MEMORANDUM

TO: Wastewater Program
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FROM: Wendy Waudby, P.E., Staff Engineer, Boise Regional Office

DATE: April 28, 2016

SUBJECT: **M-129-03 Bruneau Water and Sewer District**
Staff Analysis Supporting Reuse Permit Issuance

Executive Summary

The recycled water system for the Bruneau Water and Sewer District (Bruneau) has been permitted for recycled water use since 1997. Bruneau's wastewater treatment system treats municipal flow from the City of Bruneau. The wastewater treatment and reuse system is permitted for Class D recycled water for land application during the growing season.

Bruneau did not land apply recycled water during the current permit cycle. However, Bruneau's single lagoon is inadequate as a total containment system and Bruneau is also using the abandoned north lagoon for wastewater storage. Bruneau is working toward a solution and evaluated alternatives in their 2013 Wastewater System Master Plan. The recommended alternative includes reconstructing the north lagoon and operating the wastewater treatment system as a total containment system with evaporative disposal, similar to the original design. The timing of the project is uncertain as the capital cost for the project may be a financial burden to the limited number of users of the wastewater system.

Limited monitoring was required during the current permit term because Bruneau did not apply recycled water. Bruneau's 2014 annual report consisted of soil monitoring results, while the other annual reports for the current permit consisted of Bruneau informing DEQ they did not land apply recycled water. Bruneau's last inspection showed maintenance of the system needs to improve. Large plants were growing on the lagoon dikes and some were taller than the disinfection building. Bruneau utilizes volunteers to operate and maintain the system.

Staff recommends reissuance of this reuse permit for a 5.5-year term.

1 Introduction

The purpose of this memorandum is to satisfy the requirements of section 400 of the Recycled Water Rules (IDAPA 58.01.17) for issuing recycled water reuse permits. It briefly states the principal facts and significant questions considered in preparing the draft permit and provides a summary of the basis for the draft permit conditions.

The Idaho Department of Environmental Quality (DEQ) issued Permit LA-000129-01 to the Bruneau Water and Sewer District (Bruneau) on April 22, 1997. Subsequent to receiving their first permit, Bruneau land applied recycled water in 1997 and 1998. However, Bruneau has not land applied since 1998 and Bruneau has operated their wastewater treatment system as a total containment system. Their first permit expired in April of 2002. In 2007, a new drinking water treatment plant (DWTP) began operating to remove arsenic and fluoride from the drinking water. The DWTP discharges their green sand filter backwash and reverse osmosis (RO) concentrate to the sewer system. The DWTP inhibited Bruneau's ability to continue to operate the wastewater treatment system as a total containment system. Representatives from Bruneau and DEQ met several times throughout 2008 and 2009 to discuss potential solutions to this situation, and it was eventually determined that the most cost effective and expedient solution would be to utilize the land application system to absorb the additional hydraulic load (Ogle 2009). Consequently, a permit renewal application was submitted to DEQ on February 26, 2009. The associated Staff Analysis was completed on March 20, 2009. Permit No. LA-000129-02 was issued on June 11, 2009 with the expiration date of June 11, 2014. Bruneau applied for a wastewater facility planning grant from DEQ in March of 2012. DEQ awarded the grant and Bruneau accepted in April of 2012. In 2013, Bruneau had a Wastewater System Master Plan (Master Plan) prepared and submitted to DEQ. The Master Plan was technically approved on December 13, 2013. The Master Plan was subsequently revised and resubmitted on January 7, 2016 and approved by DEQ on January 11, 2016.

This Staff Analysis is regarding the issuance of the third Reuse Permit for Bruneau, Permit M-129-03. The following is a brief summary of timelines:

- A pre-application workshop was not held. The permit renewal application was received on December 19, 2013.
- DEQ's Completeness Determination letter was dated January 16, 2014, which is the "effective date of application". A preliminary decision letter was not issued.
- The permit was automatically administratively extended, per the Recycled Water Rules, because a timely and sufficient application for permit renewal was received and determined complete prior to the expiration date of the permit.
- DEQ's most recent inspection was conducted on October 29, 2015.
- Additional information was received in December 2015 and January 2016 in response to questions and requests for clarification from DEQ.

2 Site Location and Ownership

Bruneau is located in southwestern Idaho in Owyhee County as shown in Figure 1. The City of Bruneau is located approximately 25 miles southwest of the city of Mountain Home, Idaho. The wastewater treatment facility is located on the north side of State Highway 51 and is approximately 0.4 miles west of the City of Bruneau.

The wastewater treatment facility consists of an influent lift station, the active south lagoon, a chlorine disinfection system, a sprinkler irrigation system, and a 5.66 acre reuse site. The reuse site is located adjacent to and east of the failed north lagoon. Bruneau owns the land the wastewater treatment facility occupies. The land to the north is an alfalfa field and is privately owned. The City of Bruneau's public school is located east of the reuse site as shown in Figure 2.

A single family home is located between the reuse site and the school and this home is owned and occupied by Bruneau's current Board President, who is also the operator of the wastewater treatment and reuse system. South of the south lagoon is a ditch followed by Highway 51. The land to the west of the south lagoon is privately owned and is undeveloped. The C.J. Strike Reservoir Wildlife Management Area is west of the wastewater treatment facility. Bruneau owns the field located south of the reuse site.

