
**Annual Inspection
Sewage Lagoon, Iqaluit**

Prepared for:

Mr. Steve Burden
Department of Engineering
City of Iqaluit
P.O. Box 460
Iqaluit, NT
X0A 0H0

Trow Consulting Engineers Ltd.

154 Colonnade Road South
Ottawa, Ontario K2E 7J5
Telephone: (613) 225-9940
Facsimile: (613) 225-7337
E-mail: trow@trow.com
Web Site: www.trow.com

Project No. MA15882A
January 7, 2003



Trow Consulting Engineers Ltd
Parent Company of Oliver, Mangione, McCalla & Associates
154 Colonnade Road South
Ottawa, Ontario K2E 7J5
Telephone: (613) 225-9940
Facsimile: (613) 225-7337
E-mail: trow@trow.com
Web Site: www.trow.com

Reference: MA15882A

January 7, 2003

RECEIVED
JAN 14 2003

Mr. Steve Burden
Department of Engineering
City of Iqaluit
P.O. Box 460
Iqaluit, NT X0A 0H0

Dear Mr. Burden:

**Annual Inspection
Sewage Lagoon, Iqaluit**

Please find enclosed four (4) copies of the above noted report.

If you require any further information, please contact this office.

Yours truly,

Trow Consulting Engineers Ltd.

Ismail M. Taki, M.Eng., P.Eng.
Senior Project Manager
Geotechnical & Materials Testing Services

Enclosures: 4

/ac

Reference: MA15882A

January 7, 2003

Mr. Steve Burden
Department of Engineering
City of Iqaluit
P.O. Box 460
Iqaluit, NT.
X0A 0H0

Via Facsimile:
1-(709) 466-1810

Dear Mr. Burden;

Annual Inspection Sewage Lagoon, Iqaluit

We have now completed the annual inspection of the sewage lagoon located in the City of Iqaluit, Nunavut. Terms of reference for this inspection were provided in our Proposal P6208GM dated October 9, 2002. This work was authorized by the City of Iqaluit in a letter dated October 28, 2002.

1.0 Background Information

A dam safety review of the Sewage Lagoon was undertaken by Trow Consulting Engineers Ltd. in October and November, 2001 and final report was submitted in October 2002 under Trow Project Number MU15152B/S08768G. The report identified several concerns with the existing lagoon and provided recommendations for remedial measures as summarized below;

- The existing west dyke had experienced a series of stability problems and breaches, related to seepage problems, ice lensing and blockage, overtopping, and downstream toe erosion. While repairs appear to be effective, other sections of the dyke(s) may be vulnerable to stability problems. Because of their past history, and current stability concerns, the Dam Safety Review indicates that the sewage lagoon dykes cannot be considered "safe" in their present condition and are non-compliant with the design and performance standards of the DSG. Significant improvements are required to improve the structural integrity of the lagoon to meet the DSG.
- Three remedial options were suggested which include: 1) providing an impermeable liner for the lagoon bottom and upstream side slopes of the dykes; 2) buttressing the dykes with rock fill; and 3) redesigning and building a new lagoon to current dam safety requirements and environmental standards.

December 2002

The report indicated that as required by the Dam Safety Review guidelines and as an interim step prior to the implementation of remedial measures recommended, the sewage lagoon should be subjected to a Dam Safety Inspection (DSI) in 2002. The inspection would comprise of a non-invasive visual inspection review of the structure to identify any changes in condition or any concerns since the last inspection of October 2001.

2.0 Site Visit

The site was visited on October 28 and 29, 2002, by Mr. Ismail.M.Taki, P. Eng., Senior. Geotechnical Engineer of Trow Consulting Engineers. The inspection was non-invasive in nature. A photographic record of our inspection was made, and appended to this report (Appendix 1). Mr. Abdul Abozarad accompanied Mr. Taki during the site visit.

The inspection comprised of a thorough walkover of the lagoon site and visual examination of the lagoon dykes, slopes, toes for any signs of distress or any visible changes in the conditions as noted in Trow visit of October and November 2001. It should be noted that the presence of snow on top of the dyke surfaces and the presence of frozen water in the lagoon prevented a more detailed visual inspection of the facility.

The pond level was measured to be 1 m to 1.2 m below the crest of the dykes at the time of the inspection.

