



Environment  
Canada

Environnement  
Canada

Environmental Protection Operations  
Prairie and Northern Region  
5019 52<sup>nd</sup> Street, 4<sup>th</sup> Floor  
P.O. Box 2310  
Yellowknife, NT X1A 2P7

*Your file / Votre référence*  
EA0708-007  
*Our file / Notre référence*  
4339 001 017

December 11, 2009

VIA EMAIL

Tawanis Testart  
Environmental Assessment Officer  
Mackenzie Valley Environmental Impact Review Board  
Box 938, 5102 50<sup>th</sup> Avenue  
Yellowknife, NT X1A 2N7

**Re: Environment Canada's Technical Report Submission on the Taltson  
Hydroelectric Expansion Program**

Dear Ms. Testart:

Environment Canada (EC) is pleased to submit the attached technical report to the Mackenzie Valley Environmental Impact Review Board (the Board) as part of the environmental assessment review process being conducted for Dezé Energy Corporation's Taltson Hydroelectric Expansion Project.

EC will be in attendance at the public hearing on January 14 and 15, 2010 in Dettah, NT to present EC's submission and respond to any questions which the Board, the Proponent or other party may have concerning the issues raised by EC in this submission.

Should you have any questions or wish clarification on any aspect of this submission prior to the hearing please do not hesitate to contact Lisa Perry at (867) 669-4707 or [Lisa.Perry@ec.gc.ca](mailto:Lisa.Perry@ec.gc.ca).

Best regards,

Warren Fenton  
A/Manger, Environmental Assessment & Marine Programs

cc: Carey Ogilvie – Head, EA-North



Environment  
Canada

Environnement  
Canada

---

**TECHNICAL REPORT SUBMISSION**

**to the**

**MACKENZIE VALLEY ENVIRONMENTAL IMPACT  
REVIEW BOARD**

**for the**

**ENVIRONMENTAL ASSESSMENT (EA0708-007)**

**of the**

**TALTSON HYDROELECTRIC EXPANSION PROJECT  
DEZÉ ENERGY CORPORATION**

**December 11, 2009**

**Canada**

## 1.0 INTRODUCTION

Environment Canada (EC) is a science-based Department whose business is to help Canadians live and prosper in an environment that needs to be conserved and protected. Contributing to making sustainable development a reality in Canada's North is a priority for EC. The Department focuses on provision of scientific expertise for use in decisions on developments, so that all parties working together can ensure there is minimal impact on the natural environment, and ecosystem integrity is maintained and protected. To this end, EC has reviewed Dezé Energy Corporation Ltd's *Developer's Assessment Report 2009* (DAR) for the Taltson Hydroelectric Expansion Project, along with the supplementary information provided to the Mackenzie Valley Environmental Impact Review Board (herein known as "the Board").

### 1.1 Mandate, Role and Responsibilities of Environment Canada

The mandate of EC is determined by its own departmental statute, the *Department of the Environment Act* (DOE Act), and the legislation assigned to it by Parliament through the Minister. In delivering this mandate, the Department is also responsible for the development and implementation of policies, guidelines, codes of practice, federal, territorial, and international agreements, and related programs. The overall objective is 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 goal with other federal agencies, provinces, territories and First Nations.

The DOE Act provides EC with general responsibility for environmental management and protection. Its obligations extend to and include all matters over which Parliament has jurisdiction, which have not by law been assigned to any other department, board, or agency of the Government of Canada. The DOE Act delegates responsibility to the Minister for:

- preservation and enhancement of the quality of the natural environment (e.g. water, air, soil);
- renewable resources including migratory birds and other non-domestic flora and fauna;
- water;
- meteorology; and
- coordination of federal policies and programs respecting preservation and enhancement of the quality of the natural environment.

The DOE Act states that EC has a mandated responsibility to advise heads of federal departments, boards and agencies on matters pertaining to the preservation and enhancement of the quality of the natural environment. As such, this mandate is extremely broad.

Of particular applicability to the current project proposal and binding on Dezé Energy Corporation Ltd. if the project proposal proceeds are legislation and standards such as:

- *Canadian Environmental Protection Act 1999* (CEPA) and its Regulations
- *Fisheries Act* (Pollution Prevention Provisions)
- *Migratory Birds Convention Act* (MBCA) and its Regulations
- *Species at Risk Act* (SARA)
- *Canada Water Act*

- Canadian Council of Ministers of the Environment (CCME) Canada-wide Standards for Mercury Emissions
- CCME Canada-wide Standards for Dioxins and Furans

Please see Appendix A for a brief description of the above instruments.

Relevant national policies and strategies and international agreements include the Toxic Substances Management Policy, Federal Strategy on Pollution Prevention, Sustainable Development Strategy, United Nations Convention on Biological Diversity, Canadian Biodiversity Strategy, Canada's Action Plan on Climate Change and the United Nations Framework Convention on Climate Change.

## **2.0 BACKGROUND**

In brief, Dezé Energy Corporation Ltd. (herein known as “the Proponent”) is proposing to expand the existing 18 megawatt Twin Gorges hydroelectric facility, located on the Taltson River in the Northwest Territories, by adding a new 36 or 56 megawatts of power generating capacity. It is our understanding that the proposal consists of the following new infrastructure:

- Generation plant at Twin Gorges including an open intake canal, two penstocks, powerhouse and tailrace canal;
- Switchyard, gated bypass spillway, access roads and bridge at Twin Gorges;
- Gated control structure on Nonacho Lake;
- Minimum flow release structure through the South Valley Spillway;
- Electrical substations at each of the four mine site; and
- Transmission line, 698 km in length within a 30 metre right of way, proposed to be built to connect the new Twin Gorges switchyard northeast to the existing Snap Lake, Diavik, Ekati, and the proposed Gahcho Kué diamond mines.

The following would be required to facilitate the three (3) year period of construction for this proposal:

- 16 staging areas (each 2-5 hectares) along the length of the transmission line;
- 2 large land-based camps at Nonacho Lake and Twin Gorges;
- 2 barge-based camps within the East Arm of Great Slave Lake; and
- Approximately 13 smaller camps (40 people max; stationary and mobile) located along the length of the transmission line.

Construction access to the areas of development would be via the redevelopment of the existing winter road from Fort Smith to Gertrude Lake, the all weather road from Gertrude Lake to Twin Gorges, and a new winter road beyond Twin Gorges to near Nonacho Lake dam with a number of spur roads to access the staging areas. North of the treeline, access will be via spur roads from the existing ice road and overland tracks to the staging areas. Float plane access in the East Arm area and the existing airstrip at Twin Gorges will also be utilized for personnel and material delivery. In hilly areas, helicopters will be used for construction.

Works will also be required to upgrade and maintain the existing facilities such as repair of the rock fill dam and spillway raise at Nonacho Lake, as well as those works listed in section 6.4.8 of the DAR.

In the summer of 2007, the Proponent submitted a Land Use Permit application and a Type A Water Licence application to the Mackenzie Valley Land and Water Board (MVLWB) for preliminary screening review. EC provided two letters of comments and recommendations (dated September 11, 2007 and July 20, 2007) to the MVLWB during its screening process. In October 2007, the MVLWB referred the project applications to the Board for an Environmental Assessment (EA) under the *Mackenzie Valley Management Resources Act* on the basis of the project potentially causing significant environmental impacts and public concern.

EC participated in the Technical Sessions held in Yellowknife, NT on May 27-28, 2009 and October 1, 2 and 5, 2009, as well as submitting a number of information questions to the Proponent. This submission focuses on issues related to environmental effects on, or related to, water quality, air quality, migratory birds, species at risk, spills and emergencies and climate change.

### **3.0 TECHNICAL COMMENTS AND RECOMMENDATIONS**

EC's review of the Taltson Hydroelectric Expansion Project proposal takes into consideration all of the documents submitted with the DAR up to November 6, 2009, as well as the following documents submitted by the Proponent:

- *Taltson Hydroelectric Expansion Project - Commitments 2009*, October 2009; and
- *Taltson Expansion Project - Draft Environmental Monitoring Program*, October 2009

Our review focuses on areas which fall under the Department's mandated responsibilities, with our comments organized under the following headings:

- 3.1 Water Quality
- 3.2 Migratory Birds and Species at Risk
- 3.3 Waste Management
- 3.4 Climate Change
- 3.5 Emergency Planning & Spill Contingency
- 3.6 Environmental Monitoring Program
- 3.7 Cumulative Effects Analysis

Within each category, comments are organized by specific issue, with reference to the appropriate document section, and detailing our concerns and recommendations. While many of EC's concerns regarding the project proposal have been addressed during the review of the DAR, subsequent information submitted and the technical sessions, several issues will need to be addressed through further work, future actions and commitments by the Proponent, as summarized in this report.

Issues relating to fish and fish habitat (aside from the pollution prevention provisions of the *Fisheries Act*), and socio-economics fall outside of EC's mandate, and therefore are not addressed in this submission. Further, EC has not addressed issues or concerns related to permafrost or hydrology, and as such the board should seek expert advice as required for these issues.

