

Cliff Bowman
4380-8-460

R E P O R T



Indian and Northern
Affairs Canada

ALBERTA REGION

BEAVER LAKE FIRST NATION:

Assessment Study of Water and Wastewater Systems and Associated Water Management Practices



ASSOCIATED
ENGINEERING



February
2002

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February 28, 2002
File: 013060

Mr. Vaughn Paul
Executive Director
First Nations (Alberta) Technical
Services Advisory Group
Suite 200, 17612 - 103 Avenue
Edmonton, Alberta
T5S 1L3

**Re: Beaver Lake First Nation
Assessment Study of Water and Wastewater Systems
and Associated Water Management Practices**

Associated
Engineering
Alberta Ltd.

1000 Pacific Plaza
10909 Jasper Avenue
Edmonton, Alberta
T5J 5B9

Tel 780.451.7666
Fax 780.454.7698

www.ae.ca

Dear Sir:

We are pleased to provide one (1) copy to you and seven (7) copies to INAC, of our report on the risk assessment of water and wastewater facilities for **Beaver Lake First Nation**.

This report describes the First Nation's water and wastewater systems and provides an assessment relative to Federal operating and regulatory standards. Recommendations are included in the report as well as cost estimates.

We trust our assessment and this report will be of value in improving the operation of the water and wastewater facilities and with it, the health of the Beaver Lake First Nation.

Respectfully submitted,

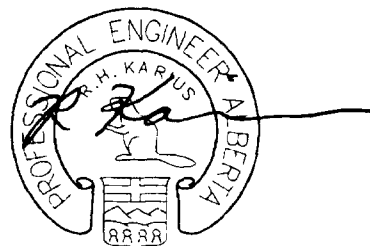
ASSOCIATED ENGINEERING ALBERTA LTD.
APEGGA Permit to Practice P3979

Prepared by:

Reviewed by:

For Keith Mayoh, A.Sc.T.
Operations Specialist

KM/RK/jfm



Rod Karius, P.Eng.
Vice President and General Manager

cc: Cliff Bowman, P.Eng. - PWGSC, Real Property Services for INAC

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REPORT

MANAGEMENT SUMMARY

1 GENERAL ADMINISTRATIVE

First Nation Community: *Beaver Lake First Nation*

Site No.: 37

Date of Visit: September 11, 2001

Inspector/Interviewer: Keith Mayoh

Site Address: Box 960
Lac La Biche, AB
T0A 2C0

Phone No.: (780) 623-4549
Fax No.: (780) 623-4523

Tribal Council Affiliation: Tribal Chiefs Ventures Inc.

Operators: Gabriel Gladue
Clarence Gladue

Community Location: 240 kilometres northeast of Edmonton, near Lac
La Biche

Population (July 2001): 783

No. of Housing Units (July 2001): 100

Conflict Declaration: Consulting services have been provided to this Band by Associated Engineering. The Risk Assessor, however, has had no prior association with the Band.

REPORT

2 DESCRIPTION OF COMMUNITY WATER SUPPLY AND DISTRIBUTION SYSTEM

The Beaver Lake water treatment plant draws raw water from Beaver Lake. The Beaver Lake water treatment plant was originally constructed in 1980-1982 and upgraded in 1990. The treatment is accomplished in two conventional packaged water treatment units, consisting of the following process steps; hydraulic mixers, upflow tube settlers, multimedia filters and chlorination.

There are two concrete reservoirs located in-ground. The combined capacity of these two reservoirs is 1,100,000 L. A diesel powered engine runs a 12" vertical turbine pump for fire flows.

The water system was given a Class II rating under the Alberta Environmental Protection Certification Program.

3 DESCRIPTION OF COMMUNITY WASTEWATER COLLECTION SYSTEM

Domestic wastewater from 40 housing units is collected by a gravity collection system which flows to the sewage pumping station. The sewage force main from the sewage pumping station sends raw sewage to a 2 cell facultative lagoon. Effluent from the lagoon is discharged into a swamp area. The remaining 60 homes are serviced by septic tanks and truck haul to the lagoon.

The wastewater system was given a Class I rating under the Alberta Environmental Protection Certification Program.

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4 OVERALL COMMUNITY RISK ASSESSMENT - WATER SYSTEM

4.1 OVERALL RISK

| Section | Section Ranking | Risk |
|---------------------|-----------------|--------|
| A - Water Source | 4 | Low |
| B - Design | 8 | High |
| C - Operations | 8 | High |
| D - Reporting | 8 | High |
| E - Operators | 6 | Medium |
| F - Overall Ranking | 7 | Medium |

4.2 MAIN POINTS

The main points of concern stemming from the assessment are as follows:

- The drinking water quality exceeds the limits of maximum allowable concentrations as outlined in the GCDWQ for HPC (over 1000) and turbidity (over 7 N.T.U.).
- Training of the operators is insufficient.
- Health Canada has issued 3 boil water advisories in the past 2 years.
- There are safety concerns at the water treatment plant.
- The drawings and manuals for the water treatment plant are missing.

4.3 RECOMMENDATIONS

- .1 Fence off the lakeshore area adjacent to the intake well and pipeline.
- .2 Provide backup power for all systems.
- .3 Move heaters or gas line a sufficient distance away from each other.
- .4 Install a railing barrier around backwash piping.
- .5 The gas line needs to be painted.
- .6 Repair plant controls that are not functioning properly.
- .7 Improve spare parts inventory and storage.
- .8 Replace submersible end suction distribution pumps.

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- .9 Rebuild the plant influent piping to improve chemical injection and flow distribution to the two treatment units.
- .10 Implement a hydrant flushing and maintenance program.
- .11 Perform fire pump tests.
- .12 Pumps require installation of hour meters.
- .13 Implement a daily record keeping (logging) procedure.
- .14 Provide adequate funding for training and certification.

**Water System
Summary of Cost Estimates**

| | Major Capital | Minor Capital | Annual Operating | Training |
|--------------------|---------------|---------------|------------------|----------|
| Total Costs | - | \$176,000 | - | \$10,000 |

5 OVERALL COMMUNITY RISK ASSESSMENT - WASTEWATER SYSTEM

5.1 OVERALL RISK

| Section | Section Ranking | Risk |
|-----------------------|-----------------|--------|
| A - Effluent Receiver | 3 | Low |
| B - Design | 3 | Low |
| C - Operations | 8 | High |
| D - Reporting | 4 | Low |
| E - Operators | 7 | Medium |
| F - Overall System | 5 | Medium |

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5.2 MAIN POINTS

- Current collection system has not been maintained.
- Lagoon is overgrown and has erosion problems due to beaver populating the lagoon.
- Truck dump manhole access and lift station access is poor and needs proper maintenance.
- Sewage back-ups have occurred.
- Insufficient operator training.

5.3 RECOMMENDATIONS

- .1 All manholes have to be located and inspected - low area manholes require raising and sealing.
- .2 Flush and inspect collection piping system.
- .3 Repair lagoon erosion, clean brush and weeds from the lagoon and dispose of material.
- .4 Repair lagoon fence, gate and lock.
- .5 Implement a regular lift station cleaning and forcemain flushing program.
- .6 Test lift station pump for capacity and pressure.
- .7 A formal record sheet should be located at the lift station.
- .8 Outfall effluent quality should be tested for fecal coliform, BOD₅ and T.S.S.
- .9 Provide adequate funding for training and certification.

**Wastewater System
Summary of Cost Estimates**

| | Major Capital | Minor Capital | Annual Operating | Training |
|--------------------|---------------|---------------|------------------|----------|
| Total Costs | - | \$37,000 | \$13,000 | \$10,000 |

Power supply to the water treatment plant is hydro-electric, 240 volt, single phase. No backup power exists for the water treatment plant, the distribution system, or the treated water storage reservoirs.

Safety concerns exist within the water treatment plant, including the following:

- .1 There is a trip hazard at the backwash piping/valve areas.
- .2 Proper containment for powdered activated carbon is not provided for.
- .3 The gas line is not painted and it is in close proximity to radiant heaters.

1.3.2 Recommendations

- .1 Provide backup power for all systems.
- .2 A railing needs to be installed around trip hazard areas.
- .3 Move heaters or gas line a sufficient distance away from each other.
- .4 The gas line needs to be painted.
- .5 Repair plant controls that are not functioning properly.

1.3.3 Cost Estimates

| Item No. | Major Capital | Minor Capital | Annual Operating | Training |
|--------------------|----------------|-----------------|------------------|----------|
| Recommendation .1 | - | \$5,000 | - | - |
| Recommendation .2 | - | \$3,000 | - | - |
| Recommendation .3 | - | \$2,000 | - | - |
| Recommendation .4 | Included in .3 | | | |
| Recommendation .5 | - | \$15,000 | - | - |
| Total Costs | - | \$25,000 | - | - |

1.4 SECTION C - OPERATIONS

- *Overall Ranking:* **8**
- *Risk Assessment:* **High**

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The treated water reservoir was last cleaned on November 1, 2000 and a regular cleaning program is being established.

No emergency repair parts are available on site and the estimated response time for a technician is up to 2 days. As well, there is no formal emergency response plan in place.

1.4.2 Recommendations

- .1 Improve spare parts inventory and storage.
- .2 Replace submersible end suction distribution pumps.
- .3 Rebuild the plant influent piping to improve chemical injection and flow distribution to the two treatment units.
- .4 Replace manuals and drawings.
- .5 Pumps require installation of hour meters.
- .6 Implement a hydrant flushing and maintenance program.
- .7 Perform fire pump tests.

