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Your file: 3BM-CAP0207
Our file: 4782 048

Thomas Kabloona
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By email: licensing@nunavutwaterboard.org

Re: Hamlet of Cape Dorset - New Sewage Lagoon Amendment Application - Water Licence 3BM-CAP

Please find attached Environment Canada's written submission to the Nunavut Water Board in respect of the Public Hearing scheduled for January 23 and 24, 2008 concerning the Hamlet of Cape Dorset's proposal to commission and operate the new sewage lagoon.

Colette Spagnuolo will be in attendance at the public hearing to make a formal presentation of this intervention, and will be available to respond to any questions which the Nunavut Water Board members, the proponent, or the public may have concerning the issues raised by Environment Canada in this submission.

If you wish clarification on any aspect of this submission prior to the public hearing, please contact Anne Wilson, Water Pollution Specialist, at EC's Yellowknife office at 867-669-4735 or email anne.wilson@ec.gc.ca.

Yours sincerely,

Cheryl Baraneicki
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cc: Carey Ogilvie (Manager, EA-North, EPOD Yellowknife)
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ENVIRONMENT CANADA'S

SUBMISSION TO THE

NUNAVUT WATER BOARD

FOR THE CAPE DORSET SEWAGE LAGOON

PUBLIC HEARING

January 2008

NON-TECHNICAL EXECUTIVE SUMMARY

Sustainable development in Canada's North is a priority for Environment Canada (EC). The Department provides scientific expertise for incorporation into decisions on developments, such that all parties working together can ensure that there is minimal impact on the natural environment, and that ecosystem integrity is maintained and preserved. Toward these goals, the Department has reviewed the licence amendment application and supporting information for the proposed Cape Dorset Sewage Lagoon.

Environment Canada has provided technical comments on the following topics:

a) Identifying the compliance point: Incorporation of P Lake as a treatment component of the system is acceptable, and the proponent may wish to include the wetlands. The definition of "end-of-pipe" as given by the Draft Canada-wide Strategy for the Management of Municipal Wastewater is broad enough to allow this.
b) Toxicity testing: The municipality should do a rainbow trout toxicity test on the effluent once a year, and ensure compliance with the *Fisheries Act* so that effluent is not deleterious to fish. The sample should come from whatever point is designated by the NWB as the final discharge point.
c) Discharge criteria: EC suggests the limits from the expired water licence would be appropriate for the outfall of P Lake, but notes that lower limits should be met before Telik Inlet. The proponent should be aware of the Canada-wide Strategy for the Management of Municipal Wastewater.
d) Design concerns: EC has previously raised concerns with the potential for a thawed zone, or talik, to occur underneath the sewage lagoon which could allow migration of contaminants out of the bottom of the lagoon and into the subsurface materials. EC recommends that the system water balance be tracked closely so that any losses through exfiltration will be detected. A contingency plan should be drafted which includes an appropriate range of management actions, including groundwater monitoring and remedial options.
e) Operation and maintenance of the system: An Operation and Maintenance plan should be submitted for approval prior to the commissioning of the new system. The plan should identify measures that are to be taken to ensure treatment efficiencies are not reduced over the operating life of the lagoon, and address erosion concerns with the spillway and discharge point. The Hamlet should take steps to evaluate the capacity of the wetland (i.e. retention times, hydraulic and organic loading rates) and determine how to optimize treatment. Drainage management should also be addressed.
f) Monitoring: Sufficient operational monitoring must be done to characterize the quality of the effluent as it travels through the treatment system, to allow for understanding of treatment efficiency and to identify if there are high levels of contaminants that would affect efficient treatment.
g) Abandonment and reclamation: Submission of an Abandonment and Reclamation plan for approval is recommended as a licence condition. Such a plan should cover the interim use and ultimate closure of the three-cell lagoon, and provide conceptual closure plans for the new system.
h) Renewal of the water licence: Improvements in solid waste management along with submission of plans required under the expired licence should be documented in the Hamlet's renewal application.

Environment Canada would like to thank the NWB for the opportunity to comment on the Cape Dorset Sewage Lagoon amendment.

