Quality Assurance Project Plan

for

Sampling and Analysis of Treated Sewage and Graywater from Commercial Passenger Vessels

Prepared by
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Prepared for
Cruise Lines International Association (CLIA) Alaska

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This Quality Assurance Project Plan will remain in effect until March 31, 2028, unless the U.S. Coast Guard and or Alaska Department of Environmental Conservation notify the other parties in writing 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. This QAPP document is valid for all USCG regulatory compliance sampling both within Alaska waters during the Alaska season and outside Alaska waters during the offseason.

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1. PROJECT MANAGEMENT

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1.2. Table of Contents – see pages 2 – 5.

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1.4. Project Organization

Figure 1-1 illustrates the project organization described in text below.

Cruise Lines International Association Alaska

The Cruise Lines International Association Alaska (CLIA-Alaska) represents the cruise line companies undergoing wastewater testing in Alaska. Individual CLIA-Alaska members are funding the sampling and analysis program for their own respective vessels through independent project management firms. All CLIA-Alaska 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 QAPP rests with the owner or operator as per federal regulation 33 CFR 159.317 (a) (1). Failure of vessel owners and operators (including contractors/subcontractors to vessel owners/operators) to follow the provisions of this QAPP may result in enforcement actions against the vessel owners and operators by the State of Alaska under AS 46.03.

CLIA-Alaska Project Manager

The CLIA-Alaska Project Manager (authorized contractor) 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 of the CLIA-Alaska Project Manager include:

- Submitting results within the time frame specified by law and this document.
- Communicating project information to the United States Coast Guard (USCG), ADEC, and cruise lines.
- Assuring that all project participants have the 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 & Samplers

The contract sampling team leader will coordinate and manage all unannounced and continued compliance sampling, except for random sampling by the USCG. The sampling team (in conjunction with the CLIA Project Manager) will design and keep confidential an unannounced 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 coordinated by the USCG Sector Southeast Alaska (USCG Sector SEAK). The sampling team leader will be available if random sampling takes place as the USCG directs.

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 all sampling events. Samplers will utilize the vessel specific sampling plan (VSSP) to verify samples are being collected from the designated sampling point, and to determine if discrepancies exist. If discrepancies do exist on the VSSP, the sampler will notify the Sampling Team Leader for reporting to the vessel owner/operator, ADEC, and the USCG Sector SEAK. VSSPs are referenced throughout this document. Section 1.9.2 discusses the components of these documents in more detail. 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, CLIA Project Manager, and the Project Quality Assurance Officer (if applicable) upon completion of all sampling.

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

Wastewater Analysis Laboratory

USCG accepted laboratories must be utilized for the USCG required sampling events per 33CFR159.317(a)(6). USCG Headquarters (CG- ENG-3) has implemented standards for acceptance and promulgated a list of accepted laboratories which can be found online at http://cgmix.uscg.mil/EQLabs/EqLabsSearch.aspx. Guidance for the laboratory acceptance process is available from the USCG Sector SEAK. In order to obtain USCG acceptance, a laboratory must: affirm and attest to the fact that the company (including its 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 USCG 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 USCG accepted lab cannot be used, the affected Cruise Line must verbally notify the USCG Sector SEAK for confirmation of an exception if they want to use the lab results for continuous compliance. To receive this one-time exemption, the Cruise Line must notify the USCG Sector SEAK within 72-hours after the sample is submitted to the non-USCG accepted lab. Every effort should be made to notify the USCG before submission, or the sample results may not be accepted and become invalidated. For the test results to remain valid, the lab used for the one-time exemption must apply to the USCG within 45 days following the sampling event and subsequently become a USCG Accepted Laboratory. USCG Sector SEAK can be notified 24-hours a day via the Sector Command Center at 907-463-2980. Written follow-up or email, if needed, can be submitted via email to AKSampleResults@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 (PT) 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 QA Officer and the Project QA Officer upon request.

Laboratory Quality Assurance Officer(s)

The Laboratory QAOs are responsible for QA/QC of laboratory analyses and will verify and validate all data in accordance with respective laboratory QA Manuals.

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 all audit findings and recommendations for improvement directly to ADEC, USCG, and CLIA Alaska. The QA Officer is also responsible for performing 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.).

USCG COTP

The USCG COTP will use data gathered in accordance with this plan to determine continuous compliance with 33 CFR.

ADEC Project Manager

The ADEC project manager evaluates data produced under this QAPP by permitees in Alaska waters to meet the requirements in Alaska statute and/or regulations. The ADEC Project Manager provides VSSPs to the CLIA Project Manager and Sampling Team Leader once approved by the department.

ADEC Quality Assurance Officer

The ADEC QA 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 QA Officer may review/audit data results and perform or coordinate data quality assessments (e.g., sampling, laboratory, and data audits, etc).

1.5. Problem Definition/Background

Monitoring efforts for AWTS samples from commercial passenger vessels in Alaska waters have been in place since the inception of US Title XIV – Certain Alaskan Cruise Ship Operations in the year 2000. 33 CFR 159 Subpart E was developed to implement Title XIV in late 2000/2001. The first QAPP for these monitoring efforts was implemented in the year 2000.

The Commercial Passenger Vessel Environmental Compliance (Cruise Ship) Program (CPVEC) was established by AS 46.03.460 – AS 46.03.490 in July 2001. These statutes became effective on November 15, 2002.

This QAPP is prepared and submitted to fulfill certain requirements of United States Title 33 Code of Federal Regulations 159.317, Alaska Statutes 46.03.460-46.03.490, and 18 AAC 69.025. The format of this QAPP has been updated as of Revision 15, in accordance with the EPA's August 31, 2023 QAPP Standard update(s).

The QAPP specifies the minimum requirements for sampling and analysis of treated sewage and/or graywater and other wastewaters as defined in AS 46.03.460 – AS 46.03.490, for vessels that are members of the CLIA-Alaska. This QAPP is also applicable for any 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. This QAPP will reference "samples" often. For this project, a "sample" is treated sewage and/or graywater produced by an advanced wastewater treatment system (AWTS) on commercial passenger vessels. 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 satisfy requirements for both regulatory programs.

Owner or operators must comply with the requirements in 33 CFR 159, 40 CFR 136.3, AS 46.03.460-46.03.490, the current ADEC Large Commercial Passenger Vessel Wastewater Discharge General Permit, 18 AAC 69, 18 AAC 70 and this plan.

1.6. Project/Task Description and Schedule

Sampling for "in-season" Alaska samples to satisfy the ADEC and USCG requirements will take place while vessels are sailing in Alaska waters, generally from April – October of each year. Sampling completed in the "off-season" to maintain compliance to satisfy USCG requirements will take place when vessels are outside of Alaska waters, generally from November – March.

1.6.1. Current ADEC General Permit

The current GP defines large commercial passenger vessels as vessels that accommodate 250 passengers or more. These vessels may receive authorization from the department to discharge treated sewage/graywater into Alaska waters if they have an operational AWTS capable of meeting the standards outlined in AS 46.03.462. The department may authorize the vessels under three different discharge patterns:

- Discharge without a mixing zone.
- Discharge at speeds of 6 knots or greater with a mixing zone 63 meters in length, 5 meters in width, and a depth from the surface to 1 meter below the discharge port.
- Discharge at Speeds Under 6 Knots with a Mixing Zone of either a radius of 83 meters or 15 meters (in Skagway at Broadway Dock or Ore Dock) and a depth from the surface to 1 meter relative to the discharge port.

1.6.2. Current USCG requirements

Large commercial passenger vessels may discharge treated sewage into Alaska waters less than one nautical mile from shore at a speed of less than six knots provided the conditions of 33 CFR 159.309(b) are met. 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 SEAK 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 complies 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 submitted to the USCG Sector SEAK for initial discharge and ensuing continuous discharge under 33 CFR 159.309(b)(5) must also follow the relevant sections of this QAPP.

Samples collected to satisfy 33 CFR 159.309(b) must be collected and analyzed using land-based or mobile facilities that are accepted by the USCG. Results from sampling must be submitted to the USCG Sector SEAK as a new application for continuous discharge for the next season no earlier than 120 days and no later than 30 days prior to anticipated discharge into Alaska waters. Once satisfied, the USCG Sector SEAK (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 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 of the 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 as per the guidelines in Table 1-2. The USCG Sector SEAK may witness 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 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 USCG lab is unavailable, the vessel may request use of a particular lab for consideration via USCG Sector SEAK. 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 the final determination as to the acceptance of the laboratory and will notify the vessel owner.

Results for continued compliance testing that have received final laboratory review and exceed the effluent limits in 33 CFR 159.309(b) must be immediately reported to the USCG Sector SEAK. 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 identified in the approved VSSP while the vessel is holding discharge and diverting effluent to a holding tank to demonstrate compliance with effluent limits while not discharging overboard. The USCG Sector SEAK 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 SEAK has established a requirement of a minimum of two sampling (including the conventional and priority pollutants) 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.

1.6.3. Sampling Frequency

Each participating ship will be sampled within 10 days of first discharge into Alaskan waters each calendar year (Alaska Department of Environmental Conservation, Division of Water, 2014) and subject to two unannounced treated sewage and graywater sampling and analysis for conventional and priority pollutants (twice per season samples), and two announced (twice per month samples) samples for conventional pollutants each month as determined by the USCG

Sector SEAK and ADEC GP. 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. Both twice per season samples will be tested for conventional and priority pollutants to concurrently fulfill USCG and ADEC General Permit sampling requirements.

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 1-2. Repeat sampling due to logistical or laboratory failures, duplicate samples, any other required samples will be scheduled by the Sampling Team Leader.

The USCG Sector SEAK Inspectors & ADEC CPVEC staff may board vessels at any time to perform sampling inspections as necessary to implement 33 CFR 159 and AS 46.03.

1.6.4. Additional Sample(s)

In addition to the twice per season and twice per month samples, USCG Sector SEAK 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 they determine additional samples are needed or necessary. This sampling will be scheduled at the request of the USCG Sector SEAK 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 SEAK and will be invited for participation.

1.6.5. Sample Location Information

All compliance samples must be collected from a location that is after the final stage of AWTS treatment, before being discharged overboard, and in accordance with the approved VSSP. Additionally, all “in-season” compliance samples must be collected from a point on the discharge line that is within 50 feet of the overboard discharge point.

The sample location used for “off-season” compliance and USCG random sampling may differ from the “in-season” sample port if the vessel is not discharging overboard at the time of the sampling event. This may also be true for resampling events, if a vessel is holding discharge and unable to sample from the VSSP specified “overboard discharge” point.

1.7. Quality Objectives and Criteria for Measurement Data

1.7.1. Objectives and Project Decisions

AWTS Effluent data collected under this project are used to determine compliance with current Alaska and USCG regulatory requirements (33 CFR 159, 40 CFR 133, AS 46.03.460-46.03.490, the current

ADEC Large Commercial Passenger Vessel Wastewater Discharge General Permit, 18 AAC 69, and 18 AAC 70).

1.7.2. Action Limits/Levels

Table 1-1 outlines the current regulatory compliance limits associated with each method of analysis required as a part of this monitoring project.

If the fecal coliform result exceeds the vessel's permitted limits, an owner/operator may resample and retest within 30 days of the original sampling. The monthly average for fecal coliform will be calculated by using the geometric mean of all samples taken during a calendar month. All resamples must be collected at least 24 hours apart (18 AAC 69.070). For fecal coliform results that are above the quantifiable range of the analytical test and reported as 'too numerous to count' (TNTC), an immediate resample of the effluent producing these results will be collected if possible and analyzed using higher dilutions as per the analytical method. Effluent streams that produce TNTC results will be analyzed using these higher dilutions for the remainder of the season to increase the probability of obtaining quantifiable results.

1.7.3. Measurement Performance Criteria / Acceptance Criteria

Data acquired under this monitoring project must be of known and acceptable quality. To define the acceptable data quality, Data Quality Objectives (DQOs) are identified for field measurements and analytical methods as a part of this QAPP.

Data Quality Objectives (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.

To define acceptable data quality for this project, data quality indicators are described in detail below, with method specific DQI criteria defined in Tables 2-4A – 2-4N.

Precision

Precision is the ability to replicate a 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 Tables 2-4A -2-4N, and Table 2-5. RPD is normally determined by the results of blind sample duplicates of collected samples, field duplicate 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:

$$RPD = 100*(\left| A-B \right|/((A+B)/2))$$

and is expressed as a percentage. X_1 = first (primary) sample measurement and X_2 = second (replicate) sample measurement.

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 i^{th} 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)

Bias is the closeness of a measurement to the true value 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 using known traceable laboratory standards.

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 depending upon the measurement method. Each contracted laboratory will maintain on file with the Project QA Officer and the ADEC QA Officer a current Quality Assurance Manual (including all appropriate method Standard Operating Procedures [SOPs]).

Field, laboratory, data quality audits, and 3rd party performance evaluation (PT, or PE) samples are independent (external) means to assess measurement bias for this monitoring project. Acceptable PE samples are required as a part of this monitoring project for every method they are available, for each calendar year.

Representativeness

Representativeness is a measure of how well a sample reflects the typical AWTS effluent. Sample representativeness will be established by:

1) Collecting cruise ship graywater, blackwater, and other wastewater discharge samples from only the sampling location(s) designated in the VSSP. The VSSP is designed to ensure samples are collected from representative location(s) and at appropriate times. The Alaska sampling point is located within 50 feet of the overboard discharge. A photograph will be taken of the sample point at each sampling event. The photograph will include the vessel name, sampling port ID, and date/time of sample collection. The photograph will also include identifying marks or signage at the sampling point if possible. This will verify the correct sampling point was used for sampling. Vessel operation that differs from the VSSP may result in State of Alaska and/or

USCG rejection of sample or sample data.

2) For in-season Alaska samples, the sample will be considered representative if the vessel is discharging overboard at the time the sampling event is occurring.

If a sampling event does not yield valid results for all parameters (e.g., if a fecal coliform sample is rejected due to receipt past holding time), Table 1-2 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 of the original event.

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 the EPA and/or CFR approved methods listed in Table 2-3 and Appendix B;
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 using 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. The sampler will identify which treatment unit is discharging (if applicable) and the discharge flow rate. The vessel speed and longitude/latitude will also be obtained by the sampler at the time the sample is taken. This information will be provided by ship staff. Information added to the VSSP or changes to the VSSP during the sampling event must be recorded on the VSSP, COC, and/or in the field sampling notes and must accompany the samples to the lab and be provided as part of the complete sampling data package.

Completeness

Completeness is the measure of the amount of valid data obtained compared to the planned amount. It is assessed quantitatively as a percentage of the total number of analytes collected. 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% 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 shipping-related delays resulting in missed holding times, a completeness criterion of less than 100% is to be expected. 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.)

Detectability (or Sensitivity)

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 method reporting limit (MRL, or RL). The MDLs and Reporting Limits are laboratory and/or method specific. They are not tied to compliance limits and are not regulatory action levels.

- The MDL is the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix containing the analyte. Each laboratory conducts MDL studies and determines MDL verifications for applicable methods according to the requirements outlined in 40 CFR 136 Appendix B, and individual laboratory SOPs.
    - For field measurements, the manufacturer's listed instrument detection limit (IDL) can be used.
    - MDL determination may be method defined (such as with BOD or fecal coliforms), rather than statistically derived.
- The PQL or RL is the minimum value that can be reported with confidence (usually some multiple of the MDL). For this reason, many labs do not report at the MDL but report at some level, often about 3 times greater than the MDL (varies by lab to ensure statistical confidence).
    - Frequently, PQL/RLs are adjusted for dilutions, changes to sample volume/size, and extract/digestate volumes. These PQL/RLs are considered to meet QAPP criteria so long as the action limits outlined in Table 1-1 are still met.

Sample data measured below the MDL are reported as ND or non-detect. Sample data greater than the MDL but below the PQL or RL may be reported for this project if they are flagged appropriately. Sample data measured above the PQL or RL are reported as reliable data unless otherwise qualified per the specific sample analysis. Individual analyte MDL and PQL limits are listed in Table 1-1. These limits have been set according to laboratory and method specific determinations and fall well below the action limits of this project.

See Table 1 – 1 Analytical Parameters and Target Limits
See Tables 2-4A – 2-4N. Quality Control Requirements for Analyses
See Table 2.5. Quality Control Requirements for Field Measurements

1.8. Special Training Requirements/Certification

1.8.1. Samplers and Sampling Team Leader

The sampling team(s) will be trained in sampling methods, sample handling, chain of custody, field measurements, and quality assurance procedures as outlined in 40 CFR 136. They will be familiar with the requirements of this QAPP and the VSSP for the vessel being sampled, per 18 AAC 69.090. Training is accomplished through a mixture of literature review, office laboratory training, and hands-on training in the field with another senior/qualified sampler. This training is followed by an observation period where new samplers are observed by senior sampling staff and management as they perform actual sampling in the field. Once the Sampling Team Leader determines that each sampler has reached sampling proficiency, they are approved for independent work in the field. Training documentation records are maintained for 5 years at the office of the Sampling Team Leader. Electronic training records may be kept in lieu of hard copy records but must be accessible from the Sampling Team Leader's office for 5 years.

Shipboard safety procedures are reviewed by all sampling staff at the beginning of their tenure. Safety procedures and practices are carried out on individual vessels under the supervision of accompanying ship staff.