1.4.3 Cost Estimates

| Item No. | Major Capital | Minor Capital | Annual Operating | Training |
|--------------------|--------------------|-----------------|------------------|----------|
| Recommendation .1: | - | \$10,000 | - | - |
| Recommendation .2: | - | \$10,000 | - | - |
| Recommendation .3: | - | \$70,000 | - | - |
| Recommendation .4: | - | \$2,000 | - | - |
| Recommendation .5: | - | \$2,000 | - | - |
| Recommendation .6: | No Additional Cost | | | |
| Recommendation .7: | No Additional Cost | | | |
| Total Costs | - | \$94,000 | - | - |

REPORT

1.5 SECTION D - REPORTING

- *Overall Ranking:* **8**
- *Risk Assessment:* **High**

1.5.1 Description

Testing for bacteriological presence in the water is done on a weekly basis and chlorine residuals in the distribution system are monitored daily.

Samples are taken by the Health Centre from the detox/rehab center and both reservoirs. Bacteriological testing is done in Edmonton (240 km distance) by a provincially certified lab. The results are kept in the Health Centre. It is unknown whether the results are properly recorded.

There are no records showing the presence of coliform bacteria in the drinking water that exceed the GCDWQ. The operator does not keep a daily log and it isn't known whether there have been any water related illnesses. Health Canada issued boil water advisories in October and December of 2000 and August of 2001. The orders were issued due to high turbidity and HPC. The operator recollects the turbidity exceeding 1 N.T.U. 6 to 8 times in the last 2 years, however, there are no formal records available.

1.5.2 Recommendations

- .1 Implement a daily record keeping (logging) procedure.

1.5.3 Cost Estimates

None.

1.6 SECTION E - OPERATORS

- *Overall Ranking:* **6**
- *Risk Assessment:* **Medium**

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1.6.1 Description

There are two operators employed by the Beaver Lake Band. The senior operator has only 11 months of experience. The second operator has only two months experience. Neither operator has certification or training. The two operators fill in for each other during vacation periods and sickness.

The operators keep the water treatment plant fairly clean and tidy, but need to be diligent in their record keeping.

It is recommended that the operators should have training in the following:

- .1 Basic Water Treatment Principles,
- .2 WTP Operation and Maintenance, and
- .3 Filter Operation.

1.6.2 Recommendations

- .1 Provide adequate funding for training and certification.

1.6.3 Cost Estimates

| Item No. | Major Capital | Minor Capital | Annual Operating | Training |
|--------------------|---------------|---------------|------------------|-----------------|
| Recommendation .1: | - | - | - | \$10,000 |
| Total Costs | - | - | - | \$10,000 |

2.4.1 Description

The sewage lift station was first cleaned in the fall of 1999. No regular cleaning occurs. The lift station pumps and other operating equipment do not receive routine maintenance. The collection system has not been maintained, flushing and inspection of the lines is required. The manholes will have to be located and inspected. Access to the lift station and truck dump manhole is poor.

Emergency repair parts are not available on site and there is no emergency plan in place in case of a sewage overflow. Estimated response time for service or emergency repair technicians is up to six hours.

The discharge frequency from the lagoon is unknown. There is no disinfection for the treated lagoon effluent.

Excessive erosion by beavers in Cell #2 at the lagoon has occurred at the truck dump area and at the inter-cell overflows. There is excessive overgrowth in Cell #1 at the lagoon which needs to be cut down.

2.4.2 Recommendations

- .1 All manholes have to be located and inspected - low area manholes require raising and sealing.
- .2 Flush and inspect collection piping system.
- .3 Repair lagoon erosion, clean brush and weeds from the lagoon and dispose of material.
- .4 Repair lagoon fence, gate and lock.
- .5 Implement a regular lift station cleaning and forcemain flushing program.
- .6 Test lift station pump for capacity and pressure.

R E P O R T

2.4.3 Cost Estimates

| Item No. | Major Capital | Minor Capital | Annual Operating | Training |
|--------------------|--------------------|-----------------|------------------|----------|
| Recommendation .1: | - | \$20,000 | - | - |
| Recommendation .2: | - | - | \$7,000 | - |
| Recommendation .3: | - | \$10,000 | - | - |
| Recommendation .4: | - | \$7,000 | - | - |
| Recommendation .5: | - | - | \$5,000 | - |
| Recommendation .6: | No Additional Cost | | | |
| Total Costs | - | \$37,000 | \$12,000 | - |

2.5 SECTION D - REPORTING

- *Overall Ranking:* 4
- *Risk Assessment:* Low

2.5.1 Description

It is unknown whether regular effluent tests are performed. No records are kept and the operators are new. Sewage backups have occurred due to a plugged lift station pump, and a plugged sewer line near the lagoon. No complaints of odour have occurred.

2.5.2 Recommendations

- .1 A formal record sheet should be located at the lift station.
- .2 Outfall effluent quality should be tested for fecal coliform, BOD₅ and T.S.S.

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2.5.3 Cost Estimates

| Item No. | Major Capital | Minor Capital | Annual Operating | Training |
|--------------------|--------------------|---------------|------------------|----------|
| Recommendation .1: | No Additional Cost | | | |
| Recommendation .2: | - | - | \$1,000 | - |
| Total Costs | - | - | \$1,000 | - |

2.6 SECTION E - OPERATORS

- *Overall Ranking:* 7
- *Risk Assessment:* Medium

2.6.1 Description

There are two operators employed by the *Beaver Lake Band*. The senior operator has only 11 months operating experience, and the junior operator has two months experience. Neither operator has certification or training. The two operators fill in for each other during vacation periods and sickness.

It is recommended that the operators should have training in the following:

- .1 Basic Wastewater Treatment Principles,
- .2 Wastewater Systems and Lagoon Operation and Maintenance,
- .3 Trouble shooting and maintenance training

2.6.2 Recommendations

- .1 Provide adequate funding for training and certification.

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2.6.3 Cost Estimates

| Item No. | Major Capital | Minor Capital | Annual Operating | Training |
|--------------------|---------------|---------------|------------------|-----------------|
| Recommendation .1: | - | - | - | \$10,000 |
| Total Costs | - | - | - | \$10,000 |

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TERMS OF REFERENCE



R E P O R T

1.0 -General

These Terms of Reference define the conditions and scope of services that the consultant is to perform for the Department of Indian and Northern Development (DIAND), Alberta Regional Office. They have been developed by DIAND HQ with cooperation from the Ontario First Nation Technical Services Corporation (OFNTSC) and Public Works and Government Service, Real Property Service for Indian and Northern Affairs (PWGSC RPS for INAC). The consultant is required to conduct assessments of water and wastewater systems and associated operation and maintenance practices at the First Nations communities which will include a professional evaluation of risk to health based on an analysis of information obtained for each system.

2.0 - Background

With the outbreaks of E-Coli at Walkerton in May 2000 and water contamination incidents by Cryptosporidium and Giardia parasites at other communities, the federal government is concerned as to the potential risk in First Nation communities. To accurately assess the current conditions of water and wastewater facilities in First Nation communities, it is necessary to conduct an assessment of those facilities in terms of its current performance, operating practices and compliance with defined quality objectives.

3.0 - Objectives

The objectives of the consultant's investigations are to:

- Conduct an assessment of water and wastewater systems and associated operational practices in First Nation communities and to identify water systems that are unable to meet the Federal *Guidelines for Canadian Drinking Water Quality (GCDWQ)* and wastewater systems unable to meet the Federal *Guidelines for Effluent Quality and Wastewater Treatment at Federal Establishments*;
- Identify the critical physical and operational components as per the questionnaire in Appendix B;
- Outline the amount and type of training each of the operators has received;
- Identify where immediate action is required due to a risk to public health;
- Make recommendations, where applicable, on such matters as operational and physical improvements needed to mitigate the health risk,, training and the immediate need for the purchase of equipment or implementation of specific actions (i.e., maintenance management practices, reporting protocols, training needs based on data collected, etc.);
- Rank each of the actions required at each location in order to identify its priority;
- Classify all systems or facilities in accordance with the Alberta Environmental Protection Certification Program;

- Provide Class "D" cost estimates to rectify the areas of concern identified. A description of a Class "D" cost estimate is provided in Appendix G.

4.0 - Location

Location of First Nation communities and contacts are included in Appendix A attached.

5.0 - Site Visit Information

Site visit information shall be obtained in order to meet assessment objectives and to complete the questionnaire attached in Appendix B, and Appendix B 1

Information gathering at the community shall be in the presence of the facility operator and where possible a circuit rider trainer or an experienced operator.

The consultant is to conduct his/her interviews in such a manner as to enlist the operator's cooperation so far as is possible and to emphasize that the study is only interested in assessing risk and is not a critique of the operator or his/her abilities. Appendix C provides a list of Tribal Council and unaffiliated communities contacts. The consultant's evaluation criteria are listed in Appendix D.

6.0 - Detailed Scope of Work

The consultant is to collect all the necessary information and data allowing for preparation of the assessment reports that will identify potential health and safety problems and provide recommendations on training and on specific future actions to improve the system and thereby minimize potential risks.