The eastern and western dykes, as well as the shorter southeastern dyke, were visually inspected. A key plan of the sewage lagoon structure is presented on Drawing No. 1.

2.1 East Dyke

The eastern dyke, approximately 80 m in length, extends from higher ground adjacent to an existing road along the northeastern shoreline of the Inlet to a small bedrock island at the south end. The maximum height appears to be about 4 m along the northern section of the dyke, reducing to about 1.5 m high near the south end.

There was obvious discolored brown sewage effluent ponded at the deeper section along the downstream toe of the eastern dyke, across a horizontal distance of at least 25 m. This indicates that some seepage takes place through the dyke similar to that observed during the inspection of 2001. The volume of water was difficult to estimate because it was frozen along the toe. Therefore, it was difficult to determine if the condition of the dyke had worsened since the 2001 inspection. Also, it was not possible to determine if there was erosion along the upstream face of the dam or piping conditions along the toe of the dam due to frozen water surface and snow on the dyke slopes.

2.2 West Dyke

The western perimeter dyke, oriented north-south, is approximately 70 m in length. There is a concrete discharge control structure located along the upstream crest of the dyke, which allows direct discharge via a buried pipe through the dyke from the lagoon to the Inlet. The presence of snow on the dyke slope prevented examination of the slopes for any evidence of erosion or piping. However, at the time of the inspection, there did not appear to be any significant seepage at the toe of the west dyke.

2.3 Southeast Dyke

The shorter southeastern dyke, located between the small bedrock island and the larger bedrock island forming the southern boundary of the lagoon, is oriented NE-SW, and is approximately 30 m in length, with a maximum height of approximately 2.0 m to 2.3 m, as measured from the downstream toe. There was some frozen water ponded below the southeastern dyke, but it was not discolored. This indicates that either some seepage takes place through the dyke or accumulation of the surface runoff is a continuing phenomenon. However, it was not possible to establish if piping takes place close to the toe of the dyke due to presence of snow and ice.

3.0 Interviews

Mr. Bob Brouille acting foreman with Iqaluit Public Works was interviewed as part of this assessment. Mr. Brule informed Trow Consulting Engineers that no maintenance work was undertaken at the lagoon since the last inspection of October 2001. He also added that the pinch-valve at the control structure of the lagoon does not function properly and therefore a gate valve is used for that purpose. He also indicated that spring run-off increases the height of water in the Lagoon.

As part of the interview process, a short meeting was held with Mr. Mathew Hough Director of Engineering of the City of Iqaluit. Mr. Hough reiterated that no capital work projects were completed at the lagoon site since our last inspection, i.e. since October 2001.

4.0 Conclusions and Recommendations

Based on the site visit and observations made, it is concluded that there appear to be no significant changes in the conditions of the lagoon dykes since our last inspection of October 2001. However, it was noted that seepage of the effluent from the east dyke continues. Also, it is known that the dykes may be subject to overtopping during spring runoff. Therefore, it is recommended that the remedial measures and improvements listed in our final report dated October 2002 report remain valid and should be implemented as soon as possible. The recommendations provided in Trow October 2001 report are listed below for easy reference.

- i. The dykes have been classified as having a Consequence Category of Low for the Life Safety category and "Moderate" for the Socioeconomic, Financial and Environmental category.

- i. There is inadequate information available concerning the as-built construction of the dykes, including topographic information, geotechnical conditions, and hydrological/hydraulic information.
- ii. The existing west dyke has experienced a series of stability problems and breaches, related to seepage problems, ice lensing and blockage, overtopping, and downstream toe erosion. While repairs appear to be effective, other sections of the dyke(s) may be vulnerable to stability problems. Because of their past history, and current stability concerns, the Dam Safety Review indicates that the sewage lagoon dykes cannot be considered “safe” in their present condition and are non-compliant with the design and performance standards of the DSG. Significant improvements are required to improve the structural integrity of the lagoon to meet the DSG.
- iii. Three remedial options are provided which include: 1) providing an impermeable liner for the lagoon bottom and upstream sideslopes of the dykes; 2) buttressing the dykes with rock fill; and 3) redesigning and building a new lagoon to current dam safety requirements and environmental standards.

For more details and descriptions on the above listed recommendations and conclusions, Trow Consulting Engineers Report Number MU15152B/S08768G dated October 2002 should be referred to.

