Monitoring Report Submittal Transmittal Form

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Central Valley Regional Water Quality Control Board
11020 Sun Center Drive #200
Rancho Cordova, CA 95670-6114

Discharger:	Bear Valley Water District
Name of Facility:	Bear Valley Wastewater Treatment and Disposal Facility
WDRs Order Number:	***5-201-208***
County:	Alpine County
Regulator Program:	Waste Discharge to Land (Non15)
Unit:	Compliance
CIWQS Place ID:	209035

The Bear Valley Water District is hereby submitting to the Central Valley Regional Water Quality Control Board the following information:

Check all that apply:

Annual Monitoring Report for the year _____2020_____

1st / 2nd / 3rd / 4th (**circle one**) Quarterly Monitoring Report for the year of_____

1st / 2nd (**circle one**) Semi-annual Monitoring Report for the year _____

Monthly Monitoring Report for the year _____

Violation Notification

During the monitoring period, there were / were not **(circle one)** any violations of the WDRs.

1. The violations were:
2. The actions to correct the violations were:
3.

Certification Statement

"I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

Signature: _____ Phone: 209-753-2112

Printed Name: Jeff Gouveia
General Manager

Date: January 26, 2021

BEAR VALLEY WATER DISTRICT
2020 ANNUAL REPORT

ORDER # 5-01-208

JANUARY 26, 2021

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SECTION 1 - INTRODUCTION AND BACKGROUND

1.1 Introduction

The Bear Valley Water District (District) provides sanitary sewer collection, treatment and disposal services for approximately 650 residential and commercial equivalent dwelling units (EDUs) in the Alpine County community of Bear Valley. The District's service area is comprised of approximately 3000 acres located primarily north of California State Highway 4. The District serves the developed private, residential and commercial areas of the Bear Valley village as well as the developed adjoining federal recreational lands including the United States Forest Service's (USFS) Lake Alpine Resort and campgrounds, special use permit (SUP) residential cabins and the Bear Valley Mountain downhill ski resort. The District's wastewater treatment and disposal facility (WWTF) is regulated by the Central Valley Regional Water Quality Control Board (Regional Board) under Waste Discharge Requirements (WDRs) Order No. 5-01-208 and Order No. R5-2019-0078.

1.2 2018 Facility Operations - Overview

During the 2020 water year (October 2019 to September 2020), an annual daily average flow of approximately 0.051 million gallons per day (MGD) (approximately 18.55 MG total) was received at the District WWTF. WDRs Order No. 5-01-208 currently limit influent flow to 0.1 MGD (annual average basis).

Preliminary treatment at the District's main pump station (headworks) consists of shredding (comminutor) and grit removal before the influent reaches the primary sedimentation tank where the settable solids are allowed to fall to the bottom of the tank. Effluent flow is then measured through an Endress and Hauser magnetic flow tube during transfer via three, 10 horse power (HP) Paco pumps to a 14.18 million gallon (MG) two cell, aerated treatment lagoon for secondary biological nutrient removal. While in the two cell lagoon system, the constituents are largely consumed and/or sequestered. Air is delivered to the secondary treatment lagoon via one 40 HP, variable frequency drive (VFD) equipped Gardner Denver positive displacement blower to twelve (12) Triplepoint Mars T-Series Double Bubble™ fine and coarse bubble diffusers. Inline YSI sensors communicate with the VFD blower by way of the SCADA system to keep dissolved oxygen (DO) and suspended solids (TSS) at optimum levels. Treated effluent from the aerated lagoon is then disinfected by use of chlorine gas during transfer via (2) - 375 gallon per minute (GPM) Paco pumps through a 12,000 gallon chlorine contact tank. The disinfected effluent is then placed into storage and receives further treatment in a 76.4 MG effluent polishing reservoir.

During the irrigation season, typically late spring through early autumn, the polished effluent is disposed of through spray irrigation on up to approximately 80 acres of sprayfields: 40 acres of land which is authorized by Special Use Permit (SUP) from the USFS and 40 acres under private lease through 2048. Both the leased disposal area and the permitted land have been in service since before the installation of the groundwater monitoring wells (approximately 40 years for the leased land) at the site.

Based on the volume of effluent in storage and available to apply to land at the beginning of the land application cycle, a determination is made on the number of acres of land to irrigate. At the beginning of the 2020 land disposal season, June 2, 2020, with approximately 32.30 MG of effluent in storage, spray field areas 1 through 9 (32.90 total acres) were placed into operation.

Effluent disposal via spray irrigation involves the disbursement of the effluent through low impact, high uniformity, Nelson sprinkler heads upon soils and vegetation within the disposal area. The average monthly application rates to the 32.90 acre spray field area during the peak disposal months of 2020 ranged from approximately 2.721 – 8.398 MG per month (0.083 MG – 0.255 MG per acre per month). The water is allowed to percolate into the soil and evapotranspirate into the atmosphere. WDRs Order No. 5-01-208 limit application of wastewater to reasonable rates considering soil, climate, and irrigation management system.

1.3 Regulatory Requirements

Discharge at the Bear Valley Water District WWTF is subject to requirements contained in the two wastewater permits: Order No. 5-01-208 and Order No. R5-2019-0078. These include the Standard Provisions and Reporting Requirements for Waste Discharge Requirements effective 1 March 1991, Revised Monitoring and Reporting Program No. 5-01-208 effective 1 July 2002, Monitoring and Reporting Program, NPDES, Appendix E. effective 1 August 2016, and the Water Quality Control Plan for the California Regional Water Quality Control Board, Central Valley Region and associated documents (Basin Plan).

The District's WDRs also contain monitoring and reporting requirements, which include tri-annual monitoring of groundwater. The District's Third Tri-Annual 2020 Groundwater Monitoring Report prepared by Stantec Consulting Services is submitted under separate cover. These requirements and policies are discussed below as they relate to discharges to land and groundwater limitations at the WWTF.