The scope of work for the consultant includes but is not necessarily limited to the following:

- 6.1 To complete the attached questionnaires (see Appendices B and B1), analyze the data gathered, complete risk assessment (see Appendix E) and to provide recommendations.
- 6.2 To review locations of First Nation communities and contacts as per Appendix A attached.
- 6.3 To review assets definitions for water and wastewater systems as per Appendix F
- 6.4 Prior to site visits, obtain approvals from the Chief and Councils to conduct the study.
- 6.5 All systems serving 5 or more homes will be assessed.
- 6.6 Obtain information from DIAND, Health Canada, Environment Canada and the Community Leaders concerning reported incidences of problems with individual systems (Refer to Appendix B; question 6, section F for both water and wastewater).
- 6.7 In communities where private systems exist, those systems will not be assessed.

- 6.8 Make all necessary reservations and coordinate with relevant parties ahead of the planned activities.
- 6.9 Based on the proposed schedule, make contacts with representatives from Tribal Councils, listed in Appendix C. Ensure that the Chief and the Tribal Councils as well as its Technical Advisors are aware of the site visit and study investigation requirements. Ensure that the operator is available throughout the entire survey process to facilitate the necessary assistance
- 6.10 Ensure that during the assessment study and when preparing the report, the appropriate expertise is available
- 6.11 Based on the field investigations, prepare a draft report by October 31st, 2001 and the final report by November 30th, 2001, in which all findings, conclusions and recommendations are provided. For the reference see Appendix H - *Reporting Guidelines*.
- 6.12 Collect and review water and wastewater effluent sampling results from Health Canada and Environment Canada
- 6.13 Incorporate any information supplied by Health Canada, DIAND, or the First Nation regarding contamination incidents.
- 6.14 Provide sufficient information in order to classify all treatment facilities in accordance to the guidelines listed in Appendix I. *Plant Classification Guidelines*
- 6.15 In general terms the sections to be assessed for both water and wastewater systems are as follows:
1. Water source and/or Receiving waters
 2. Plant Design
 3. Operations
 4. Reporting
 5. Operator Training
- 6.16 To verify all questions, that require verification, by ensuring that all data obtained for those questions was obtained from the most recent and most reliable source. Where applicable data should be verified by using:
- AS Built drawings;
 - Health Canada and Environment Canada Data;
 - Water and Effluent quality testing reports.

7.0 - Site Visits

The consultant and his staff shall carry out site visits after having made initial contact with the First Nation community and obtained concurrence as to suitability and timing. The Consultant shall provide the Study Coordinator with a list of participating communities. Once the list of participating

communities is finalized it shall be the consultant's responsibility to make and maintain community contacts and all of the necessary travel arrangements for the consultant's staff. The Tribal Council Technical Services Advisor shall be kept informed of the proposed site visits and schedules and as much as possible the Consultant shall seek the support of the Technical Services Advisor.

All First Nations communities are to be contacted regardless of the level or type of existing service in the provision of potable water. This will include communities that produce their own water, individual wells, purchase water from adjacent non-native communities or those operating under Contribution Arrangements (CAs) with the province. With regard to those communities that purchase water or operate under CAs, site visits may not be necessary, however, telephone contact shall be made with the communities and copies of the applicable water quality reports obtained. The consultant should also determine the number of individual water and wastewater systems in each community.

8.0 - Schedule

The consultant, if awarded a contract, is to provide a detailed schedule in the form of a bar chart for the appropriate milestones. This would include site visit completion, client meetings, submission of draft and final reports. The client shall be allowed, as part of the schedule, three (3) weeks for draft review and three (3) weeks for final review and acceptance. The schedule should not exceed 12 weeks in length and will come into effect on the date when the consultant is authorized to proceed. **Should the consultant anticipate during the course of the study, that he/she will be unable to maintain the agreed schedule, he/she shall notify the Study Coordinator in writing immediately of the reasons, the impacts and what steps can be taken to ensure study completion within a reasonable length of time. Any additional costs incurred in this situation shall be borne by the consultant. All appropriate deadlines and schedule requirements will be determined by the regional offices. The consultant is responsible for maintaining the project schedule as submitted by the consultant in his/her proposal.**

9.0 - Study Coordinator

The project shall be managed by the regional study coordinator. The key responsibilities of the study coordinator as a whole are as follows:

- Confirm the scope of work and the project schedule.
- Closely monitor the study to ensure the work progresses as defined by the Consultant, and the Terms of Reference and that financial responsibility is maintained.
- Ensure that the communities are familiar with the study and to obtain their approval and acceptance.

All enquiries during the proposal and study phases shall be addressed to:

Cliff Bowman, P. Eng
PWGSC - INAC Real Property Services
630, Canada Place, 9700 Jasper Avenue
Edmonton, AB T5J 4G2
Phone:(780) 495 - 6061, Fax:(780) 495 - 6445

10.0 - Consultant Responsibilities

The General Responsibilities of the consultant shall be as follows:

- to agree to enter into a contract for the scope of work as outlined by the Terms of Reference and as contained in the Consultant's proposal. The cost of services shall not exceed the accepted maximum upset limit as submitted by the consultant.
- To provide complete and comprehensive professional services required to carry out the work;
- to carry out the work in accordance with an accepted schedule presented by the Consultant with his proposal and to submit monthly reports describing progress and indicating milestones achieved;
- while conducting the survey, to notify Health Canada, the Chief and DIAND of any emergency situation that will require immediate actions (i.e. contamination of drinking water in water systems);
- the consultant will not be expected to rectify any system deficiencies during the conduct of this survey;
- to make use of existing plans, reports and records as appropriate;
- the consultant is not entitled to additional fees due to changes required to remedy errors and other problems attributable to shortcomings of the consultant, his sub-consultants, or his employees; and
- the consultant shall affix his/her professional engineering stamp or seal to all submitted final documents.

All records, reports, and other materials shall remain the property of DIAND..

11.0 - Adequate Information

In addition to the information provided in Terms of Reference, including appendices, the consultant have access to the informational sources of DIAND CAPITAL ASSET INVENTORY SYSTEM, The ASSET CONDITION REPORTING SYSTEM and any reports which may be available from DIAND, Health Canada and the First Nations and Tribal Councils.

12.0 - Consultant Submission Requirements

The consultant shall recognize that the study is comprised of 3 separate areas organized along Treaty boundaries. These are identified in Appendix A.

The consultant may submit a proposal on one or more of these areas; however, proposals for more than one shall be separate and distinct from each in terms of costs and schedules. In such a

case they shall be contained within the consultant's general overall proposal.

The consultant shall submit six (6) copies of his Proposal.

The consultant shall submit the following information in his Proposal:

- A. The qualifications of the Consulting Firm to undertake the project based on experience on similar projects in the same subject area in both Government and Private sectors. A list of clients and brief description of the project and scope of work is required;
- B. The consultant's personnel engaged in site visits and report preparations shall as a minimum:
- have several years of demonstrated training and experience in the design operation, and maintenance of water and wastewater facilities having populations of from 100-5000 persons;
 - be sensitive to First Nations culture, values and needs;
 - be licensed by **the provincial engineering organization** with specialization in water and wastewater technology and to sign and seal all reports, letters of transmissions and other such relevant data and information; and
 - provide names and a brief resume and experience of the personnel engaged in the study and report preparation.

Once the consultant is engaged, members of the consultants project team may not be added or deleted without the approval of DIAND's Project Coordinator

Note: Preference may be given to those consultants firms, companies, and partnerships etc., which have a First Nations component as part of the project team.

- C. A list of Sub-Consultants proposed for the project, together with a resume of qualifications and experience.
- D. A detailed time and activity schedule for the performance of his services based on the requirements of the Consultant Terms of Reference. The submitted schedule shall be considered in the award of work.
- E. The estimated consulting fees and disbursements for the performance of his/her services are based on the requirements of the Consultant Terms of Reference. Hourly rates for all assigned staff, policy for authorized "overtime" work, administration fees on disbursements, or on Sub-Consultant fees shall be submitted. Detailed costs shall be provided for each site and identified as travel, disbursements lodging as one unit and fees as a separate item. The consultant shall provide a total project cost, which will be the summation of all projected costs. Should communities be added or deleted, a new fee will be negotiated based on the detailed costs provided by the consultant.
- F. The methodology proposed, the technical methods to be utilized in the performance of the work and any innovative and constructive ideas presented.
- G. **The Consultant's cost information shall be submitted in a separate sealed envelope marked "Fees and disbursements".**

13.0 - Reports

The consultant shall prepare a Draft Report and a Final Report for the study. The reports shall:

- A. Be submitted in draft form to the Study Coordinator for review and approval by the Project Team. The Consultant shall obtain **written approval by the DIAND Study Coordinator prior to finalizing the report.**
- B. Be revised by the consultant to address comments of the Study Coordinator resulting from the project meetings and document reviews, and to satisfy the requirements of the consultant Terms of Reference.
- C. Be submitted to the Study Coordinator prior to any scheduled meetings.

All reports shall be produced on 8 ½ x 11 inch paper size using WordPerfect, version 6.0 with headings in Times New Roman 12 bold and text in Times New Roman 11. All relevant data will be presented using MS Access database with a provision of presenting data in Quattro Pro spreadsheets. All material including schedules and tables shall be on floppy disc and provided to the client on completion of the report. While the draft report does not require to be bound, the final report shall be bound and covered using "Cerlox" binding.

