CEAA SCREENING FORM
Department of Indian Affairs and Northern Development (DIAND)

1. Public Registry Required Information

Applicant: Shell Canada Energy
P.O. Box 100, Station M
Calgary Alberta, T2P 2H5
Randall Warren
Phone: (403) 691-2521

CEAR Number : 10-01-59498

Subject Descriptors: Land Use

Alias Project Title: Unipkat I – 22 Sump Remediation program

Lead RA and Screening Division: DIAND, Operations

RA Contact: DIAND North Mackenzie District, Tel: 867-777- 8900
NWTWB, Tel: 867-678- 8609
DFO – 867-777-7515

Lead RA Trigger Types: CEAA Law List Regulations

Other Screening Trigger Types: Inuvialuit Final Agreement

EA Start Date: Dec 03, 2010 (CEAA s.5 notification and scope)

EA Type: Screening

Physical Activity as identified from Inclusion List: Land use

Physical Work Being Assessed: Land Use and Oil and Gas Activity (Reclamation)

Phase of Project / Primary Undertaking: Remediation

Multiple Activities: _ _ Yes _X_ No Indicate One: Remediation

Project Category Code: **Point** Linear Areal (Underline one**)**

Geographic Place Name: Arvoknar Channel, Richards Island

EA Determination: 20-1-a

EA Determination Date: February 20th, 2011

Estimated monitoring termination date: 2011 - DIAND Land Use Inspector

EA Terminated: No

2. General File Information

DIAND Land Use Permit Number: N2010X0022
DFO **11-**HCAA-CA6-00008

Type of Applications: New land use permit/Water License/HADD

Present licence/permit/lease number: Nil

Proposed Date of Activity: January - April 2011

Other RAs or Screening Divisions: Provided in Appendix D, CEAA EA Coordination

Other RA Types of Approval: Provided in Appendix D, CEAA EA Coordination

Project File Locations: DIAND North Mackenzie District (Inuvik)

DIAND District: North Mackenzie, Inuvik

3. Proponent

Randall Warren
Shell Canada Energy
P.O. Box 100, Station M
Calgary, Alberta, T2P 2H5
Phone: (403) 691-2521
Fax: (403) 691-7948

Type of Proponent: Industry

4. Project Location

Appendix F

Topographic Map Sheet Number: 107C

Latitude / Longitude: Latitude 69 11’ 37.4” Longitude 135 20’ 27.4”

Watershed: Arvoknar Channel / Mackenzie Delta

Street Name: N/A

Surrounding Land Status: Crown Lands in the Inuvialuit Settlement Region

Special Designation: The Project occurs on lands designated under the Community Conservation Plans of Inuvik, Tuktoyaktuk and Aklavik.

5. Project Description

The Proposed Project

Shell has conducted Phase II ESA activities at this site on two occasions (2007 and 2010) to locate the drilling sump, delineate constituents and their concentrations at specific drill locations. The site is being eroded by a rate of approximately 1 meter per year. Based on Shell's risk based remedial action plan, this site is classified as medium priority due to the potential of the channel eroding the drilling sump. Metal debris visible along the bank will also be removed as part of this project.

The primary goal of the planned remedial program is to remove the historical main drilling sump and any residual petroleum hydrocarbon (PHC) affected soils around the sump. The sump and surrounding area is at risk of erosion over the next 30 years and the proposed program would reduce or eliminate that risk.

Previous Work

In August 2004, surface water samples, shallow soil samples, and active zone measurements were collected at the Unipkat I-22 site. An electromagnetic survey of the site using an EM31 and EM38 was conducted. Site photographs were taken from the ground and the air.

In September 2007, 82 boreholes were advanced, ten groundwater monitoring wells were installed and three thermistors were installed. In addition, two benchmarks were installed to help monitor the erosion of the channel. Hydrocarbons were detected near and around the sump, and towards the northeast. The results of the work did not fully delineate the extent of the affected soil towards the north part of the site.

In August 2010, an additional 18 boreholes were drilled and soil was tested to further delineate the site conditions. Based on the data collected to date, it was determined that approximately 5000 m3 of soil onsite may be above CCME industrial guidelines for PHC. It was also determined that the shoreline eroded at a rate of approximately 1 meter per year. The majority of the soil above regulatory guideline is contained in and around the historic sump areas.

In October 2010, a lined containment cell was built in Inuvik, with an arctic geomembrane liner and is approximately 36 m by 120 m in total. The containment area of the cell is surrounded by hard packed till soil and is capable of containing approximately 5600 m3 of soil. Material removed from the Unipkat I-22 site will be segregated into 2 windrows for short term de-watering and soil treatment.

Sump Remediation Program: Project Scope

The Unipkat I-22 sump remediation program is designed to remediate the drilling sump in a timely manner eliminate the erosion risk posed by the channel. Soils affected by PHC, potassium chloride, and total barium are the primary concern. The site activities are planned to be initiated in January 2011 and be completed by March 31 on-site. The sump remediation will involve the following activities:

- building approximately 50 km of ice road from BAR-C to access the site
- mobilizing heavy machinery, fuel, and sleigh camp as listed in Table 5-1
- site and project boundary layout
- clean soil stripping and stockpiling
- soil excavation
- trucking sump material and PHC affected soil to Inuvik
- soil containment in Inuvik
- excavation soil testing
- re-contouring of excavation within local topography
- demobilization from site of all infrastructure and generated waste
- allowing sump material to de-water in Inuvik and disposal (at southern landfill) of the drilling waste
- soil treatment by allu-bucket and allowing for periodic testing for compliance

- Removal of sand from nearby sand bar as per Fisheries act Authorization (see Appendix J for application)

Access Routes:

Ice Road Construction
Ice road construction will be used to gain access to the site as no permanent roads currently exist in the area. An ice road will be constructed from the Department of Transportation (DOT) ice road at BAR-C to Unipkat I-22 in accordance with local practices. In the building of the ice road, it is our intention to use less than 100 m3 of water per day. Approximately 50 km of ice road needs to be constructed and it is anticipated to take approximately two to three weeks construction time. This phase of the project is scheduled to start in mid-January 2011.

Site Mobilization

The site will be accessed via DOT road from Inuvik and the newly constructed ice road extension from BAR-C. All infrastructure and movement will be along this roadway. Each vehicle will have drip trays and be equipped with sufficient emergency supplies and equipment in the event of a mechanical breakdown. The site infrastructure will include a portable camp (offices, dinning location and shower/toilet facilities) with sleeping quarters, fuel storage, a spill containment sea can, and emergency supplies. The site will be equipped with satellite communication and an emergency response plan has been developed.

The program will require some heavy equipment at the site for the duration of the project as listed in Table 5-1 and includes an excavator, a bull-dozer, and an Iron Wolf attachment.

Site and Project Boundary Layout

Prior to conducting site activities, the locations of former infrastructure at the site such as well centre, lease boundaries and expected work zones will be identified and physically marked. These locations will be derived from the collection of site data that has been gathered during the completion of the various environmental assessments. All locations will be located using a survey grade global positioning system (GPS). Areas for the temporary storage of the clean surficial soils will be marked and segregated from the soils to be removed. Site boundaries will be marked with survey lath. Site excavation limits will be marked out based on the GPS coordinates of the previous borehole and monitoring wells locations, and the interpreted limits based on previous analytical results.
Vehicles may be parked and unloaded on the ice road adjacent to the site.

Clean Soil Stripping and Stockpiling

Once excavation limits have been defined and the stockpile location has been identified, the initial stage of the project will be to excavate approximately 0.5 to 1.0 meters of surficial soils. This soil has been classified to be below applicable guidelines for the constituents of concern at the site. These soils will be used in the backfill of the excavation at the site. In order to maintain these soils as suitable backfill, they will be segregated on-site. The surficial soils will be stripped with the heavy equipment on site. The IEG representative will observe the depth and location of the excavation to avoid mixing of soils. Current plans to excavate the frozen soils are to use an IronWolf™ attachment on a D-8 bulldozer (Photo 5-1).

The IronWolf™ attachment allows for grinding of frozen soil. The attachment is designed to mount to wheeled or tracked heavy equipment. The cutter assembly is a ten foot wide cutter drum and an auxiliary engine package. The cutter drum has a cutting depth up to 40 centimeters. The whole package adds approximately 15,000 kg to the heavy equipment depending on the type of assembly used. This assembly has a separate diesel fuel reservoir with a capacity of 625 L. The attachment will remain on site until the proposed project is completed.

Photo 5-1: Proposed IronWolf™ Excavation Method

Soil Excavation

The majority of the proposed project work involves the excavation of approximately 1600 m3 of soil to remove the original drilling sump and 1400 m3 of hydrocarbon affected soils surrounding the historical sump. These tasks will be time consuming as the ground will be frozen and difficult to excavate. It is anticipated that the majority of the excavation of soils with constituents of concern at the site will be with the IronWolf attachment. This attachment will grind soil into small chunks which will allow for easy management of soil cuttings with an excavator and loader. However, it is also anticipated that a limited amount of soil excavation will occur with an excavator as the total depth of proposed excavation may be 5 meters below ground surface (bgs).

Wherever practical, the site benchmarks, groundwater monitoring wells and thermistors will be maintained during the excavation of the site, to better evaluate the long term success of the remedial strategy.

The flare pit and camp sump have already been partially eroded by the river and previous debris collection has been undertaken. Debris in both of these areas appears to be limited to small metal debris and no mention of flaring at the site was found in the available drilling records. The material remaining in these areas would be removed from the bank of the river to avoid future movement of debris. This portion of the work is dependent on acquiring a water license authorizing the riverbank disturbance. Where the river ice is ground-fast adjacent to the camp sump and flare pit, debris on the river bottom would also be removed.

Trucking to Inuvik

The sump material will be excavated first as that soil contains the highest concentrations of constituents of concern at the site. The sump material will be trucked to the containment cell in Inuvik and placed in the lined cell where it will dewater in the spring before being shipped for disposal at a landfill in British Columbia.

The surrounding PHC affected soils will then be transported from the site to the treatment cell for dewatering and subsequent treatment for the removal of PHC over approximately two or more summer seasons, depending on the results of periodic analytical testing.

Once the treated soil meets applicable CCME guidelines it will be available for use as backfill material at sites in Inuvik. It is anticipated that trucking on the ice road will proceed throughout the project duration as this is a major component of the project. It is anticipated that the round trip time per truck will be approximately five hours, and that

approximately 12 trucks will be used. It is anticipated that the soil in transit will be frozen and therefore no liners will be required.

Soil Containment in Inuvik

The excavated soils will be temporarily stored on a constructed lined oversized containment cell. The cell is 36 m wide by approximately 120 m long and can contain approximately 5600 m3 of soil. The volume of the containment cell does include an allowance for a soil bulking factor and a 10% contingency factor for the amount of soil to be removed from site.

The cell is an arctic geo-membrane liner with berms surrounding the open area of containment. The berms are approximately 1 meter high and are constructed with compacted clay. The liner is anchored outside of the berms with the placement of sand. Sand was also placed inside of the containment cell to ensure that the liner is not damaged during placement or treatment of the affected soils. The containment of the sump soils will be temporary to allow for dewatering in early spring. The containment cell will allow for the capture and treatment of water from within the soils. The sump soils will be placed on the down gradient area of the containment cell, while the hydrocarbon affected soils will be placed on the upgradient area of the cell.

It is anticipated that some of the moisture will be removed through evaporation and the remaining pooled water will undergo testing and possible further treatment before being disposed of at the Inuvik municipal waste water facility. The soil drainage will be by gravity and not mechanically assisted. In the event that the amount of water from the soil needs to be removed from the containment cell, it will be pumped into an 80,000 L holding tank to allow for testing and possible treatment with granular activated carbon to satisfy discharge requirements.

The cell will be maintained to allow for the hydrocarbon affected soils to be treated and contained for a period that is anticipated to take up to two summer seasons.

Excavation Soil Testing

The sidewalls and base of the excavation will be tested for the constituents of concern at the site using confirmatory soil samples. Discrete soil grab samples will be collected from the walls and base of the excavation. Samples will be collected in accordance with standard sampling protocols and will be stored under chain of custody procedures. Samples will be placed into plastic bags for organic vapour analysis testing and into laboratory provided glass containers equipped with Teflon-lined lids for subsequent laboratory analysis. When soils are frozen they are placed in air tight bags to be thawed prior to placement in glass jars. Care will be used to avoid extreme temperatures while thawing samples. A photo ionization detector (PID) will be used to assess the concentration of volatile hydrocarbons in the headspace of each bag sample taken. The soil will be allowed to thaw and have the gases equilibrate with the air inside the sampling container prior to being tested for organic vapours.

Soil samples will be stored in a temperature controlled storage container prior to being shipped for analysis. The results of the confirmatory laboratory testing will govern the limits of the excavation at the site. Sample results will be critical in the assessment of excavation progress and as such the samples will be sent as needed on daily flights out of Inuvik to the selected accredited laboratory.

IEG anticipates that one soil sample will be submitted for laboratory analysis for every 10 m2 of exposed sidewall and base. It is anticipated that approximately 50 soil samples will removed from the site to be analyzed for constituents of concern. Depending upon analytical results from the excavation, it is possible that reduced volumes of soil would need to be excavated as the volumes presented in this document are estimates generated from the past assessment activities.

Quality Assurance/Quality Control

Approximately 10% of the samples will be collected in duplicate. These samples will be submitted to the laboratory under blind sample designations and analyzed in order to evaluate analytical precision and sampling procedures. The data will be evaluated using Zeiner's (1994) relative percent difference method.

Field sampling Quality Assurance/Quality Control (QA/QC) measures will include implementation of IEG's site investigation manual for guidelines and protocols regarding, field instrument calibration, soil description and classification, soil sampling techniques, and personal protection equipment. To prevent cross-contamination, nitrile gloves will be worn when handling soil and changed on a regular basis.

Standard sample collection practices will be used for the sampling program to ensure the integrity of the samples taken from the site.

Site Backfill

The intention is to backfill the remedial excavation using fill material from an on-site stockpile that remains from the original sump construction. Because there is insufficient fill material on-site, additional fill will be sourced from an exposed frozen sand bar on the far side of Arvoknar Channel. The backfilled excavation will be mounded to help maintain permafrost conditions and to promote drainage away from the remediated area. The mounding will be sufficient to allow for some settlement of the fill as the surface thaws in the summer. The main rational for backfilling completely with locally sourced material is based on the following:

- By completely backfilling the excavation, permafrost conditions will likely help reduce the mobility of any remaining chemicals of concern left at the site.

- Using similar material to surrounding soils and maintaining a permafrost regime similar to surrounding material will help mitigate differential rates of erosion as the river channel continues to erode the site. Placement of coarser backfill material than natural surrounding soils may otherwise affect erosion rates.

In using the sandbar as a source of fill material, the Ironwolf™ attachment will be used to grind off the upper surface of an exposed frozen sand bar or bar across the channel. The sand bars are typically exposed during low winter water levels in the channel.

Effects on river morphology due to this alternative are likely minimal due to the high sediment loads during spring and summer river flows.

Because only the top surface of the bar or bars would be removed, a relatively flat surface would remain and fish entrapment would not be a risk. The benefit of this alternative is that the source of backfill is plentiful, located close to the site and is composed of the same, fine grained material that is found on the site. The erosion rates of the placed material would be similar to the surrounding river bank and the channel's migration is unlikely to be affected. The material would originate in the river and because the site will eventually be eroded by the channel, the material would be returned to the river.

Demobilization From Site

All equipment and infrastructure will be removed from the site at the end of the proposed project. They will be removed along the ice road.

Soil Treatment

The segregated soils within the containment cell will have different soil treatment regimes. No treatment will be performed on the sump material at the containment cell. The PHC affected soils will be gravity dewatered and then treated with an allu-bucket in order to reduce the amounts of PHC concentrations within the soils.

Soil Disposal

The sump material will be trucked to a solid waste landfill in the south (i.e. CCS landfill in BC) once appropriately dewatered. The treated PHC affected soils may be used for daily landfill cover once applicable guidelines have been reached and confirmatory analytical sampling has been performed.

Post Remediation Monitoring

The Unipkat I-22 site will continue to be monitored for groundwater conditions, soil temperature, and shoreline erosion. Monitoring as per the Fisheries Act Authorizations will also be conducted.

Access

If the crew can not be accommodated in on-site facilities, the crew will access the site daily from Inuvik in a passenger vehicle by ice road. The passenger vehicle will remain on site during the field activities. The heavy equipment will be mobilized and demobilized between Inuvik and the site using a tractor trailer. The site will be resupplied using the backhaul legs of crew movements or material hauling.

Accommodation

The field crew will be based onsite or located in Inuvik. If staying in Inuvik the crew and supplies will be transported to the site daily. The anticipated field camp will accommodate between 12 and 25 people. The camp would consist of a sleigh camp structure which include; kitchen facilities/dining cabin, office space, and living quarters. A shower/washroom will also be included as part of the camp facilities.

Fuel Storage

Fuel will be stored at the site. Fuel will be contained in a 13000 L double walled fuel sloop, on skis. Fuel will be used for the heavy equipment onsite, and the camp facilities. Drip trays will be used during refuelling of the heavy equipment and will be contained within one area of the site located away from Arvoknar Channel. The transport trucks will not refuel on site unless in an emergency situation. Drip trays will be placed below the heavy equipment when it is not in use for a period of time greater than 30 minutes. A sea can containing spill response equipment and supplies will be located at the site during field activities. Each vehicle will also have a spill kit, and drip tray. All fuel spills will be recorded and the location noted with GPS. Any resulting affected snow would be shovelled and placed in drums for transport to Inuvik for disposal.

Drinking Water Requirements

Bottled (18.9 L) drinking water from Inuvik will be transported to the site for human consumption.

No water will be required for the excavation and/or performance of the proposed project, not intended for ice road construction. Minor amounts of distilled water will be brought to site and used to decontaminate sampling equipment. Water for domestic use will be transported by water truck from Inuvik and stored in an onsite tank.

Waste Management and Wastewater Treatment and Disposal

All solid waste (garbage) will be collected and removed from the site and transported to Inuvik for disposal at an approved landfill site at the end of the project. All grey water and wastewater from the project will be contained in a sealed tank. At the end, or as needed, the wastewater will be disposed at the wastewater processing facility in Inuvik. The anticipated tank will be a 90,000 L insulated, horizontal, steel tank on skids or a sleigh. The wastewater will be transported by sewage truck.

Equipment
Table 5-1 lists the equipment required to conduct the remediation program.

Equipment	Number Required
Kitchen and Dinning	1
Washroom and Showers	1
Camp Accommodation (up to 25 person)	1
Bulldozer	1
Excavator	1
Front end Loader	1
IronWolf Attachment	1
Diesel Fuel	13,000 L
Spill Kit	1
Miscellaneous Environmental Field Equipment	1
Tandem Trucks	12
Fuel Storage double walled 13,000 L tank	1
Diesel Generator	2
Wastewater Tank 90000L	1
205 L Sealable Fuel Drum	3

The Ironwolf™ attachment is specialized equipment and has been used in the region by Shell on other similar projects.

Personnel

Table 5-2 lists the personnel required on site.

Project Personnel	Number Required
Environmental Technician	1-2
Heavy Equipment Operators	4
Mechanics	2
Site/Project Supervisor	1-2
Safety Officer	1
Wildlife Monitor	1
Truck Drivers	12
Camp cook and attendant	2
EMT	1

DEVELOPMENT TIMETABLE

Table 6-1 provides the proposed development schedule.

Project Activity	Estimated Time Frame[1]
Applications and Permitting	November – January 2011
Logistics and Contracting	January 2011
Mobilization	February 2011
Field Work	February – March 2011
Demobilization	March 2011
Reporting	April – June 2011
Annual Site Monitoring	August 2011 - 2018

*Note: Time frame is approximate and subject to change depending upon variables such as weather and permit acquisition.

If government approvals are not received in time to meet the winter work schedule, the project will be rescheduled for the winter 2012. The impetus for this project is the channel erosion at the site and the need to remove constituents of concern prior to them entering the local environment. Although the sump is unlikely to be eroded in the next few years, Shell has received community support to move forward on the current schedule.

Accidents and Malfunctions:

Y Ground disturbance from human traffic on sensitive terrains.
Y Fuel spills and drill additive spills could result in ground contamination (from mechanical failure or operator error)
Y Wildlife encounters, such as an attack on humans (surprise encounter) or personnel shooting and injured wildlife (responding to perceived threat or actual attack) could occur.
Y Wildlife disturbance, such as disturbance of a bear den or caribou/Musk Ox migrating through the program.
Y Severe weather

Information Sources Used:

__ Other government data
X_ Historical maps
__ Scientific reports
_X_ Project Description for the EISC
X_ CEAA public registry system information
__ Contour maps
__ Oil and gas water licence questionnaire
_X Other: application & additional company information

6.a) Description of Environment

Climate

Unipkat I-22 is within the Upper Mackenzie Delta region. This region is classified as having a high subarctic ecoclimate, with very cold winters and cool summers. Mean temperatures range from –27.6°C in January to 14.2°C in July. The mean annual precipitation is 248 mm with a monthly maximum of 40 mm in August (Environment Canada

2010). The data is based on a 30 year average at the Inuvik A weather station, climate ID #2202570.

Physiography and Bedrock Geology

Unipkat I-22 is within the Tuktoyaktuk Coastal Plain Ecoregion of the Southern Arctic Ecozone. This ecoregion covers the outer Mackenzie River delta and Tuktoyaktuk Peninsula bordering the Beaufort Sea (AAFC 2010). There are two main landscape types within the Tuktoyaktuk Coastal Plain Ecoregion.

One is composed of distinctive delta landforms at the mouth of the Mackenzie River. These include wetlands, active alluvial channels, and estuarine deposits. Characteristic wetlands, which cover 25–50% of the area, are lowland polygon fens, both the low- and high-centre varieties. The second consists of the broadly rolling uplands. Discontinuous morainal deposits mantle much of the area, except near the coast where fine-textured marine sediments cover the surface. Occurring less frequently are outwash aprons of crudely-sorted sand and gravel, and raised beach ridges along the shores of preglacial lakes. The resulting undulating terrain is studded with innumerable lakes and ponds (AAFC 2010).

Soils and Permafrost

Organic and Turbic Cryosols developed on level to rolling organic, morainal, alluvial, fluvioglacial, and marine deposits are the dominant soils of the Tuktoyaktuk Coastal Plain Ecoregion (AAFC 2010). Typically these soils are underlain by a continuous layer of permafrost (> 90% permafrost). However, recent re-classifications (Heginbottom 2000) describe the active delta area (Niglintgak, Taglu and a very small portion of Richards Island near the seacoast) as being within the intermediate discontinuous permafrost (35–65% permafrost) zone. Most of the region from Taglu south is within continuous permafrost zones. The thickness of the permafrost varies substantially from greater than 600 m in the coastlands of Richards Island to less than 100 m in the delta itself (Taylor et al. 1996).

In the Delta, permafrost thickness is generally less than 90 m thick, and contains deep unfrozen zones (taliks), which in some cases extend to the base of the permafrost. The depth of the active layer generally ranges from 30 –100 cm but is largely a function of ground surface insulation, vegetation cover, level of ground disturbance and winter snow cover. It is estimated that the permafrost at Unipkat I-22 is between 50 and 100 m in thickness (NRCAN 2010).

Vegetation

The Lower Mackenzie Delta region is dominated by grasses, sedges and willow (Salix glauca). Low lying vegetation on poorly drained sites is composed of various grass species, tussocks of sedge, cottongrass, and sphagnum moss (AAFC 2010). Plant communities found in the vicinity of the project are dominated by a few species that are well adapted to poor soil (low nutrient) conditions and the harsh climate. From the initial environmental assessment conducted in August 2004; the vegetation at Unipkat I-22 was found to be primarily grasses with horsetail, willow and moss. Off site, willow is the dominant vegetation type, with horsetail and moss found beneath the willow canopy (Komex 2005).

Wildlife

Birds

Unipkat I-22 is located approximately 7.6 km from the Kendall Island Bird Sanctuary (KIBS). KIBS was established in 1961 to protect valuable waterfowl breeding and staging grounds within the outer Mackenzie Delta. This area has been classified as a key migratory bird site in the Northwest Territories. The 600 km2 sanctuary provides habitat for over 80 species of migratory birds, including up to 7,500 nesting snow geese. Large numbers of tundra swans, greater white-fronted geese, sandhill cranes, brants, dabbling ducks, and shorebirds also nest and moult within the sanctuary. Although the sanctuary is primarily known for water birds, several species of raptors, passerines and grounddwelling birds are also present in the area. Other common species include snowy owl, gyrfalcon, peregrine falcon, osprey, common redpoll, gray jay, common raven, redthroated loon, northern shrike, ptarmigan, and fox sparrow. Due to proximity, many of the species that occur within KIBS could occur at or near Unipkat I-22. Signs of shorebirds were observed at Unipkat I-22 during environmental assessments in 2004 (Komex 2005), 2007 and 2010. Of the birds found in the vicinity of the Unipkat I-22 well site, the peregrine falcon tundrius subspecies as well

as the brants have been ranked as sensitive species by the Working Group on General Status of NWT Species (2006). The Committee on the Status of Endangered Wildlife in Canada (COSEWIC), however, has recently evaluated the peregrine falcon tundrius subspecies and as a species of special concern (April 2007). Brants appear to have not been assessed by COSEWIC. The majority of birds that are found in and around the Mackenzie Delta are migratory and are present from May to October.

Mammals

Terrestrial mammals in the area include barren-ground grizzly bear, red fox, wolverine, ermine, least weasel, mink, muskrat, Arctic ground squirrel, and several species of small rodents (lemmings and voles). Caribou are not thought to occur on Richards Island, however the island is used as rangeland for a reindeer herd.

