1765

QUALITY ASSURANCE AND QUALITY CONTROL PLAN

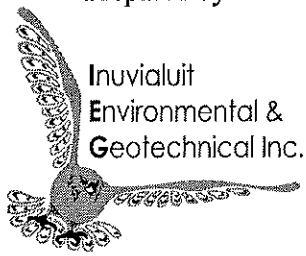
FOR

COLLECTING REPRESENTATIVE WATER SAMPLES

Prepared for

Chevron Canada Resources
500 – 5th Avenue SW
Calgary, AB
T2P 0L7

Prepared by



1338R – 36 Avenue NE
Calgary, Alberta
T2E 6T6

January 2002
Revisions April 2002

Table of Contents

1.0 INTRODUCTION..... 1
2.0 SAMPLE COLLECTION..... 1
2.1 Location..... 1
2.2 Sampling Equipment..... 1
TABLE 1..... 2
2.3 Sampling Methods..... 2
3.0 SAMPLE HANDLING..... 4
3.1 Documentation..... 4
3.2 Preservation..... 4
3.3 Transportation..... 4
4.0 LAB ANALYSIS..... 5
4.1 Lab Accreditation..... 5
4.2 Detection Limits..... 5
4.3 Methodology..... 5
TABLE 2..... 5
4.4 Reporting Requirements..... 6
TABLE 3..... 6

APPENDIX A
Definition of Terms

APPENDIX B
General instructions for calibration of; pH meter, EC meter, DO meter.

APPENDIX C
CAEAL Accreditation of Taiga Environmental Laboratory, Yellowknife, NT.

APPENDIX D
Water Licence Approval and Supporting Documents – TO BE ADDED BY CHEVRON

LIST OF TABLES
TABLE 1 –Sample Volume, Container Types, Preservation, and Holding Times
TABLE 2 – Methods of Analysis and Detection Limits
TABLE 3 – Maximum Allowable Concentrations – Grey Water Discharge

1.0 INTRODUCTION

This proposal identifies: the types of sampling required; the location of sample collection; the frequency of sampling; proper sample handling methods and documentation; and the analytical parameters for laboratory analysis, to fulfill the requirements of Indian and Northern Affairs Canada Water Resources Division and the Northwest Territories Water Board Class B Licence N7L1-1765 (Amendment). This Licence is for Ogruknang and Tumma 2001/2002 3D Seismic Program and sleigh mounted camp, located at Latitude 68° 28'00" to 68° 51'15" N and Longitude 134° 00'00" to 135° 00'00" W in the Northwest Territories.

Included in the Appendix A are basic definitions for terms used for sampling in this QA/QC Report.

2.0 SAMPLE COLLECTION

2.1 Location

Water sample collection for laboratory analysis will occur at sampling stations 1765-1 (Treated Grey-water at point of discharge). Sign posting will be used to identify the sampling location. Refer to Table 1.

2.2 Sampling Equipment

The collection of Grey-water at Station 1765-1 will require personal protective gear that should include: disposable latex or Nitrile gloves, rubber boots (waterproof), Tyvek or other protective clothing, eye protection, and hardhat (if sampling near overhead equipment). For the protection and preservation of the collected water samples, equipment would include: labels for sample identification, packing tape to protect labels, laboratory cleaned sample containers (see Table 1 for types required), coolers, ice packs, bubble wrap for packing, chain of custody forms, and completed field notes (see section 3.1). Additional equipment that may be required includes a pH meter, electrical conductivity meter, with temperature probe. A general list of instructions for calibration of pH, DO, and EC meters is placed in Appendix B. However, as the maintenance schedule and calibration is specific for each piece of analytical field equipment and for each manufacturer, please refer to manufacturer's instructions accompanying your equipment.

TABLE 1

GREY-WATER SAMPLE COLLECTION

PARAMETER	CONTAINER TYPE	SAMPLE SIZE (ml)	PRESERVATION	MAXIMUM STORAGE TIME	FREQUENCY AND LOCATION
BIWEEKLY SAMPLING					
BOD_5	Sterile Polyethylene	500 or 750	Refrigerate 4 °C	48 Hours	Biweekly – Station # 1765-1
Total Suspended Solids	Polyethylene	500 or 750	Refrigerate 4 °C	7 Days	Biweekly – Station # 1765-1
Faecal Coliforms	Sterile Polyethylene	250 or 500	Sodium Thiosulfate – Refrigerate 4 °C	24 Hours	Biweekly – Station # 1765-1
Ammonia	Polyethylene	500 or 750	Refrigerate 4 °C	28 Days	Biweekly – Station # 1765-1
Oil and Grease	Wide mouth Amber Glass	1000	4 ml 1:1 H_2SO_4 - Refrigerate	28 Days	Biweekly – Station # 1765-1

2.3 Sampling Methods

Two main categories of samples will be utilized for this program: Test Samples and Control Samples. The test sample method chosen to best characterize the site is Probability Sampling using the Simple Random Sampling method (see Appendix A). In addition to the test sampling, Quality Control (QC) sampling with field blanks, trip blanks, and duplicate samples should be performed periodically (monthly) to confirm the laboratory results.

All sampling, sample preservation, and analysis shall be conducted in accordance with method described in the current edition of "Standard Methods for the Examination of Water and Wastewater" (20^{th} edition, 1998).

When sampling in lakes and ponds, the sample bottle is lowered to mid-depth and rinsed three times before collecting the sample on the forth submersion. Ensure the sample container contains adequate room for mixing, preservative addition and thermal expansion.

When sampling stream water, the sample container is plunged into the current and rinsed three times before collecting the sample on the forth submersion. As in lake and pond water sampling, ensure the sample container contains adequate room for mixing, preservative addition and thermal expansion.

Glass containers should be used when sampling for hydrocarbon (oil and grease) concentrations.

Deviating from the above sampling protocols, water collected for faecal coliforms, and oil and grease analysis is collected during the first submersion and not rinsed three times first.