The report shall include:

- A. Hard cover with the same title as the TOR; for Indian and Northern Affairs Canada, Alberta Regional office, and bear the consultants firm name;
- B. An electronic (soft copy) of the report as well as a printed (hard copy).
- C. All reports will comply with the reporting standards listed in Appendix H.
- D. Letter of transmission;
- E. Table of contents;
- F. Management summary;
- G. Discussion - compliance, impacts, risk, comparison, general situation;
- H. Summary of observations - also in tabular form
- D. Conclusions and recommendations
- E. Tables where applicable in the report
- F. Appendices to include:
 - Terms of Reference
 - Site visit reports (completed questionnaire)
 - Schedule
 - Water Testing Results (chemical/physical/bacteriological) with comparisons to the *Guidelines for Canadian Drinking Water Quality (GCDWQ)*
 - Wastewater Testing Results with comparisons to the *Guidelines for Effluent Quality and Wastewater Treatment at Federal Establishments.*
 - Photographs of the plant

The consultant shall submit eight (8) copies of the draft report and eight (8) copies of the final report. Any other requirements as per the number of reports to be submitted will be determined by the regional offices. Refer to Appendix H for requirements for the format of the reports.

14.0 - Meetings

The consultant shall meet with the client as follows:

- At award of contract;
- For review of the draft report;
- One additional meeting if it is required.

The cost of attending such meetings shall be included in the consultant's fees and disbursements. Should additional meetings be required, they shall be charged at cost for fees and disbursements and a similar process will be followed for a reduction should any of the meetings not take place.

15.0 - Invoicing Instruction

The consultant shall submit invoices on a monthly basis including details of disbursements, progress to date, personnel hours and fees, travel costs, sub-consultant fees and other fees agreed to in the signed contract. The consultant shall not be paid more than 90% of the agreed fees, expenses, and disbursements until the final report is accepted and approved by the Study Coordinator.

16.0 - Project Documents

The Consultant shall not use any documents or information, which results from his study without the written permission of DIAND. The Consultant shall treat all information, which results from this study, both written and verbal, in strict confidence.

The Consultant shall prepare all documents and presentations in a manner and form which may be easily understood in order to facilitate involvement of the community members and to promote an understanding of the planning and decision making process of the study.

17.0 - Acceptance of Bids

The lowest priced or any particular proposal will not necessarily be accepted, and DIAND reserves the right to reject any and all proposals.

SURVEY QUESTIONNAIRE

APPENDIX
B

REPORT

**Assessment of Water Supply, Treatment and Storage Works
in First Nations Communities**

Locations and Contacts

| | | | | | |
|---|-------------------------------------|-------------------------|-----------------------|---------|--|
| Band Name: | BEAVER LAKE | Band #: | 460 | | |
| Site: | BEAVER LAKE NO. 131 | Site #: | 06701 | | |
| Region: | ALBERTA | Region #: | 7 | | |
| Asset Number: | 4020 | Asset Number Extension: | 01 | | |
| Asset Quantity: | 1 | Asset Name: | WATER TREATMENT PLANT | | |
| Latitude (decimal): | 0 | Longitude (decimal): | 0 | | |
| Street and Number of facility: | P.O. Box 980 | Phone #: | (780) 623-4549 | | |
| City: | Lac La Biche | Fax #: | (780) 623-4523 | | |
| Province: | Alberta | Postal Code: | T0A 2C0 | E-Mail: | |
| Technical Services Unit Advisor: | Hugo Battau | | | | |
| Tribal Council: | Tribal Chiefs Ventures Inc. | Phone #: | (780) 645-4288 | | |
| | | Fax #: | (780) 645-5850 | | |
| | | Email: | | | |
| Environmental Health Officer: | Skattar Sandhu cell: (780) 915-9369 | Phone #: | (780) 495-5412 | | |
| | | Fax #: | (780) 495-2743 | | |
| | | E-Mail: | | | |
| Chief/Administration: | Al Lameman | Phone #: | (780) 623-4548 | | |
| | | Fax #: | (780) 623-4523 | | |
| | | E-Mail: | | | |
| Operators: | Gabriel Gladue, Clarence Gladue | Phone #: | (780) 623-3750 | | |
| | | Fax #: | | | |
| | | E-Mail: | | | |
| Interviewer: | Keith Mayoh | Phone #: | (306) 244-8828 | | |
| Date of Inspection / Interview(mm/dd/yy): | 9/11/01 | Fax #: | (306) 244-8829 | | |
| | | E-Mail: | | | |
| Printed On Date: | 07-Jan-02 | | | | |

**Assessment of Water Supply, Treatment and Storage Works
in First Nations Communities**

Section A: Water Source

- 1) Water Source: Verified:
Description:
(of water intake)
- 2) What is the water delivery method?: Verified:
(N.B. If the water is trucked in, please select N/A for all questions that do not apply.)
- 3) a) Is there any source of potential contaminants affecting the quality of drinking water?:
If yes, describe:
b) Is there a source of pollutions (i.e. sewage outfall) upstream at the water intake?:
Verified:
If yes, describe:
- 4) Length of Distribution Lines (in meters): Verified
- 5) Have there been any reported shortages of water?:
If yes, Frequency:
Reason(s):
- 6) Is there any protection in place for the water source?: Verified:
If yes, describe:
- 7) Does the quality of the water source vary?:
If yes, describe:
- 8) Rank of the Quality of the water source:
Biological: Verified:
Chemical: Verified:
Physical: Verified:
- 9) Overall Rank for Section A:

Printed On Date:

07-Jan-02

Assessment of Water Supply, Treatment and Storage Works
in First Nations Communities

Section B: Design

- 1) Type of Plant: Verified:
- Description of the treatment process:
- Rank of the Suitability of the Treatment Plant:
- 2) In what year was the plant constructed?: Verified:
- 3) When was the last upgrade to the plant?: Verified:
- 4) What is the Daily Flow of the W.T.P.?: (L/day) Verified:
- 5) What is the water consumptions rate?: (Litres per person per day) Verified:
- 6) Rated Design Capacity: L/s Verified:
- 7) Does the current water demand in the community meet or exceed the design capacity?:
- Explain:
- 8) a) Does the quality of the drinking water exceed Maximum Allowable Concentrations (MACs) and Interim Maximum Allowable Concentrations (IMACs) as outlined in the GCDWQ health parameters?: Verified:
- Parameters Exceeded:
- Frequency:
- Reason(s):
- b) Does the drinking water exceed any aesthetic parameters as outlined in the GCDWQ health parameters?: Verified:
- Parameters Exceeded:
- Frequency:
- Reason(s):
- 9) Rank of the Quality of treated water:
- Biological: Verified: Chemical: Verified:
- Physical: Verified: Risk to Public Health:
- 10) a) Is there a Water Reservoir?: Verified:
- b) Where is the Water Reservoir Located?: Verified:

Description:

- c) What is the capacity of the Water Reservoir(s)? (L) Verified:
- d) Is there a provision in the reservoir for fire flow (as per regional standards)? Verified:
- e) Does the volume of the reservoir meet the current water demands for the community? Verified:

If no, explain:

- 11) a) Is there a pump for fire protection? Verified: Type:
Description:

b) Is there a pump test run on a regular basis? Verified:

- 12) a) Is there a generator to supply backup power to the W.T.P.? Verified:
Type: Description:

b) Is there a generator to supply backup power to the distribution system? Verified:

Type: Description:

- c) Is there a generator to supply backup power to the low level pump station? Verified:

Type: Description:

- 13) What type of reservoir is used for water storage? Verified:

If In-Ground: Is there a generator to supply backup power to the reservoir? Verified:

Type: Description:

- 14) What is the power supply to run the plant? Verified:

Description:

- 15) Is there a transformer or fluorescent lights containing PCB's located within the W.T.P.?

Description:

- 16) Safety equipment on site:
- | | | |
|-----------------------|---------------------------------|---|
| Confined Space Entry: | <input type="text" value="No"/> | Verified: <input checked="" type="checkbox"/> |
| Washroom: | <input type="text" value="No"/> | Verified: <input checked="" type="checkbox"/> |
| Eyewash: | <input type="text" value="No"/> | Verified: <input checked="" type="checkbox"/> |
| Personal: | <input type="text" value="No"/> | Verified: <input checked="" type="checkbox"/> |
| Sorbents: | <input type="text" value="No"/> | Verified: <input checked="" type="checkbox"/> |

- 17) Are there any reported or apparent safety concerns with the facility:
- If yes, describe:
- 18) Is there a designated Laboratory Area, with required equipment, within the plant?:
- Verified:
- Rank of the Condition of Equipment:
- 19) Is there a designated Office/Filing Area in the W.T.P.?: Verified:
- 20) a) Is there a workshop area available within the plant?: Verified:
- b) Are there appropriate tools in the workshop to perform maintenance required?:
- Verified:
- 21) Overall Rank for Section B:
- Printed On Date:

Assessment of Water Supply, Treatment and Storage Works
in First Nations Communities