## 3.1 Water Quality

### 3.1.1 Acid Rock Generation and Drainage

#### *References:*

- DAR Appendix 6A: Acid Base Accounting Testing Report (Klohn Crippen Berger)
- DAR, In Subsections 6.5.4.6.4 & 6.5.4.7.4: Excavations, Pages 6.5.33 & 6.5.37
- DAR, In Subsection 9.4.2.3: Acid Rock Drainage, Page 9.4.12
- Email correspondence between EC and the Proponent's consultant, Greenwood Environmental; Re. Taltson Hydroelectric Expansion Rock Testing; June 17, 2009 (posted to the Board's public registry on July 12, 2009 under 'Additional Information')

#### *Proponent's Conclusions:*

Acid Base Accounting (ABA) testing conducted on ten granite gneiss samples from the Twin Gorges and Nonacho sites indicated that, "all samples have alkaline paste pH ( $\text{pH} \geq 8.5$ ) and are not currently acid generating. Total sulphide sulphur ( $\text{S}(\text{S}^{2-})$ ) is uniformly low denoting the low concentration of acid generating minerals. The high Sobek NPR values (i.e., high neutralization potential and low acid-production potential) indicate there is sufficient long term neutralizing potential in the form of silicate buffering. These samples can be classified as non-acid generating according to industry standards, as indicated for example by Price(1997)" (from Appendix 6A).

As such the Proponent has concluded that "no issues related to acid rock drainage (ARD) are anticipated." The Proponent proposes to "monitor the rock excavation materials to ensure the ARD potential remains very low."

In response to EC's questions regarding acid rock generation, the Proponent, through its consultant (email dated June 17, 2009), committed to developing a Metal Leaching and Acid Rock Drainage Management Plan, in consultation with other interested parties, which would include additional ABA testing, as well as shake flask tests for each rock type.

#### *EC's Conclusions:*

The ABA testing on the granite gneiss rock to be excavated is consistent with that done in hard-rock mining operations. This static test provides a relatively quick inexpensive measure of net acid-generating potential. The samples exhibit very low acid-generating potential with measured sulphide concentrations in the rock are at or near detection limits. The rock also has relatively low acid neutralizing potential. The "fizz" test affirms the presence of carbonate, an acid-neutralizing constituent, in some of the samples. The paste pH values of greater than 8 again supporting the conclusion of the presence of neutralizing constituents. There is some uncertainty in the character of the rock behaviour when the net neutralizing potential (excessive neutralizing capacity) is relatively low, as it is in the case of the testing rock. The ratio of the neutralizing to acid potential is consistently above the 3 to 1 mining-industry guideline. The conclusion that the rock to be excavated as being classified as non-acid generating is reasonable and supported by the information provided.

In terms of the validity of the tests conducted, the two duplicate samples are in somewhat agreement. Most variation in duplicates values relates to variations in the neutralizing capacity. Concentrations however remain very low.

Based on mining-industry practice, the ten samples used in the analysis are somewhat unrepresentative sampling of the some 1 M m<sup>3</sup> (about 2.6 M tonnes) of material that would come to be excavated. The number of samples based on the mass to be excavated is recommended at about 35.

Additionally, excavated rock can also leach contaminants. This neutral-pH metal leaching can be problematic for some rock types. Typically, gneiss granite is not such a rock unit; however, it appears that such an evaluation has not been conducted.

The Proponent's proposed development of a Metal Leaching and Acid Rock Drainage Management Plan, and commitment to conduct further testing and evaluation would address the concerns EC identified with acid rock generation and drainage.

*EC's Recommendations:*

1. EC supports the recommendation in the Klohn Crippen Berger memorandum (dated September 8, 2008 in Appendix 6A) for sampling to be performed during excavation. Such confirmatory sampling should be conducted to address the uncertainty associated with interpreting the test results. By testing drill-hole cores in advance of blasting, the Proponent is able to assess the results and implement any appropriate mitigation measures. Continued similar results as in the first ten samples would indicate no remedial measures are necessary in terms of acid-generation. This additional testing and monitoring, as well as operating procedures on how all rock will be managed during construction and potential remedial measures should be detailed in the proposed Metal Leaching and Acid Rock Drainage Management Plan. The plan should be submitted for review in advance of the work.
2. Kinetic or leach testing should be undertaken in a timely manner to evaluate the character of any drainages from the granite to ensure the excavated rock will not leach contaminants. Depending on the nature of the test, some can be conducted quick and inexpensively. One example of such a simple leach test is the distilled water or site-water shake flask extraction.
3. Reference to the proposed monitoring of rock excavation materials to ensure ARD potential remains low should be included in the Environmental Monitoring Program for the proposed project. Also, the commitment to develop and implement a Metal Leaching and Acid Rock Drainage Management Plan should be included in the Proponent's commitments and referenced in the Environmental Monitoring Program document.

**3.1.2 Explosives and Blasting Residue**

*References:*

- DAR, In Subsection 6.5.4.4.2: Explosives, Pages 6.5.29
- DAR, In subsection 6.5.4.7.4: Excavations and Earthworks, Page 6.5.37
- DAR, In subsection 15.2.3.1.7.2: Explosives Leading to Blast Residues, Page 15.2.32
- Commitments 2009, Commitment #36 & 43, Page 65 & 68
- Proponent Response to Indian and Northern Affairs Canada (INAC) dated July 15, 2009 (posted to the public registry under 'Additional Information')

### *Proponent's Conclusions:*

Blast residues and/or leaching of explosives “could cause contamination or nutrifying elements such as nitrogen and phosphorus and mineral compounds such as ammonia, nitrates, nitrites and orthophosphates to be introduced into the aquatic environment of the Twin Gorges Forebay and/or the lower Taltson River.” However, as outlined on page 15.2.32 of the DAR, the Proponent concludes “that the use of explosives would result in no or negligible changes to contaminant concentrations as a result of blast residues. As such, the pathway has been classified as Minor.”

The Proponent has proposed to follow Fisheries and Oceans Canada's (DFO) *Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters* as a mitigation measure. From Commitment #43, the Proponent now proposes “to use a modified explosive [e.g. emulsion] in or in close proximity to water where risk of contamination is high, to significantly reduce the potential for nitrate contamination via the above pathways.” The final product has not been determined. Commitment #36 proposes a minimum set back of 10 metres from the edge of water to provide adequate rock separation between the water and explosives for containment and isolation.

The Proponent committed to developing a Drill and Blast Management Plan (responses to INAC's questions referenced above) “to ensure compliance with the required standards, protection of the environment, and personnel safety.” Mitigation measures will be provided within the plan and “may include preventative measures such as best management practices, monitoring of contained waste water and runoff, and contingency plan in the event of continued loss. The plan would also include further information on the management of waste water based on the anticipated volumes.”

For terrestrial blasting away from instream habitat, pellet ammonium nitrate-fuel oil (ANFO) explosives will be used. The DAR states, “a significant proportion of the excavated rock material would be processed and used entirely for either concrete aggregates, structural fills, or as material for the dam rehabilitation. The production of fine aggregates would likely require washing, and settling ponds would be required for this process.”

### *EC's Conclusions:*

Nitrate and ammonia are commonly associated with blasting residues (e.g. ANFO explosives). Blasting residue has the potential to be toxic to aquatic life. The deposit 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 under Section 36(3) of the *Fisheries Act*.

The measures (plan) that would be used to manage potentially contaminated runoff (e.g. from blasting using ANFO explosives) or wash water (e.g. generated from washing the aggregates) have not been provided at this stage of the review. A Blasting Management Plan is needed. With the development of a plan, in consultation with stakeholders, the Proponent commitments, and the requirement for a water licence for effluent discharges from the MVLWB, EC believes concerns identified can be addressed.



*EC's Recommendations:*

4. DFO's *Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters* should be followed (except for the change to overpressure threshold outlined in Proponent's Commitment #37) including the advice to not use ammonium nitrate-fuel oil (ANFO) mixtures in or near water due to the chance of the production of toxic by-products (ammonia), and the chance of accidents/spills.
5. The Proponent's commitment to develop a Drill and Blast Management Plan should be included in its Commitments 2009 document. Treatment or alternative disposal of water containing blasting residue from the washing of aggregates, from water collected from the blasting areas or seepage through the blast rock should be included in the plan.
6. Any effluent discharges should be regulated in a MVLWB water licence for ammonia and nitrate such that aquatic life is protected.

**3.1.3 Concrete Wash Water and Effluent**

*References:*

- DAR, In Subsections 6.5.4.6.5, 6.5.4.7.2: Concrete Works, Page 6.5.33 & 6.5.37
- DAR, In Subsections 6.5.5.3: Repair of Nonacho Lake Dam, Page 6.5.46
- DAR, Appendix 7A: Environmental Management Plans: Draft Erosion and Sediment Control Plan, Subsections 3.3.2 & 3.3.6, Page 5 & 6
- DAR, In Subsections 15.2.3.1.7.2: Industrial Equipment Leading to Change in Contaminant Concentration, Page 15.2.33
- Commitments 2009; Commitment #1, Page 10

*Proponent's Conclusions:*

The Taltson Hydroelectric Expansion Project will use concrete for building new structures and enhancing existing structures (e.g. spillway). Concrete may be used to seal the existing sluice gates at the control structure on Nonacho Lake, and grout used for the transmission line tower foundations and anchors. Concrete batch plants are proposed at the Twin Gorges and Nonacho Lake sites.