1.8.2. Laboratories and Laboratory Personnel

Laboratories used for USCG compliance purposes must be USCG accepted laboratories under the guidelines of 33CFR 159.317(a)(6). Laboratories used for ADEC compliance purposes will have a current Alaska Department of Environmental Conservation Drinking Water certification for microbiology and 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 CLIA-Alaska 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 Appendix B and that meet a detection limit below the applicable Alaska Water Quality Standard or permitted value. Testing laboratories will be required to maintain laboratory training records for 5 years.

1.9. Documents and Records

1.9.1. QA Project Plan Distribution

The CLIA Alaska contract project manager is responsible for QAPP revisions/updates. CLIA Alaska project manager will provide drafted QAPP versions to ADEC project manager, ADEC QA officer, and Project QA Officer for review(s) and finalization. If updates are required, tracked changes will be used by all parties for full transparency. Following acceptance of revisions, signatures from all representatives are collected. Due to the physical distance between potential signatories of this document, electronic signatures will be acceptable. Once all signatures have been obtained, the final document is distributed to all parties in PDF format by the ADEC Project Manager.

CLIA Alaska QAPP
Revision Number:_____
Revision Date: _____
Page _____ of _____

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. Document updates made with each revision will be tracked in Table 1-3.

1.9.2. Field Documentation and Records

A unique reference number will be assigned to each sampling event. Field documentation will be on pre-printed forms for each event, and will include COC(s), field notes, and a sampling checklist. Due to the physical distance between ships and concurrent timing of many sampling events, it is impractical for field notes to be contained within bound logbooks. A photograph of the sampling point will also be included as a part of the field record. Field documents will be kept electronically and physically (if applicable) at the office of the Sampling Team Leader.

The unique reference number, ship name, sample location ID, date, and time of sample will be included on sample bottles, field documents, and included in the photograph of the sampling port.

The sample location ID should clearly state where the sample was taken and align with the VSSP. For example, a sample from the overboard discharge from the *M/V HYPOTHETICA* will be identified as "OB Discharge Port A," if the VSSP identifies "Port A" as the representative Alaska sampling point. All samplers will use the same sample location ID system.

Vessel Specific Sampling Plan (VSSP)

The VSSP is a critical document for reference in the field. Every vessel will submit a VSSP to the

USCG Sector SEAK and the ADEC Project Manager within 30 days of initial entry into Alaska waters (33 CFR 159.317). Vessel owners/operators must have an ADEC approved VSSP in place prior to sampling.
The VSSP includes the following information (18 AAC 69.030):

- Passenger and crew capacity of ship.
- Daily water usage estimates; daily and 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.
- 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.
- 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.
- Description of standards the owner/operator will use to determine a deviation from the plan.

Field Notes/checklist

Information that must be included on the field notes and/or field sampling checklist is outlined below:

- Vessel name
- Sample date and time
- Sampling personnel,
- Shipboard assistants,
- Latitude/longitude and speed at time of discharge being sampled,
- Field measurements: pH, free chlorine, total chlorine, and temperature,
- Discharge flow rates,
- Samples collected,
- Nature of sample: composite or grab,
- Waste type: blackwater, graywater, or mixed,
- Deviations from VSSP and/or QAPP,
- Unusual conditions and explanation of data anomalies,
- Signature or initials by vessel crew in the field notes indicating the sample port is correct,
- Copy of the vessel Discharge record for the sampled discharge

Onboard staff will witness the sampling and will sign or initial the field documents. A copy of the field sampling checklist is available in Appendix A-1 and A-2.

Chain of Custody Forms and Custody Seals

The original chain of custody form(s) 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 sampler listed on the chain of custody should have custody of the sample until the COC is relinquished by that person and received by the next party signed on the COC. Custody of the sample means either in the sampler's physical possession, within their view, or locked/secured with restricted access. If the sample is unable to maintain this (such as flying with samples as checked baggage), a custody seal will be applied to the sampling cooler for at least that duration.

A scanned PDF of the original chain of custody form(s) will be included with the final data package including the COC(s) transferring samples to other labs.

Photograph

A photograph of the sample collection point will be taken during every sampling event. The photo will include the ship name, sampling port ID, date, and time. The photograph will also include identifying marks or signage at the sampling point if possible.

Discharge Log

Cruise ship operators maintain a sewage and graywater discharge record book (or electronic log) that records the date, times, volumes, and vessel location (latitude and longitude) for each wastewater discharge (according to requirements outlined in 18AAC 69.050 and 33 CFR 159.315). These records will be provided to the sampler. The sampler will collect and submit the discharge logs and field notes to the USCG, ADEC and cruise line representative with the final data package.

Field Quality Control Sample Records

Blind Duplicate samples will be logged/tracked under their own unique reference number, and distinct number/letter ID (e.g. "Blind Duplicate 1", "Blind Duplicate 2," etc.). They will have their own set of pre-printed field documents. The field record will also include a photograph of the sampling port, with only the Sample location ID (Blind Duplicate X), "OB Discharge," and sample date included.

1.9.3. Laboratory Documentation and Records

The analytical laboratory will keep a sample receiving log and all completed COC forms submitted with

the samples collected for this project. The analytical laboratory will also keep records of all analyses performed, as well as associated QC information, including laboratory blanks, matrix spikes, laboratory control samples, and laboratory duplicates. Hard copies of the data sheets, instrument calibration, and maintenance records will be maintained for five years by the laboratory.

1.9.4. Final Reports/Data Packages

Following completion of laboratory analyses, data are reviewed according to laboratory SOPs and the QA Manual by designated laboratory personnel. Once all data reviews have been completed, a laboratory report containing all the analytical data will be issued in an electronic format (PDF and Level III electronic data deliverable [EDD]). Laboratory reports and field sampling documents are compiled into final data packages by the CLIA Project Manager or their designee. The CLIA Project Manager certifies that the data meets the QAPP defined acceptance criteria for reporting. Any problems with data will be addressed, as well as what specific corrective actions were taken to remedy the problem(s) in a timely manner and avoid future reoccurrence.

Final data packages must clearly state whether the sampling was conducted:

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

Components of the final data package include:

- A short summary sheet discussing the sampling event and results.
- Sample information: ship name, sample names, waste type, date and time collected.
- Parameter name and method reference.
- Analytical result.
- Method Detection Limit and Practical Quantitation Limit (reporting limit).
- Date and time of sample preparation and date and time of analysis.
- Quality control information: blank results, spiked blank or laboratory control standard recovery, matrix spike/spike duplicate recoveries, relative percent differences between duplicate spike analyses.
- Chain of custody.
- Information documenting whether holding times were met.
- Case Narrative of deviations from methods, procedural problems with sample analysis, holding time exceedances, and any additional information that is necessary for describing the sample. This narrative should explain when results are outside the precision and accuracy required and the corrective actions taken to rectify these QC problems (if applicable).
- Field notes and records on discharge flow rates.
- Discharge log (photocopy or photo) provided by ship staff containing the discharge entry associated with the sampling event.

- Cooler receipt forms, including information on each lab receiving samples.
- Photograph of sampling port taken during sampling event.
- Latitude and longitude information pertaining to each sample including which overboard port the waste was discharged through and the speed the vessel was traveling.
- Explanation of data abnormalities.
- A completed checklist containing all components of sampling (Appendix A-1).
- A completed checklist containing all components of analysis and reporting (Appendix C).
- Electronic data file containing all Level III laboratory results in Excel format.

(FOR ADEC ONLY) If applicable, a notification that this sample is a resample under 18 AAC 69.070

Components of the Level III Electronic Data Deliverable include:

- Laboratory name
- Project ID
- Ship name
- Sample location ID
- Laboratory sample ID
- Matrix
- Sample date
- Analysis preparation date
- Analysis date
- Analytical batch ID
- Analytical method code
- Analytical method name
- Analyte name
- Analyte CAS #
- Surrogate presence
- Analytical result
- Detection limit (MDL)
- Reporting limit (PQL)
- Units
- Dilution factor
- Matrix spike level
- Percent recovery
- Control limits
- Analyst ID

Each individual analysis, as well as associated quality control analyses, will be represented by one row of the Excel spreadsheet, with information for the above bulleted items represented in individual columns.

All data packages will be submitted electronically by the CLIA Project Manager or their

designee to the respective cruise line, Project QA Officer, ADEC at dec.wq.cruise@alaska.gov, and to the USCG at AKSampleResults@uscg.mil. The owner/operator (Permittee) is responsible for meeting submittal deadlines.

Final data packages will also be submitted to the ADEC Electronic Data Management System (EDMS). EDMS is the primary submission portal for vessel owner/operators to comply with terms of the ADEC general permit (https://dec.alaska.gov/water/edms).

1.9.4.1. Final Reporting Deadlines

Complete data packages will be delivered to ADEC within 21 days of completion of laboratory analyses. Complete data packages 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 receiving analytical data that has passed final laboratory QA review. If data are/will be delayed due to circumstances outside of the laboratory's control, the CLIA Project Manager will notify the regulatory agencies and Project QA Officer (e.g., unexpected/unplanned instrument maintenance).

1.9.5. Technical Reviews and Evaluations

1.9.5.1. Field Sampling Audit Reports

The Project QA Officer will observe two sampling events to ensure adherence to this QAPP. The Project QA Officer will issue a draft field audit to sampling personnel and CLIA-Alaska Project Manager within one week of audit. The final audit report will be issued electronically in PDF format to the CLIA-Alaska Project Manager, ADEC Project Manager, Sampling Team Leader, and USCG within 2 weeks of the audit date.

If findings of the field sampling audit require response and/or corrective actions, the CLIA Project Manager will provide a response and/or corrective action documentation to all parties above.

1.9.5.2. Data Quality Audit Reports

The Project QA Officer will evaluate (a rate of 20% of total number of twice per season sampling events) final data packages for adherence to this QAPP. The first data review must be submitted electronically in PDF form by June 15 of each year to correct any system problems early in the season. The other data reviews must be equally spaced throughout the season. All data reviews must be completed and submitted within 40 days of the sampling event to the CLIA-Alaska Project Manager, ADEC Project Manager, and USCG.

Findings and recommendations from these reports will be brought to the attention of the Lab Project Manager(s) and Sampling Teams (as applicable) who will take appropriate corrective action(s). If the findings necessitate a revision of the final data package, the revised reports/documents will be clearly

labelled as revised and include the revision date in red. A brief description of the reason for the revision should be included on the first page or described in the accompanying email distribution.

1.9.5.3. Annual Reports

1.9.5.3.1. Technical Systems Laboratory Audit Report

The Project QA Officer will evaluate technical documentation provided by the testing laboratories against the objectives outlined in this QAPP. They will review current QA Manuals, relevant SOPs, 3rd party PE/PT results, and most recent (pertinent) external audit reports. A written summary of this review will be sent as a draft to the CLIA-Alaska Project Manager and ADEC Project Manager within 1-2 weeks of the completion of the audit (depending upon depth and extent of audit). The final technical systems audit will be reported to the CLIA-Alaska Project Manager, ADEC Project Manager, and USCG within 2 – 4 weeks of the completion of the audit (depending upon depth and extent of audit).

If findings of the technical systems audit require response and/or corrective actions, the CLIA Project Manager will provide a response and/or corrective action documentation to all parties above.

1.9.5.3.2. End of Season Report

By November 30th each calendar year, the Project QA Officer will issue an End of Season Report to the CLIA-Alaska Project Manager, USCG, ADEC Project Manager, and ADEC QA Officer. This report will provide a project completeness percentage, as calculated by the equation outlined in section 1.7.3. It will also summarize findings, problems and resolutions, data reliability, and general adherence to the objectives of this QAPP from the monitoring season. The report will include recommendations for future monitoring (if applicable).

2. DATA GENERATION AND ACQUISITION

2.1. Sampling Design (Experimental Design)

Field sampling will take place onboard each vessel that is authorized to (and actively does) discharge AWTS effluent into Alaska waters under the ADEC General Permit and USCG authorizations. The sampling event dates and timings for each vessel are predetermined at the beginning of the season based on vessel itineraries and ability to meet the QA/QC objectives outlined in this plan. Twice per season sampling events are unannounced to the vessels, therefore two different types of sampling schedules are created each season.

1) A master schedule outlining all unannounced twice per season, announced twice per month, and blind duplicate events to be distributed to the USCG, ADEC, and project QA Officer, and

2) schedules with “decoy events” outlined in lieu of the unannounced twice per season events + twice per month announced events, which are distributed to vessel owners/operators.

The first sampling event of the season/calendar year will take place within ten days of the first discharge

into marine waters of the state. For vessels authorized to discharge at speeds <6 knots, twice per month sampling events will take place at least 24 hours apart, and twice per season sampling events must be at least 21 days apart. For vessels authorized to discharge at speeds >6 knots, twice per season sampling events must be at least 21 days apart.

Twice per month and twice per season Alaska sampling events will take place within the geographic coverage of the ADEC General Permit (see Figures 2-1 and 2-2). The specific sampling location(s) onboard are unique to each vessel and are outlined in the current VSSP. The sampling team have access to the VSSP as provided at the beginning of the season by ADEC. Ship staff will also have a copy of their approved VSSP available onboard the vessel. The VSSP is in place to ensure samples are collected from appropriate and representative discharge locations. If deviations from the VSSP occur, they will be noted in the field documents and notification will be given to ADEC and USCG Sector SEAK 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 (if known). The explanation must also clarify if the deviation will become the routine procedure or just a one-time deviation based upon circumstances.

Table 2-1 outlines sampling location ID and rationale.

2.2. Sampling Methods

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

2.2.1. Wastewater Sampling

Each sample collected will reflect a representative discharge of treated blackwater, graywater and other wastewaters into applicable waters of Alaska from a functional marine sanitation device, other AWTS, holding tank, or some combination as specified in the VSSP. In port (<6 knot) sampling, in compliance with ADEC general permit requirements, will be conducted only if the vessel is certified to discharge in port. If samples must be collected while the ship is underway (for vessels authorized to discharge only at >6 knots), care will be taken to ensure sample representativeness and homogeneity. See VSSP for further details on sampling.

Project auditors and/or witnesses from regulatory agencies may accompany the samplers during sampling events.

Prior to sampling, vessel crew may elect to sterilize the port with alcohol or heat. The sterilization method will be noted on the sampling field notes. If no notation is made it is assumed that no sterilization occurred immediately prior to sampling.

[Optional sterilization guidance] The effluent discharge port may be sterilized with a minimum 70% alcohol (isopropyl, methanol, or denatured ethanol) solution. 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 only be used once for port sterilization (i.e., alcohol 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.

Prior to sample collection, the discharge port will be allowed to flush at least ten times the volume of the sample discharge line to clear the line of standing water and possible contamination. Specific flushing requirements/volumes are outlined in VSSPs.

Samplers will ensure that proper sampling techniques are followed, adequate notes are taken during the sampling event, and sample custody is maintained. Samplers will wear disposable gloves, protective clothing and safety eyewear and will observe precautions while collecting samples, remaining aware of the potential biohazard presence.

All samples will be collected as grab samples and will be listed as such on the field documentation. Duplicate samples are also considered grab samples (not composite). A grab sample is intended to represent the conditions that exist at the moment the sample is collected; therefore, the sampling time should not exceed 30 minutes.

Bottles will be lab certified clean and will not require rinsing with sample. When sample bottles are pre-preserved, the sample should not overflow the container (to ensure no preservatives are lost). 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. Analyses can be consolidated into containers of matching sample preservation if adequate sample volume is collected for all tests (see Table 2-3). Samplers will take care not to touch the insides of bottles or lids/caps during sampling, nor will the mouth(s) of the bottles contact the sampling port. Bottles will be filled to the shoulder or neck of the bottle, leaving a small space for expansion and mixing (except for VOC vials, detailed below).

An unpreserved glass decanting bottle will be used for VOC collection. The decant bottle will be filled completely from the sampling point. If chlorine residual is detected above 0.1 mg/L during field measurements, ascorbic acid will be added to the VOC decant bottle. If chlorine is detected <0.1mg/L, this de-chlorination step is omitted. From the decant bottle, VOC vials will be carefully filled to achieve a convex meniscus at the top of the vial. When the VOC cap is screwed on a small volume of water will be displaced and no air will be present in the bottle (zero headspace). To check headspace, invert sealed vial. A bubble may be considered acceptable if it is 5mm or less in diameter.

If chlorine residual is detected above 0.1 mg/L during field measurements, ascorbic acid will also be added to the BNA sample bottle.

AWTS Effluent samples may be 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 microbiology sample bottle(s) will be filled with

sample then placed into an individual zip close style baggie, which will then be cooled immediately in a designated ice-water bath. This ice-water bath is then placed into a larger cooler containing frozen blue ice or ice and water mixture to maintain a sample temperature of 0 - 10° C.

Sample fractions for all other temperature sensitive analytes (see Table 2-3) will likewise be cooled immediately by being placed into a cooler containing an ice/water mixture (or frozen blue ice) 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. To best maintain the sample's temperature, ship ice will be used at the time of collection and exchanged for blue ice just before shipment of samples to the lab. Wet or blue ice may be exchanged as frequently as necessary during the sampling event to ensure adequate cooling is taking place. In no event will samples be placed in refrigerators meant for human food or beverages.

Sample fractions for dissolved metals will be filtered within 15 minutes of sample collection, outside of the engine space, and before adding preservatives (per EPA guidelines in 40 CFR 136).

