Vessel Name: MV Kennicott
IMO Number: 9145205

The sampler will use the Vessel Specific Sampling Plan (VSSP) as a guide to identify the specific onboard location(s) and sources to be sampled. To satisfy the VSSP requirement, you may fill in the blanks in this form starting on page 2 or you may submit an existing up to date VSSP if it contains the components listed in 18 AAC 69.030(b).

Please note for this VSSP:

- ADEC will not approve sampling locations that are more than 50 feet from the overboard discharge port.
- The wastewater samples that are taken to satisfy the state requirements must reflect the quality of the effluent that is being discharged into Alaska waters during standard operating procedures.
- Cruise ships operating under a DEC discharge permit must obtain the required number and types of samples as listed in the permit.

If you have questions concerning the components of the VSSP, please contact:
Kaitlyn Raffier (907) 465-5138 or Johnny Zutz at (907) 465-5317, johnny.zutz@alaska.gov

ADEC Use Only – Final Document will have Approval Stamp in this block

APPROVED
By jdzutz at 1:12 pm, Feb 23, 2023

Vessel Information

Vessel Name	MV Kennicott
Year Vessel joined fleet	1998
IMO Number	9145205
Lower berth passenger capacity	218 (Double Occupancy), 320 (Total berths)
Maximum passenger capacity	450
Crew capacity	55

Treatment equipment

MSD system (USCG type)	ORCA II 500 – USCG Type II approval 159.015/6310/0. Each unit rated at 15,000 GPD
Number of MSD units	3 units operated in parallel
Other wastewater treatment units not listed above (list types & capacity)	None

Note: Include all units. Examples: cubic meters, gallons, cubic meters per second as appropriate.

Generated Volumes

		Amount	Units
Blackwater generation per day		4,040	Gallon, max
Graywater generation per day (list units of measurement)	Accommodations	11,110	Gallon, max
	Galley	1,500	Gallon, max (estimate)
	Laundry	1,500	Gallon, max (estimate)
	Other		
Daily water use/individual		30 (22-gal fresh / 8-gal seawater)	Gallon/day
Seawater usage per day		4,040	Gallon, max
Sewage generated/individual		8	Gallon/day

Discharge Ports

List all discharge ports which discharge graywater, blackwater or other wastewater

Discharge port designation (name)	Wastewater types discharged	Diameter (list units)	Location	Vertical Distance from water line	Average Flow Rate
MSD Room PS Frame 49	Black & gray	4" pipe size	MSD room	2 ft.	30 gal/min

Discharge Pumps

Complete one line for each discharge pump (even if you have multiple discharge pumps per discharge port)

Pump name or #	Pump manufacturer and model	Maximum flow rate	Units
3	ORCA II 500 Units	60	gal/min

Collection Tanks

List all of the vessel tanks which are involved with collection of wastewater prior to treatment

Tank name/number	Type of wastewater stored	Location	Volume (with units of measurement)
V-1	Black & gray	Fwd	6,173 gal
V-2	Black & gray	Aft	2,863 gal

Intermediate Tanks

List all the tanks which are involved with wastewater treatment

Tank name/number	Type of wastewater stored	Location	Volume (with units of measurement)
Treatment Tank	Black & gray	MSD Room	210 gal
Sedimentation Tank	Black/gray & solids	MSD Room	6 * 39.2 gal
Chlorine Injector Tank	Chlorine	MSD Room	50 gal

Holding Tanks

List all of the tanks which are involved with collection of wastewater for storage

Tank name/number	Type of wastewater stored	Location	Volume (with units of measurement)
N/A			

Wastewater Treatment

All black water and gray water drains into either the forward (V-1) or aft (V-2) collection tanks. The aft collection tank (V-2) holds 2,863 gallons. The wastewater collected in the aft tank is pumped to the forward collection tank (V-1) which holds 6,173 gallons. Float switches on the aft tank automatically start the transfer pump at 50% and shuts the pump off at 20% tank level.
All wastewater enters the forward collection tank from gravity drains and sewage transfer pumps from the aft collection tank. The three treatment units operate automatically based on the level of the forward holding tank. Each of the 3 ORCA process units has individual level switches on the forward holding tank. No. 1 starts at 30% and cuts out at 10%. No. 2 starts at 35% and cuts out at 15%. No. 3 starts at 40% and cuts out at 20%.

