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**To:** Nevada Division of Environmental Protection  
Nevada Environmental Response Trust

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**Cc:** Nevada Environmental Response Trust Stakeholders

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**From:** Ryan Sullivan, Vice President Service and O&M

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**Date:** Dec 20, 2018

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**Subject:** NERT – GWETS Operation Monthly Report – Nov 2018

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At the request of the Nevada Environmental Response Trust (Trust), Envirogen Technologies, Inc. (ETI) is providing this summary of the groundwater extraction and treatment system (GWETS) operation and performance during November 2018.

### Summary of GWETS Operation

Envirogen Technologies, Inc. (ETI) mechanically operated the GWETS and ion exchange (IX) system normally in November 2018. Flow from PC-119, PC-120, PC-121, and PC-133 was routed to the IX system, bypassing all flow meters associated with the FBR plant. The flow rate to the IX system averaged approximately 182 gallons per minute (gpm). The flow rate to the FBR plant averaged approximately 1,042 gpm during November 2018. At the end of the month, the GW-11 Pond volume was at 35.2 million gallons (MG), which would allow 18.9 days of available additional storage in the event of an emergency FBR plant shutdown with continued well field pumping. The water volume stored in the GW-11 Pond increased by 0.4 MG from the end of October 2018. Figure 1 in this report depicts the actual GW-11 pond volumes and additional storage available.

The influent perchlorate concentration to the IX system averaged 0.67 mg/L for the month. The influent perchlorate concentration to the FBR plant averaged 262 mg/L for the month, with a maximum concentration of 280 mg/L. In comparison, the influent perchlorate concentration to the FBRs for the month of October 2018 averaged 208 mg/l, with a maximum concentration of 240 mg/l. Fluctuations in the influent perchlorate concentrations are due to the changes in the AP-5 treatment feed rate and not a result of groundwater changes.

### Enhanced Operational Metrics

Tables 1 and 2 provide a summary of the current GWETS operational metrics data for flow rates, perchlorate and chromium concentrations, and mass removal. These tables also include data associated with the AP-5 decant liquids. Figure 2 graphically presents historical perchlorate and chromium mass flux information. Attachment A provides a summary of the NPDES permit analytes with numerical discharge limits.

## Operational Issues

All routine plant repairs conducted by ETI were performed in accordance with the NERT Perchlorate Treatment System Operations Manual. The following is a list of operational issues and major repairs and/or equipment replaced during this reporting period.

### 1. GW-11

There were no operational issues with GW-11 in the month of November.

### 2. Biological Plant

Treatment of AP-5 water through the FBR Biological plant continued in the month of November beginning with a flow rate of 7.0 gpm and increasing to 10.0 gpm throughout the end of the month.

There were influent / effluent diversions and well shutdowns during the reporting period generally associated with maintenance activities. Below is a description of the events that occurred:

#### Diversion Events

- Influent Diversion to GW-11 occurred on November 7, 2018 from 5:38pm to 6:00pm due to a high level alarm on the T-621 tank. Approximately 23,000 gallons of Influent were diverted to GW-11.
- Effluent diversion to GW-11 occurred on November 8, 2018 from 7:44am to 8:35am due to operator error during the effluent line “pigging” event. Approximately 53,000 gallons of Effluent were diverted.
- Effluent diversion to GW-11 occurred on November 21, 2018 at 4:25pm until 9:04pm due to an AP-5 batch process dilution error. Approximately 310,000 gallons were diverted to GW-11.

### 3. Spills

There were no reportable spills for the month of November.

### 4. Maintenance

- Major maintenance performed by ETI in the month included:
  - I. Removed carbon from the west GAC. Inspected and replaced hardware on the laterals. Installed a plug on the hole that had a missing nozzle. Replaced all nozzles. Transferred carbon back to the vessel and put back into service.
  - II. Replaced the pump on the media return pump for FBR A.
  - III. Assembled spare bed height and media return pumps.
  - IV. Installed the new air compressor that replaced the Kaeser and assisted Air Center with the new start up.
  - V. Installed the new pH probe and piping on FBR 8.
  - VI. Replaced the discharge piping on I-AB.
  - VII. Installed new fittings on the SLW line for the polymer system.
  - VIII. Installed a new globe valve on the drain line on the west GAC.

