

INSPECTION REPORT

Inspection Entry Date/Time	08/30/2023 01:03 PM (CT)	Announced: Yes	
Inspection Exit Date/Time	08/31/2023 08:13 AM (CT)	Access: Granted	
Weather			
Media	Water		
Statute(s)/Program(s)	Clean Water Act, NPDES, WWTP		
Type of Inspection	Compliance Evaluation Inspection (CEI)		
Permittee Name	Hannahville Indian Community		
Facility or Site Name	Hannahville Indian Community Reverse Osmosis Plant		
Facility/Site Physical Address	N14911 Hannahville B-1 Road		
City, State, Zip Code	Wilson, MI 49896		
County/Borough/Parish	Menominee County		
Facility GPS Coordinates	45.63725, -87.35205		
FRS ID	110064612637		
Permit Number(s) (If Applicable)	MI0059650		
SIC and/or NAICS	4952 / 221320		
Regulatory Representatives Participating in Inspection:			
Title	Name	Organization	
Inspector	Keith Middleton	EPA REGION 5	
Lead Inspector:			
Dean Maraldo	[Signature] Maraldo, Dean		Digitally signed by Maraldo, Dean Date: 2023.09.02 12:15:55 -05'00'
	EPA REGION 5	maraldo.dean@epa.gov	(312) 353-2098
Supervisor Review:			
Ryan Bahr	[Signature] RYAN BAHR		Digitally signed by RYAN BAHR Date: 2023.09.06 17:04:58 -05'00'
	EPA REGION 5	bahr.ryan@epa.gov	

SECTION I – INTRODUCTION

Site Entry and Inspection Objectives

I, EPA Region 5 Lead Inspector, Dean Maraldo, arrived at the Hannahville Indian Community Reverse Osmosis (“RO”) Plant (“Facility”), located at Hannahville Indian Community, Wilson, MI 49896, at 01:03 PM (CT) on 08/30/2023 for an announced inspection. I was joined by EPA Region 5 inspector Keith Middleton. We presented our inspector credentials to Facility operator Kevin Moreau and informed him that this was an EPA

Region 5 inspection to determine compliance as authorized by Clean Water Act (CWA) Section 308 and implementing regulations. This report is based on information supplied by Facility representatives, direct observations made by EPA Region 5 inspectors, records and reports maintained by the permittee and other information including: photographs taken by EPA Region 5 inspectors, physical evidence collected by the EPA Region 5 inspectors, verbal or written statements made by information supplied by Facility representatives during or subsequent to the on-site inspection, and materials, processes, data, photographs, or documents shown, demonstrated, or submitted to the EPA Region 5 inspectors by Facility representatives during or subsequent to the on-site inspection. In addition, information gathered prior to or subsequent to the inspection from a review of EPA, and/or public records may be included in this report.

Attendees

Organization	Attendee Name	Title	Present in Opening Conf.	Present in Closing Conf.
EPA Region 5	Dean Maraldo	Lead Inspector	Yes	Yes
EPA Region 5	Keith Middleton	Inspector	Yes	Yes
Hannahville Indian Community	Roxanne Miller	Operator	Yes	Yes
Hannahville Indian Community	Kevin Moreau	Operator	Yes	No
Hannahville Indian Community	Steve Javurek	Operator	Yes	Yes
Hannahville Indian Community	Tom Broeders	Operator	Yes	Yes

Facility/Site Description

I began by reviewing the Facility description provided in the current permit (excerpt below) and the Facility representatives either confirmed or corrected (in bold below) the information as described below. Unless noted otherwise, Facility responses were provided by Facility operator Steve Javurek.

Permit Fact Sheet Facility Description:

- *Permittee operates a water treatment plant consisting of three identical treatment trains consisting of dual media filters followed by a 5-micron filter followed by reverse osmosis. **Only two identical trains.***
- *Chlorine is added to the raw water before the dual media filter and dechlorinated prior to the 5-micron filter. **Facility does not chlorinate but is set up to chlorinate if needed.***
- *Backwash water from the filters (dual media and 5-micron) is discharged by sewer to the Hannahville Indian Community Wastewater Treatment Plant for treatment.*
- *Concentrate from the three reverse osmosis units runs through a 5,000-gallon equalization tank before discharging to accommodate sampling.*
- *Up to 100,000 gallons per day (gpd) total can be discharged to the wetland (Latitude: 45° 41' 93" N, Longitude: 87° 41' 25" W) via the same outfall pipe as the Hannahville Indian Community Wastewater Treatment Plant discharge.*
- *The wetland flows into Depas Creek.*

Facility/Site Information

Next, I asked some background questions. Unless noted otherwise, Facility operator Steve Javurek provided the responses in the table below.

Operation schedule?	Monday-Friday, 8am-4pm, SCADA alerts
How do you manage your biosolids?	No biosolids
Have any bypasses or overflows happened at the plant or in the collection system in the last year?	No bypasses or overflows in the last year
Backup electrical power source?	Mr. Moreau said backup generator powers the entire plant including one of the wells
Type(s) of primary flow measuring device(s)?	Mag meters for each RO system (2)
Are there any plans for renovation or additional equipment to allow for increased wastewater flow?	No
Do you use in-house or contract out for laboratory analyses?	All in-house, except for radium
Do you accept waste from septage haulers?	No
What sort of failure alarm does the plant have?	Mr. Moreau mentioned pre-filter plug and power failure alarms
Responsible official	Steve Javurek
WWTP Design Capacity & Average Daily Flow	30-40k gallons/day, June 46k gallons/day
WWTP Approx. # of residents served	Not applicable, plant just treats RO concentrate from drinking water plant
Contributing (or shared) Jurisdictions	No
Outfalls?	Outfall #001, combined with Hannahville WWTP discharge pipe to final outfall
Any portion of the treatment train that is non-operational?	No
CBI?	No CBI concerns

Inspection Focus Areas and Locations

Location/Area	Description
Interview	Hannahville WWTP Office
Flow Measurement	
Laboratory	
O&M	
Pretreatment	
Records/Reports	
Self Monitoring	
SSOs	
Physical Inspection	Hannahville Indian Community Reverse Osmosis Plant

SECTION II – OBSERVATIONS**Location:** Interview/Records/Reports**Observation #:** DM1-OB-001 **Date:** 08/30/2023

Unless noted otherwise, Facility operator Steve Javurek provided the responses (in bold) below.

Are the records and reports maintained by the permittee for at least 3 years? **Yes, at least three years.**

Submit Operations & Maintenance Report, due January 31, every year? **Yes**

The Facility has no reported effluent limit violations over the last five years.

The receiving water is accurately described in permit.

Location: Interview/Self Monitoring**Observation #:** DM1-OB-002 **Date:** 08/30/2023

I began by asking about influent and effluent sampling locations and procedures. Facility operator Steve Javurek explained that effluent samples are collected from a tap after the RO system, and influent is collected from a sample port after coming into the Facility prior to the multi-media filters.

Sampling and analysis procedures are consistent with frequency specified by the permit. All samples are collected as grab samples, pursuant to the permit, and analysis begins immediately in the lab upon sample collection. Mr. Moreau provided a copy of written laboratory procedures (see Appendix 2 – Document Log).

Radionuclide samples are sent to COC Summit Environmental in Ohio. Operator Roxanne Miller provided a copy of chain-of-custody for Summit (see Appendix 2 – Document Log).

Location: Interview/O&M**Observation #:** DM1-OB-003 **Date:** 08/30/2023

Wastewater treatment for the Facility consists only of multi-media filters (2) and the RO units (2) (see Plant Flow Diagram in Appendix 2 – Document Log). Wastewater consists only of RO concentrate from the Tribe's drinking water plant. There is no sanitary sewer collection system, no lift stations, and no wastewater or septage received at the Facility. The RO treatment process does not produce sludge.

I asked if all treatment units are currently operable. Mr. Javurek confirmed that all units are operable.