SECTION 2 – GROUNDWATER MONITORING

Please see the ***Bear Valley Water District Third Tri-Annual 2020 Groundwater Monitoring Report*** submitted December 7, 2020 under separate cover for an evaluation of groundwater quality beneath the wastewater facility as well as a discussion of current groundwater compliance status.

The Monitoring and Reporting Program (MRP) of WDR Order No. 5-01-208 states that the tri-annual reports shall be submitted to the Regional Board by the first day of July (1st Tri-Annual Report), September (2nd Tri-Annual Report), and February (3rd Tri-Annual Report) of each year.

However, these reporting requirements do not take into account the unique climatic factors that control when the District can access and sample their groundwater monitoring wells. Pursuant to email correspondence from Regional Board staff, Regional Board staff will not recommend enforcement to the Executive Officer so long as the 1st and 2nd tri-annual monitoring reports are submitted by September 1st and November 1st of each year, respectively, instead of the dates currently required in the MRP. The third tri-annual report will remain due by February 1st each year.

SECTION 3 - WATER CONSERVATION AND I/I REDUCTION SUMMARY

3.1 Water Conservation Activities

The District's Water Conservation Plan has been fully implemented since its development in 2002. The District is solely a wastewater service provider and does not provide potable water to its service area. Instead, the Lake Alpine Water Company (LAWC) is the water purveyor for approximately 39 % of the influent the District receives in the service area.

Much of the water conservation promotion is currently being undertaken by the Lake Alpine Water Company. Most significantly, Lake Alpine Water Company installed residential water meters for all its customers in 2008 and since this period water delivered to LAWC customers has decreased dramatically. Decreases have resulted not only from decreased consumption based on new usage fees but from the ability of LAWC to identify and quickly remedy water lost through faulty winterizing of vacation homes in the area as well as through pipe breaks due to freezing.

The water conservation efforts undertaken by Lake Alpine Water Company are consistent with the intent of the District's Water Conservation Plan as a means to minimize extraneous flows into the wastewater system. The District does not believe that it is cost effective to duplicate efforts of the Lake Alpine Water Company; however, it has supplemented those efforts as warranted.

It should be noted that water conservation within homes and businesses in the District may continue to reduce the annual volume of water arriving at the WWTF and that wastewater may contain higher concentrations of contaminants, if all other factors in the homes and businesses remain the same. Thus, excessive water conservation measures have the potential to increase the risk for the District of failing to comply with effluent limitations.

3.2 I/I Reduction Activities

The Bear Valley Water District continues to implement Infiltration and Inflow (I/I) reduction activities to reduce wastewater volume. During 2020, these activities included continued annual systematic assessments of the collection system. The assessment consists of hydro jetting, video analysis and flushing of collection lines to identify potential problem areas.

In an effort to cost effectively maximize the I/I reduction program as it relates to the collection system, the District purchased a digital push camera in 2013 to conduct its own collection line

CCTV video analysis. Additionally, the District invested in a trailer jetting unit in August 2018 to perform its own pipe segment cleaning. Pre-cleaning is performed prior and to enhance the quality of CCTV inspection and allows the District to rely less on costly contract jetting and CCTV services. These investments have enabled the District to increase the frequency of which the entire 83,210 linear feet (15.76 miles) of gravity collection system is assessed on a recurring basis by increasing the linear feet of collection system cleaned and assessed annually.

During 2020, 30,650 linear feet (37 %) of the gravity collection system was flushed, 17,194 linear feet (21 %) of the collection system was hydro-jetted, and 11,367 linear feet (14 %) was investigated by CCTV video using the District's sewer camera to identify collection system defects, such as root intrusion, cracked pipe, and pipe separations. In 2020, the District's video analysis found several damaged pipe segments of which all were repaired in August and September 2020.

In addition to these collection system measures, the District has continued efforts to reduce the influx of storm water into the polishing reservoir. Typically, subsurface and surface flow of snowmelt storm water may contribute as much as 60 % to the storage volume of the reservoir. In late 2011, the consulting firm MWH independently evaluated the existing storm water diversion system and made recommendations for improvements. In 2012, the District re-graded the existing diversion ditch in general conformance with MWH's option 3, as found in their December 2011 Memo, "Bear Valley Water District Polishing Reservoir Influx Mitigation Study." Per MWH's Memo, this improvement is estimated to improve the ditches performance to divert storm water flow from the reservoir by 25 percent, which is an approximate reduction of 10 million gallons during a 1- in-100 water year.

SECTION 4 – HYDRAULIC CAPACITY EVALUATION

4.1 Influent Flows

During the 2020 water year (October 2019 to September 2020) total annual influent flow was approximately 18.55 million gallons (MG), with the highest influent flow months being April and May. The highest daily influent flow was 202,000 gallons per day and occurred on April 17, 2020. WY 2020 total influent flows (18.55 MG) were approximately 6.65 MG less than WY 2019 total influent flows of 25.20 MG. WY 2020 influent flows are summarized in Table 1 below.

Table 1 - WY 2020 Influent Flows

Month and Year	Influent Flow (gallons)	Peak Day Flow (gal/day)
October 2019	501,000	35,000
November 2019	499,000	34,000
December 2019	1,002,000	67,000
January 2020	897,000	69,000
February 2020	1,154000	72,000
March 2020	2,015,000	98,000
April 2020	3,864,000	202,000
May 2020	3,494,000	165,000
June 2020	1,656,000	67,000
July 2020	1,331,000	71,000
August 2020	1,137,000	50,000
September 2020	1,001,000	66,000
Total Water Year	18,550,000	--

4.2 Projected Influent flows

As of this writing, wastewater influent flows for the 2021 water year are anticipated to be similar to or perhaps modestly higher than the 2020 water year. This estimate is a function of similar early water year (October, November, December) conditions in the region and the absence to date of any large hydraulic or "atmospheric river" events which have characterized more extreme water years such as WY2017 (36.46 MG) where influent flows were approximately 60 % higher than average. The increase in atmospheric river events as well as the quantity and duration of the snowmelt period remain the controlling factors in determining if available WWTF storage is

adequate and if a discharge to surface waters (Bloods Creek) will be utilized as permitted under Order R5-2019-0078.