In the interim, it is recommended that an inspection of the lagoon site should be undertaken following the spring run-off, i.e. during the period between late June and mid July 2003 when snow and ice have melted so that a more detailed evaluation of the lagoon slopes will be possible. Items that will be addressed include but will not be limited to, evidence of toe erosion and piping conditions, effect of rapid drawdown of spring runoff and tidal changes on dykes slopes, etc..



We trust that the information contained in this letter is satisfactory for your purposes. Should you have any questions, please contact this office.

Yours truly,

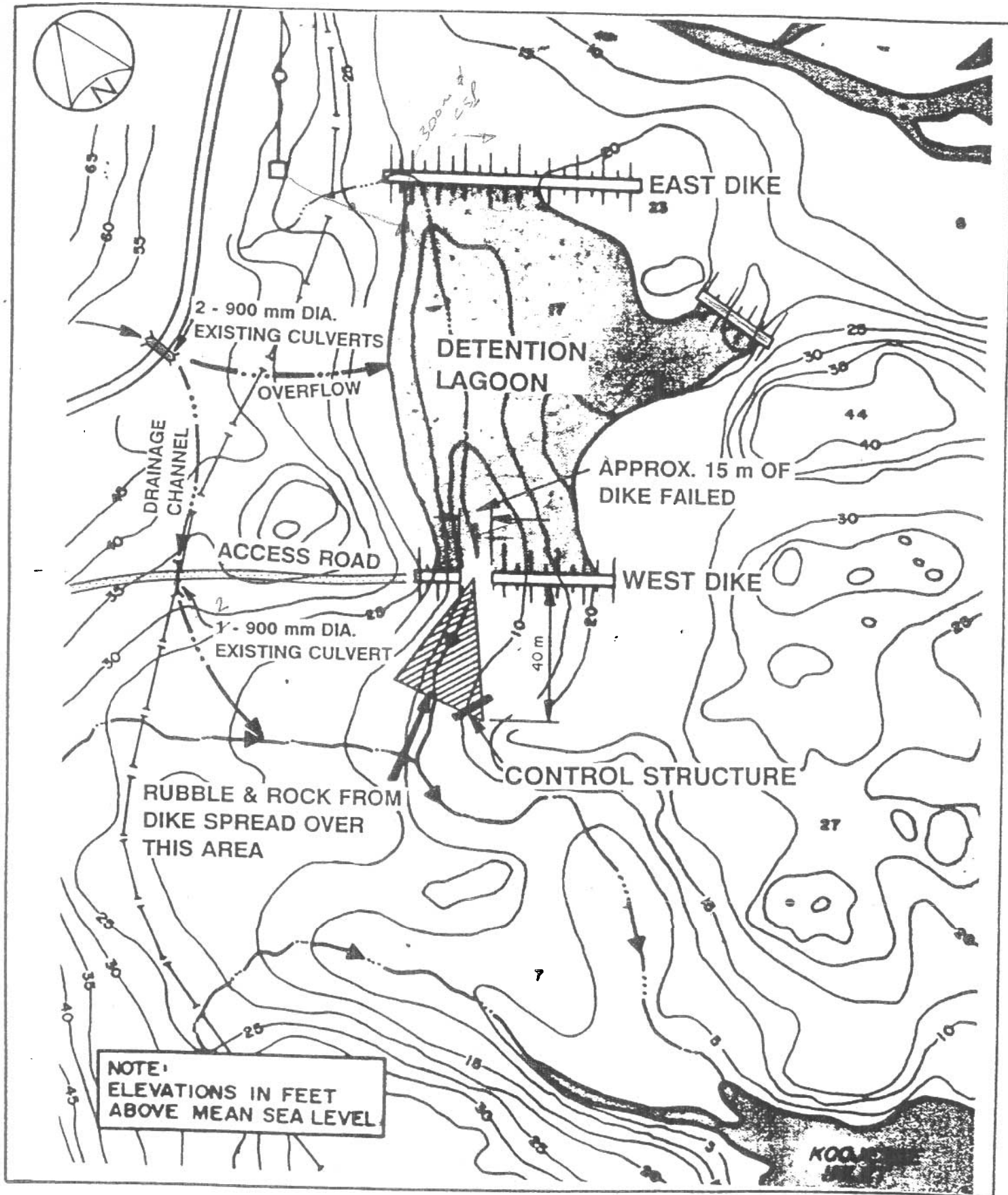
Trow Consulting Engineers Ltd.

