

# TECHNICAL MEMORANDUM

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**To:** Nevada Environmental Response Trust

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**Cc:** Dan Pastor, Tetra Tech, Inc.

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**From:** April Hussey

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**Date:** April 20, 2018

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**Subject:** Operation and Maintenance Summary – March 2018  
Weir Dewatering Treatment Plant  
Nevada Environmental Response Trust; Henderson, Nevada

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The Southern Nevada Water Authority (SNWA) is completing two weir construction projects in the Las Vegas Wash, the Sunrise Mountain Weir and Historic Lateral Weir. SNWA has hired a construction company, Las Vegas Paving (LVP) to perform weir construction activities. This includes constructing diversion channels to divert the Las Vegas Wash and perform construction dewatering activities. The Nevada Environmental Response Trust (NERT or Trust) has been ordered by the Nevada Division of Environmental Protection (NDEP) to treat the groundwater from the construction dewatering activities to remove perchlorate before discharging the treated water to the Las Vegas Wash.

To manage and treat groundwater from the construction activities, Tetra Tech, Inc. (Tetra Tech) designed and constructed two pump stations and a central water treatment plant (CWTP), collectively referred to as the SNWA Weir Dewatering Treatment Plant (Treatment Plant). The Treatment Plant will operate on a temporary basis, and operations will cease once groundwater dewatering associated with the SNWA weir construction projects is complete.

At the direction of NERT, Tetra Tech has prepared this summary of the operation and maintenance (O&M) activities performed during March 2018 for the Treatment Plant. The system was operated and maintained in accordance with the *NERT – SNWA Weir Dewatering Water Treatment Plant Operation and Maintenance Manual*.

## SUMMARY OF O&M ACTIVITIES

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During March 2018, the Treatment Plant continued to receive water from weir construction dewatering activities at both the Sunrise Mountain and Historic Lateral Weirs.

## OPERATIONS

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Operations in March 2018 were characterized by intervals of high influent total suspended solids (TSS) concentrations as a result of LVP excavating dewatering trenches and pits. Treatment Plant National Pollutant

Discharge Elimination System (NPDES) water quality samples and influent flowrate monitoring confirmed the operations were in compliance with permit limits during the March 2018 reporting period.

## Flow Rates

Flow rates for March 2018 are summarized in Table 1. This includes a summary of the flow rate into the Historic Lateral Pumps Station (HLPS), into the Sunrise Mountain Pump Station (SMPS), and out of the Treatment Plant.

### Historic Lateral Pump Station

Flow rates into HLPS are variable based upon the number of dewatering pumps being used by LVP at the Historic Lateral Weir construction site. Each dewatering pump delivers approximately 800 gpm to 1,000 gpm to the HLPS. During March 2018, LVP increased the number of dewatering pumps (up to 6 pumps) at Historic Lateral Weir construction site resulting in higher dewatering flows than previously observed.

### Sunrise Mountain Pump Station

Flow rates into the SMPS were fairly consistent over the reporting period, reflecting consistent dewatering operations by LVP at the Sunrise Mountain Weir construction site using three dewatering pumps.

## Influent Parameters

Influent water quality parameters are measured daily for the water coming into each pump station. Influent water quality parameters measured include:

- Perchlorate
- Chlorate
- Total Dissolved Solids (TDS)
- Sulfate
- Nitrate

Perchlorate, chlorate, and TDS are analyzed at a certified laboratory (Test America) in accordance with the Operations and Maintenance Agreement, executed December 31, 2017. Sulfate and nitrate are also analyzed to capture a complete evaluation of these influent parameters. Prior to March 16, 2018, sulfate was analyzed at a certified laboratory while in-house laboratory methods were finalized. Similarly, prior to March 16, 2018, nitrate was analyzed at a certified laboratory except for samples collected on Saturdays, which were analyzed in-house due to the 48-hour hold time, and as described in previous monthly reports.

Beginning March 16, 2018, both nitrate and sulfate were analyzed exclusively by the in-house laboratory. Both nitrate and sulfate are analyzed according to EPA method 300.0. To confirm in-house procedures for exclusive analysis of nitrate and sulfate, relative percent difference (RPD) comparisons were conducted on 24 samples from influent to the HLPS and 29 samples from influent to the SMPS. RPDs of nitrate results ranged from 0.1% to 15.2%. RPDs of sulfate results ranged from 0.3% to 17.2%, which are within the 30% specified in the approved NERT project Quality Assurance Project Plan.