Grizzly bears reside year round in the area, although at low density. Most local grizzly denning occurs on south and west facing lake/channel banks between sea level and 100 m above sea level within the bear's home range. Low-lying areas around lakes and channels also provide good spring foraging habitat. Grizzly bears also forage on bird eggs, and thus are attracted to KIBS during the spring waterfowl nesting season. The grizzly bear and the wolverine are regarded as being of special concern by COSEWIC (2006, 2003). These same species are considered sensitive by the Working Group on General Status of NWT Species (2006). The outer Mackenzie Delta, particularly Richards Island, provides excellent habitat for Arctic fox. (Dome *et al.* 1982)

Bear Denning Survey

A bear denning survey is currently being conducted by NWTs Department of Environment and Natural resources. The proposed project will follow the recommendations of the denning survey in order to mitigate any potential identified conflicts between this project and the identified denning areas.

Marine Mammals

Polar bear are typically restricted to areas with sea ice. However, maternity dens (October to March) and secondary winter habitat occur along the coastline of the Mackenzie Delta, Richards Island and the Tuktoyaktuk Peninsula. (Dome *et al.* 1982) The polar bear is listed as a sensitive species by the Working Group on General Status of NWT Species (2006) and as a species of special concern by COSEWIC (2002).

Hydrology

The hydrologic regime of the Mackenzie Delta is the major factor controlling vegetation and wildlife habitat in the area (Mackenzie River Basin Committee (MRBC) 1981) and the productivity of the delta ecosystem (Marsh and Hey 1989). The Mackenzie Delta comprises a complex of lakes, ponds, and channels, surrounding tidal flats (Bigras 1990) and supporting high levels of biological activity (Marsh 1998).

The delta is active with continual, year-round flow, and builds forward into the Beaufort Sea during the open water season from June to October (Bigras 1990). The freshwater discharge from the Mackenzie River reduces coastal salinities in the Southern Beaufort Sea (Thomson et al., 1986; Dome et al., 1982). The Mackenzie River is the major source of terrestrial material to the Canadian Beaufort shelf (Yunker and MacDonald 1995).

The outer delta lies in the zone of tidal, marine and fluvial influence (Graf Pannatier 1998). Delta water levels are influenced through tides and sea storm surges (Marsh and Schmidt 1993, Marsh 1998), and fluvial inflow, including spring flooding, ice jamming and changes in levee heights (Marsh and Hey 1989). The major channels of the delta appear largely unchanged in the last century, with the Middle, East, and West channels primarily controlling the hydrologic regime of the delta lakes (MRBC 1981). The development of vegetated, fine-grained levees and the presence of perennially frozen ground limit the lateral migration of many delta channels (Graf Pannatier 1998).

Water Quality

It is generally believed that flooding from the channels of the Mackenzie River plays a major role in the annual flushing and nutrient replenishment of the floodplain lakes (Lesack *et al.* 1998). The channels and lakes of the delta

are well supplied with nutrients; however, the productivity of these waterbodies appears to be controlled by turbidity, substrate stability, abrasion and climate, rather than by nutrients (Brunskill *et al.* 1973). The waters of the Mackenzie River basin typically have high levels of turbidity and moderately low total dissolved solids (TDS) concentrations and conductivity. These parameters are influenced by the discharge regime, such that values of turbidity and colour are low over the winter, highly variable in spring and peak over the summer. Conversely, conductivity and TDS levels are highest in the winter and decline in the open water period. Concentrations of metals in the Mackenzie River basin are mainly associated with suspended sediments so that levels of metals show seasonal variations in response to discharge and suspended sediment regimes.

Fish

Many lakes in the region provide conditions suitable for overwintering fish. This includes freshwater species such as lake whitefish, broad whitefish, least cisco, northern pike, Arctic grayling, lake trout, burbot, pond smelt, ninespine stickleback and longnose sucker. In many cases, these fish populations are resident year round, but lakes that are connected to the ocean with streams that flow throughout the open water season also provide overwintering habitat for diadromous species such as lake whitefish, broad whitefish and least cisco. Regional streams are generally small and provide no overwintering habitat (Lawrence *et al.* 1984). Many streams are ephemeral or intermittent and provide only periodic connection between lakes, while larger streams serve as migration routes for the diadromous species listed above. They also provide summer habitat for freshwater species such as Arctic grayling, northern pike, pond smelt, burbot and ninespine stickleback, which move in from lakes where they are resident. Streams are generally clear, with total suspended solid (TSS) levels below 10 mg/L.

The Mackenzie River channels of the outer delta, including East, Middle, Harry and Kumak channels, provide critical year-round habitat for inconnu, broad whitefish, lake whitefish, least cisco, northern pike and burbot. In addition to feeding, rearing and overwintering habitat (deeper channels), the channels also serve as migration routes for large populations of diadromous and other migratory species that move annually between the Mackenzie River or delta and the Beaufort Sea coast. The arctic grayling have been ranked as sensitive species by the Working Group on General Status of NWT Species (2006), but does not appear to have been assessed by COSEWIC.

Cultural and Historic Resources

A database search is being conducted by the Prince of Wales Northern Heritage Centre to determine if the project area contains known heritage or archeological sites. Previous searches have not returned any known historic or archeological sites within 150 m of the project area. There were also no known heritage resources identified at Unipkat I-22. If any site is identified in the current search all reasonable efforts will be used to mitigate the impacts and alternate project route placement will be considered.

NEW TECHNOLOGY

No new technology will be employed during this project. All equipment and procedures have been used in an arctic environment during similar projects.

ALTERNATIVES

No alternatives to removing the main drilling sump from the site are being proposed for this project. No alternatives in methodology are being proposed for this project. At the time of submission it is the proponent's preferred choice to have the site crew stay at an on-site camp and avoid daily trips of critical crew to and from Inuvik.
Project alternatives were considered during the pre-planning phase of the project but due to economic and/or technical constraints they were deemed not feasible for the project location and time of year. A number of alternative sources of backfill are under consideration for this project.

Backfill Alternatives

Alternative sources of backfill have been considered and found to be less desirable.

- Suitable backfill material from other sources is a valuable (and costly) resource. Granular material is limited in supply and maybe better used for community or industrial infrastructure. The generally high quality of granular material at the Ya-Ya source is rare in the region. Placement of this material in the excavation could alter the natural erosion rates and pattern around the site. Furthermore, the use of material from Ya-Ya would involve acquiring additional permits and construction of additional roads. These additional work elements would delay or jeopardize the project.

- An alternative is to use quarried rock for the initial backfill of the excavation, then followed by finer grained backfill source material. However, following chemical analysis, the analysed rock sources have been found to contain concentrations of arsenic higher than the Canadian Council of Ministers of the Environment (CCME) soil guidelines. Because of the elevated arsenic, this material was determined to be an unsuitable backfill alternative. In addition to the high concentrations of arsenic, use of this source material would also likely have different erosion rates compared to the surrounding native soils and may affect channel morphology.

- The importation of backfill material from areas outside of the lower delta may have the potential to introduce foreign seeds to the site.

An alternative to completely backfilling the excavation was considered and proposed. A proposal was made to partially backfill the open excavation so that it would have a depression which would then form a small pond resembling the natural ponds in the area. The primary rational was that the high erosion rates along the cut bank will erode the site in a matter of decades and any placed fill would therefore be temporary.

The proposed partial backfill as presented in the project description received some comments during public consultation. The Inuvik, Aklavik and Tutoyaktuk Hunters and Trappers Associations all voiced a preference for backfilling the excavation completely. Comments from regulatory stakeholders also voiced a preference for completely backfilling the excavation.

TRADITIONAL AND OTHER LAND USES

Land use in the region includes subsistence trapping, hunting, and fishing. Traditional land use and continuing subsistence use by the Inuvialuit of the region is documented within Community Conservation Plans for each community in the ISR. The proposed project falls within the Aklavik, Inuvik, and Tuktoyaktuk Conservation Planning Areas as defined by the respective Community Conservation Plans (Aklavik Inuvialuit Conservation Plan [AICCP] 2000; Inuvik Inuvialuit Community Conservation Plan [IICCP] 2000; Tuktoyaktuk Community Conservation Plan [TCCP] 2000). The community conservation plans identify four management categories of lands (B through E). The Unipkat I-22 site falls within two of these categories. The descriptions for these categories are as follows:

- Category C: lands and waters where cultural or renewable resources are of particular significance and sensitivity during specific times of the year. These areas shall be managed so as to guarantee the conservation of the resources.
- Category D: lands and waters where cultural or renewable resources are of particular significance and sensitivity throughout the year. As with Category C areas, these lands and waters shall be managed so as to guarantee the conservation of resources.

Unipkat I-22 lies in the vicinity of several areas defined as Harvesting or Special Management Areas where recommended land use practices and timing of the program must be considered in relation to local harvesting. The Harvesting and Special Management Areas located in the vicinity of the project area are listed in Table 9-1.

Table 9-1 Community Conservation Plan Areas in the Vicinity of Unipkat I-22

Site Number	Area	Importance to Community
304C	Spring Goose Harvesting Area	• key area for subsistence goose harvesting in the spring
322C	Grizzly Bear Denning Area	• grizzly bear denning occurs in the vicinity of the proposed program area from October to May
323C	Mainland Coastal Polar Bear Dens	• mainland coastal polar bear denning occurs in the vicinity from November to April. The proposed project occurs in the South Beaufort Polar Bear Management Area (TCCP 2000)
715C	Mackenzie River Delta Key Migratory Bird Habitat	• nesting and breeding habitat for birds from May to September • denning areas for grizzly bears from October to May • surrounding waters are important habitat for beluga whales from June to September • polar bear denning area from November to April, and • past and present subsistence harvesting area, especially for beluga whales (June 15 to August 15) and waterfowl (June to September)
718D	Central Mackenzie Estuary	• concentration area for belugas • transit area between Shallow and Kugmallit Bays • Used extensively by feeding anadromous coregonids • Overwintering and nursery areas for a variety of fish

Source: AICCP 2000, IICCP 2000, TCCP 2000

The site work is located within the spring harvesting area for geese (304C). This area is important as it is relied upon for subsistence harvesting by various Inuvialuit communities. Unipkat I-22 is also within the Central Mackenzie Estuary (718D); a region important for providing habitat for fish.

Special Management Areas 322C, 323C and 715D are outside the scope of Shell's Unipkat I-22 site work because of timing and location of the proposed program activities.

6.b) Description of Socio-economic and Cultural Environment

The Inuvialuit Settlement Region includes the communities of Tuktoyaktuk, Aklavik, Sachs Harbour, Holman and Paulatuk with in its boundaries. The population within the Inuvialuit Settlement Region totals approximately 2,700 people and, with the exception of Aklavik, the population in the communities is almost entirely Inuvialuit. Although Inuvik (population approximately 3400) is not within the boundaries of the Inuvialuit Settlement Region, a number of Inuvialuit businesses and administrative bodies are located there, along with federal and territorial government offices.

What sources of information did you use?

_X _ Historical Maps (expired permits and licences)
_X_ Running Maps (current permits and licences)
_ _ Interference Maps (other land dispositions)
_ _ Public Registry System
_X_ Project Description for the EISC
_ _ GIS
_ _ Indian Land Registry
_ _ Land Transition Management Style
_ _ Other, eg NWT Data Book, A & R Plan
_ _ Oil & Gas Water Licence Questionnaire

7.0 Consultation on Project by Proponent

COMMUNITY CONSULTATION

Shell met with the Aklavik, Inuvik and Tuktoyaktuk Hunters and Trappers Committees (HTCs) to discuss the proposed project. A schedule of these meetings, including dates, locations and attendees for each meeting is provided in Table 10-1.

Table 10-1 Consultation Meetings

Group	In Attendance	Date	Location
Open to Public	8 General public members, 2 reporters, Shell (2 attendees), IEG (2 attendees)	November 2, 2010	Inuvik – Ingamo Friendship Center
Aklavik Hunters and Trappers Committee	Aklavik Hunters and Trappers Committee (5 attendees), Shell (2 attendees), IEG Consultants Ltd. (2 attendees)	November 3, 2010	Aklavik
Inuvik Hunters and Trappers Committee	Inuvik Hunters and Trappers Committee (6 attendees), Shell (2 attendees), IEG Consultants Ltd. (2 attendees)	November 3, 2010	Inuvik
Tuktoyaktuk Hunters and Trappers Committee	Tuktoyaktuk Hunters and Trappers Committee (5 attendees), Shell (2 attendees), IEG Consultants Ltd. (2 attendees)	November 3, 2010	Tuktoyaktuk

Notes from these meetings are provided in Table 10-2

While questions were raised during consultation, there were no objections raised regarding the environmental impacts of the proposed project.

Table 10-2 Record of Consultation

Issue/Question/Comment Raised by Community	Response/Comment by Shell
Inuvik Public Meeting – Ingamo Frendship Centre November 2, 2010	
Why do this clean up now?	Shell would like to address the potential erosion of this material before it becomes a problem and avoid a rush. We also know that there are not many projects going on this winter in the region and people and equipment are available.
Why this site?	Shell has been looking at all of its sites in the ISR and this site is the one with the most pressing environmental issues.
Is the Territorial Government requesting this?	No, this is Shell's initiative.
Are there consequences if this is not done this year?	No, but we would like to address this site before it does become a problem.
Is the Inuvik Treatment Cell already built?	Yes. Funding for this program became available late this year and there was a rush to aquire and layout the liner material before freezing conditions occurred. It was a very tight timeline.
The metal in the side of the river bank. Are you picking that up too?	Yes, that is our plan but it is dependant on getting a water licence quickly and before the rest of the project is finished.
What advertising are you doing?	We posted notices for this meeting around Inuvik and had a notice on the rolling channel.
Are you meeting with the HTC?	Yes, we will be meeting the Tuk, Aklavik and Inuvik HTCs tomorrow.
Are you planning on doing any more sump work at Farewell?	We had originally wanted to do the work this year but the budget that was available does not allow for it. We are not planning to do any work on the Farewell sewage lagoon this winter but Shell is looking for options on when to fill in the lagoon.
Will the back haul use end dumps?	Yes, that is our plan.
Will you be using labour from all three communities?	Shell is committed to using Inuvialuit companies and we will encourage the contractors to use people from all three communities.
Will work be sole sourced?	That is our preference. There are few companies that can meet Shell's pre-qualifications and we are restricted by that.
Will you use any small contractors?	We would prefer to use a single contractor. It is difficult to manage many different contractors and our experience in the past is that few small contractors are able to pre-qualify.
What about wildlife monitors? Will they be smaller contractors?	In the past the main contractor hired them through the HTCs.
Is a drug and alcohol policy part of safety plans?	Yes, it is an integral part. The overall safety program is very important and running a safe program is a top priority for Shell.

Issue/Question/Comment Raised by Community	Response/Comment by Shell
Aklavik Hunters and Trappers Committee – Aklavik November 3, 2010	
Will a barrier be left between remaining contaminated soil and pond?	Yes. We intend to leave a barrier in place by using backfill material against the north wall of the excavation that will maintain permafrost conditions between the new ponded area and the unexcavated areas to the north of the main sump.
What if the pond is in place and more/ future work needs to be completed?	The backfill barrier will provide a wall and dam to ponded water for any future excavation that may be required on site. The PHC affected material that will remain in place to the north also appears to be shallow, not deep like the main sump area.
Have you thought about rock barriers to stop erosion [rip rap]? It worked well for Aklavik.	We did consider this approach but decided against it because the bend in the river here is very large and erosion rates all along it are quite high. Eventually, the river would have cut behind our lease area anyway. We felt it was better to remove the problem from the site altogether.
What other sites are at risk?	Shell did a risk assessment and categorized all of it's ISR sites a few years ago. Most sites were found to be in reasonable shape and did not require any action at this time. Unipkat I-22 was determined to be the most pressing site.
Who is keeping track of these sites?	Shell regularly monitors its sites and some of them are visited by INAC. All of Shell's sites will continue to be monitored to assess ongoing developments and needs.
Who determines that these sites have not failed?	In this case, Shell will provide a remediation report to INAC.
Sure they were assessed but no one came back to the communities to let us know what was found.	We can't speak for the other companies in the region but we will agree to let the HTCs know how this project works. We can also arrange a trip to the site during the project if that is of interest?
Yes, we'd be interested in seeing the site and how work is going.	Okay. We'll work on arranging that.
How deep is the channel?	Diagrams in the Unipkat I-22 well file indicate that the river channel is up to 26 m deep.
In the past, Aklavik lost a lot of ground to erosion in a single year. You never know when that might happen on a channel.	That is true. We think that some years you may see alot of erosion, maybe 5 m at a site and then virtually none for several years. We know from historic air photos that this site loses an average of 1 m/year but that could be different from year to year and is why we want to address this site early, rather than leave it until its an issue that is a rush.
Conditions are changing on the river. This is the first summer I have seen erosion on many channels. Even small ones. That wasn't the case before.	Interesting.
You should use blasting to dig up the old sump. That's how it was dug originally.	We considered blasting as an option but decided against it because it would mix up the sump and surrounding material and would increase the volume of material being removed from the

Issue/Question/Comment Raised by Community	Response/Comment by Shell
	site and to the south. The resulting fractures in the permafrost could also serve as a pathway if contaminants were accidentally left in place. The open excavation would also make a larger pond than the IronWolf.
I'm not sure the IronWolf will be able to do it. Do you have a back up plan in case the IronWolf breaks down or does not work?	It is an expensive piece of equipment and comes with alot of spare parts and dedicated mechanics. The unit was used a few years ago by Shell in the Delta and worked. The company has also made some improvements on it from the lessons they learned last time. We have excavators with ripper teeth as back ups.
Would like to see the excavation brought back to grade.	This was our first intention but borrow material for backfill is difficult to source. The material we tested from Inuvik is high in arsenic which is considerably lower at the site. We don't want to add contaminants to the site during a remediation. We are also concerned that using coarser material would alter the erosion rate and shape of the channel in the future.
Leaving a pond at this site may not be a bad thing in this case but it could set a precedent that we don't want for other sites.	We believe that each site should be managed on the conditions present. For eroding sites on the lower Delta it makes sense to have ponds similar to the surrounding terrain but we would agree that for other sites where there are no erosion issues or ponds, this plan may not be appropriate.
Have you thought about using Ya-Ya as a source of backfill?	We did but Ya-Ya is a valuable and finite resource and it seems a waste to use it to backfill a location that will be eroded into the ocean in a relatively short period of time. It would also involve a larger trucking program and more roads.
We agree that the main thing is getting the contaminated soil out. Who long before the second phase [removing the soil to the north] goes ahead?	We don't have a set time for the second phase. Our objective this year is to remove soil that could be eroded in the near future. The remaining soil is unlikely to be close to erosion for another 30 or 40 years.
Originally developers agreed to leave the land as it was found, filled to grade, now people want to deviate from those commitments.	In this case that may be true but we think the fact that this site will be eroded in a few decades should be considered. We feel it would be better not to waste money on putting backfill into the Beaufort Sea but instead using that same money in the future on other sites.
Inuvik Hunters and Trappers Committee - Inuvik November 3, 2010	
Are the natural ponds contaminated?	No. We sample the water and sediments in 2007 and found that they were not affected by the sump.
Do you have any more sites like this?	None that are eroding into the river like this. Shell continues to monitor its sites in the ISR to see which ones require work. Shell has 22 sites in the ISR.
What made you decide to do 100 boreholes?	We were trying to get a good delineation on where the sump and affected material was located on the site. It is more cost effective

Issue/Question/Comment Raised by Community	Response/Comment by Shell
	to put the money into planning than having a big surprise in how much volume we need to move.
Are you planning to place a geotextile between remaining contaminated soil and pond?	No. Just backfilling the north wall with clean soil.
Where there is disturbed ground the willows grow back quickly and that leads to permafrost degradation.	We have noticed that as well and there are some willows growing on this site. Although permafrost degradation does not seem to be a big problem at this site, many of the willows will need to be removed to conduct the site remediation and snow pads will be built on the ground to limit ground disturbance.
Are you seeing permafrost degradation adjacent to natural ponds?	No, we have not seen degradation besides the ponds. There is now cracking there suggesting subsidence and the thermal data from the site is uniform across the site.
Interested in coming on a site visit in the summer.	We can arrange that and we will also try to make a trip available to HTC members when the project is underway since the Aklavik HTC expressed interest in that.
Will monitoring be completed after the work has been completed?	Yes, the site will continue to be monitored for erosion, permafrost degradation and water chemistry.
Could you use time lapse photography?	Probably not. The site is very low lying and could be subject to ice flows which would wipe the equipment away. We'd like not to leave anymore infrastructure at the site.
Have you considered using material from exposed point bars as back fill?	No, we hadn't but it is a good idea and we will pursue it as an option but it may be difficult to get DFO buy in on the plan.
Would feel better if the excavation was backfilled.	Obtaining suitable backfill is the problem we are having.
What material would you use?	We have looked around Inuvik and most material is higher in arsenic than the soil at the site. At the present time the majority of the backfill will be from the stripped clean soil that is on the site. We are still looking for more material and are interested in the sand bars.
Have you considered Ya-Ya material?	We did but it is a finite resource and it seems a waste to use as backfill at a location that will be eroded into the ocean in a relatively short period of time. It would also involve a larger trucking program and more roads.
Are you going to do a presentation when finished or an updated report?	We can provide the HTCs with a report once the program is finished.
Tuktoyaktuk Hunters and Trappers Committee - Tuktoyaktuk November 3, 2010	
How was the well abandoned?	It was re-entered and plugged with concrete before the casing was cut off at about 30 m below ground surface.

Issue/Question/Comment Raised by Community	Response/Comment by Shell
What about using Source 177 as backfill?	Although we understand that some of the material contains a high proportion of fines and may not be as useful for construction, it would involve a larger trucking program than we want. It is also a finite resource and it may be better used on infrastructure, rather than at a site that will be eroded into the ocean in a relatively short period of time.
Will this site be used for production?	No. It has been abandoned and will not be used.
Are there more sites like this one?	None that are eroding into the river like this. Shell continues to monitor its sites in the ISR to see which ones require work. Shell has 22 sites in the ISR.
Are you going to leave the remaining contaminated soil to the north in contact with the new pond?	No, we will backfill the north wall of the excavation with enough clean soil to maintain permafrost conditions.
How much sump will be left behind?	We are going to remove all of the main sump and surrounding PHC affected soil. We are planning on leaving the shallow extension that exists to the north of the main sump for the time being.
Have you visited all 22 sites? Are there any that have problems?	Shell did a risk assessment and categorized all of it's ISR sites a few years ago. Most sites were found to be in reasonable shape and did not require any action at this time. Unipkat I-22 was determined to be the most pressing site.
What is permafrost like at the site? It can be undulating and deeper in low points.	That is what we see at this site. Generally permafrost exists from 1 to 1.5 m below the surface.
Is this an INAC issue? Are they pushing for Shell to clean-up this site?	No, Shell identified this site as a priority during our risk assessment phase a few years ago. The initiative to remediate this material before it becomes a problem by eroding into the river is Shell's.
Only real issue is to backfill if at all possible.	We have been working on it but the supply of suitable material and associated costs is making a complete backfill difficult. At this time we'd like to only complete a partial backfill.
How will you monitoring and police speeding?	We certainly won't tolerate speeding to occur with our project either on the DOT or the private road. We won't be setting speed traps or anything but we will have a journey management plan that will require drivers to radio in a designated points. From that we can tell how long it is taking them to get between points and the speed they are travelling.

Government Consultation

DIAND sent out a letter asking for comments to government agencies, local aboriginal and local government groups. Responses to this request are listed below.

Federal Government		**Contact Person**	**Dates Comments Received**
DFO/CCG	Y	Amanda Joint	CEAA Response – Dec. 08,2010 Letter to EISC – Dec. 09, 2010 Letter to DFO – January 25, 2011 Letter to INAC – Feb. 21,2011
NEB	Y	Susan Measor	CEAA response – Jan. 11, 2011
EC	Y	Stacey Lambert	CEAA response – Jan 07, 2011 Letter to INAC – Jan. 05, 2011

Federal Government		**Contact Person**	**Dates Comments Received**
NRCan	Y	Caitlin Scott	CEAA response – Dec. 08, 2010
Parks Canada	Y	Nelson Perry	CEAA response – Dec 07, 2010
Transport Canada	Y	Sophia Garrick	CEAA response – Jan. 14, 2011
Health Canada	Y	Nicole Morin	CEAA response – No response

Territorial Gov't .		**Contact Person**	**Dates Comments Received**
ENR	Y	Patrick Clancy	Letter to INAC – Jan. 06 2011 Letter to Shell – Dec 14, 2010
MACA	Y		No comment
GNWT DOT	Y	Jon Posynick	Letter to EISC – Nov. 25, 2010
PWNHC	Y	Glen MacKay	No Comment
Hamlet of Aklavik	Y	Evelyn Storr	Letter to INAC – Dec. 15, 2010
Other			

Committees/Boards and Agencies		**Contact Person**	**Dates Comments Received**
EISC	Y	Barb Chalmers	Screening decision letter– (IFA's 11(17)(b))
NWT Water Board	Y	Mike Harlow	CEAA response – Jan. 10,2011 Letter to INAC – Jan. 27, 2011 Letter to NWTWB – Feb. 18, 2011
FJMC	Y	D.V. Gillman	Letter to EISC – Dec 14 2010
Wildlife Management Advisory Council (NWT)	Y		No comment received
EIRB	Y		No Comment received
Gwich'n Land and Water Board	Y	Helga Harlander	Letter to INAC – January 18,2011
Aboriginal/Beneficiary Groups		**Contact Person**	**Dates Comments Received**
Inuvialuit Game Council	Y		No comment received
Inuvialuit Land Administration	Y		No comment received
Inuvik Comm. Corp.	Y		No comment received
Inuvik Hunters & Trappers Committee	Y	Pricilla Smith	No Comment Received
Tuktoyaktuk HTC	Y	Lila Voudrach	No Comment Received
Tuktoyaktuk Comm Corp.	Y		No comment received
Aklavik HTC	Y	Michelle Gruben	Letter to INAC – Dec. 15 2010
Aklavik Comm. Corp	Y		No comment received

Olokhaktomiut Hunters & Trappers Committee	Y	Sadie Joss	No comment received
Olokhaktomiut Comm. Corp	Y		No comment received
Sachs Harbour HTC	Y		No comment recieved
Sachs Harbour Comm. Corp	Y		No comment recieved

Summary of Committees/Boards, Agencies, Aboriginal/Beneficiary and other Public Concerns

EISC:

During a meeting held January 26-28, 2011 the Environmental Impact Screening Committee (EISC) screened the above noted project description to determine if the proposed development could have a significant negative environmental impact. Based on the information provided the EISC concluded that the development, if authorized subject to the environmental terms and condition recommended by the Screening Committee, will have no significant negative impact on the environment or on Inuvialuit wildlife harvesting in the Inuvialuit Settlement Region [IFA Section 11(17)b].

