TETRA TECH

TECHNICAL MEMORANDUM

To:	Nevada Environmental Response Trust
Cc:	Dan Pastor, Tetra Tech, Inc.
From:	April Hussey
Date:	December 3, 2018
Subject:	Operation and Maintenance Summary – October 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 October 2018.

At the direction of NERT, Tetra Tech has prepared this summary of the operation and maintenance (O&M) activities performed during October 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*. Preparation of monthly O&M summaries will continue as long as the CWTP remains operational to support decommissioning activities.

SUMMARY OF O&M ACTIVITIES

During October 2018, the Treatment Plant was operating in support of decommissioning activities.

Tetra Tech, Inc.
150 S. 4th Street, Unit A, Henderson, NV 89015
Tel 702-854-2295 tetratech.com

ED_002461_00000260-00001

OPERATIONS

Operations in October 2018 were characterized by receipt of small quantities of municipal water associated with decommissioning activities from the pipeline between the HLPS and the CWTP brought to the plant by truck. Flows were recirculated in the CWTP to maintain plant operability to support decommissioning.

As the only inflows were municipal waters associated with decommissioning efforts, and no discharges occurred, Treatment Plant National Pollutant Discharge Elimination System (NPDES) water quality samples were not collected during the October 2018 reporting period. Recirculation operations were conducted in compliance with permit terms during the October 2018 reporting period.

Flow Rates

Flow rates for October 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

During October 2018, HLPS did not receive water from the Historic Lateral Weir construction site. No activities associated with the decommissioning of the HLPS, other than recirculation of flows as noted above, occurred during this reporting period.

Sunrise Mountain Pump Station

During October 2018, SMPS did not receive water from the Sunrise Mountain Weir construction site. No activities associated with the decommissioning of the SMPS, other than recirculation of flows as noted above, occurred during this reporting period.

Central Water Treatment Plant

During October 2018 no discharges occurred. Water brought to the plant was associated with decommissioning efforts and was transported and pumped into the plant via truck. All water in the plant was stored and recirculated within the plant in a closed loop system, only.

Suspended Solids Removal and Management

Solids loading to the plant is limited during decommissioning activities. As a result, eight of the 12 external tanks for cyclone and backwash waste surge and storage capacity, along with their associated decanting system, were demobilized from the site. Four of these external tanks remain in place to allow settling of residual solids from decommissioning flows prior to treatment and discharge.

Prior to the demobilization of the eight external storage tanks, these tanks were cleaned to remove settled solids that had accumulated from previous decanting activities. This cleaning procedure results in the generation of suspended solids slurry waste that is disposed of at the landfill. In the month of October, no tanker truckloads of solids slurry were sent to the landfill.

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.

ED_002461_00000260-00002

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:

- 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 (at CWTP), service conducted on October 2, 2018;
  - XQ350 – Unit 17-250 (at SMPS), service conducted on October 24, 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

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

- Non-routine generator services on October 2, 8, and 11, 2018.
- Obstruction removed from flow meter propeller on October 3, 2018.
- Uninstalled security camera at HLPS on October 15, 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 third-party contractor decommissioning activities and Tetra Tech oversight of the same 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]	$2,623,871

[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.

ED_002461_00000260-00003

Item	Payment Details	Unit[1]	Cost Invoiced During Reporting Period	Total Costs – Project Inception to Date
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[3]	$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	$10,108[4] $31,193	$290,427
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	$41,326[5] $1,874	$258,977
Generator Fuel	Actual usage charges direct pay from Trust to Cashman	Adjusts per market	$19,381	$798,179
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	$78,853	$1,596,432
Decanting	Daily charge payable to Tetra Tech	$10,000 /day	$0	$440,000

[3] The equivalent of 9 vessel changeouts were paid by the Trust as part of the construction contract. This credit has been exhausted. These charges reflect additional vessel changeouts payable directly by the Trust.
[4] The Trust pre-paid a sum during Treatment Plant Construction for project tankage to obtain a discount on long-term equipment cost. This credit has been exhausted. Additional costs will be payable directly to the Trust.
[5] The Trust pre-paid a sum during Treatment Plant Construction for generator rental to obtain a discount on long-term equipment cost. This credit has been exhausted. Additional costs will be payable directly by the Trust.

ED_002461_00000260-00004

Item	Payment Details	Unit[1]	Cost Invoiced During Reporting Period	Total Costs – Project Inception to Date
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	$0	$143,582
		Tank Cleaning Services	$26,915	
		TOTAL	$351,650	$6,982,747

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

ED_002461_00000260-00005

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 October 2018.

December 3, 2018

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

Date

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

ED_002461_00000260-00006

Tables

Weir Dewatering Treatment Plant
Monthly Flow Summary
October 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] (FIT4010) gpm	Total (FIT4010) Gallons	Average[2] (FIT8060) gpm	Total (FIT8060) Gallons
10/1/2018	0	0	0	0	4	6,000	0	0
10/2/2018	0	0	0	0	0	0	0	0
10/3/2018	0	0	0	0	4	6,000	0	0
10/4/2018	0	0	0	0	0	0	0	0
10/5/2018	0	0	0	0	1	1,500	0	0
10/6/2018	0	0	0	0	0	0	0	0
10/7/2018	0	0	0	0	0	0	0	0
10/8/2018	0	0	0	0	1	1,500	0	0
10/9/2018	0	0	0	0	0	0	0	0
10/10/2018	0	0	0	0	0	0	0	0
10/11/2018	0	0	0	0	0	0	0	0
10/12/2018	0	0	0	0	0	0	0	0
10/13/2018	0	0	0	0	0	0	0	0
10/14/2018	0	0	0	0	0	0	0	0
10/15/2018	0	0	0	0	0	0	0	0
10/16/2018	0	0	0	0	0	0	0	0
10/17/2018	0	0	0	0	0	0	0	0
10/18/2018	0	0	0	0	0	0	0	0
10/19/2018	0	0	0	0	0	0	0	0
10/20/2018	0	0	0	0	0	0	0	0
10/21/2018	0	0	0	0	0	0	0	0
10/22/2018	0	0	0	0	0	0	0	0
10/23/2018	0	0	0	0	0	0	0	0
10/24/2018	0	0	0	0	0	0	0	0
10/25/2018	0	0	0	0	0	0	0	0
10/26/2018	0	0	0	0	0	0	0	0
10/27/2018	0	0	0	0	0	0	0	0
10/28/2018	0	0	0	0	0	0	0	0
10/29/2018	0	0	0	0	0	0	0	0
10/30/2018	0	0	0	0	0	0	0	0
10/31/2018	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 10/1 - 10/31. No influent flows or effluent discharges except where these volumes are included in the summary table.

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. The water was stored and recirculated within the plant in a closed loop system, only.

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). 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.