In general, the protocol for sampling is as follows:

- Acquire all necessary equipment, including; personal protective equipment, sample labels, writing tool (pencil or waterproof ink should be used to avoid running), laboratory cleaned sample containers, sample documenting forms (field notes, field screening results (field pH, Electrical Conductivity (EC), and temp values, if required), chain of custody forms, weigh bill for transportation by commercial carrier), coolers and ice packs for sample refrigeration and transportation to the laboratory, bubble wrap for packing, clear packing tape to protect sample

labels and seal cooler, camera to photo document sample collection, and any additional equipment required.

- Don personal protective equipment
- At sampling location, if required, perform field screening of pH, EC, and Temperature of Grey-water and record values in field notes.
- Label sample containers with information described in Section 3.1.
- Place clear packing tape over label to protect information from "washing off".
- Open control sample bottles of deionized (DI) water, and add analyte of known concentration (obtained from the Laboratory) and preservative if required, seal, label, and send with other samples for laboratory analysis. Note: if possible, it is preferable to fill control sample container with DI water at the site.
- Rinse sample containers with water to be sampled if necessary, do not rinse sample containers for faecal coliforms and oil and grease analysis.
- Collect sample in laboratory cleaned sample container (note: it is imperative that the collected samples be representative of the whole population (i.e. the effluent stream)). Qualitative observations of the sample should also be noted in the field notes at this time (i.e. sample colour, odour, clear-opaque, presence of particulates, etc.).
- Complete Chain of Custody form with required analysis listed for each collected sample.
- Carefully bubble wrap the sample containers and place in ice chilled cooler maintained at ~4 °C for transport directly to the laboratory for analysis. Note: this entire procedure, including the initial laboratory sample preparation, must be completed within the allowable holding time (Table 1) from the time of sampling (e.g. within 24 hours for faecal coliforms).
- Complete field notes and log samples. Retain paperwork for submission to the Board, if required.

Grey-water samples will be collected on a biweekly basis at Station 1765-1 and sent for laboratory analysis to determine the concentrations of Biological Oxygen Demand (BOD_5), Total Suspended Solids (TSS), Faecal Coliforms, Ammonia, and Oil and Grease. Refer to Table 1 for a summary of parameters to be analyzed, container size, preservation methods, and holding times.

The quality controlled blank and duplicate samples will be statistically compared to laboratory QA/QC samples. The "Quality" of the samples and sampling procedures are evaluated from the results of this comparison. If field control samples fall out of the allowable statistical standard deviation, then the sample results are invalid, and the Grey-water must be sampled again. If upon re-sampling and re-submission to the laboratory, QC samples continue to be "out of range", then complete review of the storage of containers prior to sampling, sampling procedures, and the storage and transport of the samples to the laboratory is warranted.

3.0 SAMPLE HANDLING

As sample-handling procedures are imperative to the integrity of the sample, lag times from the time of sample collection to the time of laboratory analysis must be kept to a minimum. Samples for Faecal Coliforms analysis, for example, have a holding time of 24 hours from the time of sample collection to the time of laboratory analysis. Beyond that time the analysis is not valid.

3.1 Documentation

Documentation is an important part of a Quality Assurance Program. The minimum documentation requirements (CCME 1993) for samples include:

- Sampling date
- Sampling time
- Identification number or code
- Sampler's name
- Sampling site (including coordinate/depth where relevant)
- Sampling conditions
- Sample type
- Sampling equipment
- Storage and preservation methods
- Time of storage and of preservation
- Auxiliary information (topography, distance from source, field screening values of pH, EC, and temp, etc.)
- Deviations from the sampling protocols, if any, and
- Completion of the Chain of Custody (COC) for transport directly to the laboratory.

Additional information on the sample containers to aid in efficient handling includes:

- Analysis required (not just listed on the COC), and
- Label the sample container lid with sample identification number.

3.2 Preservation

This procedure is used to ensure the integrity of the collected sample until it is laboratory analyzed. Preservation methods include; refrigeration (refrigerated storage or ice packs), the addition of chemicals (acids, other preservatives, etc), and filtration.

Preservation methods can be parameter specific, such as the addition of Sodium Thiosulfate for BOD_5 analysis, or can be a universal method, such as refrigeration. Refer to Table 1 for the specific preservation method used for each parameter to be analyzed.

3.3 Transportation

The collected samples with complete documentation (sample identification and chain of custody form, as described in Section 3.1) are to be packed in bubble wrap and placed in coolers with ice packs or

refrigerated. The packed samples are to be sent directly to the laboratory for analysis (Taiga Environmental Laboratory in Yellowknife, NT) as soon as possible. Therefore, due to the remoteness of the site, sample collection times must be logistically organized with transportation schedules to the laboratory. This will ensure the samples arrive at the laboratory and are analyzed within the allowable holding time.

4.0 LAB ANALYSIS

4.1 Lab Accreditation

See Appendix C for Canadian Association for Environmental Analytical Laboratories (CAEAL) accreditation of Taiga Environmental Laboratory.

4.2 Detection Limits

Refer to Table 2 in Section 4.3 for detection limits for each parameter.

4.3 Methodology

Refer to Table 2 for laboratory methods for each parameter.

TABLE 2

METHODS OF ANALYSIS AND DETECTION LIMITS

PARAMETER	TAIGA CODE	TEST METHOD[1]	DETECTION LIMIT
BIWEEKLY SAMPLING			
BOD_5	TEL019	APHA 5210 B - 5 Day incubation	2 mg/L
Total Suspended Solids	TEL008	APHA 2540 D	3 mg/L
Faecal Coliforms	TEL017	APHA 9221-E	1 CFU/dL
Ammonia	TEL013	APH 4500 NH3/H	0.005 mg/L
Oil and Grease	TEL024	APHA 5520 B	0.2 mg/L

[1]Refer to Standard Methods for the Examination of Water and Wastewater 20th Edition (1998)

4.4 Reporting Requirements

As indicated in the "Surveillance Network Program" appended to Chevron Canada Resources' Class B Water Licence N7L1-1765;

> "The Licencee Shall, within thirty (30) days following the month being reported, submit to the Board all data and information required by the "Surveillance Network Program" including the results of the approved Quality Assurance Plan."