The EISC understands that the scope of the above mentioned proposed development is as described in the supplied Project Description dated November 2010 and specifically as described in section "5.3 Sump Remediation Program: Project Scope". The EISC further understands that the scope has been amended to use if approved, frozen river bar sediments as a source of backfill, thus having sufficient volumes of suitable material to avoid leaving depressions and resultant ponds. The EISC understands that without the approval of use of the river bar sediments the project will not proceed.
The Committee received advice on the above mentioned proposed development from Fisheries and Oceans Canada (DFO), Environment Canada (EC), the GNWT Department of the Environment and Natural Resources (ENR), the GNWT Department of Transportation (DOT), the Aklavik Hunters & Trappers Committee (AHTC), and the Fisheries Joint Management Committee (FJMC). All of these communications are available for reference on the EISC Public Registry. The Committee supports these recommendations and additional mitigation measures.

Based on the advice received and the review by the Committee of the proposed development the Committee identified additional concerns and recommends as follows:
Excavated trenches and/or pits shall be sloped at one end to prevent entrapment of wildlife
Excavated materials shall be stabilized and properly stored at a safe distance from any waterbody, prior to transport off-site
Fuel and petroleum products shall be properly stored at a safe distance from any waterbody

Snow and/or ice fill roads and crossings shall be constructed and operated according to Central & Arctic (NWT) DFO Operational Statement Guidelines. The guidelines are available at: http://www.dfo-mpo.gc.ca/regions/central/habitat/os-eo/provinces-territoriesterritoires/ nt/os-eo10-eng.htm

At the ice road access point, it is advised that the road be posted with signage advising the general public of the project and indicating that the road is intended for authorized users only

Where road maintenance and grading are required, bull-dozer blades should be raised to avoid cutting the organic layer

A pre-construction survey of bear dens adjacent the proposed road right-of-way and project area shall be completed prior to undertaking any activities. Where den features are identified, the proponent should consult with E&NR regarding appropriate mitigations to prevent impacts to bears

Relay wildlife sightings by radio to all vehicles to avoid collision occurrences.

A post remediation monitoring and reporting program should be developed and implemented in consultation with responsible authorities.

The Committee recommends that the above noted terms and conditions recommended be incorporated into the developer's plans.

Subject to a final decision by the licensing or permitting authority, the issuance of appropriate permits and approvals may proceed.

Aklavik Hunters & Trappers Committee:

The Aklavik Hunters & Trappers Committee held their regular board meeting on December 13, 2010 and the above topic was discussed.

The board had passed a motion in support of the Unipkat I-22 Sump Remediation submitted by Shell Canada Energy with the conditions that the area be filled back with original contour, do not leave a hole where they propose to dig and to try their best to have it the same way it was before they started digging.

Aklavik Community Corporation: No comment received

Inuvik Hunters & Trappers Committee: No comment received

Inuvik Community Corporation: No comment received

Tuktoyaktuk Hunters & Trappers Committee: No comment received

Tuktoyaktuk Community Corp. No comment received

Fisheries Joint Management Committee:

The Fisheries Joint Management Committee (FJMC) has reviewed the following project submission to the Environmental Impact Screening Committee:
Shell Canada – *Unipkat I-22 Sump Remediation* [11/10-01]

The FJMC understands the proponent plans to:
- Build an ice road to its former well site.
- Conduct a partial site backfill and re-contour the excavation within local topography.
- Transport all human wastes (e.g. grey water) from the camp accommodation site to Inuvik for disposal.

The FJMC has the following concerns with this development proposal:
- As sediment discharge may cause disturbances to fish and marine mammals that are common in the former well site area, no excavated loose soil should be left on top of the ice to avoid sediment discharge in the water streams during the spring breakup.
- Fuel and waste water should be handled in a manner to prevent contamination of fish or fish habitat.
- Proposed mitigation measures are deemed acceptable and if implemented as described should avoid impacts on fish and marine mammal species.

The FJMC recommends the following:
- The concerns and practices of the local Hunters & Trappers Committee are observed during the duration of the project.
- The field crew should be properly licensed should any ice fishing take place during the project.

- The proponent should exercise caution when any type of fuel is being handled at or near the proposed project site.

Gwich'n Land and Water Board:

The GLWB has concerns with one aspect of this proposed project, namely the deposit of industrial wastes, generated outside the municipality, at the Town of Inuvik's facilities. The Town of Inuvik is licenced to use water and deposit waste for municipal purposes under water licence G06L3-001. Accepting industrial waste from outside the municipality would potentially put the Town in violation of the water licence.

It is a practice by the Town of Inuvik to supply water for camps, and accept camp wastewater into its facilities. My understanding is that the Town requires the waste generator to meet certain conditions, namely that the wastewater 'be of domestic character, not contaminated by industrial wastes in concentrations higher than is normally found in domestic wastewater as a result of washing hands, clothing, etc.' (See copy of form letter, provided to the GLWB by the Town of Inuvik, attached.) This arrangement allows the Town to stay in compliance with the municipal water licence.

The applicant proposes to store and dewater the excavated sump materials as well as the PHC contaminated soil, associated with this application, in a lined cell at a contractor's site in Inuvik. The applicant further proposes to test and potentially treat the collected liquids (to satisfy discharge requirements) prior to discharging the waste into the Town's sewage lagoon. It is not clear what 'discharge requirements' the applicant is referring to in 5.3.7, what type of analysis the applicant envisions, and what volume of liquid is expected to be disposed of.

The applicant proposes to treat the PHC contaminated soil and states under 5.3.12 that 'the treated PHC affected soils may be used for daily landfill cover once applicable guidelines have been reached and confirmatory analytical sampling has been performed.' Is the treated soil meant to be utilized at the municipal solid waste facility for daily cover? It is also not clear which guidelines the applicant refers to, and what analysis will be performed to determine the soil is suitable for the intended use.

Information Requests:

It is not clear what 'discharge requirements' the applicant is referring to in 5.3.7, what type of analysis the applicant envisions, and what volume of liquid is expected to be disposed of?

Is the treated soil meant to be utilized at the municipal solid waste facility for daily cover? It is also not clear which guidelines the applicant refers to, and what analysis will be performed to determine the soil is suitable for the intended use?

Proponents Response:

See Appendix "H"

8.a) Description of Effects (Tables A, B and C), Mitigation, Residual Effects and Significance.

Proposed Mitigation and Anticipated Environmental Impacts

Concern and/or Anticipated Impact	Mitigation
Avoidance of Traditional and Cultural Activities and Sensitive Areas	A wildlife monitor will be involved in the project to ensure that sensitive areas and interference with harvesting and other activities are avoided.
	Transportation is restricted to the river ice and the footprint on the land is small.
	Timing of the project causes minimal temporal overlap with traditional and cultural activities.
Impacts to Aquatic and Terrestrial Wildlife	While there is a small potential for wildlife harm (*i.e.*, human protection from problem wildlife), training of all staff in operational procedures will minimize this potential.
	The wildlife monitor will be present at all times to ensure impacts to wildlife are minimal.
	No fishing or hunting will be permitted by people working on the project.
	Feeding or harassment of wildlife will not be permitted.
	Intake pipes will be screened with mesh to protect fish in the event water is withdrawn from water bodies.
Sensory Disturbance to Wildlife	No non-emergency air transport will be used during this project.
	Wildlife attraction or avoidance at the site is expected to be minimal. All attractants to wildlife, *i.e.*, garbage, will be removed from project area.
	Environment and Natural Resources' *Bear Encounter Response Guidelines for Oil and Gas Activities* will be followed.
	Wildlife monitor will monitor and advise if wildlife is disturbed.
	Existing routes at the site will be used as much as possible.
	Field crews will be required to pack out all materials used during the project, *e.g.*, lunch wrappers, paper, sample containers.
Impacts to Terrestrial Habitat	Land based activities will be restricted to the lease area.
	Rare plant samples will not be collected and disturbance of existing vegetation on site will be avoided where possible.
	The wildlife monitor will be present at all times to ensure impacts to habitats are minimal.
	Refueling will occur in designated areas and a drip tray will be used. Fuel spills will be recorded and cleaned up immediately. Transport trucks will fuel in Inuvik.
	All fuel storage will have secondary containment.
	The partially backfilled excavation will be contoured to blend into natural topography.

Concern and/or Anticipated Impact	Mitigation
	Backfill material will be analysed for possible contaminants prior to transport to site.
	Snow pads will be constructed on the site to minimize ground disturbance in areas where heavy equipment and the camp are located.
	Excavated area will be contoured to be similar to surrounding landscape and any ponded area would likely be usable to native animals. Loss of terrestrial habitat would be minimal.
Impacts to Aquatic Habitat	Drips tray will be located under equipment when not in use.
	Unfrozen sediments will not be disturbed.
Soil and Surface Contamination	Spill pads and other spill prevention devices will be used to ensure that no spills occur during refueling of equipment.
	An emergency response plan and spill kits will be present at the site.
	Soils containing contaminants of concern will be stockpiled on snow pads while on site prior to transport to the Inuvik treatment cell. The dirty snow from the pads will also be removed to the Inuvik treatment cell.
Cultural or Heritage Resources	There are no known cultural or heritage sites within 150 m radius of the site and no known heritage sites will be impacted by the project. Should heritage resources be found during project activities, work will cease in the immediate vicinity and regulators and the Prince of Wales Northern Heritage Centre will be notified.
	If any cultural areas identified through a search of the Prince of Wales Northern Heritage Centre will be given a buffer zone of 150 m.

8.b) Effects of the Environment on the Project

Characterization of Projects and Activities

This cumulative effects assessment summarizes how expected effects of the proposed site clean-up, which may be insignificant on its own, may combine with the activities of other projects in the region, thereby compounding environmental effects and increasing their significance level.

The primary project-specific effects that could potentially occur as a result of the site remediation at Unipkat I-22 would include sensory disturbance from vehicle and heavy equipment, and sensory disturbance from human activity on the ground.
While there is small potential for wildlife harm (i.e., human protection from problem wildlife), training of all staff in operational procedures will be used to minimize this potential. This issue as well as other safety concerns, policies and incident management are addressed in the Emergency Response Plans.

At the time of this submission, we have been advised that there are no other developments that may spatially or temporally overlap with this project. A project is considered spatially overlapping if it occurs within the identified corridor or could be reasonably expected to share transportation routes or flight paths with the proposed project. Temporal overlaps are those projects with activities in the timeframe. Known past and potential future projects are not listed because the identified effects of the Biophysical and Heritage Resource investigations are short term and reversible, i.e., sensory disturbance, and/or will be mitigated for, i.e., cultural intrusion. Activities not related to oil and gas or research are usually comprised of other land-based activities, i.e., hunting and trapping, recreation.

9.a) Summary of Proponents Mitigation Measures

Cumulative Effects and Mitigation

Interactions with other projects and activities could result in incremental effects of the following types of impacts:

- Increased sensory disturbance of wildlife within area the fieldwork is to be conducted at Unipkat I-22 due to human activities on the ground and other activities. This could result in energetic stress to wildlife, displacement or, in a worst case, seasonal abandonment of habitat.

- Increased sensory disturbance of wildlife where travel corridors between Inuvik and various study areas overlap. This could also result in energetic stress to wildlife, displacement or, in a worst case, seasonal abandonment of habitat.

- Interference with traditional activities as a result of human activities on the ground.

- Intrusion on important cultural or spiritual sites as a result of human activities.

To minimize the potential for these cumulative effects to occur, the use of appropriate mitigation measures and procedures as identified in Section 12 will be employed**.**

Refer to APPENDIX "J" for the Fisheries Act Authorization Application for terms of any specific mitigations or monitoring.

10) Reviewers= Comments

GNWT/Department of Environment and Natural Resources (ENR)

The Department of Environment and Natural Resources (ENR) has reviewed the above application based on its mandated responsibilities under the *Environmental Protection Act*, the *Forest Management Act*, the *Forest Protection Act* and the *Wildlife Act* and provides the following comments and recommendations for consideration.

ENR understands the intent of proposed project is the excavation and removal of contaminated soil from a historic oil and gas disposal sump at the Shell Unipkat site, in order to prevent this material from entering the Mackenzie River via riverbank erosion. Due to the imminent risk of the sump material eroding into the Mackenzie River, ENR agrees with the intent of the proposed work and that every reasonable effort should be made to this effect.

ENR notes however, that the Project Description (PD) refers to the proposed activities as "site remediation"1. ENR understands the proposed activities only address the remediation of a single sump, and do not constitute a full site assessment, nor absolve Shell from fully assessing and remediating the remainder of the Unipkat site.

1. CCME Steps for Approach to Contaminated Sites

1.1. General Concerns and Project Context

ENR understands the Proponent asserts the application is to "conduct a sump remediation program"2. However, ENR is unaware of a Phase II or III ESA being completed to delineate the sump, to establish effective remedial actions, and submitted to any stakeholder for review.

The overall process in dealing with contaminated sites on Federal Lands, including those for Phase I, II, and III, should

1 Page 1, Executive Summary. Shell Canada Energy. Unipkat I-22 Sump Remediation Project Description. Nov 12, 2010.
2 Page 1, Executive Summary. Shell Canada Energy. Unipkat I-22 Sump Remediation Project Description. Nov 12, 2010.

follow the guidance offered in the *National Guidelines for Decommissioning Industrial Sites (CCME 1991)*. This process should also include integration of the 10 steps identified by CCME for dealing with contaminated sites, as defined in CCME *Federal Approach to Contaminated Sites*, 1999. The latter document, and a quick reference to the 10 steps, can also be found online at www.ec.gc.ca/etad/csmwg/pub/fed_aprch/en/c2_e.htm). In the absence of these steps being taken, ENR lacks confidence with respect to the nature, quantity, location and extent of the contamination in the subject sump, as well as the remainder of the site.

1.2. Recommendation

ENR recommends that any authorization granted to the Proponent be for the sole purpose of removing identified contamination likely to enter the Mackenzie River on the basis of urgency and for completing a Phase II ESA. Upon submission of the Phase II ESA, it should be submitted for review and comment by stakeholders, and modified accordingly. Following this, ENR expects the Proponent will use this information to then draft a Remedial Action Plan (RAP) which will also be submitted for review and comment by stakeholders. Once the RAP has been approved, then ENR recommends the Proponent can apply for new authorizations for the purpose of implementing the specific measures agreed to in the RAP

2. Volume of Contaminated Material

With respect to the volume of identified PHC contaminated soil, the Project Description (PD) provides volumes based on the CCME Guideline *Petroleum Hydrocarbons in Soil*, industrial criteria3. ENR is concerned that applying the industrial criteria for PHC in soils at this site will not provide an adequate level of protection for the environment, wildlife, and potential users of this site. ENR is of the opinion that any delineation of contaminants use, at minimum, the CCME PHC in soil parkland criteria with consideration of the applicable soil texture.

With respect to the supplied contaminated soil estimates the PD states:

- approximately 5000 m^3 of PHC contaminated soil onsite above CCME Industrial guidelines for PHC (page 6, Section 5.2 – Previous Work)
- 1600 m^3 of sump contents (page 9, section 5.3.5 – Soil Excavation)
- 1400 m^3 of PHC contaminated soil around the sump (page 9, section 5.3.5 – Soil Excavation)
- Approximately 6500 m^3 of PHC affected material above guideline. (Presentation attached to application)

ENR notes the PD provides inconsistent totals of PHC contaminated soil (5000 m^3 and 6500m^3) and there is a discrepancy between the total volume of contaminated soil as compared to the total volume of material to be excavated, 3000 m^3.

Further assessment by ENR casts additional doubt on the delineation of this site. The PD indicates that in September 2007, 82 boreholes were drilled and that they did not fully delineate the site4. Moreover, the PD indicates that in 2010 an additional18 holes were drilled to work towards fully delineating the site5. However, the PD does not state whether this additional work did indeed fully delineate the site.

ENR has additional concerns that other areas of contamination may exist on the site which have not been investigated. The PD makes reference to a Camp Sump and Flare Pit which are actively eroding into the Mackenzie River6. These sites have the potential for contamination and should be investigated as part of a Phase II ESA.

2.1. Recommendation

- ENR recommends that any delineation of contamination of PHC use the CCME Parkland criteria and take into account the appropriate soil texture.

3 Page 6, Section 5.2 Previous Work. Shell Canada Energy. Unipkat I-22 Sump Remediation Project Description. Nov 12, 2010.
4 Page 5, Section 5.2 Previous Work. Shell Canada Energy. Unipkat I-22 Sump Remediation Project Description. Nov 12, 2010
5 Page 6, Section 5.2 Previous Work. Shell Canada Energy. Unipkat I-22 Sump Remediation Project Description. Nov 12, 2010
6 Page 10, Section 5.3.5 Soil Excavation. Shell Canada Energy. Unipkat I-22 Sump Remediation Project Description. Nov 12, 2010

- For sites likely to erode into the Mackenzie River, ENR recommends that site specific criteria be developed through a phased ESA process as outlined in section 1.
- ENR recommends clarification is provided regarding the total volume of identified contaminated material exceeding CCME industrial criteria for PHC in soil.
- ENR recommends clarification is provided regarding the volume of material proposed for excavation as compared to the volume of material identified as exceeding CCME industrial criteria for Petroleum Hydrocarbons (PHC) in soil.
- ENR recommends that additional areas of contamination are investigated, such as, but not limited to, the Camp Sump and Flare Pit.

3. Contaminants of concern

The Proponent states, "Soils affected by PHC, potassium chloride, and total barium are of primary concern."7 ENR is concerned that there may be other contaminants present due to the nature of oil and gas activities at the time the sump was put in place and related activities that may have occurred at the site. Of primary concern are total metals, and if flaring or burning/incineration occurred on site, then the presence of polycyclic aromatic hydrocarbons (PAHs) and dioxins and furans must also be considered and assessed.

3.1. Recommendation

ENR recommends that a phased ESA process is undertaken which investigates, but is not limited to, the presence of total metals, PAHs, and dioxins and furans.

4. Regulatory Approvals

The Environment Division (ED) of ENR tracks the movement of contaminated soils as a hazardous waste in the NWT. The Department of Environment and Natural Resources (ENR) is not listed as an agency for the registration of the storage facility of contaminated soils in the Inuvik Industrial Area in Table 3-18. Shell Canada Energy is a registered generator with the Environment Division and was issued the following generator number NTG000408.

4.1. Requirement

- Due to the volume and nature of potential contaminants in the sump material ENR requires Shell Canada Energy to contact the Environment Division and register the storage facility in Inuvik as per section 3.3 and 3.4 of the Guideline for the General Management of Hazardous Waste in the NWT prior to the movement of any contaminated soil into Inuvik.

5. Contaminated material treatment

The PD states, "In October 2010, a lined containment cell was built in Inuvik..."9 for the purposes of temporarily storing the drilling sump contents and treating PHC contaminated soil. The PD indicates that the sump contents and PHC contaminated soil will be allowed to be dewatered in the containment cell and the collected water (leachate) will be treated and disposed of in the Inuvik lagoon10.

With respect to containment cell, ENR references Alberta Environment's CODE OF PRACTICE FOR LAND TREATMENT OF SOIL CONTAINING HYDROCARBONS (2008)11 for the registration of contaminated soil treatment facilities in conjunction with section 3.3 and 3.4 of the Guideline for the General Management of Hazardous

7 Page 6, Section 5.3 Sump Remediation Program: Project Scope. Shell Canada Energy. Unipkat I-22 Sump Remediation Project Description. Nov 12, 2010

8 Page 2 Section 3 Regulatory Approvals. Shell Canada Energy. Unipkat I-22 Sump Remediation Project Description. Nov 12, 2010

9 Page 11, Section 5.3.7 Soil Containment in Inuvik. Shell Canada Energy. Unipkat I-22 Sump Remediation Project Description. Nov 12, 2010.

10 Page 11, Section 5.3.7 Soil Containment in Inuvik. Shell Canada Energy. Unipkat I-22 Sump Remediation Project Description. Nov 12, 2010.

11 Also available online at: http://www.qp.alberta.ca/documents/codes/HYDROCARBONS.pdf

Waste in the NWT12. The code of practice will be referenced, where applicable, to determine the capacity of the containment cell to treat excavated soils.
With respect to the leachate, ENR notes the details of the water treatment technology and effluent quality criteria are not provided. Further, ENR notes that the Inuvik lagoon is designed for Municipal effluent, not industrial leachate sourced from industrial activities on Federal Lands.

5.1. Requirement

- Provide as built drawings of the containment cell to the Environment Division including, but not limited to, the specific location.
- Provide to the Environment Division any testing done on the contaminated soils in the containment cell for the purpose of determining if appropriate remedial criteria have been met for any proposed use of this material.

5.2. Recommendation

ENR recommends that alternate disposal options are considered for the disposal of leachate collected from the lined containment cell, such as water treatment methods that meets discharge criteria to allow discharge to the natural environment, or shipping to an approved facility capable of treating the leachate.

6. Treated Soil as backfill

The PD states that, "Once the treated soil meets applicable CCME guidelines it will be available for use as backfill material at sites in Inuvik."

ENR is concerned that soils in the containment cell treated to industrial standards and subsequently removed may be transferred to another party who is not accountable for the ultimate use of the treated soil.

ENR does not have a regulatory tracking mechanism that ensures that once contaminated soils are treated to industrial standards and given to a third party for industrial use as back fill that the remediated soil does not get redistributed as backfill in non industrial areas

6.1. Requirement

- The Proponent provide evidence of how they will ensure that soil removed from the containment cell is used only on lands suitable for the criteria to which it has been remediated to.

7. Tracking of contaminated material

The PD states that the sump remediation program will be, "allowing sump material to de-water in Inuvik and disposal (at southern landfill) of the drilling waste."13

Shell Canada Energy is a registered generator with the Environment Division and is required to track the movement of hazardous waste to registered receiving facilities.

7.1. Requirement

- The proponent utilizes movement documents to track the movement of all contaminated material out of the containment cell.

12 GNWT February 1998, Guideline for the General Management of Hazardous Waste in the NWT. Also available online at: http://www.enr.gov.nt.ca/_live/documents/content/General_management.pdf

13 Page 7, Section 5.3.Sump Remediation Program: Project Scope. Shell Canada Energy. Unipkat I-22 Sump Remediation Project Description. Nov 12, 2010.

7.2. Recommendation

The proponent utilizes scales to quantify the weight of each load of contaminated material entering the containment facility until accurate estimates can be made. Further, the proponent utilizes scales to determine the weight of each load of contaminated material and water leaving the containment facility.

8. Camp Waste Management

The Project Description states that "All solid waste (garbage) will be collected and removed from the site and transported to Inuvik for disposal at an approved landfill site at the end of the Project."14 And "all grey water and wastewater....disposed at the wastewater processing facility in Inuvik."15

ENR notes the Proponent has not provided information on onsite waste treatment, storage or segregation, or information on mitigation measures to minimize animal attraction. Further, the Proponent has not provided estimates of the quantity of waste they will generate or any indication that the Town of Inuvik has consented to the proposed use of Inuvik's waste management infrastructure.

Further, ENR is concerned with the Proponent's use of the term "wastewater processing facility" to describe Inuvik's waste water treatment system. Inuvik contains a natural lagoon system designed for municipal wastewater effluent generated from Inuvik. ENR is not aware of any "processing", other than those naturally occurring in a lagoon, hence, the level of treatment offered by Inuvik's lagoon may not meet the expectations of the Proponent or be appropriate for the waste streams proposed.

8.1. Recommendation

ENR recommends that the Proponent prepare and submit for approval, a **Project-Specific Waste Management Plan,** which includes any contaminated soil or sump contents. This Plan must address and/or contain, at a minimum:

- The identification of hazardous (or any wastes of special concern) and non-hazardous waste types and volumes expected to be produced, and a detailed listing of storage, treatment and disposal locations for these wastes.
- This waste listing must include an identification of odourous wastes that may attract wildlife, and the identification of its storage and transport mitigative measures to prevent wildlife attraction. Whether odourous waste is stored for the purpose of on-site or off-site disposal (i.e. road or air transport), it must be stored in an airtight sealed container to prevent wildlife from being attracted to odours;
- Listed hazardous wastes (or any wastes of special concern) must also include and demonstrate that the disposal of contaminated materials that may result from accidents and malfunctions (including spills) has been prepared for. This information should be cross-referenced to and included in the Spill Contingency Plan associated with the Project.
- In the case that community facilities are proposed for use in disposal, alternate disposal and transport options must be provided in the case that the referenced community's waste handling facility cannot accommodate the proposed and estimated waste types and quantities listed.
- Should the Proponent propose incineration as a waste management option, details on the incineration must be provided prior to site operations, and annually thereafter. ENR refers the Proponent to Environment Canada's Technical Document for Batch Waste Incineration (www.ec.gc.ca/drgd-wrmd/default.asp?lang=En&n=82401EC7-1). The Information should include but not be limited to the following:
  - Incineration technology selected;
  - Waste audit -- amount and types and mix of waste incinerated;
  - Operational and maintenance records;

14 Page 16, Section 5.8 Waste Management and Wastewater Treatment and Disposal. Shell Canada Energy. Unipkat I-22 Sump Remediation Project Description. Nov 12, 2010.

15 Page 16, Section 5.8 Waste Management and Wastewater Treatment and Disposal. Shell Canada Energy. Unipkat I-22 Sump Remediation Project Description. Nov 12, 2010.

- Operator training;
- Incineration ash disposal, year round.

If incinerator bottom and/or fly ash are targeted for disposal in the NWT, it must be tested prior to disposal to ensure that it meets the criteria specified in the *NWT Environmental Guideline for Industrial Waste Discharges*16. Incineration ash can be contaminated with toxic compounds and should therefore be tested to ensure that it is disposed of in an appropriate and approved manner.