As of this writing, current conditions in the region suggest the 2021 water year will result in average to below average snowfall as the region experiences early winter drought-like conditions. California's first snow survey of the year found the statewide snowpack to be just 52% of average on January 1. Moreover, climatologists are cautioning stakeholders to prepare for extended dry conditions. However, it should also be remembered that 2019 experienced record snowfall in February 2019 following a dry early season and conditions affecting storage capacity can change very quickly.

Conversely, at the same time, a corresponding increase in tourism and residential occupancy rates as a consequence of the COVID 19 virus resulting in proportionally greater commercial and residential waste generation is also anticipated for WY21. A comparison of WY Q1 influent flows (October, November and December) for 2019 and 2020 are summarized in Table 2 below.

Table 2 – Comparison of Q1 WY 2019 v WY 2020 Influent Flows

Month	2019 Influent Flow (gallons)	2020 Influent Flow (gallons)	% Change
October	501,000	707,000	41.12 %
November	499,000	622,000	24.65 %
December	1,002,000	823,000	(21.65 %)
Q1 Total	2.002.000	2,152,000	7.50 %

4.3 Storage and Disposal Summary

Land discharge at the Bear Valley Water District WWTF is required to be maximized in order to minimize the potential for a surface water discharge to Bloods Creek. The magnitude of the discharge is largely controlled by the amount of precipitation, particularly snowfall, and the timing of the snowmelt period. In light of the reduced precipitation during WY2020 as well as the quantity and duration of the snowmelt period, the District experienced increased available storage capacity and no surface water discharge to Bloods Creek was necessary during WY2020.

Provision IX.B of the District's Monitoring & Reporting Program (MRP) requires the District to electronically submit self-monitoring reports (eSMRs) using the State Water Board's California Integrated Water Quality System (CIWQS) Program Web site. The District submitted monthly SMR's including the results of all required monitoring on or before the due date according to the reporting schedule of the current Order. On October 15, 2020, the Central Valley Water Board staff reviewed the electronic self-monitoring reports (eSMRs) submitted by the Discharger for the May 2020 through August 2020 monitoring periods. No discharge to surface waters occurred during the period reviewed and no violations on the WDRs or MRP were identified from review of the eSMRs.

Effluent land disposal began on June 2, 2020 on Fields 1 – 9 (approximately 32.90 acres) with approximately 32.30 MG in storage. Effluent disposal to land via spray irrigation involves the disbursement of the effluent through low impact, high uniformity, Nelson sprinkler heads upon soils and vegetation within the disposal area. The average monthly application rates to the 32.90 acre spray field area during the peak disposal months of 2020 ranged from approximately 2.721 – 8.398 MG per month (0.083 MG – 0.255 MG per acre per month). The water is allowed to percolate into the soil and evapotranspirate into the atmosphere.

The disposal season ended on September 16, 2020, when the effluent storage reservoir was essentially empty (e.g., no carryover) and could no longer be feasibly pumped by existing equipment. A summary of irrigation disposal operations during 2020 is presented in Table 3.

Table 3 - 2020 Land Disposal Season Summary

Month and Year	Monthly Disposal Volume (gal)	Maximum Acreage Applied	End of Month Storage Volume (Million gallons)
June 2020	8,398,000	32.9	23.90
July 2020	9,527,000	32.9	14.37
August 2020	9,993,000	32.9	4.377
September 2020	2,721,000	32.9	0.00
Total 2020 Disposal Season	30,639,000	--	

Note that the naturally irregular bottom of the reservoir, coupled with limitations to measuring elevations of effluent occurring in low spots, prevents exact estimates of the small amount of

wastewater remaining in storage when the reservoir is nearly empty and cannot be pumped with existing equipment.

However, District staff assessed the storage reservoir minimum pool volume on October 2, 2013, and, with the assistance of the District engineer, determined the minimum pool volume to be approximately 14,000 gallons, significantly less than the estimated volume of 5 MG derived from 1974 Construction Drawings and as reported prior to 2012. Accordingly, the volume of wastewater remaining at the end of the disposal season, and at minimum pool, is considered negligible.

On May 29, 2020 the Division of Safety of Dams (DSOD) performed a routine inspection of the dam, reservoir, valve controls and appurtenances. The dam uses a steel pipe encased in reinforced concrete as a low-level outlet at the north dam. The outlet controls consist of an upstream slide gate and a downstream gate valve. The controllers for the upstream slide gate and downstream gate valve appeared well maintained. However, the upstream slide gate control would not operate properly at the time of the inspection and DSOD requested the District make necessary arrangements to cycle all valve controls during the next inspection.

As depicted in photos of the storage reservoir below, as of October 1, 2020 the reservoir was below minimum pool as the District further pumped remaining water out of the reservoir to evaluate the upstream gate valve to determine its condition. Upon investigation the upstream gate appears to require either repair or replacement and the District is targeting the summer of 2021 to empty the reservoir again and perform the work as required by DSOD.

Approximate reservoir storage volumes on October 1 for the previous 10 years dating back to 2011 are presented in Table 4 below:

Table 4 – Comparison of Reservoir Volumes on October 1 for Previous 10 Years

DATE	VOLUME (MG)
October 2011	50 MG
October 2012	Negligible
October 2013	0.014
October 2014	0.014
October 2015	0.014
October 2016	0.014
October 2017	0.014
October 2018	0.014
October 2019	0.014
October 2020	0.000

4.4 Projected Water Balance

The District's storage reservoir was aerial surveyed on September 23, 2013 and several discrepancies were identified between the actual reservoir and the 1974 construction drawings, which previously formulated the basis for the storage reservoir size and capacity.