Twice per month sampling events will be collected for conventional pollutants, which requires collection of 5 – 7 bottles depending on the type of event (<6 knots or >6 knots). Twice per season sampling events will be collected for conventional and priority pollutants, which requires collection of 21 - 23 bottles.

Table 2-2 outlines the additional QC samples that are collected and
Table 2-3 outlines analytical methods, containers, preservation, and holding time requirements for all analytes to be monitored as a part of this project.

2.2.2. Field Measurements

Field measurements for temperature, pH, free and total chlorine will be performed immediately in the field. Field instruments will be calibrated according to manufacturer's guidelines and per the frequency outlined in Table 2-5.

The practical quantitation limit for chlorine testing using field equipment is 0.1 mg/L. Field colorimeters 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.

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.

2.3. Sample Handling and Custody

2.3.1. Sample Custody

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

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); 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).

2.3.2. 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 period on an individual basis as directed by the USCG and ADEC prior to the six-month date, except for samples that have a biological component.

2.4. Analytical Methods

Analytical methods and field measurement methods used are listed in Table 2-3.

2.4.1. Field Measurements Methods

As described in section 2.2.2, temperature, pH, and chlorine will be measured in the field. Table 2-3 outlines method references.

2.4.2. Laboratory Analyses Methods

Water quality analytical methods that will be used throughout this project are listed in Table 2-3. Changes to analytical methods require ADEC approval prior to implementation. All methods used for this project must be contained in Appendix B. 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 a current electronic copy of their approved Quality Assurance Manual (and respective measurement method SOPs) to the ADEC

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. Laboratory and field (if applicable) QA/QC results and the acceptance limits used to verify and validate respective sample data will be included with each data report.

2.5. Quality Control Requirements

This section outlines the QC checks that are in place for the sample collection, field measurements, and laboratory analysis activities that will be used to assess the quality of the data generated from this project.

See Tables 2-4A – 2-4N. Quality Control Requirements for Analyses
See Table 2-5. Quality Control Requirements for Field Measurements

2.5.1. Field Sampling Quality Control

Field QC samples are intended to support the following data quality goals:

1) Sample shipment temperature – assessed using temperature blanks and
2) Combined sampling and analysis technique variability, as well as sample heterogeneity – assessed using blind duplicates.

Table 2-2 outlines the field QC samples and frequency they are collected.

2.5.1.1. Temperature Blanks

Temperature Blank (Large, bottle provided by laboratory) - The sampler will fill a 1-liter HDPE bottle (volume of large temperature blank should align with the largest volume sample container that has a temperature cooling requirement) with the effluent sample to serve as a representative “large” temperature blank. The temperature of this blank will be measured and recorded on the field notes and COC at the time of sampling. The temperature blank will then be placed into the cooler (with wet or blue ice, as described in section 2.2.1) at the same time as the first sample and will accompany the samples until laboratory receipt. The temperature will be measured again upon laboratory receipt and recorded on the COC and cooler receipt documentation.

Temperature Blank (Small, bottle provided by laboratory) – The sampler will fill a 120 ml HDPE bottle with the effluent sample to serve as a representative microbiology (fecal coliform) “small” temperature blank. The temperature of this blank will be measured and recorded on the field notes and COC at the time of sampling. The small temperature blank will be placed in the ice-water bath designated for microbiology fractions, at the same time as the coliform sample bottle(s). This ice-water bath is then placed into a larger cooler containing frozen blue ice or ice and water mixture to maintain a sample temperature of 0 - 10° C, as described in section 2.2.1. The small temperature blank accompanies the microbiology fraction(s) within the larger cooler and will be measured again upon laboratory receipt.

Receipt temperature will be recorded on the COC and cooler receipt documentation.

All samples will be delivered to the laboratory as soon as possible after sampling. In some situations, this may not allow enough time for sample fractions to cool to temperatures within specified limits before samples are received at the laboratory. Samples received with temperatures above the temperature preservation limits outlined in Table 2-3 will be considered acceptable if the samples were delivered to the laboratory on ice and within two hours of sample collection. Samples received with any indication of ice formation are unacceptable and all samples received in this condition will be addressed according to Tables 2-4A – 2-N. The laboratory's sample receiving thermometer must be readable to 0.01° C and accurate to 0.1° C to ensure that rounding down to 6°C may not be used to meet the ≤ to 6°C requirement (40 CFR 136.3, footnote 18).

2.5.1.2. Blind Duplicate Samples

The purpose of the blind duplicate samples is to assess sampling and laboratory precision. Precision between the parent sample and its duplicate 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 duplicate 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 parent sample location ID of the samples to the laboratory staff. The samples will be analyzed by the same lab and for the same parameters.

Blind duplicate samples will be collected at a minimum rate of 10% of the total number of samples collected for the project. Of these duplicates, 10% of the total number of twice per season samples collected for the project must be included as part of the total number of duplicates. Selection of sampling events to be duplicated will be randomly assigned to assess precision for all types of wastewater matrices monitored within the program.

Blind duplicate sample collection protocols have been established to limit temporal variance in sample results (due to variable AWTS pump cycle timing and treatment unit inputs). A large intermediary container is filled directly from the sampling point and dispensed into sample bottle pairs. The intermediary containers (cubitainers with capacity between 5 – 10L) must be certified clean for laboratory use and must not contain any preservatives. Following sampling point preparations, the sampler will fill the intermediary container, shake to mix, then pour out into individual paired sample bottles. The first sample measured/dispensed is designated as the parent sample and the second (paired) sample is the duplicate sample. The parent sample is the official laboratory result. The "duplicate" sample result is only used to assess/report overall project precision.

The intermediary vessel is not certified sterile and is a plastic material. Therefore, sample bottles for the analytes outlined below will be filled directly from the sampling point/tap.

- VOC's/VOC Decant bottle (to limit volatilization of analytes and avoid adhesion of organics to plastic material)
- BNAs (to avoid adhesion of organics to plastic material)
    - Additional volume of sample is required for matrix spike determination during the BNA analysis (see Table 2-2). An additional 2L of sample will be collected for BNA analysis from all priority pollutant duplicate sampling events.
- Oil and Grease (to avoid adhesion of organics to plastic material)
- TOCs (to avoid adhesion of organics to plastic material)
- Fecal coliforms (to maintain sterility)

Duplicate measurements must include both field measurements (e.g., total chlorine residual, temperature, pH) as well as samples collected for subsequent laboratory analysis. This is to ensure overall sample representativeness when evaluating precision results.

2.5.2. Field Measurement/Analysis Quality Control

See Table 2-5 for field measurement QC objectives and criteria.

2.5.3. Laboratory Analysis Quality Control

Laboratory QC is the responsibility of the laboratory personnel and QA/QC management of the analytical laboratories. Laboratory QAPPs and SOPs detail QA/QC procedures in depth, and a brief description of QA/QC elements are outlined below. These elements include:

- Holding times
- Method Blanks
- Laboratory Control Samples/Standards
- Instrument calibration (initial, calibration blanks, and/or calibration verification)
- Matrix Spikes
- Analysis of duplicates

Tables 2-4A – 2-4N Include specific acceptance criteria for each analytical method.

2.5.3.1. Sample Holding Times

Sample holding times for all field and analytical methods are outlined in Table 2-3. Due to the prohibitively short holding times for acrolein and acrylonitrile, analysis may commence out of holding time for these compounds, so long as the final report annotates this data flag. Every effort will be made to avoid this issue when shipping schedules allow.

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 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.

All other sample analysis commencing outside of method required holding time(s) will require a resampling effort according to Table 1-2.

2.5.3.2. Method Blanks

A method blank is a sample that is intended to contain none of the analytes of interest and is subjected to the usual analytical or measurement process to establish a zero baseline or background value. They are typically analyzed at a rate of one per sample batch/up to 20 samples. Method blanks are not required for the laboratory analyses of settleable solids or specific conductance.

2.5.3.3. Laboratory Control Samples (LCS)

An LCS is a sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of the analytes. An LCS is used to monitor the day-to-day performance (accuracy) of routine analytical methods. Results are expressed as percent recovery of the known amount of the spiked analytical parameter. An LCS duplicate may also be required by a laboratory method. When that is the case, precision (RPD) is calculated between the LCS and LCS duplicate.

2.5.3.4. Matrix Spike (MS) and Matrix Spike Duplicate (MSD)

MS and MSD are two aliquots of the same environmental sample to which known quantities of the target analytes are added in the laboratory. The MS and MSD are analyzed exactly like a sample, and their purpose is to determine whether the sample matrix contributes bias to the analytical results, and to indicate precision associated with laboratory procedures. The background concentrations of the analytes in the sample matrix must be determined in a separate aliquot and used to determine the expected result of the MS pair. Results are expressed as percent recovery.

2.5.3.5. Laboratory Duplicates

A laboratory duplicate is a laboratory-generated split sample used to document the precision of the analytical method. Results are expressed as relative percent difference between the laboratory duplicate pair.

2.6. Instrument/Equipment Testing, Inspection, and Maintenance

2.6.1. Field Measurement Instruments/Equipment

Field measurement instruments are maintained by the sampling team, under the oversight of the Sampling Team Leader.

Chlorine analysis (colorimeter, clear sample cells): The sample cells must be kept clean and free of fingerprints, oils, and scratches. An extra sample cell will be kept with the test kit in case of breakage or scratches to the sample vial. The light path in the colorimeter's measurement chamber must also be kept clean and free of fingerprints, oils, and scratches. Batteries will be replaced as needed.

pH and temperature: Equipment maintenance for temperature and pH includes regular probe rinsing, proper storage, and battery replacement as needed.

The sampling team maintains spare equipment at the laboratory. This way, in case of unexpected instrument failure, future sampling events will not be delayed or affected.

2.6.2. Laboratory Analysis Instruments/Equipment (Off-Site)

Laboratory equipment maintenance is the responsibility of the analyzing laboratory and is described in laboratory specific QA Manuals and/or method SOPs.

2.7. Instrument/Equipment Calibration and Frequency

2.7.1. Field Measurement Instruments/Equipment

Field instruments include a hand-held pH meter, chlorine residual colorimeter instrument, and a probe thermometer. Each instrument is calibrated according to Table 2-6, laboratory QA Manual, and/or SOP guidelines.

Date of the most recent calibration for all instruments will be documented on the field sampling notes. Individual calibration logs will be kept for all colorimeters and pH probes. The current calibration log will accompany the field sampling kit. The current calibration date and correction factor for thermometers will be maintained directly on the thermometers and recorded with the laboratory's thermometer calibration logs at the laboratory.

See Table 2-6. Field Equipment/Instrument Calibration, Maintenance, Testing, and Inspection

2.7.2. Laboratory Analysis Instruments/Equipment (Off-Site)

Laboratory equipment/instrument calibration(s) are the responsibility of analyzing laboratories and are described in laboratory specific QA Manuals and/or method SOPs.

2.8. Inspection/Acceptance Requirements for Supplies and Consumables

2.8.1. Field Sampling Supplies and Consumables

Sample bottles will be certified clean and will not require rinsing with sample. Sample transfer containers (for blind duplicate sampling) will be lab certified clean, will be single use, and contain no

preservatives. Temperature blank containers are the only bottles that need not be single use, since temperature is the only parameter measured from them.

All sample containers, tubing, filters, etc. provided by a laboratory or by commercial vendor, will be certified clean for the analytes of interest. The Sampling Team Leader or their designee 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 analytes of interest. Except for the sample pump, all parts of the dissolved metals filtration apparatus will be certified clean single use. Sample pumps will not contact the filtered sample.

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. If replacement bottles are not equivalent to the original bottles, discrepancies will be recorded on the COC form and field notes.

No calibration standard solutions, buffers, or other chemical additives will be used beyond expiration dates. It is the responsibility of the sampling manager or their 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.

2.8.2. Laboratory Analyses (Off-Site) Supplies and Consumables

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

2.9. Data Acquisition Requirements (Non-Direct Measurements)

Data will be acquired by the sampling team directly from the vessel for:

- Vessel location (latitude and longitude) and speed at the time of sampling. This information is used to confirm that operations align with the vessel's ADEC discharge authorization.
- Discharge sample type (graywater, blackwater/mixed).
- Discharge flow rate.

The data will be recorded on field sampling documents as reported by shipboard staff, in the vessel's Discharge Log, and/or through direct observation by the sampling team.

2.10. Data Management

The success of a monitoring project relies on data and their interpretation. It is critical that data be:

- 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.

Data management encompasses and traces the path of the data from generation to 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 office within ADEC Division of Water. It also includes/discusses the control mechanism for detecting and correcting errors.

The flow of data collected under this project is outlined below:

- The field samplers are responsible for recording field measurements and associated calibration information. They are responsible for accurately recording details from the sampling event on all field sampling documents as described in this QAPP. Field sampling documents are reviewed by the receiving party (a qualified sampler) at the time of sample submission.
- Sampling documents are scanned and saved in electronic form. Original copies of sampling documents are maintained at the office of the Sampling Team Leader for five years.
- Laboratories are responsible for receiving samples from the sampler(s), logging the samples for the correct analyses and carrying out testing in accordance with this QAPP, their laboratory QA Manual, and method specific SOPs. Raw data is reviewed, validated, and recorded according to laboratory QA requirements.
    - Validated laboratory results are reported electronically in PDF and Excel format to the Sampling Team Leader and the CLIA-Alaska Project Manager.
- 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.
- Secondary reviewers (as designated by the Sample Team Leader or Project Manager) are responsible for QC and verification and validation of field and laboratory data and data reformatting as required for the intended ADEC data storage database.
- The CLIA-Alaska Project Manager is responsible for final data certification.
- The CLIA-Alaska Project Manager (or their designee) will report final data packages in PDF and Excel formats directly to the USCG, the ADEC Project Manager, the Project QA Officer, and the vessel owner/operator after thorough review, and within the regulatory time frames.
- The Project QA officer is responsible for performing routine independent reviews of data to ensure that the data quality objectives of this QAPP are being met. Findings and recommended corrective actions (as appropriate) are reported directly to project management.

See Figure 2-3.

3. ASSESSMENT AND OVERSIGHT

3.1. Assessments/Oversight and Response Actions

Assessments are independent (of management) evaluations of the monitoring project that are performed by the Project QA Officer or their designee. The Project QA Officer is responsible for: on-site field assessments, review of laboratory audits, review of performance evaluation samples, review of blind sample duplicates (precision samples), conducting data reviews, and producing an end of cruise ship season data quality assessments (Table 3-1).

3.1.1. Field Oversight

The Project QA Officer will perform a field sampling audit on a minimum of two randomly selected sampling events every calendar year of this project to evaluate the performance of the sampling team. The Project QA Officer must notify ADEC and the USCG 36 hours prior to the audit 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 the VSSP and this 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 CLIA-Alaska 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 CLIA-Alaska PM, USCG, 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 CLIA-Alaska Project Manager will be advised in a timely manner of the results of each USCG or ADEC onboard field assessment.

3.1.2. Laboratory Assessments

The Project QA officer requests and reviews the analyzing laboratory's SOPs, QA manual(s), recent (pertinent) laboratory audit reports, and performance evaluation (PE) results for respective analytes at the beginning of the season. This is a part of the technical systems audit, which takes place within the first 30 days of project initiation each calendar year so that any recommendations from the Project QA Officer can be implemented or corrected early in the season.

If review of the laboratory's QA manual, SOPs, PE results, and recent audits show acceptable performance and evaluation of respective analytes the technical audit is considered complete, and no further actions will be taken.

If major deficiencies are identified in the Project QA Officer's review of the documents described above, the Project QA Officer may request an on-site technical audit of the testing laboratory. The Project QA Officer will communicate this to the CLIA Project Manager. The CLIA Project Manager will work with the testing laboratory's management and laboratory QA Officer to arrange an on-site audit. The ADEC Project Manager and ADEC QA Officer will be notified and invited to participate in the audit.

In conjunction with the previously described field sampling audits (section 3.1.1), the Project QA Officer will witness a laboratory log-in of the collected samples to evaluate if sample handling, preservation, and storage requirements are being met as outlined in Table 2-3.

The CLIA Project Manager or their designee will review all final laboratory reports for completeness and to verify QAPP specified methods and QA/QC objectives were met. The data will then be incorporated into a final data package. If deficiencies are noted, the CLIA Project Manager will request clarification from the laboratory manager or laboratory QA officer. The resolution of these requests may involve raw data review, analyte re-analysis, and/or report revision(s).

3.2. Reports to Management

The Project QA Officer will issue audit reports in accordance with the following guidelines (see Table 3-1), and as described in section 1.9.5.

- All reports will contain page numbers (i.e., page x of x). If tables are split, repeat table headers at the top of the following page. Include the laboratory report unique ID# that is the subject of the audit in the submission of the audit (if applicable).
- Field sampling audits--Verbal on-site debriefing of audit findings to sampling personnel. Draft field audit report issued to sampling personnel and CLIA-Alaska Project Manager within one week of audit. Final audit report to CLIA-Alaska Project Manager, ADEC Project Manager, Sampling Team Leader, and USCG within 2 weeks of end of the audit date.
- Technical laboratory audit—Verbal on-site debriefing of audit findings to laboratory personnel, and Laboratory Project Manager. Draft technical systems audit report to CLIA-Alaska 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 CLIA-Alaska Project Manager and ADEC Project Manager within 2 – 4 weeks of end of audit (depending upon depth and extent of audit).
- Data Quality Audits - The first data review must be submitted electronically in PDF form by June 15th of each year to correct any system problems early in the season. The other data reviews must be equally spaced throughout the season. All data reviews must be completed and submitted within 40 days of the sampling event to the CLIA-Alaska Project Manager, ADEC Project Manager, and USCG.
- Blind Sample Duplicate Assessment – Evaluate blind duplicate data in two sets. First, mid-way through the season, and second, at the end of the season. Draft reports will be provided to the

CLIA-Alaska Project Manager and ADEC Project Manager. Final reports will be issued to the CLIA-Alaska Project Manager, ADEC Project Manager, and USCG within one month of the Project QA Officer's receipt of the results included in each set of assessments.

