North West and Canada Cruise Association
Discharge of Effluents in Certain Alaska Waters by Cruise Vessel Operations

Quality Assurance Project Plan
For
Sampling and Analysis of Treated Sewage and Graywater
From
Commercial Passenger Vessels

Submitted to fulfill certain requirements of
33 CFR 159 United States Title 33 Code of Federal Regulations Part 159 and Alaska Statute 46.03.460 – 46.03.490 and 18 AAC 69

Effective February 1, 2013 – January 31, 2014

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Approval Page

North West and Canada Cruise Association

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Signature Date

U.S. Coast Guard Captain of the Port

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Printed Name

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Signature Date

Revision Number ___
Revision Date: _____

This document control information will appear in the upper right corner of each page of the Quality Assurance Project Plan (QAPP). Each revision of the QAPP will be assigned a revision number obtained by adding 1 (one) to the previous revision number.

On the bottom of each page will be found:
Cruise Ship Wastewater Monitoring # Quality Assurance Project Plan

Term of QAPP

This Quality Assurance Project Plan will remain in effect until January 31, 2014 unless the U.S. Coast Guard or Alaska Department of Environmental Conservation notifies the other parties that a new plan is required. If necessary, a new approval page with updated contact information and signatures may be submitted as an appendix to this plan.

Acronyms/Abbreviations Used

ADEC	Alaska Department of Environmental Conservation
BNA	Base/Neutrals, Acids
BOD	Biochemical Oxygen Demand – 5-day test
CFR	Code of Federal Regulations
COC	Chain of Custody
COD	Chemical Oxygen Demand
COTP	US Coast Guard Captain of the Port
DMR-QA	Discharge Monitoring Report Quality Assurance
DOW	Department of Water
EPA	Environmental Protection Agency
HDPE	High Density Polyethylene
HCl	Hydrochloric Acid
H_2SO_4	Sulfuric Acid
HNO_3	Nitric Acid
MDL	Method Detection Limit
MQO	Measurement Quality Objective
MSD	Marine Sanitation Device
NaOH	Sodium Hydroxide
NWCCA	North West and Canada Cruise Association
%R	Percent Recovery
PQL	Practical Quantitation Limit (Minimum Reporting Level)
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QMP	Quality Management Plan
QC	Quality Control
RPD	Relative Percent Difference
RQ	Reportable Quantity per 40 CFR part 302
SM	Standard Methods
SW-846	Solid Waste Methods
SOP	Standard Operating Procedures
TSS	Total Suspended Solids
UAS	University of Alaska, Southeast
USCG	U.S. Coast Guard
VOCs	Volatile Organic Chemicals
VSSP	Vessel Specific Sampling Plan

Management and Contractors

North West and Canada Cruise Association

The North West and Canada Cruise Association (NWCCA) represents the large cruise line companies undergoing wastewater testing in Alaska. Individual NWCCA members are funding the sampling and analysis program for their own respective vessels through independent project management firms. The costs incurred by the Project QA Officers will be distributed evenly among all participants in the program per management team. All NWCCA member line cruise ships that operate in Alaska waters will follow the provisions of this QAPP.

Individual Vessel Representatives

The responsibility for adherence to the provisions of this QA/QC plan rests with the owner or operator as per federal regulation 33 CFR 159.317 (a) (1). Failure of vessel owners and operators and contractors /subcontractors to vessel owners and operators to follow the provisions of this QA/QC plan may result in enforcement actions against the vessel owners and operators by the State of Alaska under AS 46.03.

Small Cruise Ships and Alaska Marine Highway System

Many other small cruise ship companies and the Alaska Marine Highway System (AMHS) may choose to follow this QAPP or they may submit their own QAPP to the ADEC in order to satisfy obligations under Alaska Statute 46.03 and 18 AAC 69.025.

NWCCA Project Manager

The NWCCA Project Manager is responsible for ensuring that individual project components are executed in a timely and appropriate fashion. However it is the vessel owner or operator that is responsible for compliance. Responsibilities include:

- Submitting results within the time frame specified by law and this document.
- Communicating project information to the Coast Guard, ADEC, and cruise lines.
- Assuring that project participants have necessary training.
- Fielding questions and requests for information that arise during and after the project.
- Managing the financial aspect of the project, including the determination of billing and payment mechanisms.

Sampling Team Leader

The contract sampling team leader will coordinate and conduct all unannounced and continued compliance sampling, except for random sampling by the USCG. The VSSP must be submitted by the vessel owner or operator to the ADEC and USCG Sector Juneau prior to sampling.[1] The ADEC will forward the approved VSSP to the sampling manager. The sampling team will design and keep confidential a sampling schedule only available to ADEC and USCG. Vessel operators will not be aware of the timing of sample collection for the two unannounced sampling events. Random sampling will be under the control of the USCG Sector Juneau. Sampling team leader will be available if random sampling takes place as the USCG directs.

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[1] ADEC: 21 days before sampling, 18 AAC 69.030
Coast Guard: w/in 30 days of initial entry, 33 CFR 159.317(a)(3)

Samplers are responsible for sample collection, sample integrity and custody, field measurements, and accurate notes. THE SAMPLER MUST VERIFY THAT THE VESSEL IS DISCHARGING OVERBOARD DURING THE UNANNOUNCED SAMPLING EVENTS. The owner or operator will make the VSSP available to samplers. The samplers will use the VSSP to determine if discrepancies exist. If discrepancies do exist on the VSSP, the sampler is to report them immediately to ADEC and the USCG. The sampler will provide a compilation of field notes, deviations from VSSP or QAPP plans (if applicable), and Chain of Custody to the laboratory personnel, Project Manager, and the Project Quality Assurance Officer upon completion of all sampling.

The sampler will notify the ADECproject manager 36 hours prior to the sampling event. This gives ADEC time to audit the sampling event.

Wastewater Analysis Laboratory

Coast Guard accepted laboratories must be utilized for all sampling events per 33 CFR 159.317(6). Coast Guard Headquarters (CG- 5213) recently implemented standards for acceptance and promulgated a list of accepted laboratories which can be found via the Internet at http://cgmix.uscg.mil/EQLabs/EqLabsSearch.aspx . Guidance for the laboratory acceptance process is available from the USCG Sector Juneau. In order to obtain USCG acceptance, a laboratory must: affirm and attest to the fact that the company (including it's officials, employees, and associates) is not owned or controlled by a manufacturer, vendor, or supplier of a marine device that may be used in treatment of the ships' waste water system or any other ship board system including promotion of the same as described in 46 CFR 159.010-3, or any cruise line corporation or subsidiaries thereof; attest that it is not dependent on Coast Guard acceptance to remain in business; demonstrate that it performs all testing conducted under the supervision and assurance of its laboratory Quality Assurance/ Quality Control Manager who has sufficient experience in wastewater testing and attest that all analyses are performed per 46 CFR 159.010-3(a)(1) & (2); and provide current certifications for testing and attest to the fact that their facilities are adequate to perform the required tests. In circumstances when a Coast Guard accepted lab cannot be used, the affected Cruise Line must verbally notify the USCG Sector Juneau for confirmation of an exception if they want to use the lab results for continuous compliance. In order to receive this one-time exemption the Cruise Line must notify the USCG Sector Juneau within 72-hours after the sample is submitted to the non-Coast Guard accepted lab. Every effort should be made to notify the USCG before submission, or the sample results may not be accepted and become invalidated. In order for the test results to remain valid, the lab used for the one-time exemption must apply to the Coast Guard within 45 days following the sampling event and subsequently become a Coast Guard Accepted Laboratory. USCG Sector Juneau can be notified 24-hours a day via the Sector Command Center at 907-463-2980 or 907-463-2000. Written follow up or email, if needed, can be submitted via email to D17-PF-SampleResults@uscg.mil.

Laboratories performing bacterial analysis for samples collected within Alaska for the purposes of meeting requirements under the ADEC General Permit must have current State of Alaska Drinking Water Laboratory Certification for fecal coliform. Laboratories performing chemistries for samples collected within Alaska for the purposes of meeting requirements under the ADEC General Permit must (1) have current Drinking Water certification with the State of Alaska for chemistries or (2) be a current NELAC or Washington State Department of Ecology certified

laboratory for applicable water/wastewater analytes of interest. Due to the short hold time for microbiological samples (8 hours), all microbiological samples must be analyzed by a DEC drinking water certified laboratory within Alaska for the analytes of interest. Any lab performing bacterial or chemical analyses on samples collected within Alaska must demonstrate acceptable performance in an annual external blind Performance Test sample for each wastewater analyte and method of interest by self-enrolling in a NELAC accredited PT vendor program, with PT results mailed directly to both the ADEC DOW QA Officer and the Project QA Officer.

Laboratory Quality Assurance Officer

The Laboratory QAO is responsible for QA/QC of laboratory analyses and will verify and validate all data.

Project Quality Assurance Officer

The Project Quality Assurance (QA) Officer is an independent individual (independent of management, fiscally and managerially) that ensures that that ALL laboratories, sampling teams, data analysis and reporting functions follow the laboratory's quality assurance program guidelines, this QAPP, and the VSSP. The Project QA Officer works independently to ensure quality of the data and reports directly to DEC, USCG, and NWCCA all audit findings and recommendations for improvement. The QA Officer is also responsible to perform follow-up assessments in a timely manner to ensure that corrective actions were enacted and all problems were resolved. The Project QA Officer's responsibilities may not be parceled out to different individuals. However, the Project QA Officer may request technical assistance from technical experts where specific expertise is needed to fulfill QAPP QA requirements (e.g. on-site technical audit of lab performing GCMS and/or ICPMS analyses of cruise ship samples, etc).

US Coast Guard COTP

The USCG COTP will use data gathered in accordance with this plan to determine continuous compliance with federal law.

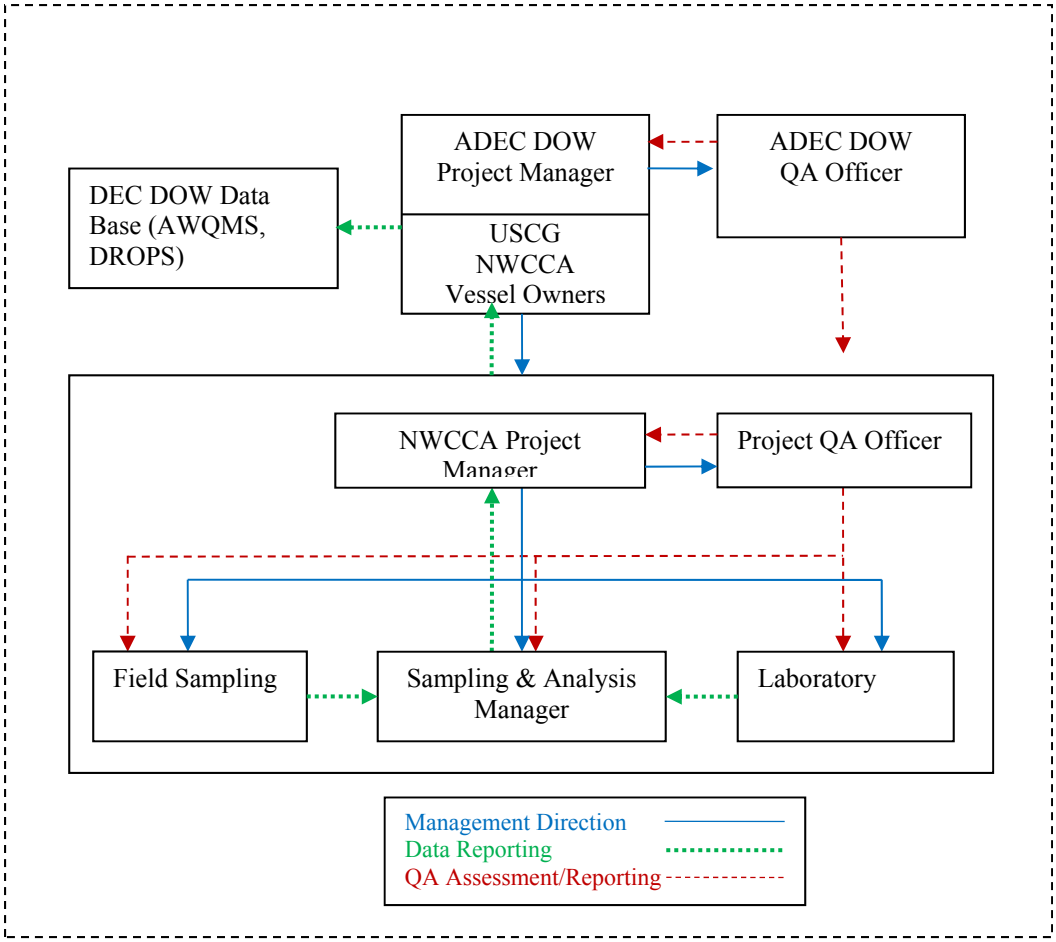
ADEC Project Manager

The ADEC project manager manages the program to meet the requirements in the Alaska statute, regulation, and the approved QAPP.

