# CEAA SCREENING FORM - LEVEL 1
## Department of Indian Affairs and Northern Development (DIAND) / National Energy Board (NEB) / Environment Canada (EC)

## 1. Public Registry Required Information

**Applicant:** Anadarko Canada Corporation, Calgary, Alberta
(Rob Jefferies: 403-231-0195)

**FEAI I.D. Reference Number:** To be added

**Subject Descriptors:** Oil and gas

**Alias Project Title:** Immerk Winter 2001/02 2D Seismic Program

**Lead RA and Screening Division:** Water Resources, DIAND for NWT Water Board

**Lead RA Contact:** Greg Cook (DIAND screener for Water Board) 867-669-2656
Laura Van Ham (NEB) 403-299-2769
Rob Walker (DIAND Land Administration) 867-777-3361
Paul Latour (EC, Canada Canadian Wildlife Service) 867-669-4769
Pete Cott (DFO) 867-777-7520

**Lead RA Trigger Types:** CEAA Law List Regulations, Inclusion List Regulations

**Other Screening Trigger Types:** Inuvialuit Final Agreement, NEB Geophysical Operation Authorization

**EA Start Date:** November 06, 2001

**EA Type:** Screening

**Physical Activity as identified from Inclusion List:** Water use, land use, oil and gas operations

**Physical Work Being Assessed:** 2D Seismic Program

**Phase of Project / Primary Undertaking:** Access construction; line production; line clearing; seismic activities, camp

**Multiple Activities:** ____ Yes _X_ No Indicate One: ___

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

**Geographic Place Name:** Tuktoyaktuk, Northwest Territories

**EA Determination:** 20-1-a

**EA Determination Date:** December 19, 2001

**Estimated Follow-up program termination date:** Summer 2002 (DIAND Land Use Inspector)

**EA Terminated:** No

## 2. General File Information

| | |
|---|---|
| **NWT Water Board File Number:** | N7-1-1782 |
| **DIAND Land Use Permit Number:** | N2001B0050 |
| **NEB File Number:** | 9180-A769-3 |
| **CWS Kendall Island Bird Sanctuary Permit Number :** | To be added |
| **Type of Applications:** | New water licence; new land use permit; new geophysical operation authorization; Bird sanctuary permit |
| **Present licence/permit/lease number:** | N/A |
| **Proposed Date of Activity:** | January 2002 to September 2002 |
| **Other RAs or Screening Divisions:** | Provided in Appendix D, "CEAA EA Coordination" - Integrated Screening is underway |
| **Other RA Types of Approval:** | Provided in Appendix D, "CEAA EA Coordination" |
| **Project File Locations:** | NWT Water Board - DIAND Water Resources Division (Yellowknife); NEB (Calgary); DIAND North Mackenzie District (Inuvik); CWS NT (Yellowknife); DFO (Inuvik) |
| **DIAND District:** | North Mackenzie, Inuvik |

## 3. Proponent

**Anadarko Canada Corporation**
**Calgary AB, T2P 4V4**
**tel. 403-231-0195**

| | |
|---|---|
| **Type of Proponent:** | Private industry |

## 4. Project Location

(Figure 1 attached)

**Topographic Map Sheet Number:** 107-C

| | |
|---|---|
| **Latitude / Longitude:** | 69°44'42"N (north point); 134°22'10"W (east point); 69°15'10"N (south point); 136°1'35" W (west point) |
| **Watershed:** | Mackenzie River |
| **Street Name:** | N/A |

**Surrounding Land Status:** Crown

**Special Designation:** Extends over much of the Kendall Island Bird Sanctuary and in the vicinity (but outside) of the area designated as Beluga Management Zone 1A (which is excluded to all activities).

## 5. Project Description

**Schedule:** Anadarko Canada Corp. proposes to conduct a 2D seismic program over much of Kendall Island, extending onto the near shore area of Mackenzie Bay, to further delineate areas of hydrocarbon interest on Exploration Licence #407. The work involves 12 seismic lines totaling approx. 417 km. on Crown land, to be conducted by Delta Trace Ltd., a geophysical company. Access construction will begin (subject to approvals) in January 2002, followed by data acquisition in February. The program should be completed by April 2002, with final clean-up and decommissioning by September 2002.

**Seismic operations:**
2D seismic data acquisition will occur over 417 km. of line, using a 24 bit telemetry recording system. The primary energy sources will be tracked vibroseis equipment (ie diesel fuelled vibrators), with some dynamite infill, ie over water bodies. Smaller water bodies not frozen to the bottom will have cables and geophones (at 25 m intervals) laid across the ice and source points will be stacked around the edges. Ice profiling will be conducted along the seismic lines to calculate ice thickness and to determine if ice is bottom-fast or not. Vibrator source points will then be "stacked" offset, or detoured around the water body if distances allow. Dynamite will be used on larger water bodies where there is water under the ice, and where data cannot be collected using vibroseis techniques. The holes for the charges will be drilled with a 3 way seismic drilling unit and placed in accordance with DFO guidelines and offset distances. Tracked and low pressure tire vehicles will be used on seismic lines extending over tundra to minimize any damage to the terrain. The seismic data recording unit will be positioned on a Nodwell or similar vehicle, and travel down the lines, hooking up to the cable/geophone system. The company has excluded the adjacent beluga management zone from its plans.

**Water Use / Waste Disposal:**
Total withdrawal rates for all uses are expected to be less than 75 $m^3$. per day, over the course of the project. Water will be withdrawn at points where seismic lines or access roads intersect with the Mackenzie River, and intake hoses will be screened. Water required for camp use, ice access and building snow ramps will be obtained from large lakes, channels and marine areas. Water withdrawn from marine areas will only be used in marine areas of the project. No water will be taken from a land-locked water body where drawdown and related fisheries concerns may be an issue. Estimated total drawdown from fresh water bodies used is estimated at less than 1%.