In section 3.3.2 and 3.3.6 of the Draft Erosion and Sediment Control Plan it states "water used to clean concrete trucks, chutes and mixers will not be allowed to enter any surface waters directly. To reduce the concentration of lime, such wash waters will be treated in a temporary impoundment system and/or percolated through the soil, after hardened concrete has been removed (Page 5)...A temporary impoundment system [may include a settling pond and a second pond for water clarification] will be specifically considered in addressing large volumes of concrete wash water. Such a system or an appropriate alternative will be used to mitigate the potential impacts of concrete wash water" (Page 6). From the October 1, 2009 technical session, details of the settling ponds (size, location etc.), and treatment options (settling, flocculants etc) will be provided in the detail design phase.

The DAR, as well as the Proponent's commitment #1 state that all concrete work will be conducted in the dry. However, the DAR goes on to say that if concrete works "can not be completed in the dry, site-specific operational and management plans would be developed...and submitted...[for review]...prior to conducting the works."

*EC's Conclusions:*

Concrete is a mixture of Portland cement, aggregate, water and additives. Portland cement is the ingredient that gives concrete wash water the highly corrosive and highly alkaline properties that make it a deleterious substance as defined by the *Fisheries Act*. Portland cement is also the active ingredient of mortar and grout. Concrete wash water is formed when water comes into contact with uncured or incompletely hardened concrete (e.g. washing of concrete mixers, pumps, cranes, equipment). The wash water will typically have a high suspended sediment load and high pH. Waste water effluent generated by concrete batch plants and will also have a high pH and high suspended sediment content.

Deposition of concrete wash water and effluent can have adverse impacts on aquatic ecosystems. The high pH of concrete wash water and effluents can kill fish in minutes.

Treatment system details have not been described for waste and wash water effluents generated. EC understands that water use and discharge of concrete wash water or effluent would require a water licence from the MVLWB.

The Proponent's commitments, as referenced above, to: a) conduct concrete work in the dry, isolated from water; b) not allow concrete wash water or effluent to enter any surface waters; c) design a treatment system to appropriately handle and treat effluent from the concrete batch plants; and d) include EC in the review of any concrete management plans (Technical Session, October 1, 2009, Page 35) would address EC's concerns at this time.

*EC's Recommendations:*

7. Implement proposed mitigation measures and commitments identified in the EA process for concrete wash water and effluent.
8. Any effluent discharges should be regulated in a MVLWB water licence for total suspended sediment and pH such that aquatic life is protected.

**3.1.4 Water Quality Monitoring**

*References:*

- Draft Environmental Monitoring Program, October 2009; Subsections 4.3.3 and 5.2.2, Page 12-13 and 18
- Proponent Response to INAC dated July 15, 2009 (posted to the public registry under 'Additional Information')

*Proponent's Conclusions:*

Water quality monitoring is proposed for both construction and operations phase of the project expansion. The Proponent intends to develop the Aquatic Effects Monitoring Program (AEMP) in cooperation with multiple agencies and stakeholders (Response to INAC, July 15, 2009).

*EC's Conclusions:*

A comprehensive AEMP expanded from the Draft Environmental Monitoring Program's (EMP) water sections is needed.

### *EC Recommendations*

9. A comprehensive AEMP expanded from the Draft EMP should be developed for the project, in consultation with stakeholders, prior to construction phase beginning and in time to complete baseline characterization.
10. To ensure that natural spatial and temporal variability in the system is characterized before construction begins, and assumptions made for water quality confirmed, baseline water quality data should be collected from all zones.
11. Dissolved Oxygen (DO) is being checked pre-construction to fill the data gap identified. EC recommends more than one year of data collection to capture the extent of natural variability since DO levels vary with snow cover, cloud conditions and any pulses of organic material into depositional areas.
12. Summer temperature increases in Trudel Creek have been modeled, and an average increase of 2°C indicated. The monitoring of temperatures using loggers is an excellent idea. EC recommends that the data be reviewed annually, within the AEMP process, to determine where DO monitoring might be warranted. Summer kill of fish has been observed in creeks and lakes, and can occur when temperatures are elevated and the amount of oxygen that the water can hold is reduced accordingly.
13. EC recommends more than one year of baseline data be collected for benthic invertebrates since they can be highly variable from year to year or the risk is run of not being able to distinguish change from natural variability. It is recommended that the metrics outlined in EC's Environmental Effects Monitoring program be used (see 3.6 for more details).
14. Details are required for the water quality monitoring proposed. Some examples are as follows:
  - a. How will the monitoring listed in the second paragraph (EMP, page 18), which is largely compliance monitoring, fit in with effects monitoring?
  - b. The third paragraph (EMP, page 18) states that monitors will do in-situ monitoring to ensure water quality meets CCME guidelines for the protection of freshwater aquatic life. What parameters and specific guideline values will be used?
  - c. The plan should include a map which shows monitoring locations, including the discharge of camp effluent mentioned in this section (5.2.2).
  - d. The potential discharge sites mentioned should at a minimum be sampled for ammonia, suspended solids, and pH, with periodic testing for total metals. The camp wastewater parameters should also include biological oxygen demand and oil and grease.

### **3.1.5 Mercury Monitoring**

#### *References:*

- DAR, In Subsections 13.4.3.2 & 13.4.4.2.2: Mercury, Page 13.4.18 & 13.4.21
- DAR, In Subsections 13.5 & 13.11.3: Bioaccumulation of Mercury, Page 13.5.1 & 13.11.6
- Commitments 2009; Commitment #15, Page 23

- Draft Environmental Monitoring Program, October 2009; Subsection 5.3.3.3: Mercury, Page 28

*Proponent's Conclusions:*

From the DAR:

"The changes in the Taltson hydrograph would cause flows and water levels to increase and/or decrease depending on the specific location and/or time of year. However, no new flooding would occur. Water levels from the Expansion Project would not exceed historic water levels on Nonacho Lake. Thus the potential effects of mercury, which can be associated with hydroelectric projects if areas are newly flooded, are not a concern of the Taltson Expansion Project. There is the potential for increased disturbance to sediments...This in turn could increase methylmercury in the aquatic environment by re-mobilizing mercury that has settled in benthic sediments. Increasing the availability of methylmercury raises the potential for bioaccumulation and biomagnification in the food chain...However, mercury modelling predicted the change to be negligible." It is concluded that the potential effect on aquatic quality from the redistributed sediments is low and mercury would not be monitored at this time.

However, given the concerns raised by stakeholders, sediment monitoring for mercury is now proposed. From Commitment #15, "monitoring of Nonacho Lake sediments would provide an early indication of the potential for increased mercury into the food chain. If changes in mercury sediment are detected, adaptive management through biological monitoring would be proposed and discussed with stakeholders as needed."

*EC's Conclusions:*

As stated in the DAR, methylmercury is highly toxic, has low water solubility and tends to be associated with sediments. The DAR predicts that water level and flow variation from project activities may disturb sediments and redistribute existing elements from sediments (e.g. sediment-sequestered mercury) into the water column. Since methylmercury tends to be associated with sediments, monitoring of sediments for mercury should be conducted prior to and after the expansion works to verify the impact predictions of the DAR.

Sediment mercury monitoring is proposed in the Draft Environmental Monitoring Program and should provide a good indicator of changes in concentrations that might be available to the ecosystem. Sampling deeper (depositional) areas is reasonable as proposed.

*EC's Recommendations:*

15. The Proponent has committed to taking more sediment cores prior to the proposed expansion, and then during operations. Thought should be given to the method to ensure increases are detected early and complete baseline data should be gathered, as there are areas of the Northwest Territories with higher than expected mercury concentrations due to geology or long-range transport. The surficial layer should be analyzed for mercury. This will provide a more meaningful baseline against which future considerations can be made to determine effects with the expansion.
16. Increasing sediment mercury concentrations (or even measurable initial ones, depending on the levels) should be a trigger to look at levels in biota.

## 3.2 Migratory Birds and Species at Risk

### 3.2.1 Mitigation and Monitoring for Horned Grebes

#### *References:*

- Commitments 2009; Commitment #112, Pages: 111-113
- Terms of Reference; Section 5.2.3, Page 26

#### *Proponent's Conclusions:*

In the Commitments 2009 report, the Proponent noted several potential impacts to Horned Grebes:

- water fluctuations in the Taltson River watershed and Trudel Creek that could lead to changes in food availability and other habitat changes;
- reduced reproductive effect from unscheduled power outages and the resulting alteration in water levels;
- sensory disturbance during construction and operations; and
- collisions with the transmission line leading to mortality.

Mitigation measures included scheduling outages for routine maintenance outside the breeding bird season, minimizing unscheduled outages, and undertaking most construction activities outside of the breeding bird season. No mitigation measures were provided for sensory disturbance during operations and collisions with the transmission lines.

