Vessel Name: MV Columbia
IMO Number: 7320095

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 3:07 pm, Feb 21, 2023

Vessel Information

Vessel Name	MV Columbia
Year Vessel joined fleet	1974
IMO Number	7320095
Lower berth passenger capacity	208 (Double Occupancy), 298 (Total berths)
Maximum passenger capacity	499
Crew capacity	63

Treatment equipment

MSD system (USCG type)	Omnipure 15MXMP - USCG Type II approval 159.015/7207/0. Each unit rated at 15,000 GPD
Number of MSD units	4 units operated in parallel (each unit rated at 15,000 gals/day)
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		4,496	Gallon, max
Graywater generation per day (list units of measurement)	Accommodations	12,364	Gallon, max
	Galley	2,000	Gallon, max (estimate)
	Laundry	2,000	Gallon, max (estimate)
	Other		
Daily water use/individual		30 (22-gal fresh / 8-gal seawater)	Gallon/day
Seawater usage per day		4,496	Gallon, max
Sewage generation/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 STB Fr. 73	Black & gray	2" size pipe	MSD room	1 ft.	10.42 gal/min/pump

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
4	Omnipure 15MXMP units	41.68	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	12,567 gal
V-3	Black & gray	Aft	15,206 gal

Intermediate Tanks

List all of the tanks which are involved with wastewater treatment

Tank name/number	Type of wastewater stored	Location	Volume (with units of measurement)
V-2	Black & gray	MSD Room	3,927 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

Provide a description and capacity of the wastewater treatment system(s) on this vessel:

All of the black water and gray water drains into either the forward (V-1) or aft (V-3) collection tanks. The aft collection tank (V-3) holds 15,206 gallons. The wastewater collected in the aft tank is pumped to the forward collection tank (V-1) which holds 12,567 gallons. Float switches automatically start the transfer pump at 50% and shuts the pump off at 20% tank level.

All wastewater enters the forward collection tank (V-1) from gravity drains and sewage transfer pumps from the aft collection tank. All four treatment units operate in parallel. Operation sequencing of these treatment units is done automatically in pairs. Two Omnipure 15MX lead units start when forward holding tank reaches 40% capacity and shut off at 20% capacity. Two additional units start at 60% capacity and shut off at 30% capacity.

When activated by V-1 tank level switches, the macerator pump for each treatment unit takes the contents of V-1 tank, mixes with the incoming seawater and is pumped through the book cells to the V-2 (3,927 gallons) effluent tank. The wastewater is chlorinated as it passes through the book cells. The seawater facilitates the electrolytic action in the book cells which create a hypochlorite generating system that produces sodium hypochlorite and in turn sanitizes the water. The plates also cause “rapid chemical oxidation of organic constituents of wastewater”.

The V-2 process tank is a 3,927-gallon tank. This tank is an independent tank located in the MSD room that shares one side with the V-1 tank. The processed wastewater from the treatment units enters the tank in downcomers to the bottom of the tank. The overflow discharge is near the top (80% – 90%) of the tank capacity. This flow pattern is designed to allow the processed (chlorinated) wastewater to reside inside this V2 process tank for at least a 30-minute period. This time allows the chlorine to react completely with the wastewater prior to the effluent discharge overboard.

The (V-2) effluent tank discharges overboard using 4 each ECO Model C-10A-OS-VD pumps rated at 10.4 gals/min. These pumps stop and start as each of the processing units start and stop. The 4 pumps are part of the 4 Omnipure 15MX units. The minimum discharge rate from the V2 tank with one MSD running and one ECO pump running; 1*10.42 gal/min= 10.42 gallons/min (minimum discharge rate). When all four MSD units are running, the V2 tank discharge rate is 4 x 10.42 gal/min= 41.68 gallons/min (maximum discharge rate).

A liquid chlorine chemical feed dosing system complete with chlorine tank and a dosing pump is part of the treatment system. This chlorine injection system is used as a backup treatment system if there is insufficient salinity in the seawater. In areas of low salinity, the MSD units will alarm on high voltage. The operator will either secure the MSD unit or put the MSD unit in the override mode and turn on the chlorine injection pump. The flow rate of the chlorine injection is adjusted so that the overboard effluent has free chlorine reading about 1 – 2 ppm.

Each Omnipure unit includes the following alarms any of which will set off a summary malfunction alarm in the engine control room:

- High level alarm
- High temperature alarm
- High pressure alarm
- System alarm (summary)
- Over voltage alarm

Discharges

Provide the individual vessel rules or procedures for discharging wastewater.

All discharges occur automatically based on levels of the V-1 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. The crew conducts a daily chlorine test of the wastewater effluent and records the readings in the Chief Engineers Weekly Report. The total chlorine test is the manufacturer's recommended on-board method for determining the quality of the treatment being accomplished.

Wastewater Sampling Port with suggested Locations and Timing

Describe the vessel's sample port location(s), where the sampling should occur (in port or underway) and the time of day that the sampling should take place. The owner/operator needs to explain why these selected sampling sites and times give the most representative sample. The sample selection should be adequately mixed and homogenous. All samples need to be taken from wastewater as it is discharging overboard, unless deemed impractical by ADEC.