Comments and recommendations were provided by ENR technical experts in Environment Division and/or the Inuvik Region and were coordinated and collated by the Environmental Assessment and Monitoring Section (EAM).

If you have any questions or concerns, please do not hesitate to contact me at 920-6591

ENR Letter to Proponent;

Proposed Unipkat I-22 Sump Remediation

The proposed Unipkat I-22 Sump Project Description (PD) describes the treatment of contaminated soils in the Town of Inuvik. As this falls within the Department of Environment and Natural Resources (ENR) jurisdiction, we would like to correspond with you directly about the PD. Shell Canada Energy is a registered generator with the Environment Division (ED) of ENR and was issued generator number NTG000408.

1. Regulatory Approvals

The ED tracks the movement of contaminated soils as a hazardous waste in the Northwest Territories. ENR is not listed as an agency for the registration of the storage facility of contaminated soils in the Inuvik Industrial Area in Table 3-1[1].

1.1. Requirement

Due to the volume and nature of potential contaminants in the sump material, ENR requires Shell Canada Energy to contact the EDand register the storage facility in Inuvik as per section 3.3 and 3.4 of the Guideline for the General Management of Hazardous Waste[2] prior to the movement of any contaminated soil into Inuvik.

2. Soil Treatment

The PD states, "In October 2010, a lined containment cell was built in Inuvik..."[3] for the purposes of temporarily storing the drilling sump contents and treating PHC contaminated soil. The PD indicates that the sump contents and PHC contaminated

[1] Page 2 Section 3 Regulatory Approvals. Shell Canada Energy. Unipkat I-22 Sump Remediation Project Description. Nov 12, 2010

[2] GNWT February 1998, Guideline for the General Management of Hazardous Waste. Also available online at: http://www.enr.gov.nt.ca/_live/documents/content/General_management.pdf

[3] Page 11, Section 5.3.7 Soil Containment in Inuvik. Shell Canada Energy. Unipkat I-22 Sump Remediation Project Description. Nov 12, 2010.

16 http://www.enr.gov.nt.ca/library/pdf/eps/industrialwastedischarges.pdf

soil will be allowed to be dewatered in the containment cell and the collected water (leachate) will be treated and disposed of in the Inuvik lagoon[4].

ENR references Alberta Environment's Code of Practice for Land Treatment of Soil Containing Hydrocarbons (2008)[5] for the registration of contaminated soil treatment facilities in conjunction with section 3.3 and 3.4 of the Guideline for the General Management of Hazardous Waste. The Code of Practice will be referenced, where applicable, to determine the capacity of the containment cell to treat excavated soils.

ENR notes the details of the water treatment technology and effluent quality criteria are not provided, however, the Inuvik lagoon is designed for municipal effluent, not for industrial leachate sourced from industrial activities on federal lands.

2.1. Recommendation

ENR recommends that alternate disposal options are considered for the disposal of leachate collected from the lined containment cell, such as water treatment methods that meets Industrial discharge[6] criteria to allow discharge to the natural environment, or shipping to an approved facility capable of treating the leachate.

2.2. Requirement

Provide as built drawings of the containment cell to the ED including the specific location.

Provide the soil test results for the sump excavation to the ED in order to determine the criteria for the remediated soils in the containment area prior to the removal of soils as fill in the Inuvik area.

3. Sump Remediation Program: Project Scope

The PD[7] states that the sump remediation program will be,

> "allowing sump material to de-water in Inuvik and disposal (at southern landfill) of the drilling waste."

Shell Canada Energy is a registered generator with the ED and is required to track the movement of hazardous waste to registered receiving facilities.

3.1. Requirement

Shell Canada Energy utilize movement documents to track the movement of all contaminated soils out of the containment cell.

3.2. Recommendation

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[4] Page 11, Section 5.3.7 Soil Containment in Inuvik. Shell Canada Energy. Unipkat I-22 Sump Remediation Project Description. Nov 12, 2010.

[5] Also available online at: http://www.qp.alberta.ca/documents/codes/HYDROCARBONS.pdf

[6] GNWT April 2004, Guideline for Industrial Waste Discharges. Also available online at: http://www.enr.gov.nt.ca/_live/documents/content/industrial_waste_guidelines.pdf

[7] Page 7, Section 5.3.Sump Remediation Program: Project Scope. Shell Canada Energy. Unipkat I-22 Sump Remediation Project Description. Nov 12, 2010.

Shell Canada Energy use scales to weigh each load of contaminated soil entering the facility until accurate estimates can be made. Shell Canada Energy use scales to weigh each load of contaminated soil and water leaving the containment facility.

4. Treated Soil as backfill

The PD states that,

> "Once the treated soil meets applicable CCME guidelines it will be available for use as backfill material at sites in Inuvik."

ENR is concerned that soils once treated to industrial standards and removed from the containment cell may be transferred to another party who is not accountable for the ultimate use of the treated soil.

ENR does not have a regulatory tracking mechanism that ensures that once contaminated soils are treated to industrial standards and given to a third party for industrial use as backfill that the remediated soil does not get redistributed as backfill in non-industrial areas.

4.1. Requirement

Shell Canada Energy demonstrate how they will ensure that the soil removed from the containment cell is used only on lands suitable for the criteria to which it is remediated.

Please contact myself at (867) 920-8044 or email Gerald.enns@gov.nt.ca if you have further questions and prior to the transportation of contaminated soils to the containment cell in Inuvik.

Regards,

Gerald Enns
Hazardous Waste Specialist

Proponents Response: See Appendix "H"

Fisheries and Oceans (DFO):

Our review consisted of:

Shell Canada Energy – Proposed Unipkat I-22 Sump Remediation Project Description – November 2010
Unipkat I-22 Phase II ESA Site Plan with Contaminant Areas – Diagram
Photos and emails as provided on November 19, 2010.

We understand that the proponent plans to:

• Build an ice road to access the site. Water will be withdrawn from the Mackenzie River.
• Partially backfill the primary site and re-contour the excavation to the local topography. The maximum depth of the excavation will be 5m.

Remove a pre-determined contaminated section of the river bank (3-4m wide x 1.5m deep).

To reduce potential impacts to fish and fish habitat we are recommending the following mitigation measures be included into the proposed plans:

Ensure that any water withdrawal screen complies with the previously provided Freshwater Intake End-of-Pipe Fish Screen Guideline.

Remove the contaminated material along the bank area to be similar to the natural variation of the bank upstream of the area. The removal of material from the bank area will be completed only if the ice in the excavation area is land-fast. If flowing water is found DFO will be contacted to determine a new method of material removal. Once the material is removed, the bank will be graded and compacted as much as possible and any loose material will be removed from the ice.

The excavation of the main area (~10m from the bank) will be compacted as much as possible to ensure that any potential sediment from the excavation does not enter the river upon the next season's freshet. Any backfill for the excavation will come directly from the surrounding excavation site and not from any sandbars or areas within or near any water body.

Provided that the additional mitigation measures described above are incorporated into the proposed plans, DFO has concluded that the proposal is not likely to result in impacts to fish and fish habitat.

The proponent will not need to obtain a formal approval from DFO in order to proceed with the proposal.
Please ensure that this office is notified at least 10 days before starting the work. A copy of this letter should be kept on site while the work is in progress.

If the plans have changed or if the description of the proposal is incomplete the proponent should contact this office to determine if the advice in this letter still applies.

Please be advised that any impacts to fish and fish habitat which result from a failure to implement the proposal as described or incorporate the additional mitigation measures included in this letter could lead to corrective action such as enforcement.

Letter of request to DFO

Further to our recent conversations, we would like the Department of Fisheries and Oceans to approve a plan to use frozen bar sediments from Arvoknar Channel as a source of backfill for the remedial excavation of the Unipkat I-22 sump. This letter is intended to provide DFO with the rational for approval of this proposal.

1. PROPOSED PLAN
During the Unipkat I-22 sump remediation program we propose to remove approximately 3000 m3 of sediment from the surface of exposed, frozen sandbars in Arvoknar Channel for use as backfill in the riverside remedial excavation. Besides the desire of the surrounding communities to avoid leaving a depression and pond at Unipkat I-22, there are tangible environmental benefits and margins of confidence gained by completely backfilling the proposed excavation. The idea of using channel bars as a source of backfill was suggested to Shell Canada during community consultations with the Inuvik Hunters and Trappers Committee.
The proposed methodology for the sediment removal is to select channel bars that are exposed and frozen. Approximately 0.3 m of sediment would be ground off of the upper surface of the bars using an Iron Wolf excavator.

2. REQUEST FROM DFO
During our discussions, DFO requested that we provide details on how the removed surfaces of sandbars would affect hydraulics during breakup and high water flows with and without ice cover; information on bed loads and a prediction of the time required for the bars to recover their previous shape.

3. ANALYSIS OF AVAILABLE INFORMATION
The Mackenzie River Delta is subject to large movements of sediment. The volume of the proposed sediment removal for backfill at Unipkat I-22 is minimal compared to natural sediment movement. Although volumes of water and

sediment movement in Arvoknar Channel are not known, Arvoknar is one of five main branches of Middle Channel and is similar in size to East Channel. Each year, East Channel in the Mackenzie River transports an estimated average of 1.4 billion tonnes of suspended sediment into the delta from June through September (based on available Canada Water Survey data for 1974, 1975 and 1994). Using a conservative estimate of flow in Arvoknar Channel would be in the range of 50% of the flow in East Channel. Based on these estimates, the volume of suspended sediment transport in Arvoknar Channel would be 700 million tonnes (annually June through September). A generous estimate for the proposed volume of borrowed material is approximately 5400 tonnes which is 0.0008% of the estimated suspended load. The channel is also likely to contain significant volumes of bed load.

Past experience at other locations has indicated that sedimentation rates in the Mackenzie Delta are high. Dredged channels such as those at the Kittigazuit S-bends have been rapidly in-filled by sediment. Scouring of sediments and erosion by strudelling are additional mechanisms of sediment displacement in the Delta and further indicate that the natural environment is accustomed to the processes of large sediment movements.

While features such as point bars may be a relatively consistent size and shape over time, they are likely subject to periods of both erosion and deposition. Fundamentally however, point bars are depositional features in rivers and it is likely that wherever sediment is removed from space for deposition of new material.

Studies in other channels in the Mackenzie Delta have found that these channels can be highly dynamic and undergo rapid erosion and sedimentation rates. Bank erosion rates of approximately 6 m per year have been measured in Kumak Channel and corresponding sediment deposition was recorded downstream (Whalen et. al. 2009).

Studies on Arvoknar Channel have demonstrated that there is a significant rate of cut bank erosion, averaging 1 m/year at the Unipkat I-22 site (Komex 2002, IEG 2009, IEG 2010). The cut bank erosion is a source of bed load in the channel and past studies of channel cross sections have suggested that in-channel deposition does occur downstream of rapidly eroding banks (Whalen et. al. 2009). Studies conducted at the mouth of Arvoknar Channel have found that there has been major reorganizing of the mouth bars (Solomon, 2011). These observations support the hypothesis that significant volumes of sediment are naturally moving in the channel and that material eroded from upstream cut banks would provide sediment for deposition on bars where sediment was removed.

By completely backfilling the remedial excavation with sediment from the river there is likely a net benefit to the channel's natural morphology over time. By using native material to completely backfill the excavation on the eroding river bank, permafrost and erosion rates are more likely to resemble the original site conditions and less likely to increase bank erosion rates that may otherwise be increased if a void was left in the excavation.
Table 1 summarizes the information that would be required and is available to develop a model for flow and sediment characteristics on channel bars in Arvoknar Channel.

Table 1: Information Required to Model Flow Characteristics and Predict Sediment Deposition on Bars in Arvoknar Channel

Information	Available Y/N?	Source	Alternative
Flow Rates	No	The Canada Water Survey (CWS) does not have data for Arvoknar Channel	CWS has water level (stage) data for a point upstream of the site and flow rates for Middle Channel. May be possible to estimate the volume of flow that branches off of middle channel. The estimate would be inaccurate. Winter flow velocities could be collected but would not reflect peak flow or break up conditions.
Channel Bathymetry	No	Darwin Monita of Aquatics Environmental Services indicated that detailed bathymetry had not been conducted on Arvoknar because barges are able to pass	There is a Channel cross section from the 1990's in Shell's I-22 file. A winter field program could provide additional channel cross sections
Historic Channel Morphology	Yes	Can be analysed from historic air photos	
Break-up Sequence	No		Could be estimated from other studies in the region and estimated from satellite imagery but likely to be highly variable.
Sediment Loads	No		Could be estimated from other studies in other channels in the Delta.
Sediment Characteristics and Sheer Stress	Possible	Canada Water Survey may have data for samples collected up stream.	A field investigation could collect samples

The information in Table 1 demonstrates that there is insufficient data to produce or calibrate a reliable model. Any model generated would rely upon a large array of assumptions that could not be field calibrated. The flow dynamics of break-up are complex and highly variable over time.

4. PRECEDENT

The removal of sediment from river channels is generally conducted as a dredging operation to increase water depth for transportation. In the case of channel deepening, the spoil material is a waste by-product that must be disposed of. Local examples of this can be seen in the dredging of the Kittigazuit S-bends and removal of bar/bank material during Shell Canada's 2007 Niglintgak Foundation Trial on the bank of Middle Channel. The sourcing of fill from channel deposits is uncommon for several reasons that include its relative inaccessibility and the general poor quality of silt for engineering purposes.

In the case of Unipkat I-22, river sediments from the local environment are an ideal borrow source. There is a recognized positive benefit to maintaining permafrost by backfilling the excavation; a scarcity of suitable alternative fill; the quantity required is minimal compared to the abundant potential supply; the channel bars are renewable, the geotechnical characteristics of the fill are relatively unimportant; and, the material is similar to surrounding soils and will be returned to the channel environment in the course of natural channel morphology. These benefits are site specific and uncommon. The unusual circumstances of this site are unlikely to be replicated in many cases.

5. CONCLUSIONS

There are large data gaps that restrict the development of model that would predict sediment and flow characteristics in Arvoknar Channel. Any modelled predications on bar morphology would be speculative and based on large assumptions that would devalue the results.

A wide range of observations and studies indicate that Arvoknar Channel transports sufficient sediment loads to replenish the proposed volume of removed bar material. It is also likely that the natural flow of the river would deposit new sediment on the bars.
The Mackenzie River is subject to significant natural and human displacements of sediment for a variety of reasons. The proposed shallow scallops that would be formed by the removal of sediment for this program are relatively minor compared with natural sediment dynamics in the Mackenzie Delta. Because the removed sediment would be frozen and would be replaced by subsequent spring or summer flows, there is unlikely to be negative effects on fish or fish habitat.

We would appreciate the input of DFO on the selection of bars and, should the Department see fit, would welcome DFO supervision of the operation.

DFO Letter to INAC:

Subject: DFO as RA - Response to Other RA (Lead)

With respect to the Unipkat I-22 Sump Remediation on Arvoknar Channel, for which your department is the responsible authority under the *Canadian Environmental Assessment Act* (CEAA), Fisheries and Oceans Canada (DFO) is also a responsible authority for the project. It is our understanding that your department had agreed to take a lead role in the conduct of the environmental assessment, including the management of the Canadian Environmental Assessment Registry, and the preparation of the screening report to be signed by all RAs. We have been provided the draft report to review and approve before it is finalized. We have also been provided with the Canadian Environmental Assessment Registry (CEAR) Reference Number with respect to environmental assessment of this project.

DFO has determined that a Section 35(2) Authorization will be issued for the harmful alteration, disruption and destruction (HADD) of fish habitat related to the removal of material from a sandbar within Arvoknar Channel. An application for authorization has been submitted to DFO by the proponent. This activity should be included within the screening report project scope, including the Project Boundary, the Site Backfill, and the Post-Remediation Monitoring sections. The proponent's proposal for the use of frozen river sediment as a source of backfill for the excavation has been attached to this letter for inclusion within the screening document. In addition, the Application for Authorization has been attached to this letter.

On Dec. 21, 2010 DFO provided expert advice relative to fish and fish habitat to contribute to the environmental assessment under CEAA that should be incorporated into the screening report. This advice is outside of the scope of the Section 35(2) Authorization stated above. The letter has been attached for your reference.

After taking into account implementation of appropriate mitigation measures, including the authorization to be completed, we have concluded that the project is not likely to cause significant adverse effects on fish and fish habitat.

We await completion of the screening report for our review and approval and completion of the environmental assessment process before determining a course of action.

Proponents HADD Applications; See APPENDIX "J"

Environment Canada (EC):

EC offers the following recommendations and comments for the proposed project:
General:

1. All mitigation measures identified by the Proponent, and the additional measures suggested herein, should be strictly adhered to in conducting project activities. This will require awareness on the part of the Proponents' representatives (including contractors) conducting operations in the field. EC recommends that all field operations staff be made aware of the Proponents' commitments to these mitigation measures and provided with appropriate advice / training on how to implement these measures.

2. Section 5.2 *Previous Work* of the Project Description indicates that 5 000 m3 of contaminated soil is present, but that only 3000m3 will be excavated (Section 5.3.5 *Soil Excavation*). The Proponent should clarify why they only plan to remove 60% of the contaminated soil. In addition, although the "majority" of contamination is said to be in and around the sumps, this indicates that there is other contamination elsewhere, although no details are provided in this regard. EC requests that the Proponent provide details on the other areas of suspected contamination.

3. The delineation was done using CCME industrial land use standards; however EC recommends that agricultural land use criteria be applied to natural / wild lands particularly in the Arctic, where ecosystems are more fragile and known to have more linear, shorter food-webs (Swanson, 2007). If no guidelines are available from the Northwest Territories, and the proponent chooses not to use the CCME Canada Wide Standard for Petroleum Hydrocarbons in Soil (2008) guidance, the proponent may consider adapting the Alberta Tier 1 guidance for petroleum hydrocarbon contaminated soil for a natural area land use.
4. The contaminants of concern (COCs) at the site are noted to include petroleum hydrocarbons, potassium chloride, and total barium. Infrastructure and activities at the site may have contributed to other contaminants of concern at the site. Although it is not mentioned in this report, the Proponent should ensure that total metals are accounted for, and if burning was undertaken, dioxins and furans as well as polyaromatic hydrocarbons (PAHs) may be a concern at the site. In addition, the CCME guidelines for petroleum hydrocarbons are split amongst different hydrocarbon fractions, F1 – F4; comparison to these standards will require proper chemical assessment for each fraction.

5. Permafrost is identified in table 10-2 *Record of Consultation* (first Response / Comment by Shell on page 28) as a barrier employed as a berm. Permafrost may not be the most reliable barrier; especially if the excavated area is expected to be flooded this could create an even more unstable permafrost zone. In addition, studies have shown that melt water may continue to flow beneath permafrost in discontinuous permafrost zones. For that reason, thermisters used to monitor the integrity of the barrier should extend below the depth of impacted soil.

Water Quality

6. Section 5.3.5 *Soil Excavation* states that the flare pit and camp sump have been partially eroded by the river. As such, EC would like to remind the Proponent that meeting the requirements of the *Fisheries Act* is mandatory, irrespective of any other regulatory or permitting system. Section 36(3) of the *Fisheries Act* specifies that unless authorized by federal regulation, no person shall deposit or permit 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. 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.
7. The Proponent is advised that environmental soil quality guidelines do not apply within 10m of a surface water body. Contamination that is present within 10m of a surface water body must be dealt with on a site-specific basis to develop criteria which are protective of aquatic life such that no deleterious impacts to fish or sediment occur.

8. Although the Project Description mentions that groundwater monitoring wells and thermisters will be maintained, this presumes that groundwater, or perhaps more appropriately, permafrost meltwater, is a potentially active pathway for the transport of contaminants. However, the Project Description does not refer to any plans to address contaminated sub-surface water, nor does it present evidence that it is not a contaminated media. In particular given the low-land topography of the site and predicted future flooding and erosion, it is important that all potentially operable contaminant pathways are delineated and addressed to prevent migration of contaminants from soil in to groundwater and surface water.

9. If the Proponent requires a watercourse crossing to access the site for the ice road, EC recommends that the following measures be implemented at all watercourse crossings:
    - Winter stream crossings should be located to minimize approach grades and be constructed entirely of ice and snow materials;
    - The banks of any watercourse should be protected using suitable erosion control measures;
    - Mechanized clearing should not be done immediately adjacent to any watercourse; and
    - Water crossings should be at right angles to streams and stream crossings shall be removed or notched prior to spring break-up.

Fuel / Spill Contingency

10. Please note that any spill of fuel or hazardous / deleterious materials, adjacent to or into a water body, **regardless of quantity** must be reported immediately to the NWT / NU 24-hour Spill Line, **(867) 920-8130**. EC will be notified through this process.

11. A dedicated area should be used for refuelling equipment with measures taken to ensure capture and containment of drips and potential spills. Secondary containment or a surface liner (drip pans, etc.) should be used when refuelling any equipment on site and should also be used at all tent / cabin fuel drum locations. An appropriate spill kit with absorbent material should be located at all fuel storage and transfer sites and at drill sites Spill kits, shovels, barrels, sorbents, pumps, etc. should be consistently maintained and readily available.

12. According to the Project Description the Proponent intends on storing fuel on-site (section 5.6 *Fuel Storage*). Please note the new CEPA *Storage Tank System for Petroleum Products and Allied Petroleum Products Regulations* that 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 at www.ec.gc.ca/st-rs.

Waste Treatment

13. The Proponents soil management plans consist of landfilling and leachate containment for the hydrocarbon-impacted soil. EC recommends that a more active land farming approach be considered as it may result in a more successful soil remediation program that may be useful for more than landfill cover. Land farming can be conducted in cold climates, and if this option is considered, the proponent may refer to EC guidance on land farm construction and operation.

    If a landfarm is selected as a remedial option operating, generic, site-specific remediation limits as per the CCME Environmental Quality Guidelines (EQGs) or Canadian Wide Standards for Petroleum Hydrocarbons in Soil (CWS-PHC) should be used to monitor the extent to which the soil has been remediated to acceptable levels. The parameters analyzed during the environmental site assessment should be evaluated using these guidelines to determine chemicals of concern (COCs) and those identified should be tracked during the remediation process.

Wildlife

14. EC recommends that food, domestic wastes, and petroleum-based chemicals (e.g., greases, gasoline, glycol-based antifreeze) be made inaccessible to wildlife at all times. Such items can attract predators of migratory birds such as foxes, ravens, gulls, and bears. Although these animals may initially be attracted to the novel food sources, they often will also eat eggs and young birds in the area. These predators can have significant negative effects on the local bird populations.

15. Section 5.1 of the *Migratory Birds Convention Act* 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.

16. The following comments are pursuant to the SARA, which came into full effect on June 1, 2004. Section 79 (2) of SARA, states that during an assessment of effects of a project, the adverse effects of the project on listed wildlife species and its critical habitat must be identified, that measures are taken to avoid or lessen those effects, and that the effects need to be monitored. This section applies to all species listed on Schedule 1 of SARA. However, as a matter of best practice, EC suggests that species on other Schedules of SARA and under consideration for listing on SARA, including those designated as at risk by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), be considered during an environmental assessment in a similar manner.

EC recommends:

- Species at Risk that could be encountered or affected by the project should be identified and any potential adverse effects of the project to the species, its habitat, and/or its residence noted. All direct, indirect, and cumulative effects should be considered. Refer to species status reports and other information on the Species at Risk registry at www.sararegistry.gc.ca for information on specific species as well as the booklet "Species at Risk in the Northwest Territories" (2010 Edition) available at http://www.enr.gov.nt.ca/_live/pages/wpPages/Species_at_Risk.aspx.
- If Species at Risk are encountered or affected, the primary mitigation measure should be avoidance. The Proponent should avoid contact with or disturbance to each species, its habitat and/or its residence.
- Monitoring should be undertaken by the Proponent to determine the effectiveness of mitigation and/or identify where further mitigation is required. As a minimum, this monitoring should include recording the locations and dates of any observations of Species at Risk, behaviour or actions taken by the animals when project activities were encountered, and any actions taken by the Proponent to avoid contact or disturbance to the species, its habitat, and/or its residence. This information should be submitted to the appropriate regulators and organizations with management responsibility for that species, as requested.
- For species primarily managed by the Territorial Government, the Territorial Government should be consulted to identify other appropriate mitigation and/or monitoring measures to minimize effects to these species from the project.
- Mitigation and monitoring measures must be taken in a way that is consistent with applicable recovery strategies and action/management plans.

17. EC would like to remind the Proponent that they would need to apply for a permit if any project activities are likely to enter or use existing facilities within the Kendall Island Bird Sanctuary (e.g. Camp Farewell).

18. Implementation of these measures may help to reduce or eliminate some effects of the project on migratory birds and Species at Risk, but will not necessarily ensure that the Proponent remains in compliance with the *Migratory Birds Convention Act, Migratory Birds Regulations,* and the SARA. The Proponent must ensure they remain in compliance during all phases and in all undertakings related to the project.

If there are any changes in the project proposal or more information is available, EC should be notified, as further review may be necessary. Please do not hesitate to contact me at (867) 669-4748 or Stacey.Lambert@ec.gc.ca with any questions concerning the above points.

Environment Canada (EC) submitted comments on the Unipkat 1-22 Sump Remediation Project on January 5, 2011 to Indian and Northern Affairs Canada in response to a request for comments on a Land Use application (N2010X0022) (see attached letter). On January 19, 2011, EC received the following questions from IEG Consultants Ltd. for Shell Canada Energy (the Proponent) (electronic mail correspondence between Sam Bird, IEG Consultants Ltd. and Stacey Lambert, EC):

1. Do the *Canadian Environmental Protection Act Storage Tank Systems for Petroleum Project and Allied Petroleum Products Regulations* apply to the 40,000 L double walled Envirotank tanks that may be used on-site?
2. Does EC have any concerns with extracting material from exposed sand bars as a supply of backfill (required estimate of 2000 m3)?