- IX. Replaced the actuator on the 601 level control valve.
  - X. Installed a new air flowmeter for the O<sub>2</sub> supply to the sludge tank.
  - XI. Installed new suction piping on bed height pump □2.
- Preventative Maintenance completed or being performed by ETI in the month included:
    - I. Inspected all wiring on the phosphoric acid skid including the power and signal wire.
    - II. Flushed the ORP and pH lines.
    - III. Completed the flex coupling inspection on the recycle pumps.
    - IV. Completed A/C checks on the MCC cabinets at the Lift Stations.
    - V. Completed infrared checks on the electrical components including switches and buckets.
    - VI. Inspected the sludge tank for any buildup of solids.
    - VII. Inspected the conditioning tank for any damaged parts and any accumulation solids in the tank.

### **GWETS Upgrades and Facility Projects**

Treatment System Extension – ETI continued on production of the process engineering including Process Flow, Mass Balance and P&IDs for initial submission to NDEP. ETI anticipates the design package will be ready for submission early 2019. Along with the process engineering, ETI is moving forward with mechanical designs for all the vessels and prefabricated containers along with the overall layout. These also should be finalized by end of 2018. ETI continues to coordinate with Tetra Tech, who will install the system including the interconnection between TIMET and the Trust. Preliminary layouts and other installation information was given to Tetra Tech. ETI also supplied Tetra Tech with the required information for the air permit analysis required for this addition.

### **Equipment Availability Tracking**

ETI operators continue to update the equipment tracking form on a weekly basis or whenever there is a change in the status of key equipment. During regular site visits, Tetra Tech field personnel verify the entries on the form, including both the operating status and confirmation of the inventory of required shelf spares. The equipment tracking form is included as Attachment B.

### **GWETS Staffing**

ETI continues with 24-hour staffing of the GWETS at the direction of the Trust and continues to follow the security procedures in the Standard Operating Procedures (SOP).

# Tables

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*Operational Metrics*

Nevada Environmental Response Trust   Groundwater Extraction and Treatment System   Monthly Stakeholder Metrics				
Location ID	Average Flow Rate (gpm)	Perchlorate (mg/L) <sup>6 7</sup>	Chromium (TR) (mg/L) <sup>6 7</sup>	Chromium(VI) (mg/L) <sup>6 7</sup>
SWF Total Extraction <sup>1</sup>	740 <sup>5</sup>	7.2	0.0017	0.0013
AWF Total Extraction <sup>1</sup>	474 <sup>5</sup>	81	0.15	0.17
IWF Total Extraction <sup>1</sup>	56 <sup>5</sup>	599	7.3	7.1
AP Area Total Extraction <sup>1</sup>	8.4 <sup>5</sup>	917	0.072	0.069
GWTP Effluent <sup>2</sup>	56	708	0.75	ND
GW-11 Influent <sup>1</sup>	0.28	58	0.066	0.046
FBR Influent <sup>2 3</sup>	1,042	262	0.048	0.037
T-205 Effluent (AP-5 Wash Water) <sup>3 4</sup>	9.0	19,921	NA	NA

## Notes:

TR = Total Recoverable; NA = Not Analyzed; ND = Not detectable above laboratory method detection limit (Chromium (VI) = 0.25 ug/L).

- 1: Perchlorate and chromium TR sampled monthly, values reported from TestAmerica.
- 2: Perchlorate, chromium TR, and chromium (VI) sampled weekly, values reported from TestAmerica.
- 3: AP-5 Wash Water perchlorate data is also included in the GW-11 Effluent/ FBR Influent totals.
- 4: Flow weighted average concentration based on mass flow meter readings.
- 5: Sum of daily average flow for individual wells.
- 6: All concentrations reported are monthly flow weighted averages.
- 7: ND analytical values are treated as zero values in the flow weighted average calculations.

