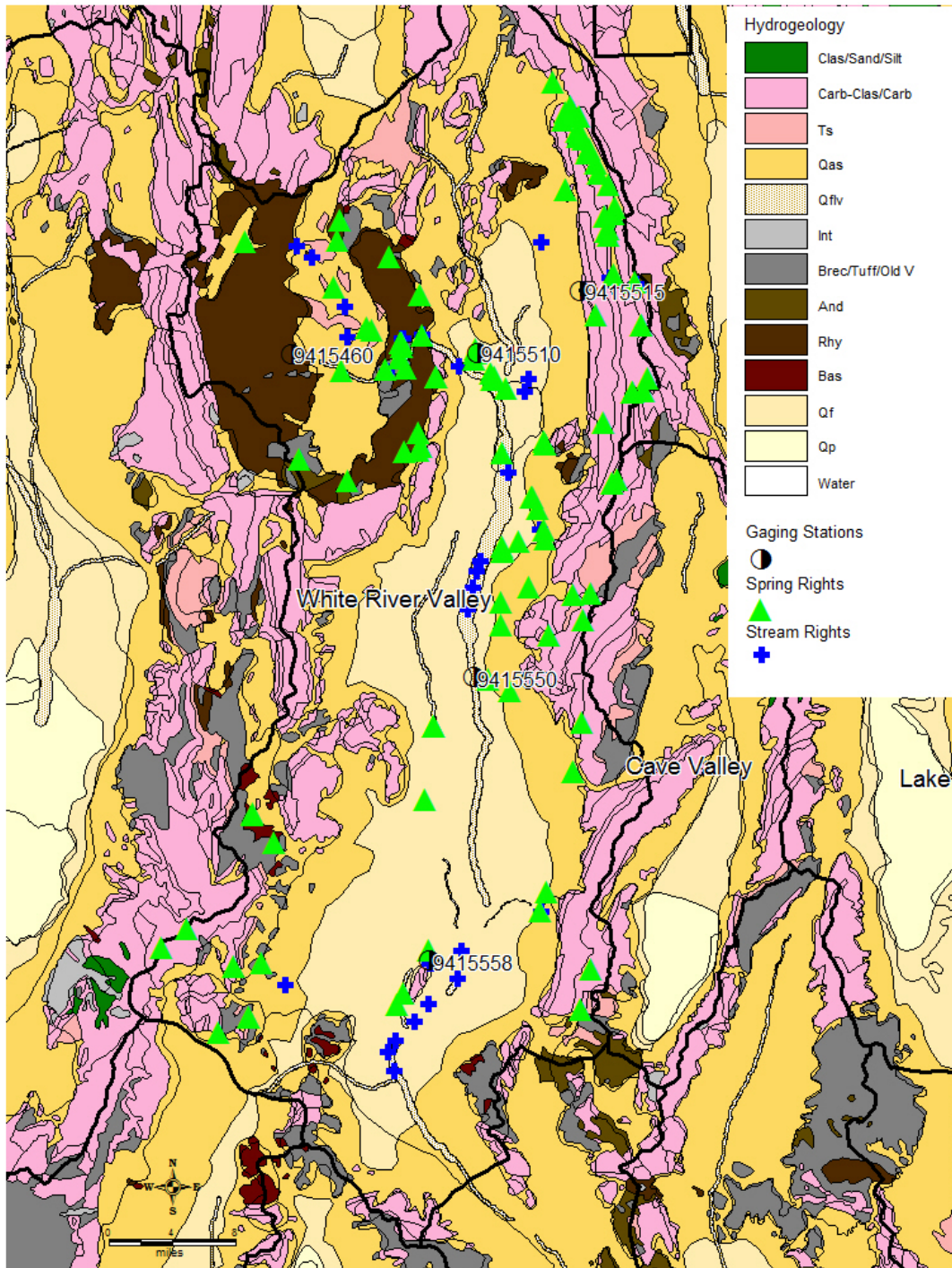


Figure 9: Map showing the location of stream and spring water rights points of diversion as tabulated in the hydrologic abstract obtained from the NSE website.

rials in that area are unknown.

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Hot Creek Spring annually discharges 11,000 acre-feet of water. Of this amount about 4,000 acre-feet may be accounted for by evapo-transpiration losses between the spring orifice and the south end of the valley. It is recognized that not all of this 4,000 acre-feet loss is supplied by Hot Creek Spring, as there is substantial underflow from White River and the springs to the north. Also, about 700 acre-feet of water from Hot Creek Spring probably is discharged from the valley as stream flow. According to these figures not less than 6,300 acre-feet of water from Hot Creek Spring alone must leave the valley as underflow. Consequently, the estimate of 17,500 acre-feet for the entire underflow out of the valley is believed not to be unreasonable.