May 23, 2003

Mr. Bob Wooley,
Executive Director
Mackenzie Valley Land & Water Board
7th Floor – 4910, 50th Avenue
P.O. Box 2130
Yellowknife, NT X1A 2P6
Tel: 867 669-0506
e-mail: bwooley@mvlwb.com

Dear Mr. Wooley,

Yellowknife HWY #3, km 23. Proposed Deh Cho Bridge on Mackenzie River. Application for a New Water License

The purpose of this correspondence is to request the necessary authorization from your agency for the construction of a privately owned bridge at the crossing of Yellowknife HWY #3, NT and Mackenzie River. The Applicant for this work is the *Deh Cho Bridge Corporation* of Fort Providence, NT.

The Applicant has retained the Consultant *Jivko Engineering* of Yellowknife to submit applications to obtain required approvals before proceeding with the project. *Jivko Engineering* is also part of the design and construction management team for the project.

In addition to your office we have contacted the following government agencies:

DFO, Fish Habitat Management Office, Yellowknife, NT
DFO, Canadian Coast Guard, Navigable Protection Office, Sarnia, ON

The contact person from the Deh Cho Bridge Corporation is:

Mr. Andrew Gamble, P. Eng.
Andrew Gamble & Associates
14 Mitchell Drive
Yellowknife, NT X1A 2H5
Tel: 867 873-4629

The enclosed Application for a New Water Licence or Amendment of Existing Licence contains all information relevant to the Bridge Construction. If you have any questions or wish additional information, please contact the undersigned at Tel (867) 920-4455, Fax (867) 873-6090, or e-mail: jivko@theedge.ca.

Sincerely,

Jivko I. Jivkov, P.Eng.
Principal
Jivko Engineering

Enclosure

cc Mr. Andrew Gamble

Mackenzie Valley Land and Water Board
7th Floor - 4910 50th Avenue
P.O. Box 2130
YELLOWKNIFE NT X1A 2P6
Phone (867) 669-0506
FAX (867) 873-6610

APPLICATION FOR A NEW WATER LICENCE OR AMENDMENT OF EXISTING LICENCE.

	Application/License No: (amendment)

1. Name and Mailing Address of Applicant:	2. Name and Mailing Address of Consultant:
Andrew Gamble, P. Eng. **Project Manager, Deh Cho Bridge Corporation** **14 Mitchell Drive, Yellowknife, NT X1A 2H5** Telephone: **867 873-4629** Fax: **867 669-2028** Email **agamble@theedge.ca**	**Jivko I. Jivkov, P. Eng.** **Principal, Jivko Engineering** **5610, 50A Avenue, Yellowknife, NT X1A 1G3** Telephone: **867 920-4455** Fax: **867 873 6090** E mail **jivko@theedge.ca**

3. Location of Undertaking (describe and attach a map, indicating watercourses and location of any proposed waste deposits).

The proposed site is located at the crossing of the Yellowknife HWY #3, NT and the Mackenzie River. It is located on the existing highway right-of-way, at km 23 HWY #3, near Fort Providence, NT.

1:5,000,000 NT Geographic Map (*Attachment #1).*

1:50,000 Topographic Map 85F/5 *(Attachment #2).*

1:25,000 Hydrographical Chart #6453 *(Attachment #3).*

Latitude: **61° 15' 45" N** Longitude: **117° 31' 30" W**

4. Description of Undertaking (describe and attach plans)

.1 Introduction.

The Deh Cho Bridge Corporation Ltd. of Fort Providence, NT is proposing to the GNWT to construct a privately owned bridge across the Mackenzie River, at km23, Yellowknife HWY #3. The estimated cost of the bridge is $52M, which will be raised through Territorial and Federal Government and shareholders contributions and bank loans. After construction, the bridge will be operated under an agreement with GNWT for a period of 35 years. For the duration of the agreement the bridge will be operated and maintained by the Deh Cho Bridge Corporation. On expiration of the agreement the ownership of the bridge will be transferred to the GNWT.

The proposed bridge will replace the existing ferry and ice bridge crossings, and will make the Yellowknife HWY an all-weather facility guaranteeing an uninterrupted link between the capital of the NT and the rest of Canada.