I asked what maintenance procedures and records systems exist for the Facility. Mr. Moreau said they have manuals for the RO skids and for backwashing multi-media filters, and written records of maintenance history. They also have written standard operating procedures for operation and maintenance of major equipment. Mr. Moreau added that operators monitor pressure, hardness, alkalinity, and inline chlorine levels on a regular basis to make sure the RO system is operating properly. Mr. Javurek confirmed the Facility maintains an inventory of critical spare parts. Plant maintenance activities are recorded on monthly maintenance sheets and daily round sheets (see Appendix 2 – Document Log).

The Facility operators confirmed their certification status, as follows: Tom Broeders (Class B Michigan), Steve Javurek (Class B Michigan), Kevin Moreau (Class B, and L1 lagoon, Michigan), and Roxanne Miller (Class C Michigan).

I asked if the Facility experienced any bypasses in the last 12 months. Mr. Moreau said they have not.

I asked if the Facility maintains written procedures for responding to emergencies such as power failures, floods, fires, and other natural disasters. Mr. Moreau said yes and provided a copy of an emergency response plan for the Facility.

The Facility has a standby diesel generator providing emergency power for the Facility's treatment units.

Location: Interview/Flow Measurement**Observation #:** DM1-OB-004**Date:** 08/30/2023

I asked if influent and effluent flow measuring devices (Rosemount mag meters) are professionally calibrated at least once per year. Mr. Javurek said the mag meters are not routinely calibrated.

Location: Interview/Overflows and backups**Observation #:** DM1-OB-005**Date:** 08/30/2023

I asked if there have been any backups or overflows at the Facility since the last inspection. Mr. Javurek said they've had no backups at the plant (the Facility only treats RO concentrate from the drinking water system and does not collect or treat sanitary sewage).

Location: Interview/Pretreatment**Observation #:** DM1-OB-006**Date:** 08/30/2023

The Facility only treats drinking water system RO concentrate, no other wastewater or pretreatment inputs.

Location: Physical Inspection**Observation #:** DM1-OB-008**Date:** 08/30/2023**Weather:** Sunny and mild

Physical Inspection observations are documented in the Photo Log (see Appendix 1). The physical inspection concluded at 2:15 pm CT on August 30, 2023. The Facility representatives were nearing the end of the workday (Facility operates on the Eastern time zone), so we agreed to conclude for the day and reconvene the next morning to conduct the inspection close out conference.

Photo(s)

1. [HRO001.JPG](#)
2. [HRO002.JPG](#)
3. [HRO003.JPG](#)
4. [HRO004.JPG](#)
5. [HRO005.JPG](#)
6. [HRO006.JPG](#)

SECTION III – SAMPLING ACTIVITIES AND ANALYTICAL RESULTS

No sampling was conducted.

SECTION IV - AREA OF CONCERN

The presentation of Areas of Concern does not constitute a formal compliance determination or violation.

AOC Reference #: DM1-OB-004	Location: Interview/Flow Measurement
Regulation and/or Permit Requirement Permit Part II.C.2: Flow Measurement. Appropriate flow measurement devices and methods consistent with accepted scientific practices shall be selected and used to ensure the accuracy and reliability of measurements of the volume of monitored discharges. The devices shall be installed, calibrated and maintained to ensure that the accuracy of the measurements is consistent with the accepted capability of that type of device.	
AOC: Influent and effluent flow monitoring devices (mag meters) are not routinely calibrated.	

SECTION V – CLOSING CONFERENCE AND FOLLOW UP**Closing Conference**

I held the inspection closing conference with Facility personnel at 08:00 AM (CT) on 08/31/2023. During the closing conference, I discussed the observations and preliminary Area of Concern identified during the inspection. Observations and Areas of Concern have not yet been evaluated for a formal compliance determination. I also provided an estimated timeframe for completing an inspection report.

Per my request, the Facility representatives provided copies of daily plant rounds for week of 7/31-8/28/23; weekly sampling form for RO concentrate; maintenance sheet for week of 7/17/23; lab procedures; chain-of-custody form for 8/15/23; and pH and conductivity calibration log sheets (see Appendix 2 – Document Log).

Follow Up

The following follow up item was discussed during the close out conference.

Location: Interview/Permit	Area: Facility Description
DM1-OC-FD	
During the opening conference, we reviewed the Facility description in the current permit. Facility representatives confirmed two discrepancies between current plant conditions and the existing Facility description in the permit, including chlorination (Facility does not chlorinate), and the number of RO treatment trains (permit mentions three, however the plant only operates with two RO treatment trains). I recommended the Facility contact the EPA Permit Program to resolve these discrepancies.	

Communication Log

No additional information received by EPA Region 5 after exiting the Facility on 08/31/2023.

SECTION VI – LIST OF APPENDICES

- 1. Photo Log
- 2. Document Log

APPENDIX 1: PHOTO LOG



Well Inflow Piping			HRO001.JPG
08/30/2023 02:59 PM ET	No CBI	No PII	Photographer - Dean Maraldo
Physical Inspection			
Two wells currently in use as drinking water plant supply.			



Well Influent Flow Meters			HRO002.JPG
08/30/2023 03:00 PM ET	No CBI	No PII	Photographer - Dean Maraldo
Physical Inspection			
Flow meters are Rosemount mag meters.			



Multi-media filters (2)			HRO003.JPG
08/30/2023 03:01 PM ET	No CBI	No PII	Photographer – Dean Maraldo
Physical Inspection			
Facility uses one multi-media filter at a time, alternating monthly for cleaning.			



Reverse osmosis unit (one of two) with control panel			HRO004.JPG
08/30/2023 03:02 PM ET	No CBI	No PII	Photographer – Dean Maraldo
Physical Inspection			
Facility alternates RO units every cycle, every two or three hours during the day.			



Final Outfall #001			HRO005.JPG
08/30/2023 03:13 PM ET	No CBI	No PII	Photographer – Dean Maraldo
Physical Inspection			Coordinates: 45.69830666, -87.33678833
Final Outfall #001 discharges to a wetland which flows to Depas Creek. Discharge appeared clear. Final Outfall #001 includes treated effluent flow from both the RO plant and the Hannahville Wastewater Treatment Plant.			