ADEC Water Quality Assurance Officer

The ADEC Water Quality Assurance Officer will review the QAPP to determine if it meets the State of Alaska's objectives for the data collection effort. At ADEC discretion, the ADEC WQA Officer may review/audit data results and perform or coordinate data quality assessments (e.g. sampling,laboratory and data audits, etc).

Figure 1: Program Organizational and Data Flow Chart



Purpose

This document is prepared and submitted to fulfill certain requirements of United States Title 33 Code of Federal Regulations 159.317, Alaska Statute 46.03.460- 46.03.490, and 18 AAC 69.025. Vessel owners may discharge treated sewage into Alaska waters less than one nautical mile from shore at a speed of less than six knots under 33 CFR 159.309(a)(1)-(4). Vessel owners will provide notification to the USCG for permission to discharge continuously into Alaska waters under the guidelines of 33 CFR 159.309(b)(1). Samples submitted to the USCG for initial discharge and ensuing continuous discharge under 33 CFR 159.309(b)(5) must also follow this QAPP.

Prior to any such discharge of treated sewage, the owner, operator or master, or other person in charge of a cruise vessel, will provide to the USCG SECTOR Juneau test results from at least five samples taken from the vessel, representative of the effluent to be discharged, on different days over a 30-day period or more which confirm that the water quality of the effluents proposed for discharge is in compliance with all limits included in 33 CFR 159. These samples must be evenly distributed within this 30-day period whenever logistically possible or on an extended

period over 30 days. The samples will be taken in a manner that seeks to capture a typical wastewater discharge while still meeting the fecal coliform 8-hour holding time.

Samples must be collected and analyzed using land-based or mobile facilities that are accepted by the USCG. Results of this sampling must be submitted to the USCG SECTOR Juneau as a new application for continuous discharge for the next year season no earlier than 120 days and no later than 30 days prior to anticipated discharge into Alaska waters. Once satisfied, the USCG SECTOR Juneau at the request of vessel representative may send a letter of notification confirming intent of the vessel to discharge continuously into Alaska waters as defined in 33 CFR 159.307 for the calendar year of application. Upon receipt of the letter, the vessel owner shall demonstrate continued compliance while operating in Alaska waters through sampling and testing of the effluent for parameters listed in 33 CFR 159.309 (b) at a frequency of two samples per calendar month. Each two adjacent sampling events must be separated by at least 24 hours but it is recommended that there be a one week (7 days) separation and/or the sampling events be spread out over the period when the ship is in Alaska waters. Each sampling event will include valid samples for all required analytes of interest. Any sample missing a valid analyte will be resampled for the entire suite of samples that were due to be collected at that time. The USCG SECTOR Juneau may witness any and all continued compliance sampling events. All sample results for the parameters indicated above must be within the stated limits of 33 CFR 159.309 (b) and must meet the data quality guidelines of this QAPP document to be considered valid.

Vessel owners can maintain continuous discharge certification while outside of Alaska waters by sampling and testing of the effluent for parameters listed in 33 CFR 159.309 (b) at a frequency of two samples per 60-day period, and there cannot be greater than a 60-day period between any two samples. Samples must be collected and analyzed using either land-based or mobile facilities that are accepted by the USCG. In the event an accepted CG lab is unavailable, the vessel may request use of a particular lab for consideration via USCG SECTOR Juneau. The vessel owner will be requested to provide certain proof of accreditations or certification of the lab submittals and will allow a visit to the lab by the USCG COTP or designee at the discretion of the USCG. USCG will make a determination to the acceptance of the laboratory and will notify the vessel owner.

Results for continued compliance testing that exceed the effluent limits in 33 CFR 159.309 (b) must be immediately reported to the USCG SECTOR Juneau. The vessel owner will initiate corrective action by: investigating and rectifying the cause of the exceedance; and resampling of the effluent to demonstrate that the effluent meets the limits in 33 CFR 159.309 (b). Representative samples may be taken from the sampling point approved in the VSSP while the vessel is holding discharge and diverting effluent to a holding tank in order to demonstrate compliance with effluent limits while not discharging overboard. The USCG SECTOR Juneau may direct the vessel to retain onboard all effluents in certain situations due to continued exceedances of the effluent limits in 33 CFR 159.309 (b) either within or outside of Alaska waters or failure to present data for sampling and testing of the effluent for parameters listed in 33 CFR 159.309 (b) at the required frequency.

The local USCG SECTOR Juneau has also established a requirement of a minimum of two sampling events per vessel in a season (twice per season samples) while operating in the applicable waters of Alaska, and that these two sampling events are unannounced to the vessel

beforehand. Additional sampling events (twice per month samples) are required for vessels operating under the General Permit issued by the State of Alaska. A "sampling event" is the collection of representative samples[2] of each wastewater type being discharged within Alaska waters. The number of samples in a sampling event is based upon the ship configuration, vessel wastewater management practices, and the wastewater quantities discharged while the sample team is on-board.

All compliance samples must be taken at a point in the system directly before being discharged overboard**.** Sample ports must be within 50 feet of the point of overboard discharge.[3] Both twice per season samples will be tested for conventional and priority pollutants in order to concurrently fulfill USCG and ADEC General Permit sampling requirements. Repeat sampling due to logistical or laboratory failures, replicate samples, any other required samples will be scheduled as deemed necessary by the Sampling Team Leader.

In addition to the twice per season samples, the USCG Sector Juneau may also direct the sampling team to conduct unscheduled random sampling for conventional and/or priority pollutants as directed in 33 CFR 159.317(5) at any time that they determine that additional samples are needed or necessary. This sampling will be scheduled at the request of the USCG Sector Juneau and will also be unannounced. The USCG will inform the sampling project manager 24 hours in advance to request any random sampling events. ADEC will be notified about these events by USCG Sector Juneau and will be invited for participation.

Lab reports should clearly state whether the sampling was conducted

- to obtain certification for continuous discharge (typically performed outside of State of Alaska waters)
- to maintain continued compliance for continuous discharge (twice per month)
- to satisfy 33 CFR 159.317 and AS 46.03.465 (twice per month and twice per season)

The lab will submit the sample results directly to ADEC and USCG, but the owner/operator is responsible for meeting submittal deadlines.

Applicability

This QAPP specifies the minimum requirements for sampling and analysis of treated sewage and/or graywater and other wastewaters as defined in AS 46.03.490, for vessels that are members of the North West and Canada Cruise Association. This QAPP is also applicable for any

[2] The VSSP for each vessel will list the proper location and timing of wastewater sampling. The samples will be taken in a manner that seeks to capture a typical wastewater discharge while still meeting the fecal coliform 8-hour holding time.

[3] Samples taken at the treatment system are sometimes of different quality than the samples taken at the discharge port. This will make it possible to fairly compare the data from all ships.

commercial passenger vessel that discharges treated sewage, graywater and/or other wastewater in the applicable waters of Alaska as defined in 33 CFR 159.305 and the waters of the Alexander Archipelago as defined in AS 46.03.490. All sampling events required by 33 CFR 159 and AS 46.03 shall be conducted in accordance with this QAPP and can be combined to complete requirements for both regulatory programs.

Owner or operators must comply with the guidelines in 33 CFR 159, 40 CFR 136.3, AS 46.03.460-46.03.490, and 18 AAC 69, 18 AAC 70 and this plan.

Each participating ship will be sampled within 30 days of initial entry into Alaska waters and subject to unannounced treated sewage and graywater sampling and analysis for conventional and priority pollutants (twice per season samples) as determined by the Coast Guard Sector Juneau and ADEC. The second twice per season sampling event must occur at least 21 days after the first sampling event. Twice per month samples must be taken on separate calendar days and must be taken at least 24 hours apart. The USCG Sector Juneau Inspectors & ADEC may board vessels at any time to perform sampling inspections as necessary to implement 33 CFR 159 and AS 46.03.

This QAPP covers sampling and analysis for the parameters listed in Table 5. A sample that fails to provide valid results for all required pollutants will not be counted as an acceptable sample for purposes of meeting the sampling requirements defined in this QAPP, unless resampling is performed as outlined in Table 1.

If the fecal coliform result exceeds the vessel's permitted limits, an owner or operator may resample and retest with 30 days of the original sampling. The monthly limit for fecal coliform will be calculated by using the geometric mean of all samples taken during a calendar month. All sample events must be at least 24 hours apart. (18 AAC 69.070).

Blind Replicate Samples

Blind replicate samples will be collected at a minimum rate of 20% of the total number of twice per season samples collected for the project. All blind replicate samples will be analyzed for dissolved metals, total recoverable metals, and COD. Blind replicate samples representing at least 10% of the total number of twice per season samples collected for the project will also be analyzed for the remaining (in addition to dissolved metals, total recoverable metals, and COD) analytes listed in Table 5. Blind replicate samples will be randomized to assess precision for all ships monitored within the program. For analytes measured on-site, replicate samples will be collected/measured at a minimum of 10% of samples (i.e. pH, temperature, total residual and free chlorine).

The purpose of the blind sample replicates is to assess sampling and laboratory error and to assess overall method variability. Precision between the sample and its replicate will be determined by calculating the relative percent difference between the two samples, in the same way that precision is measured between two laboratory-fortified blanks or a matrix spike/matrix spike duplicate. The use of replicate samples extends the test of precision to the sampling method itself. The use of blind samples provides a test of the laboratory and is used to assess total bias or analytical errors not detected by the laboratory (e.g., a false positive). No information will be provided to the laboratory

analysts that would disclose the replicate nature of the samples to the laboratory staff. The samples will be analyzed by the same lab and for the same parameters.

Overall project precision (field measurements, sample collection and laboratory precision) is assessed by collecting blind (to the laboratory) replicate (paired) samples at the same sample collection point. The samples will be collected into a transfer container to limit temporal variance in the sample results. Transfer containers must be certified clean for laboratory use and must not contain any preservatives. The sampler will need to collect a cubitainer (10 liters) of wastewater and thoroughly mix it. The sampler should then pour the contents of the cubitainer into individual sample bottles. Samples for the analyses of volatile organics (VOC's) and fecal coliforms will be collected directly into the appropriate sample containers without use of a transfer container in order to limit volatilization of analytes (VOC) and to maintain sample sterility (fecal coliform). The first sample measured/dispensed is designated as the primary sample and the second (paired) sample, the replicate sample. The primary sample is the official laboratory result. The "replicate" sample result is only used to assess/report overall project precision. Replicate measurements must include both field measurements (e.g. total chlorine residual, temperature) as well as samples collected for subsequent laboratory analysis (e.g. total recoverable metals, dissolved metals, NH3, PAH, VOC's, etc). This is to ensure overall sample representativeness when evaluating precision results.

Quality Objectives and Criteria for Measurement Data

DQOs are qualitative and quantitative statements derived from the DQO Process that:

- Clarify the monitoring objectives.
- Define the appropriate type of data.
- Specify the tolerable levels of decision errors for the monitoring program.

Measurement Quality Objectives

Measurement Quality Objectives (MQOs) are a subset of DQOs. MQOs are derived from the monitoring project's DQOs. MQOs are designed to evaluate and control various phases (sampling, preparation, and analysis) of the measurement process to ensure that total measurement uncertainty is within the range prescribed by the project's DQOs. They define the acceptable quality of QAPP field and laboratory data for the project. MQO's are defined in terms of Precision, Bias, Representativeness, Detectability, Completeness, and Comparability.

Detectability

Detectability is the ability of the method to reliably measure a pollutant concentration above background. Two components can be used to define detectability: method detection limit (MDL) and practical quantification limit (PQL) or reporting limit (RL).

- The MDL is the minimum value which the instrument can discern above background but no certainty to the accuracy of the measured value. For field measurements the manufacturer's listed instrument detection limit (IDL) can be used.

