

**Assessment Studies of  
Water and Wastewater Systems  
and Associated Water Management Practices  
at Indian Island First Nation  
Indian Island, NB (Site #06015)  
Atlantic Region**

For  
Indian and Northern Affairs Canada  
Atlantic Region

By  
MGI Limited  
Fredericton, NB

March 2002



A member of the  Family of Companies

**MGI Limited**

466 Hodgson Road  
Fredericton, New Brunswick  
Canada E3C 2G5

Tel. 506.458.1248

Fax 506.462.7646

Email [mgi.nb@mgi-limited.com](mailto:mgi.nb@mgi-limited.com)

Web [www.mgi-limited.com](http://www.mgi-limited.com)  
[www.CRAworld.com](http://www.CRAworld.com)

March 28, 2002

Public Works & Government Services Canada  
1713 Bedford Row  
Halifax, NS  
B3J 3C9

MGI File 10294B

Attention: Shauna Pierce

**Re: Assessment Study - Indian Island First Nation, Indian Island, NB (Site #06015)**

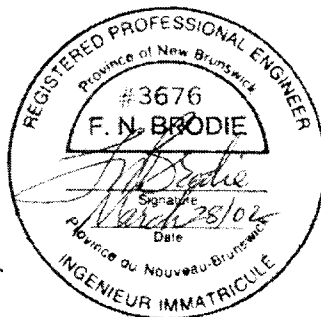
Dear Ms. Pierce:

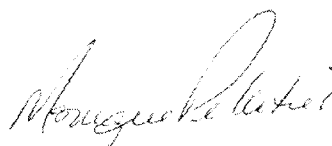
Please find enclosed our report on the assessment of the water and wastewater systems at the Indian Island First Nation community located in Indian Island, NB.

We trust this report meets your requirements. If you have any questions, please call Neil Brodie at 506-458-1248.

Sincerely,  
MGI LIMITED

F. Neil Brodie, P.Eng.  
Senior Project Manager



  
Troy Small, M.Sc.  
Project Hydrogeologist

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## 1.0 Overview

MGI Limited was retained by Public Works & Government Services Canada on behalf of Indian and Northern Affairs Canada to conduct an inspection of the water and wastewater system of the Indian Island First Nation community located in Indian Island, NB. As homes in the community obtain their potable water supply by private wells and individual septic systems for sewage services the following methodology was used:

- 1) Review of available data from Indian and Northern Affairs Canada and Health Canada;
- 2) Liaison with Indian Island First Nation community representative to schedule a site visit;
- 3) Site visit and interview with community representative (i.e. Chief, Community Health Representative, etc.);
- 4) Physical inspection of community infrastructure;
- 5) Discussion with local well driller and septic system installers on general bedrock conditions, water levels, when necessary for supplemental information; and
- 6) Draft and final report preparation discussing risks and possible mitigation if necessary.

Provided below is background information on the Indian Island First Nation community.

|                              |   |
|------------------------------|---|
| Date of Visit:               | January 21, 2002                            |
| Inspector(s)/Interviewer(s): | Troy Small                                  |
| Site Address:                | 61 Island Drive, Indian Island, NB, E4W 1S9 |
| Phone #:                     | 506-523-4875                                |
| Fax#:                        | 506-523-8110                                |
| Tribal Council Affiliation:  | Union of New Brunswick Indians              |
| Chief:                       | Joseph Second Peter Barlow                  |
| Location:                    | Indian Island, NB                           |
| Population:                  | ~100 (on-reserve)                           |
| # Housing Units:             | 36  |

## 2.0 Water System Findings

### 2.1 Water Source and Design

All of the homes in the community receive their potable water from private on-site wells. The private potable water wells in the community range from approximately six to 18 metres in depth and from one to 40 years in age. Bedrock in the area is known to be relatively shallow (0.5 to three metres depth) and consists of highly weathered sandstone. Newly drilled wells in the community are installed by Collette Elmo Well Drilling. Private wells in the community are predominately 150 mm in diameter with aboveground well heads. The community well located in a wooded area on Street A was reportedly drilled in the 1980s but is currently not being used. The well was equipped with a hand pump for emergency water supply in the event of a sustained power outage. There was no information regarding the community well depth, casing depth or yield available at the time of the site visit. All homes in the community have private on-site septic systems and approximately five homes in the community also have furnace oil tanks. There is no known industry, farming, or forestry in the immediate vicinity that is expected to impact the potable groundwater supply. However, the Community Health Coordinator (Georgina Barlow) and the Band

Councillor responsible for community public works (John Simon) both noted that there have been reports of salt water contamination in residential wells located adjacent to the coast. Health Canada noted that salt water is likely infiltrating shallow wells adjacent to the shoreline as this is the only area to be impacted in the community.

The Community Health Coordinator noted the historical presence of coliform bacteria exceeding GCDWQ guidelines in the potable water wells at several homes in the community. The problem was normally assumed related to surface water entering wells via below grade well heads that did not have well covers properly secured. Most wells now reportedly have proper screw tightened caps and are above grade. The councillor also noted that there have been many complaints in the community regarding aesthetic properties of the potable water such as objectionable odours (hydrogen sulphide) and staining (likely due to high iron and manganese content). Available Health Canada data (1995 - 2000) identified the presence of total coliform bacteria at approximately eight residences and fecal coliform bacteria was also identified in the potable water supply at two of these eight homes. The isolated occurrence of total coliform bacteria above GCDWQ guidelines (>10 counts) was noted at three locations. As such Health Canada recommended that the potable water wells at several residences be disinfected using sodium hypochlorite (regular household Javex) as per Health Canada protocols. The available Health Canada chemical water quality data (1991 - 2000) noted that several homes in the community have lead and turbidity levels exceeding GCDWQ guidelines for maximum allowable chemical concentrations (MACs). In addition, barium exceeding MACs has been identified at two locations in the community. Chloride, hardness, iron, manganese, sodium, pH and colour were also noted to be routinely exceeding aesthetic objectives. There have been isolated occurrences of copper at two locations that exceed aesthetic objectives. The high rating is due to the recurring bacterial presence and chemical concentrations exceeding MACs at several potable water wells in the community.

It was noted during the site visit that one home (██████████ 10/1) has recently had a new well drilled due to elevated lead concentrations in the "old" drilled well (well was subsequently abandoned). In addition, due to high iron and manganese content of the groundwater in the area, several homes have had two or more wells drilled in an effort to obtain suitable potable water. The Community Health Coordinator noted that some residents in the community do not use the potable water at their home due to the high iron and/or hydrogen sulfide content and they carry their water from a neighbors home.

The community is not equipped with fire hydrants but the Village of Rexton provides fire protection.

## 2.2 Operation and Sample Collection

The band is responsible for the maintenance and operation of private wells in the community. As noted in Section 2.1, following the presence of coliform bacteria in potable water wells the applicable community residents were instructed to disinfect their wells using sodium hypochlorite as per Health Canada protocols. The community does not have operation and maintenance manuals for the private wells and there are no spare parts kept on-site. The community does not have an emergency response plan in the event of potable water contamination but the community well is available if required. The community potable water well would require testing (bacterial and chemical) prior to being distributed throughout the community.

Health Canada conducts bacteriologic sampling at each home in the community approximately once per year. No boil orders have been issued in the community in the last two years, however the presence of bacteria exceeding GCDWQ guidelines is frequently observed in some residential potable water wells. The band is not equipped with a Coli-Lert unit for on-site bacterial analyses. During the site visit the Community Health Coordinator expressed concerns regarding the approximate week time lapse between sample collection and receiving the analytical data from Health Canada.

