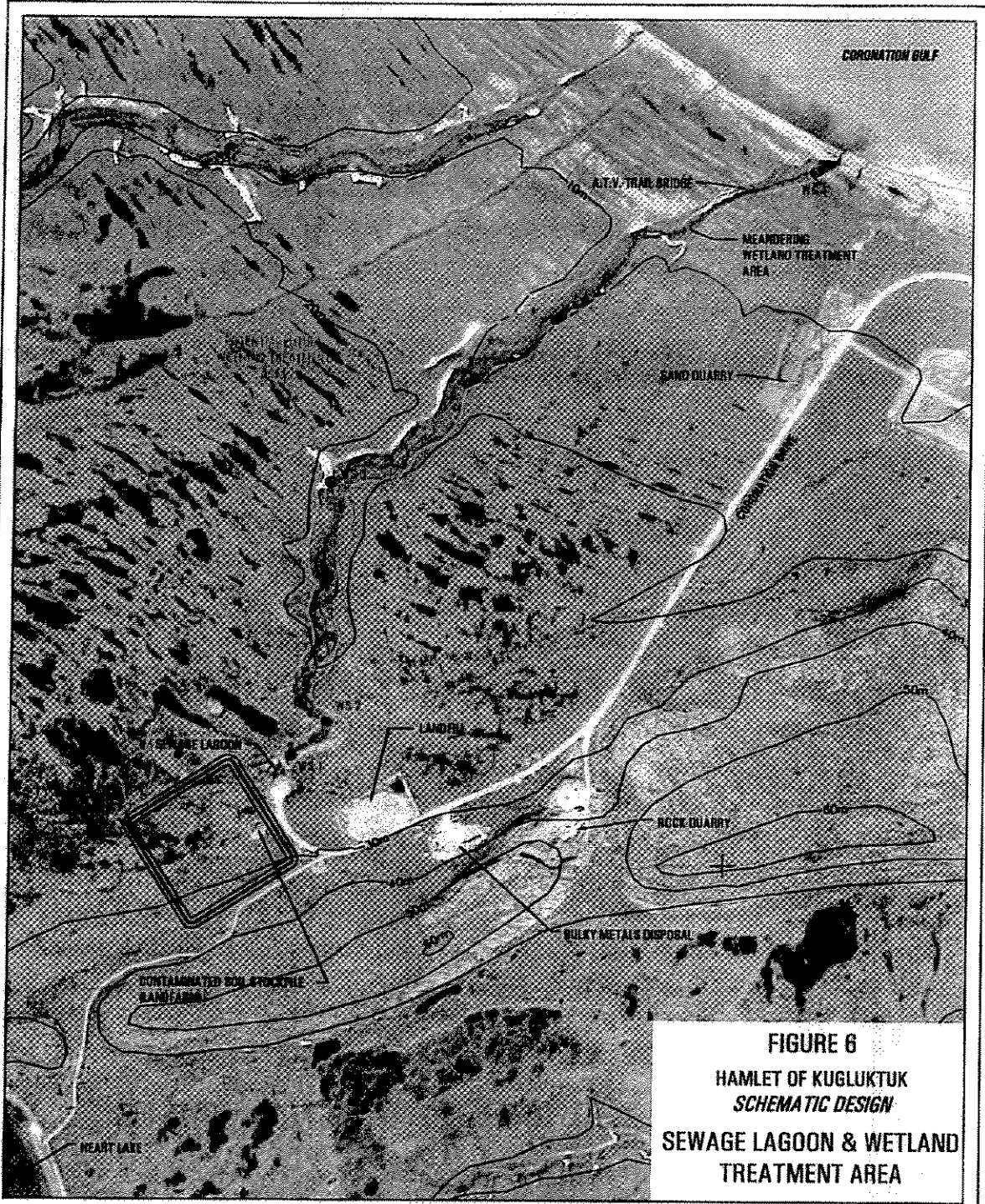


NEEGAN BURNSIDE

**Attachment II – Existing Sewage  
Lagoon and Landfill Summary of  
Sampling Locations**



**FIGURE 6**  
**HAMLET OF KUGLUKTUK**  
**SCHEMATIC DESIGN**  
**SEWAGE LAGOON & WETLAND**  
**TREATMENT AREA**

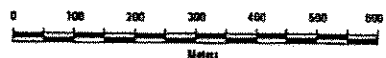
**Legend**

- SURFACE WATER SAMPLE LOCATION
- 30m — EXISTING CONTOURS (in small obtained from National Topographic Survey Digital Data Contour interval 10m)
- OUTLINE OF WETLAND TREATMENT AREA (10 ha)
- OUTLINE OF EXPANDED WETLAND TREATMENT AREA (15.1 ha)
- OUTLINE OF POTENTIAL FUTURE WETLAND TREATMENT AREA (if required) (29.3 ha)



Image Source: © Copyright 2002 DigitalGlobe Inc. All Rights Reserved.