- By November 30th each calendar year, the Project QA Officer will issue an End of Season Report to the CLIA-Alaska Project Manager, USCG, ADEC Project Manager, and ADEC QA Officer. This report will summarize findings, problems and resolutions, data reliability, and general adherence to the objectives of this QAPP from the monitoring season. The report will include recommendations for future monitoring (if applicable).

All QA assessments will also be submitted into the ADECs EDMS portal if/when this becomes an option.

3.2.1. Corrective Action(s)

The CLIA-Alaska Project Manager, in conjunction with the Sampling Team Leader and Laboratory Manager(s) will evaluate and respond to deficiencies noted by the Project QA Officer in the reports outlined above. Problems will be addressed and corrective actions taken if necessary. These actions include final data package revisions, emailed explanations or clarifications of procedures, and/or formal corrective action reports. This documentation will be sent by the Project Manager or their designee, to the Project QA Officer, ADEC Project Manager, and the USCG. The Project QA Officer will conduct a follow-up assessment (if required, depending on the original finding) to ensure recommended corrective actions are routinely being followed.

4. DATA REVIEW AND USABILITY

4.1. Data Review, Verification, and Validation Requirements

Field sampling data – Data collected in the field is compared to the QA/QC requirements outlined in Tables 2-5 and 2-6. Field data are acceptable if all QA/QC protocols have been followed. Any deficiency in those protocols will be reported by the sampler to the Sampling Team Leader, and corrective actions will be followed as prescribed.

Laboratory data – Data generated by the laboratory are subject to each laboratory's own QA reviews and verifications as prescribed in the laboratory QA manual and method specific SOPs. Data will also meet the criteria outlined in Tables 2-4A – 2-4N.

Final Report Package – Assembly of the field sampling and laboratory data is completed by the CLIA Project Manager or their designee and utilizes the "Alaska Cruise Ship Data Review Checklist" to ensure all components of the report package are accounted for (see Appendix C).

4.2. Verification and Validation Methods

The Project QA Officer will verify and validate data collected for the project by using the evaluation procedures described below.

4.2.1. Field sampling audits (two per season)

- Samplers follow data acquisition requirements outlined in section 2.
- Personnel training records are available for review.
- Field measurement QA/QC protocols are followed according to Tables 2-2, 2-3, 2-5, and 2-6.
- Evaluation of post sampling activities (laboratory log-in, sample handling, preservation, and storage procedures).

4.2.2. Technical Systems Laboratory Audit (one annually).

The Project QA Officer will request the following documentation from the analyzing laboratories at the beginning of each season.

- Current QA Manual
- Relevant SOPs
- Most recent pertinent audit reports
- 3rd party PE/PT results

The Project QA Officer will evaluate the documentation provided to ensure the DQI criteria outlined in Tables 1-1 and 2-4A – 2-4N are met. If the Project QA Officer determines deficiencies, they may require an on-site technical audit. Refer to section 3.1.2.

4.2.3. Data Quality Audits of Final Data Packages

Final Data Package audits are performed at a rate of 20% of total number of twice per season sampling events.

- Field sampling documentation is compared to the requirements of this QAPP and VSSP to ensure:
  - Correct sample(s) was/were taken
  - all QC requirements outlined in Tables 2-5 and 2-6 were met and
  - all required data was recorded.
- Laboratory data are reviewed to ensure consistency with the QAPP QA requirements outlined in Tables 2-4A – 2-4N.
- Final data package is reviewed for completeness according to the guidelines in 1.9.4.

Any problems noted will be immediately brought to the attention of the Lab Project Manager and Sampling Team Leader who will take appropriate corrective action(s) as necessary.

4.2.4. Blind Sample Duplicate assessments

All Blind Sample Duplicate reports are evaluated to determine if the field duplicate QC criteria outlined in Tables 2-4A – 2-4N and Table 2-5 have been met. Criteria that have not been met will be identified. Persistent issues will be discussed among project management at the end of the season to determine if adjustments to sampling or analysis protocols are required for the next season.

4.3. Reconciliation with User Requirements

The Project QA Officer will reconcile the data from this project with the DQOs and DQIs defined in this document following the validation and verification methods stated above. An end of season report is produced by the Project QA Officer to summarize all evaluations from the monitoring season. This report is reviewed by the CLIA and regulatory project managers. If the overall assessment of these elements cannot ensure that the data are of sufficient quality to meet objectives, then additional evaluation of raw data and project protocols will be performed.

5. REFERENCES

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FIGURES:

Figure 1-1. Program Organizational and Data Flow Chart

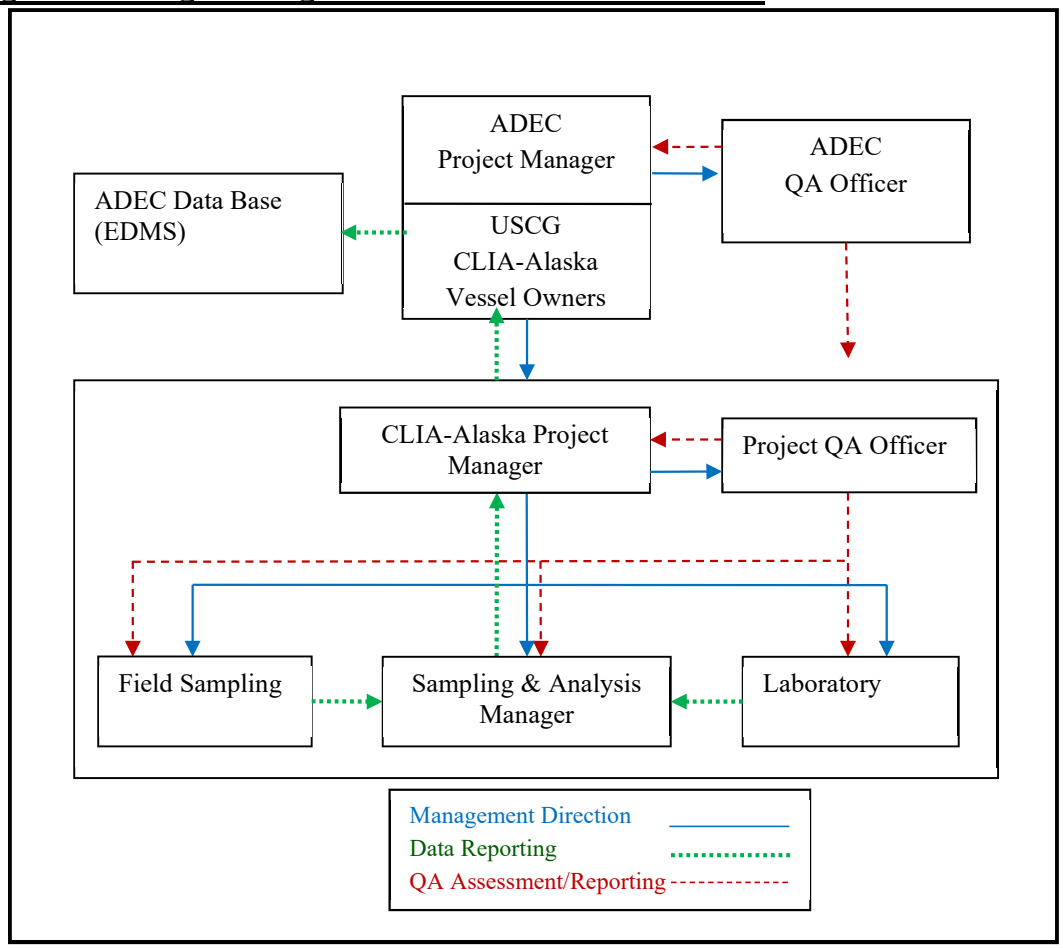


Figure 2-1. Geographic coverage of ADEC GP, SE Alaska Boundaries

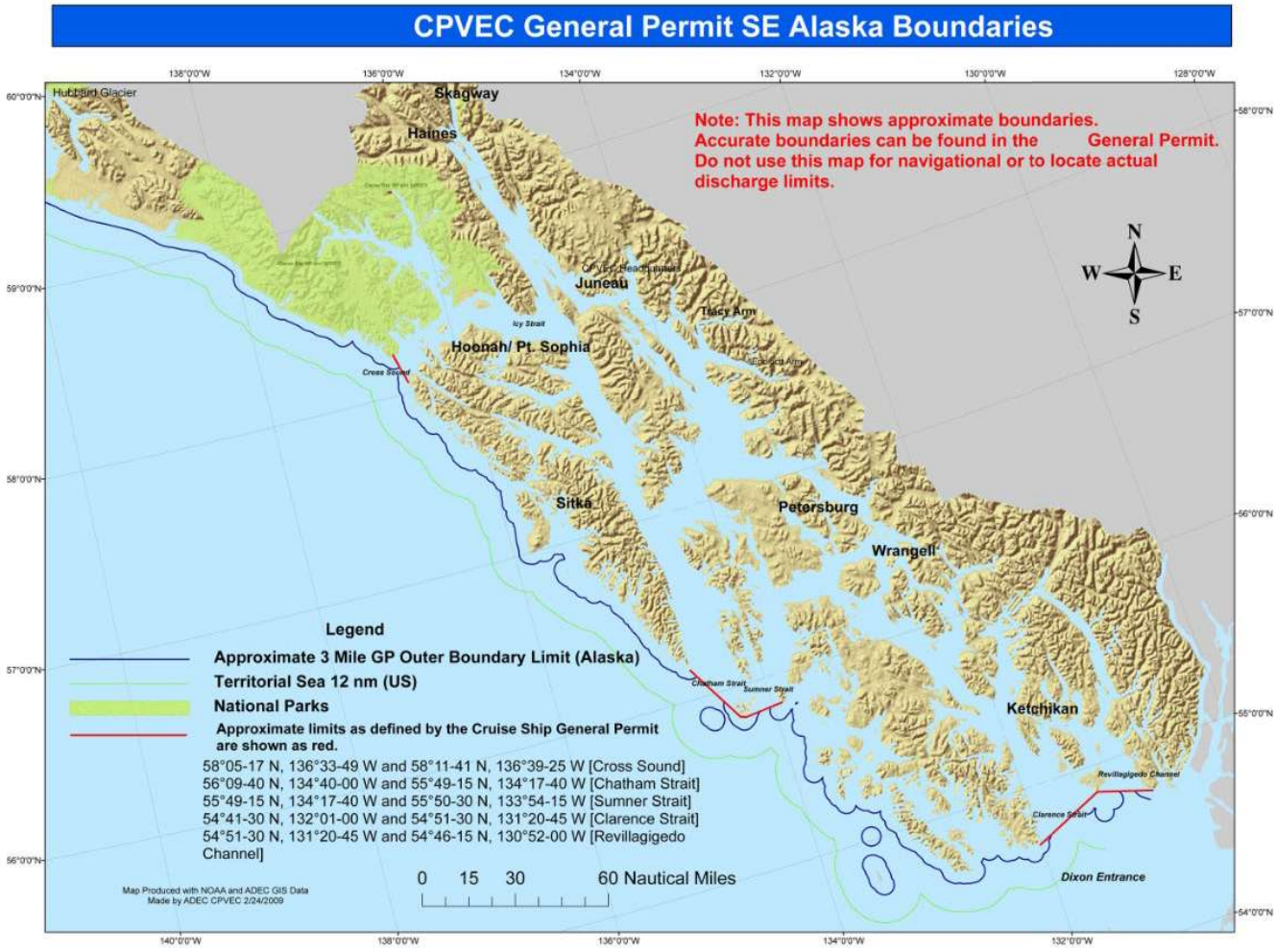


Figure 2-2. Geographic coverage of ADEC GP, southern border of Alaska

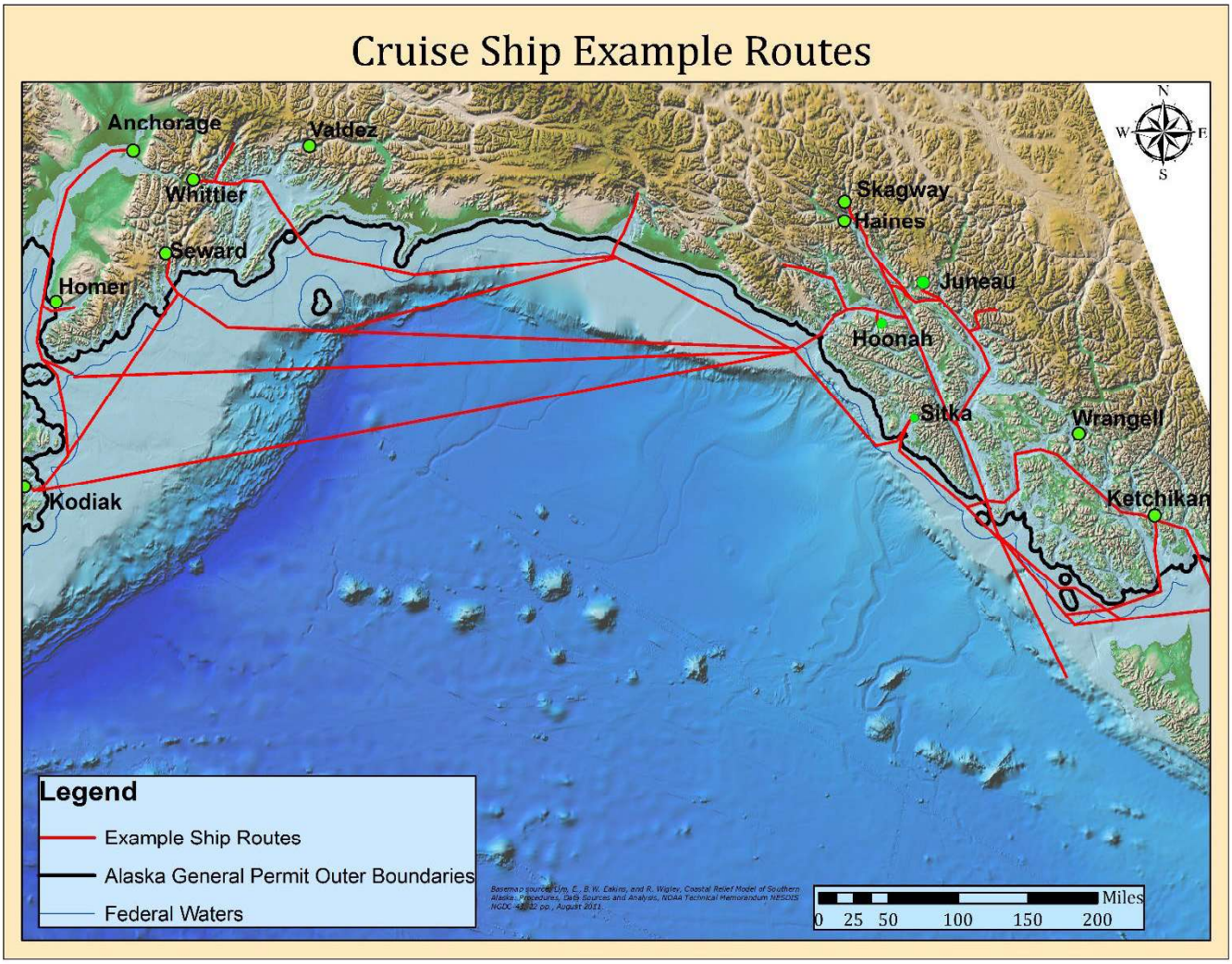
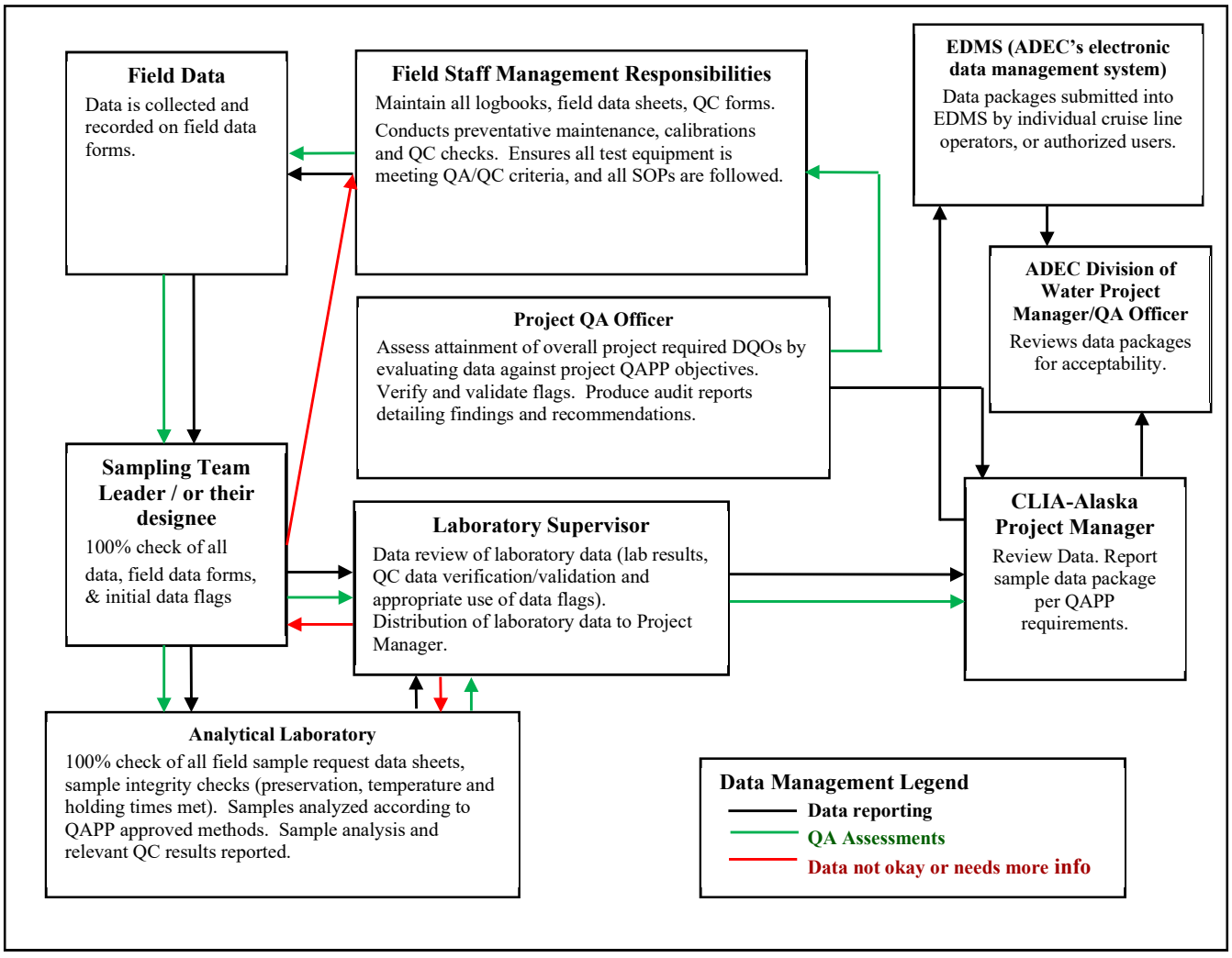