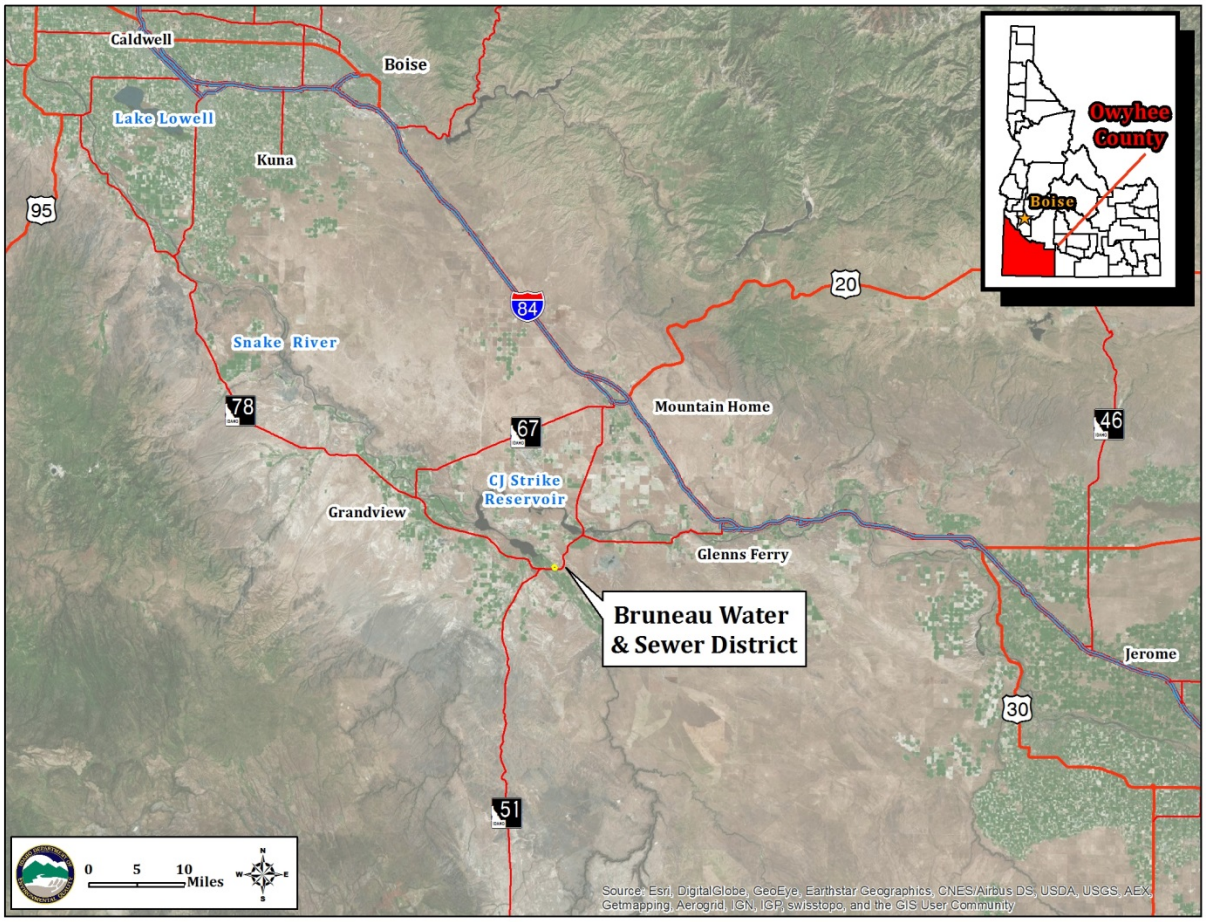

Figure 1. Vicinity Map

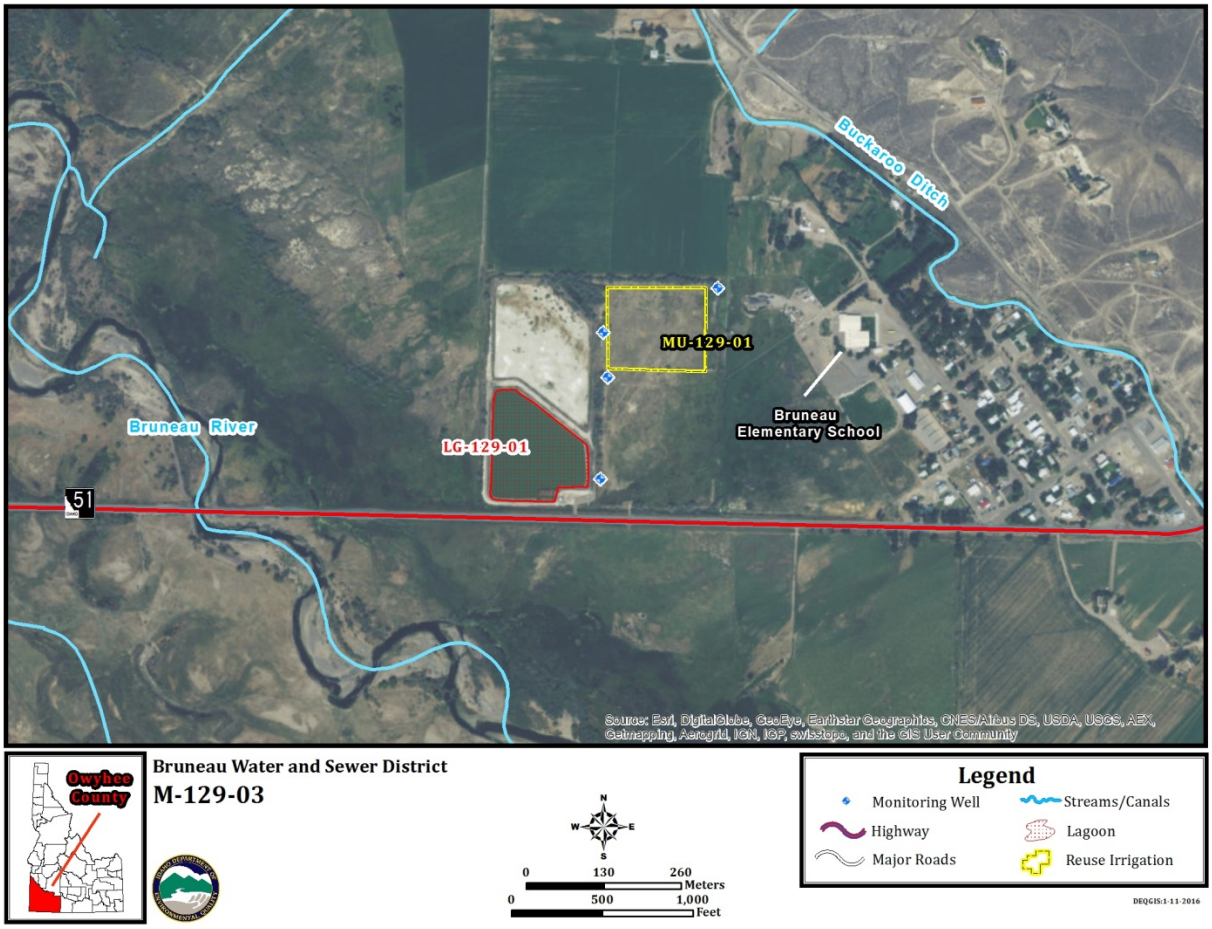

Figure 2. Site Map

3 Process Description

Bruneau's collection system currently serves all occupied areas of Bruneau. Bruneau has an estimated sewered population of 210 people (J-U-B 2013). The collection system consists of 12,640 linear feet of eight inch gravity collection mains and one lift station at the wastewater treatment facility (J-U-B 2013). Influent flow enters the lift station via an eight inch gravity sewer line, and is pumped through a six inch PVC pipeline to the lagoon inlet structure and then flows by gravity through an eight inch PVC pipe into the south lagoon (J-U-B 1998). The wastewater treatment system consists of the lift station, one facultative lagoon (south), a chlorine disinfection system, a sprinkler irrigation system, and a 5.66 acre reuse site. The lift station has two pumps and each pump has a capacity of approximately 150 gallons per minute, which is sufficient to meet the estimated flows in 2033 (J-U-B 2013). The capacity of the south lagoon is 4.15 million gallons. When the chlorine disinfection system is utilized, the operator adds hypochlorite granules to the contact channel, and then the effluent pump station is activated causing a chlorine solution to be injected at the inlet to the chlorine contact channel (J-U-B 1998). The chlorine contact channel is shown in Figure 3. The combined capacity of both irrigation pumps is 200 gpm and at this rate the chlorine contact channel would provide a contact time of approximately 170 minutes (J-U-B 2013).

Figure 3. View of chlorine contact channel looking west.

The system was originally designed as a total evaporative system with two lagoons. The north lagoon failed in 1984 due to high ground water. Evaluation of the failure and possible methods of rehabilitation of the north lagoon led to the conclusion that constructing a new treatment facility utilizing the south lagoon could be less expensive than rehabilitating the failed north lagoon (J-U-B 1991a). The 1991 facility plan update evaluated alternatives to the failed north lagoon and the recommended alternative was slow rate land application (J-U-B 1991b). Bruneau submitted their first application for a reuse permit in 1992. The north lagoon was abandoned and disconnected from the wastewater system in 1992. As part of the 1992 Wastewater Treatment Plant Modification Project, Bruneau increased the heights of the dikes of the south lagoon; and constructed the disinfection and irrigations systems, including the chlorine contact channel, and a drain around the property (J-U-B 1992a). The heights of the dikes were increased to increase the capacity of the south lagoon to provide adequate storage for six months while allowing a minimum depth to be maintained to protect against odors and potential impact on the liner from ground water (J-U-B 1991b). The drain runs from east to west along the north boundary of the reuse site and north lagoon, then runs south along the western boundaries of the north and south lagoons, and then connects to a pre-existing drain (J-U-B 1992b). The south lagoon has a section of liner which bubbled up in 2008 due to a low water level and high ground water (J-U-B 2013). No repairs were made to the liner and the south lagoon was able to pass a seepage test in 2010. The liner and seepage testing is discussed further in section 5.3.

A new drinking water treatment plant (DWTP) was constructed in 2006 to remove arsenic and fluoride from the drinking water. The sand filter backwash and RO concentrate from the DWTP are discharged into the sewer and flow to the wastewater treatment system. The flows from the DWTP more than doubled the flow into the wastewater treatment system. Neither the DWTP's reject flow nor the wastewater treatment system influent flow has a flow meter. The current approved Operation and Maintenance (O&M) Manual, dated August 1998, indicates the lagoon influent flow should be calculated using pump run times and the manufacturer's pump curve and the operator should track the flow. However, the influent flow has not been tracked during the current permit term. Wastewater flows were measured for the Master Plan during a fifteen day period in 2012 and the municipal flow was estimated by subtracting the DWTP flow from the total flow. Flow from the DWTP, from both the sand filter backwash and the RO concentrate, was approximately 30,165 gallons per day (gpd) and the municipal flow was estimated to be 20,422 gpd (J-U-B 2013).

Bruneau's operator indicated he tries to keep the south lagoon depth within a narrow range to keep pressure on the liner and ensure the ground water does not push up the liner. The O&M Manual states, "The lagoon water surface elevation must be maintained between the maximum elevation of 2488.2 (2.40 on the staff gauge) and the minimum elevation of 2485.9 (0.10 on the staff gauge)." Staff recommends the draft permit require Bruneau to monitor the lagoon depth to better enable Bruneau to land apply recycled water. Bruneau has not been applying recycled water to the reuse site. However, the operator indicated the south lagoon reaches capacity during the non-growing season and to reduce the water level in the south lagoon, water is pumped from the south lagoon to the abandoned north lagoon using temporary piping. DEQ has not approved the use of the abandoned north lagoon. Historical information regarding the north lagoon is provided in section 5.3.

Section 493.08.a. of the Wastewater Rules (IDAPA 58.01.16) requires three cells for a wastewater treatment pond system to facilitate both series and parallel operations. However, this section of the Wastewater Rules goes on to say two cell systems may be utilized in very small installations of less than fifty thousand gpd. The current municipal wastewater flow plus the DWTP wastewater flow is 50,588 gpd (J-U-B 2013), which puts Bruneau above fifty thousand gpd when the flows are combined. The current system of one active lagoon is problematic. Bruneau is working toward implementing the recommendations in the Master Plan, which would bring the system into compliance with the number of cells required in the Wastewater Rules.

The recommended alternative in the Master Plan includes (J-U-B 2013):

- Separation of the municipal and DWTP wastewater flows.
- Reconstruction of the north lagoon into two lagoons, one for municipal wastewater and one for DWTP wastewater, including removing the existing liner and installing underdrain systems and liners as shown in Figure 4.
- Total containment of municipal wastewater with evaporative disposal.
- Land application of the DWTP wastewater utilizing the existing irrigation pump station.

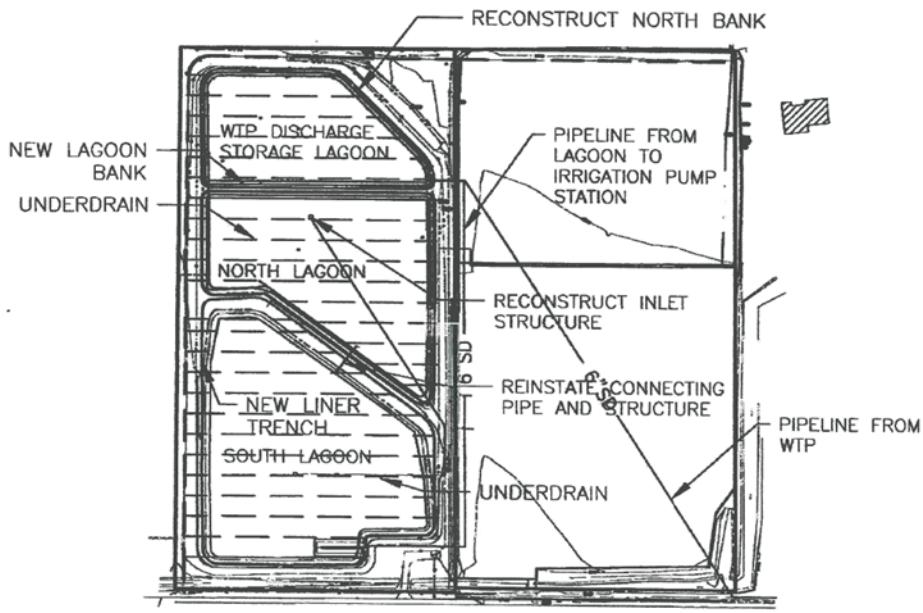

Figure 4. Master Plan Recommended Alternative Site Improvements (J-U-B 2013).