- The PQL or RL is the minimum value that can be reported with confidence (usually some multiple of the MDL).

Sample data measured below the MDL is reported as ND or non-detect. Sample data greater than the MDL but below the PQL or RL is reported as estimated data and must be flagged. Sample data measured above the PQL or RL is reported as reliable data unless otherwise qualified per the specific sample analysis. Individual analyte MDL and PQL limits are listed in Table 6.

Precision

Precision is the ability to replicate the measurement. It is expressed as Relative Percent Difference (RPD). Overall project acceptance criteria for precision are analyte, matrix, and method specific and are listed in the Measurement Quality Objectives table. RPD is normally determined by the results of blind sample replicates of collected samples, field replicate measurements (for direct measurements made in the field), and the analysis of laboratory control standard or matrix spike duplicates in the laboratory. The calculation for RPD is:

$$\frac{(X_1 - X_2)}{\frac{(X_1 + X_2)}{2}} \times 100$$

and is expressed as a percent. X_1 = first (primary) sample measurement and X_2 = second (replicate) sample measurement. Precision limits for specific analytes are listed in Table 6.

If calculated from three or more replicates, relative standard deviation (RSD) is used rather than the relative percent difference (RPD):

$$RSD = \left(\frac{S}{Y}\right) \times 100$$

Where,

RSD = relative standard deviation

S = standard deviation

Y = mean of replicate analysis

Standard deviation, s, is defined as follows:

$$S = \sqrt{\frac{\sum_{i=1}^{N} \left(X_i - \overline{X}\right)^2}{N-1}}$$

Where,

S = standard deviation

X_i = measured value of the ith replicate

$\overline{X}$ = mean of replicate measurements

N = number of replicates

Laboratories also routinely assess precision of their measurements within a laboratory (matrix spike duplicates, lab split samples, laboratory-fortified blank duplicates, etc). The frequency of laboratory precision measurements and their acceptance criteria are analyte and method specific. Minimum acceptance criteria limits are specified in the respective EPA approved measurement methods and in each laboratory's approved Quality Assurance Manual. Calculations for laboratory precision are the same as above.

Bias (Accuracy)

Overall bias for this QAPP is assessed through measurements of sample spike and matrix spike duplicate recoveries. Bias is the closeness of the measurement to the true level of the variable. Bias is expressed as percent recovery (%R). Bias criteria for %R vary depending on the analyte and the method. %R is normally determined by the use of known traceable laboratory standards. Acceptance limits for Bias for each analyte are listed in Table 6.

Laboratory bias is demonstrated through routine instrument calibrations, various types of QC checks (e.g., sample split measurements, sample spike recoveries, matrix spike duplicates, continuing calibration verification checks, internal standards, sample blank measurements (field and lab blanks) and use of certified external Quality Control samples--external standards), etc. Bias is normally determined by the percent recovery of the target analyte in spiked samples/sample blanks and internal surrogate standards. Bias (percent recovery or % R) is calculated as follows:

$$\%R = \left(\frac{Analyzed\ Value}{True\ Value} \right) \times 100$$

Laboratory bias acceptance criteria limits must be within the respective EPA approved method criteria limits and as specified in the respective contract laboratory's Quality Assurance Manual. Analyte specific acceptance criteria limits vary dependent upon the measurement method. Each contracted laboratory will maintain on file with the Project QA Officer and the ADEC DOW QA Officer a current Quality Assurance Manual (including all appropriate method SOPs (standard operating procedures), electronic copies requested).

Field laboratory and data quality audits and 3rd party performance evaluation (PT) samples are independent (external) means to assess measurement bias for the monitoring project.

Completeness

Completeness is the percentage of laboratory analyses that actually resulted in valid reported data. . Completeness is not intended to represent the number of samples that are required to be collected

for each ship; it is strictly a data validation tool utilized once the sampling season has ended. The completeness criterion for this project is 80 percent of the compiled analytical data per each analytical parameter for each vessel participating in the program. Because of the variety of vessels and discharges sampled, and the possibility for weather or other shipping-related delays resulting in missed holding times, a completeness criterion of less than 100% is to be expected. Completeness also extends to the total sample analytes composing each sampling event. Completeness will be predicated on a 100 % valid analytes/sampling event. The following equation is used to calculate completeness:

$$Completeness = \frac{T - (I + NC)}{T} \times 100$$

Where,

T = Total number of expected measurements

I = Number of invalid results

NC = Number of results not produced (e.g., spilled sample, etc.)

Representativeness

Representativeness is a measure of how well the sample reflects the typical wastewater effluent. Sample representativeness will be established by collecting cruise ship graywater, blackwater, and other wastewater discharge samples following vessel specific sampling plans (VSSP). The owner and operator is responsible for developing and submitting VSSPs to both agencies for each vessel participating in the program

The treatment system effluent will be considered representative for the two unannounced samples only if the vessel normally discharges continuously. If the vessel normally stores the wastewater in holding tanks before discharging, the effluent from the holding tank will be sampled. The VSSP is designed to ensure that consistent sampling methods are followed and that samples are collected from appropriate and representative locations at appropriate times. A picture will be taken of each sampling event. Also the identifying sample date, time, vessel and sampling port will be recorded for each sampling event. These actions will ensure and document each sample was collected from the VSSP specified sampling port.

If a twice per season sampling event does not yield valid results for all parameters, the following table will be used to guide the resampling process. The table provides groupings for resampling events. Resampling events must be continued until valid results are yielded for all target parameters collected during the resampling event.

Table 1 Analyte Groupings for Resampling

Group #1 Field Measurements	Group #2 Bacteria/Nutrients	Group #3 Oxygen Demand	Group #4 Metals	Group #5 Organics
pH	Fecal Coliform	BOD	Metals, total recoverable	VOCs
Chlorine (total and residual)	Ammonia, Total	COD	Metals, dissolved	BNAs
Temperature	Alkalinity	TOC	Specific conductance	
	Nitrate	Total Suspended Solids	Hardness	
	Nitrate + Nitrite	Settleable solids		
	TKN			
	Phosphorous, Total			

Note: All resampling events will require the re-measurement of group 1 parameters.

Vessel operation that differs from the VSSP may result in State of Alaska and/or the USCG rejection of samples.

Comparability

Comparability is a measure of confidence with which one data set can be compared to another. It is addressed in the plan by 1) following EPA standardized sampling and analytical methods; 2) by using similar sampling and analytical methods as followed in last year's monitoring project; 3) ensuring that appropriate reporting limits are used; and 4) obtaining data of known and acceptable quality through the use of specified QC measures and QA assessment procedures.

Because of the different source types found on different vessels (e.g., a holding tank on some ships may contain both blackwater and graywater, while on others it may only contain graywater), careful definition of discharge types will be made in the VSSP. It is essential that these definitions be carried through to the end data user, as these differences could erroneously bias data interpretation.

The sampling team must make full use of ship records and logs, especially the Graywater and Sewage Discharge Record Book which includes the latitude and longitude at the beginning and end of discharge, identifying tanks, estimating volumes and calculating discharge rates (if any) at the time the sample is drawn. If the vessel is discharging continuously (not just certified but actually is in practice) then the sampler does not need to record latitude and longitude at the beginning and end of discharge, identifying tanks, estimating volumes of those tanks. The sampler needs to identify which treatment unit is discharging and the discharge rate. The vessel speed and longitude/latitude must be obtained by the sampler if the sample is taken while the vessel is discharging underway. Information added to the VSSP or changes to the VSSP during the sampling event must be recorded on the VSSP, COC, or in the field notes and must accompany the samples to the lab and be provided to the project data recipients as part of the complete unannounced sampling report.

Special Training Requirements/Certification

Samplers will be trained in sampling methods, sample handling, chain of custody, and field measurements as outlined in 40 CFR 136. Additionally, samplers will receive appropriate training through their employer or their employer's designee, in any necessary shipboard safety procedures.

Laboratories used for USCG compliance purposes must be USCG accepted laboratories under the guidelines of 33 CFR 159.317(6). Laboratories used for ADEC compliance purposes will have a current Alaska Department of Environmental Conservation Drinking Water certification for microbiologicals or inorganics or home state or provincial equivalent. Laboratory analysts will be trained in accordance with each laboratory's QA Plan and Standard Operating Procedures (SOPs). Records of current certification, analyst training, and the laboratory QA documents listed above will be made available to the NWCCA Project Manager, the Project QA Officer, and the ADEC Project Manager. Laboratories will only employ approved methods of testing as outlined in 40 CFR 136.3 and referenced in Appendices C-E and that meet a detection limit below the applicable Alaska Water Quality Standard or permitted value.

Table 2 Specialized Training and Certification

Specialized Training/Certification	Samplers and Sample Team Leader	NWCCA PM	Project QAO	Analysts	Lab QA Manager
NWCCA QAPP and requirements and responsibilities for personnel	X	X	X	X	X
Cruiseship Effluent Water sampling techniques	X	X	X		
Project documents (VSSPs, discharge logs, permits, etc.)	X	X	X	X	X
Instrument calibration and QC activities for field measurements	X	X	X		X
Instrument calibration and QC activities for laboratory measurements			X	X	X
QA principles including laboratory specific QA Plan and SOPs		X	X	X	X
Chain of Custody procedures for samples and data	X	X	X	X	X
Handling and Shipping of Hazardous Goods	X	X	X	X	X
Specific EPA Approved Analytical Method Training for measurement performed or	X	X	X	X	X

Specialized Training/Certification	Samplers and Sample Team Leader	NWCCA PM	Project QAO	Analysts	Lab QA Manager
responsible for reviewing/approving					
ADEC Microbiological Drinking Water Certification				X **Note:** Certification for specific micro analysis is limited to the individually certified analyst.	

Documentation and Records

Sample schedule and Vessel/Sample Identification

The sampling team will work with the USCG and ADEC to develop a schedule of twice per season sample events as required in 33 CFR 159.317 (a). The schedule is confidential and is NOT shared with the vessels, nor are the vessels notified of such sampling events. The sampler must also notify the ADEC of its intent to sample at least 36 hours prior to sample collection. The two sampling events must be a minimum 21 days apart unless being conducted as a USCG random unannounced sampling event. For purposes of compliance with the State of Alaska, vessels discharging in Alaska waters must comply with the sampling and monitoring frequency outlined in the ADEC Large Commercial Passenger Vessel Wastewater Discharge General Permit.

Samples will be identified clearly on the chain of custody and sample bottles. The sampler should fill out the checklist in Appendix A.

Field Records (Required for both unannounced and continued compliance samples)

Field notes will be collected in bound field notebooks with numbered pages or recorded on pre-printed forms with specific information pertaining to the sampling event. On-board staff will witness the sampling and will initial the field notes. Information to be included in the field notes is outlined on the sampling checklist in Appendix A.

Cruise ship operators maintain a sewage and graywater discharge record book that records the date, times, volumes, and vessel location (latitude and longitude) for each wastewater discharge. These records will be provided to the sampler. . This information will also be included in final laboratory reports.

Laboratory Records

Upon completion of laboratory analysis, laboratory data review, and data validation, the laboratory will issue a full report in an electronic format describing the results of analysis for each sample

submitted. Prior to issuance of the analytical report to the vessel's representatives, ADEC, and the USCG Sector Juneau, the laboratory's QA manager will review and approve the report. All reports will be submitted electronically to ADEC at dec.wq.cruise@alaska.gov and to the USCG at D17-PF-SampleResults@uscg.mil .

The final laboratory reports will identify whether a sample was taken to satisfy 33 CFR 159.317 and AS 46.03.465 or done in order to seek USCG approval for discharge without distance or speed limitations or is a continuous discharge compliance sample.

Information to be included in the analytical report is outlined in the data review checklist in Appendix B.

Reports to ADEC and USCG

The NWCCA Project Manager approves and certifies that the data meets the ADEC/USCG QAPP defined acceptable valid data reporting criteria. Any problems with data will be addressed as well as what specific corrective actions were taken to remedy the problem in a timely manner. Complete sample data reports will be delivered to ADEC within 21 days of completion of laboratory analysis. Complete sample data reports will be delivered to USCG within 15 days of sample collection for conventional analytes and within 30 days of sample collection for priority pollutant analytes. All permit/regulatory exceedances must be reported to ADEC and USCG within 24 hours of final quality assurance review of the data by the laboratory.