Nevada Environmental Response Trust   Groundwater Extraction and Treatment System   Monthly Stakeholder Metrics			
Location ID	Perchlorate (lbs/month) <sup>3</sup>	Chromium (TR) (lbs/month) <sup>3</sup>	Chromium (VI) (lbs/month) <sup>3</sup>
SWF Total Extraction	1,909	0.45	0.35
AWF Total Extraction	13,822	26	29
IWF Total Extraction	12,105	148	144
AP Area Total Extraction	2,765	0.22	0.21
GWTP Effluent	14,369	15	ND
GW-11 Influent	5.8	0.01	0.00
FBR Influent <sup>1</sup>	98,684	18	14
T-205 Effluent (AP-5 Wash Water) <sup>1 2</sup>	64,477	NA	NA

## Notes:

TR = Total Recoverable; NA = Not Analyzed.

1: AP-5 Wash Water perchlorate data is also included in the GW-11 Effluent/ FBR Influent totals.

2: AP-5 Wash Water concentrations and mass flux are estimates based on mass flow meter readings.

3: Total mass extracted is calculated from flow weighted average concentration and average flow (see Table 1).

# Figures

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*Operational Metrics*

Figure 1 - GW-11 Pond Volume Through 11/30/2018

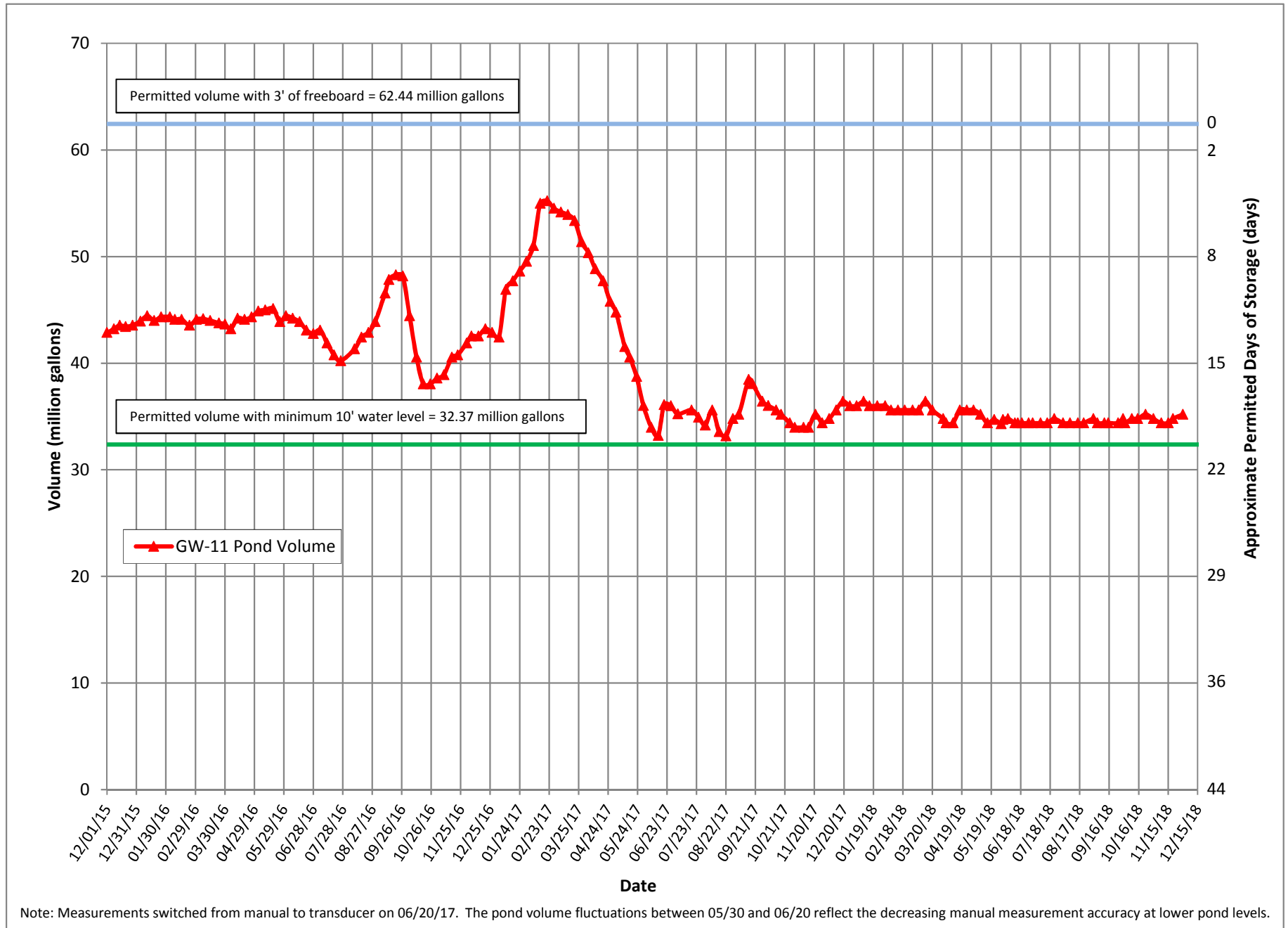
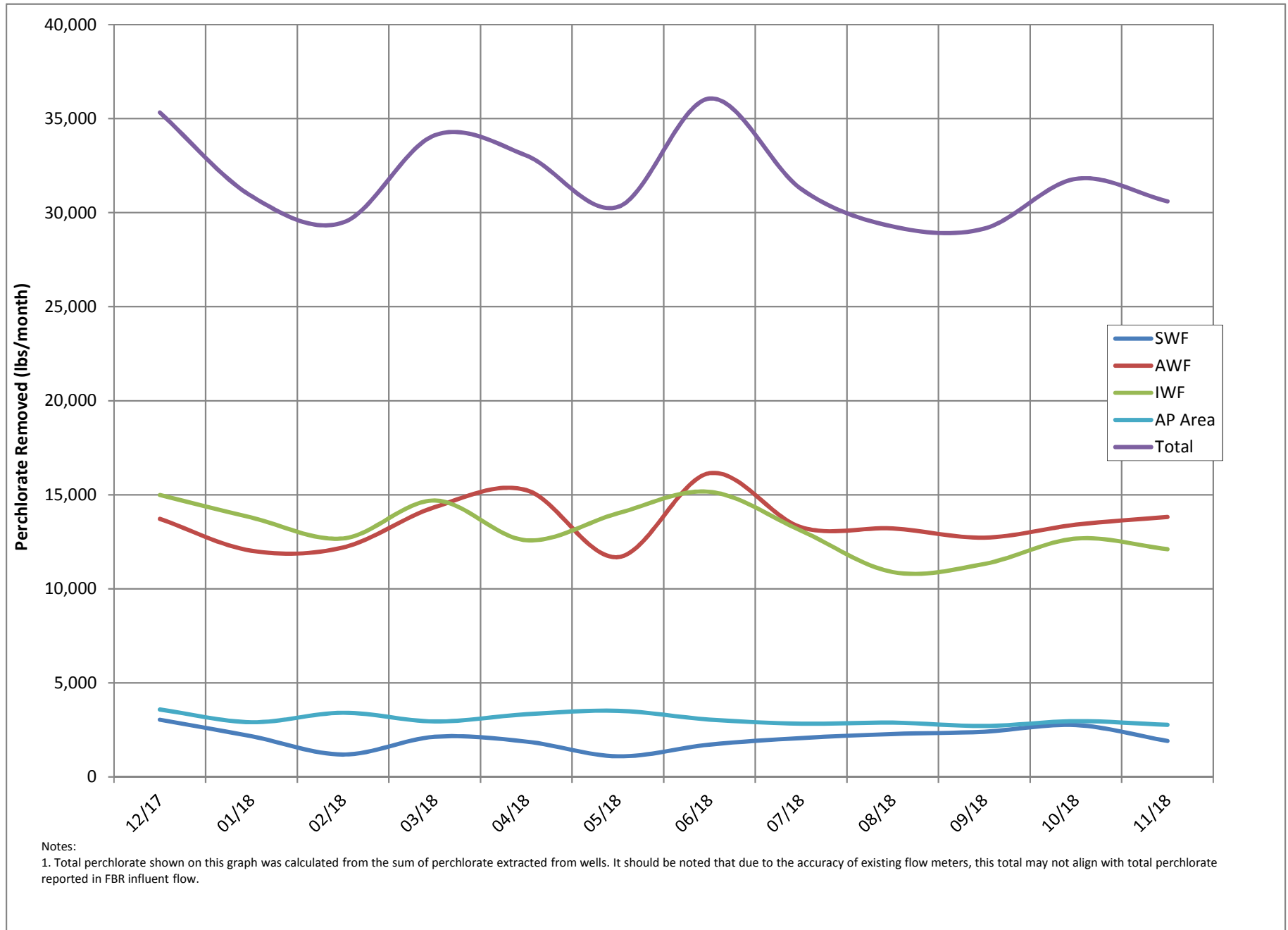