The estimated capital cost of for the entire project may be a financial burden to the limited number of users of the Bruneau wastewater system (J-U-B 2013). The Master Plan indicates the project could be phased to complete smaller portions as financing is available and facility upgrades are necessary. The Master Plan further indicates Bruneau's immediate need is the reconstruction of the portion of the north lagoon needed for wastewater treatment and disposal in order to provide additional capacity overall and additional lagoons. Once the DWTP and municipal wastewater flows are separated, the municipal stream will be less than 50,000 gallons per day. This reduced flow will allow for a wastewater treatment system of two lagoons in accordance with the Wastewater Rules. The construction of the underdrain system beneath a reconstructed north lagoon may ease or eliminate the concern of ground water intrusion under the liner of the south lagoon, which would allow the portion of the project of installing an underdrain system and new liner for the south lagoon to be delayed (J-U-B 2013). However, a minimum separation of two feet between the bottom of a lagoon and the maximum ground water elevation must be maintained in accordance with section 493.05.b of the Wastewater Rules. Staff recommends Bruneau collect ground water level data as discussed further in section 6.3. The underdrain design of the two proposed lagoons in the location of the existing north lagoon must provide two feet or more separation between the high ground water level and the bottom of the lagoons.

The existing irrigation system uses sprinklers and to meet the buffers required in the existing permit, the actual land area available for reuse would only be approximately 1.5 acres (J-U-B 2013) of the 5.66 acre reuse site. During the preceding and current permit renewals, Bruneau has expressed interest in replacing the solid set sprinkler irrigation lines with gated pipe for flood irrigation. The Master Plan indicates with flood irrigation the acreage available for land application considering buffers would be 5.62 acres. The current permit includes provisions for both sprinkler and flood irrigation and the draft permit does as well. The Master Plan used irrigation efficiencies of 65% for sprinklers and 45% for gravity, based on DEQ's Guidance for

Reclamation and Reuse of Municipal and Industrial Wastewater (DEQ Guidance) (DEQ 2007). If Bruneau moves forward with flood irrigation, then they must submit plans and specifications to DEQ for review and approval. The draft permit includes this requirement as indicated in section 9.2.

Bruneau does not have supplemental irrigation water rights. The Master Plan indicated Bruneau may be able to purchase supplemental irrigation water, however it is unlikely (J-U-B 2013). The supplemental irrigation water would be from the Buckaroo ditch, the source of which is the Bruneau River.

4 Site Characteristics

4.1 Site Management History

Recycled water was land applied in 1997 and 1998. The disinfection system and solid set sprinkler irrigation system were installed in 1992. Crops have not been harvested from the reuse site.

4.2 Climatic Characteristics

The climatic characteristics are described in section 2.2.3 of the Master Plan. Crop evapotranspiration for this location was taken from the ET_{Idaho} website located at: *http://data.kimberly.uidaho.edu/ETIdaho/* using the Bruneau National Weather Station (NWS) located at latitude 42° 53' North, longitude 115° 48' West at an elevation of 3,000 feet. The current permit specifies March 15 through October 31 as the growing season. The Master Plan indicates the crop will be alfalfa with less frequent cuttings. The precipitation deficit (Pdef), also known as the net irrigation water requirement, for the Bruneau NWS for alfalfa less frequent cuttings is shown in Table 1. There is a negative Pdef in January, November, and December and a minimal positive deficit in February. The Pdef for the month of March is 1.38 inches as shown in Table 1. AgriMet, for the Grand View weather station, indicates the start date when vegetative growth begins for alfalfa is February 15 and the termination date is October 10 (Agrimet 2015). Bruneau is located between the Grand View and Glenns Ferry AgriMet weather stations. The crop dates for alfalfa are the same for both weather stations. The draft permit maintains the growing season as March 15 through October 31. The growing season precipitation deficit for alfalfa, less frequent cuttings, is 40.1 inches (U of I 2012a).

Table 1. Precipitation deficit, alfalfa less frequent cuttings, Bruneau NWS (U of I 2012a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
						mm/day						
Mean daily Pdef	-0.11	0.10	1.13	4.19	5.28	5.44	6.05	5.49	4.07	2.20	-0.03	-0.17
						inches/month						
Mean monthly Pdef	-0.13	0.11	1.38	4.95	6.44	6.43	7.38	6.70	4.81	2.69	-0.04	-0.21

Bruneau has expressed interest in continuing to grow pasture grass on the reuse site without harvesting a crop. Bruneau would like to continue to graze horses and cows on the reuse site. The Pdef for the Bruneau NWS for grass pasture, low management is shown in Table 2 and is lower than the Pdef for alfalfa, less frequent cuttings. The growing season precipitation deficit for grass pasture, low management, is 31.5 inches (U of I 2012b).

Table 2. Precipitation deficit, grass pasture - low management, Bruneau NWS (U of I 2012b)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
						mm/day						
Mean daily Pdef	-0.19	0.04	0.83	3.01	4.12	5.00	5.67	4.30	2.51	1.10	-0.32	-0.18
						inches/month						
Mean monthly Pdef	-0.23	0.04	1.01	3.56	5.03	5.91	6.92	5.25	2.96	1.34	-0.38	-0.22

The average annual precipitation is 7.62 inches per year (WRCC 2010), of which 3.63 inches occur during the non-growing season (November 1 through March 14). The prevailing wind direction in the area is from the west to southwest, and the average wind speed is from five to seven miles per hour (J-U-B 2013). The annual average maximum temperature is 66.7 °F and annual average minimum temperature is 38.4 °F. Additional meteorological data can be found at: *http://www.wrcc.dri.edu/summary/climsmid.html.*

4.3 Soils

Bruneau is located in the Western Snake River Plain. Soil types present in the Bruneau area are described in section 2.2.1 of the Master Plan. A map of the reuse site was prepared using Natural Resources Conservation Service (NRCS) data. The predominant soil types are Bram silt loams with zero to two percent slopes and Garbutt silt loams with zero to four percent slopes. The farmland classification for the Garbutt silt loam is prime farmland if irrigated. The Bram silt loam is somewhat poorly drained and the farmland classification is not prime farmland. However, if irrigated, both of these soil types are suitable for agricultural production (Soil Conservation Service 1961). Additional soil information for the site can be found in the NRCS soil survey for the Owyhee County Area at:
http://www.nrcs.usda.gov/wps/portal/nrcs/surveylist/soils/survey/state/?stateId=ID

The current permit required soil sampling during the fall of 2014. Soil samples were collected during December of 2013. Soil sample results are shown in Table 3 and Table 4.

Table 3. 2013 Soil Sample Results (Western Laboratories.com 2013)

	Sample Location						
	A	**B**	**C**	**D**	**E**	**Average**	**Interpretation of Average**
pH	9.0	8.0	8.6	8.5	7.6	8.3	Moderately Basic
Soluble Salts	4.19	1.58	2.18	1.13	0.35	1.89	High
% Organic Matter	0.90	1.16	0.77	1.21	1.35	1.08	Very Low
Phosphorus (ppm)	39	4	3	5	3	11	Very Low
Potassium (ppm)	559	401	241	233	300	347	Adequate

Table 4. 2013 Soil Sample Nitrogen Results by Depth (Western Laboratories.com 2013)

	Sample Location					
	A	**B**	**C**	**D**	**E**	**Average**
Nitrates (ppm)						
0-12”	32	8	10	21	15	17
12-24”	17	7	60	13	24	24
24-36”	28	14	17	12	14	17
Ammonium (ppm)						
0-12”	4	3	3	3	2	3
12-24”	2	3	7	2	3	3
24-36”	3	2	2	4	2	3

Soil monitoring was only required and conducted once during the current permit term. Recycled water has not been applied during the permit term nor has a crop been harvested. The laboratory indicated the soluble salts were high, the percentage organic matter was very low, and the phosphorus was very low. Nitrate levels between 6 to 20 ppm and 21 to 40 ppm are considered medium and high, respectively (DEQ 2007). Staff recommends annual soil monitoring to better characterize the soil and effects of recycled water application on the reuse site. Staff recommends maintaining the nitrogen loading limit at 150% of typical crop uptake. Due to the high soluble salts results, the draft permit requires sodium adsorption ratio (SAR) monitoring. DEQ recommends monitoring the cation exchange capacity and the texture once during each permit cycle (DEQ 2007) and the draft permit includes this monitoring.

4.4 Surface Water

The Bruneau River is located approximately 700 feet from the southwest corner of the south lagoon and approximately 1,650 feet from the southwest corner of the reuse site. The beneficial uses of the Bruneau River in this area are agricultural water supply, industrial water supply, and primary contact recreation (DEQ 2012). The Snake River is approximately four miles north of the reuse site. Neither the Idaho Department of Water Resources nor the FEMA Flood Map Service Center had 100-year floodplain map data for the reuse site.