The proponent suggested that, overall, the effects on the project on Horned Grebes are anticipated to be not significant.

The Proponent stated that further baseline surveys will be undertaken to determine the breeding population of Horned Grebes (and other birds) within the Taltson River and Trudel Creek to further refine the baseline data and to serve as a basis for mitigation and monitoring (Commitments 2009, page 113). However, the Proponent's Draft Environmental Monitoring Program did not include any Horned Grebe monitoring.

#### *EC's Conclusions:*

In April 2009, Horned Grebe (western population) was newly assessed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as being a species of Special Concern. As such, it is now under consideration for listing on Schedule 1 of SARA.

The Terms of Reference (Section 5.2.3, page 26) state:

*For Species at Risk, the analysis provided in the DAR must be of sufficient detail to allow the Review Board, as well as relevant other parties, to discharge its responsibilities under the Species at Risk Act, which includes:*

- a) Determining whether the proposed development is likely to affect a listed species or its critical habitat;*
- b) Identifying the adverse effects on the species and its critical habitat;*
- c) Ensuring that measures are taken to avoid or lessen those effects, consistent with any applicable recovery strategy and action plan; and*
- d) Monitoring the effects.*

*For the purpose of this environmental assessment, the term “species at risk” includes all species listed under any applicable schedule of the Species at Risk Act, as well as any species listed by the Committee on the Status of Endangered Wildlife in Canada.*

The Proponent has identified some adverse effects, but has not identified mitigation measures to avoid or lessen all the adverse effects identified. Note that for Species at Risk the criteria for mitigation and monitoring is whether an adverse effect is likely, as opposed to whether the effect is significant or not. Mitigation measures were not identified for sensory disturbances during the operations and for collisions with transmission lines.

The Proponent has not adequately outlined its plans for monitoring any effects on Horned Grebes.

*EC's Recommendations:*

17. EC recommends that mitigation measures be developed to avoid or lessen all potential adverse effects to Horned Grebes.
18. EC recommends that monitoring be undertaken by the Proponent to determine the effectiveness of mitigation and/or identify where further mitigation is required. Details of all mitigation measures and monitoring for Horned Grebes should be developed, in consultation with EC, prior to the start of construction for the project.

**3.2.2 Scheduling of Annual Outages for Routine Maintenance**

*References:*

- DAR, In Subsection 14.3.3: Ramping from Annual Scheduled Outages: Trudel Creek, Pages: 14.3.19 - 14.3.20
- Commitments 2009; Commitment #112, Pages: 111-113
- Fournier, M.F. and J.E. Hines. 1999. Breeding ecology of Horned Grebe *Podiceps auritus* in subarctic wetlands. Canadian Wildlife Service Occasional Paper 99

*Proponent's Conclusions:*

The Proponent plans to have scheduled shutdowns annually for each turbine for regular maintenance. The preferred timing of the annual outages would be scheduled to occur just prior to the onset of freshet, which generally occurs in April or May.

The Proponent has also stated that one of the mitigation measures to minimize adverse effects to Horned Grebes (a Species at Risk) is to schedule outages for routine maintenance in April or May, prior to the migratory breeding bird season (Commitments 2009, page 112).

*EC's Conclusions:*

Section 6(a) of the *Migratory Birds Regulations* states that no one shall disturb or destroy the nests or eggs of migratory birds. Some species of migratory birds (e.g., some ducks, loons) nest close to the water edge. Grebes will build floating nest platforms. These nests could be disturbed or destroyed by any changes in flow rates/water levels during the scheduled outages.

In the boreal region of the Northwest Territories, the incubation period for migratory birds, ranges from May 7 until July 21, and young birds can be present in the nest until August 10. Not all these species of birds would necessarily be nesting in the areas affected by changes in flow rates/water levels, but some may be. Horned Grebes (a Species at Risk) have been observed to have eggs in their nests as early as May 20 in the Northwest Territories (Fournier and Hines 1999).

*EC's Recommendations:*

19. EC recommends that scheduled outages be done prior to May 7, unless local baseline data on migratory birds in the area indicates that these outages could be done later without disturbing or destroying nests or eggs of migratory birds.

### **3.2.3 Yellow Rail Surveys**

*References:*

- DAR, In Appendix 13.10A: 2008 Taltson Basin Wildlife Baseline Study, Subsection: 5.1.1, Pages: 5.1

*Proponent's Conclusions:*

The Proponent had a wildlife consultant undertake surveys for Yellow Rail in 2008 (Appendix 13.10A of the DAR, 2008 Taltson Basin Wildlife Baseline Study, page 5.1). No Yellow Rails were detected during the surveys, although the wildlife consultant suggested that the surveys may have been conducted slightly too early to detect Yellow Rail.

*EC's Conclusions:*

Section 79(2) of the SARA states that during an assessment of effects of a project, the adverse effects of the project on listed wildlife species must be identified, that measures are taken to avoid or lessen those effects, and that the effects need to be monitored. This requirement is also reflected in the Terms of Reference for the project (Section 5.2.3, page 26). Yellow Rail is listed as Special Concern in SARA and, as such, these requirements apply to this species.

As a first step in determining whether there could be potential adverse effects, it needs to be determined if Yellow Rail occur in the project area. Unfortunately, the timing of the Yellow Rail survey undertaken in early June 2008 was likely too early to detect this species, particularly for the Nonacho Lake area as the water was still frozen in some sites.

The coverage of the 2008 surveys was reasonable, with increased coverage in areas with greater potential for Yellow Rail. The surveyors appeared to have a good idea as to the type of habitat that they should survey for Yellow Rails. They surveyed most sites in Zones 1 and 3, which according to them had the best habitat both for vegetation/water levels as well as wetland size. Vegetation and water levels are the most important criteria in determining good habitat for Yellow Rail, and the surveyors properly focussed on these characteristics when choosing survey sites.

The breeding range of Yellow Rail is imperfectly known. EC notes that the range of Yellow Rail in the Northwest Territories is currently being re-examined by biological experts to ensure that it best reflects the areas likely to be used by Yellow Rail. Dependent on the

outcome of this, this could influence the extent of the Yellow Rail survey area for the Taltson project.

*EC's Recommendations:*

20. EC recommends that additional Yellow Rail surveys be done prior to construction of the project in the areas likely to have Yellow Rail. Surveys should be done using established protocol for this work. Given the uncertainty of the breeding chronology for Yellow Rails in this region, surveys should start mid-June and have 3 visits that are 10 days apart to increase the likelihood of detection of the birds. If Yellow Rails are detected, the Proponent should work with EC to determine the appropriate mitigation and monitoring measures. The Proponent should consult with EC prior to conducting the surveys to ensure that they have the best information on the likely range of the Yellow Rail in the Northwest Territories.

**3.2.4 Assessment of Impacts to Waterfowl from Transmission Line Collisions**

*References:*

- DAR; In Subsection 15.4.8.4: Collisions with the Transmission Line Leading to Mortality of Waterfowl, Pages: 15.4.88 - 15.4.91
- Latour, P.B., J. Leger, J.E. Hines, M.L. Mallory, D.L. Mulders, H.G. Gilchrist, P.A. Smith and D.L. Dickson. 2008. Key migratory bird terrestrial habitat sites in the Northwest Territories and Nunavut. 3rd edition. Canadian Wildlife Service Occasional Paper No. 114.

*Proponent's Conclusions:*

The Proponent provided an estimate of the potential waterfowl mortality from breeding waterfowl colliding with the transmission line. The Proponent concluded that impacts to waterfowl from collisions would be negligible.

*EC's Conclusions:*

The Proponent's assessment of the risk of breeding waterfowl colliding with transmission lines was adequate.

High numbers of migrating waterfowl use the Slave River Delta area, which is approximately 50 km east of the Taltson River outflow into Great Slave Lake. Observed numbers of waterfowl in the Slave River delta are up to 80,000 birds in spring and 17,000 birds in fall (Latour et al. 2008).

The Proponent did not assess the risk of migrating waterfowl colliding with the transmission line. EC agrees with the Proponent that migrating waterfowl usually fly too high to be at risk of collision. However, if large flocks of migrating waterfowl are staging (i.e. resting and feeding) in the area, this could greatly increase the collision risk. Migrating waterfowl that are staging in the area for an extended period of time would likely be flying at lower levels and potentially moving between nearby wetlands and lakes. Unfortunately, little information exists as to whether waterfowl are staging in the project area during spring or fall migration. Thus, there currently is insufficient information to adequately assess the risk of collisions to staging waterfowl in the area.



*EC's Recommendations:*

21. EC recommends that the Proponent undertake a spring and fall survey of potential wetlands/lakes along the transmission line route to determine if large flocks of birds are staging near the line. If areas along the transmission line have significant numbers of waterfowl during spring or fall migration, the Proponent should assess whether further mitigation and monitoring measures are required to minimize the impact of collisions of these flocks of birds with the transmission line.