The Indian Island First Nation community has a designated person responsible for the proper maintenance of the private potable water wells and the individual septic systems. The Band Councillor (John Simon) has approximately 12 years on the job experience but he noted that if any problems arise with the wells or the septic systems that a contractor is contacted to conduct the required work. He is not certified by the ACWWA and has not had any formal training. The Chief (Joseph Second Peter Barlow) accepts responsibility for maintaining the private wells and septic systems during vacations and illness. The operator appears to be knowledgeable of the wells in the community that historically have had problems.

### **3.0 Wastewater System Findings**

#### **3.1 Wastewater Collection and Treatment**

All of the 36 homes in the community have private septic systems. As noted, the Band Councillor responsible for the potable water wells is also responsible for ensuring the proper installation and maintenance of the private septic systems in the community. He noted that all septic systems in the community are currently being maintained and installed by a local contractor (Gerry Mazerolle) and Health Canada inspects any new installations or upgrades. The operator reported that individual septic systems in the community range from one to 30 years in age. He also noted that soil conditions in the community are predominately gravel and there are no known raised septic beds in the community. However, the councillor also noted that the eastern end of the community has bedrock at approximately 0.5 metres below grade. Health Canada noted that most septic systems in the community are situated directly on highly weathered sandstone bedrock and there are no known raised septic beds. Health Canada noted that weathered bedrock in the community is generally 1 to 1.5 metres below grade. During the site visit the Band Councillor also expressed concerns regarding the close proximity between private septic systems and potable water wells in the community.

#### **3.2 Operation**

As noted in Section 3.1, the operator is responsible for ensuring proper maintenance all the septic systems in the community and a local contractor responds to any complaints of sewage back-ups and/or required maintenance. Each septic tank is cleaned approximately every two to three years or as required using a vacuum truck. The operator reported that several homes in the community have flooded basements each spring due to poor drainage but there have not been any reports of sewage back-ups.

#### 4.0 Discussion and Recommendations

**Issue #1** The site visit noted that several potable water wells in the community have recurring bacterial presence and turbidity values that exceed GCDWQ guidelines. The bacteria impact is assumed due to surface water infiltrating the wells and/or from improper installations of on-site septic systems. In addition, isolated occurrences of lead and barium exceeding MACs have historically been observed in the community. Several aesthetic parameters such as iron and manganese were noted as continually exceeding GCDWQ objectives throughout the community. During the site visit it was noted that several wells in the community historically have salt water impacting the potable water supply during the spring thaw. Several community residents are reportedly not using their potable water due to objectionable odours and/staining and carry potable water from a neighboring home.

**Recommendation:** Consideration should be given to decommissioning the private potable wells in the community and supply potable water to the homes via one (or more) new community well. A study should be completed to determine if a central community water system(s) can feasibly meet the water demands of the community and improve water quality in the community. The new community water well(s) should be constructed in areas of the community that are upgradient of the existing residences and in areas not scheduled for future development to limit the potential for contamination. In the interim, private potable water wells that continually have the presence of coliform bacteria and/or regularly exceed MAC guidelines should be decommissioned and the home connected to an adjacent potable water well or a new well drilled in an upgradient location.

**Issue #2:** The community is not equipped with a Coli-Lert unit for conducting on-site bacterial analyses. In addition, the Community Health Coordinator expressed concerns regarding the time lapse (approximately one week) between sample collection and analytical data reporting.

**Recommendation:** A Coli-Lert unit should be provided to the band so that on-site bacterial analyses can be completed by a community representative. Ensure that the community health representative is trained in proper water sampling techniques and in the correct usage of the Coli-Lert unit. The sampling and analyses completed by the community representative should be completed in conjunction with continued sampling by Health Canada. The community health representative together with the water system operator should maintain a log book of all water system tests, maintenance and equipment failures in the community.

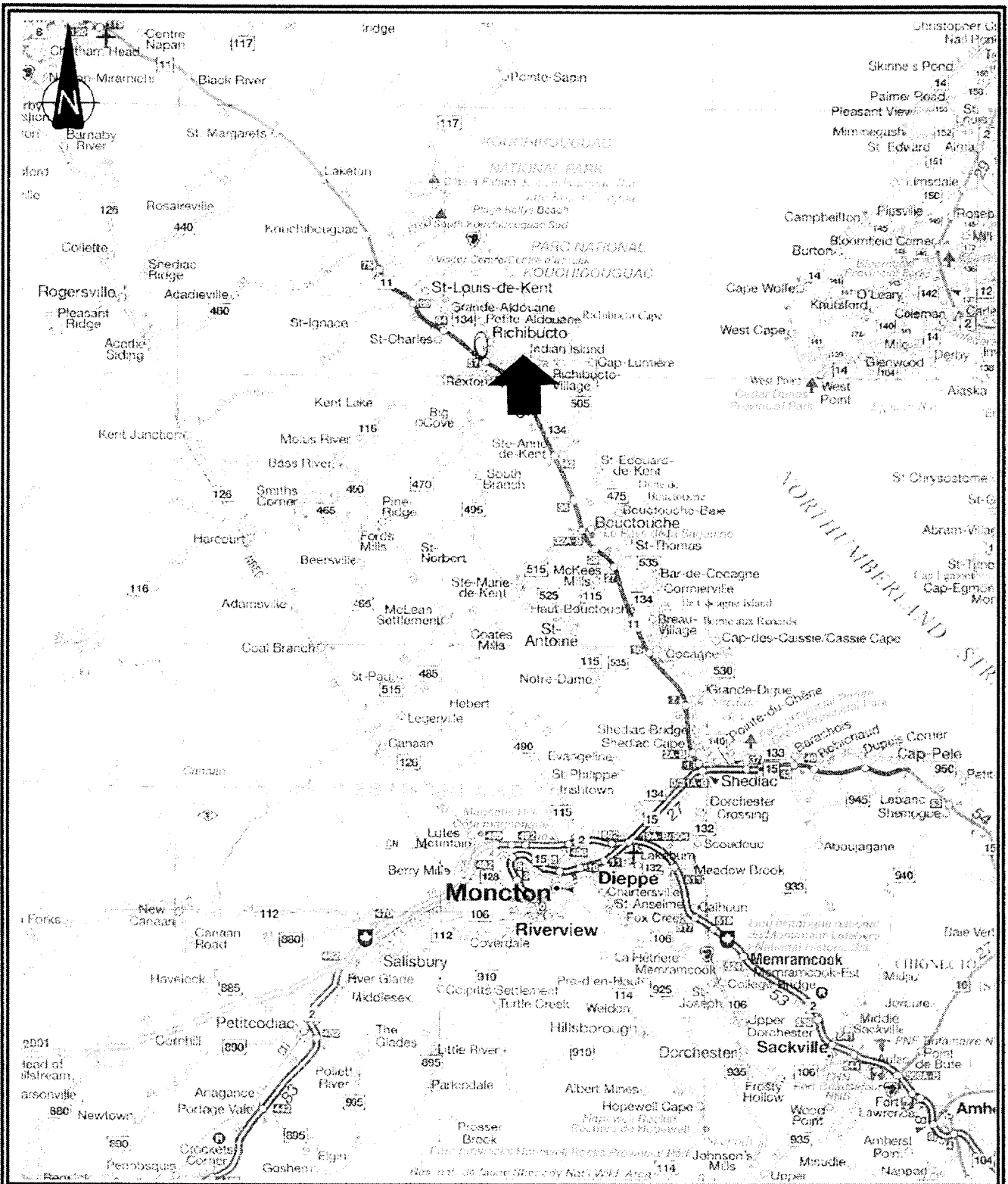
**Issue #3:** All of the 30 homes in the community have private septic systems. In addition, the band councillor responsible for the septic systems expressed concerns regarding the close proximity between potable water wells in the community and on-site septic systems. Improper private septic system installations in areas of the community with shallow bedrock (i.e. septic systems being installed directly on bedrock) could potentially contaminate some potable groundwater supplies. In addition, Health Canada data identified the presence of fecal coliform bacteria at two potable water wells in the community.