TABLE 3

MAXIMUM ALLOWABLE CONCENTRATIONS
GREY WATER DISCHARGE

SAMPLE PARAMETER	MAXIMUM ALLOWABLE CONCENTRATION
BOD_5	30.0 mg/L
Total Suspended Solids (TSS)	35.0 mg/L
Oil and Grease	5.0 mg/L
pH	6 to 9

In addition to the monthly reporting of Grey-water quality, Chevron Canada Resources shall file an Annual Report with the Board not later than March 31 of the year following the calendar year reported. This report shall contain;

- The total quantities in cubic metres of fresh water obtained from all sources,
- The total quantities in cubic metres of each and all waste discharged,
- The results of sampling carried out under the Surveillance Network Program,
- The frequency of field blanks and field replicate sample collection and reporting,
- A summary of any modifications carried out on the Water Supply and Waste Disposal Facilities, including all associated structures,
- A list of any spills and unauthorized discharges, and
- Any other details on water use or waste disposal requested by the Board within forty-five (45) days before the annual report is due.

Definition of Terms

Quality Assurance: is the system of activities designed to better ensure that quality control is done effectively.

Quality Control: is the use of established procedures to achieve standards of measurement for the three principal components of quality; precision; accuracy; and reliability.

There are two main categories of samples; Test Samples and Control Samples.

Test samples are basic samples used to characterize a site. The number of test samples depends on the degree of confidence required to characterize the site and on the number of samples needed for each analytical method. There are various approaches to collecting test samples:

- *Accessibility Sampling* - The sample is restricted to a part of a population that is readily accessible. It may be justified when resources of time, money or physical access, prevent any other type of sampling being taken, but there is little other justification.
- *Haphazard Sampling* - Taken when, although other samples may be accessible, there is no plan to control the probability of choosing a sample. It is really of value only if a very homogenous population over time and space is being sampled, which is generally unknown at the time of sampling (if it was known, samples would probably not be required). This is very difficult to justify and this method is not recommended.
- *Judgment (or Purposive) Sampling* - Taken when specific samples are selected for their unique value of interest, not for making inferences about the population. Judgment Samples may also be taken when the target population is well defined and homogenous, but the same concerns described for Haphazard Sampling apply. Since you are generally sampling because you do not know the population, this is not recommended.
- *Probability or Representative Sampling (suggested for this project).* Probability or representative sampling is the most important type of sampling and is aimed at ensuring that valid conclusions can be drawn about a population from a sample. Various approaches to this include;
- *Random Sampling* – the sample is selected by chance mechanism with known probability of selection. This method of sampling is also divided into Simple Random Sampling and Stratified Random Sampling.
    - *Simple Random Sampling* – When a population is large and homogeneous and every possible sample has an equal probability of being selected.
    - *Stratified Random Sampling* – When a population is large and heterogeneous, it can be subdivided, the subdivisions sampled and, if necessary, the results combined.
- *Grid Sampling* – When systematic samples are taken in a specified pattern, usually a grid, with the samples collected at the grid nodes.
- *Stratified Sampling* – When a specified number of random samples are taken in a specified pattern or within a cell, usually a grid.

Control samples / Quality Control (QC) samples, which may be simulated samples, are used to control the analytical process. They are often regarded as synonymous with QC check samples. The term is also used to describe samples taken outside the target area, in order to provide a "background" reading.

Preservation refers to control methods used to ensure the integrity of the collected sample until it is laboratory analyzed. Preservation methods include; refrigeration (refrigerated storage or ice packs), the addition of chemicals (acid, base, preservatives, etc), and filtration.

Detection Limit refers to the minimum concentration of analyte that can be measured above the background noise of an instrument.

Analyte is a solution containing the parameter of interest in a known or unknown concentration.

PH Meter

INTRODUCTION TO pH

Introduction

pH is a unit of measure which describes the degree of acidity or alkalinity of a solution. It is measured on a scale of 0 to 14. A pH of 7 is neutral, 0 is extremely acid and 14 is extremely alkaline (basic). pH values of some common substances are listed below.

0.35 battery acid
2.35 lemon juice
2.90 vinegar
4.30 orange juice
5.00 boric acid
6.20 corn
6.70 milk
7.00 distilled water
7.50 blood
8.00 sea water
8.40 baking soda
9.30 borax
10.25 milk of magnesia
11.40 ammonia
12.60 bleach
14.60 household lye

pH Measurement

A rough indication of pH can be obtained using pH papers or indicators, which change color as the pH level varies. These indicators have limitation on their accuracy, can be difficult to interpret correctly in colored or murky samples.

More accurate pH measurements are obtained with a pH meter. A pH measurement system consists of three parts:

1. A pH measurement electrode.
2. A measurement electrode.
3. A high input impedance meter.

The pH electrode can be thought of as a battery, with a voltage that varies with the pH of the measured solution. The pH measuring electrode is a hydrogen sensitive glass bulb, with a millivolt output that varies with the changes in the relative hydrogen ion concentration inside and outside of the bulb. The reference electrode output does not vary with the activity of the hydrogen ion.

The pH meter is basically a high impedance amplifier that accurately measures the minute electrode voltages and displays the results directly in pH units on either an analog or digital display.

Storage, Use and Maintenance

Over 80% of pH measurement difficulties are due to electrode problems. Proper storage, use and maintenance increase accuracy.

Storage: Electrodes should be stored so that the probe is keep moist and not allowed to dry out. Put a few drops of storage solution in the protective cap before putting the cap on. Never store the electrode in distilled or deionized water. Commercial soaking solutions are available or you can make your own by mixing a 1M KCl solution adjusted to pH 4.0.

Use and Maintenance: Electrodes should always be used in a vertical position.

- Electrodes should be rinsed between samples with distilled or deionized water.
- NEVER wipe an electrode to remove excess water, just blot the end of the electrode with a lint-free paper. Wiping electrode can cause spurious reading due to static charges.
- pH electrodes are fragile, care should always be taken when using the pH meter.