The Buckaroo Ditch runs from the southeast to northwest through Bruneau as shown in Figure 2. The Bruneau River provides water to the Buckaroo Ditch approximately eight miles southeast of

Bruneau. The closest portion of the Buckaroo Ditch is approximately 925 feet north of the reuse site. The area along the Bruneau River located south and west of Bruneau is classified as freshwater emergent, freshwater forested/shrub and riverine wetlands (J-U-B 2013). A ditch runs between Highway 51 and the south lagoon. There is a field south of the reuse site therefore it is unlikely runoff from the reuse site would enter this ditch. The ground water drain installed in 1992, and described in section 3, runs along the north boundary of the reuse site and connects to the ditch north of Highway 51. A runoff management section is required in the Plan of Operation (PO) in the draft permit, and is described in section 5.2, and should address the drain north of the reuse site.

A potential ground water connection to surface water exists with the Bruneau River. The Master Plan preliminarily reviewed pursuing a National Pollutant Discharge Elimination System (NPDES) permit and included the following as a complication, "The surface waters in the area drain to the Bruneau River and ultimately drain to the Snake River, which already has a waste load allocation for point source discharges under the Middle-Snake River and Upper-Snake River TMDLs. The District currently does not have waste load allocations for suspended solids and phosphorus as part of those TMDLs. Based on discussions with IDEQ, it is likely that the District would receive very low or no waste load allocations for suspended solids and phosphorus with a new NPDES permit."

The draft permit requires ground water monitoring and an irrigation management section in the PO as described in sections 5.9 and 6.3. At this time, the permit does not include a phosphorus limit. Land application did not occur during the current permit term and the phosphorus levels in the reuse site soil in 2013 were very low as shown in Table 3. Staff recommends phosphorus loadings be reviewed during the next permit renewal cycle.

4.5 Ground Water/Hydrogeology

The uppermost aquifer has a water level from four to ten feet below the ground surface depending on the time of year, with the highest ground water level at the end of the irrigation season. The ground water flow direction beneath the site is generally southwest toward the Bruneau River (Chen 1990). The soils consist of unconsolidated sediments with varying thicknesses of silts, sands, and clays to a depth of approximately 14 to 20 feet below ground surface followed by three to nine feet of moderately to highly permeable, poorly sorted gravels which directly overlie the Glenns Ferry Formation (Chen 1990).

A hydrogeologic investigation was conducted to ascertain the cause of the embankment slumping and associated failure of the liner along the northern margin of the north lagoon (Chen 1990). As part of this investigation, five groups of clustered piezometers and three single piezometers were drilled around the north lagoon to collect hydraulic head data as shown in Figure 5. Each group of clustered piezometers had piezometers completed to depths of 15, 25, and 35 feet below ground surface. The piezometers completed to 15 and 25 feet were completed within the shallow, unconsolidated alluvial deposits. The piezometers completed to 35 feet were completed within the deeper Glenns Ferry Formation. The investigation found the hydraulic head within the shallow alluvial deposits quickly responds to irrigation practices, while the finer grained Glenns Ferry Formation provides a delayed response to shallow ground water variations. The investigation also evaluated the potential impact to the south lagoon from ground water

levels and stated, “Groundwater level measurements also suggest that hydraulic pressure could build beneath the geomembrane of Cell 1 [the south lagoon] during the irrigation season. Most likely, the water stored inside the cell has offset this pressure, if any, preventing damage to the geomembrane. If the cell is ever emptied for cleaning or repair, the work should be done after the irrigation season to minimize the risk of membrane damage from hydrostatic uplift.” In 1992, a ditch was installed north of the north lagoon and reuse site and helped to drain the property upgradient of the north lagoon and deepen the shallow ground water depth by several feet (Bowser 1997).

The investigation took three ground water samples from piezometers in 1989 and the results are provided in Table 5 along with the current ground water quality standards from the Ground Water Quality Rule (IDAPA 58.01.11). Fluoride was above the primary constituent standard and iron was above the secondary constituent standard.

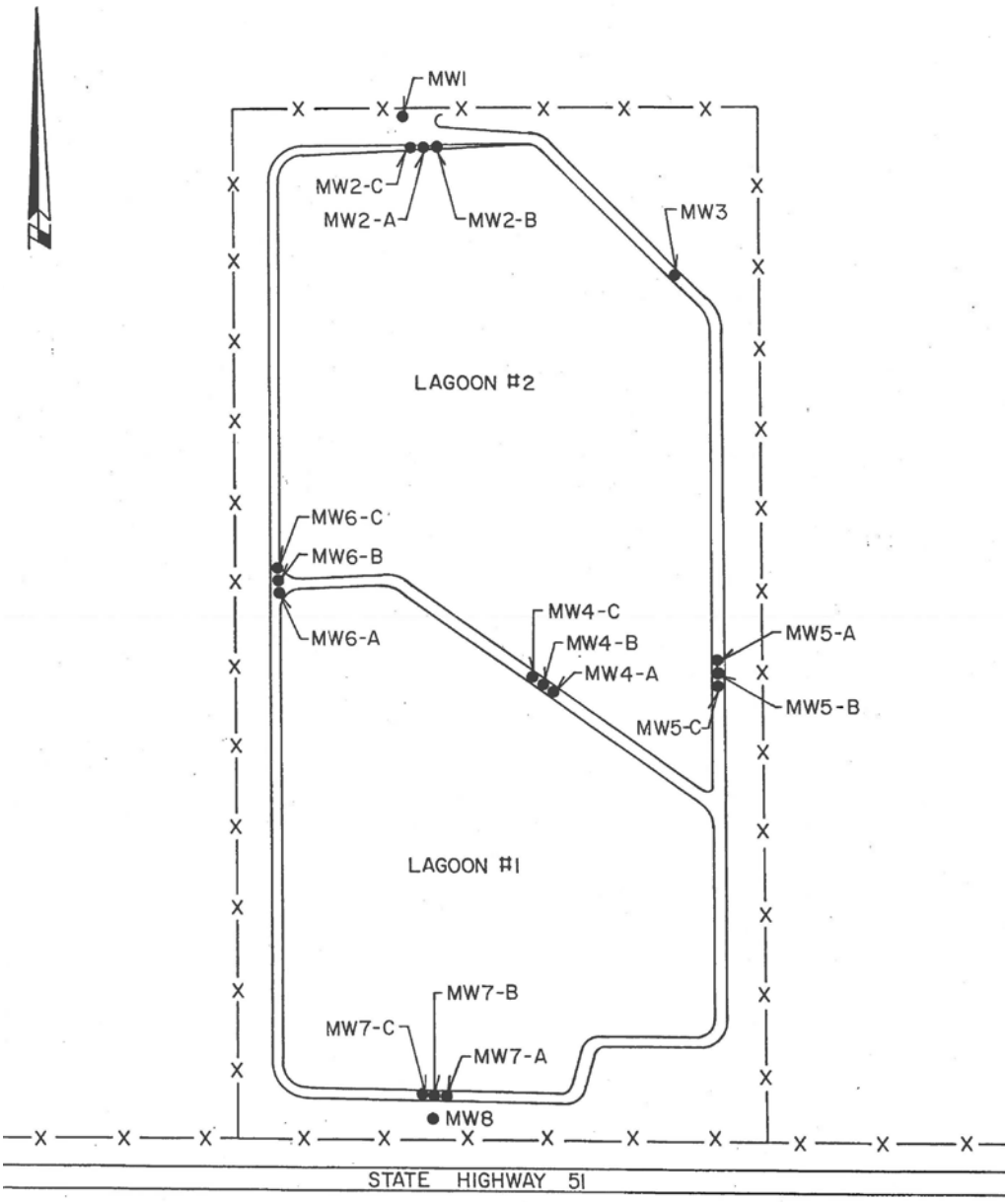

Figure 5. Piezometers installed for hydrogeologic investigation (Chen 1990).

Table 5. Ground Water Quality from Piezometers from 1989 Investigation (Chen 1990).

Constituents (mg/L unless otherwise specified)	Piezometer			Primary Constituent Standards*	Secondary Constituent Standards*
	4C	6C	7C		
Na	46	36	230		
Cl	9.3	5.6	35.2		250
F	**3.6**	**6.2**	**5.1**	**4**	
SO_4	24	17	71		250
Cr	<.010	<0.010	<0.010	0.1	
Fe	**1.01**	**2.08**	**3.79**		**0.3**
Pb	<.005	0.006	0.005	0.015	
Hg	<0.0005	<0.0005	0.0012	0.002	
Zn	0.016	0.023	0.025		5
Ortho-phosphate	0.005	0.018	0.101		
total phosphorus	0.69	0.72	2.7		
Nitrate as N	0.458	0.124	0.032	10	
Nitrite as N	0.002	0.009	0.011	1	
Specific Conductance (umhos/cm)	765	1470	854		

*From the Ground Water Quality Rule

In order to provide for future monitoring of ground water levels within the reuse site area, four 10-foot piezometers were installed when soil test pits were backfilled during the initial evaluation of the reuse site (J-U-B 1991a). The observations of the soil profile of the reuse site indicated the soils are very fine grained and the consultant cautioned Bruneau that proper operation of the application system is a must for successful treatment (J-U-B 1991a). Proper irrigation management will be essential and is discussed in section 5.9. No records were found indicating the piezometers at the reuse site were monitored and monitoring of piezometers was not required by the first or second permits. Staff recommends Bruneau monitor ground water levels to ensure land application of recycled water occurs when ground water is greater than three feet below the ground surface.

In addition to the piezometers discussed above, there are four ground water monitoring wells around the reuse site as shown in Figure 6. The current permit does not require ground water monitoring. The first permit required monitoring of the designated upgradient well, GW-129-04, and the designated downgradient well, GW-129-02, for constituents biannually in 1997 and 1998, and annually thereafter. Limited ground water data was collected from ground water monitoring well GW-129-02, as shown in Table 6. Well GW-129-02 is considered downgradient and is located just outside of the southwest corner of the reuse site as shown in Figure 6. In two of the three samples, the iron significantly exceeded the secondary constituent standard of the Ground Water Quality Rule. One sample was tested for total dissolved solids (TDS) and had a result of 485 mg/L, which is close to the secondary constituent standard of 500 mg/L. Only one sample from GW-129-04 was found, from October of 1996, and the result was a non-detect for total coliform. Staff did not find any records indicating ground water monitoring was conducted after 1998.