Parent Company of Oliver, Mangione, McCalla & Associates

Ismail M. Taki, M.Eng., P.Eng.
Senior Project Engineer
Geotechnical & Materials Testing Services

Surinder K. Aggarwal, M.Sc., P.Eng.
Manager
Geotechnical & Materials Testing Services





IQALUIT, NWT
LAGOON DIKE BREACH

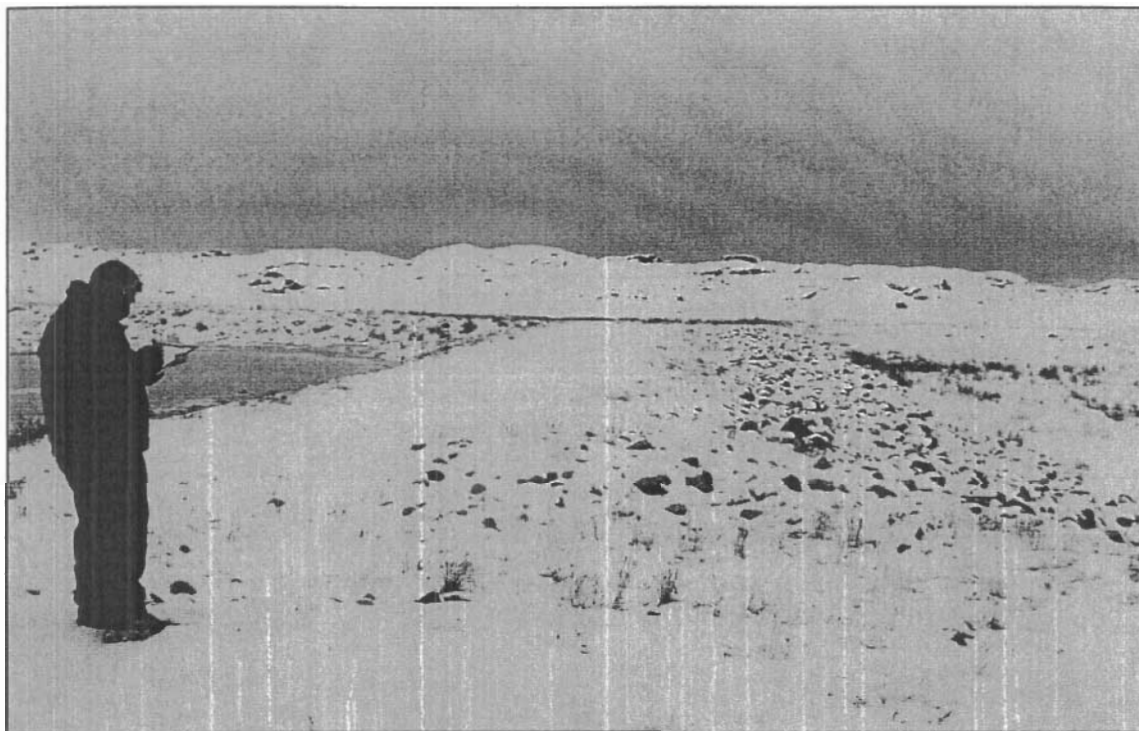


Photo 1 – Showing the West Dyke of the Lagoon



Photo 2 - Showing Frozen Water in the Lagoon (Looking at the East Dyke)