The range and average of perchlorate concentrations observed into each pump station during the reporting period were:

- HLPS: 69 to 246 µg/L, average: 159 µg/L
- SMPS: 964 to 1,440 µg/L, average: 1,196 µg/L

Table 2 contains the summary data from the daily influent parameter measurements.

## Perchlorate Mass Removal Estimates

Daily perchlorate mass removal estimates were calculated from the recorded total influent flow to the SMPS and HLPS and daily measurements of perchlorate (analyzed at Test America by Method 314.0). The mass removed was calculated based on an effluent perchlorate concentration of zero (0) µg/L. The estimated mass of perchlorate removed during March 2018 is:

- HLPS: 93 pounds
- SMPS: 924 pounds
- Total: 1,017 pounds

Perchlorate removal estimates have been tabulated since the startup period ended January 17, 2018. The estimated total perchlorate mass removed from January 18, 2018 through March 31, 2018 is:

- HLPS: 200 pounds
- SMPS: 2,053 pounds
- Total: 2,253 pounds

A graph showing the estimated removal of perchlorate from January 18 through March 31 is presented in Figure 1.

## Suspended Solids Removal and Management

The Treatment Plant was designed to remove the majority of suspended solids from the influent waters via hydrocyclones and multimedia filters (MMF). High TSS waste from the hydrocyclones are stored in the 20,000-gallon cyclone waste tank. High TSS waste from the MMFs is generated during the MMF backwash process and is stored in two 20,000-gallon backwash waste tanks. The system is designed to slowly blend in backwash waste and cyclone waste water into the treated effluent stream in small quantities to ensure the concentrations do not exceed the National Pollutant Discharge Elimination System (NPDES) permit discharge limits for perchlorate (18 µg/L) and TSS (135 mg/L).

To address the ongoing significant solids loading in the waters produced from weir construction, continued use of external tanks for cyclone and backwash waste surge and storage capacity and associated decanting system occurred in March 2018. These external surge tanks are connected to the permanent cyclone and backwash waste tanks with a semi-permanent hard-pipe system to reduce the potential for releases outside of containment. The piping system maintains all pumps and connections within secondary containment, and includes a pumping circuit to decant the water overlying settled solids from these tanks back into the SMPS influent tanks. In the month of March:

- 12 tanker truckloads of solids slurry were sent to the landfill, or 60,000 gallons of tanker capacity; and
- 851,600 gallons of water overlying settled solids were decanted from the surge tanks and routed back through the Treatment Plant (1,374,500 total gallons since start of decanting process).

## MAINTENANCE

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Maintenance performed at the Treatment Plant during the reporting period included both routine maintenance activities and non-routine maintenance activities as described in the following sections.

### Routine Maintenance

Routine maintenance activities included the following:

- Generators supplying power to the SMPS, HLPS, and CWTP require service approximately every 250 hours of generator run time. Generators were serviced during the reporting period as follows:
  - XQ500 – Unit 14-165, service conducted on March 14, 2018, and March 27, 2018
  - XQ350 – Unit 14-161 (at HLPS), service conducted on March 9, 2018, and March 24, 2018
  - XQ350 – Unit 17-249 (at HLPS), service conducted on March 9, 2018, and March 29, 2018
  - XQ350 – Unit 14-162 (at HLPS), service conducted on March 21, 2018
  - XQ350 – Unit 17-248 (at SMPS), service conducted on March 17, 2018
  - XQ350 – Unit 17-251 (at SMPS), service conducted on March 2, 2018, and March 21, 2018
  - XQ350 – Unit 17-250 (at SMPS), service conducted on March 2, 2018, and March 20, 2018
- Wye strainer was flushed periodically to clear solids accumulation.
- Cyclone underflow lines were flushed periodically to clear solids accumulation.
- Pump oil was changed on Pumps 6C and 6D.
- Tank level sensors were cleaned.
- Cyclone bolts were tightened and valves were greased.