Figure 6. Ground water monitoring wells.

Table 6. Ground Water Monitoring Well GW-129-02 Water Quality Data.

Constituents (mg/L unless otherwise specified)	Oct-96	Dec-97	Oct-98	Primary Constituent Standards*	Secondary Constituent Standards*
Ammonia Direct		6.21	<0.04		
Chloride	25	24	14		250
Conductivity (umhos)	915	883	720		
Iron	**5.77**	**36**	**<0.05**		**0.3**
Nitrate-N	0.23	0.13	0.2	10	
TDS			485		500
TKN		2.53	0.24		
total coliform (CFU/100mL)	<3			1	
TSS		2640			

*From the Ground Water Quality Rule

Staff recommends including ground water monitoring in the draft permit due to shallow ground water; levels of fluoride, iron, and TDS above or near ground water quality standards in historical data; and the potential ground water connection to surface water discussed in section 4.4. The draft permit requires ground water monitoring as discussed in section 6.3.

The nearest public water supply wells are for the city of Bruneau and are located approximately half of a mile east of the reuse site. These wells are not downgradient of the ground water flow direction and are completed at over 300 feet deep. There is also a public water supply well on the other side of the Bruneau River approximately one mile southwest of the reuse site, which is 340 feet deep. These wells are not anticipated to be impacted by reuse operations.

4.6 Wastewater/Recycled Water Characterization and Loading Rates

4.6.1 Wastewater Characterization

The sources of wastewater to Bruneau are the municipal connections to the sewer system and the DWTP wastewater (reject water). There are two streams of wastewater from the DWTP, which are filter backwash and RO concentrate as discussed in section 3. For the Master Plan, these two streams were sampled for water quantity but not water quality. Bruneau sampled the streams in February of 2016 at the request of DEQ and results are shown in Table 7. The Master Plan considered the wastewater from the DWTP to have the same loadings as the municipal wastewater and indicated this was a conservative approach to evaluate alternatives. However, when existing waste loads were discussed, the Master Plan stated, “The water treatment plant waste is potable water with higher than normal concentrations of fluoride and arsenic and will not contribute additional sewer constituent loads.” The DWTP wastewater streams had very low concentrations of nitrogen and phosphorus as shown in Table 7. The TDS was less than 450 mg/L in the RO concentrate stream, as shown in Table 7, which is acceptable for reuse without anticipated restrictions on use (Metcalf & Eddy 2003). Additional water quality samples from the DWTP would be worthwhile. Staff recommends requiring sampling of the two DWTP wastewater streams for nitrogen, phosphorus, and dissolved solids.

Table 7. DWTP Wastewater Quality.

Parameter (in mg/L)	Sand Filter Backwash	RO Concentrate
Arsenic	Not tested	0.005
Nitrate + Nitrite (as N)	0.08	0.15
Total Phosphate (as P)	0.06	<0.05
Fluoride, F	Not tested	3.72
Total Dissolved Solids	126	442
Total Suspended Solids	7	<3

Minimal sampling of the influent municipal wastewater has been conducted. Influent and effluent wastewater treatment system samples were collected for the first permit application. The 1997 staff analysis indicated the COD was very high for a municipal wastewater and minimal reductions in COD and BOD were seen between influent and effluent samples suggesting a lack of treatment (Bowser 1997). The first permit required a study to assess the sources of COD and BOD in the wastewater. No records were found indicating the compliance activity was completed. The current permit requires monitoring of COD in the recycled water. However, since recycled water was not applied during the current permit term, no additional data is available. Staff recommends requiring monitoring of BOD and COD in both the influent wastewater and the recycled water to the reuse site.

4.6.2 Recycled Water Characterization

The current permit required recycled water monitoring for total Kjeldahl nitrogen (TKN), nitrate+nitrite-nitrogen, TDS, pH, COD, total phosphorus, and total coliform when Bruneau land applied. Recycled water has not been land applied since 1998; therefore recycled water

monitoring was not required or conducted during the current permit term. Staff recommends maintaining the monitoring requirements from the current permit and adding a BOD monitoring requirement as discussed in section 4.6.1.

Bruneau is classified as a Class D Recycled Water system. The Recycled Water Rules require the following total coliform limits for Class D systems:

- The median number of total coliform organisms does not exceed 230 total coliform organisms/100 mL, as determined from the bacteriological results of the last 3 days for which analyses have been completed.
- No sample shall exceed 2,300 total coliform organisms/100 mL in any confirmed sample.

These are the same limits in the current permit and in the draft permit.

4.6.3 Hydraulic Loading Rates

Recycled water has not been land applied since 1998. Due to high ground water levels, proper irrigation scheduling is critical. The O&M Manual includes steps for determining when to schedule application of recycled water including determining the availability of recycled water, determining the soil moisture content, reviewing the climatic conditions forecast, and ensuring loading limits will not be exceeded. Further details should be provided when the O&M manual is updated to a PO as required in the draft permit. An irrigation management section is a required component of the PO and is discussed in section 5.9. To ensure irrigation does not occur when ground water levels are less than three feet below the surface of the reuse site, ground water level monitoring is recommended in sections 4.5 and 6.3

The Master Plan indicates alfalfa will be grown on the reuse site. Currently crested wheat is grown on the reuse site and is not harvested. Bruneau has expressed interest in leaving the reuse site as is, continuing grazing, and not harvesting a crop. The hydraulic loading limit in the draft permit is substantially at the irrigation water requirement (IWR). The precipitation deficits for alfalfa and pasture grass are discussed in section 4.2. The irrigation efficiencies are discussed in section 3. The IWR is the precipitation deficit divided by the irrigation efficiency ($IWR=Pdef/E_i$). The IWR per acre for alfalfa for the growing season is 1.7 million gallons (MG) for sprinkler irrigation and 2.4 MG for flood irrigation, as shown in Table 8 and Table 9. The IWR per acre for pasture grass for the growing season is 1.3 MG for sprinkler irrigation and 1.9 MG for flood irrigation, as shown in Table 10 and Table 11.

Table 8. IWR per acre, for alfalfa-less frequent cuttings for sprinkler irrigation with 65% efficiency.

	Mar*	Apr	May	Jun	Jul	Aug	Sep	Oct	Growing Season Total
Pdef (inches/month)	0.76	4.95	6.44	6.43	7.38	6.70	4.81	2.69	40.2”
IWR (inches/month)	1.2	7.6	9.9	9.9	11.4	10.3	7.4	4.1	61.8”
IWR (MG/month)	0.03	0.21	0.27	0.27	0.31	0.28	0.20	0.11	1.7 MG

*March 15 to 31

Table 9. IWR per acre, for alfalfa-less frequent cuttings for flood irrigation with 45% efficiency.

	Mar*	Apr	May	Jun	Jul	Aug	Sep	Oct	Growing Season Total
Pdef (inches/month)	0.76	4.95	6.44	6.43	7.38	6.70	4.81	2.69	40.2”
IWR (inches/month)	1.7	11.0	14.3	14.3	16.4	14.9	10.7	6.0	89.2”
IWR (MG/month)	0.05	0.30	0.39	0.39	0.45	0.40	0.29	0.16	2.4 MG

*March 15 to 31

Table 10. IWR per acre, for pasture grass-low management for sprinkler irrigation with 65% efficiency.

	Mar*	Apr	May	Jun	Jul	Aug	Sep	Oct	Growing Season Total
Pdef (inches/month)	0.56	3.56	5.03	5.91	6.92	5.25	2.96	1.34	31.5”
IWR (inches/month)	0.9	5.5	7.7	9.1	10.6	8.1	4.6	2.1	48.5”
IWR (MG/month)	0.02	0.15	0.21	0.25	0.29	0.22	0.12	0.06	1.3 MG

*March 15 to 31

Table 11. IWR per acre, for pasture grass-low management for flood irrigation with 45% efficiency.

	Mar*	Apr	May	Jun	Jul	Aug	Sep	Oct	Growing Season Total
Pdef (inches/month)	0.56	3.56	5.03	5.91	6.92	5.25	2.96	1.34	31.5”
IWR (inches/month)	1.2	7.9	11.2	13.1	15.4	11.7	6.6	3.0	70.0”
IWR (MG/month)	0.03	0.21	0.30	0.36	0.42	0.32	0.18	0.08	1.9 MG

*March 15 to 31

The 1992 Wastewater Treatment Plant Modification Project, discussed in section 3, increased the capacity of the south lagoon to 4.15 MG to provide six months of storage at that time. The Master Plan analyzed the reuse system water balance with the existing municipal and DWTP wastewater flows, and assuming alfalfa is grown on the reuse site, and calculated an additional one million gallons of lagoon storage is required.

4.6.4 Constituent Loading Rates

Bruneau did not apply recycled water during the current permit term. The current permit has a nitrogen loading limit of 150% of typical crop uptake. The draft permit maintains this limit when a crop is harvested. The University of Idaho Extension publication, “Southern Idaho Fertilizer Guide Irrigated Pastures” (U of I 2009) recommends 50 pounds per acre of nitrogen for a 100% grass site with a yield potential of one to two acres. If a crop is not harvested and grazing is the only means of crop removal then the nitrogen loading is limited to 50 pounds per acre. The draft permit requires grazing management be addressed as part of the PO as indicated in section 8. The grazing management plan should not allow supplemental feed when animals are grazing the reuse site.