For each three process units:
Each process unit consists of one treatment tank (210 gallons), six sedimentation tanks (39.2 gallons per tank), one chlorine injection tank (50 gallons), and eight chlorination cells.

- The treatment tank receives the incoming sewage. It contains the level controls, the retention/reduction screen through which all sewage must pass and the backwash nozzles which continuously clean the retention/reduction screen.
- The sedimentation tanks of the ORCA II-500 are arranged in series and flow is by gravity between modules. These modules provide a relatively quiet zone for settling of solids and for the chlorine to perform its task. The ORCA II-500 has three sedimentation modules with two tanks per module.
- One Transfer Pump (30 gpm)
- One Macerator Pump (flow rate not listed)
- One Sludge Pump (10 gpm)
- One Discharge Pump (30 gpm)
- One Flow Pump (30 gpm)
- One Backwash Pump (30 gpm)

The sewage is routed into the treatment tank for maceration and recycled continuously. The flow pump takes the macerated sewage through a retention/reduction screen located inside the treatment tank, pumping it to the sedimentation modules. Settled solids within the sedimentation modules are continuously pumped back into the treatment tank via the sludge pump. A submersible grinder pump receives the sludge pump discharge and sends it back through the retention/reduction screen. All solids which are small enough to pass through the screen, are picked up by the flow pump for more processing. The backwash pump provides a flow of seawater through a series of chlorination cells “ORACLOR” producing sodium hypochlorite. The chlorination is performed at a rate based upon amperages and is adjustable to provide the desired level of chlorine in the effluent required to meet permit levels. The backwash spray nozzles flush the retention/reduction screen to keep the screen clear of solids. (These cells work well even in brackish water). The backwash pump purpose is to provide large amounts of sea water for dilution. The effluent will finally pass through all the sedimentation modules and the discharge pump sends the treated effluent overboard.
The hypochlorite generating system is used in conjunction as part of the marine sanitation device. The sewage is chlorinated with a metering system of hypochlorite and a high-level warning system sensor located in the treatment tank. The sensor is activated when the tank reaches 80% capacity. The hypochlorite and chemical oxidation disinfect the organic matter in the sewage.
The discharge pumps are rated at 30 gallons per minute however the maximum sewage process rating from the manufacturer is 20 gallons per minute. The minimum flow rate from the tank with one processing unit running; 1*20 gal/min=20 gal/min (minimum discharge rate). When all three units are running, the maximum sewage processing rate is 3*20 gal/min= 60 gallons/ minute (maximum discharge rate).
The entire process is a maceration / chlorination system. The controls for this processing system are normally run in “timer mode”. In this mode, the system processes one batch every 30 minutes. During this timer process, there is constant recirculation of the water being treated as well as some overboard discharge. The sampling

event should be done midpoint in this batch process for a representative reading - 12 to 16 minutes from the start of the batch process.
Each ORCA II 500 unit includes the following alarms any of which will set off a summary malfunction alarm in the engine control room.

- System Fail
- High Sewage Level
- Motor Overload
- ORCA high level

Discharges

All discharges occur automatically based on levels of the forward collection tank as described above. Operation in port is currently the same operation as at sea. Procedures for minimizing discharge in port are being updated in the Best Management Practice (BMP) plans and Standard Operating Procedures (SOP). The crew keeps a log of estimated discharges based on the number of persons onboard with an estimate of 22-gals gray water and 8-gals black water generated per person per day. Crew will conduct a daily chlorine test of the wastewater effluent and records the readings in the Chief Engineers Weekly Report. This total chlorine test is the manufacturers recommended on-board method for determining the quality of the treatment being accomplished.