Figure 2-3. Data management flow chart



TABLES

Table 1-1. Analytical Parameters and Target Limits

Matrix/Media: AWTS Effluent

Analytical Parameter	Project Action Limit/Level (mg/L)							Laboratory Limits[1] µg/L	
	ADEC GP 2013DB004 six knots or greater		ADEC GP 2013DB004 less than six knots		33 CFR 159.309 & 40 CFR 133.102			Detection Limits (MDL)	Quanti-tation Limits (PQL)
	Daily limits	Monthly limits	Daily limits	Monthly limits	Daily limits	Weekly limits	Monthly limits		
Chlorine Residual (total/free)	0.01[3]	NRL[2]	0.01[3]	NRL	0.01[3]	NRL	NRL	0.1 mg/L[3]	0.1 mg/L[3]
pH	6.0 - 9.0 SU	NRL	6.0 - 9.0 SU	NRL	6.0 - 9.0 SU	NRL	NRL	0.10 standard units	0.10 standard units
Temperature	NRL							0.01°C	0.01°C
Alkalinity	NRL							5 mg/L	20 mg/L
Ammonia – Total	160	NRL	78	NRL	NRL	NRL	NRL	0.25 mg/L	0.5 mg/L
Biochemical Oxygen Demand	60	30	60	30	NRL	45	30	2 mg/L	2 mg/L
Chemical Oxygen Demand	NRL							11 mg/L	28 mg/L
Fecal Coliforms	40 FC/100ml	14[4] FC/100ml	40 FC/100ml	14[4] FC/100ml	40 FC/100ml	N/A	20[4] FC/100ml	1 FC/100 ml	2 FC/100 ml
Hardness[5]	NRL							5 mg/L	20 mg/L
Nitrate	NRL							0.1 mg/L	1.0 mg/L
Nitrate plus Nitrite	NRL							0.1 mg/L	1.0 mg/L
Oil and Grease	NRL							1.4 mg/L	5.0 mg/L
Settleable Solids	NRL							0.10 (ml/L)	0.10 (ml/L)
Specific Conductance	NRL							2 µmHos/cm	5 µmHos/cm
Total Kjeldahl Nitrogen	NRL							3.0 mg/L	10 mg/L
Total Organic Carbon	NRL							0.5 mg/L	1 mg/L
Total Phosphorus	NRL							0.3 mg/L	0.5 mg/L

Table 1-1. Analytical Parameters and Target Limits

Matrix/Media: AWTS Effluent

Analytical Parameter	Project Action Limit/Level (mg/L)							Laboratory Limits[1] µg/L	
	ADEC GP 2013DB004 six knots or greater		ADEC GP 2013DB004 less than six knots		33 CFR 159.309 & 40 CFR 133.102			Detection Limits (MDL)	Quanti-tation Limits (PQL)
	Daily limits	Monthly limits	Daily limits	Monthly limits	Daily limits	Weekly limits	Monthly limits		
Total Suspended Solids	150	30	150	30	N/A	45	30	1.0 mg/L	4.0 mg/L
Antimony	NRL							1	5
Arsenic	NRL							1	5
Beryllium	NRL							1	5
Cadmium	NRL							1	5
Chromium	NRL							1	5
Copper	NRL							1	3
Lead	NRL							1	5
Mercury (Total)	NRL							0.2	0.2
Nickel	NRL							1	5
Selenium	NRL							1	5
Silver	NRL							0.5	1
Thallium	NRL							1	5
Zinc	NRL							3	10
Antimony, dissolved	NRL							1	5
Arsenic, dissolved	NRL							1	5
Beryllium, dissolved	NRL							1	5
Cadmium, dissolved	NRL							1	5
Chromium, dissolved	NRL							1	5
Copper, dissolved	NRL	NRL	77 µg/L	NRL	NRL	NRL	NRL	1	3

Table 1-1. Analytical Parameters and Target Limits

Matrix/Media: AWTS Effluent

Analytical Parameter	Project Action Limit/Level (mg/L)							Laboratory Limits[1] µg/L	
	ADEC GP 2013DB004 six knots or greater		ADEC GP 2013DB004 less than six knots		33 CFR 159.309 & 40 CFR 133.102			Detection Limits (MDL)	Quanti-tation Limits (PQL)
	Daily limits	Monthly limits	Daily limits	Monthly limits	Daily limits	Weekly limits	Monthly limits		
Lead, dissolved	NRL							1	5
Nickel, dissolved	NRL							1	5
Selenium, dissolved	NRL							1	5
Silver, dissolved	NRL							0.5	1
Thallium, dissolved	NRL							1	5
Zinc, dissolved	NRL							3	10
1,1,1,2-Tetrachloroethane	NRL							3	10
1,1,1-Trichloroethane	NRL							3	10
1,1,2,2-Tetrachloroethane	NRL							3	10
1,1,2-Trichloroethane	NRL							3	10
1,1-Dichloroethane	NRL							3	10
1,1-Dichloroethene	NRL							3	10
1,1-Dichloropropene	NRL							3	10
1,2,3-Trichlorobenzene	NRL							3	10
1,2,3-Trichloropropane	NRL							3	10
1,2,4-Trichlorobenzene	NRL							3	10
1,2,4-Trimethylbenzene	NRL							3	10
1,2-Dibromo-3-Chloropropane	NRL							3	10
1,2-Dichlorobenzene	NRL							3	10
1,2-Dichloroethane	NRL							3	10

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Matrix/Media: AWTS Effluent

Analytical Parameter	Project Action Limit/Level (mg/L)							Laboratory Limits[1] µg/L	
	ADEC GP 2013DB004 six knots or greater		ADEC GP 2013DB004 less than six knots		33 CFR 159.309 & 40 CFR 133.102			Detection Limits (MDL)	Quanti-tation Limits (PQL)
	Daily limits	Monthly limits	Daily limits	Monthly limits	Daily limits	Weekly limits	Monthly limits		
1,2-Dichloropropane	NRL							3	10
1,3,5-Trimethylbenzene	NRL							3	10
1,3-Dichlorobenzene	NRL							3	10
1,3-Dichloropropane	NRL							3	10
1,4-Dichlorobenzene	NRL							3	10
2,2-Dichloropropane	NRL							3	10
2-Butanone	NRL							10	50
2-Chloroethyl Vinyl Ether	NRL							3	10
2-Chlorotoluene	NRL							3	10
2-Hexanone	NRL							3	10
4-Chlorotoluene	NRL							3	10
4-Isopropyltoluene	NRL							3	10
4-Methyl-2-Pentanone	NRL							3	20
Acetone	NRL							10	50
Acrolein	NRL							50	100
Acrylonitrile	NRL							50	100
Benzene	NRL							3	10
Bromobenzene	NRL							3	10
Bromochloromethane	NRL							3	10
Bromodichloromethane	NRL							3	10

Table 1-1. Analytical Parameters and Target Limits

Matrix/Media: AWTS Effluent

Analytical Parameter	Project Action Limit/Level (mg/L)							Laboratory Limits[1] µg/L	
	ADEC GP 2013DB004 six knots or greater		ADEC GP 2013DB004 less than six knots		33 CFR 159.309 & 40 CFR 133.102			Detection Limits (MDL)	Quanti-tation Limits (PQL)
	Daily limits	Monthly limits	Daily limits	Monthly limits	Daily limits	Weekly limits	Monthly limits		
Bromoform	NRL							3	10
Bromomethane (Methyl bromide)	NRL							3	10
Carbon Disulfide	NRL							3	10
Carbon Tetrachloride	NRL							3	10
Chlorobenzene	NRL							3	10
Chloroethane	NRL							3	10
Chloroform	NRL							3	10
Chloromethane (Methyl chloride)	NRL							3	10
Cis-1,2-Dichloroethene	NRL							3	10
Cis-1,3-Dichloropropene	NRL							3	10
Dibromochloromethane	NRL							3	10
Dibromomethane	NRL							3	10
Dichlorodifluoromethane	NRL							3	10
Ethylbenzene	NRL							3	10
Hexachlorobutadiene	NRL							3	10
Iodomethane	NRL							3	10
Isopropylbenzene	NRL							3	10
m&p-xylene	NRL							3	10
Methylene Chloride	NRL							3	10
n-Butylbenzene	NRL							3	10

Table 1-1. Analytical Parameters and Target Limits

Matrix/Media: AWTS Effluent

Analytical Parameter	Project Action Limit/Level (mg/L)							Laboratory Limits[1] µg/L	
	ADEC GP 2013DB004 six knots or greater		ADEC GP 2013DB004 less than six knots		33 CFR 159.309 & 40 CFR 133.102			Detection Limits (MDL)	Quanti-tation Limits (PQL)
	Daily limits	Monthly limits	Daily limits	Monthly limits	Daily limits	Weekly limits	Monthly limits		
n-Propylbenzene	NRL							3	10
O-Xylene	NRL							3	10
sec-Butylbenzene	NRL							3	10
Styrene	NRL							3	10
tert-Butyl Methyl Ether	NRL							3	10
tert-Butylbenzene	NRL							3	10
Tetrachloroethene	NRL							3	10
Toluene	NRL							3	10
Trans 1,2-Dichloroethene	NRL							3	10
trans-1,3-Dichloropropene	NRL							3	10
trans-1,4-Dichloro-2-Butene	NRL							3	10
Trichloroethene	NRL							3	10
Trichlorofluoromethane	NRL							3	10
1,1,2-Trichloro-1,2,2-Trifluoroethane	NRL							3	10
Vinyl Acetate	NRL							3	10
Vinyl Chloride	NRL							3	10
1,2-Diphenylhydrazine	NRL							3	10
2,4,5-Trichlorophenol	NRL							3	10
2,4,6-Trichlorophenol	NRL							3	10
2,4-Dichlorophenol	NRL							3	10

Table 1-1. Analytical Parameters and Target Limits

Matrix/Media: AWTS Effluent

Analytical Parameter	Project Action Limit/Level (mg/L)							Laboratory Limits[1] µg/L	
	ADEC GP 2013DB004 six knots or greater		ADEC GP 2013DB004 less than six knots		33 CFR 159.309 & 40 CFR 133.102			Detection Limits (MDL)	Quanti-tation Limits (PQL)
	Daily limits	Monthly limits	Daily limits	Monthly limits	Daily limits	Weekly limits	Monthly limits		
2,4-Dimethylphenol	NRL							10	30
2,4-Dinitrophenol	NRL							10	30
2,4-Dinitrotoluene	NRL							3	10
2,6-Dinitrotoluene	NRL							3	10
2-Chloronaphthalene	NRL							3	10
2-Chlorophenol	NRL							3	10
2-Methylnaphthalene	NRL							3	10
2-Methylphenol	NRL							3	10
2-Nitroaniline	NRL							3	10
2-Nitrophenol	NRL							3	10
3&4-Methylphenol	NRL							3	10
3,3'-Dichlorobenzidine	NRL							10	50
3-Nitroaniline	NRL							30	55
2-Methyl-4,6-dinitrophenol	NRL							10	30
4-Bromophenyl Phenyl ether	NRL							3	10
4-chloro-3-methylphenol	NRL							3	10
4-Chloroaniline	NRL							3	10
4-Chlorophenyl methyl sulfone	NRL							3	10
4-Chlorophenyl Phenyl ether	NRL							3	10
4-Nitroaniline	NRL							30	55

Table 1-1. Analytical Parameters and Target Limits

Matrix/Media: AWTS Effluent

Analytical Parameter	Project Action Limit/Level (mg/L)							Laboratory Limits[1] µg/L	
	ADEC GP 2013DB004 six knots or greater		ADEC GP 2013DB004 less than six knots		33 CFR 159.309 & 40 CFR 133.102			Detection Limits (MDL)	Quanti-tation Limits (PQL)
	Daily limits	Monthly limits	Daily limits	Monthly limits	Daily limits	Weekly limits	Monthly limits		
4-Nitrophenol	NRL							10	30
Acenaphthene	NRL							3	10
Acenaphthylene	NRL							3	10
Anthracene	NRL							3	10
Benzidine	NRL							30	55
Benzo(a)anthracene	NRL							3	10
Benzo(a)pyrene	NRL							3	10
Benzo(b)fluoranthene	NRL							3	10
Benzo(g,h,i)perylene	NRL							3	10
Benzo(k)fluoranthene	NRL							3	10
Benzoic Acid	NRL							3	10
Benzyl Alcohol	NRL							3	10
Bis(2-chloroethoxy)methane	NRL							3	10
Bis(2-chloroethyl)ether	NRL							3	10
2,2'-Oxybis(1-chloropropane)	NRL							3	10
Bis(2-ethylhexyl)phthalate	NRL							3	10
Butyl Benzyl Phthalate	NRL							3	10
Chrysene	NRL							3	10
Dibenz(a,h)anthracene	NRL							3	10
Dibenzofuran	NRL							3	10

Table 1-1. Analytical Parameters and Target Limits

Matrix/Media: AWTS Effluent

Analytical Parameter	Project Action Limit/Level (mg/L)							Laboratory Limits[1] µg/L	
	ADEC GP 2013DB004 six knots or greater		ADEC GP 2013DB004 less than six knots		33 CFR 159.309 & 40 CFR 133.102			Detection Limits (MDL)	Quanti-tation Limits (PQL)
	Daily limits	Monthly limits	Daily limits	Monthly limits	Daily limits	Weekly limits	Monthly limits		
Diethyl Phthalate	NRL							3	10
Dimethyl Phthalate	NRL							3	10
Di-N-Butyl Phthalate	NRL							3	10
Di-N-Octyl Phthalate	NRL							3	10
Fluoranthene	NRL							3	10
Fluorene	NRL							3	10
Hexachlorobenzene	NRL							3	10
Hexachlorocyclopentadiene	NRL							3	10
Hexachloroethane	NRL							3	10
Indeno(1,2,3-cd) pyrene	NRL							3	10
Isophorone	NRL							3	10
Naphthalene	NRL							3	10
Nitrobenzene	NRL							3	10
N-Nitrosodimethylamine	NRL							3	10
N-Nitrosodi-N-Propylamine	NRL							3	10
N-Nitrosodiphenylamine	NRL							3	10
Pentachlorophenol	NRL							10	30
Phenanthrene	NRL							3	10
Phenol	NRL							3	10

Table 1-1. Analytical Parameters and Target Limits

Matrix/Media: AWTS Effluent

Analytical Parameter	Project Action Limit/Level (mg/L)							Laboratory Limits[1] µg/L	
	ADEC GP 2013DB004 six knots or greater		ADEC GP 2013DB004 less than six knots		33 CFR 159.309 & 40 CFR 133.102			Detection Limits (MDL)	Quanti-tation Limits (PQL)
	Daily limits	Monthly limits	Daily limits	Monthly limits	Daily limits	Weekly limits	Monthly limits		
Pyrene	NRL							3	10

[1]Units are specified, if not typically reported in µg/L

[2]NRL = No regulatory limit. Laboratory Quantitation Limit or Field Measurement Range is acceptable for this project

[3]Analytical results below the instrument method detection limit of 0.1mg/L shall be deemed compliant with the effluent limit

[4]Calculated as a geometric mean

[5]Hardness is calculated from results of calcium and magnesium analyses determined from EPA Method 200.8. SM2340B provides the calculation

Table 1-2. Analyte Groupings for Resampling

Group #1 Field Measurements[1]	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			

[1]Field Measurements are required for every sample event, including resample events.