**3.2.5 Impact of Ravens and Other Avian Predators on Migratory Birds**

*References:*

- DAR, In Subsection 15.4.5.2.2.8: Transmission Tower Perching Leading to Altered Predation Rates for Raptors, Page: 15.4.34
- Commitments 2009; Commitment #66, Pages: 114-115
- Fournier, M.F. and J.E. Hines. 1999. Breeding ecology of Horned Grebe *Podiceps auritus* in subarctic wetlands. Canadian Wildlife Service Occasional Paper 99.

*Proponent's Conclusions:*

In the DAR, the Proponent assessed the potential impacts of the transmission towers providing hunting perches and nest sites for raptors (Section 15.4.5.2.2.8, page 15.4.34). The DAR did not address the issue of ravens nesting and roosting on towers or other project infrastructure, but the Proponent did later consider address this issue (Commitments 2009, Commitment #66, page 114-115).

The Proponent suggested that the impact of raptors and ravens would be minor (i.e., the pathway exists but would have a negligible residual effect on the population of the prey species).

*EC's Conclusions:*

Predation of eggs and chicks is a key factor that limits the productivity of many species of birds. Although predation is a natural process, artificial increases in predator abundance from human activities can readily alter any existing balance between predators and nesting birds. This can lead to population declines and conservation problems. Ravens and some raptors are predators of eggs and chicks, and increases in these predator populations in development areas elsewhere in the north have resulted in declines in local bird populations (e.g., Alaskan North Slope). In a study near Yellowknife, Northwest Territories, evidence suggested that ravens are one of the main predators of eggs of Horned Grebes - a Species at Risk (Fournier and Hines 1999).

The Proponent has provided some reasonable arguments why its project is not expected to increase predation rates by ravens and raptors in the project area. EC agrees with the Proponent in that nest predation is likely of greatest concern in areas where nest predators are maintained at artificially high levels through access to food from humans. The Proponent has committed to adopt careful waste management practices. Unfortunately, the Proponent cannot control the waste management practices of other nearby developments. Development will likely increase in the region and there are some reasonably foreseeable projects, particularly in the area north of the treeline (DAR, page 15.4.119-15.4.120). A combination of poor waste management practices from other developments and an increase

in potential nest sites from the Taltson transmission line could artificially increase the numbers of predators in the region. This scenario is most likely to occur north of the treeline where more development is occurring and nest sites for ravens and raptors are most likely to be limited. As such, EC suggests that there still is some uncertainty on this issue, particularly in the area north of the treeline.

*EC's Recommendations:*

22. EC recommends that the numbers and locations of raven and raptor nests on transmission towers be recorded annually. If the number exceeds a pre-established threshold, the Proponent should undertake further mitigation measures to discourage further nesting on the transmission towers. Information on numbers of ravens and raptors nesting on the Snare Lake/Yellowknife transmission line may be useful to help establish a reasonable threshold for the Taltson transmission line.

**3.2.6 Assessment of Impacts to Passerines (songbirds) and their Habitat**

*References:*

- DAR, In Subsection 15.4.8.1: Project Footprint Leading to Habitat Loss and Fragmentation for Passerines, Pages: 15.4.77 - 15.4.82

*Proponent's Conclusions:*

The Proponent provided density data for passerines and project habitat loss data. The Proponent concluded that the project is anticipated to have a negligible effect to passerine populations (DAR, page 15.4.82).

*EC's Conclusions:*

The Proponent never adequately answered the question as to how many passerines would be impacted. The Proponent's presentation of results for passerines is a quantification of habitat loss, not of any calculated effect to the birds themselves. EC expected that the Proponent would have made the link with the density data for passerines and the habitat loss data, but this was not done.

EC has decided not to ask the Proponent for further analysis on the number of passerines impacted because (1) the Proponent likely overestimated the project impacted area for passerines and (2) it is unlikely that any new presentation of data would change the assessment of significance.

The issue of overestimating project impact stems from a number of things. First, substantial areas of the project are not going to be cleared because they are already exposed bedrock or tundra or water. The totals in, for example, table 15.4.11 are too high for passerines and that is the table we are referred to on page 15.4.79. Second, only about 5m of the whole Right-of-way (ROW) will be definitely cleared, on top of a 30x30m clearing for constructing each pad. The remainder of clearing along the ROW will be 30m or less, and evidently often only around 15m. Furthermore, that clearing does not have to be down to ground level, it merely has to provide the required clearance between the power lines and vegetation.

In order to determine how many passerines would be impacted, one would first have to refine the estimate of project footprint to a number more relevant to songbirds. Once that much smaller number is derived, one would also have to consider what is just a seral stage change or alteration (like clipping the vegetation at 3m not at ground level, and leaving all sub 3m vegetation in place) and would actually result in either an incomplete loss (reduction of density) or a potential replacement of some species with others - like a succession model. Once all of that was done, there would likely be positive impacts and negative impacts to consider. However, in this case, further analysis of the data as suggested above will likely not lead to a change in the level of significance for passerines. As such, EC is not requesting further analysis on this issue.

### **3.3 Waste Management**

#### **3.3.1 Incineration Management Plan**

##### *References*

- DAR, In Subsection 3.3.1, 6.5.3.2, and 6.5.3.3
- Commitments 2009; Commitment #38, 39, 40, and 41, Page 66
- Meeting Report: Incinerators, October 21, 2009 (posted to the Board's public registry on October 30, 2009 under 'Technical Sessions')
- Webster, E. and Mackay, D., *Modelling the Environmental Fate of Dioxins and Furans Released to the Atmosphere During Incineration*, Canadian Environmental Modelling Centre report no. 200701, 2007.  
<http://www.trentu.ca/academic/aminss/envmodel/CEMC200701.pdf>
- Canadian Council of Ministers of the Environment, Canada-wide Standards for Dioxins and Furans, 2001
- Environment Canada, Technical Document for Batch Waste Incineration, 2009.  
<http://www.ec.gc.ca/drgd-wrmd/default.asp?lang=En&n=82401EC7-1>

##### *Proponent's Conclusions:*

The Taltson Hydroelectric Expansion Project will include two (2) main work camps, Twin Gorges and Nonacho Lake (Section 6.5.3.2), and small work camps along the transmission line corridor (Section 6.5.3.3). At each camp, the Proponent is planning to use incineration to dispose of camp waste (Section 3.3.1).

The Proponent has made several commitments regarding waste management: commitments #38, 39, 40 and 41. In particular, the Proponent has committed (commitment #41) to follow the advice provided in the EC "Technical Document for Batch Waste Incineration" and to develop and implement an incineration management plan with annual reports. Further details of this commitment can be found in the Meeting Report submitted to the Board summarizing the discussion between the proponent, EC and GNWT dated October 21, 2009.

##### *EC's Conclusions:*

EC recognizes that timely disposal of camp waste - specifically food waste - is of critical importance to minimize safety risks associated with wildlife attraction. Timely disposal is usually achieved through burning. However, burning of waste products releases numerous contaminants to the air, many of them persistent, bioaccumulative and toxic (e.g. polycyclic aromatic hydrocarbons - PAH's - heavy metals, chlorinated organics – dioxins and furans).

These contaminants can result in serious impacts to human and wildlife health through direct inhalation and they can also be deposited to land and water, where they bioaccumulate through food chains affecting wildlife and country foods. Therefore, burning should only be considered after all other alternatives for waste disposal have been explored.

The Canadian Environmental Modelling Centre (Webster and Mackay, 2007) modelled the environment fate of incineration contaminants from a typical northern camp through the environment and food chain. The study considers a good incineration scenario and a poor incineration scenario. In the good incineration scenario, appropriate equipment is operated with best management practices and the Canadian Council of Ministers of the Environment (CCME) *Canada-wide Standards (CWS) for Dioxins and Furans* are achieved. In the poor incineration scenario, appropriate equipment and best management practices are not used and the release of contaminants are about 1000 times greater than in the good incineration scenario. Modelling results for the good incineration scenario indicate that adverse environmental impacts are unlikely. However, the modelling results indicate that there is potential for adverse impacts to water and sediment quality and fish and wildlife health from poor incineration. In other words, there is significant risk to the environment from incineration but this risk can be mitigated by using appropriate equipment and best management practices.

EC analyzed sediment samples at a northern mine site for dioxins and furans. Sediment samples were collected from a target lake near the mine's incinerator and a control lake located 25km from incinerator. The dioxins and furans concentrations in the target lake sediments are 10 times greater than the concentration in the control lake. The concentrations in the target lake exceed the CCME Interim Freshwater Sediments Quality Guidelines for dioxins and furans.

The CCME CWS for Dioxins and Furans provides air emission limits from incineration. The CWS are only enforceable if included as conditions in operating licences and permits. Achievement of the CWS is to be demonstrated through stack testing and/or "determined efforts". EC has developed a "Technical Document for Batch Waste Incineration" that if followed would be considered "determined efforts". The technical document focuses on the type of incineration that is common throughout the north and that is being proposed by the proponent. The technical document provides information on appropriate incineration equipment and best management practices in effort to reduce the formation and release of contaminants during the incineration process and thereby minimizing the risk to the environment.