The current and draft permits do not limit phosphorus or non-volatile dissolved solids (NVDS). The current permit limits the recycled water COD loading to the reuse site to 50 pounds per acre per day as a seasonal average during the growing season. Since recycled water was not applied

during the current permit term, no COD data was collected as discussed in section 4.6.1. The draft permit maintains the COD limit.

5 Site Management

5.1 Buffer Zones

Buffer zones for protection of surface water, ground water, drinking water supplies, and the public are required by section 604 of the Recycled Water Rules. For this permit, the following scenario was used in determining buffer distances: municipal, rural location, sprinkler application and flood application. The location is categorized as rural though there is a public school and housing in close proximity to the reuse site as shown in Figure 2. A summary of buffer zones is shown in Table 12.

Table 12. Buffer zones (in feet), fencing, and posting

	Current Permit Buffer Requirements[1]		**Guidance Buffer Zone Requirements[2]**		**Actual Reuse Area Buffers**
Irrigation Type	Flood	Sprinkler	Flood	Sprinkler	
Nearest Inhabited Dwelling	300	500	300	500	~100 (east of MU-129-01)
Nearest Public Water Supply Well	1,000	1,000	1,000	1,000	2,500
Nearest Private Water Supply	500	500	500	500	670 (east of reuse site)
Areas Accessible to the Public	50	300	50	300	~80 north (agricultural field) ~375 east (school property) ~800 south (Hwy 51)
Nearest Surface Water	100	100	50	100	~1,650 southwest (Bruneau River) 4 miles north (Snake River)
Nearest Irrigation Ditches/Canals	50	50	25	50	~925 (Buckaroo Ditch) ~50 feet (drainage ditch on north side of reuse site)
Fencing	three-wire pasture fence		Medium security (example: 6' woven fence)	Low security (example: three-wire pasture fence)	4 to 5 barbed wire pasture fence
Posting	Every 500 feet		Every 500 feet around the perimeter of the reuse		Faded signs with unknown spacing

	Current Permit Buffer Requirements[1]	Guidance Buffer Zone Requirements[2]	Actual Reuse Area Buffers
		area and at any points of access into the reuse area	

1. Current Buffer Zone Requirements in Permit LA-000129-02.
2. DEQ Guidance provides recommendations for buffer distances, fencing, and posting for various reuse scenarios.

For the reuse site, DEQ Guidance buffer requirements are not satisfied for the distance to the nearest inhabited dwelling for both types of irrigation or for the distance to an area accessible to the public for sprinkler irrigation, as shown in Table 12 and Figure 7. The existing distances to wells are sufficient as shown in Table 12 and Figure 8. The Master Plan evaluated the reuse site for buffer zones and specified a reduced acreage for the reuse site to allow for adequate buffer zones as shown in Figure 9. Bruneau needs to order and install new signs to meet the current and draft permit posting requirements.

Figure 7. Reuse site inhabited dwelling buffers (300' flood and 500' sprinkler).

Figure 8. Wells in the vicinity of the reuse site (IDWR 2015).

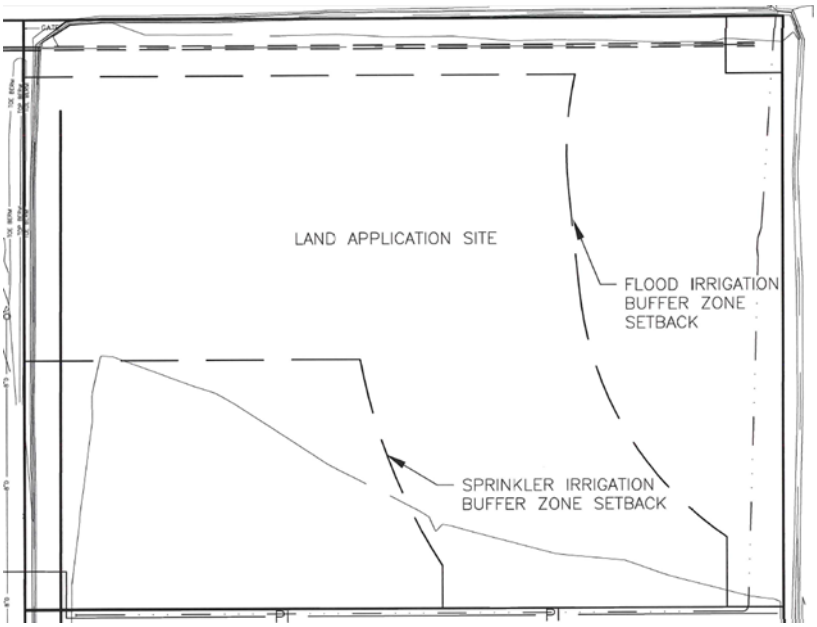

Figure 9. Buffer zone setbacks proposed in Master Plan (J-U-B 2013)

The current permit requires a three-wire pasture fence to enclose the treatment facilities and reuse site. The existing fence around the reuse site is a four to five wire pasture fence using barbed wire. The existing fence meets the current permit requirements and DEQ Guidance for sprinkler irrigation. For flood irrigation, current DEQ Guidance recommends a 6 foot woven fence. The Master Plan addressed the fencing around the lagoon once it is relined with HDPE and stated, “An eight foot high “deer proof” fence will be installed around the lagoons to provide a barrier to deer and other large animals that could damage the liner.” If flood irrigation is used, then fencing should be reevaluated to consider DEQ guidance recommendations. A compliance activity requiring fencing to be approved by DEQ prior to using flood irrigation is included in the draft permit as indicated in section 9.2. A buffer zone section is a required component of the PO required by compliance activity CA-129-01 in the draft permit (see section 8).

5.2 Runoff

No runoff management plan has been required for Bruneau in previous permits. A runoff management section is a required component of the PO required by Compliance Activity CA-129-01 in the draft permit (see section 8). The runoff management section of the PO shall include control structures and other best management practices (BMPs) designed to prevent runoff from the permitted site except in the event of a 25-year, 24-hour storm event or greater, using the Western Regional Climate Center (WRCC) Precipitation Frequency Map, Figure 28, ‘Isopluvials of 25-YR, 24-HR Precipitation. For this site, the 25-year, 24-hour event is 1.8 inches (WRCC 1973).

5.3 Seepage Rate Testing

The existing facilities consist of the abandoned north lagoon and the active south lagoon. The north side of the north lagoon failed in 1984 due to high ground water and was disconnected

from the wastewater system in 1992. A seepage test was conducted on the uncompromised portion of the north lagoon in late 2008 in an apparent attempt to show DEQ the lagoon could be used for overflow storage (Greear 2015). DEQ did not approve the north lagoon seepage test report. DEQ's February 4, 2009 response letter indicated the north lagoon had not been used, repaired, or regularly maintained since at least 1991 and the letter went on to state, "Given the current state of the cell walls and liner, along with the potential for ground water infiltration at this site, it is unclear that the North Lagoon can be successfully isolated, as is required for the purposes of seepage testing." DEQ further noted that continued use of the north lagoon for overflow capture and storage may result in adverse impacts to ground water and/or surface water quality. DEQ's 2009 staff analysis indicated the north lagoon should not be used for wastewater treatment or storage. The Master Plan recommends reconstructing the north lagoon into two cells with under drain systems as discussed in section 3. The draft permit does not include the north lagoon. Bruneau will need to request a permit modification if they move forward with constructing two lagoons in the location of the north lagoon.

The active south lagoon has a PVC liner with a six inch soil cover (J-U-B 2013). The south lagoon, as part of the wastewater treatment system, is described in Section 3. In 2008, Bruneau pumped down the south lagoon to fill part of the north lagoon to seepage test the north lagoon. The liner of the south lagoon bubbled up and was visible near the north edge of the lagoon (J-U-B 2013). The cause of the visible liner and associated bubble was thought to be ground water beneath the liner (J-U-B 2013). The portion of the south lagoon liner without soil cover may be more susceptible to degradation and is approaching the end of its expected usable life (J-U-B 2013). The Master Plan recommends removing the existing liner from the south lagoon, constructing an under drain system, and installing a new liner. However, the Master Plan recommended phased construction of the recommended alternative and the work on the south lagoon would be last. Bruneau has not provided a timeline for implementing the recommended alternative. Table 13 contains a summary of seepage rate testing for the south lagoon. The south lagoon, LG 129-01 requires seepage rate testing in 2020.

Table 13. Seepage rate testing

Lagoon	Lagoon Name	Test Date Completion	Date of DEQ approval of test report	Seepage rate, inches/day	Allowable rate, inches/day	Date next seepage rate test is due
LG-129-01	South	July 1998		0.12	0.125	
		September 2010	11/28/2011	-0.08	0.25	September 2020

Test procedures for completing seepage tests should be submitted at least 42 days prior to the due date shown in the table above.

Information on seepage testing procedures are located at: *http://www.deq.idaho.gov/water-quality/wastewater/lagoon-seepage-testing.aspx*

Seepage test requirements are found in section 493 of the Wastewater Rules: *http://adminrules.idaho.gov/rules/current/58/0116.pdf.*

5.4 Waste Solids, Biosolids, Sludge, and Solid Waste

A plan has not been developed for disposing of the solids accumulated in either lagoon. Solids have not ever been removed from the south lagoon (J-U-B 2013).Waste solids have not been applied to the reuse site. Waste solids (sludge) accumulate in the treatment lagoon and over time will build up to levels requiring removal. The Master Plan indicates no significant sludge accumulation has been visible after the south lagoon has been drawn down to provide winter storage volumes (J-U-B 2013); however, the Master Plan estimates there are 1.5 inches of solids accumulation in the south lagoon. The draft permit requires the development of a waste solids management section of the PO to address how sludge accumulation in the lagoon is monitored (including frequency), when sludge should be removed, how sludge will be removed, and how the sludge is treated and/or disposed of. A waste solids management section is a required component of the PO required by compliance activity CA-129-01 in the draft permit (see Section 8).