Table 1-3. QAPP Revision History

Date	Revision #	Description of changes
January, 2025	15	Formatting updates and content rearrangement to align with current EPA QAPP requirements.
January, 2026	n/a	No significant changes were made. Minor updates: 1) pg. 6, section 1.3. Update Distribution List, update CLIA PM to Hope O'Neill, update Sampling Team Leader to Kyle Hopkins, and update ADEC QA Officer to Melinna Faw. 2) Pg. 20, section 1.7.3. Text update "Sample data measured below the MDL are reported as ND or non-detect. Sample data greater than the MDL but below the PQL or RL may be reported for this project if they are flagged appropriately."

Table 2-1. Sampling Design and Rationale

Sampling Location/ID Number	Matrix/Media	Analytical Parameter[1]	Rationale for Sampling Design[2]
"Overboard (OB) discharge port ___" (numerical or alphabetical ID of port is specific to each vessel and outlined in the VSSP)	AWTS Effluent (H_2O) Graywater, or Blackwater/ mixed	All analytical parameters will be collected from this sampling location.	The most representative location for sampling AWTS effluent that is being discharged into Alaskan waters is directly from the overboard discharge line at a point after final treatment but before discharge into the receiving waters around the vessel.

[1] Analytical parameter includes all planned field measurements and laboratory analyses.

[2] Rationale supports the selection of sampling locations and associated analytical parameters.

Table 2-2. Summary of Field and QC Samples to be Collected

Matrix/ Media	Analytical Parameter[1]	No. of Sampling Locations	No. of field duplicates	Organic Analyses[2] No. of:		Inorganic Analyses[2] No. of:		No. of trip blanks (for VOCs only)	No. of PE Samples[3]
				MS	MSD	Dup	MS		
FIELD MEASUREMENTS:									
AWTS Effluent (H_2O) Graywater, or Blackwater/mixed	pH	refer to VSSP	10%[4]	N/A	N/A	N/A	N/A	N/A	1/year
	Chlorine, residual (total)	refer to VSSP	10%[4]	N/A	N/A	N/A	N/A	N/A	1/year
	Chlorine, free	refer to VSSP	10%[4]	N/A	N/A	N/A	N/A	N/A	1/year
	Large temperature blank	refer to VSSP	10%[4]	N/A	N/A	N/A	N/A	N/A	N/A
	Small temperature blank	refer to VSSP	10%[4]	N/A	N/A	N/A	N/A	N/A	N/A
LABORATORY ANALYSES:									
AWTS Effluent (H2O) Graywater, or Blackwater/mixed	Total Suspended Solids	refer to VSSP	10%[4]	N/A	N/A	N/A	N/A	N/A	1/year
	Settleable Solids	refer to VSSP	10%[4]	N/A	N/A	N/A	N/A	N/A	1/year
	Biochemical Oxygen Demand (BOD)	refer to VSSP	10%[4]	N/A	N/A	N/A	N/A	N/A	1/year
	Ammonia – Total	refer to VSSP	10%[4]	NAS	NAS	N/A	N/A	N/A	1/year
	Chemical Oxygen Demand (COD)	refer to VSSP	10%[4]	NAS	NAS	N/A	N/A	N/A	1/year
	Specific Conductance	refer to VSSP	10%[4]	N/A	N/A	N/A	N/A	N/A	1/year
	Fecal coliforms	refer to VSSP	10%[4]	N/A	N/A	N/A	N/A	N/A	1/year

Table 2-2. Summary of Field and QC Samples to be Collected

Matrix/ Media	Analytical Parameter[1]	No. of Sampling Locations	No. of field duplicates	Organic Analyses[2] No. of:		Inorganic Analyses[2] No. of:		No. of trip blanks (for VOCs only)	No. of PE Samples[3]
				MS	MSD	Dup	MS		
	Alkalinity	refer to VSSP	10%[4]	N/A	N/A	N/A	N/A	N/A	1/year
	Oil and Grease	refer to VSSP	10%[4]	NAS	NAS	N/A	N/A	N/A	1/year
	Total Organic Carbon (TOC)	refer to VSSP	10%[4]	NAS	NAS	N/A	N/A	N/A	1/year
	Total Kjeldahl Nitrogen	refer to VSSP	10%[4]	NAS	NAS	N/A	N/A	N/A	1/year
	Total Phosphorus	refer to VSSP	10%[4]	NAS	NAS	N/A	N/A	N/A	1/year
	Hardness	refer to VSSP	10%[4]	N/A	N/A	N/A	N/A	N/A	1/year
	Nitrate/Nitrite	refer to VSSP	10%[4]	NAS	NAS	N/A	N/A	N/A	1/year
	BNA	refer to VSSP	10%[4]	10%[4]	10%[4]	N/A	N/A	N/A	1/year
	VOCs (Acrolein, Acrylonitrile, 2-chloroethyl vinyl ether)	refer to VSSP	10%[4]	NAS	NAS	N/A	N/A	1/sample (unpres.)	1/year
	VOCs (all other compounds)	refer to VSSP	10%[4]	NAS	NAS	N/A	N/A	1/sample (pres. HCl)	
	Total metals	refer to VSSP	10%[4]	N/A	N/A	NAS	NAS	N/A	1/year
	Dissolved metals	refer to VSSP	10%[4]	N/A	N/A	NAS	NAS	N/A	1/year

[1] Analytical parameters include all laboratory analyses and field measurements.

Table 2-2. Summary of Field and QC Samples to be Collected

Matrix/ Media	Analytical Parameter[1]	No. of Sampling Locations	No. of field duplicates	Organic Analyses[2] No. of:		Inorganic Analyses[2] No. of:		No. of trip blanks (for VOCs only)	No. of PE Samples[3]
				MS	MSD	Dup	MS		

[2] Information includes the number of associated analytical QC samples, if collection of additional sample volume and/or bottles is necessary. If the QC samples listed are part of the analysis and don't require the collection of additional sample volume and/or bottles, NAS (for no additional sample) is included in the column. (Note: MS=matrix spike, MSD=matrix spike duplicate, Dup=laboratory duplicate/replicate.)

[3] PE or Performance Evaluations will be completed annually for all parameters noted.

[4]10% refers to percentage of all samples within a sampling season/calendar year, the "Blind Sample Duplicates"

Table 2-3. Analytical Method, Containers, Preservation, and Holding Time Requirements

Matrix/Media: AWTS Effluent

Analytical Parameter[1] and/or Field Measurements[2]	Analytical Method Number	Containers (number, size/volume, type)	Preservation Requirements[3]	Maximum Holding Times[4]
FIELD MEASUREMENTS:				
Chlorine Residual (free & total)	SM 4500-Cl (G)	100ml, P, G	none	Within 15 minutes
pH	EPA 150.1, SM 4500-H+			
Temperature (large temperature blank)	SM 2550B	1000ml, P, FP, G	none	ASAP in the field
Temperature (small temperature blank)	SM 2550B	100ml, P, FP, G	none	ASAP in the field
ANALYTICAL PARAMETERS:				
Alkalinity	SM 2320 B-2011	100ml, P, FP, G	Cool, ≤6° C, do not freeze	14 days
Ammonia – Total	EPA 350.1, Hach 10205	250ml, P, FP, G	Cool, ≤6° C,H_2SO_4 to pH <2, do not freeze	28 days
Total Kjeldahl Nitrogen	EPA 351.2 Rev 2.0 Hach 10242			
Chemical Oxygen Demand	EPA 410.4 Rev 2.0			
Nitrate plus Nitrite[5]	EPA 300.0, EPA 353.2			
Biochemical Oxygen Demand	SM 5210B	1000ml, P, FP, G	Cool, ≤6° C, do not freeze	48 hours
Total Suspended Solids	SM 2540D			7 days
Specific Conductance	SM 2510 B EPA 120.1			28 days
Nitrate (NO_3) Nitrite (NO_2)[5]	EPA 300.0			48 hours
Fecal Coliforms	SM 9222 D	100ml, PA, G	Cool, <10°C, 0.0008% $Na_2S_2O_3$, do not freeze	8 hours
Oil and Grease	EPA 1664B	1000ml, G	Cool, ≤6° C,H_2SO_4 to pH <2, do not freeze	28 days
Settleable Solids	SM 2540 F	1000ml, P, FP, G	Cool, ≤6° C, do not freeze	48 hours

Table 2-3. Analytical Method, Containers, Preservation, and Holding Time Requirements

Matrix/Media: AWTS Effluent

Analytical Parameter[1] and/or Field Measurements[2]	Analytical Method Number	Containers (number, size/volume, type)	Preservation Requirements[3]	Maximum Holding Times[4]
Total Organic Carbon	SM 5310C	2x 40ml, P, FP, G	Cool, ≤6° C, H_2SO_4 or H_3PO_4 to pH<2, do not freeze	28 days
Total Phosphorus	EPA 365.1 Rev 2.0	250ml, P, FP, G	Cool, ≤6° C,H_2SO_4 to pH <2, do not freeze	28 days
Total Recoverable Metals (except boron, chromium VI, and mercury)	EPA 200.8 Rev 5.4	100ml, P, FP, G	HNO_3 to pH <2 at least 24 hours prior to analysis, do not freeze	6 months
Hardness[6]	SM 2340 B EPA 200.7			
Total Mercury (CVAA)	EPA 245.1 Rev 3.0		HNO_3 to pH <2 at time of collection, do not freeze	28 days
Dissolved Metals [7] (except boron, chromium VI, and mercury)	EPA 200.8 Rev 5.4	100ml, P, FP, G	Filtration w/ 0.45micron filter within 15 min. of collection, HNO_3 to pH <2 at least 24 hours prior to analysis, do not freeze	6 months
VOCs (except acrolein, acrylonitrile, and 2-chloroethyl vinyl ether)	EPA 624.1	duplicate 40ml vials, G, FP-lined septum	Cool, ≤6° C, do not freeze, 0.008% $Na_2S_2O_3$ or ascorbic acid if residual chlorine is detected above 0.1 mg/L, HCl to pH <2, sample filled to zero headspace	14 days
2-chloroethyl vinyl ether	EPA 624.1	40ml vial, G, FP-lined septum	Cool, ≤6° C, do not freeze, 0.008% $Na_2S_2O_3$ or ascorbic acid if residual chlorine is detected above 0.1 mg/L, sample filled to zero headspace	7 days
Acrolein and Acrylonitrile	EPA 624.1		Cool, ≤6° C, do not freeze, pres. HCl to pH 4-5, 0.008% $Na_2S_2O_3$ or ascorbic acid if residual chlorine is detected above 0.1 mg/L, sample filled to zero headspace	3 days if no acid preservative, 14 days if pH is 4-5

Table 2-3. Analytical Method, Containers, Preservation, and Holding Time Requirements

Matrix/Media: AWTS Effluent

Analytical Parameter[1] and/or Field Measurements[2]	Analytical Method Number	Containers (number, size/volume, type)	Preservation Requirements[3]	Maximum Holding Times[4]
BNA [8]	EPA 625.1	1000ml G, FP-lined septum[8]	Cool, ≤6° C, do not freeze, 0.008% $Na_2S_2O_3$ or ascorbic acid if residual chlorine is detected above 0.1 mg/L	7 days until extraction, 40 days after extraction
Total Aromatic & Total Aqueous Hydrocarbons [9]	See BNA and VOCs			

[1] Analytical parameter includes both field and laboratory analyses.

[2] Field measurement parameters include those parameters measured directly in the field (e.g., temperature, pH, etc.).

[3] 40 CFR Part 136, Table II: Required Containers, Preservation Techniques, and Holding Times

[4] Maximum holding times include all pertinent holding times for each analytical parameter (e.g., from sample collection to sample preparation, from sample preparation to analysis, from sample collection to analysis, etc.) and field measurement (e.g., from sample collection to measurement).

[5] Nitrate and nitrite can be analyzed individually in an unpreserved fraction or analyzed together in a fraction preserved with H2SO4. Results will be reported as nitrate plus nitrite regardless of preservation decision.

[6] Hardness is calculated from results of calcium and magnesium analyses determined from EPA Method 200.8. SM2340B provides the calculation.

[7] Only copper is required twice/month. Full suite sampling of all dissolved metals twice/season

[8] Additional volume of sample is required for matrix spike determination during the BNA analysis. The sampling team will collect an additional 2L of sample from 10% of the twice per season sampling events to provide matrix spike data at a frequency of 10% for project related samples.

[9] Total Aromatic and total aqueous hydrocarbons can be calculated from the BNA and VOC results

Shaded color indicates: 2/month if discharging >6 knots + USCG conventional pollutants

Shaded color indicates: 2/month if discharging <6 knots conventional pollutants

Table 2-4A. Quality Control Requirements for Laboratory Analyses

Analytical Method: Alkalinity, SM 2320B - 2011

QC Sample:	Data Quality Indicator (DQI)[1]	Frequency /Number	Method/SOP QC Acceptance Limits	Acceptance Criteria/ Measurement Performance Criteria	Corrective Action
FIELD:					
Field duplicate	Precision (S & A)	10%	N/A	RPD </= 20% for concentrations >5x QL	Qualify associated data within QA review reports
Temperature blank	Representative-ness	1/cooler of samples	N/A	≤6°C, no sign of freezing	Acceptable if received <2 hours from sampling on ice. If >2 hours from sampling, contact project manager.[2]
LABORATORY:					
Method Blank	Precision/Bias (A)	1/batch up to 20 samples (ICB)	< MRL	<MRL	Qualify and report associated sample results <MRL or >10Xs blank contamination. Rerun or qualify associated data if concentrations not in the range listed above.
Laboratory Duplicate	Precision (A)	1/batch up to 20 samples	RPD <20%	RPD <20%	Qualify source sample if RPD does not meet criteria.
Laboratory Control Standard	Accuracy/Bias (A)	1/batch up to 20 samples (ICV)	90 - 110% recovery of true value	90 - 110% recovery of true value	Qualify and Report sample results when any spiked target fails high but the analyte concentration in the sample is <MRL. Rerun or qualify associated data if sample concentrations are >MRL.

[1] Data quality indicators may be related to sampling (S) and/or analysis (A) activities
[2] Project manager will make decisions on how to proceed on a case-by-case basis. At a minimum, a note will be included with the data report from the laboratory.

Table 2-4B. Quality Control Requirements for Laboratory Analyses

Analytical Methods: Ammonia, Hach 10205, EPA 350.1,
COD EPA 410.4 Rev. 2.0
Nitrate/Nitrite EPA 300.0, EPA 353.2

QC Sample:	Data Quality Indicator (DQI)[1]	Frequency /Number	Method/SOP QC Acceptance Limits	Acceptance Criteria/ Measurement Performance Criteria	Corrective Action
FIELD:					
Field duplicate	Precision (S & A)	10%	N/A	RPD </= 20% for concentrations >5x QL	Qualify associated data within QA review reports
Temperature blank	Representative-ness	1/cooler of samples	N/A	≤6°C, no sign of freezing	Acceptable if received <2 hours from sampling on ice. If >2 hours from sampling, contact project manager.[2]
LABORATORY:					
Method Blank	Precision/Bias (A)	1/batch up to 20 samples	< MDL	< MDL	Reanalyze entire batch
Laboratory Duplicate	Precision (A)	1/batch up to 20 samples	RPD </= 20%	RPD </= 20%	Reanalyze affected sample
Laboratory Control Standard	Accuracy/Bias (A)	2/batch up to 20 samples	90 - 110% recovery of true value	90 - 110% recovery of true value	Reanalyze entire batch
Matrix Spike	Accuracy/Bias (S & A)	2/batch and per 10 samples	Ammonia: 90 - 110% recovery, COD: 75-125% recovery, NO2/NO3: 80-120% recovery	Ammonia: 90 - 110% recovery, COD: 75-125% recovery, NO2/NO3: 80-120% recovery	reanalyze affected sample. If problem recurs, qualify in sample report

[1] Data quality indicators may be related to sampling (S) and/or analysis (A) activities

[2] Project manager will make decisions on how to proceed on a case-by-case basis. At a minimum, a note will be included with the data report from the laboratory.

Table 2-4C. Quality Control Requirements for Laboratory Analyses

Analytical Method: Biochemical Oxygen Demand, SM 5210B

QC Sample:	Data Quality Indicator (DQI)[1]	Frequency /Number	Method/SOP QC Acceptance Limits	Acceptance Criteria/ Measurement Performance Criteria	Corrective Action
FIELD:					
Field duplicate	Precision (S & A)	10%	N/A	RPD </= 20% for concentrations >5x QL	Qualify associated data within QA review reports
Temperature blank	Representative-ness	1/cooler of samples	N/A	≤6°C, no sign of freezing	Acceptable if received <2 hours from sampling on ice. If >2 hours from sampling, contact project manager.[2]
LABORATORY:					
Method Blank	Precision/Bias (A)	2/batch up to 20 samples	<0.2 mg/L	<0.2 mg/L	Review with lab manager. Narrate blank result in data report.[2]
Laboratory Duplicate	Precision (A)	1/batch up to 20 samples	RPD </= 20%	RPD </= 20%	Review with lab manager.
Laboratory Control Standard	Accuracy/Bias (A)	1/batch up to 20 samples	85 - 115% recovery of true value	85 - 115% recovery of true value	Review with lab manager. Narrate LCS result in data report.[3]

[1] Data quality indicators may be related to sampling (S) and/or analysis (A) activities

[2] Project manager will make decisions on how to proceed on a case-by-case basis. At a minimum, a note will be included with the data report from the laboratory.