A stationary camp will be provided, with a capacity of 120 people, with maximum accommodation for 101. No sumps will be required. Potable water will trucked in from Inuvik, with permission from municipal officials through a bulk water agreement. All sewage and grey water will be collected in a holding tank and transported to a "suitable" approved, municipal treatment facility in Inuvik. An agreement has been established with the Town of Inuvik and operator Delta Trace Ltd. to use water from, and return wastewater to municipal facilities. Solid refuse will be incinerated and/or transported to a suitable licensed landfill, either in Inuvik or Tuktoyaktuk.

**Land Use:**
The proposed activities will occur on Kendall Island Bird Sanctuary, and extend into Mackenzie Bay within the Inuvialuit Settlement Area. The seismic lines will remain outside the boundaries of the Beluga Management Zone (see map). The camp will be constructed at the north end of Harry Channel, or alternatively, it may be located near Rae Island, or even other locations depending on ice conditions encountered. To minimize environmental impacts, vibroseis

equipment will use standard, high ground pressure tires over ice roads where feasible, and use tracked and low pressure tired vehicles over lines in tundra areas. The company will take special care not to disturb the vegetative mat.
The company conducted both a field reconnaissance (August 2001) of the project area, as well as a helicopter aerial survey (October 2001) beforehand to confirm areas to be avoided, verify preselected camp locations and access roads etc. A local wildlife monitor accompanied staff. Pre-survey, access construction, and mobile camp set-up is planned for January 2002, with drilling and charge placement, data recording in February to April, and abandonment and clean up in April 2002 and from July to September 2002. Access to the program will primarily be along an ice route used before by Burlington Resources, as well as single route into the vicinity of the program will be shared with other operators like Japex, Chevron and AEC West. Surface preparation of roads over ice will involve clearing snow from surfaces, while overland routes where required, will consist of snow compaction, and watering/icing along the routes. Ground depressions encountered may be filled with snow, and iced over to smooth the surface. Bulldozer blades will be equipped with mushroom shoes to elevate the blade, leaving a sufficient snow cover to protect the underlying organic layer.

**Fuel Storage:**
The company plans to bring in a number of containers of diesel, gasoline and aviation fuel. Fuel will be stored in eight sleigh mounted fuel sloops with secondary containment. Tanks will vary in size from 500 to 1500 gallons. There will be a fuel manager responsible for filling all tanks and ensuring proper drip containment is used. All tanks and refueling procedures will adhere to safety standards within the Fuel and Oil Spill Contingency Plan (subject to approval). Each fuel sloop will be fully lined to contain any accidental fuel leaks.

**Accidents and Malfunctions:** Unanticipated releases of mechanical fluids, fuel or hydrocarbons could contaminate soil, water, vegetation, wildlife, and aquatic resources. Potential accidents and malfunctions that might adversely affect the environment include:

- vehicle accidents due to collisions from speeding, bad weather etc;
- fuel or fluid leaks or spills if vehicles break through ice on a lake or channel, spills from contained tanks and sp during fueling, slinging of fuel drums by helicopter, small leaks and drips from stationary vehicles or releases from broken hydraulic hoses on tracked vibrators;
- inadvertent spillage of untreated or insufficiently treated wastewater from a waste treatment system malfunction, and
- possible accidents due to ignition of unknown pockets of gases around drilling areas may effect vegetation

**Information Sources Used:**

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

## 6.a) Description of Environment

**Methods:** Inuvialuit Environmental and Geotechnical Inc., on behalf of Anadarko Canada Corp. provided a description of the environment for the project area based on existing literature, field surveys during summer and Fall 2001, a field reconnaissance, and communications with local experts, regulatory agencies, and professional biologists. Information was augmented through local discussions with residents regarding "traditional knowledge", as well as existing literature. A biophysical assessment was conducted in the Mackenzie Delta Region in July 2001, involving over 500 sampling sites.

**Ecozone:** Southern Arctic

**Biophysical Environment:**
The terrestrial component of the project extends over the Tuktoyaktuk Coastal Plain, while also extending out over the land fast ice north of Kendall Island. The coast line here is undergoing retreat, with a mean annual recession rate of >1 metre, higher in certain places. The surficial geology of the outer Mackenzie Delta primarily consists of Holocene deltaic and floodplain sediments from the surface of the modern Mackenzie Delta., typically composed of interbedded silts and silty sands. Sediments in the Tuk coastal Plain are predominantly composed of glacial till or glacio-fluvial sands and gravels. Dominant soils of the coastal plain are organic and turbic cryosols, underlain by a continuos layer of permafrost, and often waterlogged due to impeded drainage. Continuous permafrost with low to high ice content occurs beneath all terrestrial and many subaqueous areas. Offshore sediments may exceed thicknesses of 100 m. This area has a low arctic ecoclimate, with cold winters and cool summers. Snow and freshwater ice may persist for eight months. Winds are westerly in summer, and north-westerly in winter. Atmospheric inversions occur during all seasons. The Coastal plain is characterized by a large number of both isolated and interconnected thermokarst lakes, that drain through small streams into the S. Beaufort Sea. These streams freeze to the bottom in winter, and are often ephemeral in summer. Three ice zones are found in the Southern Beaufort Sea: landfast zone, seasonal ice/transition zone; and polar pack zone.