**Recommendation:** A study should be completed to determine if communal septic treatment systems (systems that may serve five or more homes) are necessary in areas of the community that are expected to have groundwater contamination due to improperly installed private septic systems. The studies should determine if the soil, groundwater and bedrock conditions in the area are suitable for individual septic systems.



## 5.0 Conclusions

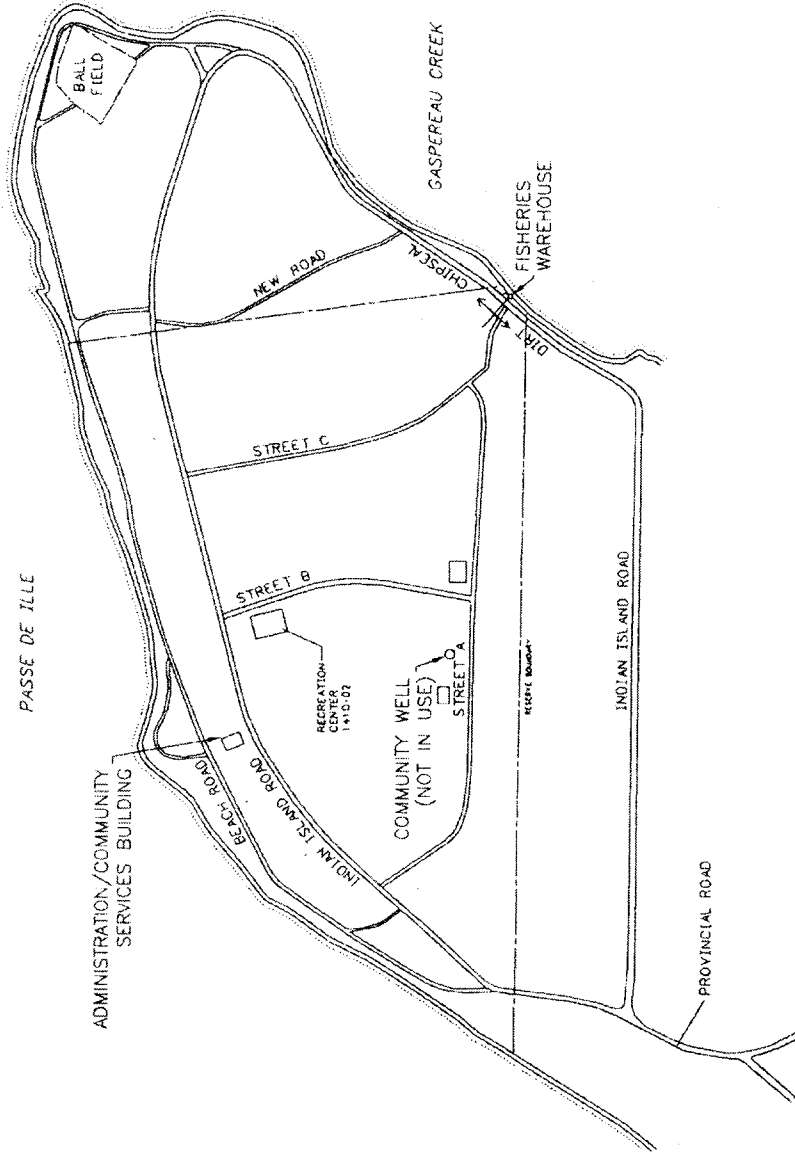
### Overall Community Risk Assessment


| Water               |        | Wastewater            |        |
|---------------------|--------|-----------------------|--------|
| A. Water Source     | High   | A. Effluent Receiving | N/A    |
| B. Design           | N/A    | B. Design             | High   |
| C. Operations       | Medium | C. Operations         | Medium |
| D. Reporting        | Medium | D. Reporting          | N/A    |
| E. Operators        | Low    | E. Operators          | Low    |
| F. Statistical Data | High   | F. Statistical Data   | High   |



10294B-06015-F1

|  |  |                              |                                  |
|--|--|------------------------------|----------------------------------|
|  <p>A member of the  Family of Companies</p> | <p>TITLE</p> <p><b>SITE LOCATION (SITE #06015)</b></p>   | <p>DATE</p> <p>Feb. 2002</p> | <p>PROJECT NO.</p> <p>10294B</p> |
|  | <p>PROJECT</p> <p>ASSESSMENT STUDIES OF WATER &amp; WASTEWATER SYSTEMS<br/>ATLANTIC CANADA FIRST NATION COMMUNITIES<br/>INDIAN ISLAND FIRST NATION, INDIAN ISLAND, NB.</p> | <p>SCALE</p> <p>Unknown</p>  | <p>FIGURE NO.</p>                |
|  |  | <p>DRAWN</p>                 | <p>1</p>                         |
|  |  | <p>GBS</p>                   |                                  |



|   |           |   |        |  |
|---|-----------|---|--------|--|
|  | TITLE     | SITE PLAN (SITE #06015)   |        |  |
|   | PROJECT   | ASSESSMENT STUDIES OF WATER & WASTE WATER SYSTEMS<br>ATLANTIC CANADA FIRST NATION COMMUNITIES<br>INDIAN ISLAND FIRST NATION, INDIAN ISLAND, NB. |        |  |
| DATE  | Feb. 2002 | PROJECT NO.   | 10294B |  |
| SCALE   | As Noted  | FIGURE NO.  | 2      |  |
| DRAWN   | GBS       |   |        |  |

**Appendix A**  
**Water Testing Results**

**HEALTH CANADA DATABASE**  
**Water Quality Data - Bacteriological Sampling**  
**INDIAN ISLAND MICMAC FIRST NATION RESERVE**