APPENDIX 2: DOCUMENT LOG**Documents Received**

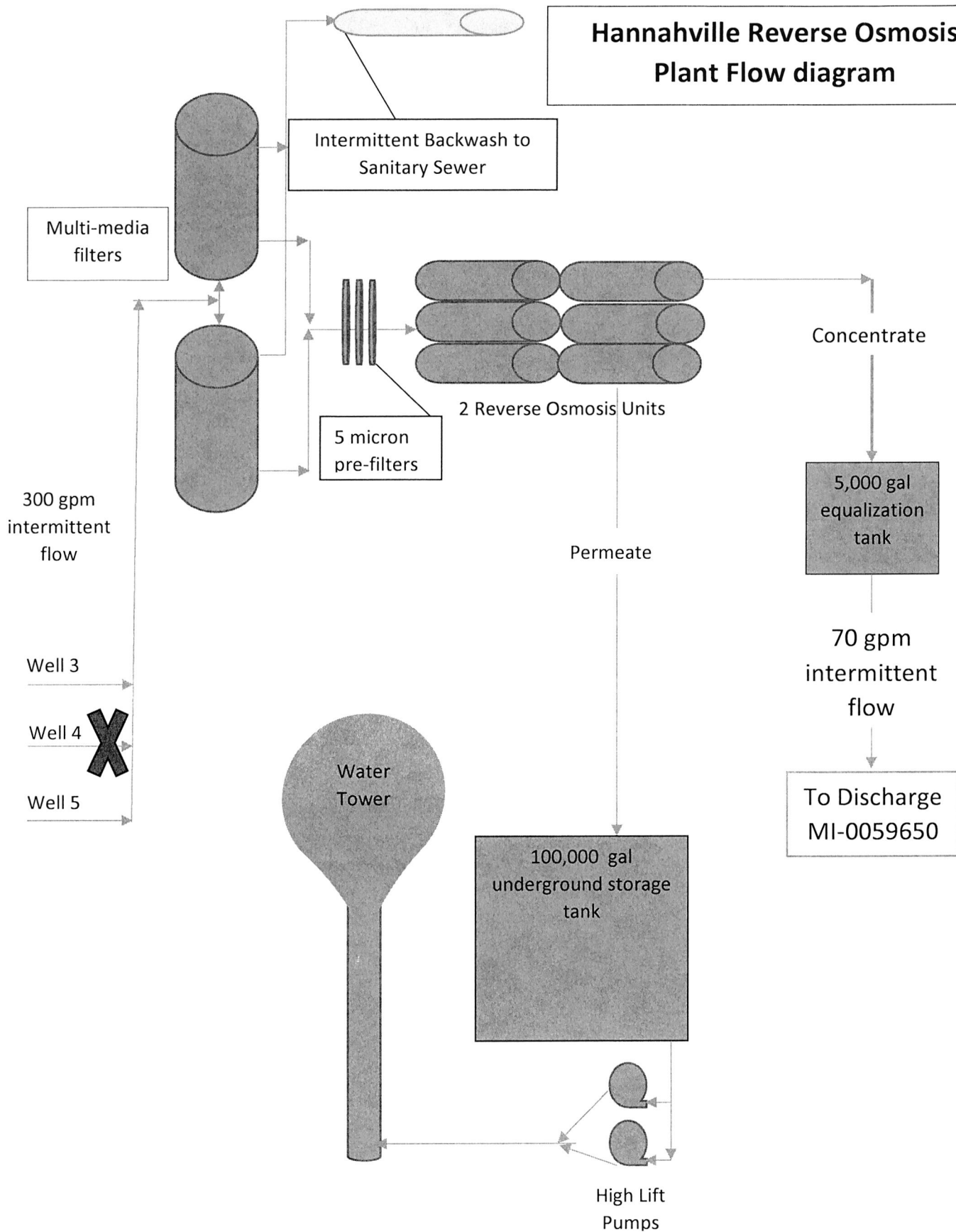
Document Name	Contains CBI or PII	Date Received	Pages	Attached to Report?
Opening conference sign-in sheet	No	8/29/2023	1	Yes
RO Plant Map (excluded for wellhead security reasons)	No	8/29/2023	1	No
RO Plant Flow Diagram	No	8/29/2023	1	Yes
RO Concentrate Yearly flow & pH Averages 2017-2021	No	8/29/2023	1	Yes
RO Plant 2022 NPDES App Form 2c epa form_3510-2cr	No	8/29/2023	47	No
RO Plant 2022 NPDES permit renewal	No	8/29/2023	22	No
Water Analysis and Plant Round Forms (7/31-9/1/2023)	No	8/31/2023	5	Yes
RO Concentrate Sample Forms (7/5-8/29/2023)	No	8/31/2023	2	Yes
Monthly Maintenance Forms (July and August 2023)	No	8/31/2023	2	Yes
pH Calibration Log (8/23-30/2023)	No	8/31/2023	1	Yes
Conductivity Calibration Log (9/22/2022-8/29/2023)	No	8/31/2023	1	Yes
Lab Procedures	No	8/31/2023	4	Yes
Chain of Custody form (Summit Environmental) 8/15/2023	No	8/31/2023	1	Yes

Event Hannahville WWTP + RO Plant Inspection
 Date 9/30/2023
 Location Henns, MI

Participants

Name	Title	Agency/Company	Phone	Email
Keith Middleton	Env. Engineer	US EPA	312-386-6465	Middleton, K. H @ epa.gov
Tom Broeders	Hannahville	Hannahville Operator	906-399-7491	broeders@ gmail
Steve Javurek	Operator	Hannahville Watrops	906-399-7490	Stevejavurek@gmail.com
Dean MARAUS	Physion Scientist	U.S. EPA	312-353-2098	MARAUSO, Dean @ EPA.gov
Kevin Moreau	operator	Hannahville	906 399 4953	Kmoreau2008@gmail.com
Roxanne Miller	operator	Hannahville	906 280 3446	millerroxanne18@gmail.com

Hannahville Reverse Osmosis Plant Flow diagram



Flow Averages (x100)											Total Average
Year	2017		2018		2019		2020		2021		
	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	
Jan	293.06	382.00	343.84	582.00	295.19	390.00	330.13	409.00	360.68	480.00	324.58
Feb	327.19	837.00	287.84	530.00	176.42	376.00	331.13	426.00	265.65	411.00	277.65
Mar	315.81	481.00	291.93	824.00	354.32	426.00	285.29	419.00	351.06	483.00	319.68
Apr	316.77	453.00	253.03	351.00	344.55	439.00	194.55	483.00	298.94	366.00	281.57
May	343.48	511.00	306.16	387.00	459.87	809.00	273.03	423.00	276.42	348.00	331.79
Jun	322.55	394.00	341.19	616.00	397.81	677.00	345.81	472.00	335.65	429.00	348.60
Jul	374.03	450.00	353.45	407.00	365.06	493.00	403.26	477.00	346.65	448.00	368.49
Aug	384.10	800.00	419.13	952.00	317.42	473.00	404.74	472.00	343.06	403.00	373.69
Sep	335.26	442.00	376.00	693.00	393.39	483.00	365.94	461.00	353.19	694.00	364.75
Oct	338.39	763.00	381.42	467.00	376.65	526.00	346.87	402.00	342.90	463.00	357.25
Nov	252.74	357.00	354.55	525.00	319.03	434.00	323.35	692.00	273.32	369.00	304.60
Dec	265.32	390.00	335.48	726.00	344.10	743.00	335.45	401.00	278.87	352.00	311.85
Yearly Avg	322.39		337.00		345.32		328.30		318.87		330.37
Yearly Max	837.00		952.00		809.00		692.00		694.00		952.00
											All time

All time

Solids = 1.10213 lbs

pH Min/Max Averages												
Year	2017		2018		2019		2020		2021		Average MIN	Average MAX
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max		
Jan	7.66	8.06	7.81	7.96	7.79	7.97	7.87	7.94	7.86	7.94	7.80	7.97
Feb	7.67	8.02	7.81	7.94	7.84	7.96	7.88	7.94	7.87	7.99	7.81	7.97
Mar	7.6	7.87	7.75	7.98	7.78	7.98	7.87	8.01	7.83	7.99	7.77	7.97
Apr	7.9	8.06	7.61	7.91	7.79	7.95	7.85	7.93	7.87	8	7.80	7.97
May	7.87	8.03	7.6	7.98	7.85	7.92	7.84	7.98	7.88	7.96	7.81	7.97
Jun	7.9	8.2	7.83	7.98	7.83	7.93	7.87	8.29	7.87	7.97	7.86	8.07
Jul	7.91	8.18	7.83	7.95	7.82	7.91	7.86	7.95	7.86	7.95	7.86	7.99
Aug	7.89	8.03	7.88	8.02	7.84	7.93	7.78	7.96	7.84	7.96	7.85	7.98
Sep	7.89	8.11	7.87	8.05	7.79	8	7.81	7.95	7.82	7.98	7.84	8.02
Oct	7.83	8.02	7.86	7.95	7.83	7.98	7.82	7.95	7.86	7.95	7.84	7.97
Nov	7.8	8.28	7.84	7.99	7.82	7.95	7.82	7.98	7.85	7.98	7.83	8.04
Dec	7.84	8.03	7.81	8.03	7.83	7.93	7.83	7.94	7.89	7.99	7.84	7.98
Yearly Avg	7.81	8.07	7.79	7.98	7.82	7.95	7.84	7.99	7.86	7.97		
MIN	7.60	7.87	7.60	7.91	7.78	7.91	7.78	7.93	7.82	7.94		
MAX	7.91	8.28	7.88	8.05	7.85	8.00	7.88	8.29	7.89	8.00		