## Non-Routine Maintenance

Non-routine maintenance was performed during March 2018 to improve Treatment Plant operation, including:

- Installed tank for improved water feed source for the polymer injection system at MMFs on March 1, 2018.
- Replaced mechanical seal on Pump 6D on March 5, 2018.
- Replaced gasket in manway for MMF 1B on March 6-7, 2018.
- Optimized tank level sensor configuration in influent, effluent, and rinse water tanks on March 6-8, 2018.
- Adjusted MMF flow meters on March 8, 2018.
- Adjusted MMF 1 and 3 differential pressure sensors on March 8, 2018.
- Installed new mechanical seal and coupler in Pump 6B on March 6-7, 2018.
- Installed secondary nuts to all multimedia hatches on March 8, 2018.
- Recalibrated combined influent TSS probe on March 9, 2018.
- Changed ion exchange resin in vessels 1C and 2A on March 12, 2018.
- Installed cooling fan and uninterrupted power supply for ion exchange control panel on March 22, 2018.
- Removed mixer 1H on backwash waste tank for maintenance on March 24, 2018.
- Changed ion exchange resin in vessels 2B and 2C on March 24, 2018.
- Installed additional hoses and fittings for water feed source tank for the polymer injection system at MMFs on March 26, 2018.
- Adjusted valve on MMF 2A on March 26, 2018.

## O&M Costs

At the direction of the Trust, Tetra Tech has summarized cost data for the reporting period. The following table summarizes project charges in accordance with the Operations and Maintenance Agreement, executed December 31, 2017. This section only captures project charges consistent with the O&M agreement or agreed upon charges for items supplied by/through Tetra Tech and billed to the Trust.

**Table 3: O&M Cost Summary**

Item	Payment Details	Unit <sup>1</sup>	Cost Invoiced During Reporting Period	Total Costs – Project Inception to Date
Monthly Base Cost	Lump sum payable to Tetra Tech	\$297,500 /month	\$297,500	\$892,500
Ion Exchange Resin	Lump sum direct pay from Trust to Evoqua for turn key resin delivery, replacement, transportation and disposal services	\$135,755 /vessel which includes: \$109,750 /vessel for resin <sup>2</sup> \$26,005 /vessel for changeout services and disposal	\$0 <sup>2</sup>	\$0
Tankage	Actual usage charges direct pay from Trust to Baker Corp and Rain for Rent	<u>Baker Corp</u> : \$20,074 /month plus variable maintenance fees as necessary <u>Rain for Rent</u> : As used	\$0 <sup>3</sup> \$75,961	\$75,961
Generator Rental / Maintenance	Actual usage charges direct pay from Trust to Cashman	\$625 every 250 run hours per XQ350 Generator \$1,250 every 250 run hours per XQ500 plus Backup generator rental costs as required to support maintenance	\$6,250 <sup>4</sup>	\$6,250
Generator Fuel	Actual usage charges direct pay from Trust to Cashman	\$3.65 /gal delivered	\$79,117	\$84,583
Solids Disposal	Lump sum payable to Tetra Tech for off-site transportation and disposal	\$4,150 /3,000-gallon tanker \$6,917 /5,000-gallon tanker	\$557,506	\$1,218,767
Decanting	Daily charge	\$10,000 /day	\$90,000	\$90,000

<sup>1</sup> Unit rates do not include applicable taxes.

<sup>2</sup> The Trust pre-paid a sum during Treatment Plant Construction to pre-purchase the equivalent of 4.5 vessel changeouts of resin to ensure product availability and vendor readiness. As of March 31, 2018, 6 vessel changeouts have occurred. 0 vessel changeouts of resin remained on credit with Evoqua. Additional charges for 1.5 vessel changeouts of resin have yet to be invoiced by Evoqua.

<sup>3</sup> The Trust pre-paid a sum during Treatment Plant Construction for project tankage to obtain a discount on long-term equipment cost. As of March 31, 2018, the remaining credit balance is \$136,151.06. Additional payment by the Trust will not be required until this prepayment credit is exhausted.

<sup>4</sup> The Trust pre-paid a sum during Treatment Plant Construction for generator rental to obtain a discount on long-term equipment cost. As of March 31, 2018, the remaining rental credit balance is \$207,427.18. Additional payment by the Trust for rental will not be required until this prepayment credit is exhausted. Maintenance costs are separate from the pre-paid sum for rental and are included in the table above.