Section C: Operations

- 1) Method of disinfection: Verified:
- Description:
- a) Is the disinfection equipment working?: Verified:
- b) If no, explain:
- Verified:
- 2) a) Is there sufficient disinfection agent available?: Verified:
- b) Has the usefulness of the disinfecting agent expired?: Verified:
- 3) a) Is there a Chlorine Residual Analyzer?: Verified:
- b) Is the Chlorine Residual Analyzer calibrated sufficiently?: Verified:
- 4) a) How often are Chlorine residuals in the treated water checked?:
- b) Current free Chloride residuals in W.T.P. reservoir?: mg/L
- 5) What other chemicals are used in this process?:
- a) Are the chemicals properly stored in accordance with provincial guidelines?: Verified:
- b) Are the chemicals effective in the treatment process?: Verified:
- c) Is a sufficient supply of the listed chemicals for treatment readily available?: Verified:
- 6) Are there sufficient test reagents with a current shelf life available?:
- 7) Is there a coli-tert unit and incubator available?: Verified:
- a) Does the operator use it?:
- If no, explain:
- b) Are there sufficient test reagents with a current shelf life available?:
- 8) Are the Bacteriological samples analyzed within 24 hours?:
- 9) By What methods are bacteriological samples transported to on/off site labs?:
- 10) Are the operating and maintenance manuals for the W.T.P. readily available at the W.T.P.?: Verified:
- If no, Where are they located?:

Ranking for Emergency Plan:

19) Is the water treatment facility and water reservoir secure enough to restrict access? Verified:

a) When you arrived was the pump house locked or secured? Verified:

20) Overall Ranking for Section C:

Printed On Date:

Assessment of Water Supply, Treatment and Storage Works in First Nations Communities

Section D: Reporting

Analysis: The following questions regarding analyses should use the Guidelines for Canadian Drinking Water Quality as the reference document

- 1) Are regular bacteriological tests conducted?: Verified:
- a) By Whom?:
- b) Frequency of Testing: Verified:
- c) Where are the test samples taken from?:
- d) Are the results properly recorded?: Verified:
- e) Where are the results kept?: Verified:
- f) Distance to the closest Lab?: Km Verified:
- g) Is the lab certified under provincial guidelines to conduct water tests?: Verified:
- h) Have been any records showing the presence of coliform bacteria in the drinking water exceeding the GCDWQ Verified:
- If yes, how often was it recorded in the past 2 years?:
- Explain:
- i) Ranking for Labs and Testing (Question 1):
- 2) Does the operator keep a Daily Log?: Verified:
- 3) Have there been any water related disease or health related outbreaks in the last two years?: Verified:
- If yes, explain:
- 4) Have there been any "Boil Water" advisories issues in the past 2 years?: Verified:
- If yes; Number issued:
- Who issues these orders?:
- Reason(s)
- Notification Protocols:
- Ranking for Question 4:
- 5) Is the Turbidity of the treated water recorded?: Verified:
- If yes, How often are these results recorded?: Verified:
- 6) Have there been any Turbidity readings in excess of 1 N.T.U.?: Verified:
- If yes, how often was it recorded in the past 2 years?:

Is testing of the chemical properties of the treated water conducted?:

No

Verified:

Frequency of Testing?:

Verified:

7) Which specific chemical parameters were considered when designing the W.T.P.?:

unknown

Verified:

8) Overall Ranking for Section D:

8

Printed On Date:

07-Jan-02

Assessment of Water Supply, Treatment and Storage Works
in First Nations Communities

Section E: Operators

- 1) Name of Operator: Clarence Gladue
- 2) Operator Experience (years): s.19(1)
- 3) Is the Operator Certified?:
Level: Type:
- 4) Has the Operator received training to operate and maintain the facility?: Verified:
When?(mm/dd/yy): By Whom?:
- 5) Is the operator familiar with calibrating and maintaining the disinfection equipment?:
- 6) Does the operator appear to have confidence in his/her operational techniques?: N/A
Explain: New operational staff - training has only started at the location in the last 6-8 months
- 7) Is any training recommended?: Yes
Recommendations: All possible training need to be conducted at this location. WTP O&M, wastewater O&M. Confined space, filters, etc.
- 8) a) Is there only one operator?: No
b) Does anyone accept responsibility for operations during vacations or sickness?: Non
Verified:
If yes, Whom?: each other
What training has this person received?:
- 9) Overall Rank for Section E (Operator Training): 0
- 10) General overall assessment of housekeeping, cleanliness, operation and maintenance of the water system:

Water plant is fairly clean and orderly, no records have been maintained, the plant is operating properly at the time.
The operators need to receive immediate training on the package unit operation and maintenance to keep the water quality high.

- 1) Name of Operator: Gabriel Gladue
- 2) Operator Experience (years): s.19(1)
- 3) Is the Operator Certified?:
Level: Type:
- 4) Has the Operator received training to operate and maintain the facility?: Verified:
When?(mm/dd/yy): By Whom?:

5) Is the operator familiar with calibrating and maintaining the disinfection equipment? No

6) Does the operator appear to have confidence in his/her operational techniques? N/A

Explain:

7) Is any training recommended? Yes

Recommendations:

8) a) Is there only one operator? No

b) Does anyone accept responsibility for operations during vacations or sickness? Non

Verified:

If yes, Whom?:

What training has this person received?:

9) Overall Rank for Section E (Operator Training):

10) General overall assessment of housekeeping, cleanliness, operation and maintenance of the water system:

Printed On Date:

Assessment of Sewage Treatment Plants, Pumping Stations,
Lagoons and Communal Septic Tanks in First Nations

Section E: Operators

- 1) Name of Operator: Clarence Gladue
- 2) Operator Experience (years): s.19(1)
- 3) Is the Operator Certified?: s.19(1)
Level: _____ Type: _____
- 4) Has the operator received training to operate and maintain the facility?: Verified:
When?(mm/dd/yy): _____ By Whom?: _____
- 5) Is the operator familiar with calibrating and maintaining the disinfection equipment?:
- 6) Does the operator appear to have confidence in his/her operational technique
Explain: _____
- 7) Is any training recommended?: Yes
Recommendation(s): O&M wastewater systems, lagoons, troubleshooting repair and general concepts of wastewater treatment.
- 8) a) Is there only one operator?: No Verified:
b) Does anyone accept responsibility for operations during vacation or sickness?: Yes Verified:
If yes, Whom?: Each other
What training has this person received?: _____
- 9) Overall Ranking for Section E (Operator Training): 7
- 10) General overall assessment of housekeeping, cleanliness, operation and maintenance of the wastewater system:

Collection system has not been maintained - flushing and inspection required; Lagoon is overgrown and has beaver problem - needs to be brushed, mowed and material removed. Banned at solid waste disposal site; Lift station should be thoroughly cleaned and flushed. Pump needs to be tested for capacity and pressure - could not complete pump test at this time.

- 1) Name of Operator: Gabriel Gladue
- 2) Operator Experience (years): _____
- 3) Is the Operator Certified?: s.19(1)
Level: _____ Type: _____
- 4) Has the operator received training to operate and maintain the facility?: Verified:
When?(mm/dd/yy): _____ By Whom?: _____

5) Is the operator familiar with calibrating and maintaining the disinfection equipment?:

6) Does the operator appear to have confidence in his/her operational technique

Explain:

7) Is any training recommended?:

Recommendation(s):

8) a) Is there only one operator?: Verified:

b) Does anyone accept responsibility for operations during vacation or sickness?: Verified:

If yes, Whom?:

What training has this person received?:

9) Overall Ranking for Section E (Operator Training):

10) General overall assessment of housekeeping, cleanliness, operation and maintenance of the wastewater system:

Printed On Date:

**Assessment of Water Supply, Treatment and Storage Works
in First Nations Communities**

Section F: Statistical Data

- | | | | |
|--|----------------------------------|-----------|-------------------------------------|
| 1) Total Population of the community: | <input type="text" value="783"/> | Verified: | <input checked="" type="checkbox"/> |
| 2) Population served by the system: | <input type="text" value="783"/> | Verified: | <input checked="" type="checkbox"/> |
| 3) Total number of houses in the community: | <input type="text" value="100"/> | Verified: | <input checked="" type="checkbox"/> |
| 4) Number of homes severed by the system: | <input type="text" value="40"/> | Verified: | <input checked="" type="checkbox"/> |
| 5) Number of homes with no service: | <input type="text" value="0"/> | Verified: | <input checked="" type="checkbox"/> |
| 6) a) Number of homes with individual wells: | <input type="text" value="3"/> | Verified: | <input checked="" type="checkbox"/> |
| b) Are there any reported problems with individual wells in the community: | <input type="text" value="No"/> | | |
| Frequency: | <input type="text"/> | | |
| Reasons: | <input type="text"/> | | |
| Overall Ranking for Individual Wells: | <input type="text" value="5"/> | | |

Printed On Date:

**Assessment of Water Supply, Treatment and Storage Works
in First Nations Communities**

Section G: System Deficiencies

System Deficiencies:

Parallel operation of the two units is not balanced. Each unit should have its own chemical injection point and rapid mixer OR one rapid mixer and chemical injection should be installed ahead of the units with equal pipe distances from mixer to flocculation tanks. Currently overloading the first unit and underloading second.

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**Assessment of Water Supply, Treatment and Storage Works
in First Nations Communities
Section H: Recommendations**

Recommendations:

- Water treatment plant needs the chemical injection, mixer and flow distribution improved.
- Pump requires installation of meters.
- Area between backwash piping may require installation of railing barriers.