[3] Due to the length of the BOD incubation (5-days), and short holding time (48 hours) it is impractical to reanalyze samples. QC that does not meet criteria will be narrated. If there is a gross failure, analysis batch data will be discarded and resample(s) requested.

Table 2-4D. Quality Control Requirements for Laboratory Analyses

Analytical Method: Fecal coliforms, SM 9222D

QC Sample:	Data Quality Indicator (DQI)[1]	Frequency /Number	Method/SOP QC Acceptance Limits	Acceptance Criteria/ Measurement Performance Criteria	Corrective Action
FIELD:					
Field duplicate	Precision (S & A)	10%	N/A	RPD </= 20% for concentrations >5x QL	Qualify associated data within QA review reports
Small temperature blank	Representative-ness	1/separate ice bath within larger cooler of samples	N/A	≤10°C	Acceptable if received <2 hours from sampling on ice. If >2 hours from sampling, contact project manager.[2]
LABORATORY:					
Method Blank	Precision/Bias (A)	1/batch	No presence of fecal coliform bacteria	No presence of fecal coliform bacteria	Invalidate analysis batch if fecal coliforms are present on client samples
Rinse Blank	Precision/Bias (A)	1/batch	No presence of fecal coliform bacteria	No presence of fecal coliform bacteria	Review data with Laboratory manager. Invalidate analysis batch or qualify on fecal coliform bench sheet.

[1] Data quality indicators may be related to sampling (S) and/or analysis (A) activities

[2] Project manager will make decisions on how to proceed on a case-by-case basis. At a minimum, a note will be included with the data report from the laboratory.

Table 2-4E. Quality Control Requirements for Laboratory Analyses

Analytical Methods: Oil and Grease, EPA 1664B

QC Sample:	Data Quality Indicator (DQI)[1]	Frequency /Number	Method/SOP QC Acceptance Limits	Acceptance Criteria/ Measurement Performance Criteria	Corrective Action
FIELD:					
Field duplicate	Precision (S & A)	10%	N/A	RPD </= 20% for concentrations >5x QL	Qualify associated data within QA review reports
Temperature blank	Representative-ness	1/cooler of samples	N/A	≤6°C, no sign of freezing	Acceptable if received <2 hours from sampling on ice. If >2 hours from sampling, contact project manager.[2]
LABORATORY:					
Method Blank	Precision/Bias (A)	1/batch up to 20 samples	< MRL	< MRL	Qualify and report associated sample results <MRL or >10Xs blank contamination. Rerun or qualify associated data if concentrations not in the range listed above.
Laboratory Control Standard	Accuracy/Bias (A)	1/batch up to 20 samples	recovery = 78-114%	recovery = 78-114%	Qualify and report sample results when any spiked target fails high but the analyte concentration in the sample is <MRL. Rerun or qualify associated data if sample concentrations are >MRL.
Matrix Spike	Accuracy/Bias (S & A)	1 MS/MSD pair/batch up to 20 samples	recovery = 78-114%; RPD = <18% in MSD	recovery = 78-114%; RPD = <18% in MSD	Qualify and report source sample when any spiked sample fails accuracy or precision.

[1] Data quality indicators may be related to sampling (S) and/or analysis (A) activities

[2] Project manager will make decisions on how to proceed on a case-by-case basis. At a minimum, a note will be included with the data report from the laboratory.

Table 2-4F. Quality Control Requirements for Laboratory Analyses

Analytical Method: Settleable Solids, SM 2540F

QC Sample:	Data Quality Indicator (DQI)[1]	Frequency /Number	Method/SOP QC Acceptance Limits	Acceptance Criteria/ Measurement Performance Criteria	Corrective Action
FIELD:					
Field duplicate	Precision (S & A)	10%	N/A	RPD </= 20% for concentrations >5x QL	Qualify associated data within QA review reports
Temperature blank	Representative-ness	1/cooler of samples	N/A	≤6°C, no sign of freezing	Acceptable if received <2 hours from sampling on ice. If >2 hours from sampling, contact project manager.[2]

[1] Data quality indicators may be related to sampling (S) and/or analysis (A) activities

[2] Project manager will make decisions on how to proceed on a case-by-case basis. At a minimum, a note will be included with the data report from the laboratory.

Table 2-4G. Quality Control Requirements for Laboratory Analyses

Analytical Method: Specific Conductance, SM 2510B, EPA 120.1

QC Sample:	Data Quality Indicator (DQI)[1]	Frequency /Number	Method/SOP QC Acceptance Limits	Acceptance Criteria/ Measurement Performance Criteria	Corrective Action
FIELD:					
Field duplicate	Precision (S & A)	10%	N/A	RPD </= 20% for concentrations >5x QL	Qualify associated data within QA review reports
Temperature blank	Representative-ness	1/cooler of samples	N/A	≤6°C, no sign of freezing	Acceptable if received <2 hours from sampling on ice. If >2 hours from sampling, contact project manager.[2]
LABORATORY:					

Table 2-4G. Quality Control Requirements for Laboratory Analyses

Analytical Method: Specific Conductance, SM 2510B, EPA 120.1

QC Sample:	Data Quality Indicator (DQI)[1]	Frequency /Number	Method/SOP QC Acceptance Limits	Acceptance Criteria/ Measurement Performance Criteria	Corrective Action
Laboratory Duplicate	Precision (A)	1/batch up to 10 samples	RPD </= 20%	RPD </= 20%	Reanalyze affected sample

[1] Data quality indicators may be related to sampling (S) and/or analysis (A) activities

[2] Project manager will make decisions on how to proceed on a case-by-case basis. At a minimum, a note will be included with the data report from the laboratory.

Table 2-4H. Quality Control Requirements for Laboratory Analyses

Analytical Methods: TKN, Hach 10242 or EPA 351.2 Rev. 2.0

QC Sample:	Data Quality Indicator (DQI)[1]	Frequency /Number	Method/SOP QC Acceptance Limits	Acceptance Criteria/ Measurement Performance Criteria	Corrective Action
FIELD:					
Field duplicate	Precision (S & A)	10%	N/A	RPD </= 20% for concentrations >5x QL	Qualify associated data within QA review reports
Temperature blank	Representative-ness	1/cooler of samples	N/A	≤6°C, no sign of freezing	Acceptable if received <2 hours from sampling on ice. If >2 hours from sampling, contact project manager.[2]
LABORATORY:					
Method Blank	Precision/Bias (A)	1/batch up to 20 samples	< MDL	< MDL	Review with laboratory manager. Narrate on data report, or reanalyze entire batch.
Laboratory Duplicate	Precision (A)	1/batch up to 20 samples	RPD </= 20%	RPD </= 20%	Reanalyze affected sample

Table 2-4H. Quality Control Requirements for Laboratory Analyses

Analytical Methods: TKN, Hach 10242 or EPA 351.2 Rev. 2.0

QC Sample:	Data Quality Indicator (DQI)[1]	Frequency /Number	Method/SOP QC Acceptance Limits	Acceptance Criteria/ Measurement Performance Criteria	Corrective Action
Laboratory Control Standard	Accuracy/Bias (A)	2/batch up to 20 samples	85 - 115% recovery of true value	85 - 115% recovery of true value	Reanalyze entire batch
Matrix Spike	Accuracy/Bias (S & A)	2/batch and per 10 samples	85 - 115% recovery of true value	85 - 115% recovery of true value	reanalyze affected sample. If problem recurs, qualify in sample report

[1] Data quality indicators may be related to sampling (S) and/or analysis (A) activities
[2] Project manager will make decisions on how to proceed on a case-by-case basis. At a minimum, a note will be included with the data report from the laboratory.

Table 2-4I. Quality Control Requirements for Laboratory Analyses

Analytical Methods: Total Organic Carbon, SM 5310C

QC Sample:	Data Quality Indicator (DQI)[1]	Frequency /Number	Method/SOP QC Acceptance Limits	Acceptance Criteria/ Measurement Performance Criteria	Corrective Action
FIELD:					
Field duplicate	Precision (S & A)	10%	N/A	RPD </= 20% for concentrations >5x QL	Qualify associated data within QA review reports
Temperature blank	Representative-ness	1/cooler of samples	N/A	≤6°C, no sign of freezing	Acceptable if received <2 hours from sampling on ice. If >2 hours from sampling, contact project manager.[2]
LABORATORY:					

Table 2-4I. Quality Control Requirements for Laboratory Analyses

Analytical Methods: Total Organic Carbon, SM 5310C

QC Sample:	Data Quality Indicator (DQI)[1]	Frequency /Number	Method/SOP QC Acceptance Limits	Acceptance Criteria/ Measurement Performance Criteria	Corrective Action
Method Blank	Precision/Bias (A)	1/batch of 20 or less	< MRL	< MRL	Qualify and report sample results <MRL or >10Xs blank contamination. Rerun or qualify associated data if concentrations not in the range listed in the last sentence.
Laboratory Control Standard	Accuracy/Bias (A)	1/batch of 20 or less	recovery = 90-110%	recovery = 90-110%	Qualify and report sample results when any spiked target fails high but the analyte concentration in the sample is <MRL. Rerun or qualify associated data if sample concentrations are >MRL.
Matrix Spike	Accuracy/Bias (S & A)	1 MS/MSD pair /batch of 10 or less	85-115% accuracy, <15% RPD in MSD	85-115% accuracy, <15% RPD in MSD	Qualify source sample when any spiked sample fails accuracy or precision.

[1] Data quality indicators may be related to sampling (S) and/or analysis (A) activities

[2] Project manager will make decisions on how to proceed on a case-by-case basis. At a minimum, a note will be included with the data report from the laboratory.

Table 2-4J. Quality Control Requirements for Laboratory Analyses

Analytical Methods: Total Phosphorus, EPA 365.1 Rev. 2.0

QC Sample:	Data Quality Indicator (DQI)[1]	Frequency /Number	Method/SOP QC Acceptance Limits	Acceptance Criteria/ Measurement Performance Criteria	Corrective Action
FIELD:					

Table 2-4J. Quality Control Requirements for Laboratory Analyses

Analytical Methods: Total Phosphorus, EPA 365.1 Rev. 2.0

QC Sample:	Data Quality Indicator (DQI)[1]	Frequency /Number	Method/SOP QC Acceptance Limits	Acceptance Criteria/ Measurement Performance Criteria	Corrective Action
Field duplicate	Precision (S & A)	10%	N/A	RPD </= 20% for concentrations >5x QL	Qualify associated data within QA review reports
Temperature blank	Representative-ness	1/cooler of samples	N/A	≤6°C, no sign of freezing	Acceptable if received <2 hours from sampling on ice. If >2 hours from sampling, contact project manager.[2]
LABORATORY:					
Method Blank	Precision/Bias (A)	1/batch of 20 or less	< MRL	< MRL	Qualify and report sample results <MRL or >10Xs blank contamination. Rerun or qualify associated data if concentrations not in the range listed in the last sentence.
Laboratory Control Standard	Accuracy/Bias (A)	1/batch of 20 or less	recovery = 90-110%	recovery = 90-110%	Qualify and report sample results when any spiked target fails high but the analyte concentration in the sample is <MRL. Rerun or qualify associated data if sample concentrations are >MRL.
Matrix Spike	Accuracy/Bias (S & A)	1 MS/MSD pair /batch of 20 or less	recovery= 90-110% <20% RPD in MSD	recovery= 90-110% <20% RPD in MSD	Qualify source sample when any spiked sample fails accuracy or precision.

[1] Data quality indicators may be related to sampling (S) and/or analysis (A) activities

[2] Project manager will make decisions on how to proceed on a case-by-case basis. At a minimum, a note will be included with the data report from the laboratory.

Table 2-4K. Quality Control Requirements for Laboratory Analyses

Analytical Methods: Total Suspended Solids, SM 2540D

QC Sample:	Data Quality Indicator (DQI)[1]	Frequency /Number	Method/SOP QC Acceptance Limits	Acceptance Criteria/ Measurement Performance Criteria	Corrective Action
FIELD:					
Field duplicate	Precision (S & A)	10%	N/A	RPD </= 20% for concentrations >5x QL	Qualify associated data within QA review reports
Temperature blank	Representative-ness	1/cooler of samples	N/A	≤6°C, no sign of freezing	Acceptable if received <2 hours from sampling on ice. If >2 hours from sampling, contact project manager.[2]
LABORATORY:					
Method Blank	Precision/Bias (A)	1/batch up to 20 samples	<MDL	<MDL	Reanalyze entire batch
Laboratory Duplicate	Precision (A)	1/batch up to 20 samples	RPD </= 20% if TSS results are >20mg/L, or ±4mg/L	RPD </= 20% if TSS results are >20mg/L, or ±4mg/L	Review with lab manager. At a minimum, reanalyze affected sample.
Laboratory Control Standard	Accuracy/Bias (A)	2/batch up to 20 samples	85 - 115% recovery of true value	85 - 115% recovery of true value	Reanalyze entire batch
Drying efficiency	Accuracy/Bias (A)	1/batch up to 20 samples	within 4% or 0.0005g of initial weight	within 4% or 0.0005g of initial weight	Re-dry and re-weigh entire batch. Repeat until criteria are met.

[1] Data quality indicators may be related to sampling (S) and/or analysis (A) activities

[2] Project manager will make decisions on how to proceed on a case-by-case basis. At a minimum, a note will be included with the data report from the laboratory.

Table 2-4L. Quality Control Requirements for Laboratory Analyses

Analytical Methods: Metals, mercury, and Hardness[2] (EPA 200.8, EPA 245.1, SM 2340B)

QC Sample:	Data Quality Indicator (DQI)[1]	Frequency /Number	Method/SOP QC Acceptance Limits[2]	Acceptance Criteria/ Measurement Performance Criteria	Corrective Action
FIELD:					
Field duplicate	Precision (S & A)	10%	N/A	RPD </= 20% for concentrations >5x QL	Qualify associated data within QA review reports
LABORATORY:					
Method Blank	Precision/Bias (A)	1/batch of 20 or less	< 2.2 x MDL	< 2.2 x MDL	Qualify and report sample results <MRL or >10Xs blank contamination. Rerun or qualify associated data if concentrations not in the range listed in the last sentence.
Laboratory Control Standard	Accuracy/Bias (A)	1/batch of 20 or less	recovery= 85-115%	recovery= 85-115%	Qualify and report sample results when any spiked target fails high but the analyte concentration in the sample is <MRL. Rerun or qualify associated data if sample concentrations are >MRL.
Matrix Spike	Accuracy/Bias (S & A)	1 MS/MSD pair /batch of 20 or less	recovery = 70-130% ; <20% RPD in MSD	recovery = 70-130% ; <20% RPD in MSD	Qualify source sample when any spiked sample fails accuracy or precision.

[1] Data quality indicators may be related to sampling (S) and/or analysis (A) activities

[2] For hardness there are no method-specific QC. Hardness is calculated from the calcium and magnesium concentrations determined from EPA Method 200.8 which covers the QC criteria.

Table 2-4M. Quality Control Requirements for Laboratory Analyses

Analytical Methods: VOCs, EPA 624.1

QC Sample:	Data Quality Indicator (DQI)[1]	Frequency /Number	Method/SOP QC Acceptance Limits	Acceptance Criteria/ Measurement Performance Criteria	Corrective Action
FIELD:					
Field duplicate	Precision (S & A)	10%	N/A	RPD </= 20% for concentrations >5x QL	Qualify associated data within QA review reports
Temperature blank	Representative-ness	1/cooler of samples	N/A	≤6°C, no sign of freezing	Acceptable if received <2 hours from sampling on ice. If >2 hours from sampling, contact project manager.[2]
LABORATORY:					
Method Blank	Precision/Bias (A)	1/batch of 20 or less	< MDL	<MDL	Qualify and report sample results <MRL or >10Xs blank contamination. Rerun or qualify associated data if concentrations not in the range listed in the last sentence.
Laboratory Control Standard	Accuracy/Bias (A)	1/batch of 20 or less	Recovery-A mix of Lab Statistical limits and reference method limits. Vary by Analyte.	Recovery-A mix of Lab Statistical limits and reference method limits. Vary by Analyte.	Qualify and report sample results when any spiked target fails high but the analyte concentration in the sample is <MRL. Rerun or qualify associated data if sample concentrations are >MRL.
Matrix Spike	Accuracy/Bias (S & A)	1 MS/MSD pair /batch of 20 or less	Recovery-A mix of Lab Statistical limits and reference method limits. Vary by Analyte. RPD<30%	Recovery-A mix of Lab Statistical limits and reference method limits. Vary by Analyte. RPD<30%	Qualify source sample when any spiked sample fails accuracy or precision.

Table 2-4M. Quality Control Requirements for Laboratory Analyses

Analytical Methods: VOCs, EPA 624.1

QC Sample:	Data Quality Indicator (DQI)[1]	Frequency /Number	Method/SOP QC Acceptance Limits	Acceptance Criteria/ Measurement Performance Criteria	Corrective Action
Surrogates	Accuracy (A)	All env and QC samples	Statistical limits. Vary by Analyte	Spiked with 4 separate surrogates.	Qualify and report sample results when any surrogate fails high but target analytes are ND. Re-analyze or qualify is associated sample target analytes >MRL.