Image Platform: Quick Bird (Satellite)  
 Image Acquisition: 01 July, 2002  
 Spatial Resolution: 0.6m



1:7,500  
 November 2005  
 Project Number: H 0 00755.0  
 Prepared by: C. Sheppard

Projection: UTM Zone 18  
 Datum: NAD83  
 Verified by: J. Wale

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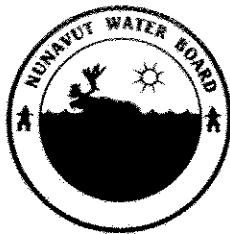
Table 5:  
Summary of Sewage Report Data for the Hamlet of Kugluktuk, Nunavut

| Parameter                     | Units     | Historic Data |         |           |           |           |           |               |          |           |           |           |           |           |           |          |          | Current Data |           |          |          | Nunavut Requirements |                 |                   |
|-------------------------------|-----------|---------------|---------|-----------|-----------|-----------|-----------|---------------|----------|-----------|-----------|-----------|-----------|-----------|-----------|----------|----------|--------------|-----------|----------|----------|----------------------|-----------------|-------------------|
|                               |           | Sample Data   |         | 21-Sep-88 | 21-Sep-89 | 21-Sep-95 | 21-Aug-99 | 28-Aug-00     | 5-Jul-99 | 28-Aug-02 | 22-Jul-04 | 14-Jul-04 | 14-Jul-04 | 10-Aug-04 | 10-Aug-04 | 9-Sep-04 | 9-Sep-04 | 23-Jun-04    | 23-Jun-04 | 4-Jul-05 | 4-Jul-05 | 4-Jul-05             | 4-Jul-05        | Existing Criteria |
|                               |           | Sample ID     | 1978-2a | 1978-2b   | 1978-2a   | 1978-1    | 05 ocean  | 05 correction |          | KUG-3     | KUG-4     | KUG-2     | KUG-4     | KUG-2     | KUG-4     | KUG-2    | KUG-4    | W61          | W62       | W63      | W64      |                      |                 |                   |
| Total Metals - GCME           |           |               |         |           |           |           |           |               |          |           |           |           |           |           |           |          |          |              |           |          |          |                      |                 |                   |
| Total Trace Metals            |           |               |         |           |           |           |           |               |          | nd        |           |           |           |           |           |          |          | nd           | nd        | nd       | nd       |                      |                 |                   |
| Silver                        | mg/L      |               |         |           |           |           |           |               |          | 75        |           |           |           |           |           |          |          | 1.78         | 0.2       | 0.21     | 0.1      |                      |                 |                   |
| Aluminum                      | mg/L      |               |         |           |           |           |           |               |          | nd        | 4         | nd        | nd        | 1         | 2         | 3        | nd       | nd           | 0.0015    | 0.0005   | 0.0012   | 0.0012               |                 |                   |
| Arsenic                       | mg/L      |               |         |           |           |           |           |               |          | nd        |           |           |           |           |           |          |          | 0.14         | 0.05      | 0.08     | nd       |                      |                 |                   |
| Boron                         | mg/L      |               |         |           |           |           |           |               |          | 10.4      |           |           |           |           |           |          |          | 0.010        | 0.019     | 0.023    | 0.013    |                      |                 |                   |
| Barium                        | mg/L      |               |         |           |           |           |           |               |          | nd        |           |           |           |           |           |          |          | nd           | nd        | nd       | nd       |                      |                 |                   |
| Beryllium                     | mg/L      |               |         |           |           |           |           |               |          | nd        | 0.1       | nd        | nd        | nd        | nd        | nd       | nd       | nd           | nd        | nd       | nd       |                      |                 |                   |
| Cadmium                       | mg/L      |               |         |           |           |           |           |               |          | 0.4       |           |           |           |           |           |          |          | nd           | nd        | nd       | nd       |                      |                 |                   |
| Cobalt                        | mg/L      |               |         |           |           |           |           |               |          | nd        |           |           |           |           |           |          |          | nd           | nd        | nd       | nd       |                      |                 |                   |
| Chromium                      | mg/L      |               |         |           |           |           |           |               |          | nd        | 5.7       | 3.5       | 0.8       | 0.8       | 0.6       | nd       | 0.5      | 1.2          | nd        | nd       | nd       | nd                   |                 |                   |
| Copper                        | mg/L      |               |         |           |           |           |           |               |          | 3.3       | 40.2      | 8.0       | 2.6       | 1.7       | 4.0       | 7.0      | 3.3      | 4.1          | 0.075     | 0.010    | 0.021    | 0.003                |                 |                   |
| Mercury                       | mg/L      |               |         |           |           |           |           |               |          | nd        | nd        | nd        | 0.04      | nd        | nd        | nd       | nd       | nd           | nd        | nd       | nd       | nd                   |                 |                   |
| Lithium                       | mg/L      |               |         |           |           |           |           |               |          | 1.5       |           |           |           |           |           |          |          | nd           | nd        | nd       | nd       |                      |                 |                   |
| Molybdenum                    | mg/L      |               |         |           |           |           |           |               |          | nd        |           |           |           |           |           |          |          | nd           | nd        | nd       | nd       |                      |                 |                   |
| Nickel                        | mg/L      |               |         |           |           |           |           |               |          | 0.5       | 0.7       | 2.2       | 1.5       | 2.4       | 2         | 2.7      | 0.8      | 1.8          | 0         | 0.002    | 0.003    | 0.003                |                 |                   |
| Lead                          | mg/L      |               |         |           |           |           |           |               |          | 0.1       | 4.7       | 0.4       | 0.1       | 0.2       | 0.2       | 1.4      | 0.2      | 0.6          | 0.0020    | 0.0020   | 0.0007   | 0.0002               |                 |                   |
| Antimony                      | mg/L      |               |         |           |           |           |           |               |          | 0.5       |           |           |           |           |           |          |          | 0.0023       | 0.0012    | 0.0007   | nd       |                      |                 |                   |
