EA03-008
DAR addendum 1

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hand-delivered

Ms. Kimberley Cliffe-Phillips
Environmental assessment Officer
Mackenzie Valley Environmental Impact Review Board
Yellowknife, NT

May 28, 2004

Dear Ms. Cliffe-Phillips;

Deh Cho Bridge – Developer's Assessment Report, Addendum 1

In our May 25 revision of the Developer's Assessment Report (DAR), we omitted inclusion of updates to *Section C.7 – Accidents and Malfunctions*, addressing comments in the MVEIRB deficiency report.

Enclosed are 35 copies of Addendum 1. This should be substituted for Section C.7 (beginning on page 72 of DAR).

My apologies for the omission.

Please do not hesitate to contact us for any further information.

Sincerely,

Andrew Gamble

enclosures

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C.7 Accidents and Malfunctions:

List any possible accidents or malfunctions that may occur and describe the procedures to be followed in such instances (include the probability, potential magnitude and potential environmental impacts of any such accidents or malfunctions). Do proposed contingency plans include an alternative system of transport in the event that the bridge is closed to traffic for a long period of time due to structural damage?

C.7.1 Accidents and Malfunctions During Construction of the Bridge

Possible accidents would include but not necessarily be limited to the following:

i. Collision of Construction Equipment with traffic on the HWY or in the construction corridor– medium probability
ii. Persons falling in the river from the barge-bridge – low probability
iii. Persons falling in the river from the superstructure- low probability
iv. Heavy equipment falling in the river from the barge-bridge – low probability
v. Heavy equipment falling in the river from the superstructure – low probability
vi. Collapsing of a cofferdam during pier construction – low probability
vii. Collapsing of steel superstructure during installation – low probability
viii. Failure of ice access during installation of the pier shafts – low probability
ix. Dropping a concrete panel into the river during deck installation – low probability
x. Other construction worker accident – high probability

All general contractors and subcontractors are required to comply with strict safety standards set by government agencies, the WCB, their insurers and internal company policies. These are designed to minimize probability and mitigate the impacts of any accident/injury or spill. However, this cannot eliminate all risk during a construction project.

The following additional steps have been, or will be taken to reduce the probability and mitigate the consequences of injuries, environmental damage or disruption to traffic from possible construction accidents:

i. As a condition of the contracts, operators will be required to meet required licensing and Workplace Hazardous Materials Information System (WHMIS) certification. During weekly site safety "lunch-box meetings" all operators will be reminded the importance of defensive driving and of observing the speed limits established on the construction site. Safety inspector will regularly inspect heavy equipment and monitor traffic on site. In case of unsafe driving or exceeding speed limits drivers will be reprimanded, inclusive dismissal in case of repeated delinquency.

   In case of accident first priority will be given in attending injured persons. Bridge management will be in contact with the nursing station in Ft Providence and will have readily available vehicle to transport the injured to the nursing station. Construction Foremen and bridge management will be in contact via local radio communication network. The accident will be reported to the low enforcement authorities. In case of oil spill resulting from the accident, the rules of the Spill Contingency Plan will apply.

ii. All workers or operators having access to the barges will be subject to additional Safety Orientation course. Wearing safety jackets will be mandatory for all personnel working on the barges. Safety inspectors will monitor the operation and will correct unsafe behavior.

In case of accident, first priority will be given in attending injured persons. The plan of action described above in **item i.** will apply. There will be a motorboat available for water rescue.

iii. Only workers with previous experience in steel erection will be hired for this work. Personnel working on the superstructure will be properly instructed on safety procedures and will wear approved harnesses.