Vegetation here is limited by permafrost and other climatic conditions. Dominant species are sedges and Low Willow Alder. The Kendall Island Bird Sanctuary provided critical habitat for numerous migratory waterfowl and shorebird species (see table 16, Project Description[1]), eg tundra swans, Canada geese, white fronted geese, and brant. Some species of birds may overwinter here, including snowy owl, gyrfalcon, and two species of ptarmigan. Several fish species inhabit both the freshwater and marine waters here, including broad whitefish, burbot, inconnu, Arctic and Least cisco, N. pike, Pacific Herring and lake trout (see Table 17, Project Description). Mammals common to the region include caribou, Arctic fox, grizzly bear, muskrat, and wolverine, while marine mammals may include polar bear, beluga whale, and ringed seal (see Table 15, Project Description).

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

The proposed Project falls within the Tuktoyaktuk, Inuvik and Aklavik Conservation Planning Areas as defined by the respective Community Conservation Plans, and four categories of lands coincide with the proposed project area: B, C, D, and E. B lands and waters signify some degree of significance and sensitivity regarding cultural or renewable resources, but may be permitted, moving through to E lands and waters where such resources are of extreme significance and sensitivity, and no development is allowed. There are also 17 Special Management Areas (see Table 6, Project Description) within or adjacent to the proposed program area.

The area is used for trapping (several fur bearers), fishing, hunting (caribou, beluga, waterfowl), recreation, and tourism. However, consumptive hunting and fishing and adventure tourism is limited. Some birding tours are led into the Kendall Island Bird Sanctuary in spring and summer, and caribou viewing, sport hunting and dog sled tours may occur out of Tukyoyaktuk. Several local cabins are located near the proposed program, with only one actually within it. No known archaeological or historical sites are found in the project area; however seven have been identified in the vicinity (Table 18, Project Description). The boom in oil and gas exploration has been providing wage employment to local residents .

Information Sources Used:

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[1] Inuvialuit Environmental and Geotechnical Inc., October 2001, "Project Description for the Proposed Anadarko Canada Corporation Immerk Winter 2001/02 2D Seismic Program."

___ Historical Maps (expired permits and licences)
___ Running Maps (current permits and licences)
___ Interference Maps (other land dispositions)
_X_ Public Registry System
___ GIS
___ Indian Land Registry
___ Land Transition Management Style
_X_ Other: application & additional company information
_X_ Project Description for EISC
_X_ Oil and gas water licence questionnaire

## 7.a Consultation on Project (Water licence and/or by EISC)

| Federal Government | | Contact Person | Dates Comments Received |
|---|---|---|---|
| DIAND | | | |
| Water | ✔ | G. Cook; R. Jenkins, R. Beavers | Nov.21, 2001 (CEAA s.5 response) |
| Geology | | | |
| Lands | ✔ | D.Elliott | |
| Minerals | | | |
| Ec. Dev. | | | |
| Environment | | | |
| I&I | | | |
| D.M. | | | |
| R.M.O./DWRO | ✔ | R. Walker | Nov.22, 2001 (CEAA s.5 response) |
| | ✔ | S. Gallupe | Nov.30, 2001 (CEAA s.5 response) |
| DFO/CCG | ✔ | P. Cott, Bruce Hanna | Dec. 10, 2001 (CEAA s.5 response) |
| | | K. Barron | Dec. 04, 2001 (letter of advice to proponent) |
| DOE | ✔ | P. Pacholek | Nov. 30, 2001 (CEAA s.5 response) |
| | ✔ | P. Latour , CWS | Dec. 06, 2001 ;Dec.19 2001 |
| Health Canada | ✔ | S. Grewal | NR |
| DOT | | | |
| NRCan | ✔ | I. Lamirande | NR |
| NEB | ✔ | L. Van Ham | Nov. 20, 2001 (CEAA s.5 Notification) |
| | | | Dec. 05, 2001 (IR to proponent) |

| | | Contact Person | Dates Comments Received |
|---|---|---|---|
| **N.W.T. Government** | | | |
| | RWED | ✔ B. Hudson | Dec. 03, 2001 (from EISC) |
| | Health | ✔ D. Fleming | NR |
| | Transportation | ✔ H. Green | NR |
| | Tourism | | |
| | MACA | | |
| | EM&PR | | |
| | PWNHC/ECE | ✔ B. Cameron | Dec. 05, 2001 (from EISC) |

| **Aboriginal Groups** | | Contact Person | Dates Comments Received |
|---|---|---|---|
| | EISC | ✔ L.Graf | Dec. 10 2001 (decision) |
| | Inuvik HTC | ✔ R. Binder | Nov. 29 2001 (from EISC) |
| | FJMC | ✔ R. Bell | Nov. 28 2001 (from EISC) |
| | Tuk HTC | ✔ F. Pokiak | Nov. 20 2001 (from EISC) |

| **Public/Interested Parties/Other** | Contact Person | Dates Comments Received |
|---|---|---|
| oil and gas rep.,TAC | ✔ B. Boos | - |

## 7.b) Consultation List

For the Land Use Permit, # N2001B0050 (from North Mackenzie District, DIAND)

| Name | Comments | Date: |
|---|---|---|
| ILA - Tuk | No response (NR) | |
| EPS - Yellowknife | | |
| DFO - Inuvik K. Barron | | Dec 04, 2001 letter of advice |
| National Energy Board | Ceaa Co-ord ltr. | Nov. 20, 2001/ IR Req., Dec 05/01 |
| North. Oil & Gas Dir. | NR | |
| Aklavik Hamlet Council | NR | |
| " Ren. Res. Comm. | NR | |
| " Band Council | NR | |
| " H.T.C. | NR | |
| " Community Corp. | NR | |
| " Metis Local #56 | NR | |
| Tuktoyaktuk Hamlet Coun. | NR | |
| " H.T.C. - P. Pokiak | | Nov. 20, 2001 From EISC |
| " Community Corp. | NR | |
| GNWT - MACA Inuvik | NR | |
| GNWT - E.C.E.,Yk-B. Cameron | | Nov 5, 2001 From EISC |
| GNWT - Transport ,Yk-H. Green | | Dec. 4, 2001 |
| GNWT - RWED - Inuvik From Yk | | Dec.3, 2001 |
| Inuvik Town Council | NR | |
| " Native Band | NR | |
| " H.T.C. - R. Binder | | Nov. 29, 2001 |
| " Community Corp. | NR | |
| " Metis Local # 62 | NR | |
| EISC - Inuvik | Approval | Dec 10 , 2001 |
| Gwichin Land & Water B. | NR | |
| FJM Council - R. Bell | | Nov. 28, 2001-from EISC |