The 2013 aerial survey and analysis indicates that the reservoir is only 18.6 acres in gross area (not 21.3 acres) and the total storage capacity is 76.4 million gallons (not 106 million gallons). These values suggest that input from I/I into the ponds (directly and from snowmelt on adjacent land) may be less than previously estimated. The District has incorporated the 2013 surveyed storage capacity into their evaluation of maximum wastewater flows, including I/I, which will be contained during a maximum precipitation year with a 1-in-100 year return frequency.

The District Engineer revised and updated the District's water balance in August 2017 following the adoption of NPDES Order R5-2016-0045 and the collection of valid creek flow data for Bloods Creek for the entire permitted discharge period of January through June. In addition, the first successful surface discharge during the March through June 2017 period provided the District Engineer the opportunity to update its 1-in-100 year water balance to verify the assumptions, limitations and capacity determinations which were utilized in previous water balances.

Based on the updated water balance, the latest projected capacity of the District has been determined to be 1196 additional equivalent dwelling units (EDUs) assuming no infiltration associated with any new connections. Attached as Appendix A. is the District's 2020 updated water balance that provides detail on treatment and disposal calculations for this capacity determination.

SECTION 5 - LAND DISPOSAL AGREEMENTS

Current Land Disposal Agreements are as follows:

1. United States Forest Service (USFS) Special Use Permit (SUP) #1029-01
    a. 40 acres of Sprayfield - Expired July 1, 2015 (In Renewal Phase)
    b. 20 Acres of Buildings and Transmission Lines - Expired July 1, 2015 (In Renewal Phase)
2. C. Bruce Orvis and TBH Partners - 118 acres - Expires December 7, 2048.
3. C. Bruce Orvis and TBH Partners - Sewer Line Easement - Expires December 7, 2048. (Applies to surface discharge outfall facilities outside of long-term lease land)

The USFS and BVWD have been working closely to maintain continued land use within federally permitted limits. Following the June 16, 2011 expiration of the temporary 10-year, 40 additional acre amendment to SUP #1029-01 ratified in 2001, the USFS and BVWD have been working to better craft the District's remaining 40 acre SUP to better match actual land use. To this end, the USFS performed a site visit in 2012 and, together with District staff, used global positioning (GPS) technology to better identify the District's current land disposal array. This visit yielded a map which now defines the active SUP.

On May 28, 2014, the District provided a copy of communication with a USFS representative reflecting their intent to renew the special use permit in accordance with Order No. R5-2011-0053, Special Provision VI.C.2.c. Subsequently, a meeting was held with the USFS Calaveras District Ranger, Forest Supervisor, and three other USFS representatives on January 9, 2015 to further discuss District use of federal land for effluent spray field application. All indications from the USFS representatives were that the 20 year permit expiring in 2015 would be renewed in the form of a two permits: one, 40 year permit for permanent infrastructure and conveyance systems (lift stations and collection lines) and one, 10 year permit for effluent spray field application. With respect to the 10 year permit, the USFS recommended the District begin to consider purchasing the land from the federal government through the Townsite Act to ensure long term, sustainable control of these areas for spray field purposes.

On March 17, 2015, in advance of the July 1, 2015 expiration date, the District submitted Standard Form 299, "Application for Transportation and Utility Systems and Facilities on Federal Lands" to the USFS to trigger the SUP reissuance process.

As of April 2019, the USFS informed the District that the Stanislaus National Forest has pushed the project as far as they were capable and that the renewal is now on a list of projects at the USFS regional office in Vallejo to conduct and finish the NEPA review prior to permit renewal. According to officials at the Stanislaus National Forest, as resources become available the project is expected to be added to the program of work at the regional office in the next few years. However, depending on what new projects and priorities the USFS Regional office takes on it may still take several years or longer for this renewal project to be accepted and listed as a priority.

SECTION 6 - SLUDGE/SOLID WASTE DISPOSAL

6.1 Treatment Lagoon

Effluent is transferred from the District's headworks following preliminary treatment to a 14.18 million gallon (MG) two cell, aerated treatment lagoon for secondary biological nutrient removal. While in the two cell lagoon system, the solids are largely consumed and/or sequestered as air is delivered to a network of fine and coarse bubble diffusers strategically positioned in the secondary treatment lagoon. The aeration and mixing strategy employed by the District suspends solids sufficiently for successful floc formation permitting efficient biological consumption of most solids.

The District completed a comprehensive upgrade to the wastewater treatment lagoon in October 2019. The scope of this upgrade included removal of the original and failing coarse bubble diffuser array and installation of twelve (12) new Triplepoint Mars T-Series Double Bubble™ high efficiency fine and coarse bubble diffusers in both cells. Additionally, the original buried air header which carried air to the original diffusers was abandoned and a new CPVC air header was installed. Lastly, the District replaced the original cedar baffle wall that had largely disintegrated over the last 45 years and restored the lagoon to its original two cell design, increasing the lagoon's retention time which has improved effluent quality, modestly reduced overall sludge and reduced energy consumption.

Limited sludge at the WWTF has accumulated at the bottom of the two cell treatment lagoon since the lagoon was brought online in 1974. The sludge depth at the bottom of the treatment pond is measured annually by District staff using a combination of a sludge judge and Secchi Disc. Sludge measurements on November 4, 2020 revealed that the sludge depth ranged from approximately 6" to as much as 36". According to the solids distribution in the lagoon, there remains accumulation at the inlet, in the far ends and corners, near the baffle wall in both cells and particularly at the point where effluent passes through the baffle wall from cell 1 to cell 2. This solids distribution pattern is reasonable based on the location of the inlet and outlet structures and the locations of highest loading correspond roughly to points historically known to trap solids.

In general, the organic solids loading rate on the pond system appears to be so low compared to their natural decay and consumption rate that no material accumulation of sludge appears to

have occurred over the past 45 years. At some point in the distant future, if the lagoon upgrades do not accomplish this on their own, the treatment lagoon may require sludge to be mechanically removed and disposed of at an appropriate landfill.