EC commends the Proponent for its waste management commitments. However, in the view of EC, there is risk of significant adverse impacts to the environment from incineration. The risk to the environment can and should be mitigated through proper incineration management. There are currently no incineration regulations in the Northwest Territories. EC is looking to the Board to recommend that incineration for this project should be managed through the MVLWB water licence.

#### *EC's Recommendations:*

23. To mitigate the risk of significant adverse impacts to the environment, EC recommends that the Proponent develop and implement an Incineration Management Plan which incorporates the information provided in the EC "Technical Document for Batch Waste Incineration". The proponent should also submit an annual report providing the

information described in the Meeting Report and the “Technical Document for Batch Waste Incineration”.

### **3.3.2 Sewage Treatment and Effluent**

#### *References:*

- DAR, Appendix 7A: Environmental Management Plans: DRAFT Materials and Waste Management Plan, Subsections 3.1.3 & 3.3.3, Page 2 & 10
- DAR, In Subsection 6.8.4.3: Sewage Lagoons; Page 6.8.7
- Technical Session Transcripts, October 2, 2009; Day 2, Page 121-124

#### *Proponent's Conclusions:*

Treatment of domestic wastewater at the temporary and permanent camps may occur with on-site sewage treatment systems or regularly transporting the waste off-site (section 3.1.3 and 3.3.3). In section 6.8.4.3 a sewage lagoon may require clean-up and restoration if utilized.

During the Technical Session on October 2, 2009, the Proponent stated that the details of sewage treatment and management, and location of a lagoon were not available at this stage. The details “would be part of the detail design, and certainly ensure that any waste water treatment facility is sized for the appropriate quantity and appropriate treatment for permanent discharge, and will be addressed during the detail design and permitting phase.” The system will meet “any regulatory criteria for discharge.”

#### *EC's Conclusions:*

No further information is provided on the type of treatment system to be used, its treatment capacity, effluent quality, or where the effluent would be discharged except to say it will “be treated according to all applicable regulations.” No mention is made about the sewage treatment proposed for barge camp facilities.

Domestic wastewater has the potential to adversely impact both surface and ground waters. EC is responsible for administering Section 36(3) of the *Fisheries Act* which ensures that deleterious substances do not enter fish bearing waters, as well as CEPA.

With further development of the Materials and Waste Management Plan, in consultation with the appropriate parties, and the requirement for a water licence for effluent discharges from the MVLWB, EC believes concerns identified can be addressed in the regulatory phase prior to construction.

#### *EC's Recommendations:*

24. Waste water treatment facility and effluent monitoring should be detailed in the monitoring programs for the project for both the construction and operations phases.

### **3.4 Climate Change**

#### **3.4.1 Project Responses to the Environment**

*References:*

- DAR In Subsection 16.1: Climate Change, Page 16.1.1 – 16.2.15

*EC's Overall Conclusion:*

EC has reviewed the Proponent's analyses of historical trends and assessments of future climate change-related effects on the significant cryospheric components.

The methodology to obtain future temperature and precipitation projections (described in section 16.1.2.1, pages 16.1.6 and 16.1.7) is consistent with current practices.

The Proponent's application and assessments of future climate change-related effects on snow cover, permafrost, river and lake ice, and river discharge specific to the Project area, described in sections 16.1.2.2 to 16.1.4.2 (pages 16.1.7 to 16.1.13) is satisfactory.

Further, conclusions and recommendations specific to the Proponent's proposed mitigation and adaptation strategies pertaining to climate change effects on water management and operations (section 16.1.5.1), and infrastructure (section 16.1.5.2) follows.

#### **3.4.2 Water Management and Operations**

*Proponent's Conclusions:*

From the DAR: "Ongoing monitoring of river flows on the Taltson River would continue to inform water management decisions. Four (4) Water Survey of Canada (WSC) stations operating at Taltson above Porter (Q7QD004), Taltson below Hydro Dam (07QD007), Tazin River at the Mouth (07QC007), and Tazin Lake (07QC002) would be extremely useful in observing trends in basin runoff as a result of climate change" (page 16.1.14).

*EC's Conclusions:*

EC agrees that appropriate assessment, monitoring, and mitigation/adaptation approaches must be incorporated into the Proponent's water management and operations plans. EC is currently committed to operating the Taltson above Porter (Q7QD004), Taltson below Hydro Dam (07QD007), and Tazin Lake (07QC002) gauging stations as a result of a signed Memorandum of Understanding (MOU) with the Proponent. Under this MOU, EC-WSC recovers 100% of the operational and salary costs associated with this work. However, EC's long-term commitment would be dependent on continued funding of these 3 stations by the Proponent. The gauging station at Tazin River at the Mouth (07QC007) is a station funded under an existing federal-territorial agreement.

*EC's Recommendations:*

25. EC will continue to operate these gauging stations as per the signed MOU and agreements. However, if unforeseen future events threaten the viability of any of these 4 gauging stations, a reassessment to explore options would be required between the Proponent, EC and other government agencies.

*Proponent's Conclusions:*

From the DAR: "The analysis of data and the integration of long-term trends due to climate change into Project operations should be easily implemented, as the operating decisions are already informed by continuous and current monitoring of the basin's environmental conditions. In considering extreme conditions, it must be noted few methods exist to quantify changes, and precautions should be taken. Specific modeling for extreme event prediction can be undertaken for this basin as more data is collected" (page 16.1.14).

*EC's Conclusions:*

EC agrees with the Proponent's conclusion.

*EC's Recommendations:*

26. EC supports the Proponent's proposal to undertake extreme event prediction modeling as more flow data become available.

### **3.4.3 Infrastructure**

*Proponent's Conclusions:*

From the DAR: "Under climate change, thawing of the ground could reduce soil strength, increasing slope instability. Therefore, power lines, buildings, and roads that have been constructed on permanently frozen ground in the Project area may be affected by warmer temperatures. Permafrost monitoring and regular maintenance would mitigate this risk" (page 16.2.15).

*EC's Conclusions:*

EC agrees with Proponent's conclusion.

## **3.5 Emergency Planning and Spill Contingency**

### **3.5.1 Spill Contingency and Response Plan**

*References:*

- DAR, Section 7.0: Environmental Management System; Subsection: 7.6, Page: 7.3
- DAR, Appendix 7A: Environmental Management Plans
- DAR, In Subsection 6.5.4.4.1: Fuel and Fuel Storage; Table 6.5.3, Page 6.5.28

*Proponent's Conclusions:*

The Contingency and Spill Response Plan follows a framework that addresses spills through initial incidents response, spill response training, equipment, duties and responsibilities, reporting, and follow-up. Follow-up investigations are key to determining the cause of a spill and minimizing future risk.

### *EC's Conclusions:*

Documentation provided adequately demonstrates the key components of prevention, preparedness, response and recovery. However, some of these components could be expanded upon. Based upon a review of the DAR, the project may not have to report for the *Environmental Emergency Regulations* (E2 Regulations), based on the types and amounts of fuel proposed at the facility. However, the Proponent should still review these regulations to determine any reporting requirements. EC sought clarification from the Proponent regarding the type of Jet Fuel proposed for use; they responded Jet A fuel type. Jet A is not a regulated substance; therefore no reporting under the E2 Regulations is required. However, if in the future Jet B fuel is used and the reporting thresholds are met these regulations would apply.

The following recommendations shall apply if the facility meets the requirements of reporting to EC's E2 Regulations and Part 8 of CEPA. If no CEPA Section 200 regulated substances meets the threshold for reporting, then the legislative requirement for an Environmental Emergency Response Plan (ERP) subject to E2 Regulations is not required. However, there may be other pieces of legislation beyond the E2 Regulations that require the Proponent to have an Emergency Response Plan (ie. Territorial and other Federal legislation), as well as good environmental practice.

### *EC's Recommendations:*

27. EC recommends the development of a spill contingency plan which includes prevention, preparedness and response. Copies of the spill plan must be made readily available on site, and all staff should be familiar with operational procedures in the event of a spill.

The Spill Contingency Plan should:

- assign responsibilities to company staff and/or contractors and outline a clear path of response;
- provide a list of agencies / persons to be contacted in the event of a spill including their phone numbers, etc;
- provide direction regarding response actions for spills on various types of terrain (e.g. spills on land, water, snow/ice, muskeg, etc.);
- create and maintain a list and indicate location(s), both on and off site, of equipment available to be used in the event of a spill;
- ensure an appropriate spill kit with absorbent material is located at all sites where fuel storage and transfer occurs;
- ensure drip pans are utilized when refuelling equipment;
- ensure proper handling and disposal of contaminated materials resulting from the containment, clean-up, etc. of any spills; and
- state that **all spills** of oil, fuel, or other deleterious materials, **regardless of size**, are to be reported to the NWT 24-hour Spill Line (867) 920-8130. All releases of harmful substances, regardless of quantity, are immediately reportable where the release:
  - is near or into a water body;
  - is near or into a designated sensitive environment or sensitive wildlife habitat;
  - poses an imminent threat to human health or safety; or
  - poses an imminent threat to a listed species at risk or its critical habitat.