Year	2017					2018					2019					2020					2021				
	Iron					Iron					Iron					Iron					Iron				
	Sulfate	lbs Avg	lbs max	mg/L Avg	mg/L Max	Sulfate	lbs Avg	lbs max	mg/L Avg	mg/L Max	Sulfate	lbs Avg	lbs max	mg/L Avg	mg/L Max	Sulfate	lbs Avg	lbs max	mg/L Avg	mg/L Max	Sulfate	lbs Avg	lbs max	mg/L Avg	mg/L Max
Jan	102	0.092	0.11	0.42	0.46	80	0.148	0.19	0.48	0.6	128	0.073	0.09	0.31	0.37	118	0.067	0.09	0.262	0.35	116	0.146	0.21	0.49	0.64
Feb	101	0.98	0.11	0.43	0.49	133	0.17	0.2	0.8	0.91	119	0.038	0.04	0.3	0.33	101	0.095	0.11	0.353	0.41	126	0.051	0.06	0.235	0.3
Mar	98	0.113	0.2	0.76	0.56	79	0.114	0.16	0.472	0.56	136	0.055	0.06	0.193	0.2	88	0.076	0.11	0.368	0.45	114	0.062	0.09	0.225	0.31
Apr	107	0.172	0.21	0.81	0.66	71	0.107	0.13	0.558	0.64	120	0.061	0.07	0.224	0.24	118	0.054	0.07	0.335	0.43	128	0.114	0.14	0.473	0.55
May	103	0.15	0.12	0.5	0.39	124	0.115	0.17	0.47	0.69	100	0.137	0.2	0.278	0.33	122	0.059	0.14	0.348	0.51	70	0.082	0.11	0.388	0.54
Jun	80	0.1	0.08	0.37	0.33	64	0.71	0.09	0.265	0.34	120	0.116	0.15	0.295	0.34	94	0.063	0.08	0.233	0.27	80	0.061	0.07	0.24	0.26
Jul	80	0.09	0.08	0.33	0.29	80	0.091	0.11	0.293	0.32	110	0.093	0.12	0.305	0.37	101	0.087	0.11	0.264	0.31	92	0.089	0.11	0.31	0.39
Aug	80	0.11	0.102	0.34	0.321	70	0.076	0.1	0.23	0.28	100	0.084	0.11	0.288	0.32	92	0.094	0.11	0.275	0.3	97	0.076	0.09	0.268	0.32
Sep	81	0.11	0.087	0.37	0.314	80	0.063	0.07	0.215	0.28	142	0.006	0.01	0.19	0.22	114	0.094	0.11	0.315	0.35	90	0.08	0.1	0.294	0.36
Oct	79	0.13	0.09	0.42	0.336	144	0.091	0.11	0.293	0.38	134	0.053	0.07	0.178	0.24	74	0.1	0.13	0.368	0.45	92	0.073	0.08	0.275	0.33
Nov	78	0.13	0.098	0.65	0.47	139	0.047	0.05	0.165	0.18	136	0.044	0.07	0.168	0.23	103	0.105	0.14	0.39	0.47	70	0.047	0.06	0.193	0.26
Dec	123	0.15	0.108	0.45	0.4	136	0.046	0.06	0.195	0.24	126	0.051	0.09	0.1458	0.21	110	0.119	0.14	0.442	0.49	89	0.058	0.11	0.242	0.4
Average	92.67	0.19	0.12	0.49	0.42	100.00	0.15	0.12	0.37	0.45	122.58	0.07	0.09	0.24	0.28	102.92	0.08	0.11	0.33	0.40	97.00	0.08	0.10	0.30	0.39
Max	123.00	0.98	0.21	0.81	0.66	144.00	0.71	0.20	0.80	0.91	142.00	0.14	0.20	0.31	0.37	122.00	0.12	0.14	0.44	0.51	128.00	0.15	0.21	0.49	0.64
Sulfate overall Avg	103.03					Iron mg/L AVG	0.35		Iron lbs AVG	0.11															
Sulfate Overall Max	144.00					Iron mg/L MAX	0.91		Iron lbs MAX	0.21															

RADS												AVERAGE	MAX
2017		2018		2019		2020		2021					
ALPHA GROSS TOTAL RADIUM	38.2	11.4	43	20.8	19.7	19	31.9	50	34.5	17.4	28.59	50	
	22.4	12.06	18.34	10	9.08	4.45	11.6	15.1	18.6	9.64	13.127	22.4	

Hannahville Water Operations
WATER ANALYSIS and PLANT ROUNDS

PARAMETER/ROUNDS		UNITS	8/28/2023 Monday	8/29/2023 Tuesday	8/30/2023 Wednesday	8/31/2023 Thursday	9/1/2023 Friday
Running Well		#	5	5	5		
Running R.O.		#	2	1	1		
Running MMF		#	2	2	2		
R.O. Inlet Flow		gpm	262	264	265.3		
R.O. Booster Pump Speed		Hz	.	42.6	42.4		
Primary Membrane		psi	140	148	149		
Final Membrane		psi	106	117	117.1		
Differential		psi	34	31			
Permeate Flow		gpm	200	200	200		
Normalized Flow		gpm	196	193	191		
Differential		%					
Concentrate Flow		gpm	66	64.3	64.5		
Machine Recovery		%	75	75.7	75.6		
Raw Water Bypass Flow		gpm	20	19.6	19.2		
Finished	pH	S.U.		7.00	7.08		
Permeate	Panel Conductivity	µS/cm	7	5.2	5.8		
	Conductivity	µS/cm		5.29			
Tap	Conductivity	µS/cm		64.9			
	pH	S.U.	7.23	7.13	7.13		
	Hardness, Total	mg/L		24			
	Alkalinity, Total	mg/L		28			
Raw	Panel Conductivity	µS/cm	451		467		
	Conductivity	µS/cm		496			
	pH	S.U.		7.65	7.59		
	Hardness, Total	mg/L		230			
Chlorine Residuals	FINISHED Total	ppm	0.50	0.65	0.52		
	FINISHED Free	ppm		0.32	0.31		
	TAP Total	ppm	0.33	0.36	0.36		
	TAP Free	ppm		0.27	0.36		
Antiscalant	Tank	lbs	746	713	688		
Tank	Pump	P# - L/hr		1-1.00	1-1.00		
Chlorine	Tank	check	+ 2 scoops	OK ✓			
Tank	Pump	P# - %		2-16	2-16		
NaOH	Tank	in./lbs	28.0/618	27.25/600	26.6/591		
Tank	Pump	P# - mL/hr		1-275	1-275		
CL17	Tap	%	30				
Reagents	Post	%	33				
Pre/Post	R.O. 1	psi		36/24	37/25		
Filters	R.O. 2	psi					
Propane Tank		%					
Analyst / Entered in Excel			KCM / KCM	SV /	SV /	/	/

Lab Notes:

Hannahville Water Operations
WATER ANALYSIS and PLANT ROUNDS

PARAMETER/ROUNDS		UNITS	8/21/2023 Monday	8/22/2023 Tuesday	8/23/2023 Wednesday	8/24/2023 Thursday	8/25/2023 Friday
Running Well		#	5	5	5	5	5
Running R.O.		#	1	2	2	2	2
Running MMF		#	2	2	2	2	2
R.O. Inlet Flow		gpm	264	266	266.0	266	265.2
R.O. Booster Pump Speed		Hz			41.0		41.1
Primary Membrane		psi	149	141	141.2	141	141.5
Final Membrane		psi	118	107	107.1	107	106.8
Differential		psi	31	34	34.1	34	34.7
Permeate Flow		gpm	200	200	200.1	200	200
Normalized Flow		gpm	192	196	197.1	195	194
Differential		%	4%	2%	1.5	2.5%	3%
Concentrate Flow		gpm	64	66	66.1	66	66.4
Machine Recovery		%	76	75	75.2	75	75.3
Raw Water Bypass Flow		gpm	20	19	18.8	19	19.0
Finished	pH	S.U.			7.06		7.03
Permeate	Panel Conductivity	µS/cm	5	7	6.9	7	7.2
	Conductivity	µS/cm					
Tap	Conductivity	µS/cm			72	76	
	pH	S.U.	7.24	7.28	7.17	7.15	7.13
	Hardness, Total	mg/L				26	
	Alkalinity, Total	mg/L				23	
Raw	Panel Conductivity	µS/cm	459	463	461	458	464
	Conductivity	µS/cm				458	
	pH	S.U.			7.57	7.59	7.55
	Hardness, Total	mg/L				228	
Chlorine Residuals	FINISHED Total	ppm	0.48	0.39	0.67	0.42	0.60
	FINISHED Free	ppm			0.37	0.36	0.36
	TAP Total	ppm	0.31	0.28	0.38	0.33	0.38
	TAP Free	ppm			0.29	0.28/0.26	0.29
Antiscalant	Tank	lbs	344	316	264	241 → 855	828
Tank	Pump	P# - L/hr			1-1.00	fill	1-1.00
Chlorine	Tank	check	+ 2 scoops	✓ - OK	✓ OK	+ 1 scoop.	✓ OK
Tank	Pump	P# - %			2-16		
NaOH	Tank	in./lbs	11.3"/261	10.8"/247	9.75"/223	9.4"/218/30.4/650	29.7"/692
Tank	Pump	P# - mL/hr			1-275	fill	1-275
CL17	Tap	%	60				
Reagents	Post	%	60				
Pre/Post	R.O. 1	psi	35/23		33		
Filters	R.O. 2	psi			33/22		33/22
Propane Tank		%					
Analyst / Entered in Excel			KCM / KCM	KCM / KCM	SW / KCM	KCM / KCM	SW / KCM

Lab Notes:

Hannahville Water Operations
WATER ANALYSIS and PLANT ROUNDS

PARAMETER/ROUNDS		UNITS	8/14/2023 Monday	8/15/2023 Tuesday	8/16/2023 Wednesday	8/17/2023 Thursday	8/18/2023 Friday
Running Well		#	5	5	5	5	5
Running R.O.		#	2	2	2	2	2
Running MMF		#	2	2	2	2	2
R.O. Inlet Flow		gpm	265	269	266	265	265
R.O. Booster Pump Speed		Hz	137				
Primary Membrane		psi	137 137	140	140	140	139
Final Membrane		psi	105 105	107	106	106	106
Differential		psi	32	33	34		
Permeate Flow		gpm	200	203	200	200	200
Normalized Flow		gpm	200	199	197	198	197
Differential		%	—	2.0%	1.5%	1.0%	1.5%
Concentrate Flow		gpm	65	66	66	66	66
Machine Recovery		%	75	75	75	75	75
Raw Water Bypass Flow		gpm	20			20	20
Finished	pH	S.U.		7.03			7
Permeate	Panel Conductivity	µS/cm	7	7	7	7	7
	Conductivity	µS/cm		6.04			
Tap	Conductivity	µS/cm		69.0 / 70.6			
	pH	S.U.	7.19	7.34 / 7.28	7.21	7.23	7.25
	Hardness, Total	mg/L		24			
	Alkalinity, Total	mg/L		24			
Raw	Panel Conductivity	µS/cm	462	467	464	463	462
	Conductivity	µS/cm		467 457			
	pH	S.U.		7.64			
	Hardness, Total	mg/L		230			
Chlorine Residuals	FINISHED Total	ppm	0.52			0.41	0.53
	FINISHED Free	ppm		0.52	0.38		
	TAP Total	ppm	0.30			0.29	0.30
	TAP Free	ppm		0.28	0.25		
Antiscalant Tank	Tank	lbs	542	515	489	459	434
	Pump	P# - L/hr					
Chlorine Tank	Tank	check	✓ - OK	+2 scoops	✓ OK	✓ - OK	+1 scoop
	Pump	P# - %					
NaOH Tank	Tank	in./lbs	14.8 / 336	14.25 / 321	13.75 / 312	13.4 / 304	12.8 / 294
	Pump	P# - mL/hr					
CL17 Reagents	Tap	%	85			75	73
	Post	%	85			75	73
Pre/Post Filters	R.O. 1	psi					
	R.O. 2	psi			34/26		33/25
Propane Tank		%					
Analyst / Entered in Excel			KCM / KC	Rem / Rem	Rem / Rem	KCM / KC	KCM / KC

Lab Notes:

Hannahville Water Operations
WATER ANALYSIS and PLANT ROUNDS

PARAMETER/ROUNDS		8/7/2023 Monday	8/8/2023 Tuesday	8/9/2023 Wednesday	8/10/2023 Thursday	8/11/2023 Friday
Running Well	#	5	5	5	5	5
Running R.O.	#	1	1	2	1	2
Running MMF	#	2	2	2	2	2
R.O. Inlet Flow	gpm	265	264	265	265	265
R.O. Booster Pump Speed	Hz					40.2
Primary Membrane	psi	147	147	137	146	138.2
Final Membrane	psi	116	117	105	116	105.1
Differential	psi	31	30	32	30	33.1
Permeate Flow	gpm	200	200	201	200	199.5
Normalized Flow	gpm	193	194	200	193	197.7
Differential	%					
Concentrate Flow	gpm	65	64	65	64	65.5
Machine Recovery	%	76	76	75	76	75.3
Raw Water Bypass Flow	gpm	20	19	20	20	19.4
Finished	pH S.U.					6.99
Permeate	Panel Conductivity	6	6	7	6	6.7
	Conductivity					
Tap	Conductivity				77	
	pH S.U.	7.28	7.26	7.27	7.21	7.13
	Hardness, Total				26/25	
	Alkalinity, Total				30	
Raw	Panel Conductivity	464	454	462	455	463
	Conductivity				459	
	pH S.U.				7.61	7.63
	Hardness, Total				221	
Chlorine Residuals	FINISHED Total	0.48	0.53	0.49	0.46	0.61
	FINISHED Free					0.47
	TAP Total	0.36	0.33	0.33	0.34	0.39
	TAP Free					0.31
Antiscalant Tank	Tank lbs	744	719	680	661	626
	Pump P# - L/hr					1 - 1.00
Chlorine Tank	Tank check	+ 2 scoops	✓ OK	✓ OK	+ 2 scoops	✓ OK
	Pump P# - %					2 - 16
NaOH Tank	Tank in./lbs	19.7"/422	18.2"/406	17.4/385	16.9/380	16.25/363
	Pump P# - mL/hr					1 - 275
CL17	Tap %	95	95	90	90	
Reagents	Post %	95	95	90	90	
Pre/Post Filters	R.O. 1 psi		36/23			8
	R.O. 2 psi					33/26
Propane Tank	%					
Analyst / Entered in Excel		KCM / K	KCM / K	KM / K	KCM / K	S / KCM

Lab Notes:

Hannahville Water Operations
WATER ANALYSIS and PLANT ROUNDS

PARAMETER/ROUNDS		7/31/2023 Monday	8/1/2023 Tuesday	8/2/2023 Wednesday	8/3/2023 Thursday	8/4/2023 Friday
Running Well	#	5	5	5	5	5
Running R.O.	#	1	2	2	2	1
Running MMF	#	2	2	2	2	2
R.O. Inlet Flow	gpm	264	265	265.5	266.1	264.6
R.O. Booster Pump Speed	Hz		39.8	40.1	40.0	42.2
Primary Membrane	psi	146	136	136.5	137.4	147.0
Final Membrane	psi	116	104	104.7	104.2	117.6
Differential	psi	30	32	31.8	33.2	29.4
Permeate Flow	gpm	200	200	200.3	200.3	199.5
Normalized Flow	gpm	193	200	201	201	192.3
Differential	%	3.5%	—	-0.3%	-0.3%	3.6%
Concentrate Flow	gpm	65	66	65.4	65.6	64.4
Machine Recovery	%	76	75.3	75.3	75.4	75.6
Raw Water Bypass Flow	gpm	19	19	18	18.5	19.4
Finished	pH	S.U.		7.00	7.01	7.11
Permeate	Panel Conductivity	µS/cm	5	7.16	6.6	4.3
	Conductivity	µS/cm		6.06		
Tap	Conductivity	µS/cm		94.2		
	pH	S.U.	7.18	7.24	7.15	7.14
	Hardness, Total	mg/L		28		
	Alkalinity, Total	mg/L		29		
Raw	Panel Conductivity	µS/cm	463	382	384	466
	Conductivity	µS/cm		463		
	pH	S.U.		7.64	7.61	7.66
	Hardness, Total	mg/L		220		
Chlorine Residuals	FINISHED Total	ppm	0.59	0.74	0.48	0.69
	FINISHED Free	ppm		0.35	0.46	0.37
	TAP Total	ppm	0.29	0.41	0.35	
	TAP Free	ppm		0.34	0.30	
Antiscalant	Tank	lbs	356	322	296	267/850
Tank	Pump	P# - L/hr			1-1.00	1-1.00
Chlorine	Tank	check	✓-OK	+1 scoop	OK ✓	+1
Tank	Pump	P# - %		2-16	2-16	2-16
NaOH	Tank	in./lbs	22.5"/500	21.5"/477	21.0/468	20.5/457
Tank	Pump	P# - mL/hr			1-275	1-275
CL17	Tap	%	<10 → 100			
Reagents	Post	%	10 → 100			
Pre/Post	R.O. 1	psi		34/28		37/23
Filters	R.O. 2	psi			32/25	33/26
Propane Tank		%				
Analyst / Entered in Excel		KCM/ICM RM/ICM S/ICM S/ICM S/ICM				

Lab Notes:

Hannahville Water Operations
R.O. CONCENTRATE

Month: JULY
Year: 2023

WEEKLY SAMPLE COLLECTION

	Week 1	Week 2	Week 3	Week 4	Week 5
Date	7/5/23	7/11/23	7-18-23	7/27/23	
Time	11:10A	8:10AM	10:11AM	7:30A	
Place	Lab Concentrate Sample Tap	Lab Concentrate Sample Tap	Lab Concentrate Sample Tap	Lab Concentrate Sample Tap	Lab Concentrate Sample Tap
Sampler	Ka	TB	KCM	Ka	

WEEKLY SAMPLE ANALYSIS

Date	7/5/23	7/11/23	7-18-23	7/27/23	
TSS, mg/L Method: HACH 8006	Ø	6	Ø / 10up = 4	Ø	
IRON total, mg/L Method: HACH 8008	0.45	0.24	0.43	0.46	
Outfall Observation	✓	✓		✓	
Total Flow, MGD	0.0410	0.0425	0.0392	0.0417	
TRC, µg/L	N/A	N/A	N/A	N/A	N/A
Analyst	Ka	TB	KCM	KCM	

DAILY pH ANALYSIS

Date	pH	Analyst
1		
2		
3	7.89	Ka
4	7.92	Ka
5	7.93	Ka
6	7.92	Ka
7	7.95	Ka
8		
9		
10	7.94	Ka
11	7.94	TB
12	7.95	✓
13	7.95	KCM
14	7.95	KCM
15		
16		
17	7.97	KCM
18	7.97	KCM
19	7.97	KCM
20	7.99	KCM
21	7.92	KCM
22		
23		
24	7.91	KCM
25	7.89/7.90	KCM
26	7.92	Ka
27	7.92	KCM
28	7.95	✓
29		
30		
31	7.93	KCM

MONTHLY
SAMPLE COLLECTION

Date	7/5/23
Time	11:10A
Place	Lab Concentrate Sample Tap
Sampler	Ka

MONTHLY SAMPLE ANALYSIS

Date	7/5/23
Chlorides, mg/L Method: HACH 8207	27.1 / 27.3
Sulfate, mg/L Method: HACH 8051	86
TDS, mg/L Method: HACH 8160	813
Analyst	Ka

SEMI-ANNUAL SAMPLES

MAY 2023 SAMPLE:

COLLECTION ANALYSIS

Date	5/8/23	Date	
Time		Gross Alpha	
Place		Radium Total	
Sampler	RM	Analyst	

AUGUST 2023 SAMPLE:

COLLECTION ANALYSIS

Date		Date	
Time		Gross Alpha	
Place		Radium Total	
Sampler		Analyst	

Lab Notes: 7-18-23 Silicon Oil to TSS vials

Hannahville Water Operations
R.O. CONCENTRATE

Month: **AUGUST**
Year: **2023**

WEEKLY SAMPLE COLLECTION

	Week 1	Week 2	Week 3	Week 4	Week 5
Date	8/2/23	8/10/23	8/15/23	8/24/23	8/29/23
Time	11:00	7:15A	9:40 AM	7:01A	9:05A
Place	Lab Concentrate Sample Tap	Lab Concentrate Sample Tap	Lab Concentrate Sample Tap	Lab Concentrate Sample Tap	Lab Concentrate Sample Tap
Sampler	SV	IC	KCM	IC	SV

DAILY pH ANALYSIS

Date	pH	Analyst
1	7.95	KCM
2	7.97	SV
3	7.93	SV
4	7.93	SV
5		
6		
7	7.99	KCM
8	7.97	IC
9	7.93	KCM
10	7.94	KCM
11	7.96	SV
12		
13		
14	7.95	IC
15	7.95	KCM
16	7.98	KCM
17	7.95	IC
18	7.97	IC
19		
20		
21	7.99	KCM
22	7.90	IC
23	7.94	SV
24	7.92/7.93	IC
25	7.95	SV
26		
27		
28	7.97	KCM
29	7.97	SV
30	7.97	SV
31		

WEEKLY SAMPLE ANALYSIS

Date	8/2/23	8/10/23	8/15/23	8/24/23	8/29/23
TSS, mg/L Method: HACH 8006	0.5 < 4	0	1.1 < 4	2.2 < 4	0.5 < 4 0.6 < 4
IRON total, mg/L Method: HACH 8008	0.43	0.31/0.34	0.16	0.19	0.23
Outfall Observation	✓	X		✓	✓
Total Flow, MGD	0.0413	0.0433	0.0402	0.0403	0.0428
TRC, µg/L	N/A	N/A	N/A	N/A	N/A
Analyst	SV	IC	KCM	IC	SV

MONTHLY SAMPLE COLLECTION

Date	8/2/23
Time	11:00
Place	Lab Concentrate Sample Tap
Sampler	SV

MONTHLY SAMPLE ANALYSIS

Date	8/2/23
Chlorides, mg/L Method: HACH 8207	27.2
Sulfate, mg/L Method: HACH 8051	110 / Dup 110
TDS, mg/L Method: HACH 8160	784
Analyst	SV

SEMI-ANNUAL SAMPLES

MAY 2023 SAMPLE: ✓

COLLECTION		ANALYSIS	
Date	5/8/23	Date	
Time		Gross Alpha	
Place		Radium Total	
Sampler		Analyst	

AUGUST 2023 SAMPLE: ✓

COLLECTION		ANALYSIS	
Date	8/15/23	Date	
Time		Gross Alpha	
Place		Radium Total	
Sampler		Analyst	

Lab Notes:

MAINT.