The following table presents results of annual sludge monitoring performed on October 11, 2020 of the District's treatment lagoon.

Table 5 - Annual Sludge Monitoring

Sampling Date	October 11, 2020
Cadmium (mg/L)	<0.25
Chromium (mg/L)	<0.10
Copper (mg/L)	<3.0
Lead (mg/L)	<0.50
Nickel (mg/L)	<5.0
Zinc (mg/L)	<5.0

6.2 Lift Stations

At the headworks of the WWTF, the most common materials generated generally include grease, sediment, and minor non-organic solid waste. The items not shredded during pretreatment are removed as necessary from the waste stream and disposed of in local, municipal waste transfer stations bound for landfill. Meanwhile, annual organic solids removal at all four (3) District lift stations is routinely performed each September or October and was completed this year by El Dorado Septic on October 12, 2020.

SECTION 7 - ANNUAL WATER SUPPLY AND POND MONITORING

7.1 Annual Water Supply Monitoring

Annual water supply monitoring was conducted on October 11, 2020 in which six (6) samples were taken to include all available unique sources of water used by District customers, including three (3) discrete springs, two (2) wells and the surface water treated by the Lake Alpine Water Company sourced from Bear Lake.

The following table presents results of annual water supply monitoring as a percentage of influent for potable water served by Lake Alpine Water Company (surface water – about 7.29 MG or 39 % of influent), the Bear Valley Mountain Resort Lodge (spring - about 2.7 % of influent), the Lake Alpine Lodge (well - about .50 % of influent), the USFS Lake Alpine Campgrounds (well - about 1.45 % of influent), the Old Subdivision (spring) and the Bear Valley Mountain Resort Shop (spring) (percentage of influent not available).

Table 6 - Annual Water Supply Monitoring

	Lake Alpine Water Co. (Surface Water)	Bear Valley Mountain Resort Lodge (Spring)	Old Subdivision (Spring)	Lake Alpine Resort (Well)	Bear Valley Mountain Resort Shop (Spring)	USFS Lake Alpine Campgrounds (Well)
Sampling Date	10/11/20	10/11/20	10/11/20	10/11/20	10/11/20	10/11/20
% of Influent	39 %	2.7 %	N/A	0.5 %	N/A	1.45 %
Boron (mg/L)	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060
Sodium (mg/L)	7.3	2.6	3.4	2.2	8.9	5.9
Iron (mg/L)	<0.050	<0.050	<0.055	<0.050	<0.050	<0.050
Manganese (mg/L)	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060	<0.0060
Calcium (ug/L)	28,000	6,300	9,200	4,700	13,000	13,000
Magnesium (ug/L)	340	2,200	3,000	1,500	800	240
Chloride (mg/L)	8.7	0.26	0.29	0.52	0.29	0.52
Hardness, Total (mg/L)	71	25	35	18	36	34
Specific Conductance (EC) (umhos/cm)	187.8	70.2	99.7	56.3	119.1	109.8
Total Dissolved Solids (mg/L)	120	63	85	56	77	88

7.2 Annual Pond Monitoring

Municipal wastewater contains numerous dissolved inorganic waste constituents which are forms of salinity that may pass through the treatment process and soil profile. Effective control of long term impacts on groundwater quality relies on monitoring and effective source control. As described in Order No. 05-01-208, even in the best of circumstances, long-term land discharge of treated municipal wastewater may potentially degrade groundwater with salt and the individual components of salts (e.g. sodium, chloride).

Order No. 05-01-208 stipulates annual pond monitoring, including sampling and analysis, of boron, chloride, iron, manganese, and sodium. Certain constituents (e.g. sodium, chloride, boron) are useful indicator parameters for evaluating the extent to which effluent reaches and potentially degrades groundwater. Other constituents (e.g. iron, manganese) are useful indicators to determine whether components of the WWTF with high-strength waste constituents, such as sludge handling facilities, may be ineffective in containing waste.

The following table summarizes the annual pond monitoring results for these constituents sampled on October 11, 2020. Note, due to expedited discharge of effluent from the District's storage reservoir to permit for evaluation of the upstream slide gate control found to not operate properly during a routine DSOD inspection, insufficient water remained available in the storage reservoir to sample for these constituents this cycle.

Table 7 - Annual Pond Monitoring

CONSTITUENT	STORAGE RESERVOIR	TREATMENT POND
Boron (mg/L)	N /A	<0.060
Chloride (mg/L)	N /A	21
Iron (mg/L)	N /A	0.38
Manganese (mg/L)	N /A	0.071
Sodium (mg/L)	N /A	20

BEAR VALLEY WATER DISTRICT, 2020 ANNUAL REPORT

Appendix A. 2020 Water Balance - Prepared January 30, 2021

APPENDIX A. 2020 WATER BALANCE

BEAR VALLEY WATER DISTRICT WASTEWATER TREATMENT AND DISPOSAL SYSTEM 1/29/2018 13:13

(2017 update- 2011 Precip. Pattern) 1 in 100 Year Water Balance Projection - 2000 thru 5/2016 90TH Percentile monthly ADF plus 1196 RLU (201 gpd/RLU) - Assumes no infiltratin with new RLUs

INPUT DATA

TREATMENT POND CHARACTERISTICS		STORAGE RESERVOIR		IRRIGATION AREA CHARACTERISTICS		CLIMATOLOGICAL FACTORS	
GROSS AREA (ac).....	3.2	GROSS AREA (ac).....	18.6	DISTRICT DISPOSAL LAND (AC).....	80		
WATER SURFACE AREA (ac).....	2.9	MAX. WATER SURFACE (ac).....	14.2	SOIL WATER DEFICIT BEFORE IRRIGATION (IN).....	n/a	OCT-APR EVAP/AVG EVAP RATIO.....	0.76
				FRACT OF LAND IRRIGATED	n/a	MAY-SEP EVAP/AVG EVAP RATIO.....	1.00
		STORAGE CAPACITY (MG).....	76.43	IRRIGATION EFFICIENCY (DECIMAL FRACT).....	n/a	PAN COEFFICIENT.....	0.80
		FRAC EST. PERC.....	1.0	FRACTION OF EST. PERC RATE	n/a	LAND PRECIP COLLECTED (FRAC).....	0.9