Figure 2 - Historical Perchlorate Mass Removed From Environment



# Attachment A

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*NPDES Tracking Sheet (Prepared by ENVIRON)*



# Attachment B

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*Equipment Tracking Form*

Sub-System	PID	Description	Status <sup>1</sup>	Checked	Criticality <sup>2</sup>	Notes
<b>Main Plant Equipment</b>						
<b>1 Seep Wells and Lift Station 1</b>						
1.01		Seep Well Field, 9 wells	Running			
1.02		Lift Station 1 Lift Pump A	Running			
1.03		Lift Station 1 Lift Pump B	Standby			
1.04		Area in and around Lift Station 1	Running			
<b>2 Athens Road Wells and Lift Station 3</b>						
2.01		Athens Road Well Field, 9 wells	Running			
2.02		Lift Station 3 Lift Pump A	Standby			
2.03		Lift Station 3 Lift Pump B	Running			
2.04		Area in and around Lift Station 3	Running			
<b>3 Lift Station 2 and Transmission Pipelines</b>						
3.01		Influent Pipeline	In operation			
3.02		Effluent Pipeline	Running			
3.03		Lift Station 2 Lift Pump A	Running			
3.04		Lift Station 2 Lift Pump B	Standby			
3.05		Area in and around Lift Station 2	Running		4	Installed a new blower on the A/C for the VFD MCC
<b>4 Interceptor Wells and Cr Treatment Plant</b>						
4.01		IWF Well Field, 30 wells	Running		3	Installed a new 1" nipple on the discharge of the pump end of well I-AB.
4.02		Ferrous Sulfate Feed System	Running			
4.03		Polymer Feed System	Running			
4.04		Clarifier	In operation			
4.05		Filter Press	Running		3	Replaced the air hoses and added hydraulic fluid to the reservoir
4.06		GWTP Effluent Tank	In operation			
4.07		Interceptor Booster Pump A	Running			
4.08		Interceptor Booster Pump B	Standby			
4.09		Area In And Around GWTP	Running			
<b>5 Equalization Area and GW-11 Pond</b>						
5.01	PID10A	Pond GW-11	In operation			
5.02	PID10A	Pond Water Pump - P101A	Running			
5.03	PID10A	Pond Water Pump - P101B	Standby			
5.04	PID10A	Equalization Tanks	In operation			
5.05	PID10A	Area in and Around EQ	In operation			
5.06	PID10A	Raw Water Feed Pump - P102A				

Status Codes

Running - Unit is in operation  
 Standby - Spare or duplicate, not currently in operation  
 Maintenance - Out of service for maintenance  
 Off - Not currently needed for use, but can be placed in service

Criticality Codes

1 = Critical - Cannot continue with operation until repairs made  
 2 = Important - Can still operate safely and in compliance with permits, but risks are increased  
 3 = Moderate - Work needs to be performed, but plant can still operate with redundancy that is in place  
 4 = Low - Minor repairs that in no way alter the performance of the plant