JULY

2023

WEEKLY: 1 2 3 4 Notes

CL-17 Cl ₂ analyzer	Chemical Solutions					
	Flow Rate					
Tap Cl ₂ analyzer	Flush w/higher flow rate					
RO Booster Pump 1	Flow Rate					
	Oil Level					
	General Inspection					
RO Booster Pump 2	Flow Rate					
	Oil Level					
	General Inspection					
High Lift Pump 1	Seal Water Flow					
High Lift Pump 2	Seal Water Flow					

Operator/Date Notes

MONTHLY MAINTENANCE

			Switch MMF filters: chlorinate and backwash
16	7/17	✓	Check/Calibrate RO 1 pH meter
16	7/17	✓	Check/Calibrate RO 2 pH meter
			RO booster pump 1 Amps & Hz
			RO booster pump 2 Amps & Hz
			RO booster pump 1 bearing temps
			RO booster pump 2 bearing temps
			High lift pump 1 Amps, Hz, flow
			High lift pump 2 Amps, Hz, flow
7/21/23	✓ - OK	16	Check High lift pumps sump pump and pit
			Well pump 3 Amps, Hz, & flow
			Well pump 5 Amps, Hz, & flow
7/21	16	✓ - OK	Check Caustic pump: leakage, diaphragm cond., valves, press.
7/21	16	✓ - OK	Check Cl ₂ pumps, leakage, oil level/cond., valves, press.
7/21	16	✓ - OK	Check Anti-scalant pumps, leakage, diaphragm cond., valves, press.
7/21	16	✓ - OK	Clean treatment area- wash down all areas, equipment & piping
7/21	16	✓ - OK	Generator Fuel
7/21	16	✓ level - OK	Change Generator Oil & Filters record hours
7/21	16	✓ OK	Generator coolant
7/17	16	✓ OK	Check all Fire Extinguishers
16	7/17	✓ - OK	Check all eyewash and Emergency showers
7/21	16	✓ - OK	Check boiler fluid level and circulation pumps
			Backwash RO 1 and Change Pre-filters
			Backwash RO 2 and Change Pre-filters
			Clean (acid wash) Scale from Chlorinators and plumbing
7/17	16	✓ - OK	Clean All VFD cabinet vents, filters and fans
7/21	16	✓ - OK	Check all UPS devices function and capacity

OTHER MAINTENANCE PERFORMED:

7/5/23 - UPS for well 3 comm - "off"? Turned back on - 16 (John e Sweetgrees) well 3 pond low (16)

7/5/23 - 2" PRV not functioning (70PSI - same as upstream) flush valve stuck open - closed + flushed lines (58 now - OK) 16 * Replaced valve 7/6/23 16

AUGUST

2023

WEEKLY: 1 2 3 4 Notes

CL-17 Cl ₂ analyzer	Chemical Solutions					
	Flow Rate					
Tap Cl ₂ analyzer	Flush w/higher flow rate					
RO Booster Pump 1	Flow Rate					
	Oil Level					
	General Inspection					
RO Booster Pump 2	Flow Rate					
	Oil Level					
	General Inspection					
High Lift Pump 1	Seal Water Flow					
High Lift Pump 2	Seal Water Flow					

Operator/Date Notes

MONTHLY MAINTENANCE

		Switch MMF filters: chlorinate and backwash
Kcm 8/28	✓	Check/Calibrate RO 1 pH meter
Kcm 8/28	✓	Check/Calibrate RO 2 pH meter
		RO booster pump 1 Amps & Hz
		RO booster pump 2 Amps & Hz
		RO booster pump 1 bearing temps
		RO booster pump 2 bearing temps
		High lift pump 1 Amps, Hz, flow
		High lift pump 2 Amps, Hz, flow
Kcm 8/28	✓ OK	Check High lift pumps sump pump and pit
		Well pump 3 Amps, Hz, & flow
		Well pump 5 Amps, Hz, & flow
8/28 Kcm	✓ OK	Check Caustic pump: leakage, diaphragm cond., valves, press.
Kcm 8/28	✓ clean	Check Cl ₂ pumps, leakage, oil level/cond., valves, press.
Kcm 8/28	✓ OK	Check Anti-scalant pumps, leakage, diaphragm cond., valves, press.
		Clean treatment area- wash down all areas, equipment & piping
Kcm 8/9	Ya tank of 850 gallons	Generator Fuel
Kcm 8/9	✓ - OK	Generator Oil level
Kcm 8/9	✓ - OK	Generator coolant
Kcm 8/28	✓ - OK	Check all Fire Extinguishers
Kcm 8/28	✓ - OK	Check all eyewash and Emergency showers
Kcm 8/28	✓ - OK	Check boiler fluid level and circulation pumps
Kcm 8/28	clean filters	Clean All VFD cabinet vents, filters and fans
		Clean (acid wash) Scale from Chlorinators and plumbing

OTHER MAINTENANCE PERFORMED:

Replace WTP gen batteries + install new trickle charger 8/9/23 Kcm/ST
 + set gen to exercise Tuesdays @ 9:00 AM ish - Kcm 8/15/23

8/24/23 - oil + filter change in WTP generator. fuel @ about 40% - Kcm

RO #2
 8/26/23 - Pre filters changed ST

8/29/23 - cleaned screens, flush lines, + adjusted "open" setpoints on 8" + 2" PRV - Kcm

[illegible]Hannhville RO Plant Inspection Report
Appendix 2

Sept 22 to
mo/yr to mo/yr

CONDUCTIVITY PROBE CALIBRATION LOG, HACH CDC401

Date	Analyst	Before Calibration	After Calibration	Date	Analyst	Before Calibration	After Calibration
		1000 μ S/cm	1000 μ S/cm			1000 μ S/cm	1000 μ S/cm
9/22/22	SV	912	1000	6/27/23	KCM	1002	1000
9/26/22	TB	909	1001	7/5/23	KCM	1007	1000
10-4-22	KCM	1001	1000	7/11/23	TB	1001	1000
10/13/22	TB	998	1001	7-18-23	KCM	1002	1000
10/18/22	SV	894	1000	7/27/23	KCM	999	1001
10/24/22	TB	893	1000	8/2/23	SV	857	1001
11-1-22	KCM	998	1000	8/10/23	KCM	1004	1000
11/9/22	KCM	999	1000	8-15-23	KCM	1001	1000
11/14/22	SV	894	1000	8/24/23	KCM	1001	1000
11-29-22	KCM	1001	1000	8/27/23	SV	857	1000
12/7/22	KCM	999	1000				
12/13/22	SV	954	1000				
12/14/22	TB	989	1002				
12-27-22	KCM	1005	1000				
1/5/23	KCM	986	1000				
1/10/23	SV	921	1000				
1/16/23	TB	914	1001				
1-27-23	KCM	1003	1001				
2/2/23	KCM	999	1000				
2-7-23	KCM	1001	1000				
2/14/23	SV	920	1001				
2/21/23	TB	896	1000				
2-28-23	KCM	1003	1001				
3/8/23	KCM	1002	1000				
3/14/23	SV	923	1000				
3/20/23	TB	924	1000				
3-28-23	KCM	1001	1000				
4/5/23	KCM	1003	1000				
4/12/23	SV	926	1000				
4/17/23	TB	1000	1000				
4-25-23	KCM	999	1000				
5/4/23	KCM	1004	1000				
5/11/23	SV	920	1003				
5/15/23	TB	834	1001				
5-23-23	KCM	1001	1002				
5/31/23	KCM	1002	1000				
6/6/23	SV	880	1003				
6/13/23	TB	994	1000				
6/27/23	KCM	1003	1001				

Calibrate Conductivity Meter Before Each Use

Lab Procedure **All lab analysis procedures are in the drawer labeled "Laboratory Manuals & Procedures"*