Photo 3 - Looking at The East Dyke of the Sewage Lagoon

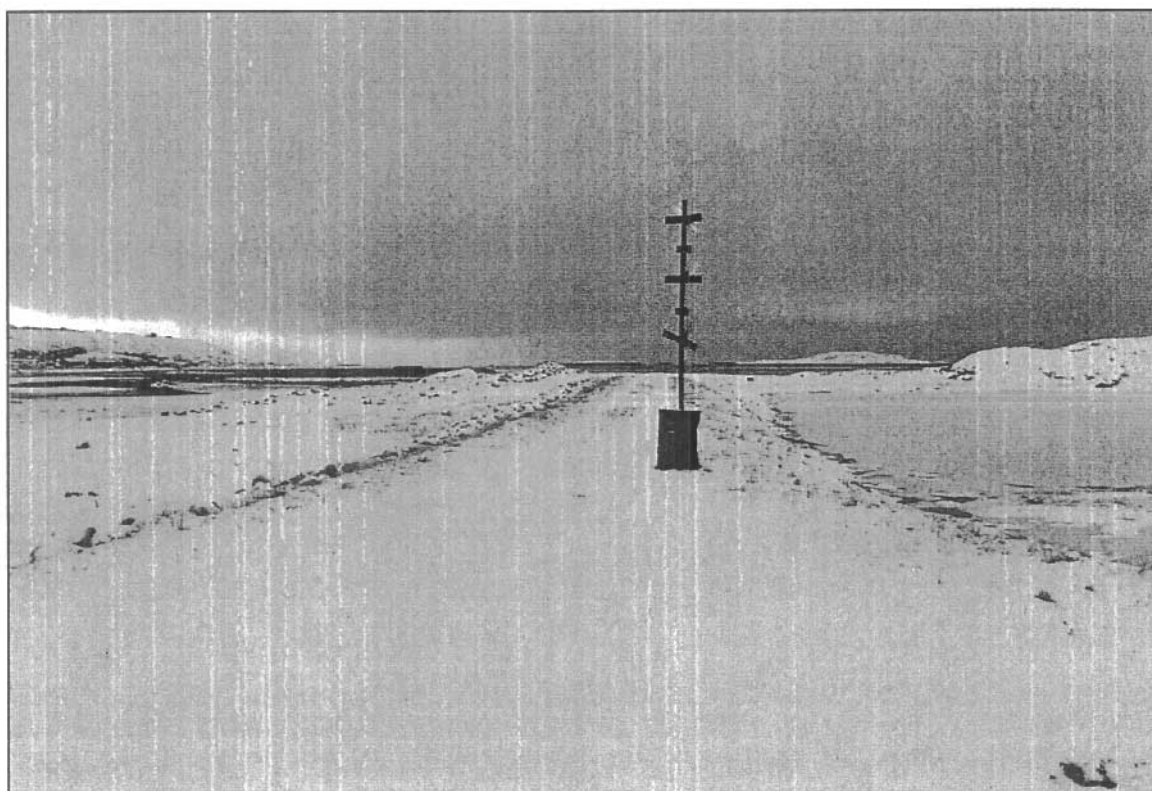


Photo 4 - Close Look at The East Dyke of the Sewage Lagoon



Photo 5 - Discharge Pipe in the Sewage Lagoon (South Side of Lagoon)