Item	Payment Details	Unit <sup>1</sup>	Cost Invoiced During Reporting Period	Total Costs – Project Inception to Date
Repairs	Replacement of shelf spare items, actual usage charges payable to Tetra Tech plus 5% markup	As necessary	\$0	\$0
<b>TOTAL</b>			\$1,106,334	\$2,368,061

No other items were supplied by/through Tetra Tech and billed to the Trust during this reporting period.

## CERTIFICATION

I hereby certify that I am responsible for the services described in this document and for the preparation of this document. The services described in this document have been prepared in a manner consistent with the current standards of the profession, and to the best of my knowledge, comply with all applicable federal, state, and local statutes, regulations, and ordinances. I hereby certify that all laboratory analytical data was generated by a laboratory certified by the NDEP for each constituent and media presented herein.

**Description of Services Provided:** Prepared Weir Dewatering Treatment Plant Operation and Maintenance Summary for March 2018.



April 20, 2018

**Kyle Hansen, CEM**  
Field Operations Manager/Geologist  
Tetra Tech, Inc.

Date

Nevada CEM Certificate Number: 2167  
Nevada CEM Expiration Date: September 18, 2018

## Tables



**Weir Dewatering Treatment Plant**  
**Monthly Flow Summary**  
**March 2018**  
**Table 1**

Date	Influent						Effluent <sup>3</sup>	
	HLPS		SMPS		Combined Flow <sup>1</sup>		Average <sup>2</sup> (FIT8060) gpm	Total (FIT8060) Gallons
	Average <sup>2</sup> (FIT3010) gpm	Total (FIT3010) Gallons	Average <sup>2</sup> (FIT2010) gpm	Total (FIT2010) Gallons	Average <sup>2</sup> (FIT4010) gpm	Total (FIT4010) Gallons		
3/1/2018	1,415	2,037,600	2,195	3,161,300	3,565	5,133,500	3,846	5,538,900
3/2/2018	1,685	2,426,200	2,182	3,142,200	3,825	5,508,700	4,219	6,075,800
3/3/2018	1,858	2,675,900	2,180	3,138,600	4,033	5,807,800	4,288	6,174,000
3/4/2018	1,735	2,498,200	2,175	3,131,400	3,921	5,646,000	4,220	6,076,900
3/5/2018	1,773	2,552,900	2,182	3,141,500	3,968	5,714,400	4,176	6,013,600
3/6/2018	1,821	2,622,800	1,912	2,752,700	3,797	5,467,200	4,010	5,773,900
3/7/2018	1,468	2,113,700	2,148	3,093,700	3,690	5,313,300	3,952	5,691,500
3/8/2018	1,555	2,239,900	2,224	3,203,000	3,802	5,475,000	4,076	5,869,000
3/9/2018	1,657	2,385,600	2,156	3,104,200	3,894	5,606,900	4,147	5,971,200
3/10/2018	1,615	2,325,300	2,151	3,097,100	3,774	5,435,100	4,088	5,887,000
3/11/2018	1,600	2,303,800	2,161	3,112,100	3,772	5,431,300	4,079	5,874,300
3/12/2018	1,521	2,189,900	2,193	3,157,400	3,710	5,341,800	3,952	5,690,400
3/13/2018	1,334	1,921,500	2,148	3,093,600	3,523	5,072,700	3,754	5,405,300
3/14/2018	1,344	1,935,700	2,163	3,114,700	3,493	5,029,600	3,789	5,456,000
3/15/2018	1,232	1,774,300	2,104	3,029,800	3,378	4,865,000	3,680	5,298,700
3/16/2018	1,319	1,899,900	2,063	2,970,600	3,359	4,836,300	3,645	5,248,500
3/17/2018	1,361	1,960,100	1,849	2,661,900	3,233	4,656,100	3,538	5,094,300
3/18/2018	1,315	1,894,100	1,923	2,769,500	3,225	4,643,600	3,453	4,971,900
3/19/2018	1,273	1,832,800	2,003	2,883,600	3,290	4,738,000	3,566	5,135,100
3/20/2018	1,570	2,260,800	2,029	2,921,800	3,339	4,808,800	3,824	5,506,600
3/21/2018	1,678	2,415,900	2,282	3,285,900	3,641	5,243,000	4,255	6,126,600
3/22/2018	1,490	2,145,000	2,151	3,097,000	3,577	5,150,800	4,077	5,870,800
3/23/2018	778	1,120,000	2,118	3,049,300	2,956	4,256,500	3,293	4,742,400
3/24/2018	1,663	2,395,200	2,081	2,996,700	3,788	5,455,400	3,935	5,666,100
3/25/2018	1,819	2,619,700	2,069	2,979,600	3,890	5,601,300	4,114	5,924,500
3/26/2018	1,562	2,249,900	2,087	3,005,000	3,707	5,338,400	3,810	5,486,500
3/27/2018	1,535	2,211,000	2,112	3,041,500	3,750	5,399,800	3,873	5,577,800
3/28/2018	1,621	2,334,500	2,084	3,001,200	3,719	5,355,600	3,927	5,655,200
3/29/2018	1,945	2,801,200	1,800	2,591,500	3,757	5,410,600	3,941	5,675,500
3/30/2018	2,014	2,900,800	1,689	2,432,500	3,724	5,362,800	3,967	5,712,200
3/31/2018	1,729	2,489,900	1,709	2,460,600	3,439	4,952,100	3,702	5,330,600