In case of accident first priority will be given to attending injured persons. Falling from the superstructure might result in a fatal injury.

iv. Preventive measures are described above in **item I** and **ii.**

In the unlikely case of accident first priority will be given in attending injured persons. The equipment involved in the accident will most likely suffer significant damage. There might be limited amount of fuel leaking in the river. In such case the rules of the Spill Contingency Plan will apply. There will be a 150 t crane deployed on a barge for the duration of the operation of the barge-bridge. This crane will have the capacity to retrieve the vehicle from the river. The vehicle may remain in the water for up to 24 hours.

v. Preventive measures are described above in **item I and ii.** In addition, vehicles working on the deck before the installation of the curbs will travel with very low speed in a corridor of temporary concrete barriers.

In the unlikely case of accident first priority will be given in attending injured persons. Potential consequences of the accident and plan of action are described above in **item i.** and **item iv**. The operator involved in the accident may suffer fatal injury.

vi & vii. Cofferdam, steel superstructure and all remaining bridge elements are designed and certified by experienced structural engineers and are reviewed by independent consulting firms retained by the GNWT. Erection schemes proposed by the contractors will also be certified and reviewed in a similar fashion. Regulated procedures for steel fabrication will be continuously monitored and approved by professional fabrication inspectors. Only contractors with proven pertinent experience will be chosen to do the work. Experienced professionals will be conducting site supervision and will be approving every phase of the work.

In the extremely unlikely case of collapsing cofferdam the work on the particular pier will be suspended. The collapsed material will be extracted with equipment available on site and will be replaced with new one. Since there is no contaminants involved in the work no significant environmental damage is anticipated. Marine traffic on the river will not be affected by the accident.

In the extremely unlikely case of collapsing superstructure the work on the bridge will be suspended. Personnel working on the bridge during collapsing will likely suffer injuries. Removal of the collapsed material is a major operation involving heavy cranes mounted on barges, steel cutting equipment and divers. The collapsed part of the superstructure will have to be replaced with a new one. Since there are no contaminants involved in the work no significant environmental damage is anticipated. Marine traffic on the river will most likely not be affected by the accident. The collapsed material may remain in the river

for few weeks while thorough investigation will be taking place. Depending on the circumstances of the accident the completion of the bridge will be delayed by at least one year.

viii. Establishing the required ice thickness and methods of construction of the ice road will be done by qualified professionals with proven experience in construction of ice roads. During the work, the ice condition and capacity of the access to the piers and of the working platforms will be rated on a daily basis. Contractor's personnel working on the ice road will be appropriately instructed.

In the unlikely case of accident first priority will be given in attending injured persons. The equipment involved in the accident will most likely suffer significant damage. There might be limited amount of fuel leaking in the river. In such case the rules of the Spill Contingency Plan will apply. Competent personnel and suitable equipment will be mobilized from Yellowknife the retrieve the equipment involved in the accident. The equipment may remain in the water for two to three days. No significant environmental damage is anticipated.

ix. Method of installation of the panels will be developed and certified by professional engineer with pertinent experience. Contractor selected for the work will have proven safety record for similar projects. Workers and operators will be properly instructed. Lifting devices, cables, spread-bars, etc will be properly rated. No equipment or personnel would be allowed under a section of the bridge where installation is taking place.

In the unlikely case of accident first priority will be given in attending injured persons. No major damage to the bridge structure is anticipated. Damage to the environment will most likely be negligible. The panel will be retrieved from the water by a crane mounted on a barge assisted by a diver. The panel might remain in the water for few days before retrieval.

x. See **item i.** above. Contractors and subcontractors must have first aid capability and clear procedures for first aid response to worker accidents.