Calibration Method

1. For accurate results a pH meter should be calibrated each time it is turned on.
2. Pour a small amount of pH 7.01 calibration solution into a clean container labelled with the pH.
3. Pour a small amount of pH 4.01 (or pH 10.01) calibration solution into a clean container labelled with the pH.
4. Turn the pH meter on by pressing the "ON/OFF" button.
5. Remove the protective cap.
6. Rinse the electrode and temperature probe with distilled water or pH 7.01 solution.
7. Immerse the electrode into the fresh pH 7.01 solution. The electrode should be approximately 4 cm in the solution.
8. Gently stir the electrode and wait for the reading to stabilize.
9. When the reading stabilizes, press the "CAL" button.
10. Wait for the "pH" symbol to stop flashing and press the "CFM" button.
11. The symbol "E5" will flash.
12. Take the electrode and temperature probe out of the pH 7.01 solution and rinse with distilled water or pH 4.01 (or pH 10.01) solution.
13. Immerse the electrode and temperature probe into the fresh pH 4.01 (or pH 10.01) solution.
14. Gently stir the electrode and wait for the reading to stabilize.
15. The "E5" symbol will disappear and the pH reading will flash.
16. When the pH reading stops flashing press the "CMF" button.
17. Take the electrode and temperature out of the pH 4.01 (or pH 10.01) solution and rinse with distilled water.
18. The meter is now ready to take sample readings. Go to the "*Sampling Method*" section below.

Sampling Method

1. Make sure electrode and temperature probe are rinsed.
2. Submerge the electrode and temperature probe in the sample water.
3. Gently stir the electrode in the sample to supply fresh water to the probe.
4. Let the display reading stabilize.
5. Record temperature and pH readings.
6. Rinse the electrode and temperature probe with clean water.
7. Repeat steps 1 to 6 for each sample.
8. Turn meter off and rinse electrode and temperature probe.
9. Put a few drop of storage solution in protective cap.
10. Put protective cap on electrode.
11. Before storing the meter, make sure it is turned off.

EC Meter

Introduction to Electrical Conductivity (EC)

Introduction

The conductivity of a water sample is the measure of its ability to carry an electrical current and the more dissolved solids in the water, the greater its electrical conductivity. In order to measure the amount of total dissolved solid, the sampler must first determine the conductivity of the water sample and then multiply that number by 0.67. The formula for this equation goes as follows: Total Dissolved Solids (TDS) in PPM = Electrical Conductivity (in micro-Siemens/cm) x 0.67. MicroSiemens/cm is the metric unit of measurement of conductivity.

Calibration

Before measuring the conductivity of a water sample, the sampler must first calibrate the conductivity meter. To calibrate the meter, the sampler must measure a "standardized solution" of known electrical conductivity. Turn the conductivity meter on. The sampler must rinse the electrode at the bottom of the probe with distilled water and afterwards blot the probe dry with a tissue. If the display on the conductivity meter does not read the standard solution value, then the sampler must adjust the instrument with a small screwdriver.

Sample Measurement

The sampler must first repeat the steps used to calibrate the instrument. After turn the instrument on, the sampler must rinse the probe with distilled water and blot dry. Immerse the EC probe in to the water sample and gently stir the sample for a few seconds to allow the display value to stabilize. Read and record the value displayed on the meter.

EC Meter General Maintenance

- Do not immerse the EC probe above the immersion level.
- When not in use, switch off the meter and replace the protective cap.
- To improve performance, clean the probe electrodes periodically by rinsing them in distilled water.
- Replace all batteries if the display become faint or disappears or if the reading are unstable or constant.

DO Meter

INTRODUCTION TO DISSOLVED OXYGEN (DO)

Introduction

Dissolved oxygen (DO) is the amount of molecular oxygen dissolved in water. Because oxygen is required for most aquatic life and many microorganisms, DO is one of the most important criteria in determining the quality of a natural water. The air we breathe is approximately 20% oxygen and the water fish "breathe" is less than 10mg/L (or 0.001%).

The amount of DO decreases with increasing water temperature. So cold water can contain more dissolved oxygen than warm water. The saturation dissolved oxygen at given temperatures is given below (the maximum DO in water at given temperatures):

0°C	14.6 mg/L
5°C	12.8 mg/L
10°C	11.3 mg/L
15°C	10.1 mg/L
20°C	9.1 mg/L
25°C	8.3 mg/L
30°C	7.6 mg/L

DO Measurement

DO can be measured using chemicals or with a DO meter. In the field a DO meter is always used. DO measurements for meters are typically given in mg/L.

For a DO meter, a thin semi-permeable membrane, stretched over a sensor, isolates the sensor elements from the environment, but allows oxygen and certain other gases to enter (pass through the membrane). When a polarizing voltage is applied across the sensor, oxygen that has passed through the membrane reacts at the cathode, causing a current to flow. Oxygen diffuses through the membrane at a rate proportional to the pressure difference across it. Since oxygen is rapidly consumed at the cathode, it can be assumed that the oxygen pressure inside the membrane is zero. Hence, the amount of oxygen diffusing through the membrane is proportional to the absolute pressure of oxygen outside the membrane. If the oxygen pressure increases, more oxygen diffuses through the membrane and more current flows through the sensor, giving a higher DO reading. A lower pressure results in less current, giving a lower DO reading.

Storage, Use and Maintenance

Storage: The protective cap should be kept on the probe when the probe is not is use to protect against damage and dirt.

Use and Maintenance: The platinum cathode (is seen when replacing the membrane) should also be bright and untarnished. If it is tarnished or stained the cathode should be cleaned.

- To clean the cathode, use a clean lint-free cardboard or cloth. Rub the cathode very gently side to side 4 to 5 times. Take care not to damage the platinum tip.
- After cleaning the cathode, rinse the probe with deionized or distilled water and install a new membrane using instruction below.
- In order to have accurate and stable measurements, the surface of the membrane should be in perfect condition.
- If any dirt is observed on the membrane, rinse carefully with distilled or deionized water. If any imperfection still exists, or any damage is evident (such as wrinkles, tears or holes) the membrane should be replaced.
- Make sure that the O-ring is properly seated in the membrane cap.