| SAMPLE LOCATION   | DATE     | PARAMETERS TESTED:    |                                |
|-------------------|----------|-----------------------|--------------------------------|
|                   |          | TOTAL COLIFORM /100ml | FECAL COLIFORM (ecoli) /100 ml |
| s.19(1)           | 06/29/99 | absent                | absent                         |
|                   | 10/31/00 | absent                | absent                         |
| Band Office       | 03/13/95 | absent                | absent                         |
| Band Office       | 12/04/95 | absent                | absent                         |
| Band Office       | 07/04/96 | absent                | absent                         |
| Band Office       | 04/15/97 | absent                | absent                         |
| Band Office       | 08/07/97 | absent                | absent                         |
| Band Office       | 08/20/97 | absent                | absent                         |
| Band Office       | 04/27/98 | absent                | absent                         |
| Band Office       | 06/29/99 | absent                | absent                         |
| Band Office       | 10/26/00 | absent                | absent                         |
| Band Office (old) | 07/24/97 | absent                | absent                         |
| Band Office (old) | 04/27/98 | absent                | absent                         |
| s.19(1)           | 05/29/95 | absent                | absent                         |
|                   | 07/11/96 | absent                | absent                         |
|                   | 07/24/97 | absent                | absent                         |
|                   | 04/27/98 | absent                | absent                         |
|                   | 06/29/99 | absent                | absent                         |
|                   | 10/26/00 | absent                | absent                         |
|                   | 07/11/96 | 2                     | absent                         |
|                   | 07/15/96 | absent                | absent                         |
|                   | 07/30/97 | absent                | absent                         |
|                   | 04/27/98 | absent                | absent                         |
|                   | 05/29/95 | absent                | absent                         |
|                   | 07/04/96 | absent                | absent                         |
|                   | 07/24/97 | absent                | absent                         |
|                   | 01/19/99 | absent                | absent                         |
|                   | 06/29/99 | absent                | absent                         |
|                   | 10/26/00 | absent                | absent                         |
|                   | 07/11/96 | absent                | absent                         |
|                   | 07/24/97 | absent                | absent                         |
|                   | 04/27/98 | absent                | absent                         |
|                   | 06/29/99 | absent                | absent                         |
|                   | 07/11/96 | absent                | absent                         |
|                   | 07/24/97 | absent                | absent                         |
|                   | 06/29/99 | absent                | absent                         |
|                   | 10/31/00 | absent                | absent                         |
|                   | 04/27/98 | absent                | absent                         |
|                   | 07/08/99 | 4                     | absent                         |
|                   | 09/27/99 | 6                     | absent                         |
|                   | 10/04/99 | 2                     | absent                         |
|                   | 06/29/99 | absent                | absent                         |
|                   | 05/29/95 | absent                | absent                         |
|                   | 10/31/00 | absent                | absent                         |
|                   | 05/29/95 | absent                | absent                         |

|          |        |        |
|----------|--------|--------|
| 07/11/96 | 27     | absent |
| 07/15/96 | 5      | absent |
| 07/30/97 | absent | absent |
| 04/27/98 | absent | absent |
| 06/29/99 | 22     | absent |
| 07/05/99 | absent | absent |
| 10/26/00 | 14     | absent |
| 10/31/00 | absent | absent |
| 07/24/97 | absent | absent |
| 07/11/96 | absent | absent |
| 06/29/99 | 1      | absent |
| 07/05/99 | absent | absent |
| 10/26/00 | absent | absent |
| 04/27/98 | absent | absent |
| 10/26/00 | absent | absent |
| 06/29/99 | absent | absent |
| 09/12/96 | 2      | absent |
| 11/26/96 | 29     | absent |
| 12/02/96 | 200    | absent |
| 12/17/96 | 2      | absent |
| 04/15/97 | 2      | absent |
| 07/24/97 | 1      | 1      |
| 01/15/98 | absent | absent |
| 04/27/98 | absent | absent |
| 06/29/99 | absent | absent |
| 04/03/00 | absent | absent |
| 10/26/00 | absent | absent |
| 09/06/95 | absent | absent |
| 07/11/96 | absent | absent |
| 07/24/97 | absent | absent |
| 04/27/98 | absent | absent |
| 10/31/00 | absent | absent |
| 07/11/96 | absent | absent |
| 04/27/98 | absent | absent |
| 06/29/99 | absent | absent |
| 05/29/95 | absent | absent |
| 07/24/97 | absent | absent |
| 10/31/00 | absent | absent |
| 03/13/95 | absent | absent |
| 07/04/96 | absent | absent |
| 05/29/95 | absent | absent |
| 07/11/96 | absent | absent |
| 06/29/99 | absent | absent |
| 09/27/99 | absent | absent |
| 10/25/99 | absent | absent |
| 10/28/99 | 32     | absent |
| 04/03/00 | absent | absent |
| 11/02/00 | absent | absent |
| 05/29/95 | absent | absent |
| 07/24/97 | absent | absent |
| 10/31/00 | absent | absent |
| 05/29/95 | absent | absent |
| 07/11/96 | 29     | 15     |
| 07/16/96 | 19     | 6      |

|                |                       |          |        |        |
|----------------|-----------------------|----------|--------|--------|
|                |                       | 07/29/96 | absent | absent |
|                |                       | 09/12/96 | absent | absent |
|                |                       | 07/24/97 | absent | absent |
|                |                       | 04/27/98 | absent | absent |
|                |                       | 06/29/99 | absent | absent |
|                | <b>s.19(1)</b>        | 10/26/00 | absent | absent |
|                |                       | 07/24/96 | absent | absent |
|                |                       | 07/24/96 | 1      | absent |
|                |                       | 09/21/95 | absent | absent |
|                |                       | 07/11/96 | absent | absent |
|                |                       | 07/24/97 | absent | absent |
|                |                       | 04/27/98 | absent | absent |
|                |                       | 06/29/99 | absent | absent |
|                |                       | 10/26/00 | absent | absent |
|                |                       | 05/29/95 | absent | absent |
|                | Beach                 | 07/15/96 | na     | absent |
|                | Beach                 | 07/30/97 | na     | absent |
|                | Beach (east of wharf) | 07/07/99 | na     | 10     |
|                | Beach (end of wharf)  | 07/07/99 | na     | 10     |
|                | Beach                 | 07/07/00 | na     | 10     |
|                | Beach                 | 07/07/00 | na     | 40     |
| <b>s.19(1)</b> | Beach                 | 08/10/00 | na     | 100    |
|                | Beach                 | 07/07/99 | na     | 20     |
|                | Beach (Health Centre) | 07/07/99 | na     | <10    |
|                | Beach (at wharf)      | 07/30/97 | na     | 9      |
|                | Beach (at wharf)      | 07/07/00 | na     | 60     |
|                | Beach (at wharf)      | 08/10/00 | na     | <10    |
|                |                       | 05/29/95 | absent | absent |
|                |                       | 07/11/96 | absent | absent |
|                |                       | 07/24/97 | absent | absent |
|                | <b>s.19(1)</b>        | 04/27/98 | absent | absent |
|                |                       | 10/31/00 | absent | absent |
|                |                       | 03/13/95 | absent | absent |
|                |                       | 07/24/97 | absent | absent |
|                |                       | 04/27/98 | absent | absent |
|                |                       | 06/29/99 | absent | absent |
|                |                       | 10/26/00 | absent | absent |
|                |                       | 07/15/96 | absent | absent |
|                |                       | 07/30/97 | absent | absent |
|                |                       | 04/27/98 | absent | absent |
|                |                       | 10/31/00 | absent | absent |
|                | Convenience Store     | 01/18/00 | absent | absent |
|                | Convenience Store     | 10/31/00 | absent | absent |
|                | Eagle's Nest Recovery | 12/04/95 | absent | absent |
|                | <b>s.19(1)</b>        | 06/29/99 | absent | absent |
|                | Health Centre         | 06/11/97 | absent | absent |
|                | Health Centre         | 07/30/97 | 15     | absent |
|                |                       | 04/27/98 | absent | absent |
|                |                       | 07/24/97 | absent | absent |
|                | <b>s.19(1)</b>        | 04/27/98 | absent | absent |
|                |                       | 10/26/00 | absent | absent |
|                |                       | 05/29/95 | absent | absent |
|                |                       | 09/21/95 | absent | absent |
|                |                       | 07/11/96 | absent | absent |