Overall Ranking for the System:

Signature of Inspector/Interviewer

Date (mm/dd/yy):

Printed On Date:

**Assessment of Sewage Treatment Plants, Pumping Stations,
Lagoons and Communal Septic Tanks in First Nations**

Locations and Contacts

| | | | |
|---|-------------------------------------|-------------------------|---------------------|
| Band Name: | BEAVER LAKE | Band #: | 480 |
| Site: | BEAVER LAKE NO. 131 | Site #: | 08701 |
| Region: | ALBERTA | Region #: | 7 |
| Asset Number: | 4480 | Asset Number Extension: | 01 |
| Asset Quantity: | 1 | Asset Name: | DETOX CENTRE LAGOON |
| Latitude (decimal): | 0 | Longitude (decimal): | 0 |
| Street and Number of facility: | P.O. Box 980 | Phone #: | (780) 623-4548 |
| City: | Lac La Biche | Fax #: | (780) 623-4523 |
| Province: | Alberta | Postal Code: | TOA 2C0 |
| E-Mail: | | | |
| Technical Services Unit Advisor: | Hugo | | |
| Tribal Council: | Tribal Chiefs Ventures Inc. | Phone #: | (780) 645-4288 |
| Fax #: | (780) 645-5850 | | |
| E-Mail: | | | |
| Environmental Health Officer: | Skattar Sandhu call: (780) 815-8388 | Phone #: | (780) 485-5412 |
| Fax #: | (780) 485-2743 | | |
| E-Mail: | | | |
| Chief / Administration: | Al Lememan | Phone #: | (780) 623-4548 |
| Fax #: | (780) 623-4523 | | |
| E-Mail: | | | |
| Operators: | Gabriel Gladue, Clarence Gladue | Phone #: | (780) 623-3750 |
| Fax #: | | | |
| E-Mail: | | | |
| Interviewer: | Keith Mayoh | Phone #: | (306) 244-8828 |
| Date of Inspection / Interview(mm/dd/yy): | 9/11/01 | Fax #: | (306) 244-8828 |
| E-Mail: | | | |
| Printed On Date: | 08-Jan-02 | | |

**Assessment of Sewage Treatment Plants, Pumping Stations,
Lagoons and Communal Septic Tanks in First Nations**

Section A: Effluent Receiver

- 1) Effluent Receiver?: Verified:
Description (of outfall):
- 2) Is the effluent discharged upstream from a water intake?: Verified:
Description:
- 3) Overall Ranking for Section A:
- Printed On Date:

Assessment of Sewage Treatment Plants, Pumping Stations,
Lagoons and Communal Septic Tanks in First Nations

Section B: Design

- 1) Type of treatment facility?: Verified:
Description:
- 2) Does the effluent quality exceed the federal guidelines?: Verified:
If yes, parameters exceeded:
Rank of the Quality of Treated Effluent:
- 3) How many Sewage Pumping Stations are part of the collection system?: Verified:
- 4) Rated design capacity of the sewage treatment plant?: L/day Verified:
a) Does the plant currently meet or exceed design capacity?:
b) Description:
c) What is the Daily Flow of the plant?: L/day Verified:
Rank of the Design of Sewage Plant:
- 5) a) Is there increased flow during wet periods?:
b) If yes, is the increase flow due to infiltration?:
- 6) Year of Construction of the Treatment Plant?: Verified:
- 7) Is the system a communal Septic Tank?: Verified:
If yes, how often is it pumped out?:
- 8) Is there adequate ventilation for: a) The Plant?: Verified:
b) Chemical Storage?: Verified:
- 9) Is there a backup power supply for: a) the W.T.P.: Verified:
b) Lift Stations?: Verified:
- 10) Is there a weekly test run of the diesel generator?:
- 11) Safety equipment on site: Confined Space Entry: Verified:
Washroom: Verified:
Eyewash: Verified:
Personal: Verified:
Sorbents: Verified:
- 12) Are there any safety hazards or concern with facility?:

If yes, explain:

[Empty box for explanation]

Rank of the Concerns and Hazards Within the Plant:

[0]

- 13) Is there a designated Laboratory Area, with required equipment, within the plant?:

N/A

Verified:

Rank of the Condition of Equipment:

[0]

- 14) Is there a designated Office/Filing Area in the Treatment Plant?:

N/A

Verified:

- 15) a) Is there a workshop area available within the plant?:

N/A

Verified:

- b) Are there appropriate tools in the workshop to perform maintenance required?:

N/A

Verified:

- 16) Overall Ranking for Section B:

[0]

Printed On Date:

08-Jan-02

Assessment of Sewage Treatment Plants, Pumping Stations,
Lagoons and Communal Septic Tanks in First Nations

Section C: Operations

- 1) Is there disinfection for the treated effluent? Verified:
- If yes, what is the method of disinfection? Verified:
- a) Is it functional? Verified:
- b) If no, explain:
- c) Is there sufficient chlorine available?
- d) How long has the Chlorine/Sodium Hypochlorite been on-site?
- 2) What other chemicals are used in the process? Verified:
- a) Are chemicals properly stored in accordance with provincial guidelines? Verified:
- b) If no, explain:
- 3) Are there operating and maintenance manuals for the Treatment Plant Equipment readily available at the Treatment Plant? Verified:
- If no, where are they located? Verified:
- 4) Are the AS-Built drawings available on-site? Verified:
- 5) Have there been any service disruption (plant or distribution) in the past 2 years?
- If yes, explain cause:
- 6) How often are the Sewage Pumping Stations Cleaned?
- 7) Are the Sewage Pumping Station Pumps routinely maintained?
- 8) Are Emergency Repair Parts readily available (on-site)? Verified:
- 9) Is there an emergency plan in place in case of sewage overflow? Verified:
- If yes, explain:
- Ranking of Emergency Plan:
- 10) Is there a Contact Listing of Technicians/Trades People available? Verified:
- 11) What is the average response time of the Technicians/Trades People?
- 12) Have there been any raw sewage bypasses from any of the Sewage Pumping Stations?
- Sewage Lagoons
- 13) What is the discharge frequency?
- a) Is there any excessive weed growth? Verified:
- b) Are the berms in good condition? (Rodent problems): Verified:

If no, explain:

Beavers in lagoons - excessive erosion at truck dump area and at inter cell overflows.

14) Overall Ranking for Section C:

8

Printed On Date:

08-Jan-02

**Assessment of Sewage Treatment Plants, Pumping Stations,
Lagoons and Communal Septic Tanks in First Nations**

Section D: Reporting

- 1) Are regular effluent tests conducted (with reference to Wastewater Guidelines)? Verified:
(i.e.: BOD5, TSS, pH, etc.)
- a) Which parameters are tested?: Verified:
- b) By whom?:
- c) Frequency?: Verified:
- d) Are the results recorded?: Verified:
- e) Where are the results kept?:
- 2) Have there been any complaints of odour?:
- If yes, How Many?:
- By Whom?:
- 3) Have there been any sewage collection backups?
- a) If yes, have any basements been flooded?
- b) Do you know the cause of the sewage backups?
- If yes, Explain:
- 4) Overall Ranking for Section D:
- Printed On Date:

Assessment of Sewage Treatment Plants, Pumping Stations,
Lagoons and Communal Septic Tanks in First Nations

Section E: Operators

- 1) Name of Operator: Clarence Gladue
- 2) Operator Experience (years): [redacted] **s.19(1)**
- 3) Is the Operator Certified?: [redacted] **s.19(1)**
Level: [redacted] Type: [redacted]
- 4) Has the operator received training to operate and maintain the facility?: [redacted] Verified:
When?(mm/dd/yy): [redacted] By Whom?: [redacted]
- 5) Is the operator familiar with calibrating and maintaining the disinfection equipment?: No
- 6) Does the operator appear to have confidence in his/her operational technique [redacted]
Explain: [redacted]
- 7) Is any training recommended?: Yes
Recommendation(s): O&M wastewater systems, lagoons, troubleshooting repair and general concepts of wastewater treatment.
- 8) a) Is there only one operator?: No Verified:
b) Does anyone accept responsibility for operations during vacation or sickness?: Yes Verified:
If yes, Whom?: Each other
What training has this persone received?: [redacted]
- 9) Overall Ranking for Section E (Operator Training): 0
- 10) General overall assessment of housekeeping, cleanliness, operation and maintenance of the wastewater system:

Collection system has not been maintained - flushing and inspection required.
Lagoon is overgrown and has beaver problem - needs to be brushed, mowed and material removed. ? at solid waste disposal site.
Lift station should be thoroughly cleaned and flushed. Pump needs to be tested for capacity and pressure - could not complete pump test at this time.