| Selenium                      | mg/L      |               |         |           |           |           |           |               |          | nd        |           |           |           |           |           |          |          | 0.0009       | nd        | nd       | nd       |                      |                 |                   |
| Tin                           | mg/L      |               |         |           |           |           |           |               |          | nd        |           |           |           |           |           |          |          | nd           | nd        | nd       | nd       |                      |                 |                   |
| Titanium                      | mg/L      |               |         |           |           |           |           |               |          | 2.8       |           |           |           |           |           |          |          | 0.01         | 0.011     | 0.015    | 0.003    |                      |                 |                   |
| Thallium                      | mg/L      |               |         |           |           |           |           |               |          | 0.4       |           |           |           |           |           |          |          | nd           | nd        | nd       | nd       |                      |                 |                   |
| Uranium                       | mg/L      |               |         |           |           |           |           |               |          | nd        |           |           |           |           |           |          |          | 0.0001       | nd        | nd       | nd       |                      |                 |                   |
| Vanadium                      | mg/L      |               |         |           |           |           |           |               |          | 0.5       |           |           |           |           |           |          |          | 0.002        | nd        | nd       | 0.001    |                      |                 |                   |
| Zinc                          | mg/L      |               |         |           |           |           |           |               |          | nd        | 62        | 20        | nd        | nd        | nd        | 22       | 11       | 0.14         | 0.018     | 0.032    | nd       |                      |                 |                   |
| Total Major Metals            |           |               |         |           |           |           |           |               |          |           |           |           |           |           |           |          |          |              |           |          |          |                      |                 |                   |
| Calcium                       | mg/L      |               |         |           |           | 5.14      |           |               |          | 8.5       | 251       | 14        | 30.1      | 28.0      | 15.0      | 43.0     | 30       | 6.0          | 15.0      | 17       | 15.1     | 10                   |                 |                   |
| Phosphorus                    | mg/L      |               |         |           |           | 0.42      |           |               |          | 1.3       | 7.0       | 3.0       | 1.00      | 2.50      | 2.3       | 2        | 1.97     | 3.09         | 33        | 8.9      | 13.2     | 4.8                  |                 |                   |
| Magnesium                     | mg/L      |               |         |           |           | 2.15      |           |               |          | 7.1       | 118       | 30.8      | 21.2      | 12.1      | 11.6      | 21.1     | 12.3     | 4.0          | 10.0      | 11.5     | 12.3     | 12.9                 |                 |                   |
| Sodium                        | mg/L      |               |         |           |           | 0.58      |           |               |          | 10.7      | 105       | 30.8      | 16.2      | 21.2      | 28.2      | 18.5     | 12.5     | 14.8         | 05        | 40       | 57       | 40                   |                 |                   |
| Iron                          | mg/L      |               |         |           |           |           |           |               |          | 1810      | 11500     | 3550      | 202       | 2530      | 1550      | 5050     | 803      | 2391         | 1.10      | 1.42     | 4.02     | 0.14                 |                 |                   |
| Manganese                     | mg/L      |               |         |           |           |           |           |               |          | 122       |           |           |           |           |           |          |          | 0.143        | 0.153     | 0.225    | 0.051    |                      |                 |                   |
| Ammonia-N                     | mg/L      |               |         |           |           |           | 4.05      | 0.003         | 9.8      | 1.21      | 7         | 14        | 0.010     | 4.34      | 0.1       | 0.000    | 0.000    | 2.00         | 04        | 22.5     | 34.3     | 12.4                 |                 |                   |
| Bio Oxygen Demand (BOD)       | mg/L      |               |         |           |           |           |           |               |          | 15        | 11        | 3         | 4         | 4         | 4         | 5        | 0        | 0            | 370       | 00       | 81       | 0                    | 120             | 45                |
| LF - Fecal Coliforms          | CFL/100mL |               | 10      | 24        | 138       |           |           |               |          | 30        | 3000      | 1.10E+08  |           |           |           |          |          | 1.30E+07     | 1.50E+09  | 1.50E+06 | 4.00E+03 | 1.00E+09             | 2.00E+03        |                   |
| Oil and Grease                | mg/L      |               |         |           |           |           |           |               |          | nd        | nd        | nd        | nd        | nd        | nd        | nd       | nd       | 22           | nd        | nd       | nd       | No visible sheen     |                 |                   |
| Phenols                       | mg/L      |               |         |           |           |           |           |               |          | nd        | 1.1       | 1.0       | nd        | 0.5       |           |          | 4.4      |              | 0.485     | 0.008    | 0.110    | 0.020                |                 |                   |
| Total Suspended Solids        | mg/L      |               |         |           |           |           |           |               |          | 0         | 1540      | 4         | nd        | 4         | 14        | 6        | 6        | 18           | 95        | 14       | 34       | 7                    | 180             | 45                |
| pH                            | pH        |               |         |           |           | 7.81      |           |               |          | 7.69      | 7.54      | 7.35      | 8.22      | 7.49      | 7.22      | 7.51     | 7.61     | 7.2          | 7.4       | 7.4      | 7.5      | 7.5                  | between 8 and 9 | 1                 |
| Total Phosphorus (P-PO4)      | mg/L      |               |         |           |           |           |           |               | 0.197    | 0.34      |           |           |           |           |           |          |          |              |           |          |          |                      |                 | 10                |
| Total Kjeldahl Nitrogen (TKN) | mg/L      |               |         |           |           |           |           |               |          |           |           |           |           |           |           |          |          |              |           |          |          |                      |                 |                   |



