ATTACHMENT A

Wastewater Treatment Facility

Quality Assurance Project Plan

A1. Approvals:

This QAPP is approved as part of the attached wastewater permit
Permit No. _____

SIGNATURE ON FILE _____ _____
ADEC Project Manager Signature Date

SIGNATURE ON FILE _____ _____
ADEC Quality Assurance Officer Signature Date

This document can serve as the QAPP required under Section 1.1.4 of the attached Wastewater Disposal Permit, or it can be used as a template by a wastewater treatment facility in developing a facility-specific Quality Assurance Project Plan.

A2. Table of Contents

A3. Distribution List

This QAPP will be provided to all those responsible for permit implementation. It will remain attached to and be distributed with copies of the wastewater permit.

A4. Project/Task Organization

Duties and responsibilities of key individuals are listed below:

Project Manager - Responsible for the implementation of permit and certification requirements.

Quality Assurance Officer – Responsible for QA/QC of all self-monitoring required under the permit.

Laboratory Project Manager – Responsible for water quality analysis.

Laboratory Quality Assurance Officer. – Responsible for QA/QC of water quality analyses under federal and state certification.

ADEC Project Manager – Primary contact regarding permit and monitoring requirements. Receives DMR reports.

ADEC Quality Assurance Officer – Reviews and approves this generic QAPP and facility-specific QAPPs for ADEC along with the ADEC Project Manager. May review data or audit permittee's monitoring activities.

ADEC – APDES permit development and approval. Receives DMR reports.

A5. Problem Definition/Background

This QAPP ensures that data collected and analyzed under this permit are valid and verifiable. If implemented correctly, this QAPP provides the level of precision, accuracy and representativeness that yields data to help ensure that Alaska Water Quality Standards are met and that water quality uses (public health and public resource protection) are protected.

A6. Project/Task Description

Influent, Effluent, and Receiving Water

The laboratory specified by the permittee will perform the standard tests required by this permit. See the DMR and other sampling requirements in the permit for the parameters, sample locations, sample frequency, and sample type for all self-monitoring required by the permit.

A7. Data Quality Objectives and Criteria for Measurement of Data

Project Data Quality Objectives

The data quality objective of this QAPP is to ensure that the data collected and analyzed are scientifically verifiable and valid, and can be used to determine compliance with the requirements of the permit.

Criteria for Measurement of Data

Criteria for Measurements of Data are the performance criteria: the accuracy, precision, comparability, representativeness and completeness of the tests. These criteria must be met to ensure that the data are verifiable and that project data quality objectives are met.

The objectives for accuracy, precision, comparability, representativeness and completeness are summarized in this section. All results will be recorded in field and laboratory logbooks. Additional sampling and analyses will be performed when results fall outside the specified ranges and when Data Quality Objectives are not met. Any changes in Data Quality Objectives will be submitted to ADEC for approval before implementation.

(Note: The ADEC Water Quality Assurance Officer keeps copies of laboratory Quality Management Plans (QMP's) on file. These QMP's describe the laboratory measurement criteria. Therefore, Quality Assurance and Quality Control measures described in a contracted laboratory QMP's are not repeated in this document.)

Accuracy

Accuracy is a measure of confidence that describes how close a measurement is to its "true" value.

Field accuracy is ensured by field instrument calibration according to the manufacturers' instructions and by using standards and chemicals that are current (prior to expiration date), and by following proper sampling, sample handling and field analysis protocols.

Laboratory accuracy is normally determined by the percent recovery of the target analyte in spiked samples and also by the recoveries of the surrogates in all samples and QC samples. Accuracy is calculated as follows:

$$\%R = \frac{\text{Analyzed value}}{\text{true value}} \times 100$$

Laboratory accuracy ranges are specified in the contracted laboratory Quality Management Plans (kept on file at ADEC) and depend on the parameter being measured. The Quality Assurance Officer will ensure the facility's laboratory accuracy by meeting %R-values as shown in Table 2 below.

EPA DMR performance evaluation results are kept on file at the facility's laboratory and will be available for review by ADEC upon request.

Precision

Precision is the degree of agreement among repeated measurements of the same characteristic, or parameter, and gives information about the consistency of methods. Precision can be considered a product of the repetitiveness of monitoring.

Precision is expressed in terms of the relative percent difference (RPD) between two measurements (A and B), and is computed as follows:

$$RPD = \frac{A - B \times 100}{(A + B)/2}$$

Field precision is measured by collecting and analyzing field duplicate samples. Taking field duplicates at least every quarter ensures Field precision. (See B.5 Quality Control section and Table 2).