- 1) Name of Operator: Gabriel Gladue
- 2) Operator Experience (years): [redacted] **s.19(1)**
- 3) Is the Operator Certified?: [redacted]
Level: [redacted] Type: [redacted]
- 4) Has the operator received training to operate and maintain the facility?: [redacted] Verified:
When?(mm/dd/yy): [redacted] By Whom?: [redacted]

5) Is the operator familiar with calibrating and maintaining the disinfection equipment?: No

6) Does the operator appear to have confidence in his/her operational technique N/A

Explain:

7) Is any training recommended?: Yes

Recommendation(s):

8) a) Is there only one operator?: No Verified:

b) Does anyone accept responsibility for operations during vacation or sickness?: Yes Verified:

If yes, Whom?:

What training has this person received?:

9) Overall Ranking for Section E (Operator Training):

10) General overall assessment of housekeeping, cleanliness, operation and maintenance of the wastewater system:

Printed On Date:

**Assessment of Sewage Treatment Plants, Pumping Stations,
Lagoons and Communal Septic Tanks in First Nations**

Section F: Statistical Data

| | | | |
|--|---|-----------|-------------------------------------|
| 1) Total population of the community: | <input type="text" value="783"/> | Verified: | <input checked="" type="checkbox"/> |
| 2) Population served by the system: | <input type="text" value="783"/> | Verified: | <input checked="" type="checkbox"/> |
| 3) Total number of houses in the community: | <input type="text" value="100"/> | Verified: | <input checked="" type="checkbox"/> |
| 4) Number of homes served by the system: | <input type="text" value="40"/> | Verified: | <input checked="" type="checkbox"/> |
| 5) Number of homes with no service: | <input type="text" value="0"/> | Verified: | <input type="checkbox"/> |
| 6) a) Number of homes with individual septic systems: | <input type="text" value="60"/> | Verified: | <input checked="" type="checkbox"/> |
| b) Are there any reported problems with individual septic systems in the community?: | <input type="text" value="No"/> | | |
| Frequency: | <input type="text" value="New operators - may not have seen any problems yet."/> | | |
| Reason(s): | <input type="text" value="Should be problems with freezing, plugged pumpout control and pump breakdowns."/> | | |
| Overall Ranking for Individual Septic Systems: | <input type="text" value="6"/> | | |
| Printed On Date: | <input type="text" value="08-Jan-02"/> | | |

**Assessment of Sewage Treatment Plants, Pumping Stations,
Lagoons and Communal Septic Tanks in First Nations**

Section G: System Deficiencies

System Deficiencies:

- Truck dump manhole access poor.
- Lift station access poor - need trail to station cleared.

Printed On Date:

18-Jan-02

**Assessment of Sewage Treatment Plants, Pumping Stations,
Lagoons and Communal Septic Tanks in First Nations**

Section H: Recommendations

Recommendations:

1. All manholes have to be located and inspected - low area manholes require raising and sealing.
2. Clean brush and weeds etc from lagoon and dispose of material.
3. Repair lagoon fence, gate and lock.

Overall Rank for the System:

5

Signature of Inspector/Interviewer:

Keith Mayoh

Date(mm/dd/yy):

9/11/01

Printed On Date:

08-Jan-02

RISK ASSESSMENT MODEL

APPENDIX
C

R E P O R T

RISK ASSESSMENT MODEL

In the area of risk assessment, the concept of the frequency of occurrence, probability, and impact of risk situations are fundamental because they are used to assess the risk itself. When an impact assessment of water and wastewater systems is required, before any corrective measure can be implemented, the type and magnitude of impacts on the residents of a community must be identified.

The risk in relation to public health should be viewed as the product of such factors as: the frequency of occurrence of the event, the probability of the occurrence of negative effects and the seriousness of effects. All these factors should be considered while surveying each system. This assessment will focus on drinking water health protection using a simplified method under three categories. The following are assumed categories which should be used during the national assessment of water and wastewater systems:

| Categories | Survey Ranking Scale |
|-------------------|----------------------|
| A -LOW or NO RISK | 1 - 4 |
| B -MEDIUM RISK | 5 - 7 |
| C -HIGH RISK | 8 - 10 |

It will mean that ranking 1 represents the lowest or no risk and that ranking 10 will reflect the highest risk to human health.

Category A - Systems experiencing minimal problems or are without any problems.

Category B - Systems requiring some repairs to existing assets.

Category C - Systems with potential health and safety concerns.

Definitions and Examples of Classification

Category A - Low Risk - systems operating without major problems and are able to produce the drinking water that meet the Canadian Drinking Water Quality Guidelines.

The following are some examples of the potentially low risk items that may be classified under this category:

- requirements to purchase minor parts as backup for storage;
- interior walls may require some reconditioning;
- an entrance to the building may require some repairs;
- inadequate lighting;
- an absence of disinfection of the wastewater effluent when its quality meets the federal guidelines.

Under Reporting, the low risk may be identified when, for example, there are needs or improvements in the recording of data. With regards to the Section on Operators, there will be a minimal risk when an operator is knowledgeable about the systems he or she operates, received extensive operating training (more than the Circuit Rider Training Program) and would be able to pass the exam for certification.

Category B - Medium Risk - Under this category, systems with deficiencies that would require repairs and upgrades, should be identified. Some remedial action may be required to: construct a new facility, upgrade existing facilities, improve operation and maintenance practices. Also, water and wastewater treatment systems that do not meet the Aesthetic Objectives (AO) parameters, indicated in the federal drinking water guidelines, should be classified under this category. The operation of water and wastewater facilities should not create health risk to the public. In the case of water facilities, the quality of produced water may include a minimal excess of iron, manganese and sodium. Similarly, wastewater treatment facilities that may be experiencing operational problems, but will not create immediate health and safety risks, should be classified under this category. Examples of potential deficiencies that can be classified under this category are as follow:

- an absence of a chlorine feed pump and other equipment as backup;
- no provisions for operator training;
- an absence of clear emergency procedures;
- no safety equipment in the plant; and
- a lack of operating manuals.

Category C - High Risk - systems with potential health and safety concerns such as the repetitive water boiling advisories, not meeting the Maximum Acceptable Concentration (MAC) parameters specified in the Guidelines for Canadian Drinking Water Quality, and other issues of a similar nature. Deficiencies identified under this category may pose an immediate health risk for residents of a surveyed community. Therefore, the consultant, while conducting the survey, should notify the Chief of the First Nation community, Health Canada, and INAC of any emergency situation that will require immediate actions.

The following are a few examples of deficiencies that can be classified under this category:

- a main component of water treatment equipment is dysfunctional and requires immediate replacement of a part such as a chlorination unit, filter or chlorine feed pump;
- water treatment systems which do not produce the safe drinking water as per federal guidelines;
- an operator does not have formal training and, at least minimum, background knowledge of the system that he or she operates;
- the quality of the raw water source is poor and there is no appropriate treatment in place;
- bacteriological tests of the drinking water indicating the presence of *coliform organisms*;
- a lack of regular testing and maintenance of records.

SUPPLEMENTAL GUIDELINES FOR HIGH RISK RATINGS

These are to be used as a guideline only. Each situation will vary depending on site specifics and the interaction of the components. For a whole section to be classified as high risk, it needs to be considered a high risk in at least two of the categories below. If the risk was found to be in any of the ***bolded italics*** categories it can be rated as high risk based on that point only.

WATER

A: Water Source

High Risk Ratings

- ***If water source is impacted by known pollution source***
- ***Wide variability in raw water quality***
- ***If there is the presence of high levels of biological contamination, especially fecal***
- If suspect GWI, but not proved, rate high anyway and state why.
- If ground water quality has significantly deteriorated over time.
- If there are not enough samples then rate high.
- Actual or potential interruption of the supply from source.
- Surface water source not tested for Giardia or Crypto.
- Raw water supply volume insufficient.

B: Design

High Risk Rating

- ***If the treatment system is inappropriate for the raw water source.***
- ***If the treated water does not meet the biological requirements of the GCDWQ.***
- ***If the treated water does not meet the chemical requirements of the GCDWQ (specifically iron and manganese).***
- ***If the reservoir does not have enough capacity to meet fire flow regulations.***
- In monitoring and alarm systems are not adequate.
- If treatment system is significantly undersized.
- If there is a lot of unaccounted for water.
- If there is insufficient testing with respect to the GCDWQ.
- If there is no meter.
- If the distribution system is significantly overbuilt thus causing dead ends.

C: Operations

High Risk Ratings

- ***If there is no functioning chlorination system in place (exclude excellent quality well water with good sampling program).***
- ***If biological sampling is not carried out at all.***
- ***If no operational and maintenance records of any kind are kept.***
- ***If for any reason EHO boil water protocols are not carried out expeditiously.***
- ***If the free chlorine level of the water leaving the plant is below 0.5 mg/L.***
- ***If the free chlorine residual is too low or non existent in the distribution system.***
- If there is a safety/spillage issue with chemical storage.

WASTEWATER

A: Effluent Receiver

High Risk Ratings

- *If the sewage discharge can contaminate the water supply.*
- *If the discharge quality does not meet the Federal Guidelines.*
- If the community is unaware of the Federal Guidelines.

B: Design

High Risk Ratings

- *If the treatment is inappropriate.*
- *If there is risk of sewage lift station overflows.*
- If monitoring and alarm systems are not adequate.
- Significant I/I which causes the treatment system to exceed design capacity.
- Septic tanks are not regularly pumped.
- No back-up power for lift station.
- Lift Station storage volume is low.

C: Operations

High Risk Ratings

- *If alarm systems are not functioning.*
- *If there are frequent sewage bypasses from the pumping stations.*
- *If no operations and maintenance logs are kept.*
- *If there is continuous and uncontrolled discharge.*
- If sewage pumping station is not cleaned.
- If lagoon maintenance is not being performed.
- Chronic operational problems.
- If the Band dumps the solids contents of their septic tanks directly into the facultative lagoon and this upsets the treatment process.
- If the lagoon is leaking.
- If the lagoon is not well maintained.

D: Reporting

High Risk Rating

- *If regular testing of the effluent according to the guidelines is not done.*

E: Operators

High Risk Ratings

- *If the operator is not certified (depending on the complexity of the system).*
- *If the operator cannot reasonably operate the system.*
- *If the operator is unable to demonstrate proper diligence in his/her duties.*
- If the system is left unattended for long periods of time.
- If the operator does not have technical support from outside of the reserve.
- No back-up staffing plan.