Chain of Custody

The original chain of custody form will accompany the sample to the laboratory. When portions of the sample are sent to another laboratory (e.g., for many of the priority pollutants), a copy of the chain of custody will be made and this will accompany the samples. At each transfer of the sample, the transfer will be indicated on the chain of custody form. The person listed on the Chain of Custody should have full sight or control of the sample at all times until it the COC is relinquished by that person and received by the next party signed on the COC.

A copy of the original chain of custody will be included with the final report including the COC transferring samples to other labs. Electronic scanned copies in PDF form are sufficient.

Table 3: Project Documents and Records

Categories	Record/Document Types	Location
Site Information	Annual Approved VSSPs	ADEC Office
	Approved QAPP	ADEC Office
Environmental Data Operations	Field/Sampling Notebooks	STL Office
	Field/Sampling Method SOPs	STL Office
	Sample collection/measurement records	NWCCA PM Office

Table 3: Project Documents and Records

Categories	Record/Document Types	Location
	Sample Handling & Custody Records	PM Office
	Chemical labels, MSDS sheets	STL Office
	Inspection/Maintenance Records	
	Lab data (sample, QC and calibration) including data entry forms	Project Laboratories
Raw Data	Raw Data Packages	Project Laboratories
Data Reporting	Lab Analysis Reports	NWCCA PM Office
	Project data summary reports	Project QA Officer
	Inspection reports	NWCCA PM Office
	Data management plans/flowcharts	NWCCA PM Office
Data Management	Data algorithms	Project QA Officer
	Data quality assessments	Project QA Officer
	Field audits	Project QA Officer
	Lab audits	Project QA Officer
	QA reports/corrective action reports	Project QA Officer
	Performance Evaluation Samples	Project Laboratories
	Data quality assessments	Project QA Officer
Quality Assurance	Field audit reports	Project QA Officer
	Lab audit reports	Project QA Officer
	QA reports/corrective action reports	Project QA Officer
	Performance Evaluation Samples	Project QA Officer

Sampling Process Design

A vessel specific sampling plan (VSSP) will be developed for each ship by the ship engineers and submitted to the sampling team 30 days prior to entry into Alaska waters. The plan will include, as a minimum, the following:

- Vessel name.
- Passenger and crew capacity of ship.
- Daily water use per individual.
- Locations and capacities for treated sewage, graywater, and other wastewater tanks.
- Type of wastewater treatment systems.
- Each discharge pump type and rate
- Vessel schematic of discharge ports and corresponding sampling ports. The sample port must be no more than 50 feet from the OVERBOARD port.
- Description of discharges, including anticipated flow rates and tank volumes.
- Table containing type of discharge, type of sample (grab or composite), parameters (conventional or priority pollutants), location on the vessel where each sample is to be collected, and special circumstances.

- A narrative description of the time at which each sample is to be taken based upon circumstances that will yield a sample most likely to be representative of the average discharge that passes through the location where the sample is taken
- A description of the standards the owner or operator will use to determine a deviation from the plan
- Equipment required.

Each VSSP will be dated and a copy will be provided to the NWCCA Project Manager, the cruise ship companies, the ADEC Project Manager, and the USCG. The VSSP will be submitted to the USCG Sector Juneau and the ADEC Project Manager within 30 days of each vessel's initial entry into the applicable waters of Alaska. The ADEC must approve the VSSP prior to sampling. After the first sampling event on a vessel, the VSSP may be updated. If it is updated, copies of the updated sampling plan will also be provided to the NWCCA Project Manager, the vessel's owner or operator, ADEC and the USCG Sector Juneau before the second round of sampling occurs.

The purpose of providing the VSSP to the NWCCA Project Manager and the cruise ship companies prior to sampling is to provide certainty that consistent sampling methods are followed and that samples are collected from appropriate and representative locations. Deviations from the sampling plan may well occur; these will be noted in the field notes and notification will be given to ADEC and USCG Sector Juneau within 72 hours of the sampling event. Strong justification must be provided for the deviation, along with an explanation of how the deviation could affect sample results. The explanation must also clarify if the deviation will become the routine procedure or just a one-time deviation based upon circumstances.

Sampling Method Requirements

Sample Collection Procedures

Specific sampling techniques for each vessel will be detailed in the VSSP. The following general guidelines are listed to provide consistency among the vessels utilizing this QAPP.

Samples will reflect a representative discharge of treated blackwater, graywater and other wastewaters into applicable waters of Alaska from an operable marine sanitation device, other treatment system, a holding tank or some combination as specified in the VSSP. In port sampling, in compliance with ADEC sampling events, will be conducted only if the vessel is certified to discharge in port. If samples must be taken while the ship is underway, care will be taken to ensure sample representativeness and homogeneity. See VSSP for further details on sampling.

Prior to sampling, the effluent discharge port may be sterilized with a minimum 70% alcohol (isopropyl, methanol, or denatured ethanol) solution or by heat sterilization by the vessel owner if desired. The sample port should remain in contact with the alcohol for at least 1 minute, followed by sample flush of the discharge line. The alcohol will be only single use (i.e., may not be reused for future sample port sterilization). If heat sterilization is performed, the sampling port must be flushed and allowed to return to normal operating temperature before VOC sample fractions are collected.

Samplers will ensure that proper sampling techniques are followed, adequate notes are taken during the sampling event, and proper sample custody is maintained. One sampler will be sufficient for all in-port

sampling events. Samplers may work in teams of two if applicable for sampling events that must be performed while the vessel is underway. Samplers may be accompanied by sampling auditors and/or witnesses from regulatory agencies for both in-port and underway sampling events.

A volume of water equal to at least ten times the volume of the sample discharge line will first be discharged into a bucket or similar container to clear the line of standing water and possible contamination.

Samplers will wear disposable gloves, protective clothing and safety eyewear and will observe precautions while collecting samples, remaining aware of the potential biohazard present.

Samplers will contain all solid and liquid wastes generated during sampling (used gloves, paper towels, chlorine test waste, overflow from filling of VOC sampling vials, etc.) and remove it from the ship at the conclusion of the sampling event.

Samplers will take care not to touch the insides of bottles or lids/caps during sampling.

Samples will be listed as "grab" on the Chain of Custody form, with the exception of replicate samples that are collected in the transfer container, which will be listed as "composite".

Bottles will be lab certified and will not require rinsing with sample. When sample bottles are pre-preserved, bottles must never be rinsed but will be filled only once with sample. Due to potential contamination issues, field tests for pH and temperature may not be performed directly in a bottle to be used for other analytes of interest.

The required field tests will be performed prior to sampling in order to determine if residual chlorine is present. This will dictate the preservation procedures for the VOC and BNA analyses.

The practical quantitation limit for chlorine testing using field equipment is 0.1 mg/L. Field chlorimeters must be readable to at least 0.05 mg/L. Any values observed below this 0.1 mg/L will be recorded as actual readings on the field notes but as <0.1 mg/L final data reports.

Sample fractions for microbiology will be cooled immediately in an ice-water bath and then placed into a cooler containing frozen blue ice or ice and water mixture to maintain a sample temperature of 0 - 10° C. Temperature will be measured and recorded at the time of sample collection from a temperature blank of a size similar to the microbiology sample placed in the same cooler as the microbiology samples. Temperature of the temperature blank will also be measured upon sample receipt at the laboratory to an accuracy of 0.1° C and a note shall be made on the chain of custody of the temperature of the cooler contents upon arrival at the laboratory. Samples received with any indication of ice formation are unacceptable and sample will be flagged accordingly. Sample fractions for all other temperature sensitive analytes will likewise be cooled immediately in an ice-water bath and then placed into a cooler containing frozen blue ice or ice and water mixture to maintain a sample temperature of 0 - 6° C. Blue ice will only be used if transportation of samples on a commercial aircraft does not allow for the use of an ice and water mixture. Temperature will be measured and recorded at the time of sample collection from a temperature blank placed in the same cooler as the other temperature sensitive samples. The temperature of the temperature blank will also be measured upon sample receipt at the laboratory to an accuracy of 0.1° C. A note shall be made on the chain of custody of the temperature of the cooler contents upon arrival at the

laboratory. Samples received with any indication of ice formation are unacceptable and all samples with such conditions will be flagged accordingly. The sample receipt lab thermometer must be readable to 0.01° C and accurate to 0.1° C (40 CFR 136.3).

Sample bottles will be filled sequentially. Bottles will normally be filled to the shoulder of the bottle, leaving a small space for expansion and mixing. VOC bottles will not be intentionally over-filled but carefully filled to achieve a convex meniscus at the top of the bottle, with no air bubbles present; when the VOC lid is screwed on a small volume of water will be displaced and no air will be present in the bottle.

EPA guidelines in 40 CFR 136 require that samples to be analyzed for dissolved metals must be filtered and preserved with nitric acid within 15 minutes after sample collection. Except for the sample pump, all dissolved metals filtration apparatus will be certified clean single use. The sample pump will be appropriately cleaned in between each use to prevent contamination.

Table 4: Field QC Samples

Field Quality Control Sample	Measurement Parameter	Frequency	QC Acceptance Criteria Limits
Trip Blank	VOCs	1 per cooler containing VOC sample fractions	≤ individual VOC MDLs see Table 3, MQO
Temperature Blank	Temperature (Fecal Coliform)	1 per cooler containing fecal coliform sample fractions	Temp blank ≤ 10.0°C, no indication of freezing
Temperature Blank	Temperature (All other temp sensitive analytes)	1 per cooler containing temperature sensitive sample fractions other than fecal coliform	Temp blank ≤ 6.0°C, no indication of freezing
Blind sample replicate	All analytes collected during twice per season sampling events, except dissolved metals, total recoverable metals, and COD	Minimum of 10% of total number of twice per season sampling events	See precision criteria listed in Table 3, MQO
Blind sample replicate	Dissolved metals, Total recoverable metals, and COD	Minimum of 20% of total number of twice per season sampling events	See precision criteria listed in Table 3, MQO
Field Replicate Measurement	pH, temperature, chlorine	With every blind sample replicate	See precision criteria listed in Table 3, MQO
Calibration Check Standards that bracket expected range of measurements	pH, Chlorine residual total/free	Prior to and on day of use	See accuracy criteria listed in Table 3, MQO

Table 5 Required Sample Containers, Preservations, Holding Times, and Sample Types

LAB PARAMETER	CONTAINER	PRESERVATION	MAXIMUM HOLDING TIME	MINIMUM REPRESENTATIVE VOLUME
Total Suspended Solids	P, FP, G	Cool, ≤6° C, do not freeze	7 days	100 ml
Settleable Solids	P, FP, G	Cool, ≤6° C, do not freeze	48 hours	1000 ml
Biochemical Oxygen Demand- 5 day	P, FP, G	Cool, ≤6° C, do not freeze	48 hours	1000 ml
Ammonia – Total	P, FP, G	Cool, ≤6° C, H_2SO_4 to pH <2, do not freeze	28 days	400 ml
Chemical Oxygen Demand	P, FP, G	Cool, ≤6° C, H_2SO_4 to pH <2, do not freeze	28 days	50 ml
Specific Conductance	P, FP, G	Cool, ≤6° C, do not freeze	28 days	100 ml
Fecal Coliforms	Sterile PA, G	Cool, ≤10° C, 0.0008% $Na_2S_2O_3$, do not freeze	8 hours	100 ml
Alkalinity	P, FP, G	Cool, ≤6° C, do not freeze	14 days	100 ml
pH	P, FP, G	None	<15 minutes in field	25 ml
Oil and Grease	G	Cool, ≤6° C, HCL, H_2SO_4 or H3PO4 to pH <2, do not freeze	28 days	1000 ml