5.5 Nuisance Odors

The current O&M Manual does not address odor management. DEQ has not received any odor complaints. However, the operator indicated there is an odor associated with the lagoon for about three weeks in the late summer (August) when the lagoon is at its lowest point (Greear 2015). A nuisance odor management section is a required component of the PO required by Compliance Activity CA-129-01 in the draft permit (see section 8).

5.6 Cropping

The 5.66 acre reuse field is currently used for growing crested wheat. No other crops are used as rotation crops. A crop management plan is not a requirement in the current permit. The Master Plan indicates alfalfa will be grown on the reuse site when the site is irrigated with recycled water and the alfalfa would be harvested with less frequent cuttings. Bruneau has expressed interest in continuing to use the reuse site as pasture. The draft permit requires the development of a cropping section of the PO addressing any anticipated activities such as crop re-seeding, application of supplemental fertilizers, anticipated crop rotations, etc., which may be used to manage the reuse site. A cropping section is a required component of the PO required by compliance activity CA-129-01 in the draft permit (see Section 8).

5.7 Grazing

Section F of the current permit states, “Grazing shall be conducted in accordance with a DEQ-approved Grazing Management Plan.” (DEQ 2009). Bruneau has not submitted a grazing management plan. A local resident rents the reuse site and the pastureland to the south of the reuse site and grazes his animals there. For approximately three months during the growing season, horses and cows graze the reuse site. An inspection was conducted on October 29, 2015 and the inspection report indicated the health of the crop did not appear to be compromised by grazing (Greear 2015).

The recycled water uses were updated in the Recycled Water Rules in 2011, which was subsequent to the issuance of the current permit. Class D recycled water can be used to irrigate pasture for animals not producing milk for human consumption in accordance with the Recycled Water Rules. The cows used for grazing the reuse site in the past were not dairy cows. A grazing management plan is a required component of the PO required by Compliance Activity CA-129-01 in the draft permit (see section 8). The grazing management plan may be submitted with the PO or the plan can be submitted separately. The grazing management plan must be approved by DEQ prior to any further grazing activities on the reuse site.

5.8 Salts

Salts may be a concern for this permit. The 2013 soil sample results indicated the soluble salt levels in the soil are high as shown in Table 3. Very limited ground water sampling data has been collected as indicated in section 4.5. Staff found only one TDS ground water monitoring well sample and the result was 485 mg/L. The Secondary Constituent Standard for TDS in the Ground Water Quality Rule is 500 mg/L. A salt management section is a required component of the PO required by compliance activity CA-129-01 in the draft permit (see Section 8).

5.9 Irrigation Management

The current O&M manual includes limited irrigation management information as indicated in section 4.6.3. An irrigation management section is a required component of the PO required by compliance activity CA-129-01 in the draft permit (see Section 8).The irrigation management section of the PO should include irrigation scheduling, irrigation application rates, and discussions of irrigation pressures and pressure fluctuations. Irrigation efficiencies for the site irrigation systems must be included. The Master Plan used irrigation efficiencies of 65% for sprinklers and 45% for gravity and referenced DEQ guidance. The draft permit provides ranges of irrigation efficiencies, based on DEQ guidance, and requires each annual report to indicate the irrigation efficiency value used for calculations and the basis for irrigation efficiency value. The irrigation management section should include a discussion of managing irrigation application rates and duration to control runoff.

6 Monitoring

The proposed monitoring requirements for the draft permit are described in detail in the following subsections. All monitoring will be conducted in accordance with the facility's Quality Assurance Project Plan (QAPP) required by compliance activity CA-129-02. See Section 7 for requirements regarding the QAPP.

6.1 Wastewater/Recycled Water Monitoring

The current permit does not require influent wastewater constituent monitoring. However, the draft permit does require wastewater monitoring, as recommended in section 4.6.1. The draft permit requires wastewater monitoring of the two streams of wastewater from the DWTP in July, August, and September of 2016 in order to better characterize the water quality. The constituents

to be monitored are TKN, nitrate+nitrite-nitrogen, total phosphorus, NVDS, and TDS. The draft permit also requires monitoring the wastewater influent to the lagoon for BOD and COD monthly during July, August, and September of 2016 and during the first three months of land application during the current permit term.

The recycled water constituent monitoring required in the current permit is for COD, TKN, nitrate+nitrite-nitrogen, total phosphorus, TDS, pH, and total coliform. The draft permit requires monitoring all of these constituents monthly when land applying recycled water. In addition, the draft permit requires monitoring monthly, when land applying recycled water, for the following constituents: BOD, NVDS, and total chlorine residual.

The current permit does not require monitoring influent flow, though the O&M manual recommends monitoring influent flow. The draft permit requires influent wastewater flow monitoring based on pump run times. The flow measurements conducted for the Master Plan did not utilize the influent pumps to determine flows. Staff recommends including a compliance activity to verify calculations of influent flow based on pump run times are accurate. If the accuracy of the calculations is insufficient, then Bruneau should make recommendations for improving influent flow monitoring and a timeline for implementing improvements. Bruneau could recommend installing a flow meter. The current and draft permits require daily flow monitoring of recycled water, during periods of use. The draft permit requires monitoring of the depth of the lagoon, as recommended in section 3, daily when irrigating, weekly when not irrigating during the first 12 months after permit issuance, and monthly when not irrigating after the first 12 months after permit issuance.

6.2 Soil Monitoring

Soil monitoring objectives are discussed in Section 7.4.1 of the DEQ Guidance. Although reuse permits do not specify limits for soil parameters, soil monitoring data provides information necessary to manage reuse operations. First, the soils data is used for nutrient management. Analysis for macronutrients such as nitrogen and phosphorus are specified in the permit. Though not required by the permit, other nutrients such as potassium and micro-nutrients such as zinc, boron, calcium, magnesium, sulfate, copper, chloride, and molybdenum are typically monitored prior to planting crops to determine if any deficiencies or excesses are present that may impact crop health.

The second purpose of soil monitoring is to assess soil quality. This involves characterizing the chemical and physical properties of the reuse site and determining if any detrimental trends are occurring over time which will reduce the crop performance. The current and draft permits require monitoring soil quality parameters. Due to the high soluble salts results, SAR monitoring has been added to the draft permit as indicated in section 4.3. Buildup of soil salinity can be detrimental to crop health and reduce yield and under certain conditions. High levels of sodium can reduce the soil’s ability to infiltrate water and cause runoff and impact crop health. High levels of iron and manganese may be caused by anaerobic soil conditions due to excessive irrigation and/or high strength reuse water. The draft permit requires an irrigation management section of the PO, as discussed in section 5.9, to prevent excessive irrigation. High strength wastewater is not anticipated, however the draft permit retains the COD limit from the current permit as indicated in section 4.6.4.

The current permit required soil monitoring during the last year of the permit term for electrical conductivity, pH, nitrate, ammonium, and plant available phosphorus. The draft permit includes monitoring these constituents. As indicated in section 4.3, the draft permit requires annual soil monitoring as well as monitoring the cation exchange capacity and the texture once during the permit cycle.

6.3 Ground Water Monitoring

The purpose of ground water monitoring is to determine whether recycled water is being land applied and treated such that the waters of the state are protected for existing and projected future beneficial uses. Ground water monitoring is not required in the current permit and the associated staff analysis did not discuss historical ground water data or why ground water monitoring was not required (Ogle 2009). The current O&M Manual includes the ground water monitoring requirements from the first permit for Bruneau. The first permit required monitoring of the designated upgradient well, GW-129-04, and the designated downgradient well, GW-129-02, for static water level monthly, for constituents biannually in 1997 and 1998, and for constituents annually after 1998. The constituents listed to be monitored in the first permit were TKN, ammonium nitrogen, nitrate-nitrogen, total phosphorus, chloride, iron, manganese, specific conductivity, TDS, and total coliform. Historical ground water data is presented in section 4.5; however the monitoring data in DEQ's records is less than was required by the first permit. In the downgradient monitoring well, levels of fluoride and iron were above ground water quality standards, while TDS was slightly less than the standard. The only data for the upgradient monitoring well was one total coliform sample. The DWTP removes arsenic and fluoride from the water from a deeper aquifer as discussed in section 3. The RO concentrate from the DWTP flows to the wastewater treatment system. The ground water monitoring wells have not been tested for arsenic. The Ground Water Quality Rule primary constituent standard for arsenic is 0.05 mg/L. There is limited ground water monitoring data available to define ambient conditions and establish a water quality baseline for the facility.

Ground water monitoring can play a major role in evaluating and modifying treatment processes, management, and loading practices to protect and maintain ground water quality. There are four ground water monitoring wells, as shown in Figure 6. The draft permit includes ground water monitoring annually in April and October for the upgradient (GW-129-04) and downgradient (GW-129-02) wells for water table elevation, water table depth, nitrate-nitrogen, and total phosphorus. In addition, the draft permit requires ground water monitoring in April and October of 2017 and 2019 for arsenic, chloride, COD, fluoride, iron, manganese, TDS, and total coliform. The draft permit also requires the shallow ground water level be monitored by monitoring wells GW-129-02 and GW-129-04 to determine if there is an adequate separation between ground water and the ground surface for irrigation to proceed. The ground water level must be greater than or equal to three (3) feet below the ground surface in both wells before irrigation can proceed. Weekly monitoring will be required when irrigating.

The draft permit requires Bruneau to monitor ground water levels in the piezometers, shown in Figure 5, installed as part of the hydrogeologic investigation described in section 4.5. Staff recommends monitoring the ground water levels in the piezometers monthly during the first two years after permit issuance. The lagoon depth data, indicated in sections 3 and 6.1, and the

piezometer data will enable Bruneau to evaluate and update the operating water levels of the south lagoon recommended in the O&M Manual.