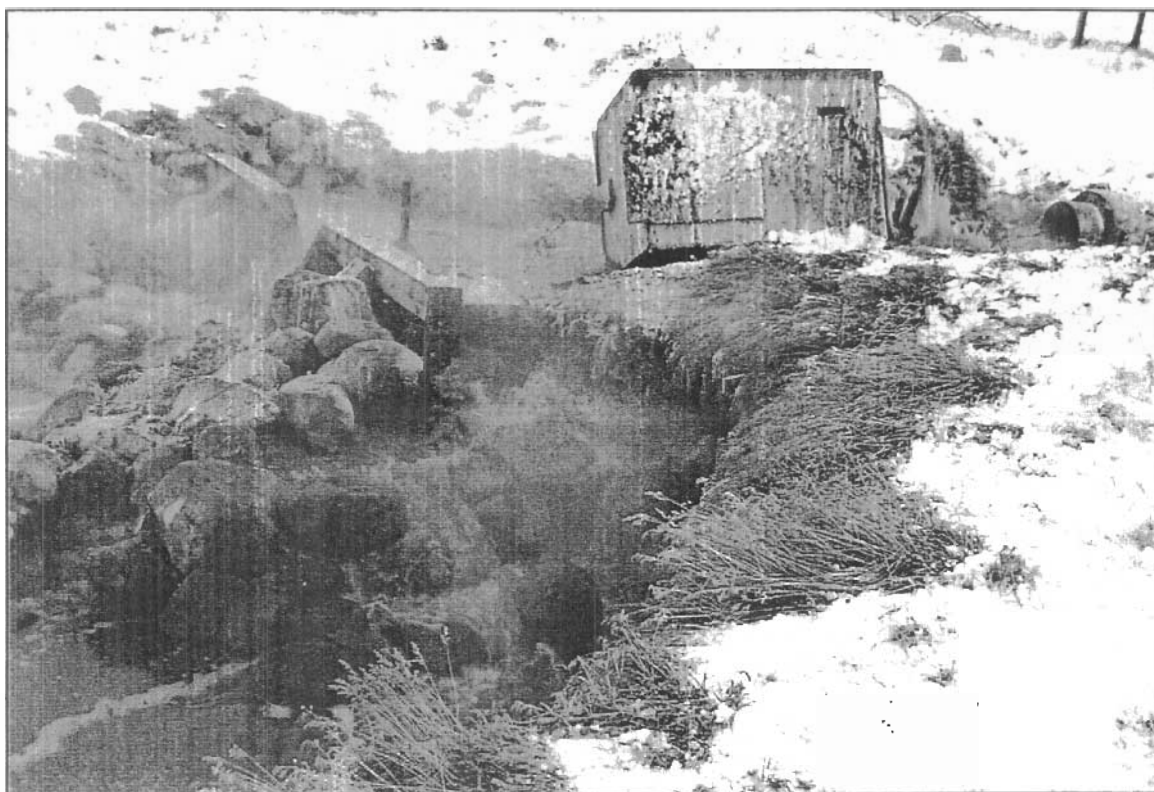


Photo 6 - Close Up of Discharge Pipe Into Lagoon



Photo 7 – Showing Discolored Water at the Downstream of the East Dyke

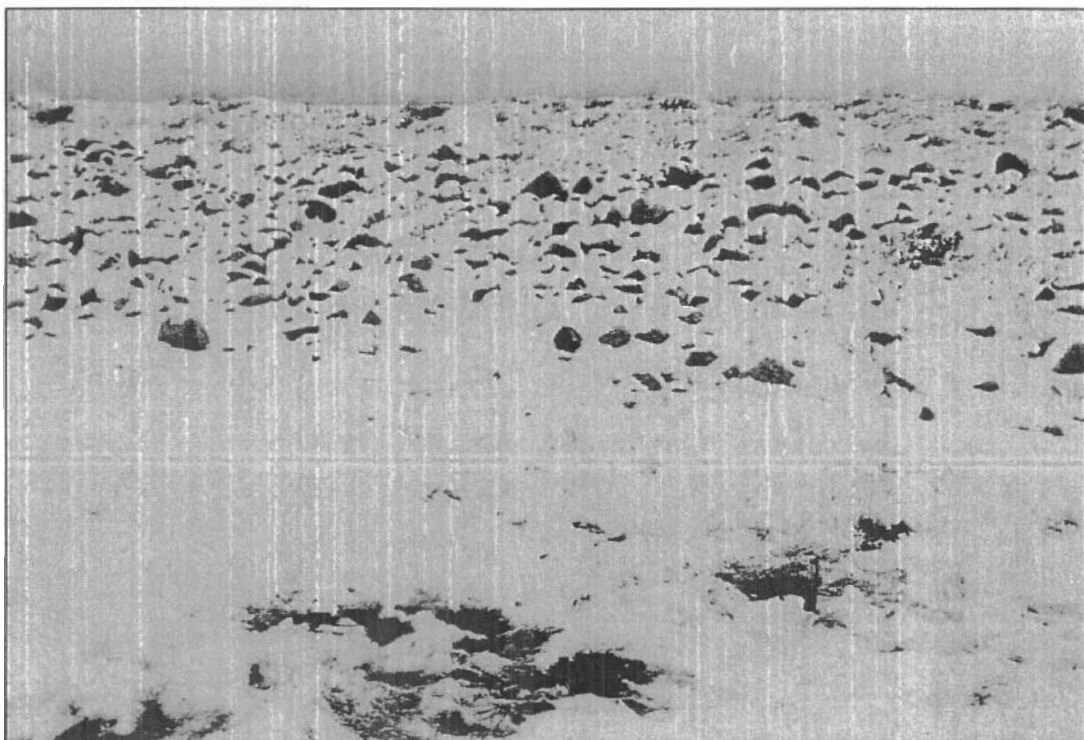