**Public Concerns:**

-The EISC received comments back from the Tuk and Inuvik Hunters and Trappers Committees, who provided some mitigation measures and suggestions, after meeting also with the proponent. There were no serious concerns raised, and remarks are noted under reviewers comments.
-In its consultation with community members in August and October 2001 (Project Description, section 16, Pages 96 to 102), Anadarko Canada discussed with the community, environmental issues, suggested mitigative measures, and program details. Environmental issues addressed by Anadarko included: timing of seismic work, road use impacts, setting of charges and clean up of shot holes, disturbance to wildlife like polar bears and overflying geese, risk of spills, leaving of debris on the various sites, avoidance of cabins etc. As well, the proponent addressed the communities' concerns about accidents and safety. In a letter from the consultant IEG Inc, issues raised at the Oct. 29 2001 community meeting in Aklavik dealt with questions about drilling techniques to be used, start up dates, and such economic questions as information on jobs, training and wages.

A record of these comments and concerns are on the CEAA public registry file filed with the NEB and NWT Water Board.

## 8. Detailed Description of Environmental and Cumulative Effects Identified in Tables A and B, or by the proponent in the Project Description.

**Potential Adverse Environmental Effects:** Anadarko notes that the following environmental components could potentially be adversely affected by the proposed Project activities: permafrost, terrain and soils; vegetation; terrestrial and marine wildlife; aquatic resources; and traditional and other land uses.

Disturbance of soils, terrain and permafrost could result in erosion, permafrost degradation and other terrain changes. Clearing of vegetation for construction of access and seismic lines would primarily result in the loss of the above ground, woody vegetation with potential for loss of root systems and herbaceous layer communities if the organic layer is disturbed. Anadarko anticipates little or no clearing of vegetation, however, compression of above ground vegetation is likely to occur along access roads and seismic lines. There is also potential for Anadarko employees and contractors to travel off designated travel areas and impact vegetation.

The primary concerns for wildlife include: sensory disturbance of over wintering wildlife species due to Project related noise, vehicle movements, activity and general presence; disturbance to migratory birds returning to the Kendall Island Bird Sanctuary and other suitable areas if the program continues too late in the spring; alteration or loss of wildlife habitat due to vegetation clearing and disturbance to terrain; potential for sedimentation of marine and freshwater aquatic habitats; injury or mortality of wildlife that are hit by Project traffic; injury or mortality of fish that are in proximity to detonated explosives or are sucked up by the water truck hoses; and, attraction of nuisance wildlife to camp.

The water requirements for the Project could result in impacts to local aquatic resources including sedimentation of the water source and, drawdown of water source volumes. In addition, clearing of riparian vegetation or travel across streambanks for Project access may result in subsequent bank erosion and sedimentation of downstream water and aquatic habitats. Fuel or other pollutants could enter water bodies resulting in contamination and degradation of aquatic habitat.

The proposed Project activities could conflict with or otherwise impact traditional harvest of fish and wildlife or could encounter and accidently damage previously unknown archaeological, historical or palaeontological resources.

**Effects of the Environment on the Project:** Anadarko notes that potential effects of the environment on the project include: delayed ice formation due to unexpected warm weather and early or unusually heavy snowfall resulting in late project start-up; sensitive terrain in the Project area that may impact project planning (i.e., steep slopes); deep snow making it difficult to travel on seismic lines; little or no snow making it difficult to move vehicles on overland access routes and lines without damaging underlying vegetation; drifting snow hampering containment and collection of garbage; and early ice breakup affecting Anadarko's ability to complete the program using ground access.

**Effects of Accidents and Malfunctions:** Anadarko notes the following potential effects of accidents and malfunctions on either/both the seismic program and surrounding environment: spills or leaks of fuels and other fluids (e.g., glycol) into the environment; accidents from drilling shot holes or igniting trapped gas pockets; and inadvertent discharge of untreated wastewater to the environment.

**Cumulative Environmental (and socio-economic) Effects:** Past, current and foreseeable future (i.e., imminent) projects and their adverse environmental effects or potential adverse environmental effects have been taken into consideration by Anadarko in its assessment of cumulative effects. The potential cumulative effects selected by Anadarko for evaluation include cumulative habitat alteration in the study region, disturbance of wildlife species causing wildlife to avoid areas and the disturbance of resource harvesting activities during the winter 2001/2002 period.

Anadarko notes that project activities, in combination with other projects and activities in the study area, have the potential to:

- disturb denning polar bears which over time may affect the productivity of the southern Beaufort Sea population;
- enhance access for traditional harvesting and permitted hunting of the Bluenose-west/Cape Bathurst caribou herd;
- increase human disturbance of caribou as well as denning grizzly bear;
- cause wildlife habitat loss and/or alteration;
- disturb aquatic habitats;
- project consultation could contribute to consultation fatigue of interested public;
- periodicity of employment (i.e., winter), recent increase in oil and gas activity and limit of local trained, available labour limits the socio-economic benefits accrued to local communities; and
- contribute to increases in land use conflicts in traditional use areas (i.e., trappers, cabin users).