The proposed initiative, including the selected bridge site and bridge parameters were approved by the DOT, GNWT engineering personnel, and is fully supported by the local residents and the Municipal Authorities of Fort Providence *(Attachment #9)*. A Memorandum of Intent (MOI), between the GNWT and the Deh Cho Bridge Corporation Ltd., for proceeding with the final design and preparation for construction was signed on November 15, 2002.

The proposed bridge site and bridge parameters have been agreed to by the Northern Transportation Company Limited (NTCL), which are the major operator on the Mackenzie River Water Way *(Attachment #10).*

.2 Selection of Bridge Site

It is proposed to construct the bridge at the existing ferry crossing. At this site the natural riverbed is approximately 1,560 m wide. For the purpose of the ferry operation, partial causeways were built on the north and on the south shore, over 30 years ago. The north causeway is projecting into the river for 430 m, and the south one for 165 m. Presently, the constricted river is 965 m wide at the ferry crossing. The proposed bridge is 1,045 m long and would allow an increase of the waterway to 995 m. *(Attachment #4).*

The proposed site has been recommended in a Study named Preliminary Hydraulic Design, Mackenzie River Bridge, Liard River Bridge, Great Bear River Bridge prepared for the PWC by NORTHWEST HYDRAULIC CONSULTANTS LTD (NHCL) of Edmonton, AB in 1975. The Study establishes that the waterway could be constricted to 3,000 feet (915 m) or less without serious hydraulic effects, and concludes that a design value of less than 3,000 feet would be acceptable from a river engineering viewpoint. The Study evaluates three potential sites for a bridge crossing between Fort Providence Rapids and the Beaver Lake *(Attachment#3),* and recommends the site at the existing ferry crossing for the following reasons:

- ✓ The bed of the river at the proposed site is believed to be highly stable and scour resistant with changes occurring only in geologic time scale.
- ✓ The direction of flow does not vary markedly from point to point across the section
- ✓ The structure is not located in a curve of the navigation channel and is perpendicular to the channel.
- ✓ The depth of the river at the proposed site is fairly uniform. The maximum depth is substantially less than the ones of the other locations.
- ✓ The bridge would use the existing highway approaches and would not interfere with lands along the shoreline that might be of interest to others.

The proposed site was confirmed by PWC and it was the basis for their Mackenzie River Bridge, Fort Providence, Yellowknife HWY #3, NT, Preliminary Design and Cost Estimate, dated December 1975.

.3 Regime Analysis, Geotechnical, Bed Scour

The banks of Mackenzie River in the vicinity of the proposed site are stable with no appreciable changes having occurred during a 50-year interval based on inspection of air photographs. A distinctive feature of the banks is numerous spur-like projections, some of which exceed 300 m in length. Although portions of them are submerged during high open water or ice jam high water, there is no sign of recent erosion.

The bed of the Mackenzie River in the vicinity of the proposed crossing is comprised of hard dry clay-till overlain by 0.8 m to 1.2 m layer of alluvium. At the ferry crossing divers have reported that the bed was clay scattered with large, partially embedded boulders.

Constructing eight piers, of comparatively negligible width, would further constrict the water way very little. The resulting minor increase in the velocity would probably produce no scour effect. However if we assume that scour occurs, the bed would adjust over a very long period, and the increase in depth would be less than 0.3 m.

.4 Ice Action

The bridge piers, abutments and the approaches projecting into the river would be designed for the calculated ice forces, and according to the applicable chapters of the Canadian Bridge Code CSA-S6-00.

.5 Components & Parameters

.1 The proposed bridge is 1,045 m long, consisting of nine continuous spans, steel girders-concrete deck composite construction. The superstructure is supported on eight piers constructed in the watercourse and two abutments constructed on the approach berms.

Under the centre (main) span there is a navigation track used by large tug-barges configurations. The main span is 190 m long with 22.56 m vertical clearance, at High Navigational Water Level. On each side of the main span there are three at 112.5 m intermediate spans and one at 90.0 m end span. In order to reduce the depth of the superstructure of the main span, and consequently to reduce the longitudinal grade on the bridge, the design contemplates a system of portal and suspenders installed on the piers on both sides of the main span. This system allows for 8.0 m vertical clearance, and 10.5 m horizontal clearance on the bridge deck. It is anticipated that such clearances will not present limitation for oversize loads travelling between Alberta and the NWT.

