TETRA TECH

TECHNICAL MEMORANDUM

To:	Nevada Environmental Response Trust
Cc:	Dan Pastor, Tetra Tech, Inc.
From:	April Hussey
Date:	January 21, 2019
Subject:	Operation and Maintenance Summary – December 2018 Weir Dewatering Treatment Plant Nevada Environmental Response Trust; Henderson, Nevada

The Southern Nevada Water Authority (SNWA) has completed construction work on two weir projects in the Las Vegas Wash, the Sunrise Mountain Weir and Historic Lateral Weir. SNWA hired a construction company, Las Vegas Paving (LVP) to perform weir construction activities, which included construction dewatering activities. The Nevada Environmental Response Trust (NERT or Trust) was 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.

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) to manage and treat groundwater from the construction activities. The Treatment Plant operated on a temporary basis, and full operations ceased on August 23, 2018 after groundwater dewatering associated with the SNWA weir construction projects was complete. Decommissioning of the Treatment Plant began in late August 2018, and support activities associated with decommissioning continued throughout December 2018, with final plant operations to support final discharge of decommissioning flushing completed on December 28, 2018. No additional plant operation is planned for 2019, with 2019 operations staff activities limited to the first 5 business days in January. January 2019 activities will be related to returning rented equipment and coordinating final equipment cleaning to support decommissioning (non-discharge activities).

At the direction of NERT, Tetra Tech has prepared this summary of the operation and maintenance (O&M) activities performed during December 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

During December 2018, the Treatment Plant was operated and maintained in support of decommissioning activities.

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OPERATIONS

Operations in December 2018 were characterized by receipt of small quantities of municipal water associated with decommissioning activities brought to the plant by truck. Flows were recirculated in the CWTP to maintain plant operability, and intermittent treatment and discharge as needed to support decommissioning.

Representative flow-based grab samples were collected and composited to represent the volume of water at each permitted sample location with flow. These samples confirmed the operations were in compliance with permit limits during the December 2018 reporting period.

Flow Rates

Flow rates for December 2018 are summarized in Table 1. Combined influent flow volumes reflect municipal water associated with decommissioning efforts transported and pumped into the plant via truck. Volumes pumped via truck were estimated using the truck tank capacity. No flows were pumped from either the Historic Lateral Weir construction site or the Sunrise Mountain Weir construction site.

Historic Lateral Pump Station

Construction of the Historic Lateral weir and decommissioning of the HLPS has been completed. Flows from this pump station will no longer occur.

Sunrise Mountain Pump Station

Construction of the Sunrise Mountain weir has been completed. No additional flows from the weir construction site will occur. Recirculation of flows as noted above, occurred through the SMPS during this reporting period.

Central Water Treatment Plant

During December 2018, intermittent discharges occurred associated with treatment and discharge of flows associated with decommissioning activities. Discharge volumes vary from influent flows associated with decommissioning due to changes in the volume of water stored in the CWTP and residual volumes present in tank bottoms below pump suction lines.

Suspended Solids Removal and Management

Solids loading to the plant does not occur during decommissioning activities, beyond what is already present in the plant from full-time operations. Four of the external tanks for cyclone and backwash waste surge and storage capacity, along with their associated decanting system remained in place to allow settling of residual solids from decommissioning flows prior to treatment and discharge. In the month of December, no solids slurry disposal associated with operations and maintenance of the plant occurred.

MAINTENANCE

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 were conducted to maintain plant operability during recirculation operations and to ensure plant operability during treatment and discharge required during decommissioning. Routine maintenance activities included the following:

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- 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:
  - XQ350 – Unit 17-250 (at SMPS), service conducted on December 6, 2018;
  - XQ500 – Unit 14-165 (at CWTP), service conducted on December 7, 2018.
- Cyclone underflow lines were flushed periodically.
- Equipment oil levels were checked.
- Flanges, gaskets, and pipe connection bolts were checked and adjusted as needed.

Non-Routine Maintenance

No non-routine maintenance was performed during December 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, as amended. 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. Costs associated with decommissioning activities are not included in this summary.