## 9.a) Summary of Proponent's Mitigation Measures (see also Attachment 1)

**General:** Implementation of mitigation measures outlined in the Project Description would be achieved through: review and understanding of key document elements (i.e., Table 19 included as Attachment 1); startup and subsequent tailgate meetings that focus on environmental concerns and improvements to carrying out Project activities; presence of Wildlife and Environmental Monitors on the Project site; involvement of the Monitors in daily activities (e.g., meetings); communication between the program supervisor and the Environmental Monitor; posting of maps/diagrams showing areas of environmental concern; clarification of subjective terms (e.g., frozen ground condition); and, flagging boundaries to ensure traffic and equipment are restricted to approved right-of-way as well as areas with particular environmental concern are avoided. In response to an NEB Information Request, Anadarko's contractor Delta Trace Ltd. designated two employees, the Operations Supervisor and the Project Manager, who are responsible for implementing mitigative measures and approval conditions through start-up, weekly safety and tailgate meetings as well as program introduction meetings for new employees or employees returning from time off. Both individuals will conduct periodic field inspections during program activities to follow-up on the information and procedures discussed in meetings with field personnel and subcontractors.

**Terrain, Permafrost and Soils:** Key mitigation measures proposed by Anadarko to avoid or minimize disturbance to the underlying terrain, permafrost and soil include: avoidance of or construction of snow/ice ramps to protect sensitive features; operating under frozen ground condition; use of tracked equipment; and taking advantage of the cushioning effect of the snow. In addition, a camp sump will not be required as wastewater (black and grey water) would be collected in a holding tank and disposed of at Inuvik disposal facilities. Arrangements would also be made with the Tuktoyaktuk facilities as a back-up.

**Vegetation:** Anadarko proposes the following measures to mitigate impacts to vegetation: operating under frozen ground condition and use of snow pack over access routes; walk over shrubs extending beyond the snowpack on seismic lines to avoid cutting; use of tracked equipment equipped with mushroom shoes to avoid disturbance to root systems; avoidance of multiple passes with equipment; and restriction of overland access to designated trails and seismic lines. Anadarko indicates that their proposed seismic activity this winter would be a component of the Canadian Wildlife Service's study of the impacts of seismic activity on habitat in the Kendall Island Bird Sanctuary.

**Wildlife:** Potential effects of the Project on wildlife would be minimized by the following mitigation measures proposed by Anadarko: maintain contact with RWED regarding wildlife habitats or locations in the project area; employment of a Wildlife Monitor to advise on possible conflicts with wildlife; project timing to avoid critical migratory periods; provision of bear awareness training to all crew members; implementing restrictions to vehicle travel (e.g., minimize overland access, coordinating access roads with other operators in the area, limit travel to essential trips); suspension of seismic activities and pull back of crews (300 to 500 m) if large carnivores enter the project area (e.g., grizzly bear, polar

bear); set back of 50 m and 100 m from known grizzly and polar bear dens respectively; avoidance of seals in the program area; shooting of seismic lines in the Kendall Island Bird Sanctuary first if program delays result in potential conflict with migratory birds returning to the area; and water intake lines would be fitted with screens in accordance with DFO's *Freshwater Intake End-of-Pipe Fish Screen Guideline* to avoid entrainment of fish. In a response to an NEB Information Request, Anadarko committed to complying with DFO's letter of advice with the expectation that slight amendments would be made through further consultation with DFO.

**Aquatic Resources:** Potential effects on aquatic resources would be minimized through Anadarko's commitment to: use of tracked vehicles and snow/ice ramps to protect terrain; avoid clearing of riparian vegetation; withdraw water from only those waterbodies, channels and marine areas where drawdown will not be an issue; use of locking fittings for fuel transfer, adherence to setbacks and secondary containment of fuel storage tanks will reduce the potential for spills into waterbodies; use of vibrosels on waterbodies frozen to the bottom; and compliance with DFO's letter of advice with the expectation that slight amendments would be made through further consultation with DFO.

**Other Land Uses:** Public consultation has been undertaken to make the public aware of ongoing exploration activities that may impact traditional and other land use activities.

**Archaeological, Historical or Palaeontological Sites:** Strategies proposed by Anadarko to protect known locations include: maintenance of a 30 m buffer zone; protection of the resource by constructing physical barriers, or investigation and recovery of the information from a resource by excavation. Should any sites be discovered during construction operations, work would be suspended until permission is granted to do otherwise and appropriate agencies would be immediately notified.

**Effects of the Environment on the Project:**
The development schedule is conservative and allows for a certain amount of delay that could be caused by weather conditions such as late ice formation, insufficient snow cover, or an early break-up. Electronic and physical ice profiling would be used throughout the program to ensure safe ice conditions. Water can be pumped from the large waterbodies to aid accelerate ice thickening. Sensitive terrain was avoided by selection of access routes where slopes are minimal; where unavoidable, steep banks would be accessed by building up snow/ice ramps to prevent disturbance or erosion. In addition, pingos, known archaeological sites, steep slopes (potential bear dens), grizzly bear dens and polar bear dens would be avoided by a minimum of 150 m, 30 m, 25 m, 50 m and 100 m respectively. The effects of deep snow will be mitigated through use of tracked equipment (better maneuverability) and elevation of plow blades with mushroom shoes to prevent damage to underlying terrain and vegetation. To mitigate the effect of little or no snow or early ice break-up, the program may be run using heli-portable techniques. Should drifting snow obscure refuse, a post-snow cover aerial inspection and ground clean-up would be undertaken.