The roadway width on the bridge deck is 10.50 m, allowing for two at 3.75 m traffic lanes and two at 1.50 m shoulders. On each side of the deck there is 0.82 m high safety rail consisting of 0.25 m high concrete curbs and 0.57 m high steel rail. The maximum longitudinal grade on the bridge is 3.5%.

There will be vessel-arresting devices constructed in front of the piers potentially exposed to vessel collision.

.2 The Design Live Load for the bridge is CL-750 in accordance with the CSA-S6-00. This is a vehicle with GVW of 75,000 kg. A 40% dynamic allowance and another 60% safety factor are added to the design load. With this reserve, virtually any conceivable overload vehicle, presently and in the future, could travel safely on the bridge.

.3 The superstructure is a composite construction of two WWF-Special steel girders and a deck of pre-cast concrete panels. The deck panels will be pre-stressed transversely at the fabrication plant, and will be post-tensioned longitudinally after installation.

.4 The substructure consists of eight concrete caisson piers, and two concrete abutments supported on steel piles. *(Attachment #5, Attachment #6).*

- ✓ The foundation of each pier is composed of two pre-drilled circular concrete caissons with diameters of 3.0 m or 4.0 m depending on the pier location. The caissons will be braced at water level, and protected with metal casing to elevation of 1.0 m above the calculated ice action. The caissons will be installed to an approximate depth of 10 m below the riverbed. Allowance for the calculated bed scour is incorporated in the depth of the foundations.
- ✓ Each pier shaft consists of two circular, concrete columns constructed of pre-cast and post-tensioned concrete rings. At the top end of each pier there is a hammerhead concrete beam supporting the superstructure.

.5 Each vessel arresting device consists of concrete-caisson foundations and heavy concrete superstructure. It is designed as ramp that would allow the stray vessel climbing and stopping on it before getting in contact with the bridge pier. Friction and deformation of the colliding vessel would almost entirely absorb the energy of the impact.

.6 The proposed road approaches are 12.0 m wide. Both approaches are situated on top of the existing causeways of the north and south ferry landings. The north approach is projecting into the river for 350 m, and the south one for 230 m. In order to avoid potential flooding and ice shove accumulations, the approaches are set at elevation not less than 2.0 m above the calculated ice jam. This elevation is the same as the one of the highway-winter road intersection on the north side of the bridge, which historically has never been flooded.

The footprints on the riverbed of the bridge approaches exceed the ones of the existing causeways. The required extension and widening of the footprints will be achieved by placing clean blasted rock into the river. This rock will be placed to an elevation of 1.0 m above the Mean Navigational Water Level. The approach embankments above that elevation will be constructed of common backfill and will be dressed with 1 m thick layer of blasted rock rip rap.

The roadway on the approaches would be paved. There is a standard highway guardrail installed on each side of the roadway.

.7 It is proposed to excavate and remove the backfill material from two areas within the limits of the watercourse *(Attachment #4)*. These areas have been previously constructed in relation with the existing ferryboat operation. The excavation and removal of backfill material will be completed to depths between 2.0 m and 4.0 m below the water level, to match the adjacent natural riverbed. These areas could be described as follows:

- ✓ Area "E" (4,300 sq. m) is part of the existing north ferry landing projected 80 m into the watercourse beyond the proposed bridge approach. The material to be removed from this area consists of 9,000 cu m granular backfill for embankment, 500 cu m blasted rock for rip rap, 80 cu m concrete for landing pad, and 30,000 kg structural steel for sheet-pile wall.
- ✓ Area "D" (9,500 sq. m), is part of the existing ferry haul-out on the south shore. It is located downstream, adjacent to the bridge approach. The material to be removed from this area consists of 11,000 cu m granular backfill and 90 cu m structural timber.

Most of the removed steel, concrete, and timber, will be disposed of in nearby gravel pits, and will be covered with a layer of gravel. Some of the steel and timber might be salvaged. The excavated gravel will be tested for contaminants, and if found suitable may be used for road embankment widening. Alternatively it will be appropriately disposed of in a gravel pit. The armour rock will be salvaged and will be incorporated in the erosion protection of the bridge approaches.