PARAMETER / MONTH	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	ANNUAL
DAYS IN MONTH	30	31	31	28	31	30	31	30	31	31	30	31	365
AVG PAN EVAP (IN)	0.89	0.61	0.76	0.83	2.14	3.69	5.34	6.64	7.63	6.87	5.17	3.05	43.62
ESTIMATED PRECIP (IN)	10.66	20.00	2.84	10.62	21.42	3.37	4.65	1.57	1.66	0.00	1.86	4.35	83.00
ESTIMATED SNOW ACCUM (IN Water)$_{(g)}$	7.82	23.83	26.08	36.04	53.71	41.62	22.88	0.00	0.00	0.00	0.00	2.96	
ESTIMATED SNOW MELT IN MONTH (IN Water)	0.00	0.00	0.36	0.12	0.71	13.40	21.11	22.88	0.00	0.00	0.00	1.42	60.00
ESTIMATED NEW SNOW IN MONTH (IN Water)	7.82	16.01	2.61	10.08	18.38	1.30	2.37	0.00	0.00	0.00	0.00	1.53	60.11
ESTIMATED MAX PERCOLATION (IN)$_{(a)}$	10.0	29.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
# OF ADDITIONAL CONNECTIONS (RLU)	1,196	1,196	1,196	1,196	1,196	1,196	1,196	1,196	1,196	1,196	1,196	1,196	
ADDITIONAL INFLUENT FLOW (GAL/D)	240,396	240,396	240,396	240,396	240,396	240,396	240,396	240,396	240,396	240,396	240,396	240,396	
90TH PERCENTILE EXISTING FLOWS (Avg. GAL/D)	35,340	75,835	83,020	108,476	123,884	184,549	184,888	125,446	74,976	64,231	40,142	32,953	
TOTAL INFLUENT FLOW (GAL/D)	275,736	316,231	323,416	348,872	364,280	424,945	425,284	365,842	315,372	304,627	280,538	273,349	

CALCULATIONS

	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	ANNUAL
WASTEWATER VOLUME (gal)	8,272,080	9,803,161	10,025,896	9,768,416	11,292,680	12,748,350	13,183,804	10,975,260	9,776,532	9,443,437	8,416,140	8,473,819	122,179,575
EVAPORATION (IN)	0.5	0.4	0.5	0.5	1.3	2.2	4.3	5.3	6.1	5.5	4.1	1.9	32.6
PRECIPITATION (IN)	10.66	20.00	2.84	10.62	21.42	3.37	4.65	1.57	1.66	0.00	1.86	4.35	83.00
TREATMENT POND													
PERCOLATION (IN)	8.38	5.41	12.69	7.74	5.73	21.66	15.57	17.29	4.18	2.11	2.81	2.97	106.55
PERC VOLUME (gal)	659,620	426,378	999,502	609,371	451,372	1,705,370	1,226,247	1,361,614	329,361	166,362	221,115	233,864	8,390,176
EVAP. VOLUME (gal)	39,374	31,499	39,374	39,374	102,372	173,244	338,614	417,361	480,359	433,111	322,864	149,620	2,567,166
PRECIP. VOLUME (gal)	917,603	1,721,582	244,465	914,160	1,843,814	290,087	400,268	135,144	142,891	0	160,107	374,444	7,144,564
TREATMENT DISPOSAL(GAIN)/ (gal)	218,609	1,263,705	(794,411)	265,415	1,290,070	(1,588,528)	(1,164,593)	(1,643,831)	(666,829)	(599,473)	(383,872)	(9,040)	(3,812,778)
POLISHING RESERVOIR													
PERCOLATION (IN)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PERC VOLUME (gal)	0	0	0	0	0	0	0	0	0	0	0	0	0
W.S. AREA (ac)$_{(b)}$	6.20	9.37	11.21	11.71	12.19	12.46	11.02	10.79	9.80	9.69	6.30	2.57	
EVAP. VOLUME (gal)	84,162	101,769	152,244	158,953	430,172	744,194	1,286,794	1,553,151	1,623,738	1,446,786	700,934	132,594	8,415,492
PRECIP. VOLUME (gal)	5,032,887	9,614,764	1,379,515	5,172,859	10,461,230	1,648,344	2,256,279	760,823	799,978	0	878,649	2,010,894	40,016,223
MONTHLY AVAIL. SNOWMELT (IN)$_{(c)}$	0.00	0.00	0.36	0.12	0.71	13.40	21.11	22.88	0.00	0.00	0.00	1.42	60.00
ESTIMATED SNOW CONTR. (%)$_{(d)}$	0%	0%	0%	0%	0%	0%	45%	28%	50%	50%	50%	50%	
ESTIMATED AREA OF INFLUENCE (ac)	50	50	50	50	50	50	50	50	50	50	50	50	
ESTIMATED INFLUX TO STORAGE (gal)$_{(e)}$	0	0	0	0	0	0	12,897,727	8,697,780	0	0	0	966,122	22,561,629
RESERVOIR DISPOSAL(GAIN) (gal)	4,948,725	9,512,995	1,227,271	5,013,906	10,031,058	904,150	13,867,212	7,905,452	(823,760)	(1,446,786)	177,715	2,844,422	54,162,360
IRRIGATION													
IRRIGATION DISPOSAL (gal)$_{(f)}$	0	0	0	0	0	0	0	0	10,796,000	22,361,000	17,521,000	11,999,000	62,677,000
STORAGE													
BEGINNING STORAGE (gal)	4,060,000	17,499,415	38,079,276	44,138,032	50,185,768	53,699,576	35,763,549	33,049,972	21,686,853	19,176,796	4,212,974	0	
CALCULATED STORAGE GAIN (gal)	13,439,415	20,579,861	10,458,756	15,047,737	22,613,808	12,063,973	25,886,423	17,236,881	-2,510,057	-14,963,822	-9,311,017	-689,799	
PROJECTED ESTIMATED STORAGE (gal)	17,499,415	38,079,276	48,538,032	59,185,768	72,799,576	65,763,549	61,649,972	50,286,853	19,176,796	4,212,974	0	0	
AMOUNT DISCHARGED TO BLOODS CREEK (gal)	0	0	4,400,000	9,000,000	19,100,000	30,000,000	28,600,000	28,600,000	0	0	0	0	119,700,000
ESTIMATED STORAGE (gal)	17,499,415	38,079,276	44,138,032	50,185,768	53,699,576	35,763,549	33,049,972	21,686,853	19,176,796	4,212,974	0	0	