Laboratory precision is ensured by measuring Matrix Spike/Matrix Spike Duplicate (MS/MSD) samples and by the analysis of laboratory duplicate samples. The laboratory usually performs the analysis of one set of MS/MSD and duplicate samples per matrix measured. RPD is usually <20% but can vary widely depending on the analytical method. Control charts are a graphical representation showing the limits of acceptable data.

Analysts produce charts to document accuracy and precision in their testing. These charts are kept in the laboratory for data validation purposes. The Laboratory Project Manager will provide accuracy and precision records to ADEC if requested.

Representativeness

Representativeness is the extent to which measurements actually represent the true environmental condition. Representativeness of data collected was considered in the permit development process. This included sampling locations, the delineation of the mixing zone and ambient sampling water quality site selections. (See permit and/or certification for details.)

Comparability

Comparability is the degree to which data can be compared directly to similar studies. Using standardized sampling and analytical methods and units of reporting with comparable sensitivity ensures comparability. EPA-approved methods as listed in 40 CFR 136.3 will be used for standard measurements.

Completeness

Completeness is the comparison between the amount of usable data collected versus the amount of data called for in the permit or certification. Completeness will be determined by comparing sampling and analyses with the requirements in the permit.

A8. Training and Certifications

Facility laboratory personnel will be trained in sampling methods, sample handling, chain-of-custody, sample transport, and field and laboratory measurements. The Project Manager and/or the Quality Assurance Officer are responsible for the training of staff who perform sampling, sample handling, and analyses activities. Records will be kept on file of these training activities and may be reviewed by ADEC.

A9. Documents and Records

Field logbooks, notebooks and/or data sheets will be filled out using "write in the rain" ink or pencil, and should not be erased. Changes must be made by crossing out errors and adding correct information. Logbooks should be bound with numbered pages.

Laboratory data results are recorded on laboratory data sheets, bench sheets and/or in laboratory logbooks for each sampling event. These records as well as control charts, logbook records of equipment maintenance records, calibration and quality control checks, such as preparation and use of standard solutions, inventory of supplies and consumables, check in of equipment, equipment parts, and chemicals are kept on file at the laboratory.

Any procedural or equipment problems are recorded along with data results. Any deviation from this Quality Assurance Project Plan is noted. Additional sampling and analyses will be performed when results fall outside the specified range and when DQO's are not met. Data results returned to ADEC will include information on field and/or laboratory QA/QC problems and corrective actions.

Chain-of-Custody or Transmission forms will be kept with the sample transport, and will accompany data results back to ADEC.

Training records and data review records will be kept on file in the facility's laboratory and will be available on request by ADEC.

All records and documents are kept at least 5 years at the Facility's laboratory and are available to EPA and ADEC for inspection at any time.

B. Data Generation and Acquisition

B1. Sampling Process Design

Influent and Effluent

Standard tests to be performed according to the requirements of the APDES permit include: Biochemical Oxygen Demand (BOD_5), Total Suspended Solids (TSS), Fecal Coliform Bacteria, total residual Chlorine, pH, total Ammonia, temperature, Dissolved Oxygen, and total flow. Whole Effluent Toxicity analysis will be performed by a contracted laboratory. Methods for these analyses are EPA-approved and are found in 40 CFR 136.3. (See Table 2)

Ambient Water Monitoring

Monitoring will be performed in accordance with the permit. Methods will be according to 40 CFR 136.3 (See Table 2). Quality Management Plans (QMP's) and Standard Operating Procedures (SOP's) become additions to this QAPP.

Sludge

Metals analysis will be performed in accordance with the permit. See Table 2 for EPA-approved methods.

B2. Sampling Methods

Samples and measurements taken as required by permit must be representative of the volume and nature of the monitored discharge.

When a sample is taken at a discharge line, a volume of water equal to at least ten times the volume of the sample discharge line will first be discharged into a bucket or similar container, to clear the line of standing water and possible contamination. If there is no discharge line faucet, the sampler may take the sample from the final effluent chamber, taking all safety and contamination-prevention precautions.

Samples will be identified as "composite" or "grab" on Chain-of-Custody and/or Transmission forms and in field logbooks and field data sheets.

Grab Samples

Bottles will normally be filled to the shoulder of the bottle, leaving a small space for expansion and mixing.

Composite Samples

Composite samples must consist of at least four equal volume grab samples, two of which must be taken during periods of peak flow (7-9 a.m. and 6-8 p.m.). Samples will be composited directly into the sample bottles. Between composite aliquots, bottles will be kept at a temperature of 4 +/- 2^{o}C.