**Accidents and Malfunctions:**
Anadarko would reduce the likelihood of fuel/fluid leaks or spills through ice profiling to minimize the risk of vehicles going through the ice; designating speed limits to minimize the chance for collisio; use of secondary containment on all tanks that exceeds the capacity of the tank; use of spill-proof fueling mechanisms and designation of a fuel manager; and use of newer, maintained vehicles and drip pans. Inadvertent discharge of waste water to the environment would be avoided by trucking waste water to disposal facilities in Inuvik. Accidental ignition of shallow gas during drilling would be avoided by installation of automatic shut-off valves on the drills.

**Cumulative Adverse Environmental Effects:**
Cumulative environmental effects would be mitigated by: avoidance of known polar bear and grizzly bear dens sites and identification and avoidance of possible locations during field operations; employment of a wildlife monitor to identify

and assist with avoiding potential conflicts with wildlife; use of existing access routes and coordinating access/activities, where possible, with other operators in the region to minimize enhancement of access for hunting and to minimize loss or alteration of wildlife habitat in the project area.

## 9.b) Licence Application - Reviewers' Recommended Mitigation Measures

The following is a summary of some of the recommended mitigation measures provided by reviewers, including EISC members. For the complete and unabridged recommendations, refer to the information on the public registry.

**DFO**- Letter of Advice
-the use of explosives within water bodies that do not have bottom fast ice should be avoided if possible. Prior to any seismic activity taking place in waterbodies not frozen to the bottom and where dynamite is to be used as the energy source, DFO must be satisfied that all conditions specified in the June 13, 2001 DFO letter (applicable to all companies)have been met.
-contrary to proponent's position that a 9. 5 m. burial depth is adequate, all charges deployed under waterbodies not completely frozen to the bottom should be buried at a minimum set back distance of 15 m. below the lake bed. (Setback to be measured from the start of the consolidated material layer below the lakebed to the top of the buried charge).
-only charges of 2 kg. or less shall be used in water bodies not completely frozen to the bottom. .
- Access routes should follow existing trails, winter roads or cut lines where possible to minimize unnecessary clearing of vegetation and soil compaction. Vegetation is critical for the protection of littoral and riparian fish habitats since it provides cover and enhances bank stability...DFO is pleased that access routes will be shared with Burlington Resources.
-Mechanized clearing should not occur within one hundred (100) metres of any stream or lake to protect bank stability, avoid soil compaction and retain riparian vegetation.
-If winter road construction requires water in sufficient volume that the source waterbody may be drawn down, please submit details (volume required, size of waterbody, etc.) to DFO for review. Although the company has stated that no water will be taken from a land locked waterbody where drawdown and related fisheries issues may be an issue: DFO does not recommend the use of such water bodies that have no inflow or outflow systems , as water sources.
-Water intakes should be properly screened with fine mesh to prevent the entrainment of fish. Please refer to the *Freshwater Intake End-of-Pipe Fish Screen Guideline* (DFO, 1995) available upon request.
-"Mushroom shoes", or "boots" on bladed vehicles are recommended as a protective measure to minimize ground disturbance and erosion.
-Cutting of crossing approaches should not be conducted unless approved in writing by DFO. The preferred method for crossings to avoid bank cutting is with the construction of snow ramps.

> *Note:* The use of material other than ice or snow to construct a temporary crossing-over of any ice-covered stream is prohibited under Section 11 of the *Northwest Territories Fishery Regulations*, unless authorized by a Fishery Officer.
> -Winter crossings should not impede water flow and should be v-notched or otherwise removed prior to spring break-up.

-Reclamation activities should include bank stabilization and re-vegetation as required. This work should be completed prior to spring thaw when surface runoff is greatest
-Depositing deleterious substances into fish bearing waters is prohibited as stated under subsection 36(3) of the *Fisheries Act*. The following additional mitigation measures are intended to prevent the deposition of deleterious substances and possible habitat disturbance or loss
-All activities including maintenance procedures and vehicular refuelling should be controlled to prevent the entry of petroleum products, debris, slash, rubble, concrete or other deleterious substances into the water.
-All wastes, drill cuttings, sewage containment, sumps and fuel caches should be located at least 100 metres from any water body if possible, and be sufficiently bermed or otherwise contained (such as in doubled walled tanks) to ensure that these

these substances do not enter any waterbody.
-Fuel storage should have secondary containment (such as double walled tanks, berms etc) that is sufficient to ensure that fuel will not be able to enter any water body.
-No material should be left on the ice when there is the potential for that material to enter the water (i.e. spring break-up).
-a spill contingency plan should be made available to all persons required to work on site and followed in the event of a spill.
-All spills of oil, fuel, or other deleterious material should be reported immediately to the 24-Hour Spill Line at (867) 920-8130 as well as the National Energy Board as per their regulatory provisions.

**DOE (EP and CWS):**
-all required review of activities, impacts and mitigation measures within the Kendall Island Bird sanctuary will be addressed through the screening of the permit by CWS.
-meeting the requirements of the federal Fisheries Act is mandatory, regarding deposition of any deleterious substances into waters frequented by fish.
-additional mitigation is needed to ensure that the suspension and transport of sediment from seismic detonations does not extend beyond the area of program impact.
-DOE recommends the use of an approved incinerator for disposal of solid waste.
-DOE supports the intention to equip all fuel storage areas with secondary containment, with the additional storage of hazardous wastes in such as manner as to prevent their release to the environment , but if there was not a method of leak testing between the first and second containment layers of the fuel tanks there should be, or would be recommended
-some changes to the ERP/Contingency Plan were suggested- handle in licence or LUP .
-continued improvements to the analysis of cumulative effects is needed by all proponents.
-the proponent indicated that excess drill cuttings will be collected, removed from the ice and disposed of a minimum of metres from the water body. Can the proponent identify any drilling additives that may be used to ease the drilling process, what are they , and are they toxic.
-more details are needed re final clean up phase of the project , as it is scheduled to occur during spring and summer. Environmental impacts from machinery and vehicle use in the spring/summer especially, are quite different from those in winter, ie different or additional mitigation may be needed.