►Port of Ketchikan Area:

This area is part of a Small Vessel Discharge Control Area (BMP vessels). The *M/V Kennicott* has recommended wastewater discharge regimes for this area (voluntary requirement) in place.

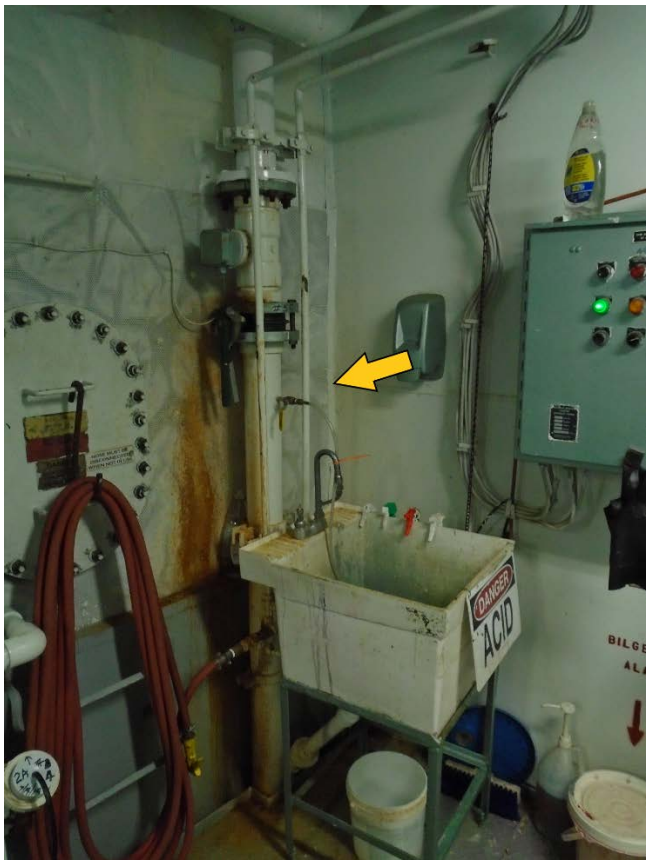
See 'Ketchikan Beaches Reports'. Web link: Ketchikan Beaches (alaska.gov)

Area of Non-discharge Small Vessels under BMP Plan: Port of Ketchikan Alaska	
►AK Boundaries of Non-Discharge Area is between:	
South Boundary	Line from → ***Gravina Point to Mountain Point***
North Boundary	Line from → ***South of Guard Island***

Wastewater Sampling Port with suggested Locations and Timing

Sample Valve Identification [notation used in WW Discharge Logbook]	MSD Room PS Frame 49
Sample Valve Location	Port side Frame 49 approx. 2 feet below waterline. 4" pipe size

Photo of Sample Valve:



Kennicott Photo Sampling Valve: |PS MSD Room "Identification DEC Sampling"

Sample Suggested Timing:

Dependent upon vessel schedule – morning/afternoon

Flushing vessel sample valve / sample Line:

Length of sample valve (from discharge pipe to where sample is collected.	20" (including plastic extension tubing), ¼" Diameter
Required minimum flushing volume [US gallons / Liters]	1.25 gal

Wastewater Sampling Overview

Sampling will take place in the Port of Juneau shortly after arrival during the day for samples to be delivered to the testing laboratory and kept refrigerated. The representative sample is the combined black and gray wastewater going overboard after processing has been completed. Sampling valve will be labeled "DEC sampling". "DEC sampling" valve is located in the MSD room in a 4" vertical plastic pipe above the utility sink port side frame 49. Samples are to be taken from 12 to 16 minutes from the start of a batch process, not to exceed a 30-minute sampling event. This sample location is less than 50 feet from the overboard hull discharge with an estimated distance of 20 feet.