Total Organic Carbon	P, FP, G	Cool, ≤6° C, HCL, H_2SO_4 or H_3PO_4 to pH<2, do not freeze	28 days	50 ml
Total Kjeldahl Nitrogen	P, FP, G	Cool, ≤6° C, H_2SO_4 to pH <2, do not freeze	28 days	500 ml
Total Phosphorus	P, FP, G	Cool, ≤6° C, H_2SO_4 to pH <2, do not freeze	28 days	50 ml
Temperature	P, FP, G	None	Analyze ASAP in field	1000 ml
Chlorine Residual	P, G	None	<15 minutes in field	100 ml
Chlorine Free	P, G	None	<15 Minutes in field	100 ml
Hardness	P, FP, G	HN03 to pH <2	6 months	100 ml
Nitrate (NO_3)	P,FP, G	Cool, ≤6° C Do not freeze	48 hours	100 ml
Nitrate/Nitrite	P, FP, G	Cool, ≤6° C, do not Freeze, H2SO4 to pH<2	28 days	100 ml
BNA*	G, FP-lined cap	Cool, ≤6° C, do not freeze, 0.008% $Na_2S_2O_3$ if residual chlorine is detected above 0.1 mg/L	7 days until extraction, 40 days after extraction	1000 ml
VOCs	G, FP-lined septum	Cool, ≤6° C, do not freeze, 0.008% $Na_2S_2O_3$ if residual chlorine is detected	14 days	Each sample collected in duplicate 40ml vials

Total Mercury (CVAA)	P, FP, G	HNO_3 to pH <2 at time of collection, do not freeze	28 days	100 ml
Total Recoverable Metals	P, FP, G	HNO_3 to pH <2 at time of collection, do not freeze	6 months	100 ml
Dissolved Metals**	P, FP, G	Filtration w/0.45 micron filter within 15 min of collection,	6 months	100 ml

P = polyethylene, FP = flouropolymer, G = glass, PA = autoclavable plastic

Sample containers will normally be pre-preserved by the laboratory. Analyses can be consolidated into containers of matching sample preservation as long as adequate sample volume is collected for all tests. A 1 liter unpreserved bottle is sufficient to provide enough sample for the tests of BOD, TSS, pH, specific conductance, and alkalinity. A 1 liter bottle preserved with sulfuric acid is sufficient to provide enough sample for the tests of ammonia, COD, total phosphorus, and TKN. The tests of settleable solids, oil and grease, and BNA require a full liter of sample for extraction and cannot be consolidated with other tests. The sampler must measure the chlorine level before taking the VOC and BNA samples. If chlorine residual is detected above 0.1 mg/L during field measurement of chlorine, ascorbic acid provided by the lab will be added in the field to the BNA sample bottles until no chlorine is detected. The lab will provide decanting bottles with ascorbic acid. When chlorine is detected, the sample will be added first to the decanting bottle, and then will be decanted into the VOC vials. Shaded areas indicate tests required for twice per month sampling for ADEC general permit compliance. All analytes in the table are required for twice per season samples. *Additional volume of sample is required for matrix spike determination during the BNA analysis. The sampling team will take an additional 2L of sample from all priority pollutant replicate sampling events for this purpose to provide matrix spike data at a frequency of 10% for project related samples. *** Only Cu/Ni/Zn required for 2x/mo; full suite for 2x/yr.

Sample Handling and Custody Requirements

Sample Custody

Samples and sample containers will be maintained in a secure environment, from the time the bottles leave the laboratory until the time the samples are received at the laboratory. The laboratories will maintain custody of bottles and samples using their normal custody procedures.

Blind field replicates will be identified with discrete sampling labels and recorded as blind field replicates in the sampler's field notebook.

To maintain the secure environment for samples on board ship and during transport, samples must be: 1) in the sampler’s possession (line of sight); or 2) in a cooler sealed with signed and dated friable evidence tape or packing tape equivalent on opposing sides of the cooler; or 3) in a locked cooler for which only the sampler has the key. When the cooler is sealed, the method of securing the samples must be such that tampering with samples or bottles is not possible: The cooler must be secured so that the lid cannot be removed without breaking the evidence tape or cutting the lock, so that tampering would be evident.

Transfer of samples will be accomplished using the laboratory's chain of custody form. When samples are transferred between personnel, such transfer will be indicated on the chain of custody form with signature, date and time of transfer. The chain of custody will remain with the samples until received by the laboratory.

At any time during sample transfer, if custody is broken, a note must be made on the chain of custody form accompanying the sample. Upon receipt at the laboratory, the laboratory sample custodian will make note if a breach of custody has occurred (for example, if a custody seal has broken during transport).

Sample Temperature and Condition

Samples will be held at 0 - 10° C for microbiological samples and all other temperature sensitive samples. The sampler will fill a 1 liter HDPE bottle with the effluent sample to serve as a representative temperature blank. A temperature blank will be placed into each cooler at the same time as the first sample and will accompany all samples, and will be measured at the laboratory upon receipt of the samples to verify the temperature. The temperature of this blank will be recorded on the chain of custody at the time of sampling and upon receipt of the sample at the lab to demonstrate the initial and final temperature of the sample. Samples received with any indication of ice formation are unacceptable.

To maintain the temperature, extra blue ice will be kept frozen on board ship or ship ice will be used. Blue ice or ship ice will be exchanged just before shipment of samples to the lab, and may be exchanged more frequently during the sampling trip, as required.

Some samples may be at a temperature near body temperature (37° C) at time of sample collection. This temperature encourages growth of fecal coliform bacteria and thus these samples must be cooled as quickly as possible, without freezing them. The sample bottles for microbial testing shall be placed in a water bath containing ice cubes provided on board ship. The bottles should be immersed in the water to the shoulder, rotated frequently, and ice should be added/water drained off as the ice melts for at least one hour or until the sample reaches a temperature of <10° C. The sampler will fill a 120 ml HDPE bottle with the effluent sample to serve as a representative temperature blank. The temperature of this blank will also be recorded on the chain of custody at the time of sampling and upon receipt of the sample at the lab to demonstrate the initial and final temperature of the microbial sample. This temperature blank must also be measured /documented as being above freezing upon receipt with no indication of freezing of samples and temperature blank. To ensure custody of these samples that may not be able to be sealed in the cooler until the temperature is lowered, these bottles can be sealed with custody tape individually, as necessary.

In no event will samples be placed in refrigerators meant for human food or beverages.

Sample Holding Times

Sample holding times are as described in Table 5 above. Planned sample shipping schedules will allow for the meeting of these holding times.

The most critical holding time will be that of fecal coliforms, which is defined by EPA as 8 hours to commencement of analysis. To meet this holding time, a stringent scheduling effort will be required by the laboratory and sampling team. If the normal discharge pattern is altered in order to adhere to this holding time, a note will be made of the change in the field notes and in the final quality control review.

Sample Disposal

Samples collected for analysis shall be held by the laboratory for not less than six months from the sample collection date, or for an extended time period on an individual basis as directed by the Coast Guard and ADEC prior to the six month date, with the exception of samples that have a biological component

Analytical Methods and Quality Control Requirements

Water quality analytical methods that will be used throughout this project are outlined in Appendix C. All methods used for this project must be contained in Appendix C. Only approved methods for water/wastewater (not drinking water) will be used for the analysis of microbiological and all other sample analytes. Any lab performing analytical work on samples collected within Alaska must provide and current electronic copy of their approved Quality Assurance Manual (and respective measurement method SOPs) to the ADEC Division of Water QA Officer as well as the Project QA Officer. These documents must specify calibration and quality control criteria, practices and procedures that are essential in the review, validation, verification and reporting of sample result data. Lab and field QA/QC results and their acceptance limits used to verify and validate respective sample data will be reported with each data report. Sample results provided to ADEC and USCG will include this information.

The USCG requires the analytical report within 15 calendar days after the sampling date for conventional pollutant analyses. The USCG requires the analytical report within 30 calendar days from the sampling date for priority pollutant analysis and associated conventional pollutant analyses from the same sampling event. The ADEC requires conventional and priority pollutants reports within 21 days of completion of laboratory analysis.

The MDL referred to in Table 6 is a statistically derived method detection limit, typically arrived at by repeat analyses performed by the laboratory, with a statistical EPA-defined calculation then performed (40 CFR 136 Appendix B). It is sometimes method-defined (as in BOD). The PQL (Practical Quantitation Limit) is the level at which the laboratory QA department feels comfortable reporting data. Because the MDL is statistically derived, data can be detected at and near the MDL that are not accurate and that are frequently false positives. For this reason, many labs do not report at the MDL but report at some level, often approximately 3 times greater than the MDL (again, for statistical purposes). The MDL's and Reporting Limits are usually laboratory-specific standards and are not tied to compliance limits, and are not regulatory action levels. The MDL and PQL values in this document reflect typical laboratory performance at the present time and will serve as general targeted levels for this project. PQL values must be lower than compliance levels for any parameters with defined effluent limits in the ADEC General Permit. Actual data reporting levels may change due to ongoing detection limit studies and sample dilution due to matrix interferences. Percent recovery (accuracy) limits are directed by the official laboratory methods, or in the absence of such directives, are derived from laboratory performance. Current targeted guidelines for MDL's, RL's (minimum levels, PQL), and precision and accuracy requirements for the project are listed in the following table. Lab performance should not deviate more than 20% from these target values.

Table 6. Project Measurement Quality Objectives

PARAMETER	MDL (mg/l)	PQL (mg/l)	PRECISION (RPD, RSD)	BIAS (% Recovery)
Conventional Pollutants				
Alkalinity	5	20	<20%	85 - 115 %
Ammonia – Total	0.15	0.5	<20%	80 - 120 %
Biochemical Oxygen Demand	2	2	<20%	70 - 130 %
Chemical Oxygen Demand	5	15	<20%	85 - 115 %
Chlorine Residual (total/free)	0.05	0.1	<20%	N/A
Fecal Coliforms	2 FC/100 ml	2 FC/100 ml	Analyzed but no precision criteria	N/A
Hardness	5	20	<20%	85 - 115 %
Nitrate	0.1	0.5	<20%	85 - 115 %
Nitrate plus Nitrite	0.1	0.5	<20%	85 - 115 %
Oil and Grease	1.5	5	<20%	60-150%
pH	0.10 standard units	0.10 standard units	<20%	N/A
Settleable Solids	0.10 (ml/L)	0.10 (ml/L)	<20%	N/A
Specific Conductance	1 µmHos/cm	2 µmHos/cm	<20%	85 - 115 %
Total Kjeldahl Nitrogen	1	5	<20%	85 - 115 %
Total Organic Carbon	0.3	1	<20%	85 - 115 %
Total Phosphorus	0.03	0.1	<20%	85 - 115 %
Total Suspended Solids	1.3	4	<20%	85 - 115 %
Priority Pollutants				
• Total Aromatic and Total Aqueous Hydrocarbons using BNA and VOC data				

PARAMETER	**MDL (µg/l)**	**PQL (µg/l)**	**PRECISION (RPD)**	**BIAS (% Recovery)**
Total Recoverable Metals	**µg/l**	**µg/l**		
Antimony	0.8	2.5	<20%	85 - 115 %
Arsenic	0.8	2.5	<20%	85 - 115 %
Beryllium	0.5	1.5	<20%	85 - 115 %
Cadmium	0.65	2	<20%	85 - 115 %
Chromium	0.8	2.5	<20%	85 - 115 %
Copper	0.4	1	<20%	85 - 115 %
Lead	0.3	1	<20%	85 - 115 %
Mercury (Total)	0.65	2	<20%	85 - 115 %
Nickel	0.5	1.5	<20%	85 - 115 %
Selenium	1.5	5	<20%	85 - 115 %
Silver	0.3	1	<20%	85 - 115 %
Thallium	0.3	1	<20%	85 - 115 %
Zinc	0.9	2.5	<20%	85 - 115 %
Dissolved Metals	**µg/l**	**µg/l**		
Antimony	0.8	2.5	<20%	85 - 115 %
Arsenic	0.8	2.5	<20%	85 - 115 %
Beryllium	0.5	1.5	<20%	85 - 115 %
Cadmium	0.65	2	<20%	85 - 115 %
Chromium	0.8	2.5	<20%	85 - 115 %
Copper	0.4	1	<20%	85 - 115 %
Lead	0.3	1	<20%	85 - 115 %
Nickel	0.5	1.5	<20%	85 - 115 %
Selenium	1.5	5	<20%	85 - 115 %
Silver	0.3	1	<20%	85 - 115 %
Thallium	0.3	1	<20%	85 - 115 %
Zinc	0.9	2.5	<20%	85 - 115 %
VOCs				
1,1,1,2-Tetrachloroethane	0.5	2	<20%	75-125%