Photo 8 –Showing Saturated Organic Soil at the Downstream Side of the East Dyke

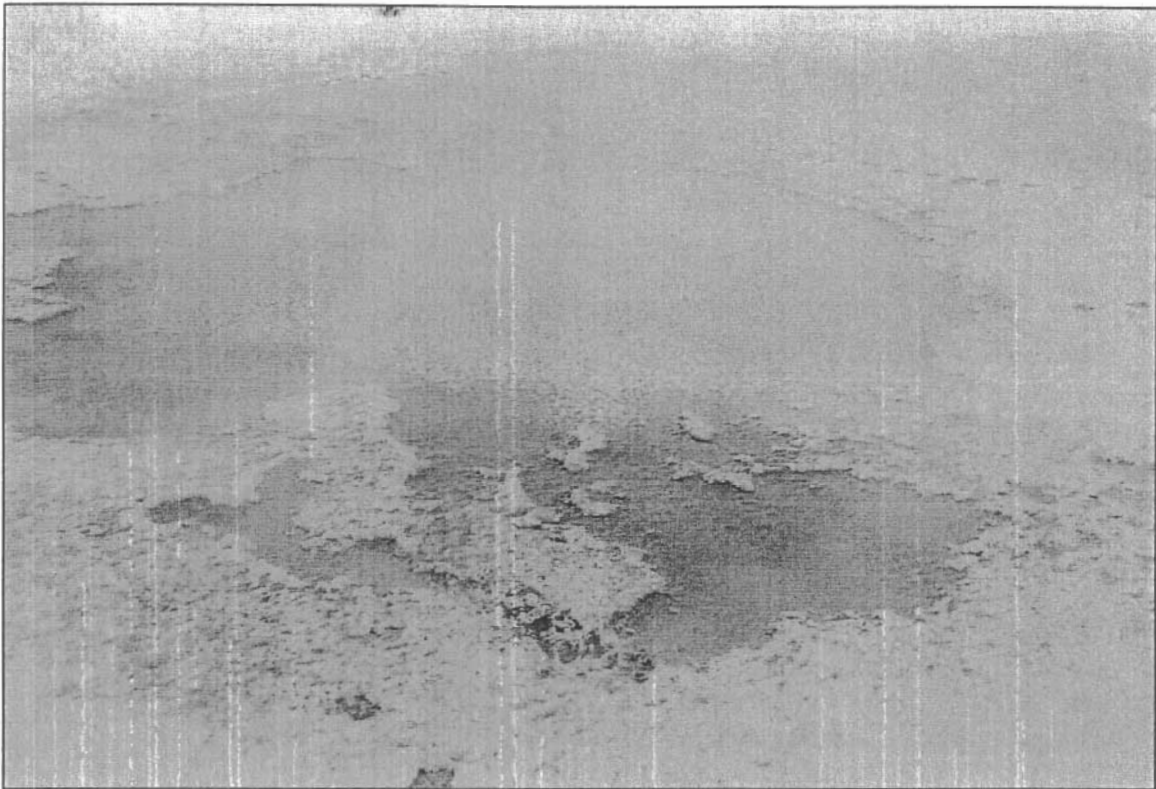


Photo 9 –Thawed Lagoon Surface downstream of Discharge Pipe

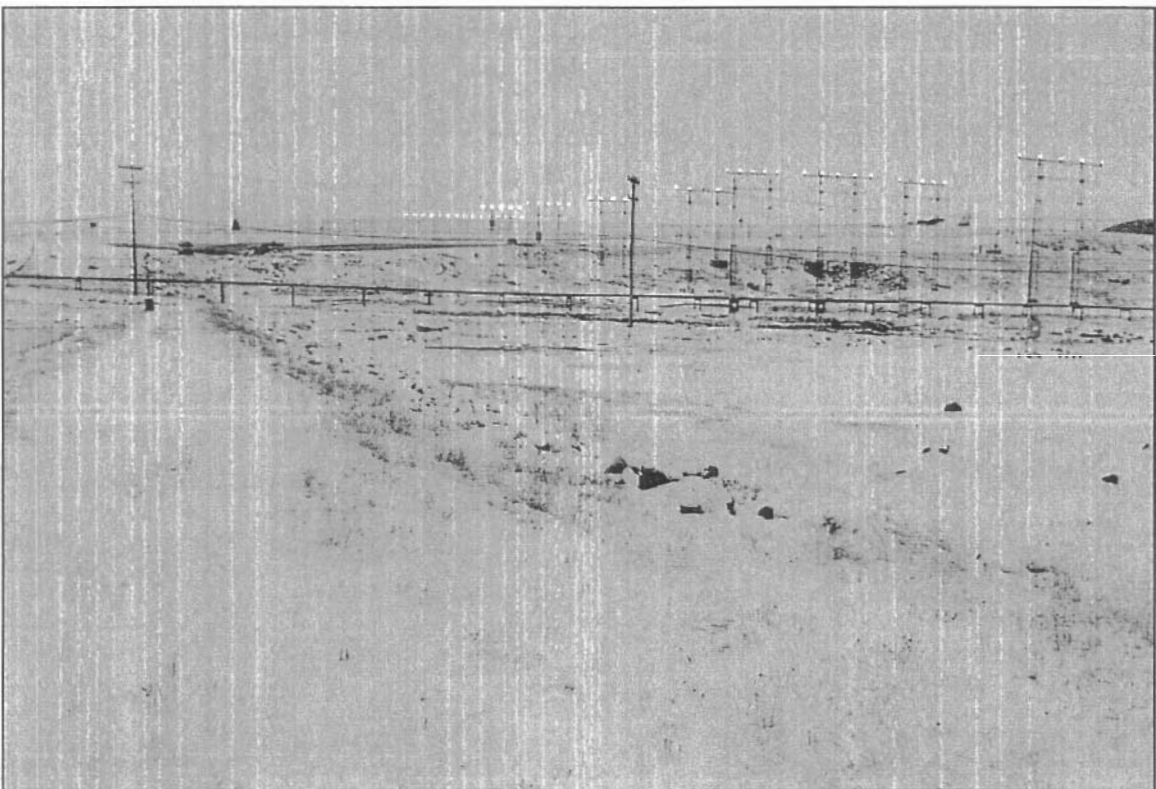