Wastewater Sampling Frequency

Conventional Samples – 1 for every three months of operation, Maximum 4 per year.

Priority Samples – 1 per year

Resampling – As needed to confirm MSD function

Description of the standards the owner or operator will use to determine a deviation from the plan.

Vessel crew will conduct daily onboard "total" chlorine testing from the "DEC sampling" test connection using a Hach Company color comparator type test (Kit #2231-01) that reads from 0 to 3.5ppm. If the reading exceeds the 3.5ppm, the operator will dilute the effluent sample with 50% distilled water and retest (test results are then doubled to a range of 0 – 7ppm). Readings are expected to vary from 0 to 5 parts per million depending on the loading of the system. The optimum reading is above zero but below .5 ppm as the lower chlorine levels are less harmful to sea life. An occasional zero is acceptable. A constant zero reading indicates a problem, which is to be repaired immediately. AMHS is requiring that if zero reading is found - that a 2nd reading must be taken within 24 hours. If there is a second zero reading, this requires shipboard investigation and repairs to commence. If there are 3 days with zero readings both the Environmental Specialist and the assigned Port Engineer must be notified by email providing information on what steps are being taken to resolve the situation and perhaps a request for outside assistance if necessary. A follow up email is required to the Environmental Specialist and the assigned Port Engineer when the problem is solved.

If the effluent chlorine reading exceeds 5 ppm (mg/liter) the ship is instructed to take corrective action. This corrective action could be any of the below actions:

- Reduce the flow rate of the chemical feed pump (if it is use)
- Discontinue any double processing of wastewater. (Some operators feel it is helpful to pump the V-2 processing tank back to the V-1 forward collection tank to help reduce the cellulose mat buildup in the V-2 tank.
- Discontinue use of Chlorine Bleach by housekeeping staff.
- Contact manufacturer for trouble shooting advice.

AMHS BMP C0-012-2021 9/27/2021 Part 7 Communications Plan [18 AAC 69.046(c) (7)]

- AMHS has implemented communication procedures to ensure that the proper operation of the MSD units on each ship is communicated to the ultimate decision makers.

MSD II Wastewater Treatment System Process Schematics M/V Kennicott:

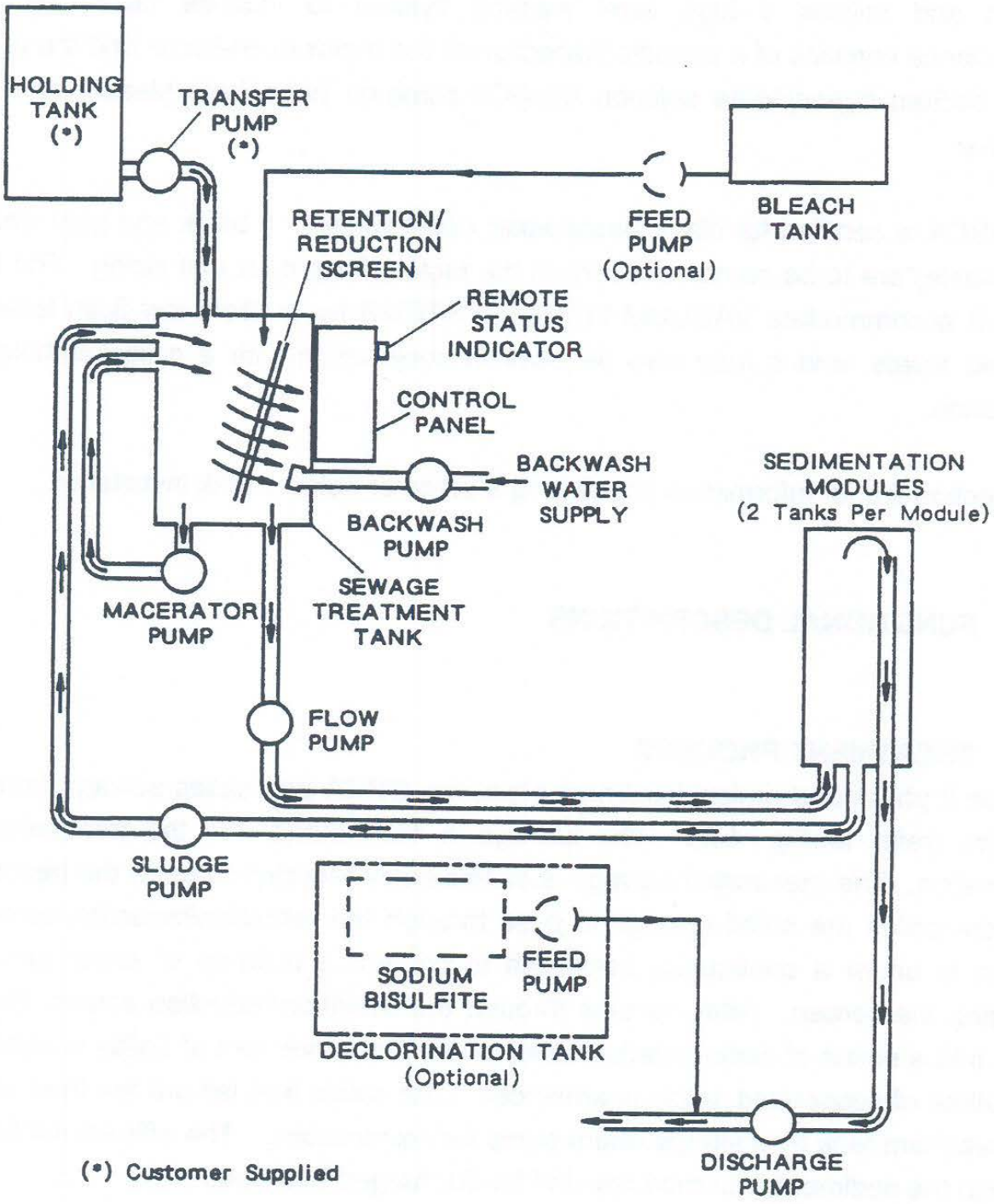
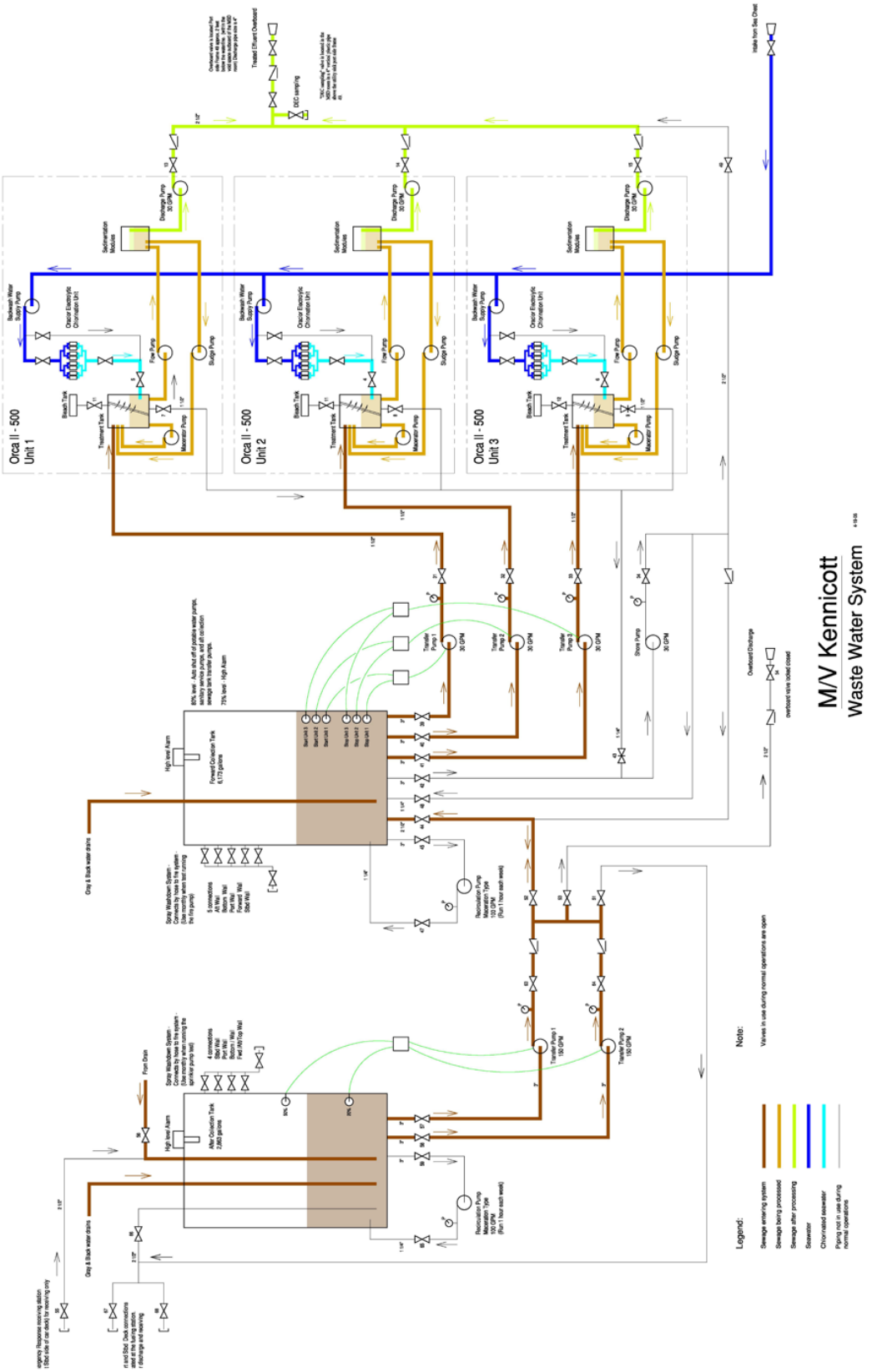