Sample Valve Identification [notation used in WW Discharge Logbook]	MSD STB Fr. 73
Sample Valve Location	STB. Side Frame 73 Approx. 1 ft below waterline – 2" size pipe.

Photo of Sample Valve:

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.	~3", Tee off main line.
Required minimum flushing volume [US gallons / Liters]	1.25 gallons

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 installed sample connection is in the combined discharge piping from all four overboard discharge pumps. This 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 in the MSD room starboard side 2 feet forward of the bulkhead on frame 73 about 7 feet above the floorplates in a 6" horizontal piping run. Samples are to be taken 10 – 12 minutes after an overboard pump cycles on, not to exceed a 30-minute sampling event. The sample location is less than 50 feet from the overboard discharge with an estimated distance of 30 feet.

Wastewater Sampling Frequency

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

Priority Samples – 1 per year

Nutrient Samples – 1 per year (first year of operation after MSD change or layup > 9 months)

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 lower chlorine levels are less harmful to sea life. An occasional zero is acceptable. A constant zero reading indicates a problem, which requires 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 captain 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:

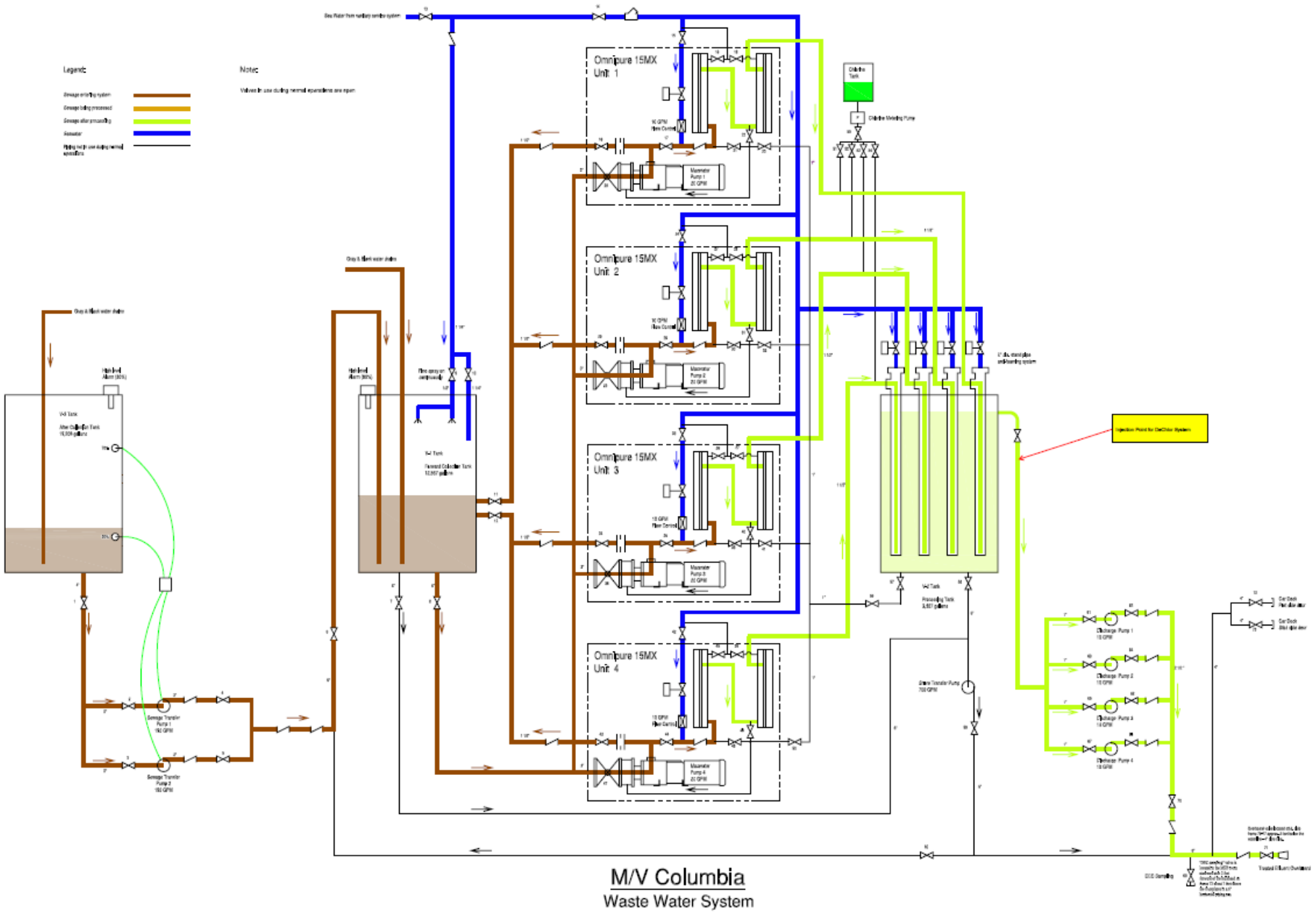
- Reduce the flow rate of the chemical feed pump (if it is use).
- Discontinue any double processing of wastewater. (Some operators feel it is helpful to pump the V-2 processing tank back to the V-1 forward collection tank to help reduce the cellulose mat buildup in the V-2 tank.