[1] Data quality indicators may be related to sampling (S) and/or analysis (A) activities

[2] Project manager will make decisions on how to proceed on a case-by-case basis. At a minimum, a note will be included with the data report from the laboratory.

Table 2-4N. Quality Control Requirements for Laboratory Analyses

Analytical Methods: BNA, EPA 625.1

QC Sample:	Data Quality Indicator (DQI)[1]	Frequency /Number	Method/SOP QC Acceptance Limits	Acceptance Criteria/ Measurement Performance Criteria	Corrective Action
FIELD:					
Field duplicate	Precision (S & A)	10%	N/A	RPD </= 20% for concentrations >5x QL	Qualify associated data within QA review reports
Temperature blank	Representative-ness	1/cooler of samples	N/A	≤6°C, no sign of freezing	Acceptable if received <2 hours from sampling on ice. If >2 hours from sampling, contact project manager.[2]
LABORATORY:					

Table 2-4N. Quality Control Requirements for Laboratory Analyses

Analytical Methods: BNA, EPA 625.1

QC Sample:	Data Quality Indicator (DQI)[1]	Frequency /Number	Method/SOP QC Acceptance Limits	Acceptance Criteria/ Measurement Performance Criteria	Corrective Action
Method Blank	Precision/Bias (A)	1/batch of 20 or less	< MDL	<MDL	Qualify and report sample results <MRL or >10Xs blank contamination. Rerun or qualify associated data if concentrations not in the range listed in the last sentence.
Laboratory Control Standard	Accuracy/Bias (A)	1/batch of 20 or less	Statistical limits. Vary by Analyte. Spiked with a select list of target analytes[3]	Statistical limits. Vary by Analyte. Spiked with a select list of target analytes[3]	Qualify and report sample results when any spiked target fails high but the analyte concentration in the sample is <MRL. Rerun or qualify associated data if sample concentrations are >MRL.
Matrix Spike	Accuracy/Bias (S & A)	1 MS/MSD pair /batch of 20 or less	Recovery- Lab Statistical limits. Vary by Analyte.[3] RPD <30%	Recovery- Lab Statistical limits. Vary by Analyte.[3] RPD <30%	Qualify source sample when any spiked sample fails accuracy or precision.
Surrogates	Accuracy (A)	All env and QC samples	Statistical limits. Vary by Analyte. Spiked with a select list of target analytes[3]	Statistical limits. Vary by Analyte. Spiked with a select list of target analytes[3]	Qualify and report sample results when any surrogate fails high but target analytes are ND. Re-analyze or qualify is associated sample target analytes >MRL.

[1] Data quality indicators may be related to sampling (S) and/or analysis (A) activities

[2] Project manager will make decisions on how to proceed on a case-by-case basis. At a minimum, a note will be included with the data report from the laboratory.

[3] Quality control analyses for BNA contain an abbreviated list of applicable compounds. These compounds are changed annually by the laboratory on a 3-year rotation.

Table 2-5. Quality Control Requirements for Field Measurements

Field parameters: Temperature, pH, free & total chlorine

QC Sample:	Data Quality Indicator (DQI)[1]	Frequency/ Number	Method/SOP QC Acceptance Limits	Acceptance Criteria/ Measurement Performance Criteria	Corrective Action
Temperature - Fisher brand traceable thermometer (S04823, 15-078J, or equivalent)					
Field Duplicate	Precision (S & A)	10%	N/A	±20%	Collect & analyze 3rd sample. Qualify data, if still exceeding criteria.
QC Check Sample[2]	Accuracy	N/A	N/A	N/A	None. Thermometer not used if calibration criteria are not met.
pH - Oakton Waterproof pHTestr (13-200-263, or equivalent)					
Field Duplicate	Precision (S & A)	10%	N/A	±20%	Collect & analyze 3rd sample. Qualify data, if still exceeding criteria.
QC Check Sample[3]	Accuracy	1/batch (each day)	±0.1 SU of true value	±0.1 SU of true value	pH probe will be replaced and/or data will be qualified.
Chlorine - Hach pocket colorimeter II (5953000, or equivalent)					
Field Duplicate	Precision (S & A)	10%	N/A	±20%	Collect & analyze 3rd sample. Qualify data, if still exceeding criteria.
QC Check Sample	Accuracy	1/week	mid range standard, measured value within calibration standard range of acceptable values.		None. Colorimeter not used if calibration check fails.

[1] S = Sampling & A = Analysis

[2] Accuracy is not ensured through the analysis of a QC check. If the temperature sensor meets the annual calibration procedures and criteria presented in Table 2-6, the measurements are considered accurate enough to meet the needs of the current project.

[3] Accuracy is ensured through the calibration and calibration check process presented in Table 2-6. The post calibration check sample(s) will be considered as QC check samples for the field measurements.

Table 2-6. Field Equipment/Instrument Calibration, Maintenance, Testing, and Inspection

Analytical Parameter	Field Equipment/Instrument	Calibration Activity	Maintenance, Inspection Activities	Frequency	Acceptance Criteria	Corrective Action
Temperature	Fisher brand NIST traceable thermometer (S04823, 15-078J, or equivalent)[1]	Verification at point of use temperature against certified NIST thermometer	Replace batteries as needed	Annually (at a minimum), recommended 2x per sampling season	Correction factor <1°C	Discard thermometer
pH	Oakton Waterproof pHTestr (13-200-263, or equivalent)	Three-point calibration bracketing expected field sample range (standards 4.0, 7.0, & 10.0 typically used), followed by one-point measurement/verification of pH 7.0 buffer.	store probe according to manufacturer recommendations. Replace batteries as needed	1/day of use	pH 7.0 measurement within 0.1 S.U of true value.	Recalibrate until verification is within acceptance criteria. If calibration procedure(s) can't be completed, do not use affected pH meter. If alternative meter is not available, qualify data.
Chlorine (free & total)	Hach pocket colorimeter II (5953000, or equivalent)	Colorimeter calibration is loaded by manufacturer. Verify calibration against 4 purchased calibration standards. Verify calibration using 1 mid-range standard more frequently.	Ensure light path of colorimeter is not blocked or dirty. Ensure measurement vials are not scratched, oily, or dirty	Full range calibration verification: quarterly Mid-range calibration verification: weekly (within 7 days of colorimeter use in the field)	within manufacturer's ± requirements from true value of standard	Discard or repair. Send back to manufacturer for calibration, do not use affected colorimeter.

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

Table 3-1. QA Reports to Management

QA Report Type	Contents	Presentation Method	Report Issued by
Field Sampling Audit Reports	Description of audit methods and results including any findings and recommendations.	Written text and tables, charts, or graphs displaying results	Project QA Officer
Technical System Laboratory Audit Report (includes review of PE results, laboratory QA manuals, SOPs, and pertinent audits)	Description of performance evaluation (PE, or PT) results, methods of analysis, and recommendations.		
	Description of laboratory methods and QA/QC documents, including any findings and recommendations.		
	Description of recent external audit findings.		
	State whether an on-site evaluation is necessary.		
Blind Sample Duplicate Assessment Report(s)	Evaluation of blind sample duplicate results including an evaluation against project acceptance criteria and recommendations for improvements.		
Data Quality Audits	Independent review of a subset of final data packages including verification of correct sample collection point, analysis and reporting; summary of data audit results, findings, and any recommendations		
Corrective Action Report	Response to findings and recommendations contained within the reports distributed by the Project QA Officer.	Email, data package revision, or formal corrective action report.	CLIA-Alaska Project Manager

Table 3-1. 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; problems detected; corrective actions taken; recommendations for future monitoring operations.	Written text and charts, graphs displaying results	Project QA Officer

APPENDICES

APPENDIX A. Field Documentation

A-1. Field Sampling Checklist for Events within Alaska Waters
A-2. Field Sampling Checklist for Events Outside Alaska Waters
A-3. Field Data Form
A-4. Chain of Custody

APPENDIX B. ADEC Approved Methods for Cruise Ship Testing

APPENDIX C. Large Ship Data Review Checklist

APPENDIX A. Field Documentation

Appendix A-1. Field Sampling Checklist for Events within Alaska Waters

Vessel Name: _____
Sampler Name: _____
Date: _____
Sampling Event ID #: _____

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
  - ☐ 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 sampling, must be at least 21 days after first sampling.
- ☐ 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, and date by the vessel crew indicating that the sample port is correct (VSSP)
- ☐ 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
- ☐ Nature of sample recorded (composite or grab)
- ☐ Waste type recorded (blackwater, graywater, or mixed)
- ☐ Total time of sample collection recorded (report as deviation if > 30min)
- ☐ If deviations from VSSP and/or QA/QCP noted, reported date and time to ADEC/USCG
- ☐ If unannounced sampling, sampler verified that vessel is discharging
- ☐ Latitude/longitude and speed at time of discharge being sampled is recorded
- ☐ Copy of the Discharge record for the sampled discharge included
- ☐ Chain of custody properly completed
- ☐ Photograph of sample collection point taken during event, incl. date, time, sample ID
- ☐ Samples delivered to laboratory within holding times for analyses

Appendix A-2. Field Sampling Checklist for Events Outside Alaska Waters

Vessel Name: _____
Sampler Name: _____
Date: _____
Sampling Event ID #: _____

I. Notification

- ☐ USCG continued compliance

II. Sampling Notes (to include:)

- ☐ Vessel name
- ☐ Names of sampling personnel
- ☐ Names of shipboard assistants
- ☐ Signature, or initials, and date by the vessel crew indicating that the sample port is correct
- ☐ Sample ID clearly stating where the sample was taken
- ☐ Sample date and times recorded on COC
- ☐ Field measurements: pH, chlorine residual, and temps recorded on COC
- ☐ Nature of sample recorded (composite or grab)
- ☐ Waste type recorded (blackwater, graywater, or mixed)
- ☐ If deviations from the QAPP noted, reported to Admiralty Environmental
- ☐ Copy of the Discharge record for the sampled discharge included
- ☐ Chain of custody properly completed
- ☐ Photograph of sample collection point taken during event, incl. date, time, sample ID
- ☐ Samples delivered to laboratory within holding times for analyses

Appendix A-3. Field Data Forms

Vessel Sampling Field Notes

Date: **ID #**

Vessel Name: _____

Sampler(s): _____

Sample Port ID #1: _____ (Grab / Composite) (Blackwater / Graywater / Mixed)

Notes: _____

Latitude: **Longitude:** **Speed:** **Itinerary:**

Discharge flow rate: **Total time of sample collection (min):**

Sample Port ID #2: _____ (Grab / Composite) (Blackwater / Graywater / Mixed)

Notes: _____

Latitude: **Longitude:** **Speed:** **Itinerary:**

Discharge flow rate: **Total time of sample collection (min):**

pH meter ID / Date Calibrated	Thermometer ID / Date Calibrated	Colorimeter ID / Date Calibrated

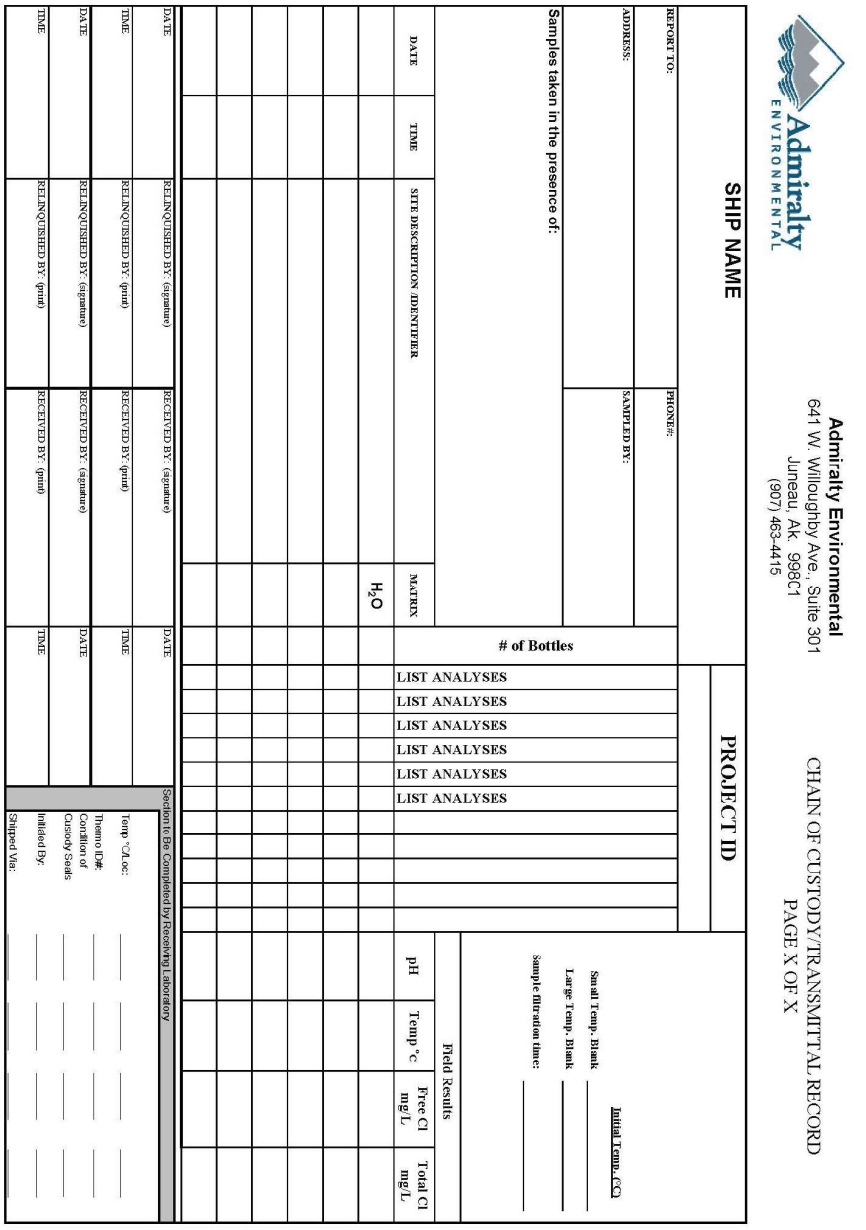
Field Test Results	#1	#2
Time, 24-hour	:	:
pH, units		
Temp, C		
Free Chlorine, mg/L		
Total Chlorine, mg/L		

As the accompanying shipboard personnel, I hereby acknowledge that I have witnessed this sampling event and can attest that the samples were collected from the correct sampling port(s) as designated in this vessel's Vessel Specific Sampling Plan (VSSP), and that the ship position and discharge flow rate supplied are accurate:

_____ _____ _____

Signature *Printed Name* *Date*

Appendix A-4. Chain-of-Custody



Admiralty Environmental
641 W. Willoughby Ave., Suite 301
Juneau, Ak. 99801
(907) 463-4415

CHAIN OF CUSTODY/TRANSMITTAL RECORD
PAGE X OF X

SHIP NAME

PROJECT ID

REPORT TO:

PHONE#:

ADDRESS:

SAMPLED BY:

Samples taken in the presence of:

Initial Temp. (°C)
Small Temp. Blank
Large Temp. Blank
Sample filtration time:

DATE	TIME	SITE DESCRIPTION /IDENTIFIER	MATRIX	# of Bottles		Field Results				
			H_2O			pH	Temp °C	Free Cl mg/L	Total Cl mg/L	
					LIST ANALYSES					
					LIST ANALYSES					
					LIST ANALYSES					
					LIST ANALYSES					
					LIST ANALYSES					
					LIST ANALYSES					

RELINQUISHED BY: (signature)	RECEIVED BY: (signature)	DATE	Section to Be Completed by Receiving Laboratory
RELINQUISHED BY: (print)	RECEIVED BY: (print)	TIME	Temp °C/Loc:
RELINQUISHED BY: (signature)	RECEIVED BY: (signature)	DATE	Thermo ID#:
RELINQUISHED BY: (print)	RECEIVED BY: (print)	TIME	Condition of Custody Seals
			Initialed By:
			Shipped Via:

Appendix B. ADEC Approved Methods for Cruise Ship Testing

1. Standard Methods for the Examination of Water and Wastewater, 22nd Edition, 2011, 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 C. Large Ship Data Review Checklist

Alaska Cruise Ship Data Review Checklist

Vessel Name: _____ **ID#** _____
Date: _____
Location: _____
Sampling Team: _____
Laboratory(s): _____

Sample Type:

- ☐ Continued Compliance (twice per month)
- ☐ ADEC General Permit (twice per month)
- ☐ Conventional and Priority Pollutants (twice per season)
- ☐ Other

Final Report Package Includes:

- ☐ Analytical Report:
  - ☐ Ship name
  - ☐ Sample IDs
  - ☐ Sample date collected
  - ☐ Parameter names and method references
  - ☐ Analytical results including analytical methods used for every parameter
  - ☐ Method Detection Limits (MDLs)
  - ☐ Practical Quantitation Limits (PQLs/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 recirculated samples, provide discharge logs back to the time of last discharge.)
- ☐ Field notes, including discharge flow rates and time elapsed for sample collection
- ☐ 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

CLIA Alaska CPVEC QAPP

Final Audit Report 2025-02-14

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