The time of the initial portion of the composite, composite intervals, and the final compositing time will be noted on the field data sheets and/or in logbooks. Sample time listed on the Chain-Of-Custody and/or Transmission form and sample bottle will be the time of the final sample composite portion.

Cleaning

All sampling equipment and sample containers will be cleaned according to the equipment specifications or the analytical laboratory.

All glassware and plasticware cleaned in the facility's laboratory will use the following procedure unless otherwise noted.

1. Wash glassware and plasticware with phosphate-free detergent and rinse with tap water.
2. Rinse with 10% hydrochloric acid (HCl).
3. Rinse four times with deionized water.

B3. Sample Handling and Custody

Sample handling, preservation, and holding times will follow those approved by EPA in 40 CFR 136.3, as described in *Standard Methods for the Examination of Water and Wastewater, 19th Edition, 1995, or most recent edition.* Sample container, minimum sample volume, preservation, and maximum storage requirements for each parameter are listed in Table 1 below.

When samples are transferred to an outside contracted laboratory, Chain-of-Custody and/or Transmission Forms will be filled out. Copies of these forms can be obtained by contacting the Department at the address listed in the permit. When samples are transferred between personnel, such transfer will be indicated on the form with signature, date and time of transfer. The Chain-of-Custody and/or Transmission Form will remain with the samples, sealed inside the cooler, until receipt by the contracted laboratory. Samples and sample containers will be maintained in a secure environment, from the time the bottles leave the facility until the time the samples are received at the contracted laboratory. Contracted laboratories will maintain custody of bottles and samples using their normal custody procedures, as described in their QMP's.

TABLE 1. Sample handling, preservation, and holding times

Parameter	**Container[1]**	**Minimum Sample volume**	**Preservation[2]**	**Maximum Holding Time[3]**
BOD_5	P, G, FP	2.5 L	Cool, 4ºC	48 Hours
TSS	P, G, FP	---[4]	Cool, 4ºC	7 days
Total Chlorine (residual)	P, G	NA	NA	Analyze immediately
Fecal Coliform Bacteria	Sterile Plastic, G	500 ml	Cool, 4ºC, $Na_2S_2O_3$[5]	6 Hours
pH	P, G, FP	NA	NA	Analyze immediately
Temperature	P, G, FP	NA	NA	Analyze immediately
Total Ammonia	P, G, FP	500 ml	Cool, 4ºC, H_2SO_4 to pH<2	28 days
Dissolved Oxygen	G	300 ml	None Required	Analyze immediately
Total Metals (sludge)	P, G, FP	250	Cool, 4ºC	Analyze as soon as possible[6]
Whole Effluent Toxicity (WET)	Plastic	4 L	Cool, 4ºC	36 hours

Superscripts:

1. Polyethylene (P) or Glass (G). Samples are normally collected in polyethylene containers to prevent breakage. (FP) is fluoropolymer (polyfluorotetraethylene (PTFE; Teflon))
2. Sample preservation should be performed immediately upon collection. For composite chemical samples, each aliquot should be preserved at the time of collection. When use of an automated sampler makes it impossible to preserve each aliquot, then chemical samples may be preserved by maintaining at 4ºC until composite sample splitting is completed.
3. Sample should be analyzed as soon as possible after collection. The times listed are maximum times that samples may be held before analysis and still be considered valid. The term "analyze immediately" usually means within 15 minutes or less of sample collection.
4. BOD_5 and TSS are tested on the same sample. 2500 mL is sufficient for both tests.
5. Should only be used in presence of residual chlorine.
6. "As soon as possible" is not in the EPA guidance.

B4. Analytical Methods

EPA-approved methods as found in *40 CFR Part 136.3* or its updates will be used. See Table 2 below. Any modifications will be discussed with ADEC and will be described in an addendum to this QAPP.

Facility Laboratory Standard Operating Procedures (SOP's) will be available to ADEC upon request.

Contracted laboratories will follow test procedures for the analysis of pollutants, which are EPA-approved methods as cited in 40 CFR Part 136.3 or as such regulations are amended. Sludge methods are specified in 40 CFR Part 503.8.