6.4 Supplemental Irrigation Water Monitoring

Bruneau does not plan to use supplemental water to meet crop requirements. The current permit required monitoring supplemental irrigation water flow. The draft permit does not include any supplemental water monitoring since supplemental irrigation water has not been utilized and is not likely to be available as indicated in section 3.

6.5 Crop Yield and Tissue Monitoring

The current and draft permits require annual monitoring of crop yield and crop nutrient uptake from crop tissue analysis or from standard tables. During the current permit term, Bruneau has not harvested crops from the reuse site or provided crop nutrient uptake data. The Master Plan indicates alfalfa will be grown on the reuse site and will be harvested with less frequent cuttings. Standard tables from the Natural Resources Conservation Service's Nutrient Content of Crops tool can be utilized to estimate crop nutrient uptake. If the nitrogen loading rate begins to approach crop nitrogen removal rate, then Bruneau should consider utilizing plant tissue analysis instead of standard tables to determine crop nutrient uptake. Crop nutrient removal calculations should be described in the PO required by Compliance Activity CA-129-01.

6.6 Meteorological Monitoring

Meteorological monitoring is not typically included in reuse permits. Runoff and nuisance odors will be addressed in the associated sections of the PO. The draft permit does not include meteorological monitoring requirements.

6.7 Calculation Methodologies

The PO should include the methods of calculation to determine permit compliance. The draft permit requires calculations in the Reporting Requirements section. The following describes recommended methods of calculation.

The IWR should be calculated with an irrigation efficiency corresponding to the type of irrigation such as flood or sprinkler. The IWR should be calculated using the tables for the Bruneau National Weather Station and corresponding to the type of crop grown as described in Section 4.6.3. The draft permit requires the permittee to indicate and provide the basis for the irrigation efficiency used in each annual report.

The draft permit requires daily monitoring of the volume of recycled water applied to the reuse site. The monthly hydraulic loading rate should be calculated by summing the daily hydraulic loading rates corresponding to each month.

Annual total nitrogen loading calculation from recycled water:

Calculate the pounds of nitrogen per acre for each month as follows:

$$\frac{(\text{monthly TKN + monthly nitrate+nitrite-nitrogen in mg/L})*\text{monthly flow in MGD}*8.34}{\text{acres utilized}}$$

Then sum all the months when recycled water was applied at the reuse site for the total nitrogen loading, in pounds per acre, from recycled water

Annual phosphorus loading from recycled water calculation:

Calculate the pounds of phosphorus per acre for each month as follows:

$$\frac{\text{monthly total phosphorus in mg/L}*\text{monthly flow in MGD}*8.34}{\text{acres utilized}}$$

Then sum all the months when recycled water was applied at the reuse site for the total phosphorus loading, in pounds per acre, from recycled water

Median number of total coliform organisms determined by the bacteriological results of the last three (3) days for which analysis have been completed:

Take current sample result and prior two samples results and arrange in order from least to greatest. The middle sample result is the median and should be reported.

Crop nutrient uptake:
If standard tables are used to calculate the crop nutrient uptake, then the Crop Nutrient Tool at the following NRCS website may be used:
http://www.plants.usda.gov/npk/main

7 Quality Assurance Project Plan

Bruneau has not yet completed a standalone QAPP. The current permit did not require a QAPP. The draft permit includes a compliance activity requiring Bruneau to prepare a QAPP as indicated in Section 9.2.

The QAPP is a written document outlining the procedures used by the permittee to ensure the data collected and analyzed meets the requirements of the permit.

In support of the agency mission, DEQ is dedicated to using and providing objective, correct, reliable, and understandable information. Decisions made by DEQ are subject to public review and may at times, be subject to rigorous scrutiny. Therefore, DEQ's goal is to ensure that all decisions are based on data of known and acceptable quality.

The QAPP is a permit requirement and must be submitted to DEQ as a stand-alone document for review and acceptance. The QAPP is used to assist the permittee in planning for the collection, analysis, and reporting of all monitoring data in support of the reuse permit and explaining data anomalies when they occur.

DEQ does not approve QAPPs, but reviews them to determine if the minimum EPA guideline requirements are met and that the reuse permit requirements are satisfied. The reason DEQ does not approve QAPPs is that the responsibility for validation of the facility sampling data lies with the permittee's quality assurance officer and not with DEQ.

The format of the QAPP should adhere to the recommendations and references in 1) the Assurance and Data Processing sections of the DEQ Guidance and 2) EPA QAPP guidance documents. EPA QAPP guidance documents are available at the following website: *http://www.epa.gov/quality/qapps.html*

8 Site Operation and Maintenance

The current O&M manual was prepared in 1998 and was approved by DEQ on September 7, 1999. The O&M includes a chapter on emergency plans and procedures. This information should be updated in the emergency operations section, which is a required component of the PO. The O&M manual includes a general maintenance schedule. At the 2015 inspection, no operation or maintenance records were available for review. The 2015 inspection report (Greear 2015) states, "Plants are growing in and around the lagoon. Roots can penetrate the liner and lead to excessive seepage, so at the least they need to be cut down. Caution should be taken when removing plants from the lagoon however, as their removal can damage the liner too." The plants in and around the south lagoon can be seen in Figure 3 and Figure 10. The plants growing on the north dike of the chlorine contact channel are taller than the chlorination building as shown in Figure 10. The O&M manual indicates weed control should be performed biannually and states, "The dikes and nearby areas should also have the weeds burned off once a year." Based on the size of the plants, it does not appear weed control has been conducted in accordance with the O&M manual.

A drain ditch was constructed in 1992 to reduce the ground water under the lagoons. The drain ditch is an important part of the treatment plant and requires maintenance in order to function properly (J-U-B 1998). Based on the 2015 inspection, it does not appear periodic ditch cleaning and rehabilitation has occurred in accordance with the O&M manual.

The draft permit includes a compliance activity requiring Bruneau to prepare a PO. The draft permit requires the PO to be submitted to DEQ for review and approval. The PO should reflect current operations and incorporate the permit requirements. The PO needs to comply with the applicable requirements stated in section 300.05 of the Recycled Water Rules and needs to address applicable items in the DEQ's PO Checklist. The PO should include updated operation and maintenance information, a grazing management plan, as well as the following sections:

- Buffer zones
- Cropping
- Emergency operations
- Irrigation management
- Nuisance odor management
- Runoff management
- Salt management
- Waste solids management

Bruneau submitted wastewater collection and treatment system classification worksheets in 2012. In letters dated March 26, 2012, DEQ determined Bruneau has a Class I Collection System and a Class I Treatment System for wastewater. The current wastewater collection and treatment system operator does not hold any operator licenses. The operator indicated the current drinking

water treatment operators may be able to help; however, they do not hold wastewater collection or treatment licenses. In addition to the wastewater collection and treatment licenses, a land application license is also required by the Wastewater Rules. Bruneau has an agreement with the person who uses the reuse site for pasture. However, the Master Plan indicates alfalfa will be grown on the reuse site and Bruneau has not determined who will farm the reuse site. Bruneau needs an operator with the following licenses at a minimum: wastewater collection operator-Class I, wastewater treatment operator - Class I, and wastewater treatment operator-land application. In addition to the responsible charge operator, Bruneau needs a substitute responsible charge operator as required by section 203.03 of the Wastewater Rules.

Figure 10. View looking east of south lagoon and chlorination building.

9 Compliance Activities

9.1 Status of Compliance Activities in Current Permit

1. CA-129-01. An updated PO was not submitted. This compliance activity required the updated PO be submitted by June 11, 2010. The current approved O&M manual is from 1998. The draft permit requires the O&M manual to be updated and incorporated into a PO to reflect the requirements of the draft permit as indicated in sections 8 and 9.2.

2. CA-129-02. This compliance activity required seepage testing of the south lagoon with test results due by June 11, 2010. A seepage test procedure was approved by DEQ on July 8, 2009. The revised seepage test procedure was submitted to DEQ on June 14, 2010. The revised procedure was approved by DEQ on June 16, 2010. The seepage test of the south lagoon was completed in September of 2010. DEQ indicated the south lagoon seepage test results were satisfactory in a letter dated November 28, 2011. Seepage testing of the south lagoon must be completed by September 2020 as indicated in sections 5.3 and 9.2.

3. CA-129-03. The Permit Renewal Application was submitted to DEQ on December 18, 2013. DEQ determined the application was complete on January 16, 2014.

9.2 Compliance Activities Required in New Permit

The following Compliance Activities are specified in the draft permit:

1. CA-129-01. Submit a PO that incorporates the requirements of the new permit within six months after permit issuance. For further information refer to section 8.

2. CA-129-02. Submit a Quality Assurance Project Plan, including verification the plan has been implemented by the facility, within six months of permit issuance. For further information refer to section 7.

3. CA-129-03. Submit lagoon seepage rate test proposed schedule and procedures at least 42 days prior to the planned seepage test. Complete the seepage test before September 2020. Submit the seepage test report within 90 days after completion of the seepage test. For further information refer to section 5.3.

4. CA-129-04. Verify influent flow calculations are accurate within three months after permit issuance. For further information refer to section 6.1

5. CA-129-05. Prior to applying recycled water to the reuse site using flood irrigation, receive approval of flood irrigation system and fencing around the reuse site. For further information refer to section 5.1.

6. CA-129-06. Schedule a Pre-Application Workshop twelve months prior to permit expiration.

7. CA-129-07. Submit a permit renewal application 180 days prior to expiration of the permit.

10 Recommendations

Staff recommends the draft reuse permit be issued for a 30 day public comment period. The duration of the draft permit is 5.5 years. The permit specifies hydraulic and constituent loading limits and establishes monitoring and reporting requirements to evaluate system performance, environmental impacts, and permit compliance.

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