.8 Accesses for public and commercial vehicles to both ferry landings and clear route for the ferryboat will be maintained, without interruption, for the duration of the bridge construction. Since sections of the existing access roads to the ferry landings and the bridge approaches overlap *(Attachment #7, Attachment #8*), it is proposed to construct detours as follows:

- ✓ South Approach: Construct approx. 250 m detour road and arrange for temporary south ferry landing 10 m downstream of the existing one. This involves minor road improvement works with no in-stream construction activities.
- ✓ North Approach: Construct approx. 450 m detour road 25 m downstream of the existing access. This involves placing approx. 6,000 cu m blasted rock into the watercourse, with corresponding 5800 sq m footprint on the riverbed. The road embankment above the

water level will be built of gravel. After completion of the bridge construction the gravel and the blasted rock will be thoroughly recovered from the river, and will be incorporated in the bridge approach widening, and armouring correspondingly.

.6 Construction Details and Schedule

.1 The construction methodology proposed for the bridge construction is based on sound engineering principals and advanced technology that have been tested, and proven to be successful in large number of similar projects in North America and all over the world. The proposed construction schedule is based on minimum disruption of the fish habitat, and was developed in consideration of the migration and spawning patterns of the different fish population inhabiting the river.

The following description of the construction activities is not presented in chronological order, but rather by type of activities comprised in the bridge construction. Those activities could be defined as follows:

- ✓ Earthworks, including placing rock, common backfill and excavation-removal of material from the river
- ✓ Foundations including installation of pier caissons, installation of vessel arresting devices, and pile driving for abutments
- ✓ Concrete for piers and abutments
- ✓ Steel fabrication and installation
- ✓ Bridge deck fabrication and installation

The proponent will be prepared to reasonably reschedule the in-stream construction activities, if this would minimise further the harm to fish habitat and population.

.2 Earthworks

Placing rock for sub-grade of the bridge approaches and detours is an in-stream activity. Clean blasted rock would be obtained from a quarry located some 200 km north of the bridge site. The rock will be trucked to site and, in order to avoid double handling, will be directly end-dumped into the river.

- ✓ An excavator deployed on the approach, above the water level, will shape the rock-fill to the design cross-section. No equipment will be deployed in the water during completion of this activity. Subject to DFO authorisation, it is proposed to complete this work between October and December 2003. At this time of the year the ground is frozen, and damage on the HWY pavement will be minimum.

- ✓ Placing common backfill for bridge approaches and detour embankments is not an in-stream activity. The common fill will be placed on top of the sub-grade described in the previous paragraph. Material for common fill will be obtained by expanding the existing gravel pits located in the vicinity of the bridge along the highway on both sides of the river. Equipment used for this work includes dump trucks, bulldozers, graders and compactors. The approach embankment will be constructed in two stages. First one, to the elevation of the abutment bearings, will be done in summer 2004 after completion of the concrete abutments. Second one, to the final roadway grade, in spring 2005 after installation of the bridge superstructure.

- ✓ Removal of detour and excavation-removal of backfill from the areas described in article 5.7 is an in-stream activity. Equipment used for this activity includes excavators, loaders and dump trucks. Concrete-cutting and demolishing equipment might be used for the removal of the concrete landing. None of the above-specified equipment will be deployed in the water for the purpose of this work. The work will be completed in September 2005 and October 2005, after opening of the bridge for traffic.

.3 Foundations

- ✓ Installation of pier caissons is an in-stream activity. The work will be completed between February 2004 and April 2004. Prior to commencement of the work, the natural ice cover of approximately 1.1 m will be increased to 1.5 m using a combination of flooding and spraying equipment. Specialised drill rigs equipped with augers will complete the excavation for caisson shafts. The rigs will be deployed on the ice and supported on spud piles. For the purpose of this work two or three drill rigs will be mobilised to work simultaneously on different piers and vessel arresting devices.

  The excavation will commence on "wet bottom". The metal casing will follow the auger. It is anticipated that approximately 2 m bellow the riverbed the casing will seal the hole and after pumping the water out, the excavation will continue in dry condition. The metal casing will be cut-off at elevation of 1.0 m above the ice action. The excavated material, ranging from 150 cu m to 250 cu m per pier, will be stockpiled for several hours on the ice, and after freezing will be trucked and disposed of in a nearby gravel pit. After removal of the excavated material the ice will be scraped clean.