PARAMETER	MDL (µg/l)	PQL (µg/l)	PRECISION (RPD)	BIAS (% Recovery)
1,1,1-Trichloroethane	1.5	5	<20%	52-162%
1,1,2,2-Tetrachloroethane	1.5	5	<20%	46-157%
1,1,2-Trichloroethane	1.5	5	<20%	52-150%
1,1-Dichloroethane	1.5	5	<20%	59-155%
1,1-Dichloroethene	1.5	5	<20%	5-234%
1,1-Dichloropropene	1.5	5	<20%	75-125%
1,2,3-Trichlorobenzene	1.5	5	<20%	75-125%
1,2,3-Trichloropropane	1.5	5	<20%	80-120%
1,2,4-Trichlorobenzene	1.5	5	<20%	75-125%
1,2,4-Trimethylbenzene	1.5	5	<20%	75-125%
1,2-Dibromo-3-Chloropropane	3	10	<20%	70-130%
1,2-Dichlorobenzene	3	10	<20%	18-190%
1,2-Dichloroethane	1.5	5	<20%	49-155%
1,2-Dichloropropane	1.5	5	<20%	5-210%
1,3,5-Trimethylbenzene	0.5	2	<20%	70-130%
1,3-Dichlorobenzene	3	10	<20%	59-156%
1,3-Dichloropropane	0.5	2	<20%	75-130%
1,4-Dichlorobenzene	3	10	<20%	18-190%
2,2-Dichloropropane	1.5	5	<20%	60-130%
2-Butanone	15	50	<20%	60-140%
2-Chloroethyl Vinyl Ether	3	10	<20%	10-305%
2-Chlorotoluene	3	10	<20%	75-135%
2-Hexanone	6	20	<20%	60-140%
4-Chlorotoluene	3	10	<20%	75-130%
4-Isopropyltoluene	1	3	<20%	75-125%
4-Methyl-2-Pentanone	6	20	<20%	60-140%
Acetone	10	50	<20%	40-160%
Acrolein	30	100	<20%	40-160%
Acrylonitrile	30	100	<20%	65-130%
Benzene	1.5	5	<20%	37-151%
Bromobenzene	1.5	5	<20%	75-130%
Bromochloromethane	1	3	<20%	35-155%

PARAMETER	MDL (µg/l)	PQL (µg/l)	PRECISION (RPD)	BIAS (% Recovery)
Bromodichloromethane	1.5	5	<20%	80-130%
Bromoform	1.5	5	<20%	45-169%
Bromomethane	3	10	<20%	10-242%
Carbon Disulfide	3	10	<20%	60-130%
Carbon Tetrachloride	1.5	5	<20%	70-140%
Chlorobenzene	1.5	5	<20%	37-160%
Chloroethane	3	10	<20%	14-230%
Chloroform	1.5	5	<20%	51-138%
Chloromethane	3	10	<20%	10-273%
Cis-1,2-Dichloroethene	1.5	5	<20%	80-130%
Cis-1,3-Dichloropropene	1.5	5	<20%	5-227%
Dibromochloromethane	1.5	5	<20%	53-149%
Dibromomethane	1.5	5	<20%	80-130%
Dichlorodifluoromethane	3	10	<20%	60-140%
Ethylbenzene	1.5	5	<20%	37-162%
Hexachlorobutadiene	15	50	<20%	50-130%
Iodomethane	1.5	5	<20%	50-150%
Isopropylbenzene	1.5	5	<20%	70-130%
m&p Xylenes	1.5	5	<20%	75-120%
Methylene Chloride	3	10	<20%	10-221%
n-Butylbenzene	1.5	5	<20%	70-130%
n-Propylbenzene	3	10	<20%	70-130%
O-Xylene	1.5	5	<20%	80-125%
sec-Butylbenzene	1.5	5	<20%	70-130%
Styrene	1.5	5	<20%	85-125%
tert-Butyl Methyl Ether	1.5	5	<20%	70-130%
tert-Butylbenzene	1.5	5	<20%	70-125%
Tetrachloroethene	1.5	5	<20%	64-148%
Toluene	1.5	5	<20%	47-150%
Trans 1,2-Dichloroethene	1.5	5	<20%	54-156%
trans-1,3-Dichloropropene	1.5	5	<20%	17-183%
trans-1,4-Dichloro-2 Butene	3	10	<20%	70-130%
Trichloroethene	1.5	5	<20%	71-157%

PARAMETER	MDL (µg/l)	PQL (µg/l)	PRECISION (RPD)	BIAS (% Recovery)
Trichlorofluoromethane	3	10	<20%	17-181%
Trichlorotrifluoroethane	3	10	<20%	60-140%
Vinyl Acetate	1.5	5	<20%	60-140%
Vinyl Chloride	0.5	2	<20%	2-251%
BNA				
1,2-Diphenylhydrazine	1.5	5	<40%	60-140%
2,4,5-Trichlorophenol	1.5	5	<40%	60-140%
2,4,6-Trichlorophenol	1.5	5	<40%	37-144%
2,4-Dichlorophenol	1.5	5	<40%	55-130%
2,4-Dimethylphenol	5	15	<40%	15-130%
2,4-Dinitrophenol	8	25	<40%	25-191%
2,4-Dinitrotoluene	1.5	5	<40%	39-139%
2,6-Dinitrotoluene	1.5	5	<40%	50-158%
2-Chloronapthalene	2	10	<40%	30-170%
2-Chlorophenol	1.5	5	<40%	23-134%
2-Methylnaphthalene	1.5	5	<40%	40-140%
2-Methylphenol	1.5	5	<40%	50-115%
2-Nitroaniline	1.5	5	<40%	50-115%
2-Nitrophenol	1.5	5	<40%	50-115%
3&4-Methylphenol	1.5	5	<40%	30-125%
3,3'-Dichlorobenzidine	5	25	<40%	30-170%
3-Nitroaniline	15	50	<40%	30-170%
4,6-Dinitro-2-methylphenol	8	25	<40%	25-181%
4-Bromophenyl Phenyl ether	1.5	5	<40%	50-140%
4-chloro-3-methylphenol	3	10	<40%	22-147%
4-Chloroaniline	1.5	5	<40%	30-170%
4-Chlorophenyl methylsulfone	6	20	<40%	30-170%
4-Chlorophenyl Phenyl ether	1.5	5	<40%	50-150%
4-Nitroaniline	15	50	<40%	40-110%
4-Nitrophenol	8	25	<40%	25-132%
Acenaphthene	1.5	5	<40%	40-145%

PARAMETER	MDL (µg/l)	PQL (µg/l)	PRECISION (RPD)	BIAS (% Recovery)
Acenaphthylene	1.5	5	<40%	33-145%
Anthracene	1.5	5	<40%	27-133%
Benzidine	50	200	<40%	30-170%
Benzo (A) Anthracene	1.5	5	<40%	33-143%
Benzo (A) Pyrene	1.5	5	<40%	17-163%
Benzo (B) Fluoranthene	1.5	5	<40%	24-159%
Benzo (g,h,i) Perylene	1.5	5	<40%	5-219%
Benzo (K) Fluoranthene	1.5	5	<40%	11-162%
Benzoic Acid	1.5	5	<40%	5-110%
Benzyl Alcohol	3	10	<40%	24-149%
Bis (2-Chloroethoxy) methane	1.5	5	<40%	33-184%
Bis (2-chloroethyl) ether	1.5	5	<40%	12-158%
Bis (2-Chloroisopropyl) ether	1.5	5	<40%	36-166%
Bis (2-Ethylhexyl) Phthalate	1.5	5	<40%	8-158%
Butyl Benzyl Phthalate	1.5	5	<40%	5-152%
Chrysene	1.5	5	<40%	17-168%
Dibenzo (a,h) Anthracene	1.5	5	<40%	5-227%
Dibenzofuran	1.5	5	<40%	50-130%
Diethyl Phthalate	1.5	5	<40%	5-114%
Dimethyl Phthalate	1.5	5	<40%	5-112%
Di-N-Butyl Phthalate	1.5	5	<40%	60-160%
Di-N-Octyl Phthalate	1.5	5	<40%	5-146%
Fluoranthene	1.5	5	<40%	26-137%
Fluorene	1.5	5	<40%	55-130%
Hexachlorobenzene	1.5	5	<40%	5-152%
Hexachlorocyclopentadiene	3	10	<40%	30-170%
Hexachloroethane	1.5	5	<40%	40-140%
Indeno (1,2,3-CD) Pyrene	1.5	5	<40%	5-171%
Isophorone	1.5	5	<40%	21-196%
Napthalene	3	10	<40%	21-133%
Nitrobenzene	1.5	5	<40%	35-180%
N-Nitrosodimethylamine	1.5	5	<40%	30-170%

PARAMETER	MDL (µg/l)	PQL (µg/l)	PRECISION (RPD)	BIAS (% Recovery)
N-Nitrosodi-N-Propylamine	1.5	5	<40%	5-230%
N-Nitrosodiphenylamine	3	10	<40%	60-140%
Pentachlorophenol	8	25	<40%	25-176%
Phenanthrene	1.5	5	<40%	50-140%
Phenol	1.5	5	<40%	5-112%
Pyrene	1.5	5	<40%	45-135%

Instrument/Equipment Testing, Inspection, and Maintenance Requirements; Calibration and Frequency

Field instruments include a hand-held pH meter, chlorine residual colorimeter instrument, and a probe thermometer. These must be certified against a laboratory method for pH and chlorine and NIST certified thermometer. All field kits must have certified instruments. The temperature, pH, and chlorine certification and calibration must be documented in the field notes.

The analysis of chlorine in the field will be used for the official analytical result. Maintenance of the chlorine residual test kit includes keeping the sample vial rinsed after sample measurement, keeping the vial clean and free of fingerprints and oils, and keeping the colorimeter itself clean. An extra sample vial will be kept with the test kit in case of breakage or scratches to the sample vial. The field kit should be checked against the lab kit twice per season. The chlorimeter must be verified at a minimum frequency of once per week with a secondary standard that ensures the chlorimeter optics are optically aligned and set to the correct wavelength frequency. Secondary standards are available from instrument manufacturers. Should the chlorimeter fail a secondary QC check standard, the chlorimeter will be recalibrated prior to use. Calibration and QC check standard results will be documented and maintained by the monitoring group performing the analysis.

The analysis of pH in the field will be used for the official analytical result. A pH meter shall be used that ensures the most accurate reading possible in the expected range of pH values. This meter will be calibrated at a minimum frequency of once per week and preferably each day prior to sample analysis. The laboratory will supply reference buffers to the sampling team for field verification of the pH meter on each day of use. Buffers used for pH meter verification should span the expected range of sample pH measurements. If pH meter measurements are not within 0.1 pH units of the reference buffer's stated value, the sampler must recalibrate the meter using appropriate standards.

Temperature at or shortly after sample collection will be measured using either a NIST traceable temperature probe or with an independent thermometer readable to an accuracy of 0.1°C. The validity of the temperature probe will be checked early and late in the season against a current NIST or NIST traceable thermometer certified at a certified laboratory; differences between the temperature probe and the certified thermometer will be documented in the final quality assurance review of the data. Infrared

probes are not to be used to measure temperatures as they only measure surface temperatures and not the actual sample temperature.

Laboratory instrument and calibration procedures are detailed in the QA Plans and SOPs from the certified laboratories. Copies of these plans will be provided electronically from the lab managers to the Project QA Officer and the ADEC DOW QA Officer.

Inspection/Acceptance Requirements for Supplies and Consumables

All sample containers, tubing, filters, etc. provided by a laboratory or by commercial vendor, will be certified clean for the analyses of interest. The sampling manager/person will make note of the information on the certificate of analysis that accompanies sample containers to ensure that they meet the specifications and guidance for contaminant-free sample containers for the analyses of interest. Except for the sample pump, all dissolved metals filtration apparatus will be certified clean single use. This process will be documented in an SOP in which the sampler has been trained. Sample pumps will be only be used that do not come in contact with the filtered media. Each sample pump will be appropriately cleaned in between each use to prevent contamination.

No standard solutions, buffers, or other chemical additives will be used beyond expiration dates. It is the responsibility of the sampling manager or his/her designee to keep appropriate records, such as logbook entries or checklists, to verify the inspection/acceptance of supplies and consumables, and restock these supplies and consumables when necessary.

Sample bottles will be lab certified and will not require rinsing with sample. Sample transfer containers will be lab certified clean, will be single use and contain no preservatives.

Samplers will visually inspect sample bottles prior to sample collection. If any issues are noted in the inspection (cracked bottles, missing lids, expired bottles, etc.) which could compromise sample integrity, the sampler will replace the compromised bottles. If replacement bottles are not available, the sampler will note the issues on the COC form. If replacement bottles are not equivalent to the original bottles, discrepancies will be recorded on the COC form and field notes.