C.7.2 Accidents and Malfunctions During Operation of the Bridge

Possible accidents would include but not necessarily be limited to the following:

i. Ship/barge collision with piers – Low probability
ii. Vehicle collision on bridge – high probability
iii. Loss of control of vehicle on bridge – high probability
iv. Collision with stay cable – Low probability
v. Fire from combustible material being transported – Low probability
vi. Ship/barge collision with superstructure – Low probability
vii. Major spill on bridge deck – Low probability

Possible malfunction would include but not necessarily be limited to the following:

viii. Deterioration of bearings – Low probability
ix. Defects in stay cables – Low probability
x. Defects in structural steel member(s) – Low probability
xi. Deterioration of expansion joints – Low probability

The following steps have been taken to reduce the probability and reduce or eliminate any inconvenience or disruption to traffic from possible accidents:

i. The main span opening provides a significant clearance for the largest vessels using the river. The piers have been designed to resists the impact from a 2500 ton barge plus tug traveling at a speed of 11 knots coming into direct contact with the piers. In the event of collision, there would be damage, possibly severe, to the vessel. This may include the spill of refined petroleum products.

ii. A vehicle collision on the bridge between two passenger cars would probably not result in any significant damage to the deck railing. Collision between two trucks may cause significant damage to the railing. It is proposed that a reasonable supply of replacements be stockpiled to the north of the bridge to permit timely repairs to be effected. A collision may result in a spill of refined petroleum products.

iii. Loss of vehicle control of a loaded truck may well result in the loss of guard rail section depending on the conditions under which this loss of control occurred. The guardrail is designed to limit damage to the superstructure while providing the restraint required by the relevant Codes governing this aspect. A single vehicle accident would be less likely to result in a spill.

iv. While this is highly improbable, the design of the bridge allows for the complete severance of stay cables. The loss of one (1) cable would not affect normal traffic, while the loss of two (2) cables of the same set would require a speed reduction. The complete loss of an entire set of cables would require both a speed reduction and flagging of traffic until repairs could be made. No environmental impact is anticipated.

v. A fire may result in a spill of products of combustion as well as refined petroleum products. The location of the fire, the type of material being transported, the time of year all are relevant in this scenario. It is anticipated that because of the bridge slope that any volatile fluid would be dispersed over a large area thus reducing the fuel mass necessary to cause damage from overheating. Local damaged areas that may be subject to heat concentration are not anticipated to be extensive and could be easily repaired.

vi. The only case where this could be of any significance is in the first or second approach spans, where the superstructure is low enough. Only the upper portion of the vessel would impact the lower chord of the truss. This portion of the vessel is not generally constructed to resist the impact of the vessel and therefore it is unlikely that significant damage would be caused to the truss. In any event, the damage would have to be assessed at the time and repairs, if required, effected as necessary.

vii. A major spill on the bridge deck is possible (refined petroleum products being the most likely). However, it is no more likely than on any other bridge in this drainage system and probably less likely than on the ice bridge or ferry ramps. Existing regulations for transportation of dangerous goods and spill contingency planning would apply.

In terms of possible malfunctions, which normally fall under the aegis of maintenance, the remedies are addressed below. Many of these fall under the same procedure as those described for Accidents. None should pose environmental concerns.

viii. Deterioration of bearings. The bearings are of two types: elastomeric pads and sliding pot-bearings. The elastomeric pads are virtually maintenance free. The details allow for quick replacement (should this ever be necessary) with the minimum degree of labour. The sliding pot bearings require occasional cleaning (every 2 to 5 years) to remove dirt and grit from the sliding surfaces. No other maintenance should be required. Similarly, details provide for quick changeover. The life expectancy of all bearings is 75 to 100 years.

ix. Defects in stay cables. Refer to item iv above.

x. As in any other structure, regular structural inspection is required as part of the due diligence. Space does not permit to examine every possible scenario and timely assessment would be required. The design of this structure has been purposely maintained as a robust structure to eliminate any such occurrence.

xi. Expansion joints require regular cleaning and maintenance. The greater attention paid to keeping these clean will result in longevity of the joint components. Normal repairs are limited to replacement of the rubber bladders.

In the very unlikely event that the bridge structure were damaged severely enough to cause a prolonged closure, the alternative would be to revert to an ice crossing and/or remobilize a ferry for the crossing. On a temporary emergency basis, a tug and barge arrangement could be used.