Changing the Membrane: To replace the membrane or refill with electrolyte, proceed as follows:

1. Remove the protective cap by gently twisting and pulling it off the body of the probe.
2. Unscrew the membrane by turning if counter-clock-wise with the other hand.
3. Wet the sensor by soaking the bottom 2.5cm of the probe in electrolyte for 5 minutes.
4. Rinse the new membrane with electrolyte while shaking it gently. Refill with clean electrolyte.
5. Gently tap the sides of the membrane with your fingertip to ensure that no air bubbles remain trapped. Do not directly tap the bottom with your finger as this will damage the membrane.
6. Make sure that the rubber O-ring is seated properly inside the membrane cap.
7. With the sensor facing down, screw the membrane cap clock-wise. Some electrolyte will overflow.

Calibration Method

1. For accurate results a DO meter should be calibrated each time it is turned on.
2. Turn the DO meter on by pressing the "ON/OFF" button.
3. It can take as long as 15 minutes for the DO probe to stabilize, therefore meter calibration should be performed after a 15 minute "warm-up" period.
4. The meter is generally left on throughout the working day, since it takes so long to stabilize.
5. Remove the protective cap from the DO probe.
6. Dip the probe into zero oxygen solution.
7. Stir gently for 2 to 3 minutes.
8. Allow another 2 minutes for reading to stabilize.
9. Adjust the zero DO calibration trimmer until the display reads "0.0".
10. Rinse the probe in a large amount of clean water to remove any residual zero oxygen solution.
11. Dry the probe tip.
12. Allow a few minutes for the readout to stabilize.
13. Press and hold the "CAL" button.
14. Adjust the slope trimmer on the top of the meter to read "100%" on the display (while still holding the "CAL" button).
15. Release the "CAL" button and the display will give the value of oxygen in mg/L.

16. Steps 6 to 10 only need to be preformed after the membrane or electrolyte are changed. When the membrane or electrolyte have not been changed steps 6 to10 can be skipped.
17. The meter is now ready to take sample readings. Go to the "*Sampling Method*" section below.

Sampling Method

1. Make sure your probe is rinsed.
2. Immerse the tip of the probe in the water sample.
3. Make sure temperature sensor is also immersed.
4. Gently stir the probe in sample to supply fresh water to the probe.
5. Let the display reading stabilize.
6. Record temperature and DO readings.
7. Rinse the probe with clean water.
8. Repeat steps 1 to 7 for each sample.
9. Put protective cap on electrode.
10. Before storing the meter, make sure it is turned off.

FAX COVER SHEET

DEPT. OF INDIAN & NORTHERN AFFAIRS, CANADA

Environmental Laboratory
Laboratoire Environnemental

Taiga Environmental Laboratory
4601 - 52 Avenue, P.O. Box 1500
Yellowknife, NT X1A 2R3
Telephone: (867) 669-2788
Facsimile: (867) 669-2718

To: Baub Kyle
Inuvialuit Environmental & Geotechnical Inc.
Fax (403) 291-1150

Date: January 9, 2002

From: Kathleen Puznicki
Environmental Chemist
Phone (867) 669- 2781

# of pages including cover: 7

Message: Attached are:

1) Taiga Env. Lab (TEL) Sampling Instructions, describing the bottle type, size, preservative, and instructions for collection (1 page)
2) TEL Soope of Accreditation with the Standards Council of Canada/CAEAL (4 pages)
   Note: Ammonia and Oil & Grease were recently added to our proposed scope; final word on our assessment for accrediting these tests is expected shortly.
3) Copy of our Certificate of Accreditation (1 page)

Additional information you requested:

Parameter:	Holding Time:	Detection Limit:
BOD_5	48 hours	2 mg/L
Total Suspended Solids	7 days	3 mg/L
Fecal Coliforms	24 hours	1 CFU/dL
Ammonia (after preservation @ TEL)	28 days	0.005 mg/L
Oil and Grease	28 days	0.2 mg/L

If you require more information, please do not hesitate to call.

Regards,

SAMPLING INSTRUCTIONS

Parameter Group	Marking	Bottle Description	Preservative	Instructions
Routine	GREEN	500 or 750 mL plastic bottle	Keep cool at 4°C	**Rinse bottle 3 times with sample**, then fill to top and cap bottle.
Nutrients	BLACK	500 or 750 mL plastic bottle	Keep cool at 4°C	
Microbiological	STERILE	250 or 500 mL bottle containing sodium thiosulfate	Keep cool at 4°C	**DO NOT RINSE bottle.** Fill to near top and cap bottle.
Total Metals	RED	250 mL plastic bottle	5 mL of 1:3 nitric acid (<20% acid) in RED-dot vial	**Rinse bottle 3 times with sample**, then fill to near top. Add contents of preservative vial(s). Cap bottle and mix.
Mercury	ORANGE	150mL glass bottle with black top or 250 mL teflon bottle	2 mL 1:1 sulphuric acid + 1 mL 5% potassium dichromate (per 125 mL sample) in ORANGE-dot vials	
Dissolved Metals	RED	250 mL plastic bottle	SEE INSTRUCTIONS	**Rinse bottle 3 times with sample**, then fill to near top. Filter in the field through a pre-rinsed 0.45 µ membrane filter, collecting filtrate in another 250 mL RED-dot bottle. Add RED-DOT preservative, cap and mix. *If unable to filter sample in the field **DO NOT ADD PRESERVATIVE** and label as "dissolved metals--unfiltered, unpreserved."*
Oil & Grease	YELLOW	1 L brown glass **WIDE**-mouthed bottle	4 mL 1:1 sulphuric acid in YELLOW-dot vial	**DO NOT RINSE bottle. Fill to shoulder of bottle.** Add contents of preservative vial. Cap bottle and mix.
Phenol	YELLOW	1 L brown glass **NARROW**-mouthed bottle	4 mL 1:1 sulphuric acid in YELLOW-dot vial	**Rinse bottle 3 times with sample**, then fill to near top. Add contents of preservative vial(s). Cap bottle and mix.
Cyanide	BLUE	500 mL brown plastic bottle	5 mL 10% sodium hydroxide in BLUE-dot vial	
Sulphide	PURPLE	250 mL plastic bottle	1 mL 6N zinc acetate + 3 mL 10% sodium hydroxide in PURPLE-dot vials	
Chlorine	PINK	250 mL plastic bottle	Keep cool at 4°C	**Rinse bottle 3 times with sample**, then fill to top, **leaving NO air space/gap.**
BTEX/Volatile Organics	WHITE	40 mL clear glass vial with white lid	Keep cool at 4°C	**DO NOT rinse bottle.** Fill bottle completely, leaving **NO air space/gap.**