Contracted laboratories will provide copies of their Standard Operating Procedures (SOP's) to ADEC as requested. As previously stated, laboratory QMP's are kept on file at the office of the

ADEC Water Quality Assurance Officer. Parameters, approved methods, Precision and Accuracy values are shown below:

Table 2. Precision and Accuracy Values

Parameter	**Approved Test Procedures[1]**	**Precision (RPD)**	**Accuracy (% R)**
BOD_5	SM 5210B	<30	80 - 120
TSS	SM 2540 D	<20	85 - 115
Fecal Coliform Bacteria	SM 9222 D or SM 9221 C or E	NA	NA
pH	SM 4500-H+ B	0. 1 pH units	0. 1 pH units
Temperature	SM 2550 B	<10	90 – 110
Total Ammonia	EPA 350.1	<30	70-130
Total Chlorine (residual)	SM4500 series	<30	NA
Dissolved Oxygen	SM4500 series	<30	85-115
Total Recoverable Metals (wastewater)	EPA 200 series or SM310 series	See specific metal	See specific metal
Sample Preparation	EPA 200.2	NA	NA
Total Metals (sludge) Sample Preparation	EPA SW-846 3050A	NA	NA
Total Metals (sludge) Arsenic	EPA SW-846 7060	<20	See control chart
Total Metals (sludge) Chromium	EPA SW-846 7190	<20	See control chart
Total Metals (sludge) Nickel	EPA SW-846 7520	<20	See control chart
Whole Effluent Toxicity (WET)	EPA/ 600/4-91/002	<20	>90 (Control survival)

Footnotes:

1. "SM" means Standard Methods for Examination of Water and Wastewater, 18th, 19th, ,20th or online editions.
   "EPA" means Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020, March 1983.
   "EPA SW-846" means Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, 3rd Edition.
   "EPA/600/4-91/002" means Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms, 2nd edition, Environmental Monitoring Systems Laboratory, U.S. EPA, Cincinnati, Ohio (July 1994)

B5. Quality Control

At least once during every quarter that samples are taken, the QA Officer will perform duplicate analysis of all parameters. Variation of duplicate values for each parameter must not exceed the range of precision and accuracy discussed in the A.7 Data Quality Objectives and Criteria for Measurement of Data, and Table 2 above. Any problems found with data collected are noted on the data sheets and in laboratory logbooks. The Project Quality Assurance Officer initials any changes to data.

Any DMR performance evaluation results are kept on file at the facility's laboratory and will be available for review by ADEC upon request.

B6. Instrument/Equipment Testing, Inspection and Maintenance

Before each sampling and analysis event, all instruments and equipment will be inspected prior to use. All testing instruments and equipment will be clean and in good working order before it is used for monitoring.

Routine maintenance for all meters will be conducted according to schedules and procedures described in manuals provided by the manufacturers and a maintenance log will be kept for each instrument.

A supply of replacement equipment and reagents is kept in the laboratory. This supply includes extras of commonly lost or broken equipment and enough reagents to perform all scheduled analysis procedures for at least 3 months. Reagent stocks are rotated out every four to six months or according the manufacturer’s recommendation.

This information will be recorded on data sheets and in laboratory logbooks and will be available to ADEC for review upon request.

B7. Instrument/Equipment Calibration and Frequency

All field and laboratory instruments and equipment will be calibrated according to the manufacturers’ instructions. Records of calibration dates will be kept on calibration log sheets, and will be available for review by ADEC upon request.

B8. Inspection/Acceptance of Supplies and Consumables

Chemicals will be checked for expiration date, sufficient quantity and discoloration.

All equipment, meters, kits and supplies will be checked upon receipt by the Quality Assurance Officer or his/her designee to ensure that they are within technical specifications before use. Each reagent will be dated with the expiration date. An Equipment/Supply Inspection Form which includes reagent expiration dates will be completed and kept on file in the laboratory. This form will be updated each time new or replacement equipment or reagents are received, and will be available to ADEC for review upon request.

B9. Non-Direct Measurements - Not Applicable.

B10. Data Management

Data will be entered onto field data sheets and into laboratory logbooks and bench sheets. The Quality Assurance Officer or his designee will enter data into the APDES Discharge Monitoring Report (DMR) form each month.

The following is a list of data information records that are kept available at the facility's laboratory for ADEC review upon request:

Training Records
Field equipment and chemicals maintenance, cleaning and calibration records
Field logbooks and/or field data sheets
Chain-Of-Custody and/or Transmission forms
Laboratory equipment and reagents maintenance, cleaning and calibration records
Laboratory bench sheets, control charts, SOP's
Records of QA/QC problems and corrective actions (field and/or laboratory)
Laboratory data QC records
Records of Data review sheets
Duplicate, split sample, performance evaluation records and other QA/QC control records (field and laboratory)
Assessment records
Data review, verification and validation records

Whenever possible data results will be entered electronically and transferred electronically to avoid transcription errors.