Sub-System	PID	Description	Status <sup>1</sup>	Checked	Criticality <sup>2</sup>	Notes
5.07	PID10A	Raw Water Feed Pump - P102B				
5.08	PID10A	F-101 Filters	Running			
5.09	PID10B	Carbon Absorber - LGAC 201A	Running		1	The system was taken offline to replace a nozzle
5.10	PID10B	Carbon Absorber - LGAC 201B	Running			
5.11	PID10B	Carbon Absorber - LGAC 201C	Running			
<b>6</b>		<b>First Stage FBRs A, 1 &amp; 2</b>				
6.01	PID14	FBR A				
6.02	PID14	Separator Tank - 1401				
6.03	PID14	Media Return Pump - P 1401			3	The pump blew out a trunnion. That was replaced with a rebuilt pump.
6.04	PID14	P1401A				
6.05	PID01A	P1401B				
6.06	PID01A	FBR 1	Running			
6.07	PID02A	FBR 2	Running			
6.08	PID01A	First Stage Separator Tank - T2011	Running			
6.09	PID01A	Media Return Pump - P2011	Running			
6.10	PID01A	First Stage FBR Pump - P1011	Standby			
6.11	PID01A	First Stage FBR Pump - P1012	Running			
6.12	PID01A	First Stage FRB Pump - P101A	Running			
6.13	PID07A	FBR A pH Feed Pump - P71A	Off			
6.14	PID07A	FBR 1 pH Feed Pump - P711	Off			
6.15	PID07A	FBR 2 pH Feed Pump - P712	Off			
6.16	PID07A	FBR A Nutrient (Urea) Feed Pump - P72A	Off			
6.17	PID07A	FBR 1 Nutrient (Urea) Feed Pump - P721	Off			
6.18	PID07A	FBR 2 Nutrient (Urea) Feed Pump - P722	Off			
6.19	PID15	FBR A Nutrient (Phos Acid) Feed Pump - P1520A	Running			
6.20	PID15	FBR 1 Nutrient (Phos Acid) Feed Pump - P1521	Running			
6.21	PID15	FBR 2 Nutrient (Phos Acid) Feed Pump - P1522	Running			
6.22	PID07B	FBR A Electron Donor Assembly Pump - P73A	Running			
6.23	PID07B	FBR 1 Electron Donor Assembly Pump - P731	Running			
6.24	PID07B	FBR 2 Electron Donor Assembly Pump - P732	Running			
<b>7</b>		<b>First Stage FBRs 3 &amp; 4</b>				
7.01	PID01B	FBR 3	Running			
7.02	PID01B	FBR 4	Running			
7.03	PID02B	First Stage Separator Tank - T2012	Running			
7.04	PID01B	Media Return Pump - P2012	Running			
7.05	PID01B	First Stage FBR Pump - P1013	Running			