  After reaching the design depth of each particular hole, a pre-assembled rebar cage will be placed in. The hole will be covered with hoarding supported on light scaffold frame, and concreting will commence. Concrete will be batched in a specialised concrete plant on shore and will be delivered directly in the holes with mixer trucks. After completion of the second hole of each pier, pre-fabricated formwork and rebar for diaphragms will be installed, and concreting of the diaphragm will take place.

  The volume of concrete required for each individual pier foundation is between 200 cu m and 400 cu m depending on diameter and depth. It is anticipated that each pier foundation could be completed within 6 to 12 days depending on the diameter and the design depth of the caissons. The vessel arresting devices will be constructed in a way similar to the pier foundations.

  During the caisson construction small amount of wood and metal debris may fall on the ice surface around the piers. Minimum amount of fresh concrete may contaminate the ice surface as well. No debris or concrete will be in contact with the water running bellow the ice. The ice around the piers will be scraped clean periodically and the debris disposed of in nearby gravel pits designated for that purpose.

- ✓ Installation of piles for abutments is not an in-stream activity. "H" piles and/or pipe piles will be driven using diesel hammer, crane and air-track deployed on top of the sub-grade of the bridge approaches. The work will be completed in May or June 2004 after completion of the pier foundations and depending on the break-up pattern of the year.

.4 Construction of pier shafts and bridge abutments

- ✓ The pier shafts will be constructed of pre-cast concrete segments fabricated in a specialised concrete plant. Each segment will be 3.0 m to 4.0 m in diameter, 2.5 m high, with 0.3 m wall thickness, and 20,000 kg of weight. The segments will be trucked to the bridge site, and loaded to a barge for delivery to each pier location.

  The on-site component of the construction of concrete piers is an in-stream activity. Erection of the segments will be done with a tower crane affixed to one of the pier caissons for each individual pier. After installation, the segments will be post-stressed and grouted. The work on site will be completed between late June and September 2004.

  The hammerhead beam on top of each pier will consist of pre-cast concrete shell in-filled with cast in place reinforced concrete. The shell will be pre-fabricated in sections, transported, erected, and post-tensioned in a fashion similar to the pier segments. The

volume of the cast in place concrete is approx. 150 cu m for each of the main span piers and approx. 60 cu m for each of the remaining piers. This concrete will be batched in a portable plant installed on barge and will be placed with the tower crane and bucket.

Experience has shown that the water contamination from this procedure is insignificant, and if any, it would be well within the permissible indicators. Monitoring and water sampling will be performed both upstream and downstream of the work area.

- ✓ The construction of the concrete abutments is not an in-stream activity. The abutments will be constructed on top of the sub-grade of the bridge approaches. The design envisages conventional formwork and cast in place reinforced concrete. The required amount of concrete is 600 cu m for each abutment. This concrete will be produced in a portable batch plant on shore, will be delivered with mixer trucks, and will be placed with crane equipped with bucket. The work will be completed in summer 2004, in parallel with the pier construction.

.5 Steel fabrication and installation

- ✓ Fabrication of steel for bridge superstructure will be carried out in a specialised plant, most likely in southern Canada. The bridge girders will be fabricated in sections and will be delivered by train and/or road to the bridge site. Each individual section will not exceed 40.0 m in length, 4.5 m in height, and/or 30.0 tonnes in weight. The fabrication and delivery will be completed between March 2004 and January 2005.

- ✓ Installation of the steel for the bridge superstructure is an in-stream activity. It will be completed in Two Phases. The Phase One consists of launching the three intermediate spans and the end-span from each side of the river. This Phase will take place from February to April 2005. The Phase Two consists of installation of the main, or centre-span of the bridge, and will take place in June and July 2005.

  Phase One:

  The girder sections of the end spans will be pre-assembles and braced together on levelled areas along the bridge approaches on both sides of the river. These areas will have dimensions greater than 300 m by 20 m, sufficient to accommodate the pre-assembled sections and all launching mechanisms. Launching will commence simultaneously on both sides of the river. In order to achieve better deflection control on the cantilevered part during launching, there will be temporary piers installed midway between all permanent piers, with the exception of the main span. Each of the temporary piers will consist of steel frame tower supported on “H” piles driven in the riverbed. Once the steel superstructure has been secured, the temporary piers will be removed. Launching of the four end-spans on each side of the river will be completed within ten weeks.