1. Let sample taps run for at least 15 minutes before collecting samples, set timer.
2. Calibrate and warm machines, turn on pH & Conductivity meter HACH HQ440d multi, HACH DR3900, and AutoCAT™ 9000, *if needed*.
3. Login into HACH DR3900 Spec.
4. Calibrate pH & Conductivity meter while sample taps are running. Calibration Log sheets are in drawer under pH & Conductivity meter.
 - a. pH Calibration, rinse & blot dry well in between each reading. During each reading make sure no air bubbles are trapped underneath probe.
 - i. Unplug air hole, make sure probe is full of 3M KCl Solution; refill if needed
 - ii. Collect each pH standard (4, 7, 10) in marked 50 ml beaker with a stir bars
 - iii. Read each standard, record
 - iv. Calibrate with each standard, record slope
 - v. After calibration, read each standard, record
 - vi. Store probe in pH 7.00 Standard
 - b. Conductivity Calibration, rinse & blot dry well in between each reading
 - i. Collect standard in 50 ml beaker with a stir bar
 - ii. Read standard, record
 - iii. Calibrate
 - iv. After calibration, read standard, record
 - v. Store probe in distilled water
5. Read & Record RO information; Running Well, RO, MMF, Primary & Final Membrane PSI, Differential, Permeate & Concentrate Flow, Machine Recovery %, Raw Water Bypass, Permeate & Raw Conductivity.
6. Read & Record Solution/Chemical tank weights, Chemical Feed Pump # and rates, refill any if needed
7. Check and note QA/QC Duplicates needed for analysis.
8. Collect following samples to warm to room temperature before analyzing.
 - a. Conductivity & pH; fill each beaker labeled "P" "F" "T" "R", at least ≈ 150 mls each. Turn off Permeate sample tap. NOTE: Conductivity only on Permeate
 - b. Hardness; 100 mls each: Finished, Tap, and Raw [measure in 100 mL Graduated Cylinder, pour into 250 ml beakers with stir bars]. Turn off Raw sample tap.

- c. Alkalinity; 100 mls each: Finished, and Tap [measure in 100 mL Graduated Cylinder, pour into 250 ml beakers with stir bars].
 - d. Turbidity; 25 ml Round Sample Cell [Label: T]: Tap. Turn down Finished and Tap to a lower flow.
9. **Chlorine, Total & Free** NOTE: Total Cl₂ residual has a 3-minute reaction period.
- a. Use round 10 mls sample cells, fill both with same sample, Tap then Finished, use Total in one and Free in the other. Read, Record.
10. **Conductivity & pH**
- a. At room temperature, rinse, blot both probes tips dry, then insert both probes into each sample, read, record.
11. **Hardness**
- a. 100 ml sample, stir bar. At room temperature.
 - b. Drop in 2.0 ml of Buffer Solution Hardness 1 into sample, let mix.
 - c. Empty contents of 1 – ManVer 2 Hardness Indicator Powder Pillow, let mix, sample will be a pink color.
 - d. Zero titrator: use EDTA Tetrasodium Salt **0.80 M** digital titrator, insert delivery tube, titrate contents through tube, empty few drops onto paper towel, wipe/blot off excess, zero digital titrator.
 - e. Titrate to a blue color end point, record.
12. **Alkalinity**
- a. 100 ml sample, stir bar. At room temperature.
 - b. Empty contents of 1 – Phenolphthalein Powder Pillow, let mix.
 - c. Empty contents of 1 – Bromecresol Green-Methyl Red Powder Pillow, let mix. Solution will be a teal/green color.
 - d. Insert pH probe into sample.
 - e. Zero the **1.60 N** Sulfuric Acid titrator: insert delivery tube, titrate contents through tube, empty few drops onto paper towel, wipe/blot off excess, zero digital titrator.
 - f. Titrate to a light pink color and pH 4.50. Record.
13. **Turbidity** NOTE: HACH DR/850 Program #95. Read at room temperature, use Silicone Oil if needed.
- a. Zero with distilled water in 25 ml Round Sample Cell [Label: B].
 - b. Read sample from 25 ml Round Sample Cell [Label: T], and record.
14. **Fluoride** Tap sample. NOTE: On DR3900, select Favorites: #195 Fluoride AV, Options, select stopwatch icon to get ready for reaction period. *If using: DR/850, Program #28.*
- a. Fill Fluoride beaker with Tap sample.

- b. Using SPADNS Fluoride Reagent AccuVac Ampule, safely break ampule open with ampule breaker submerged in sample, invert at least 10 times to mix. 1-minute reaction period, hit start on stopwatch icon.
- c. For your Fluoride Blank: Repeat steps 1 and 2, with distilled water.
- d. Zero meter with Fluoride Blank.
- e. Read sample, and record.

15. **CONCENTRATE LAB ANALYSIS**

a. **MONTHLY**

i. **Chloride**

1. **100 ml sample** [measure in 100 mL Graduated Cylinder labeled *CONCENTRATE*, pour into *Chloride* 250 ml beaker with stir bar].
2. Empty contents of 1 - Chloride 2 Indicator powder pillow, cut open with wire cutter, let mix. Sample will be a yellow color.
3. Zero Silver Nitrate 0.2256 N titrator: insert delivery tube, titrate contents through tube, empty few drops onto paper towel, wipe/blot off excess, zero digital titrator, then titrate to red/brown color.
4. Result has a dilution factor of 0.1, ($\times 0.1$) OR ($\div 10$), Record.

ii. **Sulfate**, NOTE: On DR/850 Program #91. (Revised 10/11/17)

1. Make a diluted sample, "50/50". 100 ml concentrate sample mixed with 100 ml distilled water. [Measure Concentrate with 100 mL Graduated Cylinder labeled *CONCENTRATE*, and 100 ml distilled with a clean Graduated Cylinder into *Sulfate* beaker with stir bar] Let mix. Add 10 mls of diluted sample to a 10 ml Round Sample Cell.
2. Add contents of SulfaVer 4 Sulfate Reagent Powder Pillow to Cell, invert 10 times to mix, 5-minute reaction period, start stopwatch.
3. Zero with blank concentrate sample in a 25 ml Round Sample Cell (*Don't discard, can use for TSS & Iron tests*).
4. Read 10 ml sample. Results dilution factor: ($\times 2$) OR ($\div 0.5$), Record.

b. **WEEKLY**

- i. **Total Suspended Solids**, NOTE: On DR3900, Main Menu, Favorites: #630 TSS. On DR/850 Program #94.

1. Zero meter with distilled water in a 25 ml Round Sample Cell [Label: B].

2. Collect concentrate sample in 25 ml Round Sample Cell [Label: C] (*Don't discard, can be used for Iron & Sulfur tests*).
3. Read sample, and record. Minimum result is "<4"

ii. **Iron**, NOTE: On DR3900, Main Menu, Favorites: #267 Iron, Options, select stopwatch icon to get ready for reaction period. On DR/850 Program #33.

1. Fill Iron beaker full of concentrate sample, collect at least 150 mls.
2. Using FerroVer Iron Reagent AccuVac Ampule, safely break ampule open with ampule breaker submerged in sample, invert 10 times to mix, 3-minute reaction period hit start on stopwatch icon.
3. Zero meter with blank concentrate sample from 25-mL Round Sample Cell [Label: C].
4. Read sample, and record.

iii. **Total Residual Chlorine**

1. Use HACH AutoCAT™ 9000; if no chlorine was used for concentrate write N/A; otherwise, use Amperometric Forward Titration analysis. Please note the Daily Start Up notes on page 26 of manual.

c. **DAILY**

i. **pH**

1. Fill Concentrate labeled beaker with sample, add stir bar, read and record.

16. **Clean Up**

- a. Rinse glassware and stir bars well with Tap, then rinse twice with distilled water before hanging to dry.
- b. Please put back in order; Concentrate Lab beakers to the left of sink, and RO Regular lab beakers to the right.
- c. Make sure to plug pH air hole.
- d. Rinse & wipe down counters.
- e. Refill distilled rinse bottles.
- f. Initial and check off QA/QC duplicates completed.

TDS - (and probe change settings on H2440d meter + STD

Analysis Request / Chain of Custody

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