EC offers the following responses to the questions posed by the Proponent:

Envirotanks:

1. Yes, the Storage Tank proposed for use is captured under the Storage Tank Regulations since the tank to be used is an Envirotank and will be placed within Federal Lands. Envirotanks are designed to be installed in a fixed location, and not designed to be moved with product in them (i.e. not a mobile tank). The Envirotank should not be moved with product inside due to the risk of compromising the structural integrity of the tank. The proper installation of an Envirotank involves having it mounted on steel or concrete saddles at least 4" off the ground. Alternatively,

another appropriate method of storage for petroleum products would be to use a skid mounted tank. This type of tank is designed for a fixed location but moveable when it is drained of product. If this type of system were to be used, then the tank should be identified with EC and the location updated as it is moved. In particular, the Proponent may want to consider the following points (in conjunction with the Storage Tank Regulations) before continuing with this proposal:

Intended use of the tank according to Underwriters Laboratories of Canada (ULC) standards;
Installation requirements under the Storage Tank Regulations;
Containment of transfer areas under the Storage Tank Regulations; and
Emergency Plan requirements under the Storage Tank Regulations.

Further information on these Regulations can be found at www.ec.gc.ca/st-rs.

Sandbars as a supply of backfill:
1. EC's concerns with extracting material from exposed sandbars as a supply of backfill would be related to potential migratory bird habitat impacts and deposition of sand/ sediment into fish-frequented waters. It is EC's understanding that the Department of Fisheries and Oceans (DFO) believes the proposal to remove material from sandbars or areas within or near waterbodies would likely result in impacts to fish and fish habitat, and has not authorized the activity. If the proposed activity is authorized by DFO, EC would recommend the following mitigation measures:

a. Work on the sandbars should take place before May 15 to avoid bird nesting season. If work takes places after May 15, the Proponent would need to conduct nest searches prior to the works beginning to ensure that there are no nests in the area.

b. Meeting the requirements of the *Fisheries Act* is mandatory, irrespective of any other regulatory or permitting systems. Section 36(3) of the *Fisheries Act* specifies that unless authorized by federal regulations, no person shall deposit or permit the deposit of deleterious substances of any type in water frequented by fish, or in any place under any conditions where the deleterious substance may result from the deposit of the deleterious substance, may enter such water. As such, the Proponent should use suitable erosion and sediment control measures during excavation of material from the sandbars. Furthermore, the Proponent should be prepared to conduct follow-up monitoring of the excavation areas to ensure that mitigation was effective, and the areas stabilized.

Proponents Response:

See APPENDIX "H"

Parks Canada (PC):
No concerns

NWTWB:

The comments and questions provided herein are based on a review of Shell Canada Ltd Project Description and Schedule III of the *NWTWR*.

The following provides general review comments and questions related to overall deficiencies in the Project Description and Schedule III of the *NWTWR*. The Project is lacking detailed information required to process the screening under *CEAA* in regards to water and waste management. According to the NWT Water Board support staff, the following clarifications are needed in order to complete the screening of the Unipkat I-22 project.

***NWTWR*- Schedule III :**

Section seven (7) 'Quantity of Water Involved'
It is mentioned in this section "It is estimated that a volumetric water use withdrawal amount of up to 350 m^3/ day may be required." But in the Project Description (pages 2 and 7) it is mentioned "it is our intention to use less than 100 m^3/ day."

The NWT Water Board support staff is seeking clarification regarding the quantity of Water to be use for the proposed project.

The NWT Water Board support staff is seeking clarification regarding the following:

- The location for the temporary storage of each type of soil (i.e. soil affected with petroleum hydrocarbons (PHC), potassium chloride (KCl), total barium (Ba), clean soil, sump material);
- The concentration level of soil affected with PHC, KCL and Ba to be deposited of;
- The proposed methods for the disposal of soil contaminated with KCl and Ba;
- The quantity of soil and sump material to be disposed of;
- The proposed methods for temporary soil storage for soil affected with KCl and Ba;
- Does the town of Inuvik approve the disposal of all type of waste, fuel and affected soil from this project in their facilities?
- Does CCS landfill in British-Columbia approve the disposal of dewatered sump material in their solid waste landfill facility?
- It is mentioned in the Project Description page 10 "the surrounding PHC affected soils will then be transported from the site to the treatment cell for dewatering and subsequent treatment for the removal of PHC over approximately two or more summer seasons depending on the results of periodic analytical testing". More information regarding the subsequent treatment is required;
- It is mentioned in the Project Description page 11 "it is anticipated that some of the moisture will be removed through evaporation and the remaining pooled water will undergo testing and possible further treatment before being disposed of at the Inuvik municipal waste water facility." More information regarding the possible further treatment is required;
- It is mentioned in the Project Description page 12 "In the event that the amount of water from the soil needs to be removed from the containment cell, it will be pumped into an 80,000 L holding tank to allow for testing and possible treatment with granular activated carbon to satisfy discharge requirements. The location where contaminated water be disposed of is required;
- The method use for the storage of solid waste before it is being sent to Inuvik
- More information with respect to riverbank disturbance (i.e. How will the material be removed? What measures will be taken to reduce the impact on the riverbank? What is the length and width of the riverbank that will be impacted?); and
- More information with respect to Spill Contingency Planning is required.

Proponents Response: See APPENDIX "H"

Proponents Letter to NWTWB: See APPENDIX "I"

INAC :

Information Requests 1:

Shell plans to leave some hydrocarbon and salt contaminated soil located to the north and northeast of the planned excavation. If the planned excavation fills with water, the surrounding soil could melt and contaminants could move into the surface water. Ponding in the excavation is likely since there is not enough material on site to fill the void space, and the site regularly floods.
How does Shell plan to protect the remaining contaminated materials from melting?
Has Shell considered removing all of the contaminated material from the site?
How big is the sump in total and will all of the sump contents being removed?

Proponents Response:

Historic records indicate that the sump received 2,045 m3 of drilling waste. Drilling records from our 2007 and 2010 assessments have indicated the location of the drilling waste is in the main sump location and we anticipate removing approximately 3,000 m3 from this location and the surrounding soils during the 2011 remediation program. It is our intention that the 3000 m3 will include all of the drilling waste in the sump.

An area containing hydrocarbon affected soil is located north of the main sump. Shell has considered options to remove all of the hydrocarbon affected material from the site. However, the intention of the 2011 remediation program is to remove drilling waste from the sump location in order to mitigate the risk of sump erosion into Arvoknar Channel. The hydrocarbon affected soils that will remain to the north of the excavation are not at risk of erosion in the near future and do not appear to contain drilling waste.

We would like to address the issue of insufficient fill material available at the site to completely backfill the excavation by exploring the possibilities of amending our proposed methodology. The Project Description (PD) submitted to the EISC stated that due to a lack of additional backfill, our preferred methodology would be to leave part of the excavation open and allow it to fill with water. Based in part on feedback we have received to date, we are continuing to assess the feasibility of implementing our alternate plan (also described in the PD) of backfilling the excavated area completely by sourcing additional backfill material from exposed sandbars close to the site. We discussed the possibility of collecting sandbar material for backfill with the Department of Fisheries and Oceans in November and we will continue to evaluate this option.

We propose the use of sandbars as source material for the following reasons:
- The sources of available backfill we have analysed from Inuvik contain concentrations of arsenic greater than concentrations currently found at the site and above CCME guidelines making this material an undesirable source;
- Using granular material from sources such as Ya-Ya, Source 177 or Aklavik may alter the rate of erosion at the site and affect river morphology. Material sourced from other locations may also introduce foreign plants or seeds to the site;
- Granular material is a limited resource in the area and it's utilization as backfill that will likely be eroded into the Mackenzie Delta maybe considered wasteful; and,
- The sandbars are composed of similar material as is naturally found at the site and surrounding area. Erosion rates are unlikely to be affected with this material as backfill and the limited amount of volume required is insignificant when compared to the sediment load of the Mackenzie River in these channels;

The use of exposed sandbars as a source of backfill material will, at the very least, depend upon the input and approval of DFO.

By backfilling the excavation to avoid ponding in the remediated sump area, permafrost conditions at the site would likely be maintained. Maintenance of the thermal regime at the site may mitigate possible movement of hydrocarbons from affected soils to the north of the excavation.
The site currently has two thermistor installations that will be maintained in undisturbed terrain and we intend to place a new thermistor in the backfilled material near the northern extent of the excavation to monitor thermal conditions in the remediated area.

Regardless of whether or not the excavation is completely backfilled, we are proposing to place a bentonite barrier along the northern excavation wall while the excavation is open to retard the movement of remaining hydrocarbons into the backfilled and/or ponded area. The excavation would then be backfilled either partially or completely against this barrier. A conceptual design for the bentonite barrier is shown in cross section in the attached figure(APPENDIX G). It is anticipated that even if the excavation is partially backfilled, the northern extent would be backfilled with a buffer of soil that would help insulate the undisturbed material to the north.

Information Requests 2:

Shell has considered to add a bentonite barrier between the remaining affected soil to the north and the excavated area. Shell had discussed the possibility of collecting sandbar material for backfill with the Department of Fisheries and Oceans in November and will continue to evaluate this option.

Should the possibility of a Harmful Alteration Disruption/Destruction of fish habitat Authorization be required and have further time constraints:

Please provide more detail with regards to the slope of the "Bentonite wall" and a diagram to the locations and sloping? What contingencies will be in place if the slopes of the excavation slumps or fails?

How much ice content is in the sump area being removed and surrounding area?
INAC seeks further clarification of the monitoring program for the excavated area and of any ponded water?

Proponents Response: See APPENDIX "H"

Transportation:

No comment received

GNWT/ DOT:

With regards to the above noted project description for screening, the Department of Transportation – GNWT provides the following comments:

Shell Canada Energy, or their agents, should:

- Obtain an access permit from DOT to link to the Inuvik-Tuktoyaktuk ice road;
- Complete the use of ice road by April 15, 2011; and
- Abide by posted load limits of the ice road.
- If the proponent plans to access the project area via the Inuvik-Tuktoyaktuk Winter Road, the proponent will be required to comply with the Department of Transportation's ice road restrictions and load limits.
- An access permit will be required if the proponent plans to construct a winter road from the Inuvik-Tuktoyaktuk Winter Road to the project area.

11. Significance

After taking into account the above mitigation measures, are any of the adverse environmental effects significant?

__Yes X No if yes, identify which one(s) and proceed to 11; if no, proceed to #12

12. Likelihood of Occurrence

Of the identified adverse significant environmental effects in #11, are any likely to occur?

n/a Yes n/a No If yes, which one(s)?

13. Consultation on Screening Report

Public consultation on screening report deemed necessary? _ _ Yes _X_ No
Deadline for comments on screening report N/A
Public Comments Received on Screening Report? _ _ Yes _X_ No

14. Monitoring Program

Regular land use and operation inspections should suffice to identify any problems needing attention. In addition, the Inuvialuit Land Administration will have a monitor on the project to ensure that their concerns are addressed during operations.

13.a) CEAA Determination and Authorization - DIAND North Mackenzie District

Determination:

_X__ Section 20 (1)(a) - Project may proceed as it is not likely to cause significant adverse environmental effects.

___ Section 20 (1)(b) - Project may not proceed as it is likely to cause significant adverse environmental effects that cannot be justified.

___ Section 20 (1)(c)(i) - Project must be referred to the Minister of Environment as it is uncertain whether the project is likely to cause significant adverse environmental effects.

___ Section 20 (1)(c)(ii) - Project must be referred to the Minister of Environment as it is likely to cause significant adverse environmental effects.

___ Section 20 (1)(c)(iii) - Project must be referred to the Minister of Environment as public concerns warrant the reference.

Authorization:

Approved By: Conrad Baetz
District Manager, INAC

Date February 22, 2011

Section 9 Agency Contacts

Mr Conrad Baetz
District Manager
North Mackenzie District
Indian and Northern Affairs Canada
P.O. Box 2100
Inuvik, Northwest Territories X0E OTO
Facsimile (867) 777-2090
E-mail : Conrad.Baetz@inac.gc.ca

13.a) CEAA Determination and Authorization - DIAND North Mackenzie District

Determination:

_X__ Section 20 (1)(a) - Project may proceed as it is not likely to cause significant adverse environmental effects.
___ Section 20 (1)(b) - Project may not proceed as it is likely to cause significant adverse environmental effects that cannot be justified.
___ Section 20 (1)(c)(i) - Project must be referred to the Minister of Environment as it is uncertain whether the project is likely to cause significant adverse environmental effects.
___ Section 20 (1)(c)(ii) - Project must be referred to the Minister of Environment as it is likely to cause significant adverse environmental effects.
___ Section 20 (1)(c)(iii) - Project must be referred to the Minister of Environment as public concerns warrant the reference.

Authorization:

Approved By: Mike Hecimovich
Area Director, DFO

2011-02-23
Date

Section 9 Agency Contacts

Mr. Mike Hecimovich
Area Director
Western Arctic Area
Central and Arctic Region
Fisheries and Oceans Canada
300- 5204 50th Avenue
Yellowknife, NT, X1A 1E2
Fax 867 669 4914
Email: mike.hecimovich@dfo-mpo.gc.ca

13.a) CEAA Determination and Authorization - DIAND North Mackenzie District

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___ Section 20 (1)(c)(iii) - Project must be referred to the Minister of Environment as public concerns warrant the reference.

Authorization:

Approved by: Eddie Dillon
Chair, NWT Water Board

Date Feb 23, 2011

Agency Contacts

Mr. Eddie Dillon Chairman
Northwest Territories Water Board
125 Mackenzie Road
Suite 302, Professional Building
P.O. Box 2531
Inuvik, Northwest Territories X0E 0T0
Facsimile (867) 678-2943

Appendices

APPENDIX A: Subject Descriptors

Choose from this list and insert as a "Subject Descriptor"

___ Agriculture
___ Buildings
___ communications
___ Defense
___ energy
___ forestry
___ industry
___ inland waters
___ mining
___ oceans
_Y__ oil and gas
___ parks
___ transportation

APPENDIX B: Geographic Place Name
Refer to project description

APPENDIX C: Screening Checklist and Cumulative Effects Checklist

APPENDIX D: CEAA EA Coordination

APPENDIX E: DIAND Recommended Land Use Permit Conditions

APPENDIX F: Proponents Project Location Map

APPENDIX G: Proponents Response figure to I.R. #1

APPENDIX H: Proponents Response to I.R. ‘s

APPENDIX I: Proponents Letter to the NWTWB

APPENDIX J: Proponents HADD Application to DFO

APPENDIX C

Table A. Identification of Project Components and Environmental Effects

Identify all components of the project under screening and their potential adverse environmental effects

Project Components

(T check all the items appropriate to this project)

- ☒ access road (???)
  - ☐ construction (potentially)
  - ☒ abandonment/removal
  - ☐ modification e.g., widening,
  - ☐ straightening
- ☒ automobile, aircraft or vessel movement
- ☐ blasting (sumps)
- ☐ building
- ☐ burning of garbage
- ☒ burying (sumps)
- ☐ channeling
- ☒ cut and fill
- ☐ cutting of trees or removal of vegetation
- ☐ dams and impoundments
  - ☐ construction
  - ☐ abandonment/removal
  - ☐ modification
- ☐ ditch construction
- ☐ drainage alteration
- ☐ drilling other than geoscientific
- ☐ ecological surveys
- ☒ excavation
- ☐ explosive storage
- ☐ fuel storage
- ☐ garbage
  - ☐ disposal of hazardous waste
  - ☐ disposal of sewage
  - ☐ waste generation
- ☐ geoscientific sampling
  - ☐ trenching
  - ☐ diamond drill
  - ☐ borehole core sampling
  - ☐ bulk soil sampling
- ☐ gravel
- ☐ hydrological testing
- ☒ site restoration
  - ☐ fertilization
  - ☐ grubbing
  - ☐ planting/seeding
  - ☐ reforestation
  - ☐ scarify
  - ☐ spraying
  - ☒ recontouring
- ☐ slash and burn
- ☐ soil testing

__ topsoil, overburden or soil
- __ fill
- __ disposal
- __ removal
- __ storage (replacement over sumps)

__ stream crossing/bridging (ice roads)

__ tunneling/underground

_X_ other, explain: Sand bar excavation, see APPENDIX "J" for DFO HADD application.

Y accidents or malfunctions Describe: See section 5 of screening.

Y effects of environment on project. Describe: See section 8.a.,b 9a.) of screening.

Project Effects
(T check all the items appropriate to this project)

Biophysical Environment

1. ☐ deposit into surface water
2. ☐ deposit into ground water
3 ☐ change in surface water flow
4. ☐ change in ground water flow
5. ☐ change in water temperature
6. ☐ change in drainage pattern
7. ☒ change in air quality
8. ☐ change in air flow
9. ☐ micro-climate change
10. ☐ ice fog
11. ☒ change in ambient noise levels
12. ☐ change in slope stability
13. ☐ change in soil structure
14. ☒ alteration of permafrost regime
15. ☒ destabilization/erosion
16. ☐ soil compaction
17. ☐ loss of access to non-renewable resource
18. ☐ depletion of non-renewable resource
19. ☐ removal of rare/endangered plant species
20. ☐ introduction of species
21. ☐ toxin/heavy metal accumulation
22. ☐ removal of rare/endangered wildlife species
23. ☐ change in wildlife health
24. ☒ impact to large mammals
25. ☒ impact to small mammals
26. ☒ impact to fish
27. ☐ impact to birds
28. ☐ impact to other wildlife
29. ☐ impact in a calving, nesting or spawning area
30. ☐ removal of wildlife buffer zone
31. ☐ change in wildlife habitat/ecosystem
32. ☐ other:

Directly-related Socio-economic and Cultural Environment

33. ☐ impact to trappers
34. ☐ impact to hunting
35. ☐ impact to outfitters
36. ☐ recreational or back country use
37. ☐ impact to fishing
38. ☐ impact to Inuvialuit traditional use
39. ☒ impact to community
40. ☐ impact to industry
41. ☐ impact to community health
42. ☐ change in work force economics
43. ☐ change in housing or infrastructure
44. ☐ change in regional transportation
45. ☐ other, explain _____
46. ☐ impact to traditional use area
47. ☐ impact to historical site or cultural landmark
48. ☐ impact to local aesthetics
49. ☐ impact to archaeological or historical site
50. ☐ other, explain
51. ☐ impact to natural geologic formations in area of research.

Table B. Identification of Other Resource Uses and Their Environmental Effects

Identify relevant past, current and future (pending applications) physical works and activities and their potential adverse environmental effects.

Other Resource Uses

(T check all the items appropriate to this project)

- ☐ agriculture
- ☐ forestry
  - ☐ commercial
  - ☐ domestic
- ☐ fishing
- ☒ hunting/subsistence
- ☐ other:
- ☐ urbanization
- ☐ commercial / residential (cottages)
  - ☐ built structures
  - ☐ infrastructure
- ☐ mining
  - ☐ exploration
  - ☐ open pits
  - ☐ underground
- ☐ quarries
- ☒ transportation/communications
  - ☒ roads / trails
  - ☐ channels / canal
  - ☐ telephone lines, satellite dishes,
  - ☐ cables
  - ☐ beacons
- ☐ solid waste disposal
- ☐ energy project
  - ☐ hydro
  - ☐ pipeline
  - ☐ transmission line
  - ☐ oil and gas exploration
- ☐ other water licenses, permits, leases
- ☒ land claims
  - ☒ selected
  - ☐ withdrawn
  - ☐ special management
    - ☐ heritage sites
    - ☐ cultural sites
- ☐ other private lands held under tenure
  - ☐ recreational
  - ☐ trapping
  - ☐ mineral processing
  - ☐ airport
  - ☐ recreation
  - ☐ other:

Effects from other Resource Uses
(T check all the items appropriate to the scope of this project)

Biophysical Environment
1. ☐ deposit into surface water
2. ☐ deposit into ground water
3. ☐ change in surface water flow
4. ☐ change in ground water flow
5. ☐ change in water temperature
6. ☐ change in drainage pattern
7. ☒ change in air quality
8. ☐ change in air flow
9. ☐ micro-climate change
10. ☐ ice fog
11. ☒ change in ambient noise levels
12. ☐ change in slope stability
13. ☐ change in soil structure
14. ☒ alteration of permafrost regime
15. ☒ destabilization/erosion
16. ☐ soil compaction
17. ☐ loss of access to non-renewable resource
18. ☐ depletion of non-renewable resource
19. ☐ removal of rare/endangered plant species
20. ☐ introduction of species
21. ☐ toxin/heavy metal accumulation
22. ☐ removal of rare/endangered wildlife species
23. ☐ change in wildlife health
24. ☒ impact to large mammals
25. ☒ impact to small mammals
26. ☐ impact to fish
27. ☐ impact to birds
28. ☐ impact to other wildlife
29. ☐ impact in a calving, nesting or spawning area
30. ☐ removal of wildlife buffer zone
31. ☒ change in wildlife habitat/ecosystem
32. ☐ other, explain_____

Directly-related Socio-economic and Cultural Environment
33. ☐ impact to trappers
34. ☐ impact to hunting
35. ☐ impact to outfitters
36. ☐ recreational or back country use
37. ☐ impact to fishing
38. ☒ impact to community
39. ☐ impact to industry
40. ☐ impact to community health
41. ☐ change in work force or community economics
42. ☐ change in housing or infrastructure
43. ☐ change in regional transportation
44. ☐ other, explain_____
45. ☐ impact to traditional use area
46. ☐ impact to historical site or cultural landmark
47. ☐ impact to local aesthetics
48. ☐ impact to archaeological or historical site
49. ☐ other, explain_____

Table C. Comparison of Effects as Identified in Table A and Table B

Matching Numbers	Description of cumulative adverse environmental effects
7	Air Quality change caused by running of helicopters, drills, generators and other fuel burning machinery during the life of the project will all contribute to emissions to the air environment. These emissions may cause air quality problems in localized areas where the equipment is concentrated. These effects will only be temporary and only in small areas for a limited period of time.
11	Changes in Ambient Noise Levels - this due to the increase in noise levels from heavy equipment and other machinery over the project areas in a wilderness environment. Most wildlife in the affected areas will avoid equipment due to the noise levels.
14 & 15	Alteration of permafrost and destabilization / erosion would be an issue if land use conditions and proposed operating procedures were not adhered to. To ensure that this does not occur all programs have techniques to mitigate potential damage to the ground.
24 & 25,	Impacts to the Bluenose caribou herd could possibly occur as these programs will occur in wilderness areas. Mammals and birds may be temporarily displaced for short time periods due to the activity. Due to the short period of time required for this project there will be very minimal disturbance to wildlife.
31	Habitat will be minimally effected, as the areas identified will be quite small and no cutting of brush.
38	Local business's will see a positive effect for the short duration in the area.
46	Due to the short period of time required for this project there will be very minimal disturbance to traditional use areas.

APPENDIX D: CEAA EA Coordination

CEAA Section 5 Notification

Pursuant to section 5 of the CEAA Federal Coordination Regulations, potential responsible authorities (RAs) and federal authorities (FAs) were requested on April 4, 2007 to review the proposed project and, pursuant to subsection 6(1) of the CEAA Federal Coordination Regulations, inform the lead RA by April 14th, 2007 whether they are a responsible authority or could provide specialist advice. The responses are provided in the following table:

Role of Federal Departments/Agencies

Department/Agency (District)	Responsible Authority	Specialist Department	No Involvement
Indian and Northern Affairs (Inuvik)	**Lead RA**		
Environment Canada (Yellowknife)		X	
Fisheries and Oceans (Inuvik)	X		
Parks Canada			X
NWT Water Board	**X**		
Natural Resources Canada (Ottawa)		X	
NEB		X	

Federal Approvals

INAC: *Territorial Lands Act* Land Use Permit
DFO HADD Authorization

With respect to section 8 of the FCR, the RA prepared a determination of the scope of the project, the factors to be considered, and the scope of those factors as follows:

Scope of the Project

1. Undertaking in relation to the physical work or physical activity triggering the CEAA.

   The principal project will be the removal of the drill waste sump.

2 - Other associated physical works or physical activities to be undertaken to carry out the project. For this project to be completed the following activities will have to be undertaken to complete the project.

The sump remediation program will involve the following activities:
- building an ice road to access the site
- mobilizing heavy machinery, fuel, and camp accommodations
- site and project boundary layout
- clean soil stripping and stockpiling
- soil excavation

- trucking to Inuvik
- soil containment in Inuvik
- soil testing on the sidewalls and base of the excavation as well as stockpiled soils.
- partial site backfill and re-contouring of excavation within local topography
- demobilization from site of all infrastructure and generated waste • allowing soils to de-water in Inuvik and disposal (at southern landfill) of drilling waste

3. Other undertakings in relation to the physical works and activities identified in items (1) and (2) above.

No further related activities have been identified in relation to the physical works and activities for this proposed Project. Any additional activities would be subject to future examination under the *Territorial Lands Act,* possibly the *NWT Waters Act and Fisheries Act,* and consequently, under CEAA.

Factors to be Assessed

The factors considered within the scope of an environmental assessment are those set out in subsection 16(1) of the CEAA.

Scope of the Factors to be assessed

The following spatial and temporal boundaries for the project are suggested:

1- Spatial Boundaries

Local -	Impacts are limited to the sump removal site.
Subregional -	Impacts may extend beyond the limits of the sump removal site.
Regional -	Impacts may extend beyond 25 km from the sump removal site.

2 – Temporal Boundaries

Immediate:	Impact duration is limited to less than two days.
Short Term:	Impact duration is longer than two days but less than a year.
Medium Term:	Impact duration is one year or longer but less than ten years.
Long Term:	Impact duration extends ten years or longer.