SECTION 1.0 INTRODUCTION

1.1 Mandate of Environment Canada

The general mandate of EC is defined by the *Department of the Environment Act*. This Act provides the Department with a general responsibility for environmental management and protection in terms of the need to foster harmony between society and the environment for the economic, social, and cultural benefit of present and future generations of Canadians. The Department shares this responsibility with the provinces and territories. Environment Canada is also responsible for providing specialist or expert information and knowledge to federal government agencies and for the preservation and enhancement of environmental quality.

1.2 Relevant Legislation, Regulations, Policies and Guidelines

The primary relevant legislation administered or adhered to by EC which influenced the content of this submission are the *Department of the Environment Act*, and Section 36(3) of the *Fisheries Act* – Pollution Prevention Provisions.

SECTION 2.0 BACKGROUND

This public hearing was scheduled to deal with the amendment of the Cape Dorset water licence (3BM-CAP0207) to allow for the construction and commissioning of a new sewage lagoon system. Ongoing problems with the old systems had resulted in the issuance of two Inspector's Directions from Environment Canada (March 25, 2002 and May 13, 2004) to the Hamlet and Community and Government Services, Government of Nunavut (CGS) notifying them of the imminent danger of raw sewage being deposited in Telik Inlet, in contravention of S. 36(3) of the *Fisheries Act*, and directing that all reasonable measures be taken to prevent this. The long-term response from CGS was to move forward with a new system at P Lake. Construction of a new lagoon is substantially complete and the outstanding issues to be addressed at the hearing include defining the compliance point, setting discharge criteria, engineering concerns, operation and maintenance, monitoring, and abandonment and reclamation planning for the old systems.

The current licence expired August 31, 2007 and an extension to the licence has been requested from the Nunavut Water Board. Although this hearing is focused on the sewage system, EC would like to briefly highlight other issues which should be considered in the upcoming licence renewal.

SECTION 3.0 TECHNICAL COMMENTS

Issue 3.1 Compliance point for licence criteria and for toxicity testing

References: *P Lake Area Sewage Lagoon System Final Design Report January 2006; NWB Issues Compilation June 2007; Canada-wide Strategy for the Management of Municipal Wastewater Effluent Sept.2007*

The primary lagoon has been constructed in the area directly east of P Lake to serve as an annual retention lagoon. Effluent from this primary cell will be discharged into P Lake over a period of two weeks each fall, where it will have a short residence time (in the order of 2-3 days). The outlet of P-Lake flows into a small wetland area, which drains through a small channel, over a waterfall before entering Telik Inlet. P Lake and the wetlands area do not support fish; the first waters frequented by fish would be Telik Inlet, and these waters are protected under Section 36(3) of the *Fisheries Act*.

In the pre-hearing conference and technical meeting on October 1, 2007 the proponent was asked to confirm the precise location within the P Lake wastewater treatment system where effluent criteria will be met, as well as to confirm if P Lake is part of the treatment system or part of the receiving environment.

Proponent's Conclusion:
The Hamlet's consultant, Dillon Consulting Ltd., confirmed at the Pre-Hearing Conference/ Technical meeting that the wetland and waterfall would be considered the receiving environment and not part of the treatment system. Dillon confirmed that effluent from the primary lagoon discharge will be toxic to fish and will not meet section 36(3) of the *Fisheries Act*. No estimate of toxicity levels at the outflow of P Lake was provided. In the June 2007 Compilation of Issues circulated by the NWB, it was noted that Dillon requested the compliance point be at the flow into Telik Inlet.

Environment Canada's Conclusion:
In the January 2006 Final Design Report and the July 30, 2007 appendices II and IV, it is indicated that in addition to the facultative lagoon, wastewater will receive wetland treatment. This indicates that the wetland may be considered a part of the treatment system. We note that a number of communities in the NWT and NU rely upon natural wetlands and/or downstream waterbodies to provide secondary/tertiary treatment of wastewater. Environment Canada would like to encourage municipalities to incorporate engineered wetlands into treatment systems when designing new facilities (including planning for harvesting of vegetation and flow control). Where the use of a natural wetland system is the most practical option, the proponent should operate the facility such that a good understanding of the system is gained, and used to manage flow and loadings to attain optimal treatment.