28. The following was not included in the plan, but is required under E2 Regulations if applicable:
- Identification of an Emergency that can reasonably be expected to occur at the place;
  - How notification of Members of the public will be carried out in an Emergency situation; and
  - Must update and test the plan at least once a year.
29. The following criteria must be met to be in compliance with the E2 Regulations:
- Must keep copies readily available for individuals to carry out plan.
  - Must keep the plan, a record of results from annual updates, and tests for period of not less than 5 years.

From Appendix 7A: Draft Materials and Waste Management Plan:

30. Section 3.1.2: Worker Training and Qualifications - A specific list of training for those individuals identified in specific Emergency Response positions should be listed here. Specific training should correspond with the Emergency Role required.
31. Section 3.2.10: Hazardous Materials – This section states that specific handling and disposal instructions will be prepared if any equipment contains polychlorinated biphenyls (PCBs). In addition, the spill contingency and response plan will need to identify and address response for the chemical substances contained within the transformers or other equipment.

From Appendix 7A: Draft Spill Contingency and Response Plan:

32. Table 2-2: Internal Emergency Response Communications List - A detailed list of roles of the individuals involved in an Emergency Response Scenario should be included. The current section could be expanded to include a more detailed list.
33. Section 2.8: Spill and Emergency Response Equipment - This list could be more specific, and include the locations of emergency equipment at the facility and in proximity to hazardous materials.
34. Section 5: Material Specific Risks (Appendix 7A) - General Substance Properties were included and references to Material Safety Data sheets available in section 6.3. Specific substance properties (numerical values) should be listed in the ERP for all CEPA regulated substances.
35. Figure 6-1: NTPC Plant Site Area (Page 30, Appendix 7A) - According to the map, staff housing, garage and airstrip are located near by. Potential consequences of a spill into these areas need to be addressed. What situation would cause a spill to occur that would affect the Staff housing unit? What substances can affect these areas, and how is notification of staff housing / other people in the area carried out in an Environmental Emergency situation.

### **3.5.2 Accidents and Malfunctions Screening**

#### *References:*

- DAR, Section 17: Accidents and Malfunctions; Page: 17.1, Table 17.4

*Proponent's Conclusions:*

The Proponent identified the following accidents and malfunctions under most construction activities and some activities associated with project components during operations (Table 17.4):

- vehicle accidents,
- human/wildlife interactions,
- spills,
- potential for worker injury, and
- explosives use.

*EC's Conclusions:*

Table 17.4 addresses possible accidents and malfunctions that could occur during the construction phase of the project.

*EC's Recommendations:*

36. A similar table should be present in the Spill Protocol developed by the Proponent to address potential accidents and malfunctions during regular operations of the facility.

### **3.5.3 Fuel Transport and Storage**

*References:*

- DAR, In Subsection 2.2: Permits and Licences; Table 2.1, Page 2.5
- DAR, In Subsection 6.5.4.4.1: Fuel and Fuel Storage, Page 6.5.27

*Proponent's Conclusions:*

Table 6.5.3 in the DAR identifies the locations, types and volumes of site stored fuels.

Transport of fuel would be by winter road access where available. Camps and staging areas supported by barge supply would receive fuel supplies in the summer. The Taltson facility receives fuel by air during operations. Bulk fuel storage would generally utilize double-walled Enviro tanks. Drum storage of fuels would be kept to a minimum, but would be required for lubricants and small quantities of gasoline for small engines. Specific drum storage facilities (bermed) would be constructed where necessary, or drums kept in trailers. Fuel used in vehicles at the Taltson facility is stored in a double-walled 13,600 L above ground storage tank near the plant.

Table 2.1 indicates that on-site fuel storage tanks must meet CEPA requirements.

*EC's Conclusions:*

The new *CEPA Storage Tank System for Petroleum Products and Allied Petroleum Products Regulations* came into force on June 12, 2008. These regulations apply to both outside, aboveground and underground storage tank systems (including the piping and other tank associated equipment) under federal jurisdiction containing petroleum and allied petroleum products that have a capacity greater than 230 litres. This includes tanks located on federal or Aboriginal lands. Exceptions are pressurized tanks, mobile tanks, tanks

regulated by the National Energy Board, and outdoor, aboveground storage tank systems that have a total combined capacity of 2500 litres or less and are connected to a heating appliance or emergency generator. All storage tank system owners must identify their tank systems to EC and installation of new systems must comply with the regulation's design requirements. Further information on these regulations can be found in Appendix A.

The Proponent's proposed fuel storage would be captured under the new regulations. Compliance with these new regulations is mandatory.

*EC's Recommendations:*

37. Adhere to the requirements the *Federal Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations*, under CEPA.
38. Implement proposed mitigation measures and commitments identified in the EA process including those outlined in Tables 12.2.1 (p. 12.2.2) and 15.4.5 (p. 15.4.14) of the DAR.

### **3.6 Environmental Monitoring Program**

*References:*

- Draft Environmental Monitoring Program, October 2009
- Terms of Reference; Section 3.2.7, Page 19

*Proponent's Conclusions:*

A Draft Environmental Monitoring Program (EMP) was submitted by the Proponent to the Board in October 2009 as a basis for discussion. The EMP is intended to be further developed and refined in consultation with stakeholders, and at this time, contains varying levels of detail.

*EC's Conclusions:*

The basis of any monitoring program is to set up a study design that identifies how change will be measured, and how it will be evaluated for significance. To quote Roger Green (1979):

*"A sampling program must be designed to obtain data for analysis by some statistical method, to test whether there is in fact evidence of an effect on the biota, and to describe efficiently any demonstrated effect."*

The introduction of the EMP sets out a list of the purposes of the monitoring program, and the subsequent sections link back to these purposes to varying degrees. The monitoring purposes described in the plan are linked wherever possible to adaptive management and impact prediction verification, but the subsequently described monitoring activities are not designed to clearly measure and assess project changes. Section 1.2 describes a set of principles which are reasonable, but the second principle of answering a central question is not fully met. Recognizing that this is a draft for EA stage purposes, there should still be a clearer demonstration that the Proponent has a solid understanding of baseline conditions, has described the extent of natural variability so that project changes can be distinguished from environmental "noise", and has in mind a basis for evaluating the significance of changes.

In conclusion, it is EC's view that the information provided by the Proponent with respect to monitoring does not completely fulfill the requirements set out in the Terms of Reference and the EMP still lacks clarity and detail. If the project is approved, further development of the EMP, in consultation with stakeholders, will be required in the regulatory phase prior to construction beginning.

*EC's Recommendations:*

39. To strengthen the program, EC recommends that the monitoring design answers the following questions:

- How will the data be analyzed, interpreted and applied?
- What statistical tests will be employed?
- How will comparisons between baseline and future conditions be made?
- What will distinguish a change from an impact? Temporal comparisons are used extensively; reference sites should also be considered.

40. Guidance on some aspects of monitoring design may be taken from the EC Environmental Effects Monitoring website at: <http://www.ec.gc.ca/eseem/Default.asp?lang=En&n=D450E00E-1>.

### **3.7 Cumulative Effects Analysis**

*References:*

- DAR, In Subsection 19.2.7.1: Terrestrial Environment and 19.2.7.2: Aquatic Environment; Pages : 19.1 - 19.8
- DAR, In Subsection 19.3.5: Species at Risk and Key Bird Species, Pages: 19.9 - 19.16 and 19.22
- DAR, In Subsections 19.4.2: Taltson River Aquatic Cumulative Effects and 19.4.3: Overall Aquatic Cumulative Effects, Pages: 19.35 - 19.37

*Proponent's Conclusions:*

The Proponent has concluded that the cumulative effects of the project, in conjunction with other past present and reasonably foreseeable projects, on persistence of abundance and distribution of populations of passerines and waterfowl are not significant.

*EC's Conclusions:*

Although EC reviewed the Proponents cumulative effects analysis in its entirety the comments provided here are restricted to areas directly related to departmental mandate and areas of responsibility.

The Proponent's overall approach to its cumulative effects assessment appears to be sound and its analyses reasonable. Generally, there is no reason to disagree with the conclusions. However, EC believes that one important aspect of potential predation of the nests and eggs of migratory birds has not been fully assessed as outlined in Section 3.2.5 (Impact of Ravens and other Avian Predators on Migratory Birds) of this Technical Report Submission.

*EC's Recommendations:*

41. The Proponent should apply all appropriate mitigation measures as described in the DAR, and Commitments, as well as identified in the public hearing review process and potential regulatory authorizations in order to minimize the potential for cumulative impacts.
42. EC reiterates here, the need for the Proponent to follow EC's Recommendation (Section 3.2.5 of this Submission) regarding the potential impact of ravens on migratory birds.

#### **4.0 CONCLUSION**

EC would like to thank the Board for the opportunity to comment on the Taltson Hydroelectric Expansion Project, and we hope that these technical comments and recommendations are useful to the Board in its decision-making process. EC respectfully requests the opportunity to submit additional written comments after the public hearing should any new or additional information relevant to our issues be brought forward at the hearing. We look forward to further discussions at the January 14-15, 2010 Public Hearing in Dettah, NT.