|          |        |        |
|----------|--------|--------|
| 07/30/97 | absent | absent |
| 10/26/00 | absent | absent |
| 07/11/96 | 1      | absent |
| 07/24/97 | 1      | absent |
| 04/27/98 | absent | absent |
| 06/29/99 | 3      | absent |
| 07/05/99 | absent | absent |
| 06/29/99 | 2      | absent |
| 07/08/99 | 1      | absent |
| 09/27/99 | 15     | absent |
| 10/18/99 | absent | absent |
| 10/26/00 | 2      | absent |
| 07/11/96 | absent | absent |
| 07/30/97 | 19     | absent |
| 08/11/97 | 4      | absent |
| 08/20/97 | 21     | absent |
| 04/27/98 | absent | absent |
| 10/26/00 | absent | absent |
| 05/29/95 | absent | absent |
| 06/29/99 | 1      | absent |
| 07/05/99 | absent | absent |
| 07/11/96 | absent | absent |
| 07/24/97 | absent | absent |
| 04/27/98 | absent | absent |
| 07/19/95 | absent | absent |
| 07/11/96 | 5      | absent |
| 07/15/96 | absent | absent |
| 07/24/97 | absent | absent |
| 06/29/99 | 16     | absent |
| 07/05/99 | 18     | absent |
| 10/18/99 | absent | absent |
| 10/26/00 | absent | absent |
| 11/02/00 | absent | absent |
| 07/24/97 | absent | absent |
| 06/29/99 | 16     | absent |
| 07/05/99 | absent | absent |
| 07/30/97 | absent | absent |
| 11/09/00 | absent | absent |
| 07/19/95 | absent | absent |
| 07/11/96 | absent | absent |
| 07/24/97 | absent | absent |
| 04/27/98 | absent | absent |
| 06/29/99 | absent | absent |
| 08/10/00 | absent | absent |
| 10/26/00 | absent | absent |
| 05/29/95 | absent | absent |
| 07/11/96 | absent | absent |
| 07/24/97 | absent | absent |
| 04/27/98 | absent | absent |
| 06/29/99 | absent | absent |
| 10/26/00 | absent | absent |
| 07/04/96 | absent | absent |
| 07/24/97 | absent | absent |
| 04/27/98 | absent | absent |

s.19(1)

|          |        |          |
|----------|--------|----------|
| 06/29/99 | absent | absent   |
| 10/26/00 | absent | absent   |
| 07/11/96 | absent | absent   |
| 07/24/97 | absent | absent   |
| 04/27/98 | absent | absent   |
| 06/29/99 | absent | absent   |
| 10/26/00 | 118    | absent   |
| 11/09/00 | 8      | absent   |
| 12/12/00 | 1      | absent   |
| 01/11/01 | absent | absent   |
| 11/02/00 | absent | absent   |
| 07/11/96 | absent | absent   |
| 07/24/97 | absent | absent   |
| 04/27/98 | absent | absent   |
| 05/29/95 | absent | absent   |
| 06/29/99 | absent | absent   |
| 05/29/95 | absent | absent   |
| 07/11/96 | absent | absent   |
| 07/30/97 | absent | absent   |
| 04/27/98 | absent | absent   |
| 11/09/00 | absent | absent   |
| 07/11/96 | 3      | absent   |
| 10/31/00 | 1      | absent   |
| 05/29/95 | absent | absent   |
| 07/11/96 | absent | absent   |
| 05/29/95 | absent | absent   |
| 07/15/96 | absent | absent   |
| 07/30/97 | absent | absent   |
| 04/27/98 | absent | absent   |
| 10/31/00 | absent | absent   |
| 10/31/00 | 5      | absent   |
| 11/09/00 | absent | absent   |
| 04/26/99 | absent | absent   |
| 10/26/00 | absent | absent   |
| 05/29/95 | absent | absent   |
| 07/11/96 | 118    | absent   |
| 07/15/96 | absent | absent   |
| 07/24/97 | absent | absent   |
| 04/27/98 | absent | absent   |
| 12/02/99 | absent | absent   |
| 10/31/00 | absent | absent   |
| 04/27/98 | absent | absent   |
| 06/29/99 | absent | absent   |
| 05/29/95 | absent | absent   |
| 07/11/96 | 1      | absent   |
| 04/27/98 | absent | absent   |
| 11/12/97 | 2      | absent   |
|          | Roger  | indisldb |

Well - New

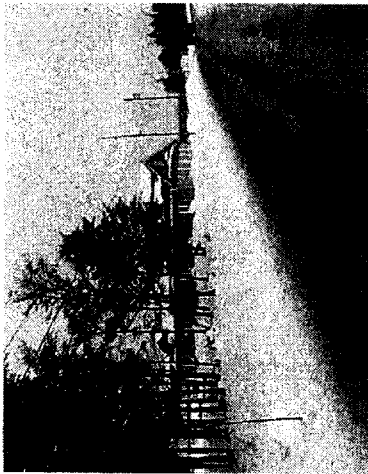
HEALTH CANADA DATABASE  
 DRINKING WATER QUALITY (CHEMICAL) DATA  
 INDIAN ISLAND MICMAC FIRST NATION RESERVE