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Sub-System	PID	Description	Status <sup>1</sup>	Checked	Criticality <sup>2</sup>	Notes
7.06	PID01B	First Stage FRB Pump - P1014	Running			
7.07	PID01B	First Stage FRB Pump - P102A	Running			
7.08	PID07A	FBR 3 pH Feed Pump - P713	Running			
7.09	PID07A	FBR 4 pH Feed Pump - P714	Running			
7.10	PID07A	FBR 3 Nutrient (Urea) Feed Pump - P723				
7.11	PID07A	FBR 4 Nutrient (Urea) Feed Pump - P 724	Off			
7.12	PID15	FBR 3 Nutrient (Phos Acid) Feed Pump - P1523	Running			
7.13	PID15	FBR 4 Nutrient (Phos Acid) Feed Pump - P1524	Running			
7.14	PID07B	FBR 3 Electron Donor Assembly Pump - P733	Running			
7.15	PID07B	FBR 4 Electron Donor Assembly Pump - P734	Running			
<b>8</b>		<b>Second Stage FBRs 5 □ 6</b>				
8.01	PID03A	FBR 5	Running			
8.02	PID03A	FBR 6	Running			
8.03	PID03C	Second Stage Separator Tank - T3011	Running			
8.04	PID03A	Media Return Pump - P3011	Running			
8.05	PID03A	Second Stage FBR Pump - P3015	Running			
8.06	PID03A	Second Stage FBR Pump - P3016	Standby			
8.07	PID03A	Second Stage FBR Pump - P301A	Running			
8.08	PID07A	FBR 5 pH Feed Pump - P715	Off			
8.09	PID07A	FBR 6 pH Feed Pump - P716	Off			
8.1	PID07A	FBR 5 Nutrient (Urea) Feed Pump - P725	Off			
8.11	PID07A	FBR 6 Nutrient (Urea) Feed Pump - P726	Off			
8.12	PID07B	FBR 5 Electron Donor Assembly Pump - P735	Running			
8.13	PID07B	FBR 6 Electron Donor Assembly Pump - P736	Running			
<b>9</b>		<b>Second Stage FBRs 7 □ 8</b>				
9.01	PID03B	FBR 7	Running			
9.02	PID03B	FBR 8	Running		4	The ORP line was cut to install a new isolation valve. The system was taken offline to remove the old pH and install the new probe.
9.03	PID03D	Second Stage Separator Tank - T3012	Running			
9.04	PID03B	Media Return Pump - P3012	Running			
9.05	PID03B	Second Stage FBR Pump - P3017	Running			
9.06	PID03B	Second Stage FBR Pump - P3018	Running			
9.07	PID03B	Second Stage FBR Pump - P302A	Running			
9.08	PID07A	FBR 7 pH Feed Pump - P717	Off			
9.09	PID07A	FBR 8 pH Feed Pump - P718	Off			
9.10	PID07A	FBR 7 Nutrient (Urea) Feed Pump - P727	Off			

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Sub-System	PID	Description	Status <sup>1</sup>	Checked	Criticality <sup>2</sup>	Notes
9.11	PID07A	FBR 8 Nutrient (Urea) Feed Pump - P728	Off			
9.12	PID07B	FBR 7 Electron Donor Assembly Pump - P737	Running			
9.13	PID07B	FBR 8 Electron Donor Assembly Pump - P738	Running			
<b>10</b>		<b>Aeration and DAF System</b>				
10.01	PID04	Aeration Tank	In operation			
10.02	PID04	Aeration Blower - B401	Running			
10.03	PID04	Bio filter	In operation			
10.04	PID04	Nutrient Solution	Running			
10.05	PID04	Bio filter Sump				
10.06	PID04	Nutrient Pump - P401	Running			
10.07	PID04	Bio filter Sump Pump - P402A	Standby			
10.09	PID04	Bio filter Blower	Running			
10.10	PID05	DAF Pressure Tanks	In operation			
10.11	PID05	DAF Vessel - D501	Running			
10.12	PID05	DAF Pressure Pump - P501	Running			
10.13	PID05	DAF Float Pump - P502	Running			
10.14	PID05	DAF Vessel - D551	Running		3	A small hole was patched on the sludge box vessel
10.15	PID05	DAF Pressure Pump - P551	Running			
10.16	PID05	DAF Float Pump - P552	Running			
10.17	PID05	Screw Conveyer Drive	Standby			
10.18	PID05	Skimmer Drive	Running			
<b>11</b>		<b>Pumping System (Old Effluent)</b>				
11.01	PID06	Effluent Tank 601	In operation		2	A new positioner was installed to replace a damaged one with a bad solenoid
11.02	PID06	Effluent Pump - P601	Running			
11.03	PID06	Effluent Pump - P602	Standby			
<b>12</b>		<b>Sand Filter System</b>				
12.01	PID17	Sand Filter				
12.02	PID17	Filter Reject Tank	In operation			
12.03	PID17	Filter Reject Pump - P1701A	Standby			
12.04	PID17	Filter Reject Pump - P1701B	Running			
<b>13</b>		<b>Effluent Tank and Pumping</b>				
13.01	PID10C	UV Effluent Tank	Running			
13.02	PID10C	Effluent Booster Pump - P1302A	Running			
13.03	PID10C	Effluent Booster Pump - P1302B	Standby			
13.04	PID10C	Area Around Effluent and North D-1	Running			
<b>14</b>		<b>Solids Collection and Pressing System</b>				