APPENDIX E

RECOMMENDED CONDITIONS ANNEXED TO AND FORMING PART OF LAND USE PERMIT NUMBER N2010X0022

31 (1) (a) - LOCATION AND AREA

1.1	The Permittee shall not conduct this land use operation on any lands not designated in the accepted application, unless otherwise authorized in writing by the Engineer.	**PLANS**
1.2	The Permittee shall not conduct any part of the land use operation within 300 metres of any privately owned land or structure unless otherwise authorized in writing by the Engineer.	**PRIVATE PROPERTY**
1.3	(a) The Permittee shall offset vehicle travel in areas without a snow covered surface. (b) The Permittee shall confine the line to a maximum width of 10 metres unless otherwise authorized in writing by a Land Use Inspector.	**OFFSET VEHICLE TRAVEL**
1.4	The Permittee shall not construct parallel lines or roads unless authorized by the Engineer.	**PARALLEL ROADS**
1.5	The Permittee shall remove from Territorial Lands, all scrap metal, discarded machinery and parts, barrels and kegs, buildings and building material.	**REMOVE WASTE MATERIAL**
1.6	The Permittee shall locate all camps on gravel, sand or other durable land.	**CAMP LOCATION**
1.7	The Permittee shall locate all lines, trails and rights-of-way to be constructed parallel to streams a minimum of 30 metres from any stream except at crossings unless otherwise authorized in writing by a Land Use Inspector.	**PARALLELING STREAMS**
1.8	The Permittee shall only excavate and stockpile in areas designated by a Land Use Inspector.	**DESIGNATED AREAS**
1.9	The Permittee shall construct and maintain ice pads with a minimum of fifteen (15) centimetres packed snow at all times during this land use operation. The Permittee shall construct Ice Pads in a manner approved by a Land Use Inspector.	**CAMP ICE PADS**

1.10	The Permittee shall construct and maintain ice pads with a minimum of fifteen (15) centimetres packed snow at all times during this land use operation. The Permittee shall construct temporary Ice Pads in an existing camp ice pad in a manner approved by a Land Use Inspector.	**TEMPROARY BERMED ICE PADS**

31 (1) (b) - TIME

2.1	The Permittee's Field Supervisor shall contact or meet with a Land Use Inspector at the Inuvik office of the Department of Indian Affairs and Northern Development, Phone Number (867) 777-8900, at least 48 hours prior to the commencement of this land use operation.	**CONTACT INSPECTOR**
2.2	The Permittee shall advise a Land Use Inspector at least 10 days prior to the completion of the land use operation of (a) his plan for removal or storage of equipment and materials, and (b) when final clean-up and restoration of the lands used will be completed.	**REPORTS BEFORE REMOVAL**
2.3	The Permittee shall submit a progress report to the Engineer and Land Use Inspector every _7__ days during this land use operation.	**PROGRESS**
2.4	The Permittee shall notify a Land Use Inspector at least 10 days prior to backfilling any sump.	**BACKFILLING NOTIFICATION**
2.5	The Permittee shall not conduct any overland movement of equipment or vehicles before 0800 hours local time on Nov. 15th unless otherwise authorized in writing by a Land Use Inspector.	**START-UP DATE**
2.6	The Permittee shall not conduct any over- land movement of equipment and vehicles after 0800 hours local time on (April 20th), unless otherwise authorized in writing by a Land Use Inspector.	**SHUTDOWN DATE**
2.7	The Engineer for the purpose of this operation designates _April 20th__, as spring break-up.	**SPRING BREAK-UP**
2.8	The Permittee shall remove all ice bridges prior to spring break-up or completion of the land use operation unless otherwise approved in writing by a Land Use Inspector.	**REMOVE ICE BRIDGE**
2.9	The Permittee shall remove all snow fills from stream crossings prior to spring break-up or completion of the land use operation unless otherwise approved in writing by a Land Use Inspector.	**REMOVE SNOW FILLS**
2.10	The Permittee shall restore all sumps prior to spring break-up unless	**SUMPS**

	otherwise authorized in writing by a Land Use Inspector.	**SPRING BREAK-UP**
2.11	The Permittee shall commence and foster revegetation on all parts of the land used, as may be directed by a Land Use Inspector, within one year of the completion of the land use operation.	**RE-ESTABLISH VEGETATION**
2.12	The Permittee shall complete all clean-up and restoration of the lands used prior to the expiry date of this permit.	**CLEAN-UP**
2.13	The Engineer reserves the right to impose closure of any area to the Permittee in periods when dangers to natural resources are severe.	**CLOSURE**

31 (1) (c) – TYPE, SIZE OF EQUIPMENT

3.1	The Permittee shall not use any equipment except of the type, size, and number that is listed in the accepted application, unless otherwise authorized in writing by the Land Use Inspector.	**ONLY APPROVED EQUIPMENT**
3.2	The Permittee shall equip bulldozer blades used in this operation with "mushroom" type shoes or a similar type of device which shall be extended twenty (20) centimetres below the cutting edge of the blade.	**BULLDOZER BLADES & SHOES**
3.4	The Permittee shall keep all garbage and debris in a covered metal container until disposed of.	**GARBAGE CONTAINERS**

31 (1) (d) - METHODS AND TECHNIQUES

4.1	The Permittee shall scout proposed lines and routes to select the best location for crossing streams and avoiding terrain obstacles prior to the movement of any vehicle that exerts pressure on the ground in excess of 35 K pa.	**DETOURS & CROSSINGS**
4.2	The Permittee shall construct and maintain winter roads with a minimum of fifteen (15) centimetres packed snow at all times during this land use operation. If this cannot be done, then the Permittee shall construct Ice Roads in a manner approved by a Land Use Inspector.	**SNOW ROADS/ ICE ROADS**
4.3	The Permittee shall plug all bore holes as the land use operation progresses.	**PLUG HOLES**
4.4	The Permittee shall replace all excavated material from the test pits prior to the expiry of this permit.	**TEST PITS**

4.5	The Permittee shall not erect camps or store material on the surface ice of streams, channels, lakes or any waterbodies unless authorized in writing by a land use Inspector.	**STORAGE ON ICE**

31 (1) (e) - TYPE, LOCATION, CAPACITY AND OPERATION OF FACILITIES

5.1	The Permittee shall not locate any sump within one hundred (100) metres of the normal high water mark of any stream.	**SUMPS FROM WATER**
5.2	The Permittee shall backfill and restore all sumps prior to the expiry date of this permit.	**BACKFILL SUMPS**
5.3	The Permittee shall backfill all sumps in such a manner that drill waste is maintained below the 1.2 metre freeboard	**BACKFILL SUMPS-HOW**
5.4	The Permittee shall: (a) Place all excavated material over the sump area (b) Overlap the replaced material a minimum of two (2) metres beyond the edges of the existing sump wall.	**BACKFILL SUMP OVERLAP**
5.5	The Permittee shall ensure that the land use area is kept clean and tidy at all times.	**CLEAN WORK AREA**

31 (1) (f) - CONTROL OR PREVENTION OF FLOODING, EROSION AND SUBSIDENCE OF LAND

6.1	The Permittee shall remove any obstruction to natural drainage caused by any part of this land use operation.	**NATURAL DRAINAGE**
6.2	The Permittee shall not use any material other than water in the construction of ice bridges	**ICE BRIDGE MATERIAL**
6.3	The Permittee shall remove or V – notch snow fills in stream crossings as the land use operation progresses, unless otherwise authorized in writing by a Land Use Inspector.	**REMOVE WATER CROSSINGS**

6.4	The Permittee shall insulate the ground surface beneath all structures and facilities associated with this land use operation to: (a) Prevent any vegetation present from being removed and, (b) The ground settling and/or eroding.	**INSULATE GROUND SURFACE**
6.5	The Permittee shall prepare the site in such a manner as to prevent rutting of the ground surface.	**PREVENTION OF RUTTING**
6.6	The Permittee shall not move any equipment or vehicles unless the ground surface is in a state capable of fully supporting the equipment or vehicles without rutting or gouging.	**VEHICLES MOVEMENT FREEZE-UP**
6.7	The Permittee shall suspend overland travel of equipment or vehicles if rutting occurs.	**SUSPEND OVERLAND TRAVEL**
6.8	The Permittee shall establish vegetation on all areas stripped of vegetation during this land use operation to a minimum of seventy (70) per cent ground cover unless otherwise authorized in writing by the Engineer.	**REVEGETATE STRIPPED AREA**
6.9	The Permittee shall apply grass seed and fertilizer to areas designated in writing by a Land Use Inspector.	**REPLANT DESIGNATED AREAS**
6.10	The Permittee when clearing land shall: (a) Save all vegetation removed from the land use area. (b) Place the vegetation over the land use area prior to expiry of the land use permit.	**SAVE VEGETATION**
6.11	The Permittee shall save the organic soil stripped from the excavation area.	**SAVE ORGANIC SOIL**
6.15	The Permittee shall place the organic soil over the disturbed area prior to the expiry date of this permit.	**PLACE ORGANIC SOIL**

31 (1) (g) - USE, STORAGE, HANDLING AND DISPOSAL OF CHEMICAL OR TOXIC MATERIAL

7.1	The Permittee shall not use chemicals in connection with the land use operation without the prior approval of the Engineer.	**APPROVAL OF CHEMICALS**

7.2	The Permittee shall depose of all sewage in a manner approved by a Land Use Inspector.	**SEWAGE DISPOSAL**
7.3	The Permittee shall not allow any drilling waste to spread to the surrounding lands.	**DRILL WASTE CONTAINMENT**
7.4	The Permittee shall remove all garbage and debris from the area of the land use operation to a disposal site approved in writing by a Land Use Inspector.	**REMOVE GARBAGE**
7.5	The Permittee shall remove all non-combustible garbage and debris from the area of the land use operation to a disposal site approved in writing by a Land Use Inspector.	**REMOVE GARBAGE**
7.6	The Permittee shall dispose of all combustible waste petroleum products by removal.	**WASTE PETROLEUM DISPOSAL**
7.7	The Permittee shall dispose of all toxic or persistent substances in a manner as approved in writing by the Engineer.	**WASTE CHEMICAL DISPOSAL**
7.8	The Permittee shall report all spills immediately to the 24 hour Spill Report Line (867) 920-8130, which is in accordance with instructions contained in "Spill Report" form N.W.T. 1752/0593.	**REPORT CHEMICAL AND PETROLEUM SPILLS**
7.9	The Permittee shall report all spills immediately in accordance with the INAC Spill Reporting Protocol on report form N.W.T. 1086(10/79). (24 hour spill report line (867) 920 8130.)	**REPORT CHEMICAL AND PETROLEUM SPILLS**
7.10	The Permittee shall not in any circumstances deposit or allow the deposit of any deleterious substances (including but not limited to fuels, lubricants, hydraulics and coolants) of any type into any waters, or in any place under any conditions where the deleterious substances may enter any waters.	**DEPOSITING DELETERIOUS SUBSTANCES**

31 (1) (h) - WILDLIFE AND FISHERIES HABITAT

8.1	The Permittee shall not unnecessarily damage wildlife habitat in conducting this land use operation.	**HABITAT DAMAGE**
8.2	The Permittee shall not obstruct the movement of fish while conducting this land use operation.	**FREE FISH MOVEMENT**

8.3	Your operation is in an area where bears may be encountered. Proper food handling and garbage disposal procedures will lessen the likelihood of bears being attracted to your operation. Information about the latest bear detection and deterrent techniques can be obtained from the Environment & Natural Resources at (867) 777- 7308 or 777 7230.	**BEAR/MAN CONFLICT**
8.4	The Permittee shall screen all water intakes from fish bearing waters to exclude fish in accordance with DFO requirements.	**SCREENS**
8.5	The Permittee shall not feed wildlife.	**NO FEEDING WILDLIFE**

31 (l) (i) - OBJECTS AND PLACES OF RECREATIONAL, SCENIC AND ECOLOGICAL VALUE

9.1	The Permittee shall immediately suspend the Land Use operation on the site and notify the Land Use Inspector of the location of the site and nature of any unearthed materials, structures or artifacts.	**ARCHAEOLOGICAL SITES AND /OR BURIAL GROUND**

31 (1) (j) - SECURITY DEPOSIT

N/A

31 (1) (k) - PETROLEUM FUEL STORAGE

13.1	The Permittee shall report in writing to a Land Use Inspector the location and quantity of all petroleum fuel caches within ten (10) days after the establishment.	**REPORT FUEL LOCATION**
13.2	The Permittee shall not place any petroleum fuel storage containers within thirty (30) metres of the normal high water mark of any stream.	**FUEL BY STREAM**
13.3	The Permittee shall locate mobile fuel facilities on land when stationary for any period of time exceeding twelve (12) hours.	**FUEL ON LAND**
13.4	The Permittee shall not allow petroleum products to spread to surrounding lands or into water bodies.	**FUEL CONTAINMENT**
13.5	The Permittee shall have one extra fuel storage container on site equal to, or greater than, the size of the largest fuel container.	**FUEL EXTRA**

CONTAINER

13.6 The Permittee shall line the dyke and area enclosed by the dyke with a type of plastic film liner approved by the Engineer. **LINE DYKE**

13.7 The volume of the dyked area shall be 10% greater than the capacity of the largest fuel container placed therein. **CAPACITY**

13.8 The Permittee shall ensure that the dyke and the area enclosed by the dyke shall be impermeable to petroleum products at all times. **IMPERMEABLE DYKE**

13.9 The Permittee shall: **CHECK FOR LEAKS**

(a) examine all fuel storage containers for leaks a minimum of once every day.

(b) repair all leaks immediately.

13.10 The Permittee shall mark all stationary petroleum products storage facilities with flags, posts or similar devices so that they are at all times plainly visible to local vehicle travel. **MARK FUEL LOCATION**

13.11 The Permittee shall seal all container outlets except the currently in use outlet. **SEAL OUTLET**

13.12 The Permittee shall mark all fuel containers with the Permittee's name. This includes 45 gallon drums. **MARK CONTAINERS**

31 (1) (l) - DEBRIS AND BRUSH DISPOSAL

N/A

31 (1) (m) - MATTERS NOT INCONSISTENT WITH THE REGULATIONS

15.1 The Permittee shall display a copy of this permit in a conspicuous place in each campsite established to carry out this land use operation. **DISPLAY PERMIT**

15.2 The Permittee shall keep on hand, at all times during this Land Use Operation, a copy of the Land Use Permit. **COPY OF PERMIT**

15.3 The Permittee shall provide in writing to the Engineer, at least forty-eight (48) hours prior to commencement of this land use operation, the following information: **IDENTIFY AGENT**

(a) person, or persons, in charge of the field operation to whom notices, orders, and reports may be served;

(b) alternates;

(c) all the indirect methods for contacting the above person(s).

15.4 The Permittee shall conspicuously display the land use permit number on all vehicles and equipment. **DISPLAY PERMIT NUMBER**

15.5 The Permittee shall ensure that a copy of this Permit, operating conditions and definitions is provided to and understood by all contractors and sub-contractors prior to the start-up of this Land Use Operation. **PERMIT CONTRACTORS & SUB-CONTRACTORS**

15.6 The Permittee shall submit to the Engineer a contingency plan, for chemical and petroleum spills, for use during the construction and operation of the winter road. **CONTINGENCY PLAN**

15.7 The Permittee shall at all times comply with and conform to the requirements of all other applicable Federal, Territorial or local acts, regulations, ordinances or bylaws. **CONFORM TO APPLICABLE LAWS**

15.8 Upon completion of a program or the expiry of a permit, whichever occurs first, specific information is to be forwarded to this Department in duplicate as per Sections 33 & 35 of the Territorial Land Use Regulations. It shall be segregated into two parts; a map component and a descriptive component. INAC would prefer this to be submitted both in a hard copy & an electronic copy. **FINAL PLAN**

1. Mapping

A map indicating the extent of the program as it was completed with the following information on it:

- access roads/lines, trails, rights-of-way and cleared areas that were used by the permittee during the land use operation, specifying those that were cleared by the permittee.
- those that existed before the land use operation began,
- buildings, campsites, air landing strips, air navigation aids, fuel and supply storage sites,
- waste disposal sites, excavations and other works and places that were constructed or used by the permittee during the land use operation, and
- source and receiver point data indicating line locations and monuments (for 2D programs, source point data only)

- bridges, dams, ditches, railroads, highways and roads, transmission lines, pipelines, streams and all other features, structures or works that were affected by the land use operation.

The base map provided can be in one of three formats:

A standard topographic map, or
A satellite image, or
An arial photograph

All base maps and data submitted shall be of a suitable scale so as to accurately depict the program and its extent of activity within the permitted area.

2. Report

The accompanying report shall include the following (in brief):

- project summary (including any changes to the program)
- project history
- general description of program location
- timetable it was completed in
- other associated permits required to conduct the program
- any photographs which may be pertinent to the report
- any additional plans you may be considering should long term restoration or monitoring be required
- calculations in hectares (in tabular form) summarizing the area used during the land use operation. This must include; campsites, drill sites, access roads and seismic lines.
- calculation of fees per above

Submission of both the map and report must be in duplicate hard copy with all mapping information on a cd - rom as well.

RECOMMENDED MITIGATIONS SUPPLEMENTARY TO PERMIT CONDITIONS

Fuel Storage

Fuel sloops located within thirty (30) metres of a water body should be parked within an impermeable dyke. This can be constructed of snow/ice material and will reduce the likelihood of a spill penetrating the ground and migrating into the water. Should equipment need access inside the dyked area for refueling, the opening should be on the uphill side.
Refueling operations occurring outside an area described above should include a haz-mat/drip tray under the tank receptacle.

Equipment

All equipment that may be parked for four (4) hours or more, should have a haz-mat/drip tray under it, or be sufficiently diapered (leaky equipment should be repaired immediately).
Low impact wheeled vehicles should be limited to properly constructed snow/ice roads. There should be no use of these vehicles on seismic lines.

Operational

- No burning of plastics.
- Waste oil should be recycled.
- Seismic lines crossing river channels thirty (30) metres or greater in width should be stopped short of the channel leaving a buffer (where possible) between the end of the line and the channels. Equipment crossing channels should be at designated intervals of one (1) km or more and their approaches should be doglegged.
- Sleigh camps discharging grey water to the ground should do so into a snow/ice berm which can be broken up and spread on land when the camp moves next.
- On those upland areas, ie, Parsons Lake, Storm Hills, Caribou Hills, where dynamite is used as the seismic source, charges should be fifteen (15) kg or less at eighteen (18) metres depth to prevent excessive cratering. Other configurations of hole depth/charge size may be acceptable as well.

PART 1 - In this Permit:

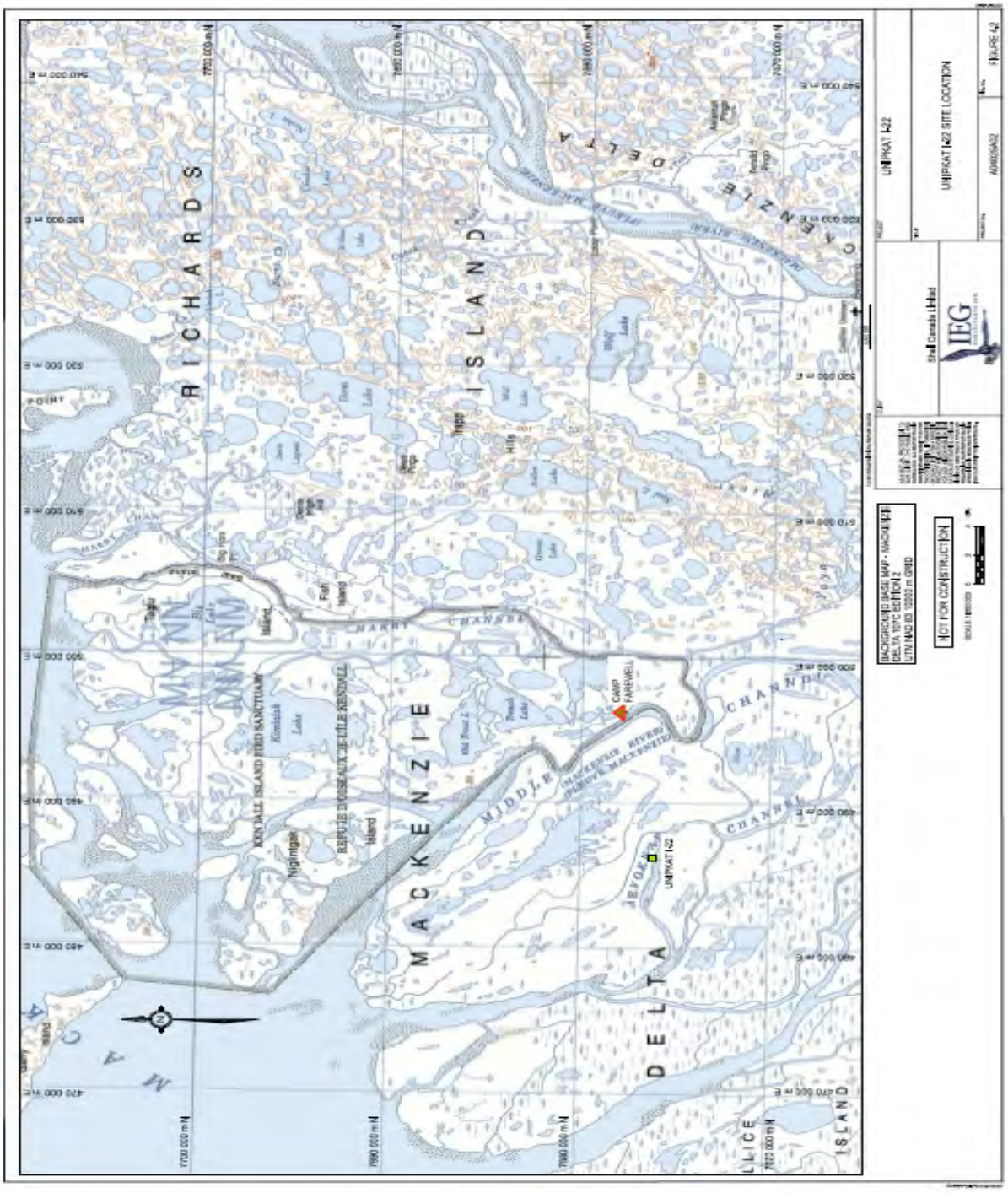
"sump" means a man-made pit, trench hollow or cavity in the earth's surface used for the purpose of depositing waste material therein.

"drill waste" means all materials or chemicals, solid or liquid, associated with the drilling of bore holes and includes bore hole cuttings.

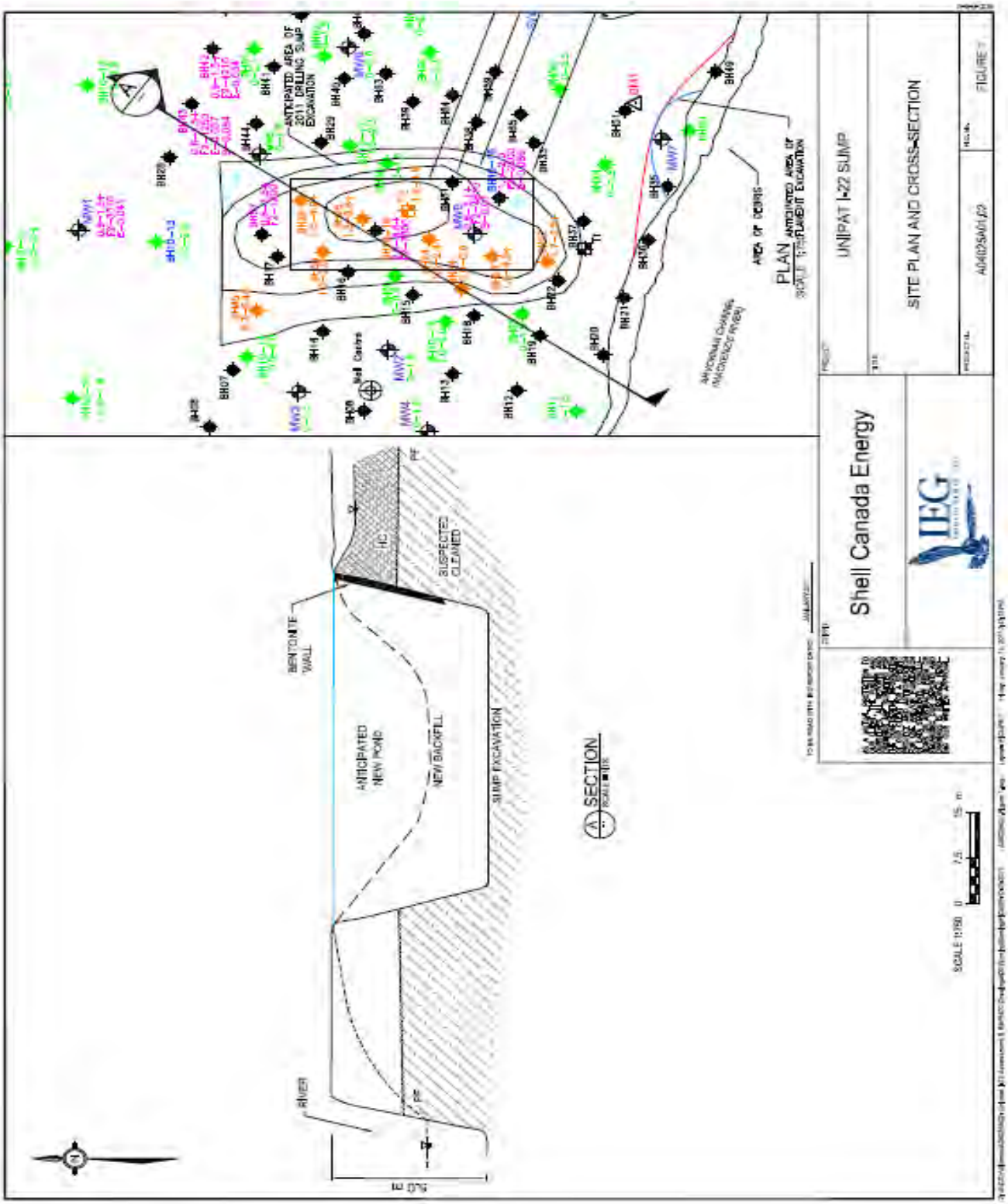
"dogleg" means clearing a line, trail or right-of-way that is curved sufficiently so that no part of the clearing beyond the curve is visible when approached from either direction.