### **Appendix A-3**

**NWB Letter of March 14, 2007**



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NUNAVUT WATER BOARD  
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March 14<sup>th</sup>, 2007

Sudhir Kumar Jha, M.Eng.  
Project Officer, Community and Government services  
Bag 200, 2<sup>nd</sup> Floor Enokhok Building  
Cambridge Bay, Nunavut X0B 0C0

**Subject: Kugluktuk Water License Application –Teleconference Call Follow-Up**

Dear Mr. Sudhir Kumar Jha,

The Nunavut Water Board (NWB) received a copy of the January 26<sup>th</sup>, 2007 letter (response letter) from Nuna Burnside Engineering and Environmental Ltd. (Nuna Burnside), on behalf of the Government of Nunavut, that gives discussion to the questions and comments developed through the NWB review correspondence dated October 24<sup>th</sup>, 2006.

On March 2<sup>nd</sup>, 2007 representatives from the NWB, Department of Community and Government Services, Government of Nunavut (GN/CGS) and associated technical consultants from each organization engaged in a 1.0 hour teleconference to discuss particulars related to the file and understand how the NWB is to consider the January 26<sup>th</sup>, 2007 letter.

The NWB understands that the original submission Detailed Design Report for the Improvement to the Sewage Lagoon and Solid Waste Disposal Facility (Detailed Design Report) was supported by the original submission Schematic Design Report and tender drawings. The January 26<sup>th</sup>, 2007 Nuna Burnside letter attempted to satisfy NWB information concerns though information gaps still exist. This was communicated to you through our March 2<sup>nd</sup>, 2007 teleconference. The January 26<sup>th</sup>, 2007 letter states that "following the discussions (of a teleconference), we recommend that the Detailed Design report be revised and resubmitted". Through the March 2<sup>nd</sup>, 2007 teleconference Mr. Gerry Popowich had clarified that the January 26<sup>th</sup>, 2007 letter was indeed not a final response to the NWB's information review and a final response (future information submission) will be submitted to the NWB for consideration.