Notes:

HLPS = Historic Lateral Pump Station.

SMPS = Sunrise Mountain Pump Station.

FIT numbers presented in column headers correlate with Flow Instrument Transmitter tag numbers for particular flow meters.

Combined flow totals recorded on 3/1-3/2, 3/6-3/9, 3/20-3/23, and 3/26-3/29 inclusive of bypass of flowmeter for maintenance or recirculated flow through plant decant process.

1 - The combined feed is measured by flow indicator FIT4010. This is not equal to the sum of flows from HLPS (FIT3010) and SMPS (FIT2010) due to fluctuating volumes in influent storage tanks.

2 - Average calculated by dividing total gallons by 1,440 (minutes per 24 hours).

3 - Effluent flow meter data is higher than the combined influent flows due to inherent flowmeter variability and is compounded by batch processing operations. Air drawn into piping (as designed for vacuum breaks) at the end of each pumping batch has been observed to result in transient, short duration high flow readings that are not representative of actual flows.

**Weir Dewatering Treatment Plant  
Influent Parameter Summary  
March 2018  
Table 2**

Parameter:		Parameter:	Parameter:	Perchlorate		Chlorate		Total Dissolved Solids		Nitrate as NO3		Sulfate		Comment
		Units:	ug/L	LQ	ug/L	LQ	mg/L	mg/L	mg/L	mg/L	mg/L	LQ		
Location	Collection Date	Lab Sample ID	Result	LQ	Result	LQ	Result	LQ	Result	LQ	Result	LQ		
HLPS Influent	3/1/2018	440-204561-1	201		146		1620		39.6		592			
	3/2/2018	440-204725-1	69.1		79.8		1610		45.6		604			
	3/3/2018	440-204857-1	131		72.9		1590		44.7		567			
	3/4/2018	440-204859-1	141		82.1		1580		47.2		579			
	3/5/2018	440-204858-1	150		82.9		1580		43.8		655			
	3/6/2018	440-205025-1	178		124		1640		41.8		567			
	3/7/2018	440-205199-1	211		129		1650		41.1		601			
	3/8/2018	440-205406-1	93.7		88.7		1630		45.1		603			
	3/9/2018	440-205526-1	100		142		1650		43.2		640			
	3/10/2018	440-205648-1	134		133		1630		44.4		570			
	3/11/2018	440-205650-1	135		129		1610		43.6		563			
	3/12/2018	440-205653-1	122		108		1630		40.8		561			
	3/13/2018	440-205742-1	177		95.1		1590		41.1		585			
	3/14/2018	440-205888-1	163		60.4		1610		38.7		564			
	3/15/2018	440-206048-1	141		42.1		1650		40.5		581			
	3/16/2018	440-206199-1	123		41.9		1610		41.7		605			
	3/17/2018	440-206370-1	100		27.7	J	1600		44.4		594			
	3/18/2018	440-206368-1	107		47.2		1600		43.6		605			
	3/19/2018	440-206366-1	108		49.9		1610		44.6		613			
	3/20/2018	440-206475-1	149		48.4		1660		43.5		611			
	3/21/2018	440-206653-1	164		49.0		1670		42.3		610			
	3/22/2018	440-206790-1	151		63.1		1620		42.3		610			
	3/23/2018	440-207016-1	193		20.0	U	1580		45.3		588			
	3/24/2018	440-207177-1	196		40.0	U	1600		44.7		579			
	3/25/2018	440-207173-1	225		62.1		1620		44.1		600			
	3/26/2018	440-207174-1	246		110		1610		43.9		609			
	3/27/2018	440-207338-1	180		40.6		1600		44.6		551			