C. Assessment and Oversight

C1. Assessments and Response Actions

The Quality Assurance Officer will ensure that the field and laboratory forms are complete when he checks for any errors. He will compare approximately 10% of the data sheets or logbook entries with the DMR entries. If any errors are found the Quality Assurance Officer will verify correct entry by comparing another 10% of the sheets.

Should the sampling staff, laboratory personnel or Quality Assurance Officer find errors in sampling or analysis, the Quality Assurance Officer will notify the Project Manager and the party responsible for the error or deficiency, and will recommend methods of correcting the deficiency. The responsible party will then take action to correct the problem and will report corrections to the QA Officer and Project Manager. See above for how this information is recorded and reported.

If an EPA-approved laboratory sends the facility a water sample, which the facility's laboratory analyzes for the standard required effluent parameters, these results are sent to ADEC where a performance evaluation takes place. The facility is notified whether it meets accuracy and precision requirements. Records of these performance evaluations will be available for ADEC review upon request.

The Quality Assurance Officer will monitor the quarterly duplicate sampling and analysis activities and will review these results. The Quality Assurance Officer will keep these assessment records available for review by ADEC.

Additionally, the facility is inspected and/or audited regularly by ADEC or EPA.

C2. Reports to Management

Monitoring results are summarized on the Discharge Monitoring Report (DMR's), included in the permit and are submitted to ADEC each month. (An example DMR form is found in the Appendices to the permit).

Quarterly and Annual Assessment Reports will be submitted by the Project Quality Assurance Officer to the Project Manager. Any improvements to Quality Assurance and/or Quality Control will be implemented as necessary. Records of changes will be available for ADEC review. ADEC will be notified if changes/improvements require an amended QAPP.

D. Data Validation and Usability

D1. Data Review, Validation & Verification Requirements

The Quality Assurance Officer will perform at least quarterly quality checks of data packages to detect correctable problems. Any problems noted will be immediately brought to the attention of the Project Manager. Items to be checked include data sheets, logbooks, data entry, Discharge Monitoring Reports (DMR's), calibration logs, and custody/transmission forms.

Questions to be considered during these quality checks include:

- Were correct methods used?
- Were holding times met?
- Were accuracy and precision within data quality objectives?
- Were reporting limits correct?
- Were lab qualifiers provided and explanations and corrective actions taken if there were anomalies in the data?
- Was the data package as a whole for each sampling event complete?

D2. Validation and Verification Methods

The Quality Assurance Officer will check the accuracy and precision of data to ensure that data quality objectives are being met.

Data sheets and/or logbooks must be completely filled out and signed at the time of sampling and analysis. The Quality Assurance Officer will review data sheets and/or logbooks for accuracy, precision, missing or illegible information, errors in calculation and values outside the expected range. The Quality Assurance Officer or his designee will initial each data package upon completing this review. Any questionable data will be brought to the attention of the field and/or laboratory personnel for resolution. The Quality Assurance Officer will initial any changes made to the data, and any action taken as a result of the data review will be specifically recorded on the data sheet. Data will then be entered into the monitoring data system, which is designed to flag any values that fall outside of the expected range for each parameter.

If data quality indicators do not meet specifications (see A7. Data Quality Objectives and Criteria for Measurement of Data and Table 2), the cause of the failure will be evaluated. If the cause is equipment failure, calibration and maintenance procedures will be reassessed and improved. If the problem is procedural error, the Quality Assurance Officer will review methods used. If accuracy and precision goals are frequently not being met, Quality Control procedures will be reviewed and, subject to ADEC approval, may be revised.

The Quality Assurance Officer or his designee will review and initial equipment maintenance logs, sample custody forms and equipment/supply inventory and inspection forms on a quarterly basis.

Verification of data accuracy will be made by the Quality Assurance Officer during quarterly quality control checks, replicate analysis and split sampling checks. The Quality Assurance Officer during the quarterly review process will make calculations and determinations for precision and completeness. Results of accuracy, precision, and completeness calculations will be kept on file at the laboratory.

D3. Reconciliation with User Requirements

The Project Manager and Quality Assurance Officer will review the permit monitoring requirements on an annual basis. Problems with quality sampling and analysis will be discussed with ADEC to ensure that permit requirements and QAPP data quality objectives are met. Modifications to monitoring required by permit will require modifications to the approved QAPP.