The final discharge point ("end-of-pipe") may need to be differentiated from the last point of control which, according to the final design report, is at the outfall of the primary lagoon. This approach is not inconsistent with the September 2007 draft Canada-wide Strategy for the Management of Municipal Wastewater, which states:

> "Effluent from a wastewater facility must be sampled upstream of the point where the effluent enters the receiving water body and downstream of any treatment process…"

and which defines end-of-pipe as:

> "A point between the end of the treatment process and the receiving environment." (Technical Supplement 5: Glossary).

All effluent discharged from the <u>final discharge point</u> as designated by the NWB shall be demonstrated to be not acutely toxic. Case law accepts that a discharge or effluent that is acutely lethal to fish is deleterious. A common biological test to determine whether or not an effluent is acutely lethal is the *Reference Method for Determining Acute Lethality to Rainbow Trout* (EPS 1/RM/13 Second Edition, Dec. 2000). The acute lethality bioassay test is not, however, the sole indicator of a deleterious discharge or effluent; any substance with a potentially harmful chemical, physical, or biological effect on fish or fish habitat is also deleterious.

Environment Canada's Recommendations:
The Hamlet must ensure that any effluent discharged must be in compliance with *Section 36(3)* of the *Fisheries Act*, which states that the deposition of deleterious substances of any type in water frequented by fish, or in any place under any conditions where the deleterious substance,

or any other deleterious substance that results from the deposit of the deleterious substance, may enter any such water, is prohibited.

Environment Canada recommends that the proponent conduct a pass/fail 96 hour rainbow trout bioassay test on effluent sampled from the outflow of P Lake, or from the final discharge point as designated by the NWB, once annually during the second half of decant.

Issue 3.2 Discharge Criteria
References: *P Lake Area Sewage Lagoon System Final Design Report Jan. 2006 Section 6.1*

Discharge criteria are normally set in the water licence for fecal coliforms, BOD_5, Total Suspended Solids (TSS), Oil and Grease, and pH. Such limits need to be determined to be protective of the receiving environment, while being achievable.

Proponent's Conclusion:
The final design report states that the lagoon treatment system will be designed to meet the following effluent criteria at the discharge point to Telik Inlet: BOD_5 45 mg/L; TSS 45 mg/L; and 10^4 Fecal Coliform/100mL. Dillon has taken several measures to assess treatment quality and predicts that the effluent released to Telik Inlet will meet these criteria. At the outflow of the lagoon, effluent is predicted to have BOD_5 of 86 mg/L, and at the outflow of P Lake, 51 mg/L.

Environment Canada's Conclusion:
The Hamlet should be aware of the work being done to develop a Canada-wide Strategy for the Management of Municipal Wastewater Effluents, under the aegis of the Canadian Council of Ministers of the Environment (CCME). The latest draft of the Canada-wide Strategy, which addresses specific parameters and governance, was released in October 2007 (http://www.ccme.ca/assets/pdf/mwwe_cda_wide_strategy_consultation_e.pdf). As part of the federal government's implementation of the CCME Canada-wide Strategy, it is EC's stated intention to develop a regulation under the *Fisheries Act*. The Canada-wide Strategy will more clearly define regulatory requirements related to the release or discharge of municipal wastewater into surface waters. Environment Canada's goal is to ensure that effluents from municipal wastewater systems are treated before being discharged to the receiving environment so that effluents do not pose unacceptable risks to ecosystem and human health, or to fisheries resources.

The focus is on setting maximum allowable limits for BOD_5, residual chlorine and TSS in municipal wastewater effluent. There will be a period of up to five years during which northern issues are examined and practical limits put forth for wastewater quality. For the Hamlet, this may eventually impact the BOD and TSS discharge criteria.

Environment Canada's Recommendations:
Environment Canada suggests that limits under the expired water licence would be appropriate for the outflow of P Lake, and we recommend that the proposed limits for the outflow to Telik Inlet be adopted as management targets to be achieved through best management of the system (acknowledging that effluent discharge criteria and the compliance point will be set by the NWB).