Photo 10 – Looking South at the East Dyke of Lagoon

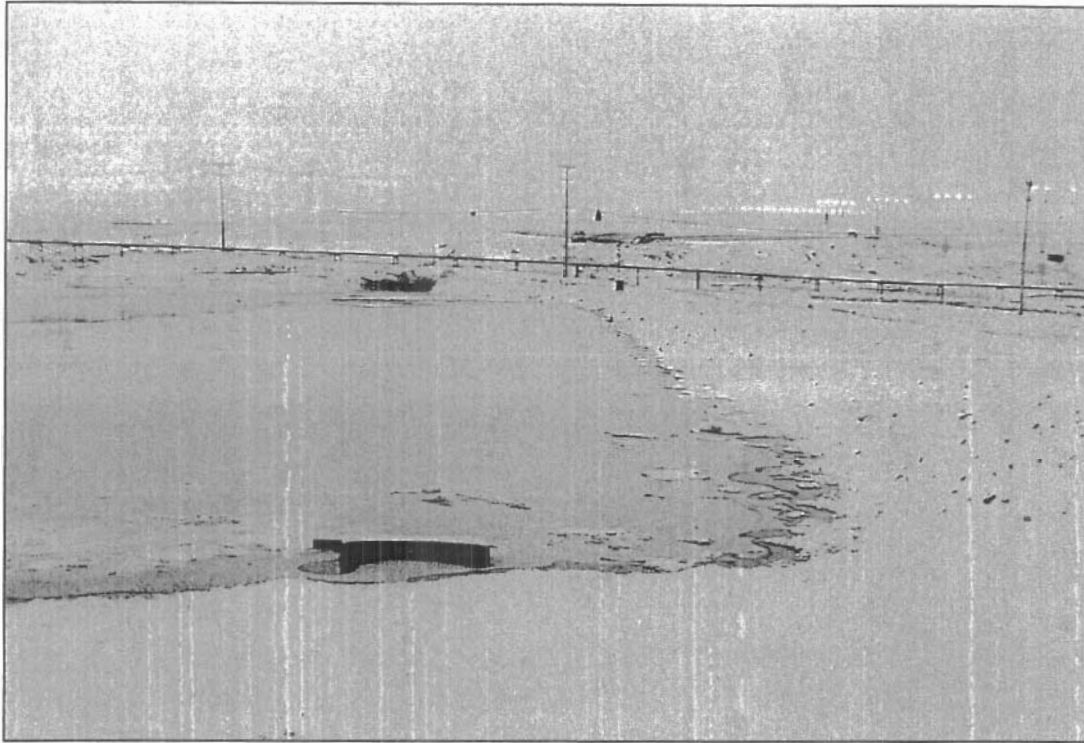


Photo 11 – General View of the Sewage Lagoon



Photo 12 –Downstream at the Southeast Dyke of the Lagoon