Table 2: O&M Cost Summary

Item	Payment Details	Unit[1]	Cost Invoiced During Reporting Period	Total Costs – Project Inception to Date
Monthly Base Cost	Lump sum payable to Tetra Tech	$142,000 /month	$142,000[2]	$2,907,871
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 $26,005 /vessel for changeout services and disposal	$0	$813,282
Tankage	Actual usage charges direct pay from Trust to vendor	Baker Corp: $20,074 /month plus variable maintenance fees as necessary Rain for Rent: Variable costs	$33,261 $5,536	$350,814

[1] Unit rates do not include applicable taxes.
[2] Beginning August 24, 2018, the monthly fee for operations and maintenance support during decommissioning was reduced to $142,000.

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Item	Payment Details	Unit[1]	Cost Invoiced During Reporting Period	Total Costs – Project Inception to Date
Generator Rental / Maintenance	Actual usage charges direct pay from Trust to Cashman	Rental: Varies based on hours of run time and generator size. Maintenance: $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	$26,639 $0	$326,041
Generator Fuel	Actual usage charges direct pay from Trust to Cashman	Adjusts per market	$19,500	$835,627
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	$0	$1,596,432
Decanting	Daily charge payable to Tetra Tech	$10,000 /day	$0	$440,000
Repairs	Cost of Equipment replacement plus 5% markup payable to Tetra Tech	Pioneer Equipment Inc: Repair/ Replacement Services	$0	$17,997
Other	Fees payable to Tetra Tech	O&M Project Decommissioning Fee Tank Cleaning Services	$0 $0	$143,582
		TOTAL	$226,936	$7,431,646

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

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 December 2018.

January 21, 2019

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

Date

Nevada CEM Certificate Number: 2167
Nevada CEM Expiration Date: September 18, 2020

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Tables

Weir Dewatering Treatment Plant
Monthly Flow Summary
December 2018
Table 1

Date	Influent						Effluent[3]	
	HLPS		SMPS		Combined Flow[1]			
	Average[2] (FIT3010) gpm	Total (FIT3010) Gallons	Average[2] (FIT2010) gpm	Total (FIT2010) Gallons	Average[2] gpm	Total Gallons	Average[2] (FIT8060) gpm	Total (FIT8060) Gallons
12/1/2018	0	0	0	0	0	0	0	0
12/2/2018	0	0	0	0	0	0	0	0
12/3/2018	0	0	0	0	0	0	0	0
12/4/2018	0	0	0	0	0	0	27	38,600
12/5/2018	0	0	0	0	0	0	0	0
12/6/2018	0	0	0	0	0	0	0	0
12/7/2018	0	0	0	0	0	0	0	0
12/8/2018	0	0	0	0	0	0	0	0
12/9/2018	0	0	0	0	0	0	0	0
12/10/2018	0	0	0	0	0	0	0	0
12/11/2018	0	0	0	0	4	6,000	0	0
12/12/2018	0	0	0	0	10	14,000	0	0
12/13/2018	0	0	0	0	0	0	69	98,900
12/14/2018	0	0	0	0	3	4,000	0	0
12/15/2018	0	0	0	0	0	0	0	0
12/16/2018	0	0	0	0	0	0	0	0
12/17/2018	0	0	0	0	0	0	0	0
12/18/2018	0	0	0	0	36	52,000	0	0
12/19/2018	0	0	0	0	0	0	52	75,100
12/20/2018	0	0	0	0	0	0	0	0
12/21/2018	0	0	0	0	0	0	26	37,300
12/22/2018	0	0	0	0	0	0	0	0
12/23/2018	0	0	0	0	0	0	0	0
12/24/2018	0	0	0	0	0	0	0	0
12/25/2018	0	0	0	0	0	0	0	0
12/26/2018	0	0	0	0	0	0	0	0
12/27/2018	0	0	0	0	11	16,000	0	0
12/28/2018	0	0	0	0	0	0	9	12,700
12/29/2018	0	0	0	0	0	0	0	0
12/30/2018	0	0	0	0	0	0	0	0
12/31/2018	0	0	0	0	0	0	0	0

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.

Flows recirculated within the plant in a closed loop system 12/3, 12/5 - 12/7, 12/10 - 12/12 & 12/14. No influent flows or effluent discharges except where these volumes are included in the summary table.

1 - Combined influent flow volumes reflect water associated with decommissioning efforts transported and pumped into the plant via truck. Volumes pumped via truck were estimated using the truck tank capacity. Except where effluent volumes are indicated, the water was stored and recirculated within the plant in a closed loop system only.

2 - Average calculated by dividing total gallons by 1,440 (minutes per 24 hours). Daily flow duration during decommissioning efforts are typically short (less than 30 minutes).

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.