| Parameters Sampled | Health or Aesthetic Limit | aluminum | arsenic | barium | boron  | cadmium | chloride | chromium | colour | copper   | hardness | fluoride | iron | L. i.  | lead   | manganese | nitrate    | pH      | selenium | sodium | sulphate     | turbidity | uranium | zinc |
|--------------------|---------------------------|----------|---------|--------|--------|---------|----------|----------|--------|----------|----------|----------|------|--------|--------|-----------|------------|---------|----------|--------|--------------|-----------|---------|------|
| mg/l →             |                           | 0.025    | 1.00    | 5.00   | 0.005  | <250    | 0.05     | < 15 TCU | < 1.0  | 80 - 100 | 1.5      | < 0.3    |      |        | < 0.05 | 46.00     | 6.5 to 8.5 | 0.01    | < 200    | < 500  | 1 NTU <5 NTU | 0.1       | < 5.0   |      |
| LOCATION           | Date:                     | IMAC     | MAC     | IMAC   | MAC    | AO      | MAC      | AO       | AO     | MAC      | MAC      | MAC      | AO   |        | MAC    | AO        | MAC        | AO      | MAC      | AO     | MAC & AO     | MAC       | AO      |      |
|                    | 09/27/95                  |          |         |        |        | 303     |          | 5        | 0.07   | 276      |          | 0.16     |      |        | 1.44   | 0.08      | 5.4        |         | 78.2     | 6      | 1.17         |           | 0.04    |      |
|                    | 10/31/00                  | <0.025   | <0.0015 | 0.183  | <0.01  | <0.0005 | 47.6     | <0.01    | 0.03   | 16.7     | <0.1     | 0.217    | -5   | <0.1   | 0.089  | 0.41      | 6          | <0.0015 | 11.9     | 1.95   | 0.3          | <0.0005   | 0.017   |      |
|                    | 10/31/00                  | <0.025   | <0.0015 | 0.489  | <0.01  | <0.0005 | 43.6     | <0.01    | 0.278  | 23       | <0.1     | 0.033    | -3.2 | <0.001 | 0.01   | <0.05     | 7.01       | <0.0015 | 18.2     | 1.84   | 0.4          | <0.0005   | 0.16    |      |
|                    | 09/03/92                  |          |         |        |        | 1030    |          | 15       | 0.06   | 917      |          | 0.23     |      |        | 6.43   | <0.05     | 5.7        |         | 304      | 81     | 1.13         |           | 0.07    |      |
|                    | 11/25/83                  |          |         |        |        | 18.6    |          | 17       | 0.02   | 12.2     |          | 0.92     |      |        | <0.01  | 0.34      | 5.9        |         | 11.1     | 3      | 4.46         |           | 0.03    |      |
|                    | 10/31/00                  | <0.025   | <0.0015 | 0.219  | <0.01  | <0.0005 | 25.8     | <0.01    | 0.244  | 14.9     | <0.1     | <0.01    | -3.3 | <0.001 | <0.005 | 0.2       | 7.09       | <0.0015 | 14       | 3      | 0            | <0.0005   | 0.037   |      |
|                    | 07/24/95                  |          |         |        |        | 713     |          | 16       | 0.02   | 807      |          | 38.8     |      |        | 6.09   | <0.05     | 5.2        |         | 201      | 80     | 28.2         |           | 0.3     |      |
|                    | 10/31/00                  | <0.025   | <0.0015 | 0.306  | <0.01  | <0.0005 | 23.7     | <0.01    | 0.032  | 12       | <0.1     | 0.029    | -4   | 0.0021 | 0.0064 | 0.31      | 6.77       | <0.0015 | 14.5     | 1.95   | 0            | <0.0005   | 0.018   |      |
|                    | 11/01/00                  | <0.025   | <0.0015 | 0.069  | <0.01  | <0.0005 | 10.9     | <0.1     | 0.077  | 11.1     | 0.1      | 0.601    | -2.9 | 0.001  | 0.029  | <0.05     | 7.46       | <0.0015 | 9.49     | 7.36   | 6.2          | <0.0005   | 0.058   |      |
|                    | 07/24/95                  |          |         |        |        | 12.3    |          | 3        | 0.02   | 5.8      |          | 0.17     |      |        | 0.05   | 0.08      | 5.9        |         | 8.2      | 3      | 0.82         |           | 0.09    |      |
|                    | 08/10/00                  | <0.025   | <0.0015 | 0.052  | <0.01  | <0.0005 | 17       | <0.01    | 0.121  | 7.8      | <0.1     | 0.02     | -4.2 | 0.0012 | 0.009  | 0.08      | 6.44       | <0.0015 | 9.55     | 2.42   | 0            | <0.0005   | 0.031   |      |
|                    | 10/31/00                  | <0.025   | <0.0015 | 0.06   | <0.01  | <0.0005 | 18.2     | <0.01    | 0.336  | 8.9      | <0.1     | 0.022    | -3.7 | 0.002  | 0.0056 | 0.1       | 6.96       | <0.0015 | 10.9     | 2.56   | 0.1          | 0.0005    | 0.054   |      |
|                    | 09/05/95                  |          | <0.005  |        |        | 15      |          | 5        | 0.5    | 95.2     | <0.1     | 0.14     |      | <0.002 | 0.016  | 6         | 7.1        |         | 10       | 13     | 1.5          |           | 0.04    |      |
|                    | 10/31/00                  | <0.025   | <0.0015 | 0.166  | <0.01  | <0.0005 | 11.8     | <0.01    | 0.046  | 7.5      | <0.1     | 0.024    | -3.5 | 0.0023 | <0.005 | 0.58      | 7.15       | <0.0015 | 9.52     | 4.04   | 0.2          | <0.0005   | 0.012   |      |
|                    | 07/04/96                  | <0.025   | <0.001  | 0.068  | <0.200 | <0.0001 | 11.1     | <0.02    | <0.01  | 6.3      | <0.1     | 0.31     |      | <0.001 | 0.021  | <0.05     | 6.67       | <0.001  | 8.76     | 3.31   | 0.3          |           | 0.056   |      |
|                    | 11/26/96                  | <0.025   | <0.001  | <0.063 | <0.200 | <0.0005 | 12.4     | <0.02    | 1.169  | 5.7      | <0.1     | 0.043    |      | <0.001 | <0.01  | 0.05      | 6.45       | <0.001  | 8.2      | 3.97   | 0.1          |           | 0.036   |      |
|                    | 10/31/00                  | <0.025   | <0.0015 | 0.097  | <0.01  | <0.0005 | 18       | <0.01    | 0.178  | 8        | <0.1     | 0.027    | -3.8 | <0.001 | 0.0053 | <0.05     | 6.93       | <0.0015 | 11.6     | 2.64   | 0.3          | <0.0005   | 0.076   |      |
|                    | 05/01/92                  |          |         |        |        | 64.5    |          | 35       | <0.01  | 43.4     |          | 2.58     |      |        | 0.37   | <0.05     | 5.9        |         | 23.9     | 4      | 14.2         |           | 0.03    |      |
|                    | 09/23/83                  |          |         |        |        | 12.3    |          | 3        | 1.32   | 8.3      |          | 1.38     |      |        | 0.05   | <0.05     | 6.2        |         | 8.9      | 3      | 15.5         |           | 1.43    |      |
|                    | 10/31/00                  | <0.025   | <0.0015 | 0.164  | <0.01  | <0.0005 | 17.8     | <0.01    | 0.172  | 11       | <0.1     | 0.042    | -3.3 | 0.0025 | <0.005 | <0.05     | 7.26       | <0.0015 | 11.6     | 3.4    | 0            | <0.0005   | 0.015   |      |
|                    | 11/01/00                  | <0.025   | <0.0015 | 0.179  | <0.01  | <0.0005 | 56.3     | <0.01    | 0.119  | 28.8     | <0.1     | 0.056    | -3   | <0.001 | 0.023  | 0.16      | 6.96       | <0.0015 | 24.7     | 4.46   | 0            | <0.0005   | 0.013   |      |
|                    | 11/01/00                  | <0.025   | <0.0015 | 0.092  | <0.01  | <0.0005 | 11.3     | <0.01    | 0.129  | 5.5      | <0.1     | 0.17     | -3.8 | 0.0012 | 0.027  | <0.05     | 7.09       | <0.0015 | 7.78     | 6.14   | 1.3          | <0.0005   | 0.026   |      |
|                    | 04/30/91                  |          | <0.005  |        |        | 10      |          | <3       | <0.01  | 6.36     | <0.1     | 0.03     |      | <0.002 | <0.01  | <0.05     | 6.6        |         | 7.8      | 4      | 0.24         |           | 0.02    |      |
|                    | 08/26/83                  |          |         |        |        | 9.9     |          | <3       | <0.01  | 6.36     |          | 0.03     |      |        | <0.01  | 0.06      | 6          |         | 8.6      | 5      | 0.34         |           | <0.01   |      |
|                    | 04/26/99                  | <0.025   | <0.0015 | 0.151  | <0.200 | <0.0005 | 18.6     | <0.01    | <0.01  | 7.5      | <0.1     | 0.149    |      | <0.001 | 0.011  | 0.4       | 6.54       | <0.0015 | 8.04     | 4.02   | 1.7          |           | 0.01    |      |
|                    | 10/31/00                  | <0.025   | <0.0015 | 0.14   | <0.01  | <0.0005 | 13.8     | <0.01    | <0.01  | 9.2      | <0.1     | 0.037    | -3.5 | <0.001 | 0.025  | 0.19      | 7.23       | <0.0015 | 9.89     | 5.14   | 4.1          | <0.0005   | 0.063   |      |
|                    | 12/02/99                  | <0.025   | <0.0015 | 0.145  | <0.200 | <0.0005 | 12.2     | <0.01    | 0.081  | 8.3      | <0.1     | 0.15     | -4.4 | <0.001 | 0.007  | 0.11      | 6.25       | <0.0015 | 9.17     | 3.72   | 0.2          |           | 0.015   |      |
|                    | 11/01/00                  | <0.025   | <0.0015 | 0.156  | <0.01  | <0.0005 | 13.3     | <0.01    | 0.112  | 8.1      | <0.1     | 0.148    | -3.5 | <0.001 | 0.0061 | 0.1       | 7.2        | <0.0015 | 8.94     | 3.55   | 0.6          | <0.0005   | 0.014   |      |