APPENDIX F

LOCATION MAP



APPENDIX G
SHELL RESPONSE to I.R. #1



APPENDIX H
SHELL RESPONSE to I.R.'s

Item	Comment	Stakeholder(s)	Response	Action	Category
1	The project is for a "Sump Remediation" not a "Site Remediation"	ENR	The primary objective of the proposed program is the removal of drill cuttings and mud from the drilling sump. Pending regulatory approval from the NWTWB, Shell will also remove debris found at two locations on the river bank. The site will be the subject of on-going management.	Clarification provided in this Table.	Definition
2	Phase I, II and III ESAs/RAP have not been provided to stakeholders for review. Not convinced that the site has been correctly assessed. Should follow assessment guidelines provided by CCME.	ENR	Unipkat I-22 has undergone a number of assessments; Hrudey et al. 1975, Kokelj and GeoNorth 2002, IEG and Komex 2002 (geophysical survey), IEG and Komex 2004 (preliminary ESA), IEG 2009 (Phase II ESA), and IEG 2010 (Phase II supplementary sampling). A full RAP for the remainder of the site that includes site specific criteria will be produced for stakeholder approval and future management of the site. Following the removal of the drill sump material, the site will continue to be monitored to evaluate future conditions. Note: Shell has also maintained this site by abandoning the well head, repairing infrastructure as needed and removed exposed debris from the shoreline in 2006.	Pre 2009 work was submitted to INAC. 2009 and 2010 Phase II ESA and supplementary data has been submitted to INAC, DFO and ENR as requested.	Remedial Planning
3	Proponent estimated volumes of PHC soil comparing results to CCME Industrial Guidelines which do not provide adequate protection for the environment, wildlife and potential users of the site. CCME Parkland criteria are more appropriate.	ENR	Final site specific criteria for PHC will be generated based on risk assessment and realistic exposure rates. At present, regardless of criteria used, PHC containing soils tend to be concentrated in the drilling sump and the extension to the north. Shell intends to remove the drilling sump during this remediation program. Residual PHC containing soils will not be at surface. The CCME parkland guidelines are derived from long term, concentrated exposure to a site. Although increasingly proximal to the river, Unipkat is an isolated site with no sings of intensive habitation by humans or harvested species. The final site specific criteria will consider protection of aquatic life as well as exposure pathways to terrestrial life.	Site specific criteria are currently under development through a risk based assessment. The site specific criteria will be submitted to stakeholders when they are available in February.	Criteria
4	The PD contains differing volumes for the estimated volumes of PHC affected soil at the site.	ENR	The current estimate for volume of soil to be removed from the drilling sump during the proposed remediation is 3000 m^3. The current estimate of PHC affected soil above CCME Industrial guidelines to be left in place at this time is 2000 m^3.	Clarification provided in this Table.	Volume
5	Doubt that the site has been delineated.	ENR	The site has undergone significant assessment (see response #2) and has been well delineated with historical record reviews, geophysics and more than 100 boreholes or hand auger sampling points in addition to sediment, groundwater and surface water samples.	Provided ENR with analytical results and remediation figure.	Volume

6	Camp Sump and Flare Pit should be investigated as part of the Phase II ESA.	ENR	Both the flare pit and camp sump have been assessed. Pending approval from the NWTWB, these two areas will be excavated and removed from site. Debris removal from these locations also occurred in 2006. Additional confirmatory samples will be collected following removal of material from these areas and will include analysis for PAHs, dioxins and furans.	Clarification provided in this Table.	Assessment
7	Contaminants of Concern listed in the PD do not include total metals, PAHs and dioxins and furans.	ENR, EC	Total metals were assessed and found to be minimal and geographically isolated to two boreholes (As, Cu and Ni in BH42 and Cd in MW9). MW9 is in the sump material and will be removed during the proposed remediation. BH42 is not currently at risk of erosion and metals exceeding residential parkland criteria are greater than 0.5 m deep. Records indicate that this exploration well was dry and flaring is unlikely to have occurred. However, post-remedial confirmatory testing of the flare pit area will include analysis for PAHs, dioxins and furans.	Clarification provided in this Table. Commitment to conduct post remediation confirmatory sampling.	Assessment
8	ENR should be listed as an agency for the tracking of contaminated soils and for the registration of the storage cell.	ENR	The drilling material being removed does not contain constituents that would classify it as "Hazardous Waste" under TDG regulations and we are unaware of similar material being classified as "Hazardous Waste" in the NWT or in other jurisdictions. Using the guidelines referred to by ENR, the drilling muds are non-hazardous and therefore, the waste does not need to be manifested and the Inuvik cell is not required to be registered. Hazco and IEG will track the type and volume of soils transported from the site to the Inuvik cell and from the cell to the final disposal locations.	IEG has provided ENR with lab analysis of the material and requested clarification on classifications from ENR.	Regulatory Approval
9	Proponent must use movement documents to track hazardous waste.	ENR	If encountered, hazardous waste will be correctly manifested on movement documents supplied by ENR.	ENR to provide information on classification of hazardous waste	TDG
10	Proponent must use scales to quantify the weight of each load of material entering the containment cell until accurate estimates can be made and must weigh each load of material and water leaving the containment cell.	ENR	The type and volume of soils transported to and from the Inuvik cell will be tracked. The volume of water released from the cell to the environment will be estimated on-site. The volume of any water shipped to a disposal facility will be tracked.	Proponent to track volumes and movement of wastes.	Waste Management

11	Provide information regarding the disposal of treated soils.	ENR	In the event that some of the soil in the cell is shown to meet CCME industrial criteria, Shell will seek local disposal options to use the material as industrial backfill. At this time, the preferred disposal location is the Inuvik landfill where the soil could be used as intermediate fill and would not be subject to re-use elsewhere. Regardless of where the industrial fill is disposed of, Shell will receive written authorization from the receiver acknowledging the receipt of the fill and a commitment from the receiver to limit the use of fill at industrial locations. ENR will be provided analytical results and notification prior to the soil being removed from the cell. All soil that does not meet industrial criteria will be transported to an appropriate CCS landfill in BC.	The actions described in the response have been discussed with ENR and satisfy their concerns.	Waste Management
12	The Alberta treatment cell code of practice should be referenced to determine the capacity of the Inuvik storage cell.	ENR	As per ENR's request, the Ealberta Environmental Code of Parctice for Land Treatment of Soil Containing Hydrocarbons (2008) has been reviewed. The containment cell in Inuvik will meet the storage requirements in the code of practice. Additional detail on the cell are included with this Table.	Photos of the cell under construction and figures of the storage cell are included with this Table.	Storage Cell
13	What disposal criteria will the water in the Inuvik containment cell meet proir to discharge?	ENR, GLWB	The water will meet NWT industrial waste water discharge criteria as published in the Guideline for Industrial Waste Dishcharges in the NWT prior to release. Prior to release of water to the environment, water samples will be collected and sent for analysis at a CALA certified laboratory.	IEG discussed this approach with ENR and satisfies ENR.	Criteria
14	The Inuvik sewage lagoon is not designed to accept industrial leachate from the dewatering soils in the Inuvik cell. Disposal of waste water should be directed to the ditch.	ENR	Following advice provided by ENR, the waste water in the Inuvik cell will be treated as necessary and disposed of in the natural environment in a manner that will prevent erosion once the waste water is shown to meet NWT industrial waste water criteria. Waste water that can not be treated to meet discharge criteria will be shipped to an approved facility capable of treating the water.	IEG discussed this approach with ENR and will follow ENR's guidance.	Water disposal
15	How will the Proponent manage waste water generated at the site?	ENR	Waste water generated by the camp facilities will be stored in sealed, waste water storage tanks. Waste water from the camp will be transported via sewage trucks to the Inuvik sewage lagoon. No other waste water will be generated at the Unipkat I-22 site.		Waste Management
16	The Inuvik sewage lagoon may not meet the Proponent's requirements.	ENR	Waste water generated by the camp will be indistinguishable from waste water generated by the Town of Inuvik. The municipal sewage lagoon is capable of managing this type of waste.		Waste Management
17	No indication has been provided that the Town of Inuvik is willing to accept solid waste or waste water generated by the camp operations.	ENR, NWTWB	The Town of Inuvik regularly accepts waste water and solid waste for disposal in it's facilities that has been generated by local camp operations supporting industry.	A letter of acceptance for waste will be acquired from the Town.	Waste Management

18	No details were provided about the Proponent's plan to manage solid waste generated by the camp.	ENR, NWTWB	Solid waste generated by the camp will be stored on-site in a covered metal garbage bin. The waste will be inaccessible to animals and the wildlife monitor on-site will watch for signs of animals near the site.		Waste Management
19	No estimates of the volume of waste to be generated by the camp were provided by the Proponent.	ENR	The sleigh camp is estimated to produce less than 37,000 L of waste water (combined total of grey and black water).		Waste Management
20	The Proponent should prepare and submit for approval a Project-Specific Waste Management Plan.	ENR	A plan is under development and will be submitted to ENR for approval.	Prepare plan for approval.	Waste Management
21	If flowing water is found during bank disturbance DFO should be contacted to determine a new method of material removal.	DFO	Agree. DFO will be notified if flowing water is encountered.		Aquatic Disturbance
22	Notify stakeholders if any plans described in the PD have changed.	DFO, EC	As a result of community consultation feedback and INAC's request to completely backfill the remedial excavation, DFO and other regulatory stakeholders have been notified about the Proponent's revised plan to source borrow material from exposed frozen sand bars.	Continue dialogue with DFO and NWTWB to achieve approval of plan	Aquatic Disturbance
23	Proponent's staff and contractors on-site should be aware of all mitigation measures undertaken.	EC	All workers on-site will receive an orientation that will describe environmental mitigation measures.	Worker Orientation	Compliance
24	Why will 2000 m3 of identified PHC affected material be left on-site? Where is the additional material?	EC	The objective of this sump remediation program is to remove the drilling muds and surrounding affected material from the drilling sump that are at risk of being eroded by Arvoknar Channel. At the current rates of erosion, the remaining 2000 m3 of affected soil to the north of the main drilling sump is not at risk of erosion in the next 30 to 40 years. Pending approval from the NWTWB, additional material and debris will also be removed from the camp sump and flare pit that are currently subject to erosion.	Clarification provided in this Table.	Volume

25	Permafrost may not be a reliable barrier for contaminant migration and may not be stable. Thermistors used to measure the integrity of the barrier should extend below the depth of affected soil.	EC, INAC	A new thermistor will be installed beneath the depth of affected soil. To further decrease possible migration of material into the backfilled area the proponent proposes to add a bentonite barrier between the remaining affected soil to the north and the excavated area (conceptual figure supplied with this Table). To decrease the porosity of the permafrost zone, the backfilled material may be periodically saturated and allowed to freeze prior to additional lifts of soil being placed.	Future Monitoring	Monitoring
26	In relation to the flare pit and camp sump areas the Proponent is advised that deleterious substances must not be permitted to enter the water.	EC	As discussed with the NWTWB and EC, Shell intends to remove these areas during the remediation program pending NWTWB approval.	Remove Camp sump and flare pit areas pending NWTWB Water Licence.	Regulatory Approval
27	Proponent is advised that Environmental soil quality guidelines do not apply within 10 m of a surface water body.	EC	Site specific criteria based on risk assessment and protection of aquatic life are under developed for this site.	Complete development of site specific criteria and submit to stakeholders when they are available in February.	Criteria
28	Delineation of groundwater as a potential pathway for migration.	EC	Natural sediments at the site contain or transmit little groundwater. The previous assessment work at the site did not identify evidence of contaminant migration from the sump. Dissolved iron was above FWAL guidelines in MW 6. TDS and Cd were above CCME FWAL guidelines in MW1 and MW6. MW9 contained concentrations of toluene, TDS, and pH above FWAL guidelines. MW9 will be removed during the proposed remediation program.	Water, sediment and soil analytical results provided with this Table.	Assessment
29	A more active land farming approach should be considered for soils in the containment cell and CCME guideline parameters should be used to monitor the extent of remediation.	EC	Soils affected by salinity or high concentrations of barite can not be treated and must be transported to an appropriate disposal facility. Baseline samples will be collected from the soils in the treatment cell affected only by PHC and the results will be compared to CCME criteria to help determine the exact future management options undertaken. If the soils are treated in the cell, the progress of the treatment will be tracked by analysing samples during the treatment process.	Characterize and track soil in the Inuvik cell.	Waste Management
30	Recommend that substances that may attract wildlife be made inaccessible to animals at all times.	EC	Measures will be undertaken to avoid attraction of wildlife. A wildlife monitor will patrol the area for signs of approaching animals and human/animal interactions will be minimized.	Minimize interaction with wildlife, comply with Migratory Birds Act and SARA.	Wildlife

31	The Territorial Government should be consulted with respect to species managed by the GNWT.	EC	The Proponent has consulted with ENR regarding bear denning in the project area. Although it was too late in the season to conduct a denning survey, the worker orientation will stress the importance of reporting all bear observations.		Wildlife
32	Has Shell considered removing all of the affected material from site?	INAC	See response for Item 24.		Remedial Planning
33	Disposal of industiral waste water [from the Inuvik containment cell] in the Inuvik sewage may violate the Town's Water Licnece.	GLWB	It is no longer our intention to dispose of waste water from the dewatered soils in the Town lagoon. Following ENR's advice, waste water in the containment cell will be discharged to the environment once proven to meet NWT industrial discharge criteria.		Waste Management
34	What volume of water is expected to be disposed of from the dewatered soils in the containment cell?	GLWB	The volume of water requireing disposal from the containment cell will be partially dependant upon weather conditions. Warm, dry weather would likely lead to a significant decrease in volume through evaporation while significant percipitation would increase the volume. However, the cell will be closely monitored to avoid significant accumulation of standing water within the bermed area. Water will be pumped into holding tanks if and when required to avoid ponding.		Waste Management
35	Will any treated soil be used as cover material in the Inuvik landfill?	GLWB	The Inuvik landfill is the Proponent's prefered disposal location for soil that meets CCME industrial landuse guidelines. Prior to any soil being offered to the municipality for landfill cover, the soil will be analysed for concentrations of CCME regulated; metals, hydrocarbon fractions, salinity and pH. If the soil originated from the flare pit area it will also be assessed for PAHs, dioxins and furans. The soil will be shipped to a CCS landfill in BC in the event that the soil does not meet industiral guidelines.	Confirmatory soil analysis.	Waste Management
36	Request clarification regarding the location for the temporary storage for each type of soil (PHC soil, Ba soil, KCl soil, sump soil and clean soil)	NWTWB	PHC, Ba and salt (KCl) affected soil tend to be co-constituents in the "sump soil". The soil surrounding the sump has been assessed as being affected by PHC. These two categories of soil will be separated as much as possible during the excavation process, and stored on an ice pad (on-lease) prior to transport to the containment cell in Inuvik. The material will be frozen when on-site and a possible release of fluids from affected soil is therefore not an issue. The ice pads will be scraped down following removal of the affected soil and the dirty ice/snow will be transported to the Inuvik containment cell. The clean soil will be stored on-lease prior to being used as backfill in the excavation.	Information provided in this Table.	Waste Management
37	What are the concentration levels of affected soils?	NWTWB	Concentration levels are shown in the analytical summary tables provided on January 27.	None required	Assessment

38	What is the proposed method of disposal for soil affected by KCl and Ba?	NWTWB	The soil will be dewatered in the Inuvik containment cell and then transported to the CCS landfill in Ft. Nelson BC for final disposal.	Information provided in this Table.	Waste Management
39	What are the volumes of soil and sump material to be disposed of?	NWTWB	See response for Item 4.	Information provided in this Table.	Volume
40	Does the Town of Inuvik approve the disposal of all types of waste, fuel and affected soil from this project?	NWTWB	See response for Item 17. In addition: there will be no waste fuel generated from this project; affected soil will be disposed of at the CCS Ft. Nelson BC landfill; and, if and when treated soil meets applicable CCME criteria, it will be offered to the local municipal landfill as intermediate cover. If the treated soil is refused at that time, alternate disposal locations will be sought in consultation with ENR and may include transport to the landfill in Ft. Nelson.	Information provided in this Table.	Waste Management
41	Does the intended CCS landfill in BC approve the disposal of sump material?	NWTWB	Yes. The landfill regularly accepts drilling waste. The material generated from Unipkat I-22 will meet the landfill criteria.	Information provided in this Table.	Waste Management
42	Require more information regarding the treatment of soils in Inuvik.	NWTWB	The soils that may be treated in the Inuvik containment cell will be characterized once they are within the cell. Exact remedial methodology, if any, will then be determined. Options currently under consideration are aeration with an Allu bucket, addition of nutrients to increase bio-remediation or addition of products such as peroxide to breakdown the hydrocarbons.	Information provided in this Table.	Waste Management
43	Require more information regarding the treatment of water from within Inuvik containment cell.	NWTWB	The treatment will depend upon the constituents of concern identified by analytical testing. In the event that hydrocarbon concentrations do not meet discharge criteria, the water will be passed through a low pressure filtration system to remove sediments prior to treatment for hydrocarbons using pre-packaged granular activated carbon (GAC) supplied by Siemens. In the event that salinity or metals are found to be a concern in the water, the volume of affected water will be reduced using an evaporator.	Information provided in this Table.	Waste Management
44	The location of waste water discharge from the containment cell is required.	NWTWB	See response to item 14. ENR has requested that any waste water from the containment cell should be discharged to a local ditch.	Information provided in this Table.	Waste Management

45	More information regarding the disturbance to the riverbank is required.	NWTWB	Two areas of bank disturbance are anticipated on the site. The camp sump area excavation is expected to be 15 m long and remove 3 m of bank material from the existing shoreline. The flare pit area excavation is expected to be 19 m long and remove approximately 5 m of bank from the existing shoreline. All material will be frozen. An excavator with a ripper will be used to remove the frozen material. The new bank will be left in a vertical cut, similar to the existing bank and the excavation will be a scalloped shape similar to natural shapes found along the river. Any differences between the excavated bank areas and natural bank erosion will be negligible. In addition to the bank material being removed from the site, Shell has proposed to use approximately 3000 m^3 of exposed, frozen sandbars as borrow material to backfill the sump excavation. This proposal is outlined in a letter supplied to DFO, NWTWB, ENR and INAC on January 25, 2010. An Application for Fisheries Act Authorization will be filed with DFO for approval of this operation. Exact locations of bar removal will be provided in the application to DFO. Only the top 0.3 m of sand bars would be removed and the natural sediment volumes in the channel are expected to rapidly replenish the removed material.	Volumes and locations of the proposed sand bar harvesting will be provided to NWTWB when they are filed with DFO during the application for an Authorization.	Information
46	More information regarding spill contingency planning is required.	NWTWB	In addition to the information provided in the EISC PD, a shipping container containing spill response equipment will be staged at Unipkat I-22 during the field program. This spill kit (nuisance spill container #3) is supplied through the Mackenzie Delta Spill Response Corporation. The inventory of this container is supplied with this Table (Feb. 1, 2010). Furthermore, each person working on the project will receive a site orientation presentation that will provide information regarding spill response. In the event of a spill, the site superintendant will take control of abatement and clean up operations and report the spill to the GNWT and Federal agencies.	Nuisance spill kit inventory supplied with this Table. A full spill response plan is under development and will be presented and available to all employees working at the site. A copy of the plan will be provided to the NWTWB, INAC and the EISC.	Information
47	Please provide more detail regarding the slope of the "bentonite wall" and a diagram to the locations of the wall.	INAC	The slope of the bentonite wall will be as vertical as practically possible and is expected to be near vertical. The slope of the bentonite wall will have little affect on it's performance as a hydraulic barrier but a high slope would make future excavation of the remaining material more difficult. The bottom of the bentonite barrier will also be keyed into the permafrost zone and the surrounding soils saturated (and frozen) to reduce the possibility of groundwater migration.	Provide a diagram to INAC showing the bentonite wall location.	Design

48	What contingencies will be in place if the walls of the excavation slump or fail?	INAC	The material on-site is a dense silt with a high moisture content. The material will also be frozen. These factors will make the side walls solid and stable. No wall failures or slumps are expected. However, slope stability will be assessed on an ongoing basis. No one will be permitted to enter the excavation if there is any indication of instability.	Information provided in this Table.	Safety
49	How much ice content is in the sump area being removed and surrounding area?	INAC	Ice content in the boreholes on site is highly variable between locations and depths. Some of the sump material has an estimated ice content of 50% in some locations and less than 25% in other locations. Outside of the sump there is generally a lower moisture content and less ice but the variability ranges from borehole to borehole.	Information provided in this Table.	Design
50	Request further clarification of the monitoring program for the excavated area and of any ponded water.	INAC	The site will be visited in the summer of 2011 to assess the affects of thaw, settlement and possible ponding in the backfilled area. If any ponding is apparent, surface water samples and sediment samples will be collected. Data from the on-site thermistors will also be downloaded and analysed. If the observed settlement and temperature profile do not indicate that ponding is imminent, the next monitoring event will be scheduled for summer 2013. The assessment of conditions and observed trends at that time will be used to determine future frequency and scope required to assess the site conditions.	Information provided in this Table.	Monitoring

APPENDIX "I"
Letter To NWTWB

IEG CONSULTANTS LTD.

February, 18 2011

Véronique D'Amours Gauthier
Science and Regulatory Officer
NWT Water Board
P.O. Box 2531
Inuvik, Nt, X0E 0T0

Additional Information Regarding Water License Application Submitted for Shell Canada's 2011 Unipkat I-22 Sump Remediation Project

This letter is has been sent to provide supplementary information to support our application for a Type B Water Licence and is intended to provide the NWTWB with additional information as requested.

Shell Canada would like to make three amendments to our original application:

1. We would like to amend the volume of water we have applied to withdraw during this program to be not more than 295 m^3/day.

   Although construction of an ice road for this project has begun, the construction program will withdraw less than 100 m^3 of water per day until such time as the NWTWB issues a licence that will allow for larger volumes to be withdrawn.

2. Our original application requested permission to remove bank material from the camp sump and flare pit area of the Unipkat I-22 lease. As described in our Application for Fisheries Act Authorization filed with the Department of Fisheries and Oceans (DFO) on February 9, 2011, we would like to include the excavation of about 3000m^3 from a sandbar in Arvoknar Channel. The NWTWB was provided a copy of the application at that time. The description of the proposed work to take place is described in that application. A letter stating DFO's position on the application will be provided as soon as it is available.

   No disturbance of the river bank will occur prior to receiving permission from the NWTWB.

3. In an effort to minimize disturbance to established vegetation on the Unipkat I-22 site, we would like to move our planned camp location from the site to grounded

IEG Consultants Ltd. • 500, 2618 Hopewell Place NE • Calgary, AB T1Y 7J7 • CANADA
403.274.3424 t • 403.274.5349 f • www.ieg.ca

ice across the river Channel as shown on the attached figure. The possibility of a fuel leak from the camp generator was identified as a risk during discussions with INAC about potential problems with this location. To mitigate this risk, the generator and it's day tank will be contained within a bermed area. The bermed area will be lined with a hydrocarbon resistant 40 mil liner. The berms under the liner will be constructed of snow and frozen solid with the addition of water. The main fuel storage area will remain more than 30 m away from all water bodies on an ice pad on land within the lease area. In addition to the main spill container located on-site (inventory supplied previously), sorbent spill clean-up supplies, shovels and barrels to deposit contaminated snow in will be located at both the fuel storage area on land and the bermed generator area.

The camp will not be mobilized to the site prior to receiving permission and conditions from the NWTWB.

Additional information regarding our program is provided below.

As stated in our earlier submission, all grey and black waste water from the camp will be transported to Inuvik for disposal in the local sewage lagoon. ALL camp refuse will be stored in wildlife resistant covered bins and then transported to Inuvik for disposal in the municipal landfill. We have received verbal confirmation from the Town of Inuvik that they will accept this waste but a letter of acceptance from the Town will be provided as soon as it is available.

Our Project Description outlined our plan to transport waste soil from the Unipkat I-22 site to a containment cell in Inuvik to allow the material to thaw and dewater in the summer. The containment cell is lined with a hydrocarbon resistant arctic liner. Details of the liner are attached with this letter.

The volume and chemical characteristics of all soil and water that is disposed of from the cell will be reported to the NWT Department of Environment and Natural Resources (ENR). A licence application will be filed with the Gwich'in Land and Water Board (GLWB) for the disposal and management of waste soil and water in the Inuvik containment cell.

The water produced from the melting of soils will be contained in the containment berm. Staff from IEG's Inuvik office (located approximately 200 m from the cell) will regularly check water levels in the cell and have any significant accumulations of water pumped into holding tanks adjacent to the cell. Once the soils have been dewatered, the stored water will be tested at a Canadian Association for Laboratory Accreditation certified laboratory. Acceptable water discharge criteria will be developed with ENR officers and the GLWB and permission to discharge will be sought from the GLWB/ENR prior to discharging water to the surrounding land or ditch.

In the event that the collected water does not meet applicable discharge criteria, it will be treated with granular activated carbon to remove hydrocarbons. A process diagram showing the hydrocarbon treatment system is included with this letter. In the event that the water is unacceptable for discharge due to salinity or metal concentrations, the volume of water will be reduced using an evaporator and the remaining residual material will be transported south for disposal at a licenced facility. The NWTWB will be provided with a letter of acceptance from the licenced facility prior to transport of the water from the containment cell.

Once thawed and dewatered, the removed soil from the sump, affected by hydrocarbons, salts and barite, will be transported and disposed of at the CCS Landfill near Ft. Nelson BC. The landfill is licenced by the BC Ministry of the Environment to accept this type of soil. A letter of acceptance from the landfill will be provided to the NWTWB as soon as it is available.

At this time the soil around the sump scheduled to be removed from Unipkat I-22 is affected by hydrocarbons that exceed CCME industrial guidelines and does not appear to be acceptable for disposal in Inuvik. If future testing of the soil demonstrates that the soil does meet CCME criteria, Shell Canada may seek a local disposal option in conjunction with the Town of Inuvik, ENR and the GLWB. However, if an appropriate location can not be found or future analysis demonstrates that the soil remains above CCME criteria, the soil will be transported to the CCS landfill near Ft. Nelson BC.