**DIAND:**
-an approved contingency plan is required by licence issuance, along with a list of spill response equipment, with locations
-all vehicles should be equipped with absorbent materials, drip trays, shovels and disposal bags.
-if waste water is to be hauled and deposited at the Inuvik sewage facilities, the proponent should disclose the method of waste disposal up front in the project description, and provide a written letter of approval from the town to do this (since under their licence), include additional contingencies, ie should the camp storage be full, and no pumpout truck is able to get in, comply with Transportation of Dangerous Goods Act re haulage of waste on public roads, record all waste quantities, and ensure that
the pumpout contractor has effective spill response capabilities.
-creeks, channels, and river crossings must have approaches made of clean ice/snow materials, full details are needed on raw water sources (estimated drawdowns, lake size and depth etc), and no marine water should be deposited on land.
-the emergency response plan needs additional details (note for the licence)
-support DFO recommendations re use of dynamite, and explosives in water bodies with no bottom fast ice should be avoided, as increases in sedimentation could occur.
-while clearing of riparian vegetation is not planned, should it be required, mitigative measures to minimize erosion should be put into place.

**EISC review (of Project Description)**
**i) Tukoyaktuk Hunters and Trappers Committee:**
-signs should be erected along access roads, for safety reasons.
-avoid disturbing any archeological sites that may be in the area.

- separate wildlife and environmental monitors must be hired for the duration of the project .

ii) **Inuvik Hunters and Trappers Committee:**

-ensure that ice is thick enough before heavy traffic uses them , to avoid vehicles potentially going through the ice and negatively impacting fish, habitat and water quality.

-equipment should remain on the right of way, (contrary to reports received in the past),

-banks of rivers, streams lakes and coastal regions are vulnerable to slumping and erosion, and so approaches must be constructed in such as way as to avoid any negative impacts to these areas if encountered.

-wildlife monitors, supplied by the HTC's , must be hired for all projects.

**RWED (to EISC)**

-the number of camps to be used is unclear, but in any event, if any are to be located on marine ice, additional environmental measures should be applied in recognition of sensitivity of the marine environment, eg enhanced secondary containment of contaminants.

-suggests EISC may want to gather more information about how past seismic activity has affected wildlife and habit in the region, eg from harvesters, and from the pending CWS-operators study in the Kendall Bird sanctuary.

-in the event that reclamation is deemed to be necessary, the company should provide a description of how disturbed tundra areas will be reclaimed.

-with the increasing number of companies planning or using community waste disposal areas, these companies should give some thought as to how facilities can be expanded, or plan to treat their own sewage and water.

-RWED has guidelines for spacing of windrows, eg those created here by snow removal. One such recommendation is to have breaks in windrows every 60 m , and be 10 m in width.. This maximizes opportunities for wildlife to escape and cross the ROW, if humans or vehicles are encountered.

-advise the RWED Inuvik office to discuss exact seismic line locations, once determined, to avoid impacts to known denning bears.

- a more detailed map showing the access route into the area would be useful, to help assess sensitive areas, use of existing routes etc.

-several recommendations for inclusion in the Spill Contingency Plan were outlined.

**GNWT Education, Culture and Employment: Prince of Wales Northern Heritage Centre** (to EISC):

-stay at least 30 metres back from the boundaries of all known archeological sites

-proceed with caution in all operations as the area exhibits a reasonable potential for finding new archeological sites;

-the proponent should be directed to conduct a follow up study next summer to assess potential impacts to heritage resources as a result of the winter's activities.

**9c) DIAND/INAC Land Administration Terms and Conditions :**

The following conditions should be considered as mitigation measures to help in preventing or restoring environmental damage:

## RECOMMENDED CONDITIONS ANNEXED TO AND FORMING PART

## OF LAND USE PERMIT NUMBER N2001B0050

**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 operation within three hundred (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.<br>(b) The Permittee shall confine the line to a maximum width of Eight (8) 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** |
| 1.7 | The Permittee shall remove from Territorial Lands, all scrap material discarded machinery and parts, barrels and kegs, buildings and building material. | **REMOVE WASTE MATERIAL** |

**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, telephone number (867)777-3361, at least forty-eight (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 ten (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 land used will be completed. | **REPORTS BEFORE REMOVAL** |
| 2.3 | The Permittee shall submit an approved progress report to the Engineer every seven (7) days during this land use operation. | **PROGRESS** |
| 2.5 | The Permittee shall not conduct any overland movement of equipment or vehicles before 0800 hours local time on November 15, unless otherwise authorized in writing by a Land Use Inspector. | **START-UP DATE** |
| 2.6 | The Permittee shall not conduct any overland movement of equipment and vehicles after 0800 hours local time on April 15, unless otherwise authorized in writing by a Land Use Inspector. | **SHUT-DOWN DATE** |
| 2.7 | The Permittee shall not conduct any overland movement of equipment and vehicles between April 15 and November 15, unless otherwise authorized by a Land Use Inspector. | **SHUT-DOWN PERIOD** |

| | | |
|---|---|---|
| 2.9 | The Engineer, for the purpose of this operation, designates April 15, as spring break-up. | **SPRING BREAK-UP** |
| 2.10 | 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** |
| 2.11 | 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** |
| 2.15 | The Permittee shall commence and foster revegetation on the land used, as directed by a Land Use Inspector, within one (1) year of the completion of the land use operation. | **RE-ESTABLISH VEGETATION** |
| 2.16 | The Permittee shall complete all clean-up and restoration of the lands used prior to the expiry date of this Permit. | **CLEAN-UP** |
| 2.17 | 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) - 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 a 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 AND SHOES** |
| 3.3 | The Permittee shall use a forced-air fuel-fired incinerator to incinerate all combustible garbage and debris. | **INCINERATORS** |