SCOPE OF ACCREDITATION

Indian & Northern Affairs Canada
TAIGA ENVIRONMENTAL LABORATORY
P.O. Box 1500, 4601 - 52nd Avenue
YELLOWKNIFE NT X1A 2R3

Accredited Laboratory No. 187

CONTACT:	Mr. William Coedy	TEL.: (403) 920-8129 FAX.: (403) 873-9300
CLIENTS SERVED:	All interested parties.	
FIELD(S) OF TESTING:	Biological, Chemical/Physical.	
PROGRAM SPECIALTY AREA:	Environmental	
ISSUED ON:	2000-12-08	VALID TO: 2002-03-06

ENVIRONMENTAL AND OCCUPATIONAL HEALTH AND SAFETY

Environmental:

Soil/Sediment

(Arsenic - Soil)

TEL 032; based on EPA 3050 B	HYDRIDE AA - DIGESTION Arsenic

(Mercury - Soil)

TEL 034 B; based on #2 JONASSON ET AL (1973) GSC, #1 EPA 7471A	COLD VAPOUR AA - DIGESTION Mercury

(Metals - Soil)

TEL 038; based on EPA 200.8	ICP/MS - DIGESTION Cadmium

	Copper Lead Zinc

Water (Inorganic)

(Alkalinity (pH 4.5) - Water)

TEL003; APHA 2320B	TITRIMETRIC Alkalinity (pH 4.5)

(BOD (5 Day) - Water)

TEL 019; APHA STD METHODS (1995) 5210 B	D.O. METER BOD (5 day)

(CN (SAD) - Water)

TEL022; APHA 4500-CN/E, NAGASHIMA ET AL (1981) ANAL. CHEM. VOL10 pp99-106	COLOR - DISTILLATION CN (SAD)

(Chloride - Water)

TEL010; APHA 4500-CL/E	AUTOCOLOR Chloride

(Conductivity (25°C) - Water)

TEL002; APHA 2510-B	CONDUCTIVITY METER Conductivity (25 °C)

(Fluoride - Water)

TEL004; APHA 4500-CL/E	SELECTIVE ION ELECTRODE Fluoride

(Iron - Water)

TEL031; ENVIRODAT 26004	AA FLAME Dissolved Iron

(Major Ions - Water)

Accredited Laboratory No. 187

TEL026/027/029/030; EPA 200.7/APHA 3111B	AA FLAME Dissolved Calcium Dissolved Magnesium Potassium Sodium
(Metals - Water/ICP)	
TEL035; EPA 200.8	ICP/MS Dissolved Cadmium Dissolved Chromium Dissolved Cobalt Dissolved Copper Dissolved Iron Dissolved Lead Dissolved Nickel Dissolved Vanadium Dissolved Zinc
(Nitrate plus Nitrite - Water)	
TEL014; APHA 4500-NO3/F	AUTOCOLOR Nitrate plus Nitrite
(PH - Water)	
TEL001; APHA 4500-H, EPA 335.4 (1993)	pH METER pH
(Phosphorus - Total - Water)	
TEL015; US EPA 365.1	AUTO COLOR - DIGESTION Total Phosphorus
(Silica - Reactive - Water)	
TEL012; APHA 4500-Si/F	AUTOCOLOR Reactive Silica
(Total Suspended Solids - Water)	

OFFICIAL/NON-RESTRICTED
Somers

Accredited Laboratory No. 187

TEL008; EPA 160.1/APHA 2540D	GRAVIMETRIC Total Suspended Solids

Water (Microbiology)

(Coliforms - Water)

TEL017; APHA 9221-E/9222-C	MEMBRANE FILTRATION Fecal Coliforms Total Coliforms

Footnotes:

TEL #	Taiga Environmental Laboratory In-House Test Methods

FOR

D.W. Wilson, Director, Conformity Assessment

CAEAL 2635, SCC 1003-15/257
Partner: CAEAL

CERTIFICATE OF ACCREDITATION

CERTIFICAT D'ACCRÉDITATION

Indian & Northern Affairs Canada
TAIGA ENVIRONMENTAL LABORATORY
4601 - 52nd Avenue, Yellowknife, Northwest Territories

having been assessed by the Canadian Association for Environmental Analytical Laboratories (CAEAL) Inc., under the authority of the Standards Council of Canada (SCC), and found to comply with the requirements of the ISO/IEC Guide 25, the conditions established by the SCC and the CAEAL proficiency testing program, is hereby recognized as an

ACCREDITED ENVIRONMENTAL LABORATORY

for specific tests or types of tests listed in the scope of accreditation approved by the Standards Council of Canada.

ayant été soumis à une évaluation par l'Association canadienne des laboratoires d'analyse environnementale (ACLAE) Inc., sous l'autorité du Conseil canadien des normes (CCN), et ayant été trouvé conforme aux prescriptions du Guide ISO/CEI 25, aux conditions établies par le CCN et au programme d'essais d'aptitude de l'ACLAE, est de fait reconnu comme

LABORATOIRE DE L'ENVIRONNEMENT ACCRÉDITÉ

pour des essais ou types d'essais déterminés inscrits dans la portée d'accréditation approuvée par le Conseil canadien des normes.

Accredited Laboratory No.
No de laboratoire accrédité : 187

Date d'accréditation	Émis ce	Date d'expiration
Accreditation date: 1995-03-06	Issued on: 1998-06-09	Expiry date: 2002-03-06

Chair (SCC) / Présidente (CCN)

Assessment performed according to the *General Requirements for the Accreditation of Calibration and Testing Laboratories*, CAN-P-1 (ISO/IEC Guide 25), *Requirements for the Competence of Environmental Analytical Laboratories*, CAN/CSA-Z753 and the *Conditions for the Accreditation of Calibration and Testing Laboratories*, CAN-P-1515.
The scope of accreditation is available from the accredited laboratory or SCC.