MAXIMUM STORAGE (MG)..... 53.70
AVAILABLE STORAGE (MG)..... 76.43

SUMMARY

ANNUAL INFLOW (MG)	
WASTEWATER	122.18
PRECIPITATION.....	47.16
SNOW INFLUX (MG).....	22.56
TOTAL	191.90

ANNUAL OUTFLOW POTENTIAL (MG)	
AMOUNT DISCHARGED TO BLOODS CREEK.....	119.70
EVAPORATION.....	10.98
PERCOLATION.....	8.39
IRRIGATION.....	62.68
TOTAL	201.75

OVERALL BALANCE	
UNUSED DISPOSAL CAPACITY (MG).....	5.79
(MUST NOT BE NEGATIVE)	
UNUSED STORAGE CAPACITY (MG).....	22.73
(MUST NOT BE NEGATIVE)	

(a) Estimated percolation based upon measured inflow components, estimated evaporation, and actual reservoir levels in 2011 - in Storage Reservoir only.
(b) Reservoir water surface area is a function of storage volume at start of month.
(c) Estimated snowmelt volume available for influx to storage reservoir.
(d) Estimated percentage of snowmelt contributing to influx to reservoir.
(e) Estimated based on fraction of accumulated snow within reservoir "area of influence" entering the reservoir during snowmelt months.
(f) Disposal capacity based on maximum estimated land disposal volumes.
(g) Per Bloods Creek Gauging Station
(h) Not used in calculations

BEAR VALLEY WATER DISTRICT WASTEWATER TREATMENT AND DISPOSAL SYSTEM 1/29/2018 13:14

(2017 update - 2017 Precip. Pattern) 1 in 100 Year Water Balance Projection - 2000 thru 5/2016 90TH Percentile monthly ADF plus 1196 RLU (201 gpd/RLU) - Assumes no infiltratin with new RLUs

INPUT DATA

TREATMENT POND CHARACTERISTICS		STORAGE RESERVOIR		IRRIGATION AREA CHARACTERISTICS		CLIMATOLOGICAL FACTORS	
GROSS AREA (ac)	3.2	GROSS AREA (ac)	18.6	DISTRICT DISPOSAL LAND (AC)	80		
WATER SURFACE AREA (ac)	2.9	MAX. WATER SURFACE (ac)	14.2	SOIL WATER DEFICIT BEFORE IRRIGATION (IN)	n/a	OCT-APR EVAP/AVG EVAP RATIO	0.76
				FRACT OF LAND IRRIGATED	n/a	MAY-SEP EVAP/AVG EVAP RATIO	1.00
		STORAGE CAPACITY (MG)	76.43	IRRIGATION EFFICIENCY (DECIMAL FRACT)	n/a	PAN COEFFICIENT	0.80
		FRAC EST. PERC	1.0	FRACTION OF EST. PERC RATE	n/a	LAND PRECIP COLLECTED (FRAC)	0.9

PARAMETER / MONTH	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	ANNUAL
DAYS IN MONTH	30	31	31	28	31	30	31	30	31	31	30	31	365
AVG PAN EVAP (IN)	0.89	0.61	0.76	0.83	2.14	3.69	5.34	6.64	7.63	6.87	5.17	3.05	43.62
ESTIMATED PRECIP (IN)	3.17	8.48	30.79	22.56	5.72	9.28	1.10	1.91	0.00	0.00	0.00	0.00	83.00
ESTIMATED SNOW ACCUM (IN Water)(g)	2.23	4.46	27.12	42.39	39.69	38.40	0.00	0.00	0.00	0.00	0.00	0.00	
ESTIMATED SNOW MELT IN MONTH (IN Water)	0.82	1.06	0.00	1.29	8.10	10.33	38.40	0.00	0.00	0.00	0.00	0.00	60.00
ESTIMATED NEW SNOW IN MONTH (IN Water)	3.05	3.29	22.66	16.56	5.40	9.04	0.00	0.00	0.00	0.00	0.00	0.00	60.00
ESTIMATED MAX PERCOLATION (IN)(a)	10.0	29.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
# OF ADDITIONAL CONNECTIONS (RLU)	1,196	1,196	1,196	1,196	1,196	1,196	1,196	1,196	1,196	1,196	1,196	1,196	
ADDITIONAL INFLUENT FLOW (GAL/D)	240,396	240,396	240,396	240,396	240,396	240,396	240,396	240,396	240,396	240,396	240,396	240,396	
90TH PERCENTILE EXISTING FLOWS (Avg. GAL/D)	35,340	75,835	83,020	108,476	123,884	184,549	184,888	125,446	74,976	64,231	40,142	32,953	
TOTAL INFLUENT FLOW (GAL/D)	275,736	316,231	323,416	348,872	364,280	424,945	425,284	365,842	315,372	304,627	280,538	273,349	