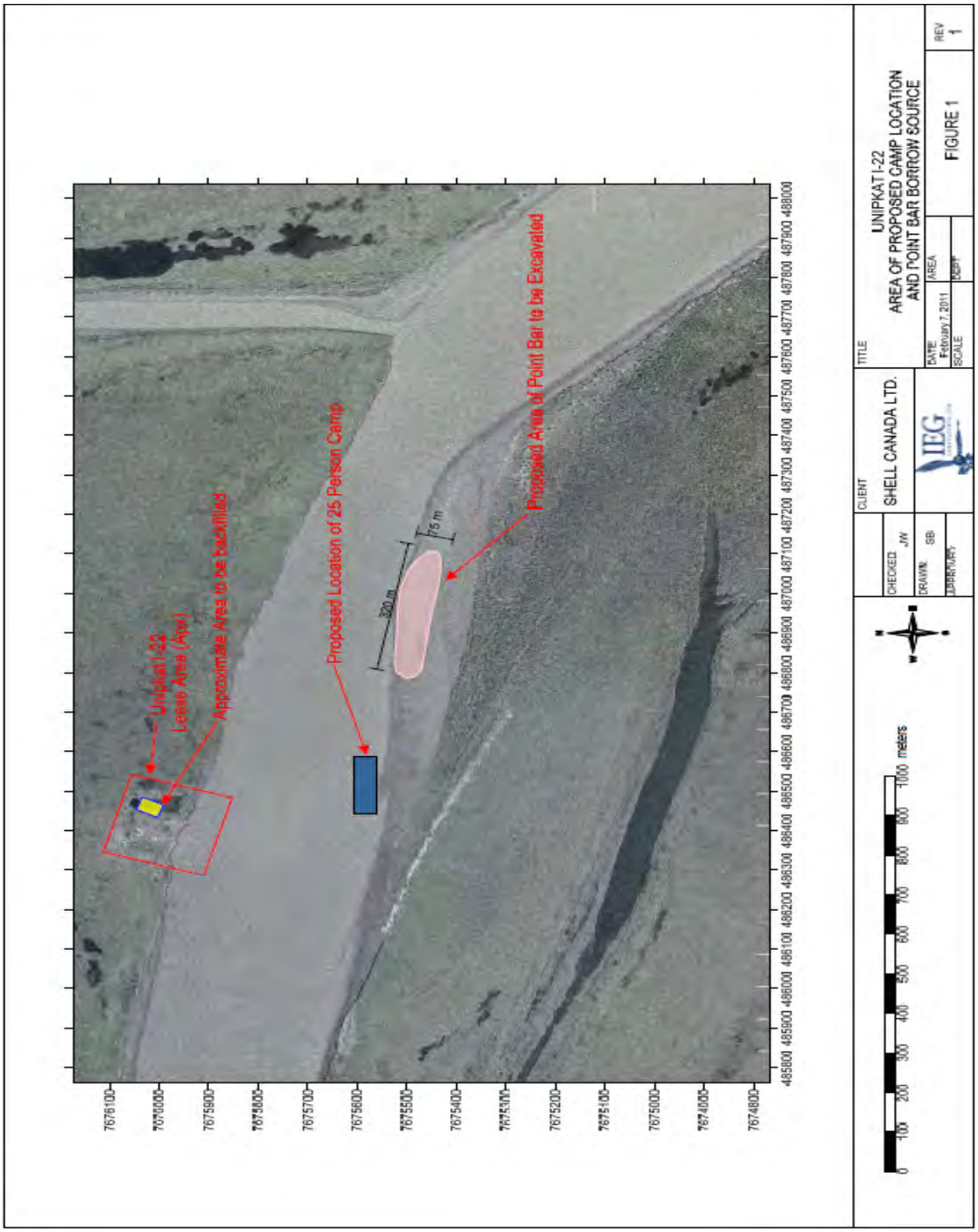
If you have any questions please feel free to contact me at (403) 990-1382 or at sbird@ieg.ca.

Yours truly,

IEG CONSULTANTS LTD.

Sam Bird B.Sc.

c.c. Randall Warren – Shell Canada Energy
Randy Ambler – Shell Canada Energy
Kevin Erickson – Hazco Environmental Services
Don Arey – Indian and Northern Affairs Canada
Gerald Enns – GNWT Department of Environment and Natural Resources
Helga Harlander – Gwich'in Land and Water Board


Unipkat I-22
Lease Area (Apx)
Approximate Area to be backfilled
Proposed Location of 25 Person Camp
300 m
75 m
Proposed Area of Point Bar to be Excavated
CLIENT
SHELL CANADA LTD.
TITLE
UNIPKAT I-22
AREA OF PROPOSED CAMP LOCATION
AND POINT BAR BORROW SOURCE
CHECKED JW
DRAWN SB
DATE February 7, 2011
SCALE
AREA
DEPT
FIGURE 1
REV 1
0 100 200 300 400 500 600 700 800 900 1000 meters

LAYFIELD
Product Cut Sheet

Arctic Liner

1. Product Description

Arctic Liner® is a highly flexible geomembrane with advanced chemical resistance, it is formulated specifically for winter installation in harsh environments like the Arctic. The Arctic Liner® formulation is easily solvent bondable during periods of warm weather, making repairs an easy task even in isolated areas. This proprietary oil resistant alloy is well suited to secondary containment of combustible liquids and some fuels. Arctic Liner® is also excellent for soil remediation work and for separation of soils at contaminated sites. Arctic Liner® is often used for the secondary containment of industrial chemicals as well. Generally a short immersion test with Layfield's Field Chemical Testing Kit will show if Arctic Liner® is compatible with a given chemical. Arctic Liner® is excellent for the containment of combustible liquids and many oilfield chemicals.

2. Technical Data

Materials information is on page 2.

3. Installation

Layfield's Arctic Liner® is flexible enough to be prefabricated at our facility into large panels. The prefabricated panel is accordian folded, rolled on a core, and delivered to the job site secured to a pallet. Prefabricated panels can often cover a small project with a single panel. Local labor forces can be used to unroll and unfold the panel, while on larger projects Layfield installation forces can be used to join panels. Layfield has spent years developing innovative thin film seaming technology. All of our primary field welding of Arctic Liner® is based on hot wedge welding technology. Field wedge welding of the Arctic Liner® provides strong seams, and fast installations on large projects. Arctic Liner® can also be welded in the field with a solvent, allowing contractors to do small seams and attach pipe boots without the need for a Layfield installation crew.

4. Availability and Cost

Available from Layfield or distributors. Call
425-254-1075 Pacific time
780-453-6731 Mountain time, or
905-761-9123 Eastern time

5. Fabricated By

Layfield Environmental Systems Corp.
Layfield Geosynthetics & Ind. Fabrics Ltd.

6. Warranty

Products sold will meet Layfield's published specifications. Any extended warranty required by the buyer must be negotiated at the time of order. Extended warranties may be available on this product and may be at extra cost. Full warranty details are available from Layfield.

7. Maintenance

Geomembranes should be inspected at least once per year for damage, stress, or any other detrimental condition. The entire containment area should be visually inspected annually. Layfield provides geomembrane maintenance services on request.

8. Filing Systems

www.LayfieldGroup.com
www.geomembranes.com

9. Material Properties

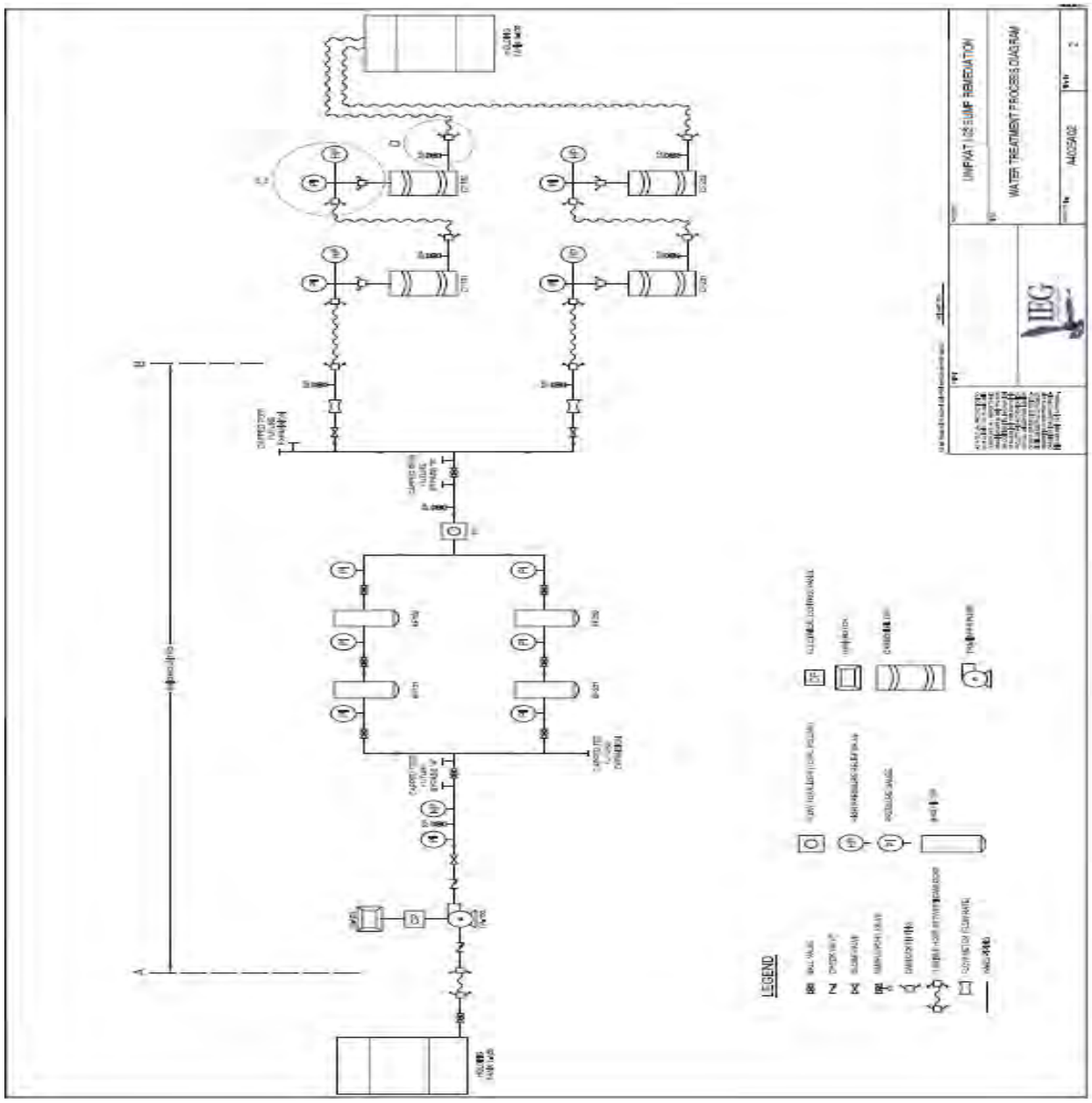
18 Oct 2010	Arctic Liner® Material Properties		
Style	**ASTM**	**Arctic Liner 30 (U)** (White)	**HAZGARD 100** (Green)
Thickness (Nominal)	D1593	30 mil 0.75 mm	30 mil 0.75 mm
Thickness Minimum	D1593	28.5 mil 0.72 mm	28.5 mil 0.72 mm
Tensile Strength (MD)	D882	57 ppi 10 N/mm	57 ppi 10 N/mm
Elongation	D882	500 %	500 %
Modulus at 100%	D882	18 ppi 3.2 N/mm	18 ppi 3.2 N/mm
Tear Strength (MD)	D1004	6 lbs 26.7 N	6 lbs 26.7 N
Low Temperature	D1790	**-65°F** **-54°C**	**-22°F** **-30°C**
Dimensional Stability	D1204 Max Change	4 %	4%
Water Extraction	D3083	0.25 %	0.25%
Volatile Loss	D1203 (A)	1.0 %	1.0%

10. Shop Seam Strengths

18 Oct 2010	Arctic Liner® Shop Seam Strengths		
Style	**ASTM**	**Arctic Liner® 30 (U)**	**HAZGARD 100**
Heat Bonded Seam Strength	D6392 25.4 mm (1") Strip	37 ppi 6.5 N/mm	37 ppi 6.5 N/mm
Heat Bonded Peel Adhesion Strength	D6392 25.4 mm (1") Strip	FTB 19 ppi 3.3 N/mm	FTB 19 ppi 3.3 N/mm

11. Field Seam Strengths

18 Oct 2010	Arctic Liner® Field Seam Strengths		
Style	**ASTM**	**Arctic Liner® 30 (U)**	**HAZGARD 100**
Heat Bonded Seam Strength	D6392 25.4 mm (1") Strip	Solvent 28 ppi 5.0 N/m	Solvent 28 ppi 5.0 N/m
Heat Bonded Peel Adhesion Strength	D6392 25.4 mm (1") Strip	AD-BRK 10 ppi 1.7 N/mm	AD-BRK 10 ppi 1.7 N/mm


UNIPKAT I-22 SUMP REMEDIATION
WATER TREATMENT PROCESS DIAGRAM
IEG
LEGEND

DATA SHEET

USFILTER WESTATES CARBON
AQUACARB® 1230C AND 1230AWC

Coconut shell based granular activated carbon

(Formerly CC-602 and CC-602AW)

FOR USE IN POTABLE, WASTE AND PROCESS WATER APPLICATIONS

Description and Applications

AquaCarb® 1230C and AquaCarb® 1230AWC are high activity coconut shell based granular activated carbons. These hard, attrition resistant high surface area carbons are designed to remove difficult to adsorb organics from potable, waste and process water. They are especially effective for adsorbing chlorine, disinfection by-products, TCE, PCE, MTBE and other trace level organics. AquaCarb® 1230AWC is acid washed yielding a very low ash content, pH neutral carbon that is ideally suited for use in potable water and high purity water systems for the microelectronics and other industries.

- ANSI/NSF Standard 61 classified for use in potable water applications
- Fully conforms to physical, performance and leachability requirements established by the current ANSI/AWWA B604 (which includes the Food Chemical Codex requirements)
- A detailed quality assurance program guarantees consistent quality from lot to lot and shipment to shipment

Quality Control

All AquaCarb® activated carbons are extensively quality checked at our State of California certified environmental and carbon testing laboratory located in Los Angeles, CA. USFilter's laboratory is fully equipped to provide complete quality control analyses using ASTM standard test methods in order to assure the consistent quality of all AquaCarb® carbons.

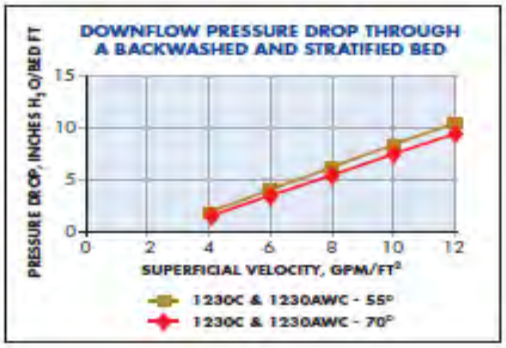
Our technical staff offers hands-on guidance in selecting the most appropriate system, operating conditions and carbon to meet your needs. For more information, contact your nearest USFilter representative.

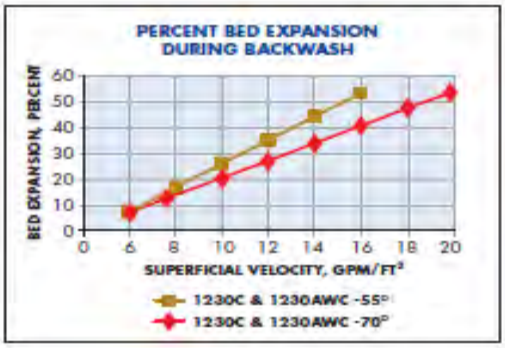
USFilter

AQUACARB® 1230C
AQUACARB® 1230AWC

Coconut shell based granular activated carbon

(Formerly CC-602 and CC-602AW)





Safety Note: Wet activated carbon depletes oxygen from the air and therefore dangerously low levels of oxygen may be encountered. Whenever workers enter a vessel containing activated carbon, the vessel's oxygen content should be determined and work procedures for potentially low oxygen areas should be followed. Read Material Safety Data Sheet (MSDS) before using this product.

All information presented herein is believed reliable and in accordance with accepted engineering practices. USFilter makes no warranties as to the completeness of this information. Users are responsible for evaluating individual product suitability for specific applications. USFilter assumes no liability whatsoever for any special, indirect or consequential damages arising from the sale, resale or misuse of its products.

SPECIFICATIONS/TYPICAL PROPERTIES

Specification	AquaCarb® 1230C	AquaCarb® 1230AWC
Carbon Type	Coconut Shell	Coconut Shell
Mesh Size, U.S. Sieve	12 x 30	12 x 30
Effective Size, mm	0.6 - 0.85	0.6 - 0.85
Uniformity Coefficient (max.)	2.0 (max)	2.0 (max)
Iodine No., mg/g (min.)	1100 (min)	1100 (min)
Hardness No., Wt. % (min.)	98 (min)	98 (min)
Abrasion No., Wt. % (min.)	85 (min)	85 (min)
Apparent Density, g/cc	0.45 - 0.52	0.45 - 0.52
Water Soluble Ash, Wt. % (max)	2.0	0.2
Contact pH	9.0 - 10.0	6.5 - 8.0

USFilter

Westates
Customer and
Technical Service Network:

Gulf Coast Region 800.659.1723
(Louisiana) 225.744.3153
Western Region 800.659.1771
Mid-Atlantic Region 800.659.1717
Midwest Region 708.345.7290
Northwest Region 800.659.1718
Southeast Region 225.744.3153
New England Region 800.659.1717

www.usfilter.com

WS-AQ12-DS-0704

USFilter
Westates
11711 Reading Road
Red Bluff, CA 96080
Telephone (530) 527-2684
Facsimile (530) 527-8724

ASC200-SS
Specification Summary

ASC200 Liquid Phase Adsorption Filter is designed to treat a wide range of contaminated process streams, ease of handling and economical usage. This adsorber is capable of maximum flow rate of 10 GPM.

Data Summary:

Dimensions	22" dia x 34" high
Maximum Working Pressure	3 psi.
Vessel Volume	7.4 cu-ft
Carbon Capacity	200 lbs.
Carbon Bed Volume-Typical	6.8 Ft^3
Maximum Flow	10 GPM
Empty Bed Contact Time	5 MIN @10 GPM
Material	Stainless Steel
Standard Color	Stainless Steel

UNDERDRAIN:

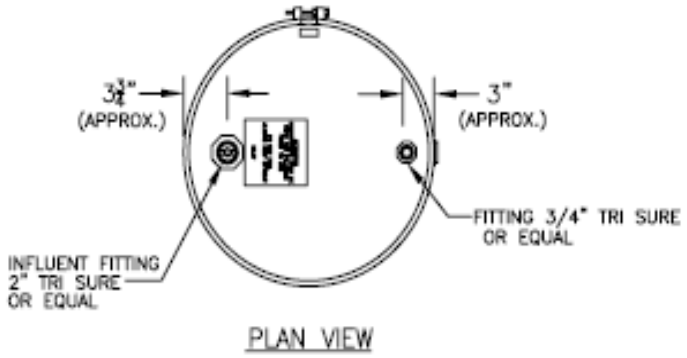
Slotted pipe	2" x 18" PVC

WEIGHT:

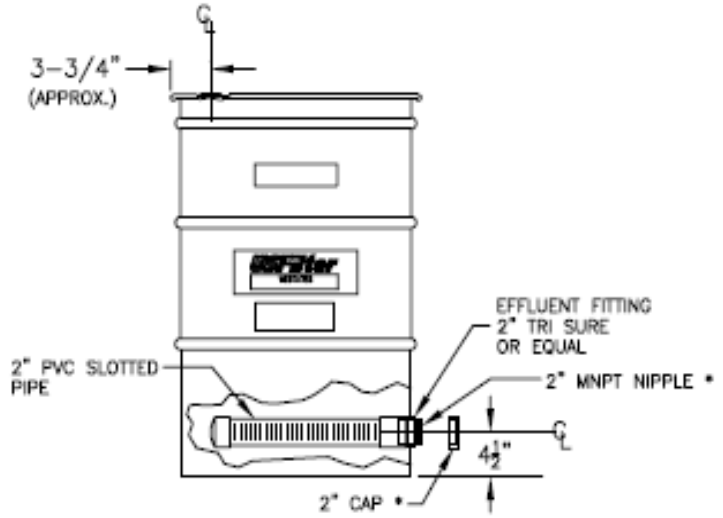
Shipping	250 lb
Operating	500 lb

2-2-04

STD: 2-0800-8X11A | INTL REF:



PLAN VIEW



SIDE VIEW

DESCRIPTION:	55 GALLON OPEN HEAD DRUM
MATERIAL:	CARBON STEEL
EXTERIOR FINISH:	HIGH GLOSS ENAMEL
LINNING:	VALSPAR 285D118 RED BROWN EPOXY PHENOLIC
FITTINGS:	
HEAD:	TYPE 1 (2" & 3/4")
BODY:	2" SIDE FITTING 4-1/2" TO CL FROM BOTTOM OF DRUM
FITTINGS GASKETS:	BUNA ON TRI SURE PLUGS
CLOSURE:	12 GA SQUARE BACK W/ 5/8" BOLT & JAM NUT
HEAD GASKET:	7/16" EPDM ROUND CORD GASKET
OUTSIDE DIAMETER:	23.5"
OVERALL HEIGHT:	34.625" +/- .5
INTERNALS:	2" PVC SLOTTED PIPE
FLOW RATE:	10 GPM MAX.
TEMPERATURE:	140° F MAX. OPERATING
PRESSURE:	6 PSI MAX. WORKING
CARBON CAPACITY:	200 LBS.
WEIGHTS:	
SHIPPING:	250 LBS.
OPERATING:	500 LBS.

* THIS IS FOR NON-HAZARDUS MATERIAL ONLY. SPECIAL FITTING REQUIRED FOR HAZARDUS MATERIAL TRANSPORTATION.

DESIGNER	DATE	
TAC	2/1/05	
CHECKER	DATE	
ENGINEER	DATE	
LLR	1/26/05	
MANAGER	DATE	
FILE:		
SCALE: NONE		

TITLE: ASC200 SALES DRAWING

CLIENT

USFilter — USFILTER/WESTATES, RED BLUFF, CA, 1-800-795-2864

PROJECT	DRAWING	SHEET	REV
	ASC200-Sales	1 OF 1	

APPENDIX "J"
Proponents DFO HADD Application

Fisheries and Oceans Canada | Pêches et Océans Canada

DFO File No.: (PATH NO.)

APPLICATION FOR *FISHERIES ACT* AUTHORIZATION

Applicant

I, the undersigned, hereby request authorization for the harmful alteration, disruption or destruction of fish habitat and/or the destruction of fish by means other than fishing that will likely result from the works, undertakings, activities or operations related to the proposed development described on this application form. I understand that the *Fisheries Act* Authorization, if granted, is from the Minister of Fisheries and Oceans standpoint only and does not release me from my obligation to obtain permission from other concerned regulatory agencies. If an authorization is granted as a result of this application, I hereby agree to carry out all activities relating to the project within the designated time frames and conditions specified in the Authorization.

Applicants Name:	Shell Canada Energy
Contact Person, Title:	Randall Warren, Manager, DAR & Drilling Waste
Applicant's Address:	400 - 4 Ave SW Calgary AB
Applicant's Telephone No.:	403-691-2521
Applicant's Fax No.:	403-269-7948
Applicant's Email:	randall.warren@shell.com

Location of Proposed Development

Nearest community (city, town, village):	Tuktoyaktuk, NT
Municipality, district, township, county:	Mackenzie delta, Inuvialuit Settlement Region
Name of watercourse, waterbody:	Arvoknar Channel, Mackenzie River
Longitude and latitude, UTM Coordinates:	69.188229° N, 135.325584° W. UTM: 487090 E, 7675385 N

Canada

.../2

DFO File No.: (PATH NO.)

Description of Proposed Development

The proposed development impacting on fish and fish habitat involves:

little to no impact on fish or fish habitat. The work will involve Excavating approximately 3000 m3 of sediment from the upper surface of an exposed, frozen point bar using an Iron Wolf excavator. The maximum depth of excavation below the original surface of the point bar is 0.3 m. The sediment would be used as backfill in a remediation excavation across the Channel. A frozen, ice free bar above winter water level of approximately 2.4 ha has been selected as the proposed source (See attached photo and Figures 2 and 3). The sides of the excavation will be sloped and the low point of the excavation will on the channel side to promote drainage and avoid possible fish entrapment during high water events.

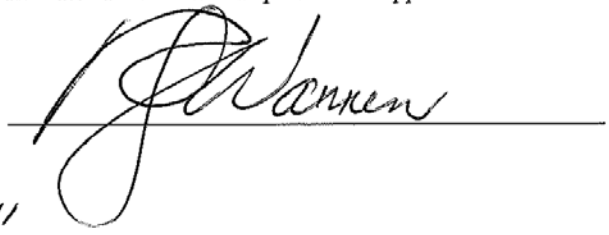
Description of Potential Impacts to Fish and Fish Habitat

Impacts to fish and fish habitat resulting from the works, undertakings, operations or activities associated with proposed development described above include:

Impacts to fish and fish habitat from the works are expected to be minimal or non-existent. No fish will be impacted during excavation as the bar is frozen and above water level. The profile, shape and elevation of the bar will be altered from the existing conditions but is expected to :1) resemble existing surrounding conditions to such a degree that habitat for fish will not be down-graded; 2) be above water level for the majority of the year and not be accessible to fish; and, 3) return to a similar state as the currently existing conditions with the addition of natural sediment loads during periods of high water. If sediment from the excavation is mobilized during high water events, the volume of increase is expected to be inconsequential in comparison to natural sediment loads in the channel. Mitigation measures to be used at the site are described in the attached pages.

Applicant Declaration

I solemnly declare the that information provided for the review and assessment of my proposed development for impacts on fish and fish habitat are true, complete and correct, and I make this declaration conscientiously believing it to be true knowing that it is of the same force and effect as if made under oath. This declaration applies to all material submitted as part of this application for *Fisheries Act* Authorization.

Applicant's Signature (and corporate seal): 

Date: February 9, 2011