EC also recommends periodic analysis of a full suite of parameters including metals, nutrients and major ions, in addition to the regulated parameters. Carbonaceous BOD (CBOD) should be

added as a monitored parameter to help the Hamlet assess whether they would be able to meet the proposed national performance standards.

Issue 3.3 Lagoon design concerns

Correspondence between the Board, CGS, and various consultants over the past year would indicate that there are differences of opinion regarding engineering of the lagoon. EC does not have the technical expertise to comment on these aspects of the licence amendment, but is concerned with integrity of the lagoon, and operational aspects arising from the design and construction.

Proponent's Conclusion:
CGS describes the lagoon as technologically sound and constructed under well-supervised conditions and are committed to its proper operation and monitoring (Applicant's opening remarks at the PHC Oct. 1, 2007).

Environment Canada's Conclusion:
EC has previously raised concerns with the potential for a thawed zone, or talik, to occur underneath the sewage lagoon. The liners cover the sides of the lagoon, but not the base; if the lagoon bottom is comprised of permeable materials there is the possibility of movement into the shallow groundwater. This exfiltration would result in migration of contaminants out of the bottom of the lagoon and into the subsurface materials.

Environment Canada Recommendations:
EC recommends that the system water balance be tracked closely so that any losses through exfiltration will be detected. A contingency plan should be drafted which includes an appropriate range of management actions, including groundwater monitoring and remedial options.

Issue 3.4 Operation & Maintenance of the System

Proper operation of the lagoon system will be the key to optimizing treatment and minimizing the potential for structural problems associated with water management.

Proponent's Conclusion:
The proponent's consultant has provided a table of contents for the sewage and solid waste facility Operations and Maintenance Manual (dated Feb. 24, 2006) in response to direction from the NWB to provide a "detailed scope to include…what will be contained in the O&M Manual…a fixed, methodic, and thorough outline".

Environment Canada's Conclusion:
Insufficient detail has been provided to allow intervenors to evaluate the effect of operational practices on treatment efficacy and structural stability. Measures such as timing of decant will affect the level of treatment achieved, and discharge flow velocities must be managed to ensure erosion doesn't occur and that treatment is optimized. Operational factors such as sludge removal and management should be identified, and logistical challenges identified. For example, will ice removal be necessary for winter discharge into the lagoon? If so, where will ice be disposed? A contingency plan should be made for discharge alternatives should the discharge pipe freeze. There is also concern with drainage management: the Dillon letter dated June 2, 2006 states that due to terrain difficulties they won't be able to construct diversion

ditches. How will drainage be managed to reduce recharge of P Lake? This raises concerns with berm stability if the upstream side becomes saturated. Furthermore, how will spring flooding of the wetlands and P Lake affect the system operation?

Environment Canada Recommendations:
An Operation and Maintenance plan should be submitted for approval prior to the commissioning of the new system. The plan should identify measures that are to be taken to ensure treatment efficiencies are not reduced over the operating life of the lagoon, and address erosion concerns with the spillway and discharge point. The Hamlet should take steps to evaluate the capacity of the wetland (i.e. retention times, hydraulic and organic loading rates) and determine how to optimize treatment. Drainage management should also be addressed.

Issue 3.5 Monitoring sites and end of pipe sampling
Reference: *P Lake Area Sewage Lagoon System Final Design Report January 2006 Section 7.*

New Surveillance Network Program (SNP) stations will need to be selected for the P Lake system, and should include sufficient sampling sites and frequencies to inform the community about treatment effectiveness. INAC has requested subsurface water quality monitoring and suggested limits on this could be set by NWB

Proponent's Conclusion:
The Final Design Report recommends using eight sample locations (control site (unidentified), lagoon inflow, lagoon effluent, P Lake effluent, wetlands effluent, and three sites along wetlands between P Lake discharge and the wetlands outlet) and doing analyses for five parameters. Sampling is proposed to be done a week prior to discharge and weekly during decant.