CALCULATIONS

	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	ANNUAL	
WASTEWATER VOLUME (gal)	8,272,080	9,803,161	10,025,896	9,768,416	11,292,680	12,748,350	13,183,804	10,975,260	9,776,532	9,443,437	8,416,140	8,473,819	122,179,575	
EVAPORATION (IN)	0.5	0.4	0.5	0.5	1.3	2.2	4.3	5.3	6.1	5.5	4.1	1.9	32.6	
PRECIPITATION (IN)	3.17	8.48	30.79	22.56	5.72	9.28	1.10	1.91	0.00	0.00	0.00	0.00	83.01	
TREATMENT POND														
PERCOLATION (IN)	8.38	5.41	12.69	7.74	5.73	21.66	15.57	17.29	4.18	2.11	2.81	2.97	106.55	
PERC VOLUME (gal)	659,620	426,378	999,502	609,371	451,372	1,705,370	1,226,247	1,361,614	329,361	166,362	221,115	233,864	8,390,176	
EVAP. VOLUME (gal)	39,374	31,499	39,374	39,374	102,372	173,244	338,614	417,361	480,359	433,111	322,864	149,620	2,567,166	
PRECIP. VOLUME (gal)	272,871	729,951	2,650,375	1,941,944	492,372	798,814	94,687	164,411	0	0	0	0	7,145,425	
TREATMENT DISPOSAL(GAIN)/ (gal)	(426,123)	272,074	1,611,500	1,293,199	(61,372)	(1,079,801)	(1,470,174)	(1,614,564)	(809,720)	(599,473)	(543,979)	(383,484)	(3,811,918)	
POLISHING RESERVOIR														
PERCOLATION (IN)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
PERC VOLUME (gal)	0	0	0	0	0	0	0	0	0	0	0	0	0	
W.S. AREA (ac)(b)	6.20	9.02	10.52	12.32	13.41	13.33	12.67	12.50	10.89	10.58	9.12	6.65		
EVAP. VOLUME (gal)	84,162	97,925	142,888	167,265	473,377	796,269	1,479,375	1,799,534	1,803,763	1,580,200	1,015,010	343,175	9,782,944	
PRECIP. VOLUME (gal)	1,496,647	4,068,510	14,898,468	11,026,175	2,812,579	4,561,027	538,670	934,466	0	0	0	0	40,336,541	
MONTHLY AVAIL. SNOWMELT (IN)(c)	0.82	1.06	0.00	1.29	8.10	10.33	38.40	0.00	0.00	0.00	0.00	0.00	60.00	
ESTIMATED SNOW CONTR. (%)(d)	100%	100%	100%	100%	40%	40%	30%	0%	0%	0%	0%	0%		
ESTIMATED AREA OF INFLUENCE (ac)	50	50	50	50	50	50	50	50	50	50	50	50		
ESTIMATED INFLUX TO STORAGE (gal)(e)	1,115,930	1,434,767	0	1,753,604	4,399,951	5,611,532	15,638,956	0	0	0	0	0	29,954,738	
RESERVOIR DISPOSAL(GAIN) (gal)	2,528,414	5,405,352	14,755,579	12,612,514	6,739,152	9,376,289	14,698,250	(865,067)	(1,803,763)	(1,580,200)	(1,015,010)	(343,175)	60,508,335	
IRRIGATION														
IRRIGATION DISPOSAL (gal)(f)	0	0	0	0	0	0	0	0	10,796,000	22,361,000	17,521,000	11,999,000	62,677,000	
STORAGE														
BEGINNING STORAGE (gal)	4,060,000	14,434,371	29,914,958	51,907,933	66,582,062	65,452,522	56,497,361	54,309,241	34,204,870	30,571,918	15,474,682	4,810,833		
CALCULATED STORAGE GAIN (gal)	10,374,371	15,480,587	26,392,975	23,674,129	17,970,460	21,044,839	26,411,880	8,495,628	-3,632,951	-15,097,236	-10,663,849	-4,251,841		
PROJECTED ESTIMATED STORAGE (gal)	14,434,371	29,914,958	56,307,933	75,582,062	84,552,522	86,497,361	82,909,241	62,804,870	30,571,918	15,474,682	4,810,833	558,993	=CARRYOVER	
AMOUNT DISCHARGED TO BLOODS CREEK (gal)	0	0	4,400,000	9,000,000	19,100,000	30,000,000	28,600,000	28,600,000	0	0	0	0	119,700,000	
ESTIMATED STORAGE (gal)	14,434,371	29,914,958	51,907,933	66,582,062	65,452,522	56,497,361	54,309,241	34,204,870	30,571,918	15,474,682	4,810,833	558,993		

MAXIMUM STORAGE (MG) 66.58

AVAILABLE STORAGE (MG) 76.43

SUMMARY

ANNUAL INFLOW (MG)	
WASTEWATER	122.18
PRECIPITATION	47.48
SNOW INFLUX (MG)	29.95
TOTAL	199.62

ANNUAL OUTFLOW POTENTIAL (MG)	
AMOUNT DISCHARGED TO BLOODS CREEK	119.70
EVAPORATION	12.35
PERCOLATION	8.39
IRRIGATION	62.68
TOTAL	203.12

OVERALL BALANCE	
UNUSED DISPOSAL CAPACITY (MG)	-0.56
(MUST NOT BE NEGATIVE)	
UNUSED STORAGE CAPACITY (MG)	9.85
(MUST NOT BE NEGATIVE)	

(a) Estimated percolation based upon measured inflow components, estimated evaporation, and actual reservoir levels in 2011 - in Storage Reservoir only.

(b) Reservoir water surface area is a function of storage volume at start of month.

(c) Estimated snowmelt volume available for influx to storage reservoir.

(d) Estimated percentage of snowmelt contributing to influx to reservoir.

(e) Estimated based on fraction of accumulated snow within reservoir "area of influence" entering the reservoir during snowmelt months.

(f) Disposal capacity based on maximum estimated land disposal volumes.

(g) Per Bloods Creek Gauging Station

(h) Not used in calculations