  Phase Two:

  The girders of the main span will be fully pre-assembled on a barge in the NTCL docks in Hay River, and will be towed to the bridge site. The approximate weight of the pre-assembled span is 900 tonnes. The tower cranes on the main piers, having remained in place, will be used to install the outrigger arms, which in turn will be used to erect the main span. The work will be completed within two weeks, in June 2005, immediately after termination of the ice traffic on the river.

.6 Bridge Deck

- ✓ The bridge deck will be constructed of pre-cast and transversely pre-stressed concrete panels fabricated in a specialised concrete plant. Each panel will be 11.5 m long, 2.5 m wide, with 0.3 m thickness, and 30,000 kg of weight. All of the panels will be trucked

and stored on the bridge site prior to installation. Fabrication and delivery will be completed between June 2004 and June 2005.

- ✓ Installation of the deck panels will proceed from each side using the previously placed panels as a platform. These slabs would in turn be post-tensioned and anchored to the steel girders to provide composite action for permanent traffic. Handrails, curbs and bridge lights would follow in due course to present a finished structure. Installation of the bridge deck will commence in June 2005 and will be substantially completed in late August 2005.

5. Type of Undertaking.

1.	Industrial		5.	Agriculture	
2.	Mining and Milling		6.	Conservation	
3.	Municipal		7.	Recreation	
4.	Power		8.	Miscellaneous	**Bridge**

6. Water Use

To obtain water		Flood control	
To cross a watercourse	**X**	To divert water	
To modify the bed or bank of a watercourse	**X**	To alter the flow of, or store water	

Other (describe):

7. Quantity of water involved (litres per second, litres per day or cubic meter per year, including both quantity to be used and quality to be returned to source.

N/A

8. Waste deposited (quantity, quality, treatment and disposal)

N/A

9. Other persons or properties affected by this Undertaking (give name, mailing address and location. Attach a list if necessary.

Please see the attached:

Section 9: <u>Deh Cho bridge Consultation Summary</u>

10. Predicted environmental impacts of Undertaking and proposed mitigation.

The potential environmental impacts and the appropriate mitigation measures are summarised below:

10.1 Storage of Materials:

Backfill material, steel, concrete, and timber for the bridge construction, also fuel and miscellaneous tools would be stored near the construction site.

Mitigation:
All materials would be stored safely, on designated areas well beyond the high water mark. There would be no presence of material contaminating the water body near the shore.

10.2 Permanently Disturbing the Riverbed:

The piers and part of the backfill on the approaches would be placed directly on the riverbed, thus permanently reducing the feeding opportunities for fish in the area. The loss of fish habitat is corresponding to the sum of the footprints on the riverbed of the following areas as depicted on *Attachment #4:*

Area **A**:	Backfill & rip-rap on the south approach	5,600 sq m
Area **B**:	Backfill & rip-rap on the north approach	1,600 sq m
Area **C**:	Pier footprints for all eight piers	200 sq m
	Total area of habitat loss	**7,400 sq m**

Mitigation:

The proposed compensation includes removing from the riverbed backfill material, structural steel, and timber previously imported into the river as part of the ferry infrastructure. The gain of fish habitat includes the removal of material and restoration of the following areas:

Area **D**:	Barge landing area on the north approach (this includes the associated steel sheet-piling and concrete pad)	4,300 sq m
Area **E**:	Barge landing area and ferry haul-out on the south approach (this includes the associated concrete pad and timber for haul-out)	9,500 sq m
	Total area of habitat gain	**13,800 sq m**

10.3 Temporary Disturbing the Riverbed:

Temporary disruption of the riverbed will occur:

- ✓ During installation of the pier foundations clay/till material would be excavated from the riverbed.
- ✓ During construction the in-stream part of the bridge approaches backfill material would be placed on the riverbed.
- ✓ For the construction of the detour road on the north approach backfill material will be placed on the riverbed.

Mitigation:

- ✓ Pier Foundations: This work will be completed in winter. The auger excavating the ground will be confined in a metal casing, thus preventing pollution of the river below the ice. The excavated material will be stockpiled on the ice, and after freezing will be loaded on trucks and disposed of in a designated area. Prior to installation and during work on the ice the drill rig and all other heavy equipment would be thoroughly and continuously inspected and repaired to ensure no leakage of any harmful liquid occurs.
- ✓ Bridge Approaches: The submerged part of the approaches will be constructed of clean blasted rock with zero, or very little fines content. The rock would be placed directly on the

bottom during construction window conforming to the fish habitat requirements. All vehicles and equipment involved in placing the rock will be inspected for leaks and repaired if necessary prior to beginning of the construction activities.