As discussed in our teleconference the NWB had completed a quick cursory review of the January 26<sup>th</sup>, 2007 Nuna Burnside letter. The NWB identified information gaps that

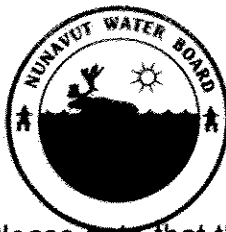


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NUNAVUT WATER BOARD  
NUNAVUT IMALIRIYIN KATIMAYINGI

the January 26<sup>th</sup>, 2007 letter failed to provide. The following global issues were communicated to all participants on the teleconference call:

1. **Inconsistencies:** Inconsistencies frequently occurred among the Detailed Design Report, the Schematic Design Report, the tender drawings, and the January 26<sup>th</sup>, 2007 letter (including the AMEC geotechnical analysis). In order to convey adequate information to the NWB and the respective Interested Parties (through the 30 day comment period) the NWB requests consistency between the record documents. The NWB had communicated through the teleconference discrepancies between lagoon berm details and landfarm berm details through various documents.
2. **Assumptions for the Calculations of Effluent Concentrations and Sludge Amount:** The response letter references 'Wastewater Engineering – Metcalf & Eddy – 4<sup>th</sup> Edition'. Further clarification about the parameter value selection is required, such as the specific gravity of dry solids and the total phosphorus.
3. **Effluent Quality Projection and Monitoring Program:** Additional information on lagoon performance, wetland engineering, and related monitoring as per the October 24<sup>th</sup>, 2006 NWB review is requested.
4. **Geotechnical Analysis:** The geotechnical analysis appears to not to cover all municipal structures, such as landfill, landfarm, and hazardous waste depot area. Details on designer reasoning for this should be provided.
5. **Engineering Specifications:** Sufficient detail is still required for engineering specifications, such as QA/QC for construction and material specifications and geomembrane construction specifications and material specifications.
6. **Landfill:** Further clarification on issues related to landfill containment function and final cover is to be provided as per the October 24<sup>th</sup>, 2006 NWB review.
7. **Reference to Guidelines and Standards:** Reference to the document alone is not sufficient. For record purposes, quantifiable details are to be provided. For example, the response letter references CCME Industrial land use criteria to establish concentration limits for contaminated soil suitable for cover material. For record purposes, these limits are to be provided in the application.
8. **Appropriate Delineation:** The Proponent shall understand that the water licence application is a communication tool where elements of water and waste management and design are sufficiently detailed. The NWB encourages the Proponent to provide materials that effectively communicate and eliminate the ambiguity outlined in the NWB comment letters.



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Please note that the above guidance materials are not exhaustive and does not imply that any information presented to the NWB to date is acceptable. As aforementioned, the NWB has only completed a quick cursory review of January 26<sup>th</sup>, 2007 letter from Nuna Burnside.

The NWB is pleased that communication channels have been opened between the NWB and the Proponent to move the discussion forward on outstanding technical information issues. The NWB is looking forward to a single complete document as Nuna Burnside committed through their January 26<sup>th</sup>, 2007 letter and reiterated during our March 2<sup>nd</sup>, 2007 teleconference, and expects it will fully address the comments listed on this letter correspondence and the NWB review dated October 24<sup>th</sup>, 2006.

As recommended by the NWB a conformity table covering the GN/Nuna Burnside future information submission (outlining how each question was satisfied in the future information submission and where in the future information submission the answer to the NWB's questions in the October 24<sup>th</sup>, 2006 NWB review may be found) would quicken the NWB response period and will assist all parties in ensuring that the information requirements have been met.

If there are specific questions regarding information requirements and file administration please do not hesitate to contact the undersigned at (867) 360-6338 ext.27 or [tech4@nunavutwaterboard.org](mailto:tech4@nunavutwaterboard.org).

Sincerely,

*Original signed by*

Zhong Liu (M.Sc., MBA, M.A.Sc.)  
Technical Advisor

cc. Phyllis Beaulieu (NWB)  
Patricia Randell (Acting SAO of the hamlet of Kugluktuk)  
Tom Livingston (GN-CGS)  
John Dawe (GN-CGS)  
Gery Popowich (Nuna Burnside)  
Jim Rogers (INAC)  
David Abernethy (INAC)  
Stephen Bathory (INAC)  
Jamie VanGulck (VGQ Consulting Inc.)