Contracted and sub-contracted laboratories will follow procedures in their laboratory's QA Plan and SOPs for inspection/acceptance of supplies and consumables.

Inspection/Acceptance Requirements (Non-Direct Measurements)

Historical data for this project includes only 10 years of monitoring, so data acceptance criteria will not be required for historical data acceptance.

On-board ship data to be recorded includes tank volume and pumping rate data from ship tracking systems and any documented occurrence of seawater influx. The data will be recorded as reported by shipboard staff in the Graywater and Blackwater Discharge Record Book and through direct observation by the sampling team.

Data Management

The success of a monitoring project relies on data and their interpretation. It is critical that data be available to users and that these data are:

- Of known quality,
- Reliable,
- Aggregated in a manner consistent with their prime use, and
- Accessible to a variety of users.

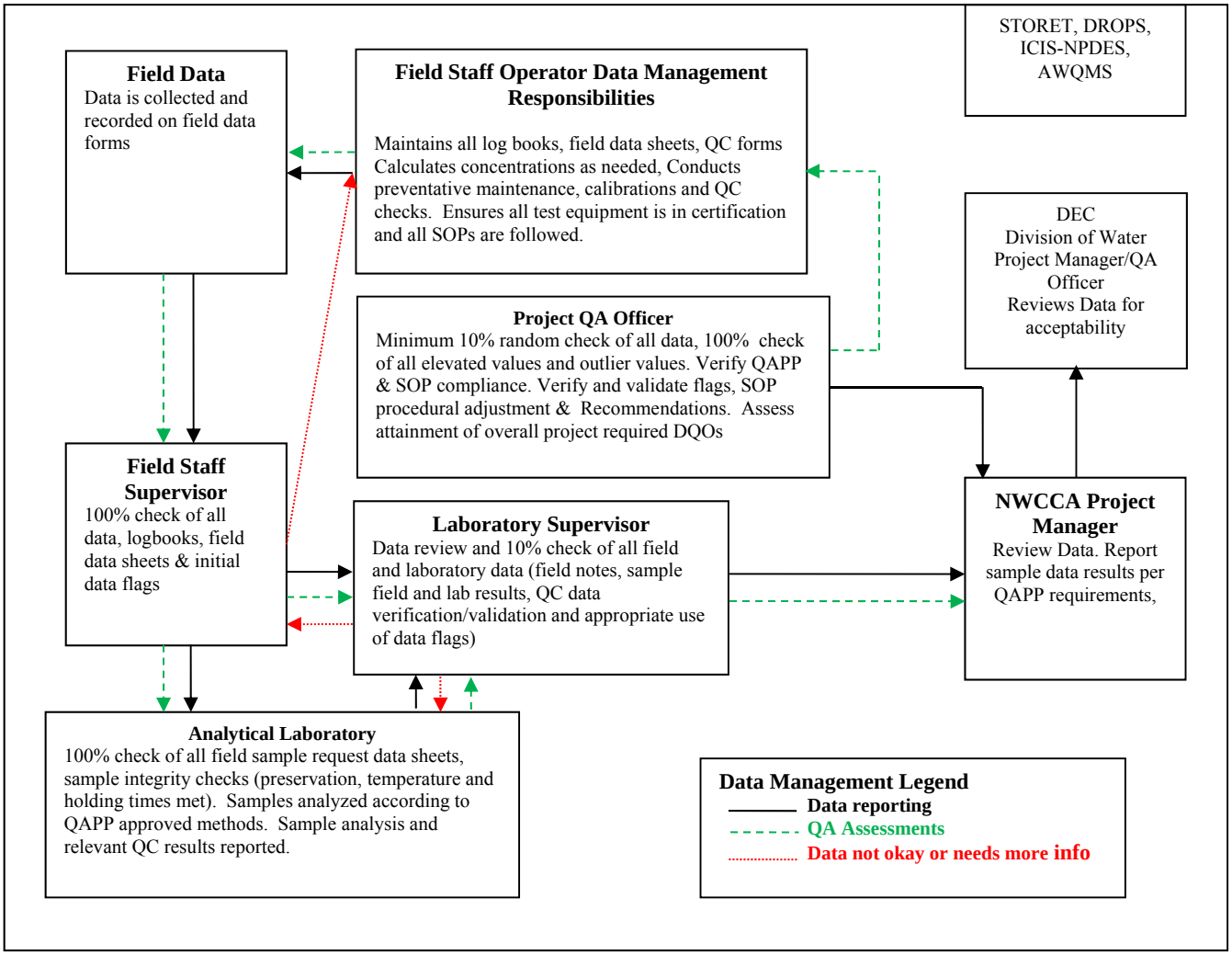
Quality Assurance/Quality Control (QA/QC) of data management begins with the raw data and ends with a defensible report, preferably through the computerized messaging of raw data.

Data management encompasses and traces the path of the data from their generation to their final use or storage (e.g., from field measurements and sample collection/recording through transfer of data to computers (laptops, data acquisition systems, etc.), laboratory analysis, data validation/verification, QA assessments and reporting of data of known quality to the respective ADEC Division of Water Program Office. It also includes/discusses the control mechanism for detecting and correcting errors.

Various people are responsible for separate or discrete parts of the data management process:

- The field samplers are responsible field measurements/sample collection and recording of data and subsequent shipment of samples to laboratories for analyses. They assemble data files, which includes raw data, calibration information and certificates, QC checks (routine checks), data flags, sampler comments and meta data where available. These files are assembled and forwarded for secondary data review by the sampling supervisor.
- Laboratories are responsible to comply with the data quality objectives specified in the QAPP and as specified in the laboratory QAP and method specific SOPs. Validated sample laboratory data results are reported to the Sampling Manager and the NWCCA Project Manager.
- Secondary reviewers (sampling coordinator/project manager) are responsible for QC and verification and validation of field and laboratory data and data reformatting as appropriate for reporting to DROPS (ADEC), and reporting validated data to the project manager.
- The Project QA officer is responsible for performing routine independent reviews of data to ensure the monitoring projects data quality objectives are being met. Findings and recommended corrective actions (as appropriate) are reported directly to project management.
- The NWCCA Project Manager is responsible for final data certification.

Figure 2: Data Management Flow Chart



The NWCCA Project Manager will report data directly to the Coast Guard, the ADEC Project Manager and the individual cruise lines after thorough review by the Laboratory QA Manager within the regulatory time limits.

The Lab Project Manager will not be placed in the position of determining whether an analytical result represents a violation of federal or state laws or regulations.

Assessment/Oversight

Assessments and Response Actions

Assessments are independent (of management) evaluations of the monitoring project that are performed by the Project QA Officer or his/her designee. At a minimum the Project QA Officer is responsible for: on-site field assessments, laboratory audits, performance evaluation samples, blind sample replicates (precision samples), data reviews and end of cruiseship season data quality assessments.

Field Assessments

The Project QA Officer will perform a field sampling audit on a minimum of two randomly selected sampling events during the project in order to evaluate the performance of the sampling team. The Project QA Officer must notify ADEC 36 hours prior to the audit in order to observe if desired. Follow-up field audits may be necessary pending audit findings. The initial field sampling audit will be conducted within 30 days of project initiation, with the second audit occurring midway through the project. Each audit will concentrate on sampling technique, sample handling, field records, field testing methods, chain of custody, and adherence to vessel specific sampling plans and the QAPP. The Project QA Officer will do a verbal on-site debriefing of assessment findings to sampling personnel. The QA Officer will issue a draft field assessment to sampling personnel and the NWCCA PM within one week of assessment for confirmation/verification by the auditee of audit findings. The Project QA Officer will issue the final assessment report to the NWCCA PM, ADEC QA Officer and ADEC PM within two weeks of the assessment. The USCG and ADEC may also participate in random onboard field assessments of the sampling effort. The Project QA Officer and NWCCA Project Manager will be advised in a timely manner of the results of each USCG or ADEC onboard field assessment.

Laboratory Assessments

Laboratories are subject to periodic and extensive audits by regulatory agency personnel as part of their certification. Reports of most recent 3rd party laboratory technical systems audits, EPA Drinking Water and Water/Wastewater Blind Performance Evaluation Samples demonstrating competence in the respective methods will be made available to the ADEC Project Manager, ADEC Water Quality Assurance Officer, and the Project QA Officer prior to analysis of samples. The Project QA Officer will review any recent and pertinent technical systems audit reports of the analytical laboratories involved in this project.

The Project QA officer will use technical system audit report findings and recommendations to design an on-site technical systems audit of the project laboratories (in consultation with and support from technical experts at ADEC). The technical systems audit must be performed within the first 30 days of project initiation so any recommended enhancements to laboratory operations can be implemented early on in the

project. The Project QA Officer must notify the ADEC Project manager at least 36 hours prior to audit of the audit date to give the ADEC the opportunity to observe if desired. The ADEC may perform additional lab audits for labs analyzing commercial passenger vessel samples.

Based upon review and acceptable performance of recent lab audits and Performance Evaluation sample results, the Project QA Officer may recommend that a technical systems audit is not warranted. If the ADEC Project Manager and ADEC Water QA Officer disagree, the on-site lab technical audit must be performed.

The ADEC Project Manager and ADEC Water Quality Assurance Officer will be notified in advance and invited to participate in any audit, and a report of these findings will be presented to the ADEC Project Manager and the Lab Project Manager. Any deficiencies noted by the auditor will be corrected immediately, and the Lab Manager will note these changes in a corrective action report to the Project QA Officer and ADEC Project Manager. The Project QA Officer will also perform a technical systems audit on two sampling events in order to evaluate laboratory log-in, sample handling, preservation, and storage procedures.

Laboratories performing testing under this program must also participate in a DMR-QA (Discharge Monitoring Report Quality Assurance) performance sample study once annually with results sent directly to the Project QA Officer and the ADEC Water Quality Assurance Officer for all wastewater parameters (chemistry and microbiology) analyzed under this program.

Precision and Bias

Precision blind sample replicates will be collected on a minimum of 10% of the total number of twice per season samples collected for the project. All blind replicate samples will be analyzed for both conventional pollutants and priority pollutants. The purpose of the blind sample replicates is to assess sampling and laboratory error and to assess overall method variability. Precision between the sample and its replicate will be determined by calculating the relative percent difference between the two samples, in the same way that precision is measured between two laboratory-fortified blanks or a matrix spike/matrix spike duplicate. The use of replicate samples extends the test of precision to the sampling method itself. The use of blind samples provides a test of the laboratory and is used to assess bias or analytical errors not detected by the laboratory (e.g., a false positive). Every effort will be made to ensure that the labeling of the samples does not disclose the replicate nature of the samples to the laboratory. The samples will be analyzed by the same lab and for the same parameters. Replicate samples will be evaluated as individual precision pairs, and overall measurement precision will be evaluated for each parameter for the monitoring season as an aggregate of the pair analyses. Results of the replicate analysis will be monitored by the Project QA Officer and submitted to the ADEC Project Manager. Acceptance criteria limits for precision samples are listed in Table 6, Project Measurement Quality Objectives.

Bias/Accuracy Matrix spike duplicates will be performed by laboratories analyzing the samples. Acceptance criteria limits for bias are listed in Table 6, Project Measurement Quality Objectives.

Table 7: Project Assessments

Assessment Type/Auditor	Measurement Parameters	Frequency	Acceptance Criteria Limits
On-site Sampling Audit/Project QAO	On-site measurement parameters and laboratory parameters	2/monitoring season	Site technicians in compliance with QAPP on-site measurement methods and sampling protocols, sample site meets VSSP design criteria
3rd Party PT Sample Audit/Project QAO	Laboratory parameters	Annually	Analytes within PT study limits
On-site Technical System Laboratory Audit/Project QAO	Laboratory parameters	Annually if determined necessary by ADEC	
Blind Sample Replicate Assessment/Project QAO	On-site measurement parameters and laboratory parameters	All Blind Sample Replicates	Defined in Section A7 and MQO Table (Table 3)
Data Quality Audits/ Project QAO	Laboratory parameters	20% of reported data	All sample data results evaluated against analyte specific QA/QC criteria limits
End of Season Summary QA Assessment Report/ Project QAO	On-site measurement parameters and laboratory parameters	Annually at end of Cruiseship Season	Defined in Section A7 and MQO Table (Table 3)

Corrective Action

The NWCCA Project Manager will notify the Project QA Officer and ADEC project manager within 7 days, if errors are noted by the laboratory or sampling personnel. The Project QA Officer will then notify the Lab Project Manager and the party responsible for the error of the deficiency, and will recommend methods of correcting the deficiency. The responsible party will then immediately correct the problem and will send those corrections via email to the Project QA Officer, the NWCCA Project Manager, and ADEC Project Manager. The Project QA Officer will conduct a follow-up assessment to ensure recommended corrective actions are routinely being followed.