	3/28/2018	440-207469-1	181		32.7	J	1670		45.4		602			
	3/29/2018	440-207584-1	207		79.4		1660		44.6		589			
	3/30/2018	440-207700-1	204		88.4		1510		44.7		593			
	3/31/2018	440-207812-1	233	F1	94.1		1550		41.6		593			
SMPS Influent	3/1/2018	440-204561-2	1100		200		2820		28.6		1140			
	3/2/2018	440-204725-2	1160		200		2800		32.0		1290			
	3/3/2018	440-204857-2	1250		193		2780		29.99		1180			
	3/4/2018	440-204859-2	1250		200		2800		30.3		1210			
	3/5/2018	440-204858-2	1320		208		2800		29.7		1360			
	3/6/2018	440-205025-2	1270		202		2830		27.9		1170			
	3/7/2018	440-205199-2	1160		179		2650		30.1		1160			
	3/8/2018	440-205406-2	1010		247		2810		29.4		1210			
	3/9/2018	440-205526-2	1140		238		2830		28.8		1340			
	3/10/2018	440-205648-2	973		203		2780		32.6		1140			
	3/11/2018	440-205650-2	980		199		2790		27.6		1140			
	3/12/2018	440-205653-2	964		197		2770		26.9		1060			
	3/13/2018	440-205742-2	1280		165		2790		27.7		1130			
	3/14/2018	440-205888-2	1220		163		2800		26.1		1120			
	3/15/2018	440-206048-2	1180		165		2800		27.2		1170			
	3/16/2018	440-206199-2	1230		171		2830		27.7		1250			
	3/17/2018	440-206370-2	1090		195		2920		28.1		1340			
	3/18/2018	440-206368-2	1060		193		2930		27.9		1330			
	3/19/2018	440-206366-2	1040		190		2920		28.3		1340			
	3/20/2018	440-206475-2	1220		187		2860		28.6		1300			
	3/21/2018	440-206653-2	1270		183		2860		28.4		1290			
	3/22/2018	440-206790-2	1200		172		2760		29.0		1230			
	3/23/2018	440-207016-2	1430		162		2790		31.0		1250			
	3/24/2018	440-207177-2	1380		173		2760		30.9		1240			
	3/25/2018	440-207173-2	1230		168		2770		30.8		1240			
	3/26/2018	440-207174-2	1210		173		2760		31.8		1250			
	3/27/2018	440-207338-2	1250		174		2780		31.2		1270			
	3/28/2018	440-207469-2	1250		170		2850		31.3		1240			
	3/29/2018	440-207584-2	1190		170		2870		29.7		1200			
	3/30/2018	440-207700-2	1330		208		2890		29.1		1370			
	3/31/2018	440-207812-2	1440		200		2920		25.9		1330			

Notes:

- ug/L micrograms per liter (parts per billion)
- mg/L milligrams per liter (parts per million)
- U Parameter analyzed for but not detected above the reporting limit shown.
- J Result is less than the reporting limit but greater than or equal to the method detection limit and the concentration is an approximate value.
- B Compound was found in the blank and sample.
- F1 Matrix Spike and/or Matrix Spike Duplicate Recovery is outside acceptance limits.
- HLPS Historic Lateral Pump Station
- SMPS Sunrise Mountain Pump Station
- LQ Laboratory qualifier

Nitrate data presented as NO<sub>3</sub> consistent with terms of O&M agreement.

Nitrate analyzed by In-House Laboratory on 3/3/18, 3/10/18 and exclusively beginning 3/16/18.

Sulfate analyzed exclusively by In-House Laboratory beginning 3/16/18.

**Figure**

Figure 1  
Estimated Perchlorate Mass Removed January 18 - March 31, 2018