- ✓ Detour Road: The submerged part of the detour road will be constructed of clean blasted rock with zero, or very little fines content. After completion of the bridge construction all material would be thoroughly removed from the riverbed.

10.4 Fuel Spills: Spills Contingency Plan

.1 GENERAL

Types of Contaminants: Diesel fuel, gasoline and vehicle lubricants will be used on the work site and in the equipment.

Storage if Contaminants: No fuel will be kept at the work site within the limits of the High Water Level. All vehicles and equipment will be refuelled at a safe distance from the river.

Use of Fuel Truck/Route Fuel will be transported to the site from local distributors with specialised fuel truck.

Spills Containment and Clean Up Training The on-site construction management team will review and familiarise themselves with the 1997 NWT Spill Containment and Clean Up Course.

.2 POTENTIAL SPILL INCIDENTS

.1 Transfer of the fuel from the fuel truck to the machinery

Incident:

Refuelling hose could break, spring a leak, fall out of the gas receptacle, or the tank could be overfilled, thereby spilling fuel on the refuelling area.

Consequences:

i) Limited area; puddles of fuel.
ii) Hose breaks off at tank, leaking significant amount of fuel over large area; the slick flows steady from tank.

Preventive Measures:

i) All refuelling of vehicles should occur in an area well back of the high water mark. Refuelling of drill-rigs on ice should be done by thoroughly inspected fuel trucks operated by specially instructed crew. Crew should be aware of emergency shut-offs.
ii) Site should be stocked with a complement of spills management material.

.2 Equipment Storage and Operation

Incident:

i) Vehicle, drill rig, or construction equipment could leak fuel while in operation or during overnight.
ii) Vehicle, drill rig, or construction equipment could experience mechanical problems, discharging fluids.

Consequences:

At best small puddles of fuel, or drops of lubricants, antifreeze, etc., at worst, the entire content of the vehicle fuel tank or fluid container could be discharged.

Preventive Measures:

i) Vehicles and equipment working within the high water mark will be thoroughly inspected for leaks on a daily basis and the operators properly instructed.
ii) Vehicles and mobile equipment will be stored in an area well back of the high water mark.
iii) Site should be stocked with a complement of spills management material such as Sphagdry Spill Kit.

.3 Fuel truck accident en-route to site

Incident:

Fuel truck has accident while servicing site.

Consequences:

Worst case scenario: The truck overturns and/or the tank is ruptured potentially discharging content over large area. On-site bridge management and contractor could be unaware of the accident.

Preventive Measures:

i) Coordination and communication between fuel supplier, bridge management and the Contractor including routes and timing of delivery.
ii) Ensure that the fuel supply company has in place a Spill Contingency Plan.
iii) Ensure that the fuel truck is stocked with spill containment equipment.
iv) The on-site management and the construction crew should be prepared to mobilize to contain the spill.

.3 LIST OF ON-SITE SPILLS CONTAINMENT AND MANAGEMENT EQUIPMENT

Heavy Equipment	To remove the soiled material, construct containment ditches, etc, a bulldozer D7 CAT and/or a wheeled loader 930 CAT will be available on site for the duration of the work.
Hand Tools	Specially assigned shovel, axe, hammer, and set of wrenches will be readily available for the full duration of the work.
Spill Kit	45 gallon drums of sphagnum absorbents, gloves, disposal containers, will be stored on site for immediate removal of contaminated materials.
Containment Structures	Land/ Ice based containment structures will be constructed to contain spilled hazardous materials. Containment berms should be constructed to create an area of sufficient size to hold 10% more than the maximum capacity of the leaking container within the bermed area. The bermed area should be lined with material impervious to leakage.