Évaluation effectuée conformément aux *Prescriptions générales concernant la compétence des laboratoires d'étalonnage et d'essais*, CAN-P-1 (Guide ISO/CEI 25), *Exigences visant les compétences des laboratoires de l'environnement*, CAN/CSA-Z753 et les *Conditions d'accréditation des laboratoires d'étalonnage et d'essais*, CAN-P-1515.
La portée d'accréditation est disponible auprès du laboratoire accrédité ou du CCN.

FAX COVER SHEET

DEPT. OF INDIAN & NORTHERN AFFAIRS, CANADA

Environmental Laboratory
Laboratoire Environnemental

Taiga Environmental Laboratory
4601 - 52 Avenue, P.O. Box 1500
Yellowknife, NT X1A 2R3
Telephone: (867) 669-2788
Facsimile: (867) 669-2718

To: Baub Kyle
Inuvialuit Environmental & Geotechnical Inc.
Fax (403) 291-1150

Date: January 10, 2002

From: Kathleen Puznicki
Environmental Chemist
Phone (867) 669- 2781

# of pages including cover: 1

Message: I apologize for omitting this information from yesterday's fax:

Ammonia:	Method ID:	TEL 013
	Method:	APHA Standard Methods 4500-NH3:G Colourimetry
Oil & Grease:	Method ID:	TEL 024
	Method:	APHA Standard Methods 5520:B Extraction/Gravimetric

If you require any more information, please do not hesitate to contact me.

Regards,

NORTHWEST TERRITORIES WATER BOARD

LICENSEE:	Chevron Canada Resources
LICENCE NUMBER:	N7L1-1765
EFFECTIVE DATE OF LICENCE:	December 1, 2001
EFFECTIVE DATE OF SURVEILLANCE NETWORK PROGRAM:	December 1, 2001

SURVEILLANCE NETWORK PROGRAM

A. Location of Sampling Stations

Station Number	Description
1765-1	Treated Greywater at the point of discharge.

B. Sampling and Analysis Requirements

1. Water at Station Number 1765-1, shall be sampled every two weeks, and analysed for the following parameters:

BOD_5	Total Suspended Solids
Oil and Grease	Faecal Coliforms
Ammonia	

2. More frequent sample collection maybe required at the request of an Inspector.

2. The Licensee will maintain a copy of the Emergency Response Plan onsite in a readily available location, to the satisfaction of an Inspector.

3. The Licensee shall ensure that petroleum products, hazardous material and other wastes associated with the project do not enter any Waters.

4. The Licensee shall ensure that all containment berms are constructed of an impermeable material, to the satisfaction of an Inspector.

5. If, during the period of this Licence, an unauthorized discharge of waste occurs, or if such a discharge is foreseeable, the Licensee shall:

   a) report the incident immediately via the 24 Hour Spill Report Line (867) 920-8130; and

   b) submit to an Inspector a detailed report on each occurrence not later than thirty (30) days after initially reporting the event.

NORTHWEST TERRITORIES WATER BOARD

Witness

Chairman

b) such Modifications do not place the Licensee in contravention of either this Licence or the *Act;*

c) an Inspector has not, during the five (5) days following notification of the proposed Modifications, informed the Licensee that review of the proposal will require more than five (5) days; and

d) an Inspector has not rejected the proposed Modifications.

2. Modifications for which all of the conditions referred to in Part E, Item 1 have not been met may be carried out only with written approval from an Inspector.

3. The Licensee shall provide to the Board as-built plans and drawings of the modifications referred to in this Licence within ninety (90) days of completion of the modifications.

PART F: CONDITIONS APPLYING TO STREAM AND WATER BODY CROSSINGS

1. The Licensee shall ensure that only clean snow is used on all stream or Water body crossings and that no debris is left on the surface of the crossings.

2. Stream or Water body crossings shall be notched or removed before spring break-up to facilitate natural flow.

3. The removal of naturally occurring material from the bed or banks of any stream or Water body below the ordinary high water mark is not permitted.

PART G: CONDITIONS APPLYING TO CONTINGENCY PLANNING

1. Prior to commencement of operations the Licensee shall submit to the Board for approval, a Contingency Plan in accordance with the Board's "Guidelines for Contingency Planning, January 1987", or subsequent edition.

2. All Greywater Waste being discharged shall meet the following interim requirements at 1765-1:

Sample Parameter	Maximum Allowable Concentration
BOD_5	30.0 mg/L
Total Suspended Solids	35.0 mg/L
Oil and Grease	5.0 mg/L

The Waste discharged shall have a pH between 6 and 9.

3. All analyses shall be conducted in accordance with methods prescribed in the current edition of "Standard Methods for the Examination of Water and Wastewater" or by such other methods as may be approved by an Analyst.

4. Any Greywater which does not meet the requirements outlined in Part D, Item 2 shall be directed to the Greywater steamer as described in the Project Description, with the produced sludge disposed of at an approved landfill or as otherwise approved by an Inspector.

5. The Licensee shall ensure that all Toilet Wastes are disposed of at an approved sewage lagoon. If such Wastes are not disposed of at an approved sewage lagoon, the Licensee shall dispose of all Toilet Wastes in the manner outlined in the Project Description. All ash created from the disposal of Toilet Wastes are to be disposed of at an approved landfill facility or as otherwise approved by an Inspector.

6. The Licensee shall dispose of all solid wastes in a manner acceptable to the Inspector.

PART E: CONDITIONS APPLYING TO MODIFICATIONS

1. The Licensee may, without written approval from the Board, carry out Modifications to the planned undertakings provided that such Modifications are consistent with the terms of this Licence and the following requirements are met:

   a) the Licensee has notified an Inspector in writing of such proposed Modifications at least five (5) days prior to beginning the Modifications;

2. The Licensee shall comply with the "Surveillance Network Program" annexed to this Licence, and any amendment to the said "Surveillance Network Program" as may be made from time to time, pursuant to the conditions of this Licence.

3. The "Surveillance Network Program" and compliance dates specified in the Licence may be modified at the discretion of the Board.

4. Meters, devices or other such methods used for measuring the volumes of Water used and Waste discharged shall be installed, operated and maintained by the Licensee to the satisfaction of an Inspector.