- Discontinue use of Chlorine Bleach by staff cleaning rooms.
- Contact manufacturer for trouble shooting advice.

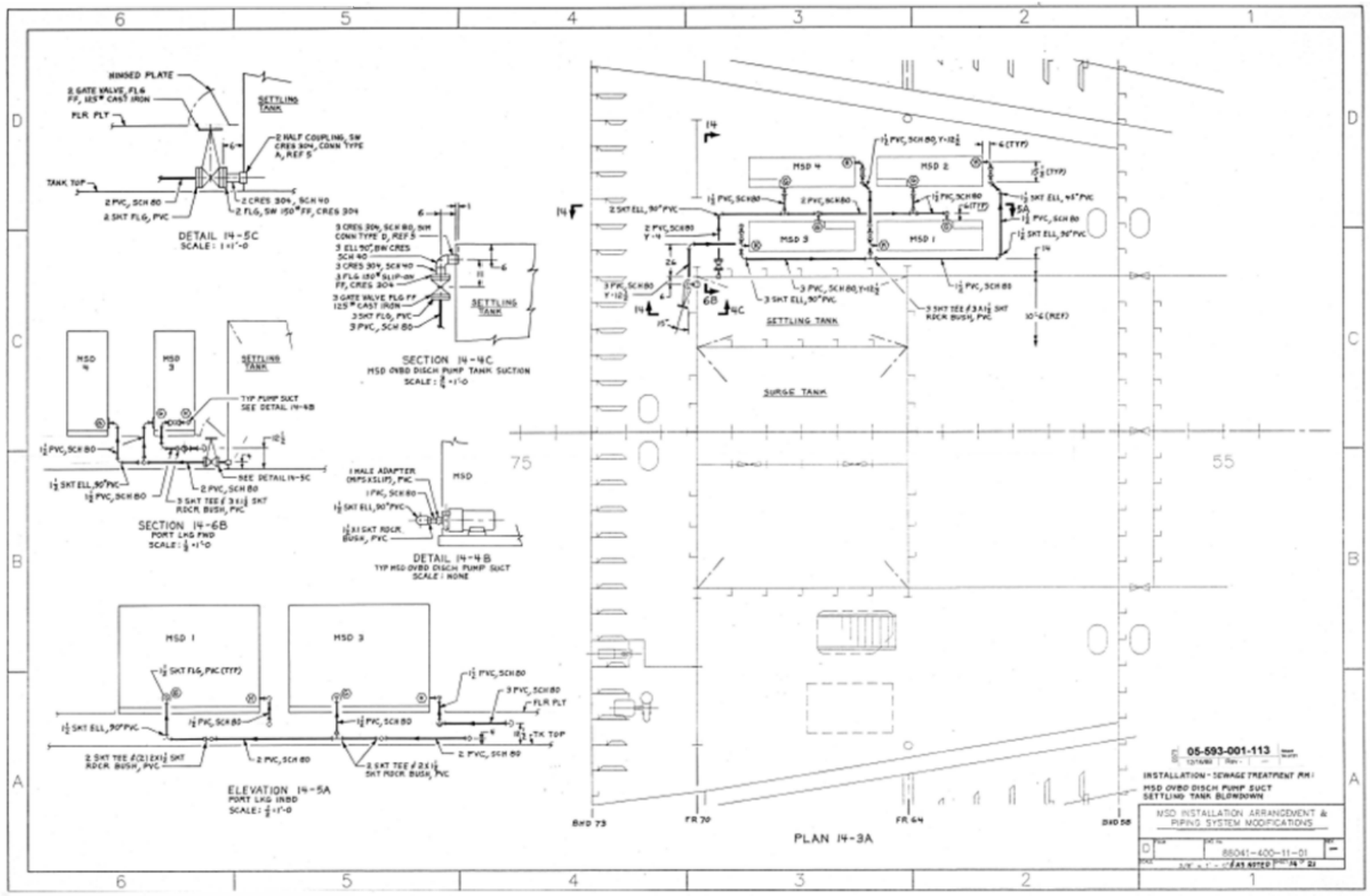
AMHS BMP Part 7 Communications Plan [18 AAC 69.046(c) (7)]

- 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.

Attach a sketch or sketches of vessel with treatment system, tanks, discharge pumps, discharge lines, sampling locations, and overboard ports.


Legend:
Notes:
Omnipure 15MX
Unit: 1
Omnipure 15MX
Unit: 2
Omnipure 15MX
Unit: 3
Omnipure 15MX
Unit: 4
Injection Point for ClorDox System
M/V Columbia
Waste Water System

Columbia Wastewater System Flow Diagram



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 STB Fr. 73	Morning / Afternoon (AMHS vessel schedule)

Columbia 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	1
Total Organic Carbon, Total Kjeldahl Nitrogen, Nitrate/Nitrite, Total Phosphorus	1
Priority parameters [1]	
BNA(TAqH)	1
VOCs	1
Total Recoverable Metals	1
Dissolved Metals	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