Reports to Management

The Project QA Officer will issue audit reports in accordance with the following guidelines:

- Field sampling audits--Verbal on-site debriefing of audit findings to sampling personnel. Draft field audit report issued to sampling personnel and NWCCA Project Manager within one week of audit. Final audit report to NWCCA Project Manager and ADEC Project Manager within 2 weeks of end of audit. The NWCCA Project Manager will forward all corrective action reports to the ADEC Project Manager when completed.
- Technical laboratory audit—Verbal on-site debriefing of audit findings to laboratory personnel, and Lab Project Manager. Draft technical systems audit report to NWCCA Project Manager and

ADEC Project Manager within 1-2 weeks of end audit (depending upon depth and extent of audit). Final technical systems audit report to NWCCA Project Manager and ADEC Project Manager within 2 – 4 weeks of end of audit (depending upon depth and extent of audit). NWCCA Project Manager will forward all corrective action reports to the ADEC Project Manager when completed.

- Blind Sample Replicate Assessment—Draft report findings within one week of receiving/verifying results to Laboratory QA officer, NWCCA Project Manager, and ADEC Project Manager. Final report will be issued to these same personnel within one month of the Project QA Officer's receipt of the results.

By November 15th, the Project QA Officer will issue an End of Season Report to the NWCCA Project Manager, USCG, ADEC Project Manager, ADEC Water Quality Assurance Officer, and vessel representatives detailing findings, problems and resolutions, data reliability and recommended enhancements for future monitoring projects, etc.

Table 8: QA Reports to Management

QA Report Type	Contents	Presentation Method	Report Issued by
On-site Sampling Audit Report	Description of audit methods and results including and any recommendations	Written text and tables, charts, graphs displaying results	Project QA Officer
3rd Party PT Audit Report	Description of PT study results, methods of analysis and any recommendations	Written text and tables, charts, graphs displaying results	Project QA Officer
On-site Technical System Laboratory Audit Report	Description of audit methods and results including and any recommendations	Written text and tables, charts, graphs displaying results	Project QA Officer
Blind Sample Replicate Assessment Reports	Evaluation of blind sample replicate results including an evaluation against project MQOs and recommendations for improvements.	Written text and tables, charts, graphs displaying results	Project QA Officer
Corrective Action Report	Description of problem(s); recommended action(s) required; time frame for feedback on resolution of problem(s)	Written text/table	Project QA Officer
Response to Corrective Action Report	Description of problem(s); description/date corrective action(s) implemented and/or scheduled to be implemented	Written text/table	NWCCA Project Manager
Follow up Response to Corrective Action Report	Description of problem(s); description/date corrective action(s) taken; verification corrective actions implemented, corrected problems and are routinely being followed.	Written text/table	Project QA Officer
Data Quality Audits	20% Independent review of all sample data packages including verification of correct sample collection, analysis and reporting; summary of data audit results; findings; and any recommendations	Written text and charts, graphs displaying results	Project QA Officer

Table 8: QA Reports to Management

QA Report Type	Contents	Presentation Method	Report Issued by
End of Season QA Summary Report to Management	Project summary; evaluation and summary of data completeness, precision, and bias; listing/summary of parameters exceeding permit limits, problems detected; corrective actions taken; recommendations for future monitoring operations.	Written text and charts, graphs displaying results	Project QA Officer

Data Validation and Usability

Data Review, Verification, and Validation

During the project, the Project QA Officer will review at least 20% of field notes and laboratory data packages of the twice per season samples to detect correctable problems for the remainder of the study. The first data review must be submitted by June 15 of each year in order to correct any system problems early in the season. The other data reviews must be equally spaced throughout the season. Upon receipt of these completed data packages from the NWCCA Project Manager, the Project QA Officer will review data and field notes to verify that this QAPP was followed. Items reviewed will include:

- Comparison of dated vessel specific sampling plans with the QAPP to assure that the correct samples were taken.
- Comparison of dated sampling plans with field notes and custody forms to assure that planned samples were collected.
- Review of field notes and data to assure that information specified in the QAPP has been recorded.
- Review of laboratory data packets, particularly the QA/QC laboratory sheets.

Any problems noted will be immediately brought to the attention of the Lab Project Manager who will take appropriate corrective action as necessary. The ADEC Project Manager will also be notified. This data review must be completed and submitted to the ADEC within 40 days of the sampling event. Any review made outside the date will not be accepted.

Reconciliation with Data Quality Objectives

The Project QA Officer will reconcile the data from this project with the Measurement Quality Objectives defined in this document following the validation and verification methods stated above. If an overall assessment of these elements cannot ensure that the data are of sufficient quality to meet objectives, then additional evaluation of raw data will be performed.

Bibliography

Documents referenced during the preparation of this document include:

1. April 13 *Alaska Cruise Ship Initiative Wastewater Work Group Protocol for Voluntary Wastewater Monitoring Program in 2001*.
2. *NWCCA Cruise Ship Wastewater Monitoring 2012 Quality Assurance Project Plan,* April 10, 2012.
3. *EPA Requirements for QA Project Plans (QA/R-5)*, EPA/240/B-01/003 March 2001.
4. US Code of Federal Regulations; including 33 CFR 159 and 40 CFR 136.
5. *Water Quality Standards Handbook, Second Edition*, EPA-823-B-94-005a, August 1994.
6. *Compilation of the U.S. Environmental Protection Agency's Water Quality Criteria for the Priority Toxic Pollutants*, ADEC, September 1997.
7. *Methods for Chemical Analysis of Water and Wastes*, Environmental Protection Agency, Environmental Monitoring Systems Laboratory - Cincinnati (EMSL-CI), EPA-600/4-79-020, Revised March 1983 and 1979 where applicable. http://www.epa.gov/cgi-bin/claritgw?op-Display&document=clserv:ORD:0167;&rank=4&template=epa
8. *Standard Methods for the Analysis of Water and Wastewater*, 21st Edition, APHA/AWWA/WEF.
9. *EPA Test Methods for Evaluating Solid Wastes. Physical/Chemical Methods (SW-846).* 3rd Edition Update 2B, January 1995.
10. *Manual for the Certification of Laboratories Analyzing Drinking Water,* 5th Edition EPA-815-R-05-004, January 2005.
11. *State of Alaska Department of Environmental Conservation Large Commercial Passenger Vessel Wastewater Discharge General Permit No. 2009DB0026,* State of Alaska Department of Environmental Conservation, 2010.

Appendix A - Alaska Cruise Ship Sampling Checklist for All Sampling Events

Vessel Name _____
Sampler Name_____
Date _____

I. Notification

- ☐ ADEC Project Manager notified 36 hours prior to the sampling event

II. Type of Sampling

- ☐ Twice per month (announced)
  - ☐ USCG Continuous Compliance Parameters
  - ☐ ADEC General Permit Parameters (dissolved metals and ammonia)
  - ☐ If second continuous compliance sample for month, must be at least 24 hours after first sample.
- ☐ Twice per season (unannounced)
  - ☐ If second twice per season sample, must be at least 21 days after the first sampling event.
- ☐ Other (Example Re-sampling after exceedance of discharge limitations under 18 AAC 69.070 or 33 CFR 159)

III. Sampling Notes (to include:)

- ☐ Vessel name
- ☐ Names of sampling personnel
- ☐ Names of shipboard assistants
- ☐ Signature or initials by the vessel crew in the field notes indicating that the sample port is correct
- ☐ Sample ID clearly stating where the sample was taken (VSSP specified collection point)
- ☐ Sample date and times recorded on COC
- ☐ Field measurements: pH, chlorine residual, and temp recorded on COC
- ☐ Records collected on discharge flow rates (always) and holding tank volumes (only for underway sampling)
- ☐ Sample ports within 50 feet of the point of overboard discharge
- ☐ Nature of sample recorded (composite or grab)
- ☐ Waste type recorded (blackwater, graywater, or mixed)
- ☐ If deviations from VSSP and/or QAPP noted, reported to ADEC/USCG
- ☐ If unannounced sampling, sampler verified that vessel is discharging
- ☐ Latitude/longitude and speed at time of discharge being sampled is recorded (only for underway sampling),
- ☐ Copy of the Discharge record for the sampled discharge included (unannounced only)
- ☐ Chain of custody properly completed
- ☐ Photograph of sample collection point taken during sampling event, including date, time, and sampling port ID
- ☐ Samples delivered to laboratory within holding times for analyses

Appendix B - Alaska Cruise Ship Data Review Checklist

Vessel Name _____
Date_____
Location_____
Sampling Team_____
Laboratory_____

Sample Type:
- ☐ Continued Compliance (twice per month)
- ☐ ADEC General Permit (twice per month)
- ☐ Twice per season

Final Report Package Includes:

- ☐ Analytical Report
- ☐ Ship name
- ☐ Sample ID's
- ☐ Sample date and time collected
- ☐ Parameter names and method references
- ☐ Analytical results including analytical methods used for every parameter
- ☐ Method Detection Limits (MDL's)
- ☐ Practical Quantitation Limits (PQL's/reporting limits)
- ☐ Date and time of sample preparation
- ☐ Date and time of analysis
- ☐ Verification that holding times were met
- ☐ Quality control information for lab and field test results: blank results, spiked blank of laboratory control standard recovery, matrix spike/spike duplicate recoveries, relative percent differences between duplicate spike analyses and acceptance limits
- ☐ Case narrative describing deviations from methods, procedural problems with sample analysis, explanation of data abnormalities, and any additional information that is necessary for describing the sample. This narrative should state that either all DQOs/MQOs were met, or explain why they were not. Any corrective actions taken to rectify QC problems in a timely manner will be noted. Indication that sample is a resample, if applicable
- ☐ Chain of custody form including copies of Chain of Custodies transferring samples to other laboratories
- ☐ Cooler receipt forms with temperature indicated
- ☐ Discharge logs covering time of sampling. (For recircultated samples, provide discharge logs back to the time of last discharge)
- ☐ Field notes
- ☐ Latitude and longitude information pertaining to each sample including which overboard port the waste was discharged through and the speed the vessel was traveling
- ☐ Completed sampling checklist
- ☐ Completed data review checklist
- ☐ Photograph of sampling port indicating date, time, and sample port ID
- ☐ Electronic data file containing all lab results in Excel or .xmls format

Appendix C - ADEC Approved Methods for Cruise Ship Testing

1. Standard Methods for the Examination of Water and Wastewater, 20th Edition, 1998, published jointly by the American Water Works Association, the American Public Health Association, and the Water Environment Federation.
2. Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020, Revised March 1983.
3. EPA Test Methods for Evaluating Solid Wastes. Physical/Chemical Methods (SW-846). 3rd Edition Update 2B, January 1995.
4. Methods for Determination of Inorganic Substance in Environmental Samples, EPA/600/R-93-100, August 1993.
5. Methods for the Determination of Metals in Environmental Samples, EPA/600/4-91-010, June 1991.
6. Methods for the Determination of Metals in Environmental Samples, Supplement I, EPA/600/R-94-111, May 1994.
7. Methods for the Determination of Organic Compounds in Drinking Water, EPA/600/4-88/039, December 1988.
8. Methods for the Determination of Organic Compounds in Drinking Water, Supplement I, EPA/600/4-90/020, 1990.
9. Methods for the Determination of Organic Compounds in Drinking Water, Supplement II, EPA/600/R-92/129, August 1992.
10. Methods for the Determination of Organic Compounds in Drinking Water, Supplement III, EPA/600/R-95/131, August 1995.
11. Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater Appendix A to Part 136. 40 CFR, Part 136, Revised as of July 1, 1995.
12. EPA 600 Series - Methods for the Determination of Non-conventional Pesticides in Municipal and Industrial Wastewater - Volume 1 - EPA-821-R-93-010-A, August 1993, Revision 1.

Appendix D— Distribution List

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