s.19(1)

| Parameters Sampled  | Health or Aesthetic Limit | mg/l → | aluminum | arsenic | barium | boron   | cadmium | chloride | chromium | colour | copper | hardness | fluoride | iron  | L. I.  | lead   | manganese | nitrate | pH      | selenium | sodium | sulphate | turbidity | uranium | zinc    |       |
|---------------------|---------------------------|--------|----------|---------|--------|---------|---------|----------|----------|--------|--------|----------|----------|-------|--------|--------|-----------|---------|---------|----------|--------|----------|-----------|---------|---------|-------|
| LOCATION            | Date:                     |        | IMAC     | MAC     | IMAC   | MAC     | <250    | 0.05     | <15 TCU  | AO     | MAC    | MAC      | MAC      | AO    |        | MAC    | AO        | MAC     | AO      | MAC      | AO     | AO       | MAC & AO  | MAC     | AO      |       |
| s.19(1) Band Office | 11/01/00                  | <0.025 | <0.0015  | 0.088   | <0.01  | <0.0005 | 10.8    | <0.01    |          |        | 0.037  | 4.2      | <0.1     | 0.17  | -4.5   | 0.0028 | 0.018     | <0.05   | 6.75    | <0.0015  | 8.61   | 8.44     | 0.3       | <0.0005 | 0.098   |       |
|                     | 03/11/93                  | 0.007  | <0.002   | 0.078   | <0.005 | <0.0005 | 11      | 0.002    | <3       |        | 0.24   | 6.03     |          | 0.11  |        | 0.014  | 0.01      | 0.35    | 6.2     | <0.002   | 7.9    | 3        | 0.99      | <0.0001 | 0.01    |       |
| s.19(1) Band Office | 10/31/00                  | <0.025 | <0.0015  | 0.372   | <0.01  | <0.0006 | 20.9    | <0.01    |          |        | 0.07   | 9.9      | <0.1     | 0.022 | -3.6   | <0.001 | 0.0095    | 0.33    | 7.08    | <0.0015  | 13     | 1.76     | 0.2       | <0.0005 | 0.049   |       |
|                     | 09/23/93                  |        |          |         |        |         | 80.9    |          | <3       |        | 0.05   | 65.4     |          | 0.07  |        |        | 0.3       | 0.93    | 5.5     |          | 35     | 7        | 0.07      |         | 0.03    |       |
|                     | 10/31/00                  | 0.025  | <0.0015  | 0.408   | 0.012  | <0.0005 | 214     | <0.01    |          |        | 0.106  | 162.7    | <0.1     | 0.069 | -2.7   | <0.001 | 0.837     | 0.72    | 6.8     | <0.0015  | 77.4   | 15       | 0.2       | <0.0005 | 0.033   |       |
|                     | 12/17/96                  | <0.025 | <0.001   | 0.563   | <0.200 | <0.0005 | 76.6    | <0.02    |          |        | 0.05   | 85.8     | <0.1     | 0.269 |        | 0.0027 | 0.013     | <0.05   | 6.09    | <0.001   | 22     | 3.19     | 17.9      |         | 0.02    |       |
|                     | 01/19/99                  | <0.025 | <0.001   | 0.569   | <0.200 | <0.0005 | 97.7    | <0.01    |          |        | 0.022  | 89.7     | <0.1     | 0.659 |        | <0.001 | 0.034     | <0.05   | 6.31    | 0.0021   | 22.3   | 2.8      | 2.8       |         | 0.022   |       |
|                     | 11/01/00                  | <0.025 | <0.0015  | 0.523   | <0.01  | <0.0005 | 94.1    | <0.01    |          |        | 0.047  | 87.7     | <0.1     | 0.539 | -2.7   | <0.001 | 0.033     | <0.05   | 7.11    | 0.00182  | 20.8   | 3.31     | 1.6       | <0.0005 | 0.031   |       |
|                     | 11/01/00                  | <0.025 | <0.0015  | 0.232   | <0.01  | <0.0005 | 35.6    | <0.01    |          |        | 0.271  | 14.3     | <0.1     | 0.074 | -4.1   | 0.0939 | 0.018     | 1.08    | 6.79    | <0.0015  | 18.3   | 2.47     | 0         | <0.0005 | 0.018   |       |
|                     | 01/11/01                  |        |          |         |        |         |         |          |          |        |        |          |          |       |        | 0.109  |           |         |         |          |        |          |           |         |         |       |
|                     | 11/01/00                  | <0.025 | <0.0015  | 0.116   | <0.01  | <0.0005 | 10.7    | <0.01    |          |        | 0.067  | 18.3     | 0.134    | 1.58  | -2.3   | 0.0014 | 0.043     | <0.05   | 7.55    | <0.0015  | 9.24   | 4.69     | 4.5       | <0.0005 | 0.098   |       |
|                     | 08/29/97                  | 0.376  | <0.001   | 1.58    | <0.200 | <0.0005 | 157     | <0.01    |          |        | <0.01  | 122.7    | <0.1     | 0.663 |        | 0.0026 | 0.95      | <0.05   | 5.26    | 0.0012   | 48.1   | 5.58     | 2         |         | 0.12    |       |
|                     | 10/31/00                  | <0.025 | <0.0015  | 0.063   | <0.01  | <0.0005 | 15.7    | <0.01    |          |        | 0.035  | 8.7      | <0.1     | 0.014 | -3.7   | <0.001 | <0.005    | 0.72    | 7.03    | <0.0015  | 10.5   | 1.82     | 0         | <0.0005 | 0.024   |       |
|                     | 10/31/00                  | <0.025 | <0.0015  | 0.126   | <0.01  | <0.0005 | 12.1    | <0.01    |          |        | 0.049  | 5.7      | <0.1     | 0.011 | <0.001 | <0.005 | 0.1       | 7.05    | <0.0015 | 8.61     | 2.77   | 0        | <0.0005   | 0.016   |         |       |
|                     | 09/12/96                  |        |          | <0.055  | <0.200 |         | 6070    | <0.02    |          |        | <0.01  | 3311.1   | 0.134    | 56.1  |        |        | 19.707    | <0.05   | 6.17    |          | 1370   | 391      | 24.7      |         | 0.079   |       |
|                     | 11/26/96                  | 0.076  | 0.00183  | 0.483   | <0.200 | <0.0005 | 460     | <0.02    |          |        | <0.01  | 423.1    | <0.1     | 0.805 |        | 0.0027 | 2.824     | <0.05   | 6.39    | 0.00306  | 103.1  | 16.1     | 2.1       |         | 0.102   |       |
|                     | 12/16/97                  |        |          |         |        |         |         |          |          |        |        |          | <0.01    |       |        |        | 3.17      |         |         |          |        |          |           |         |         |       |
|                     | 09/27/95                  |        |          |         |        |         | 18.2    |          |          | 5      | 0.04   | 6.67     |          | 0.13  |        |        | 0.05      | 0.18    | 5.8     |          | 12.3   | 5        | 1.33      |         | 0.18    |       |
|                     | 11/01/00                  | <0.025 | <0.0015  | 0.303   | <0.01  | <0.0005 | 37      | <0.01    |          |        | 0.153  | 18.1     | <0.1     | 0.03  | -3.3   | 0.0018 | 0.014     | 0.4     | 7.08    | <0.0015  | 15.3   | 1.2      | 0.1       | <0.0005 | 0.063   |       |
|                     | 03/14/95                  |        |          |         |        |         | 21.9    |          |          | 3      | 0.05   | 15.5     |          | 0.03  |        |        | 0.13      | 0.98    | 6.2     |          | 10.4   | 3        | 0.46      |         | 0.07    |       |
|                     | 11/27/96                  | <0.025 | <0.001   | <0.194  | <0.200 | <0.0005 | 54.9    | <0.02    |          |        | 0.079  | 19.9     | <0.1     | 0.292 |        | <0.001 | 0.158     | 0.65    | 6.12    | <0.001   | 11     | 3.56     | 5.4       |         | 0.013   |       |
|                     | 11/01/00                  | <0.025 | <0.0015  | 0.112   | <0.01  | <0.0005 | 18      | <0.01    |          |        | <0.01  | 13       | <0.1     | 0.066 | -3.3   | <0.001 | 0.044     | <0.05   | 7.21    | <0.0015  | 10.8   | 6.88     | 0.9       | <0.0005 | 0.013   |       |
|                     | 10/28/99                  | <0.025 | <0.0015  | 0.198   | <0.200 | <0.0005 | 14.9    | <0.01    |          |        | <0.01  | 10.6     | <0.1     | 0.424 | -4.1   | <0.001 | 0.059     | <0.05   | 6.48    | <0.0015  | 11.3   | 6.78     | 0.5       | 0       | 0.0085  |       |
|                     | 04/29/93                  |        |          |         |        |         | 17.2    |          |          | <3     | 0.11   | 7.44     | <0.1     | 0.05  |        |        | 0.01      | <0.05   | 5.9     |          | 9.9    | 2        | 0.13      |         | 0.14    |       |
|                     | 10/31/00                  | <0.025 | <0.0015  | 0.224   | <0.01  | <0.0005 | 21.8    | <0.01    |          |        | 0.306  | 10.4     | <0.1     | 0.04  | -3.9   | <0.001 | 0.0083    | 0.63    | 6.87    | <0.0015  | 13     | 2.22     | 0         | <0.0005 | 0.037   |       |
|                     | 09/27/95                  |        |          |         |        |         | 399     |          |          | 3      | 0.04   | 375      |          | 1.23  |        |        | 1.59      | 0.05    | 4.8     |          | 80.6   | <2       | 0.29      |         | 0.16    |       |
|                     | 11/27/96                  | 1      | <0.001   | 4.979   | <0.200 | <0.0005 | 376     | <0.02    |          |        | 0.012  | 354.1    | 0.18     | 0.591 |        | 0.0034 | 1.364     | <0.05   | 4.39    | 0.00295  | 62.6   | 2.51     | 0.8       |         | 0.135   |       |
|                     | 10/17/91                  |        |          |         |        |         | 240     |          |          |        |        | 0.7      |          |       |        |        | 0.3       |         | 4.39    |          | 0.0295 | 62.6     | 2.51      | 0.8     | 0.135   |       |
|                     | 11/01/00                  | <0.025 | <0.0015  | 0.234   | <0.01  | <0.0005 | 21.9    | <0.01    |          |        | 0.092  | 11.9     | <0.1     | 0.017 | -3.1   | <0.001 | <0.005    | <0.05   | 7.21    | <0.0015  | 10.6   | 1.79     | 0         | <0.0005 | 0.014   |       |
|                     | 11/01/00                  | <0.025 | <0.0015  | 0.207   | <0.01  | <0.0005 | 88.4    | <0.01    |          |        | 0.048  | 74       | <0.1     | 0.965 | -2.8   | <0.001 | 0.327     | <0.05   | 7.12    | 0.00192  | 28.3   | 3.66     | 11.7      | <0.0005 | 0.019   |       |
|                     | 11/01/00                  | <0.025 | <0.0015  | 0.116   | <0.01  | <0.0005 | 12.8    | <0.01    |          |        | 0.011  | 10.2     | <0.1     | 0.138 | -3.1   | 0.0048 | 0.046     | <0.05   | 7.37    | <0.0015  | 8.32   | 5.09     | 1.4       | <0.0005 | 0.04    |       |
|                     | 11/01/00                  |        |          |         |        |         |         |          |          |        | 109.2  | <0.1     | 1.28     | -3.9  | 0.0082 | 0.165  | <0.49     | 6.45    | 0.00385 |          | 144    | 21       | 1.3       | <0.0005 | 0.151   |       |
| Maintenance Store   | 11/01/00                  | 0.327  | <0.0015  | 0.716   | 0.036  | <0.0005 | 256     | <0.01    |          |        | 0.012  | 109.2    | <0.1     | 1.28  | -3.9   | 0.0082 | 0.165     | <0.49   | 6.45    | 0.00385  |        | 144      | 21        | 1.3     | <0.0005 | 0.151 |
| Health Centre       | 05/11/97                  |        |          |         | <0.200 |         | 78      |          |          |        |        | 915.9    | 0.392    | 43.8  |        |        |           | <0.05   | 4.51    |          | 353    | 130      | 2         |         | 0.273   |       |
| Health Centre       | 07/29/97                  | 0.546  | <0.001   | 0.19    | 0.669  | <0.0005 | 4260    | <0.01    |          |        | 0.267  | 2991     | <0.1     | 22.6  |        |        | 16.9      | 0.06    | 4.69    |          | 1150   | 473      | 52.3      |         |         |       |
| Health Centre       | 08/20/97                  |        |          |         |        |         |         |          |          |        |        |          |          |       |        |        |           |         |         |          |        |          |           |         |         |       |
| Health Centre       | 11/20/97                  | 0.027  | <0.001   | 0.269   | <0.200 | <0.0005 | 14.4    | <0.01    |          |        | 0.04   | 7.4      | <0.1     | 0.545 |        | 0.0103 | 0.016     | 0.46    | 6.53    | <0.001   | 10.1   | 1.74     | 12.9      |         | 0.023   |       |
| Health Centre       | 12/15/97                  |        |          |         |        |         |         |          |          |        |        |          |          |       |        | <0.001 |           |         |         |          |        |          |           |         |         |       |