## **APPENDIX A: RELEVANT LEGISLATION, POLICIES AND GUIDELINES**

The following summaries have been prepared for ease of reference and convenience only. For purposes of reliability and accuracy, and for interpreting and applying the Act, regulation or policy, it is recommended that the reader review the original document itself, including any subsequent amendments.

### ***Canadian Environmental Protection Act, 1999***

Proclaimed on March 31, 2000, the *Canadian Environmental Protection Act, 1999* (CEPA) is an Act respecting pollution prevention and the protection of the environment and human health in order to contribute to sustainable development. CEPA shifts the focus away from managing pollution after it has been created to preventing pollution. The Act provides the federal government with tools to protect the environment and human health, establishes strict deadlines for controlling certain toxic substances, and requires the virtual elimination of toxic substances which are bioaccumulative, persistent and result primarily from human activity.

For substances that are declared “toxic” under CEPA and are added to the List of Toxic substance in Schedule 1 of the Act, instruments will be proposed to establish preventive or control actions for managing the substance and thereby reduce or eliminate its release into the environment. These tools may be used to control any aspect of the substance’s life cycle, from the design and development stage to its manufacture, use, storage, transport and ultimate disposal.

Examples of preventive and control instruments include:

- Regulations;
- Pollution prevention plans;
- Environmental emergency plans;
- Environmental codes of practice;
- Environmental release guidelines; and
- Pre-notification and assessment of new substances (chemicals, biochemicals, polymers, biopolymers, and animate products of biotechnology).

#### **➤ *Environmental Emergency Regulations under CEPA***

Authority to require emergency plans for toxic or other hazardous substances is provided in Part 8 of CEPA. The *Environmental Emergency Regulations* require those who own or manage toxic and hazardous substances specified in a list of substances under CEPA, at or above the specified thresholds, to provide required information on the substance(s), their quantities and to prepare and implement environmental emergency plans. Environmental emergency plans for such a substance(s) must cover prevention, preparedness, response and recovery.

#### **➤ *Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations under CEPA***

These regulations came into force on June 12, 2008. The main objective of the new regulations is to prevent soil and groundwater contamination from storage tank systems located on federal and Aboriginal lands. The regulations cover tanks storing petroleum

products and allied petroleum products, and compliance with these regulations is mandatory. For additional detail and ‘tank tips’ please refer to: [www.ec.gc.ca/st-rs](http://www.ec.gc.ca/st-rs).

### **Pollution Prevention Provisions of the *Fisheries Act***

The Minister of Fisheries and Oceans is legally responsible to Parliament for administration and enforcement of all sections of the *Fisheries Act*. However, under a Prime Ministerial Instruction (1978) and a Memorandum of Understanding (1985), EC administers and enforces those aspects of the *Fisheries Act* dealing with the prevention and control of pollutants affecting fish. In this context, EC works to:

- Advance pollution prevention technologies;
- Promote the development of preventative solutions; and
- Work with the provinces, territories, industry, other government departments and the public on issues relating to the pollution provisions of the *Fisheries Act*.

The main pollution prevention provision is found in section 36(3) of the Act, and is commonly referred to as the “general prohibition”. This section prohibits the deposit, into fish-frequented waters, of substances that are deleterious to fish. The legal definition of “deleterious substance” provided in section 34(1) of the *Fisheries Act*, in conjunction with court rulings, provides a very broad interpretation of deleterious and includes any substance with a potentially harmful chemical, physical or biological effect on fish or fish habitat.

### ***Migratory Birds Convention Act***

The Migratory Birds Convention, between Canada and the United States, provides for the cooperative management of shared migratory birds populations on a continental basis. The Parties agree to manage migratory bird populations in accord with the following conservation principles:

- Manage migratory birds internationally;
- Ensure a variety of sustainable uses;
- Sustain healthy migratory bird populations for harvesting needs;
- Provide for and protect habitat necessary for the conservation of migratory birds; and
- Restore depleted populations of migratory birds.

Within Canada, the Migratory Birds Convention is implemented through the *Migratory Birds Convention Act* (MBCA) and its Regulations. The MBCA provides for the protection of migratory birds and nests and for the creation of protected areas for migratory birds and the control and management of those areas. The *Migratory Birds Regulations* (MBR) address the harvest and possession of migratory birds. Section 6 of the MBR prohibits the disturbance, destruction, taking of a nest, egg, or nest shelter of a migratory bird or to be in possession of the above, except under the authority of a permit. Section 5.1 of the MBCA prohibits persons from depositing substances harmful to migratory birds in waters or areas frequented by migratory birds or in a place from which the substance may enter such waters or such an area.

### ***Species at Risk Act***

The *Species at Risk Act* (SARA) is intended to prevent endangered or threatened species or subspecies from becoming extinct or lost from the wild as a result of human activity and to help in the recovery of these species. It is also intended to manage species of special

concern and to prevent them from becoming endangered or threatened. Most of SARA came into force in June 2003. The prohibition provisions came into force in June 2004.

With respect to species at risk, SARA provides for:

- Status assessment and legal listing (Schedule 1);
- Preparation of recovery strategies and action plans;
- Protection of critical habitat; and
- Management plans to prevent further endangerment.

SARA includes general prohibitions against the:

- killing, harming, harassing of listed extirpated, threatened or endangered species or their residences;
- damage or destruction of the residences of individuals of an endangered or threatened species, or of an extirpated species where its reintroduction into the wild has been recommended; and
- destruction of critical habitat of an extirpated, threatened or endangered species, as defined in a recovery strategy or action plan.

How and when these prohibitions apply will depend on the type of species (e.g. aquatic species, migratory bird), its status designation (e.g., threatened, endangered) and where it is located (e.g., lands under the authority of the Minister of the Environment or the Parks Canada Agency, other federal lands).

SARA also requires that federal environmental assessments incorporate assessments of species at risk into reviews and that attention be paid to mitigation and monitoring of affected species.

### ***Canada Water Act***

The *Canada Water Act* enables EC to enter into agreements with other jurisdictions and to carry out research and surveys regarding water quantity and quality issues (e.g. Northern River Basins Study). This also enables EC to support the implementation of the Federal Water Policy (1987) and Canadian Council of Ministers of the Environment Canadian Water Quality Guidelines (1987). The Mackenzie River Basin Board is an example of a mechanism in place to deal with water basin impacts.

### ***Canadian Council of Ministers of the Environment Canada-wide Standards***

The Canada-wide Environmental Standards Sub-agreement is a framework for federal, provincial, and territorial Environment Ministers to work together to address key environmental protection and health risk reduction issues that require common environmental standards across the country. Set under the framework of the Canada-wide Accord on Environmental Harmonization, the standards sub-agreement sets out principles for governments to jointly agree on priorities, to develop standards, and to prepare complementary work plans to achieve those standards, based on the unique responsibilities and legislation of each government. The sub-agreement does not change the jurisdiction of governments nor does it delegate authority.

A defining characteristic of the Canada-wide standard process is the accountability of each jurisdiction to ensure the implementation of approved Canada-wide standards. Section 6 of



the Canada-wide Standards Sub-agreement, sets out requirements and suggestions regarding implementation, with the objective of ensuring co-operative, effective, accountable and consistent implementation of each standard.

➤ ***Canada-wide Standards for Mercury Emissions***

Mercury is a naturally occurring substance, which is transformed through biological processes to methyl mercury, a persistent substance which bioaccumulates in the food chain and is particularly toxic to humans and wildlife. Mercury levels originate from a combination of naturally-occurring mercury and anthropogenically emitted mercury. Levels in any one region reflect variable combinations of local, regional and even global sources. Approximately sixty percent of the mercury entering the ecosystem is from anthropogenic sources.

Recognizing the hazard posed by anthropogenically emitted mercury entering the food chain, the CCME ministers agreed in June 2000 to the Canada-wide Standards for Mercury Emissions. The CWS set limits for mercury emissions from several sectors, including incinerators. For more information: [http://www.ccme.ca/assets/pdf/mercury\\_emis\\_std\\_e1.pdf](http://www.ccme.ca/assets/pdf/mercury_emis_std_e1.pdf)

➤ ***Canada-wide Standards for Dioxins and Furans***

Polychlorinated dibenzo-p-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs), commonly known as dioxins and furans, are toxic, persistent, bioaccumulative, and result predominantly from human activity. Due to their extraordinary environmental persistence and capacity to accumulate in biological tissues, dioxins and furans are slated for virtual elimination under CEPA, the federal *Toxic Substances Management Policy* and the CCME *Policy for the Management of Toxic Substances*.

Recognizing the hazard posed by dioxins and furans entering the environment, the CCME ministers agreed, in May 2001, to the Canada-wide Standards for Dioxins and Furans. These standards set limits for dioxin and furan emissions from several sectors including incinerators. For more information: [http://www.ccme.ca/assets/pdf/d\\_and\\_f\\_standard\\_e.pdf](http://www.ccme.ca/assets/pdf/d_and_f_standard_e.pdf)