.4 SPILLS REPORTING PROCEDURE - Contact Phone Numbers

NWT Spills Hotline	**867 920-8130**
Deh Cho Bridge Corporation, Albert Lafferty	**867 699-3441**
Jivko Engineering, Jivko Jivkov	**867 920-4455**
Hamlet of Fort Providence	**867 699-3441**
Contractors	**to be determined**
Mackenzie Valley Land and Water Board	**867 669-0506**
DFO - Area Habitat Biologist, David Tyson	**867 669-4919**

DFO – Fisheries Officer	**867 669-4923**
Environment Canada, Stephen Harbicht	**867 669 4700**
Department of RWED Ken Davidge	**867 695-2231**

.5 SPILL RESPONSE PROCEDURE

The following procedure is to be followed in the event of spill. Steps are listed in the order of importance; however depending on the circumstances, conditions, and potential injuries, this order may need to be altered to meet specific needs.

.1 Identify the product spilled:

If the identity is unknown, and if identification means further risks, then action must be based on the assumption that the product is extremely dangerous. The crew is not to smell, taste, touch, or attempt to reach ruptured containers if they are surrounded by the contaminant.

.2 Assessment of dangers and hazards:

Immediately must be determined the direction of the spill's progress, whether it is confined in a pocket on land, running downhill towards the water, or already in the water. Careful attention will be paid to the full nature of the incident: Is this solely a surface contamination? Are fumes an additional factor? Are there any injuries current or possible?

.3 Stop the flow at source

Has the flow been stopped, or is it still leaking? Is there an emergency shut-off valve? Have ruptures or holes in the container been patched? Is the container empty? PRECAUTION: ATTEMPT TO STOP THE FLOW ONLY IF IT IS SAFE TO DO SO!

.4 Take actions to contain the spill

Prompt containment could reduce environmental exposure and risk. Depending on the case, containment measures could be land and/or water based. Land based measures include application of absorbents, construction of berms and diversion/collection trenches. Water based measures could include dams, dykes, floating booms or curtains, etc.

.5 Report Action to the NWT Spills Hotline

When calling the NWT spills hotline the person reporting the spill shall give as much of the following information as possible:

- ✓ Date and time of spill
- ✓ Precise location of the spill
- ✓ Type of containment spilled
- ✓ Cause of spill
- ✓ Description of the container and the rupture
- ✓ Approximate quantity spilled
- ✓ Direction the spill is moving towards, or it has already stopped.
- ✓ Actions taken to recover, clean-up and dispose of the spilled containment
- ✓ Name and phone number of the persons close to the location of the spill
- ✓ Name, address and phone number of the person reporting the spill
- ✓ Name and phone number of the person in charge of management or control at time of spill.

NOTE: It is important to note that the Spills Hotline Operator is NOT A SPILL CONTAINMENT EXPERT, The role of the operator is solely to record the information and to relay it to the appropriate channels.

.6 REPORTING PROCEDURE CHAIN OF EVENTS

.1 Worker notices spill

a.) Is the source of the spill still flowing?
b.) Could the source be turned safely off? - If yes, do so.

.2 Worker notifies the on-site Construction Manager, and/or his Construction Foreman

a.) The Manager or Foreman will either decide to take immediate action to stop the source of the flow, or contain the flow.
b.) The Manager or the Foreman call the NWT Spills Hotline to file a report

.3 Notifying the other agencies

a.) The Manager or the Foreman notifies:

Deh Cho Bridge Corporation
Jivko Engineering
Hamlet of Fort Providence
Contractors
DFO

c.) The NWT Spills Hotline notifies

Environment Canada
Mackenzie Valley Land and Water Board
DIAND
RWED

.3 The appropriate personnel arrive on site to clean-up/contain the spill

11. Contractors and sub-contractors (names, addresses and functions). Attach a list if necessary.

To be determined

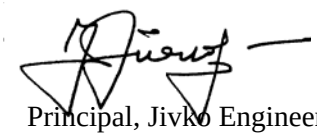
12. Studies undertaken to date. Attach a list if necessary.

Fish Habitat Assessment Study is presently being commissioned.

13. Proposed time schedule.

Start date: **November 01, 2003** Completion date: **September 30, 2005**

Name (print): **Jivko I. Jivkov P. Eng.**

Signature: 

Title (print): Principal, Jivko Engineering

Date: April 30, 2003

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Please make all cheques payable to "Receiver General of Canada"

Application Fee Amount: $_____ Receipt No: _____

Water Use Deposit Amount: $_____ Receipt No: _____