**Appendix B**  
**Photographs of Infrastructure**



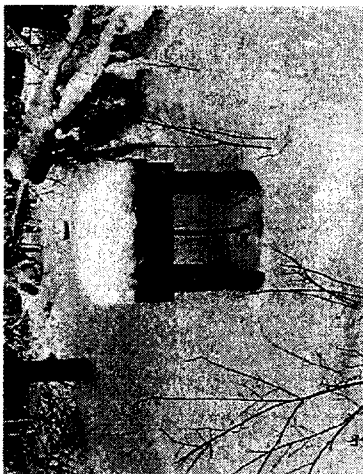
Indian Island Road at band office.



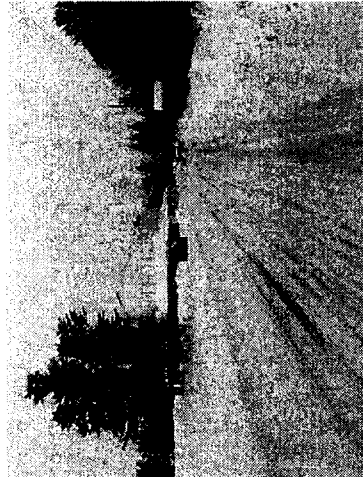
Indian Island Road along Gaspereau Creek.



Street A looking east at the community well.



Community well.



Street B at Recreation Center.



Indian Island Road looking west toward band office.

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Indian Island First Nation (Site # 06015)