FIGURE 1.2 ORCA II-500 SYSTEM FLOW DIAGRAM


M/V Kennicott
Waste Water System
Orca II - 500 Unit 1
Orca II - 500 Unit 2
Orca II - 500 Unit 3
Legend:
Note:

Wastewater Sampling Tables

►Dates of sampling can be submitted separately by operator or sampling contractor.
►Notification to ADEC CPVEC must be made 36 hours prior to a sample being taken.

Wastewater Type	Sample type	Sample Location	Representative times for Sampling
BW/GW mixed	Grab	MSD Room PS Frame 49	Morning / Afternoon (AMHS vessel schedule)

Kennicott 2023 Sampling Table

	Frequency
	Blackwater
Temperature, pH, Chlorine (residual and free)	Parameters measured in the field for every sample
Conventional parameters	
Fecal coliform, Total Suspended solids, Biochemical Oxygen Demand – 5-day, Specific Conductance	4 (max) – 1 Sample require for every 3 months of operation
Settleable Solids, Chemical Oxygen Demand, Alkalinity, Hardness, Oil and Grease	4 (max) – 1 Sample require for every 3 months of operation
Nutrients	
Ammonia – Total	0
Total Organic Carbon, Total Kjeldahl Nitrogen, Nitrate/Nitrite, Total Phosphorus	0
Priority parameters [1]	
BNA(TAqH)	1
VOCs	1
Total Recoverable Metals List	1
Dissolved Metals List	1

Table Notes:
Refer to the QAPP/Discharge Authorization for analyte groupings (including resampling requirements).
[1] BNA, VOC, and Metals lists are found in the approved QAPP