5. Prior to the use of water for municipal undertakings or the disposal of waste and pursuant to Section 17(1) of the *Act* and Section 12 of the Regulations, the Licensee shall have posted and shall maintain a security deposit of Two Hundred Thousand ($200,000.00) Dollars in a form suitable to the Minister.

6. The Licensee shall ensure a copy of this Licence is maintained at the site of operation at all times.

PART C: CONDITIONS APPLYING TO WATER USE

1. The Licensee shall obtain Water from the Mackenzie River as described in the Project Description or as otherwise approved by an Inspector.

2. The daily quantity of Water used for all purposes shall not exceed 100 cubic metres.

3. The Water intake hose used on the Water pumps shall be equipped with a screen with a mesh size sufficient to ensure no entrainment of fish.

PART D: CONDITIONS APPLYING TO WASTE DISPOSAL

1. The Licensee shall ensure that all Greywater is treated in a manner outlined in the Project Description.

"**Licensee**" means the holder of this Licence;

"**Minister**" means the Minister of Indian Affairs and Northern Development;

"**Project Description**" refers to the report titled "Project Description for the Proposed Chevron Canada Resources Winter 2001/2002 Ogruknang and Tumma Seismic Program", and dated August 2001 prepared by Inuvialuit Environmental & Geotechnical Inc.;

"**Regulations**" mean Regulations proclaimed pursuant to Section 33 of the *Northwest Territories Waters Act;*

"**Toilet Wastes**" mean all human excreta and associated products, but does not include greywater;

"**Waste**" means waste as defined by Section 2 of the *Northwest Territories Waters Act;* and

"**Waters**" mean waters as defined by Section 2 of the *Northwest Territories Waters Act.*

PART B: GENERAL CONDITIONS

1. The Licensee shall file a Final Report with the Board not later than March 31st of the year following the calender year reported which shall contain the following information:

   a) the total quantity in cubic metres of fresh Water obtained from all sources;

   b) the total quantities in cubic metres of each and all Waste discharged;

   c) a list of any spills and unauthorised discharges;

   d) results from monitoring programs; and

   e) any other details on Water use or Waste disposal requested by the Board within forty-five (45) days before the annual report is due.

PART A: SCOPE AND DEFINITIONS

1. Scope

a) This Licence entitles Chevron Canada Resources to use water and dispose of waste for industrial undertakings in the Mackenzie Delta for the Ogruknang and Tumma 2001/2001 3D Seismic Program and sleigh mounted camp located at Latitude 68°28'00" to 68°51'15" N., and Longitude 134°00'00" to 134°50'00" W., Northwest Territories;

b) This Licence is issued subject to the conditions contained herein with respect to the taking of water and the depositing of waste of any type in any waters or in any place under any conditions where such waste or any other waste that results from the deposits of such waste may enter any waters. Whenever new Regulations are made or existing Regulations are amended by the Governor in Council under the *Northwest Territories Waters Act*, or other statutes imposing more stringent conditions relating to the quantity or type of waste that may be so deposited or under which any such waste may be so deposited this Licence shall be deemed, upon promulgation of such Regulations, to be automatically amended to conform with such Regulations; and

c) Compliance with the terms and conditions of this Licence does not absolve the Licensee from responsibility for compliance with the requirements of all applicable Federal, Territorial and Municipal legislation.

2. Definitions

In this Licence: **N7L1-1765**

"**Act**" means the *Northwest Territories Waters Act;*

"**Analyst**" means an Analyst designated by the Minister under Section 35(1) of the *Northwest Territories Waters Act*;

"**Board**" means the Northwest Territories Water Board established under Section 10 of the *Northwest Territories Waters Act*;

"**Greywater**" means all liquid wastes from showers, baths, sinks, kitchens and domestic washing facilities, but does not include toilet wastes;

"**Inspector**" means an Inspector designated by the Minister under Section 35(1) of the *Northwest Territories Waters Act;*

NORTHWEST TERRITORIES WATER BOARD

Pursuant to the *Northwest Territories Waters Act* and Regulations the Northwest Territories Water Board, hereinafter referred to as the Board, hereby grants to

CHEVRON CANADA RESOURCES
(Licensee)

of 500 - 5 Avenue S.W.
CALGARY, ALBERTA T2P 0L7
(Mailing Address)

hereinafter called the Licensee, the right to alter, divert or otherwise use water subject to the restrictions and conditions contained in the *Northwest Territories Waters Act* and Regulations made thereunder and subject to and in accordance with the conditions specified in this Licence.

Licence Number	N7L1-1765 (AMENDMENT)
Licence Type	"B"
Water Management Area	NORTHWEST TERRITORIES 07
Location	Ogrukfnang and Tumma Latitude 68º28'00" to 68º51'15" N. and Longitude 134º00'00" to 134º50'00" W. NORTHWEST TERRITORIES
Purpose	TO USE WATER AND DISPOSE OF WASTE FOR INDUSTRIAL UNDERTAKINGS
Description	OIL AND GAS EXPLORATION
Quantity of Water Not to be Exceeded	100 CUBIC METRES DAILY
Effective Date of Licence	DECEMBER 1, 2001
Expiry Date of Licence	DECEMBER 31, 2002

This Licence issued and recorded at Yellowknife includes and is subject to the annexed conditions.

NORTHWEST TERRITORIES WATER BOARD

Witness

Chairman

3. All sampling, sample preservation, and analyses shall be conducted in accordance with methods prescribed in the current edition of "Standard Methods for the Examination of Water and Wastewater", or by such other methods approved by an Analyst.

4. All analysis shall be performed in a laboratory approved by an Analyst.

5. The Licensee shall, by January 31, 2002, submit to an Analyst for approval a Quality Assurance/Quality Control Plan.

6. The Plan referred to in Part B, Item 5 of the SNP shall be implemented as approved by an Analyst.

C. Reports

1. The Licensee shall, within thirty (30) days following the month being reported, submit to the Board all data and information required by the "Surveillance Network Program" including the results of the approved Quality Assurance Plan.

NORTHWEST TERRITORIES WATER BOARD

Witness

Chairman