Environment Canada's Conclusion:
Environment Canada supports the proposal to start sampling with a series of samples being taken along the treatment system. Samples should also be taken at the outflow to Telik Inlet. In addition to the five parameters suggested (BOD_5, Fecal Coliforms, TSS, ammonia, and phosphorus) it would be useful to add periodic analysis of a full suite of parameters in order to characterize the wastewater. Annual bioassay testing should be done using a pass/fail rainbow trout bioassay test.

Environment Canada Recommendations:
Sufficient operational monitoring must be done to allow the system managers to optimize treatment, and results can be used to rationalize decant management. Weekly sampling may be more than is needed, but there should be sufficient monitoring done to characterize the quality of the effluent as it travels through the treatment system, to allow for understanding of treatment efficiency and to identify if there are high levels of contaminants that would affect efficient treatment.

Issue 3.6. Abandonment and reclamation of old lagoon systems
Reference: *P Lake Area Sewage Lagoon System Final Design Report January 2006 Section 9.3; Letter from Dillon dated June 2, 2006.*
Abandonment and Reclamation plan are needed for the new and old lagoons.

Proponent's Conclusion:
In the Final Design Report, it is noted that abandonment and restoration plans will be required for the three-cell lagoon as well as the new lagoon system. Provision may be made for use of the first cell of the three-cell lagoon system as an emergency discharge option if the lagoon is not accessible for long periods of time due to weather.

Environment Canada's Conclusion:
If the three-cell lagoon system is to be designated as providing emergency capacity, it should be included in the O&M plan and maintenance during its "standby" status as described. EC would like to highlight that the consequences of allowing the old lagoon to fail would almost certainly result in *Fisheries Act* violations, and appropriate planning and actions must be identified to avoid that.

Environment Canada Recommendations:
Submission of an Abandonment and Reclamation plan for approval is recommended as a licence condition. Such a plan should cover the interim use and ultimate closure of the three-cell lagoon, and provide conceptual closure plans for the new system.

Issue 3.7 Other aspects of the licence re: municipal operations.
EC would like to take this opportunity to outline aspects of the municipal operations which should be considered for the renewal of the licence. We note that the application for renewal did not contain sufficient details on current practices and compliance over the licence term.

With respect to solid waste, improvements to the disposal facility are sought such as eliminating open burning, and preventing leachate generation from the solid waste disposal site. EC recommends that improvements to management practices be made in the following areas:

- separation of all hazardous wastes, with secure storage and appropriate disposal;
- development of a spill contingency plan which sets out all the steps to be taken in the event of a spill, including maintenance of a stock of appropriate sorbents and clean-up materials.
- Installation of a perimeter fence at the landfill to contain wind-blown garbage.
- Previous Inspector's reports have identified problems with runoff entering the landfill, and flowing through the site. There is concern for leachate generation, and the quality of runoff which enters the marine waters. This needs to be addressed with appropriate measures such as diversion ditches or berms, and segregation of hazardous wastes.
- Bulky metal wastes have encroached below the high water mark of the ocean. EC supports cleanup being done as soon as feasible. Planning for future disposal of such wastes should form part of an operation and maintenance manual for the Municipality, and include keeping a buffer zone between disposal sites and water bodies.

Development of an Operations and Maintenance manual is a very important step in identifying good practices and planning how to implement them. This was a condition of the expired licence (Part F Item 1) but it is our understanding that an O&M Plan has not been submitted. Other aspects of the expired licence which EC would like to see taken forward into a renewal licence would include the abandonment and reclamation plan for all municipal facilities (expired licence Part G), and the SNP, including QA/QC plan (expired licence Part H).

EC recommends re-submission of the Hamlet's licence renewal application with a better level of detail, and strongly recommends that it contain the plans required by the previous licence.

4.0 CONCLUSION

Environment Canada would like to thank the NWB for the opportunity to comment on the Cape Dorset Sewage Lagoon amendment, and we hope that these technical comments and recommendations are useful to the NWB in their decision making process. Environment Canada respectfully requests the opportunity to submit additional written comments after the public hearing to address any new information brought forward at the hearing.