- If the reservoir is not regularly cleaned.
- If the distribution system is not flushed. Frequency depends on water quality.
- If the system suffers from regular breakdowns as a result of lack of maintenance.
- Operator does not operate the system since all work is contracted out and the contract is ad hoc.
- Significant number of main breaks.
- Chronic operational problems.

D: Reporting

High Risk Ratings

- *If bacteriological sampling is not carried out at least monthly (if coli alert system is used then sampling period may be longer).*
- *If as per the Guidelines, there are unacceptably high coliform levels in the water.*
- *If as per the Guidelines, there are unacceptably high levels of HPC or there are repeated high levels of HPC.*
- *If there are reported incidents of widespread illness related to the water supply.*
- *If there are any verified fecal counts in the water.*
- *If there are frequent and on-going boil water notices.*
- *If free chlorine levels not recorded at the plant.*
- *If turbidity is not measured in the system.*
- If chlorine and/or turbidity levels are not recorded in the system.
- If the operations staff must wait too long to receive the water quality testing results from the EHO.

E: Operators

High Risk Ratings

- *If the operator cannot reasonable operate the system.*
- *If the operator is unable to demonstrate proper diligence in his/her duties.*
- *If the community does not fund routine maintenance and supplies.*
- If the operator is not certified depending on the complexity of the system.
- If the system is left unattended for long periods of time.
- If the community has lost confidence in the system and no longer drinks the water.
- If the operator spends his time simply responding to emergencies and does no proactive work.
- The operator does not have access to technical support from outside of the reserve.
- If an outside contractor is used, no formal contract outlining responsibilities and liabilities.
- No back-up staffing plan.

**FACILITY CLASSIFICATION - WATER AND WASTE-
WATER TREATMENT FACILITIES**

**APPENDIX
D**

R E P O R T

Facility Classification Guidelines

BEAVER LAKE FIRST NATIONS

1. Water and wastewater treatment facilities shall be classified according to the following points system:

| | |
|--------------------------|---------------------------|
| 30 points or less | Class I Facility |
| 31-55 points | Class II Facility |
| 56-75 points | Class III Facility |
| 76 points | Class IV Facility |

A sum of all rating values will determine the class of each facility.

2. Points shall be assigned to each facility according to Table 1 for water treatment plants and Table 2 for wastewater treatment facilities.

Table 1 - Water Treatment Facilities

| Item | Points | Rating |
|---|---|--------|
| Size: | | |
| Maximum population served, peak day | 1 point per 10,000 persons | 1 |
| Design flow average day or peak month's average day, whichever is larger | 1 point per 4.546 million litres (1million Imp. Gallons) per day | 1 |
| Water Supply Source: | | |
| Groundwater | 3 | |
| Surface water | 5 | 5 |
| Average raw water quality * (Max 10 points): | | |
| -Little or no variation | 0 | |
| -Water quality (<i>other than turbidity</i>) varies and treatment changes are occasionally required | 2 | 2 |
| -Water quality varies severely and frequent treatment changes are needed | 5 | |
| -Water quality subject to periodic serious industrial waste pollution | 10 | |

Table 1 - Water Treatment Facilities (2)

| Item | Points | Rating |
|---|------------------------|--------|
| Treatment Processes: | | |
| Sedimentation | 5 | 5 |
| Coagulation | 4 | 4 |
| Flocculation | 6 | 6 |
| Filtration (slow sand) | 10 | 10 |
| Disinfection ** : - no disinfection - chlorination or comparable - on-site generation of disinfectant | 0 5 5 | 5 |
| Aeration | 2 | |
| Packed Tower Aeration | 6 | |
| pH Adjustment | 4 | |
| Stability or corrosion control | 4 | |
| Taste and odour control | 8 | |
| Colour control | 4 | |
| Iron or Iron manganese removal | 10 | |
| Ion exchange softening | 10 | |
| Chemical precipitation softening | 20 | |
| Fluoridation | 5 | |
| Upflow clarification | 14 | |
| Special processes (i.e. reverse osmosis, electrodialysis) | 15 | |
| In-plant treatment of plant sludge | 6 | |
| Laboratory Control *** | | |
| Bacteriological/biological (Max. 10 points): - Lab work done outside the facility - Membrane filter processes - Use of fermentation tubes or any dilution method; faecal coliform - biological identification - viral studies or similarly complex work conducted on-site | 0 3 5 7 10 | |
| | | |

Table 1 - Water Treatment Facilities (3)

| Item | Points | Rating |
|---|--------|--------|
| Chemical/physical (Max. 10 points): | | |
| - Lab work done outside the facility | 0 | |
| - Push button or colorimetric methods for simple tests (as chlorine residual, pH) | 3 | 3 |
| - Additional procedures such as jar tests, alkalinity, hardness | 5 | |
| - Highly sophisticated instrumentation such as atomic absorption | 10 | |

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Notes:

- * The key concept is the variation or change in the quality of the raw water source with point values ranging from 0 to 10.
- ** For disinfectant such as ozone, chlorine dioxide or chloramine, assign 5 points
- *** The key concept is to credit laboratory analyses done on-site by facility personnel with point values ranging from 0 to 20.

Table 2 - Wastewater Treatment Facilities (1)

| Item | Points | Rating |
|--|--|--------|
| Size | | |
| Maximum population served, peak day | 1 point per 10,000 persons | 1 |
| Design flow average day or Peak month's average day whichever is larger | 1 point per 3.785 million litres (one million gallon) per day | 1 |
| Variation in Raw Waste * | | |
| Variation do not exceed those normally or typically expected | 0 | |
| Recurring deviations or excessive variations of 100 to 200% in strength and/or flow | 2 | |
| Recurring deviations or excessive variations of more than 200% in strength and or flow | 4 | |
| Raw waste subject to toxic waste discharges | 6 | |
| Treatment Processes | | |
| Facility pumping of main flow | 3 | 3 |
| Screening | 3 | |
| Grit Removal | 3 | |
| Chemical pretreatment (except chlorination, enzymes) | 4 | |
| Equalization | 1 | |

Table 2 - Wastewater Treatment Facilities (2)

| Item | Points | Rating |
|---|--------|--------|
| Treatment Processes | | |
| Primary clarifiers | 5 | |
| Imhoff tanks | 5 | |
| Bio-filtration with secondary clarifiers | 10 | |
| Activated sludge with secondary clarifiers, including extended aeration and oxidation ditches | 15 | |
| Stabilization ponds (lagoons) without aeration | 5 | 5 |
| Stabilization ponds (lagoons) with aeration | 8 | |
| Polishing ponds for advanced wastewater treatment | 2 | |
| Chemical/physical advanced wastewater treatment without secondary treatment | 15 | |
| Chemical/physical advanced wastewater treatment following secondary treatment | 10 | |
| Biological or chemical/biological advanced treatment (i.e. RBCs) | 12 | |
| Ion exchange for advanced wastewater treatment | 10 | |
| Reverse osmosis, electrodialysis for advanced wastewater treatment | 15 | |
| Advanced wastewater treatment chemical recovery, carbon regeneration | 4 | |
| Solids conditioning | 2 | |
| Solids thickening | 5 | |
| Anaerobic digestion of biosolids | 10 | |
| Aerobic digestion of biosolids | 6 | |
| Evaporating drying of biosolids | 2 | |
| Mechanical dewatering of biosolids | 8 | |
| Biosolids reduction (incineration, wet oxidation) | 12 | |
| On-site landfill for biosolids | 2 | |
| Composting of biosolids | 10 | |
| <u>Disinfection of Effluent:</u> | | |
| - No disinfection | 0 | |
| - Chlorination or comparable | 5 | |
| - On-site generation of disinfection | 5 | |

Table 2 - Wastewater Treatment Facilities (3)

| Item | Points | Rating |
|--|----------------------------|--------|
| Effluent Discharge | | |
| Post aeration | 4 | |
| <u>Receiving stream sensitivity:</u> ** - effluent limited - secondary treatment is adequate - more than secondary treatment is adequate - water quality of stream is very critical and very high degree of treatment is required - effluent used in a direct recycle and reuse system - land disposal of effluent - evaporation - subsurface disposal | 0 2 3 6 2 4 | |
| Laboratory Control *** | | |
| Bacteriological - apply the same procedures and rating criteria as indicated in Table 1 | as in Table 1 | |
| <u>Chemical/Physical:</u> - Lab work done outside the facility - Push-button or visual methods for simple tests such as pH, residual chlorine, settleable solids - Additional test such as DO, COD, BOD, gas analysis, titrations, TSS. - More advanced tests such as: nutrients, oils, phenols - Highly advanced tests, such as atomic absorption and gas chromatography | 0 3 5 7 10 | |

Notes:

- * The key concept is frequency or intensity of deviation or excessive variation from normal or typical fluctuations. The deviation can be used in terms of strength, toxicity, shock loads, inflow/infiltration with point values ranging from 0 to 6.
- ** The key concept is th degree of dilution provided under low flow conditions with point values ranging from 0 to 6.
- *** The key concept is to credit laboratory analyses done on-site by facility personnel with point values ranging from 0 to 20.

HEALTH CANADA - ANALYTICAL TEST RESULTS
WATER AND SEWER

APPENDIX
E

REPORT

BEAVER LAKE FIRST NATION

No Water and Wastewater Testing Data Available for Review

Page(s) 015573 to\à 015643

**Is(are) duplicate(s)
est(sont) (des) duplicata(s)**