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Sub-System	PID	Description	Status <sup>1</sup>	Checked	Criticality <sup>2</sup>	Notes
14.01	PID16	Sludge Storage Tank	In operation		2	The vessel was taken offline to open and inspect for any damages or accumulation of solids. None were found and the unit was put back into service.
14.02	PID16	Solids Storage Effluent Pump - P1601	Running			
14.03	PID16	Solids Cond. Tank	In operation		3	A visual inspection was conducted to verify there was no damage to the vessel
14.04	PID09	Sludge Mixer	Running			
14.05	PID09	Filter Press Pump - P901	Running		2	The pump was taken offline to replace the slide pin
14.06	PID09	Filter Press Pump - P902				
14.07	PID09	West Press	Standby			
14.08	PID09	East Press	Running			
14.09	PID09	Filtrate Tank	In operation			
14.10	PID09	Filtrate Tank Effluent (recycle) Pump - P903	Running			
<b>Chemical Systems</b>						
<b>15</b>		<b>Electron Donor System</b>				
15.01	PID07B	Electron Donor Tank	In operation			
15.02	PID07B	Booster Pump P739A	Running			
15.03	PID07B	Booster Pump P739B	Standby			
17	PID07C	Micro Nutrient System	In operation			
18	PID07C	Hydrogen Peroxide System	In operation			
19	PID07C	De-Foam System	In operation			
20	PID15	Nutrient (Phosphoric Acid) System (Tank only - pumps included in FBRs)	In operation			
21	PID07A	Nutrient (Urea) System (Tank only - pumps included in FBRs)	In operation			
22	PID07A	pH System (Tank and effluent pH feed pump only - other pumps included in FBRs)	In operation			
23	PID07C	Ferric Chloride System	In operation			
24	PID07B	Polymer Systems - DAF	In operation			
25	PID09	Polymer System - Solids Dewatering (2 tanks, 2 centrifugal pumps, mixer, volumetric feeder)	In operation			
<b>Utility Systems</b>						
<b>26</b>		<b>Compressed Air System</b>				
26.01	PID08	West Compressor	Running			
26.02	PID08	East Compressor	Running			
26.03	PID08	O2 Compressor	Running			
26.04	PID08	Compressed Air Receiver Tank	In operation			

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Sub-System	PID	Description	Status <sup>1</sup>	Checked	Criticality <sup>2</sup>	Notes
26.05	PID08	Air Dryer	Running			
26.06	PID08	Oil Removal Filter	In operation			
26.07	PID08	Particulate Filter	In operation			
27	PID16	Oxygen System	In operation		1	The system is currently offline until the O2 sensor can be replaced. New filters were ordered for the system.
28		GWETS Plant Controls/ Siemens Controls	In operation			
29		Well Control System/ Allen Bradley Controls	In operation			
30		MCC FBR Pad	In operation			
31		MCC in D-1	In operation			
32		MCC in EQ area	In operation			
<b>Miscellaneous Systems</b>						
33		Operations Office/Network	In operation			
34		Laboratory Analyzers	In operation			
35		Security Systems	In operation			
<b>Shelf Spares</b>						
		Media Return Pump Rebuild Kit	In stock			
		pH Feed Pump	In stock			
		Nutrient Feed Pump	In stock			
		Electron Donor Feed Pump	In stock			
		Phosphoric Acid Feed Pump	In stock			Spares are on the shelf
		Interceptor Well Pumps (4 each)	In stock			Pumps and motors are stocked.
		Seep Well Pump (1 each, same as Athens so total of 2)	In stock			
		Athens Road Well Pump (1 each, same as Seep so total of 2)	In stock			Spares are on the shelf.

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