**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 kPa. | **DETOURS AND CROSSINGS** |
| 4.2 | The Permittee shall construct and maintain winter roads with a minimum of fifteen (15) centimetres packed clean snow at all times during this land use operation. If this cannot be done, | **SNOW ROADS/ ICE ROADS** |

then the Permittee shall construct Ice Roads in a manner approved by a Land Use Inspector.

| | | |
|---|---|---|
| 4.4 | The Permittee shall plug all bore holes as the land use operation progresses. | **PLUG HOLES** |
| 4.5 | The Permittee shall refill and restore bore hole craters as the land use operation progresses. | **REFILL CRATERS** |
| 4.6 | The Permittee shall remove all wire from the land as the land use operation progresses. | **REMOVE WIRE** |
| 4.13 | The Permittee shall not store material on the surface ice of streams, channels, lakes or any other waterbodies. ( except at camp locations and designated staging areas ) | **STORAGE ON ICE** |

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

| | | |
|---|---|---|
| 5.6 | The Permittee shall mark all seismic lines on land at least once every one and a half (1.5) kilometres with a permanent marker indicating the Land Use Permit number or in a manner approved by a Land Use Inspector. | **MARKERS SEISMIC LINES** |
| 5.7 | 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**

| | | |
|---|---|---|
| 6.2 | The Permittee shall remove any obstruction to natural drainage caused by any part of this land use operation. | **NATURAL DRAINAGE** |
| 6.4 | The Permittee shall not use any material other than water in the construction of ice bridges. | **ICE BRIDGE MATERIAL** |
| 6.5 | The Permittee shall not allow any ice bridge to hinder the flow of water in any stream. | **ICE BRIDGE** |
| 6.17 | 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. | **VEHICLE MOVEMENT FREEZE-UP** |
| 6.18 | The Permittee shall suspend overland travel of equipment or vehicles if rutting occurs. | **SUSPEND OVER-LAND TRAVEL** |
| 6.19 | The Permittee shall apply grass seed and fertilizer to areas | **REPLANT** |

Designated in writing by a Land Use inspector. **DESIGNATED AREAS**

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

| | | |
|---|---|---|
| 7.8 | The Permittee shall burn all garbage and debris at least daily. | **GARBAGE DISPOSAL** |
| 7.10 | The Permittee shall remove all noncombustible garbage and debris from the land use area to a disposal site approved in writing by a Land Use Inspector. | **REMOVE GARBAGE** |
| 7.12 | The Permittee shall dispose of all combustible waste petroleum products by removal. | **WASTE PETROLEUM DISPOSAL** |
| 7.15 | The Permittee shall report all spills immediately in accordance with instructions contained in "Spill Report" form N.W.T. 1086 (10/79). 24 hour Spill Report Line: (867) 920-8130. | **REPORT CHEMICAL AND PETROLEUM SPILLS** |
| 7.17 | The Permittee shall dispose of all sewage and grey water in a manner approved by a Land Use Inspector. | **SEWAGE DISPOSAL** |

**31 (1) (b) - WILDLIFE AND FISHERIES HABITAT**

| | | |
|---|---|---|
| 8.1 | The Permittee shall not unnecessarily damage wildlife habitat in conducting this land use operation. | **HABITAT DAMAGE** |
| 8.3 | The Permittee shall not obstruct the movement of fish while conducting this land use operation. | **FREE FISH MOVEMENT** |
| 8.8 | The Permittee shall not detonate explosives within Thirty (30) metres of any body of water which is not completely frozen to the bottom, or as stated in the Department of Fisheries and Oceans Explosives Setback Guidelines. | **EXPLOSIVES WATER** |
| 8.11 | 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 Department of Resources, Wildlife and Economic Development at (867) 777-7308. | **BEAR/MAN CONFLICT** |

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

| | | |
|---|---|---|
| 9.3 | The Permittee shall not operate any machinery or one hundred and fifty (150) metres of the base of a pingo. | **PINGOS** |
| 9.4 | The Permittee shall not feed wildlife. | **NO FEEDING WILDLIFE** |

**31 (1) (k) - PETROLEUM FUEL STORAGE**

| | | |
|---|---|---|
| 11.2 | The Permittee shall not place any petroleum fuel storage containers within thirty (30) metres of the normal high water mark of any stream where possible. | **FUEL BY STREAM** |
| 11.3 | The Permittee shall locate mobile fuel facilities on land when stationary for any period of time exceeding twelve (12) hours . | **FUEL ON LAND** |
| 11.4 | The Permittee shall not allow petroleum products to spread to surrounding lands or into water bodies. | **FUEL CONTAINMENT** |
| 11.6 | The Permittee shall construct a dyke around each stationary fuel container or group of stationary fuel containers where any one container has a capacity exceeding 4,000 litres. | **DYKE FUEL CONTAINERS** |
| 11.8 | The volume of the dyked area shall be ten per cent (10%) greater than the capacity of the largest fuel container placed therein. | **CAPACITY** |
| 11.10 | The Permittee shall:<br>(a) Examine all fuel storage containers for leaks a minimum of twice every day.<br>(b) Repair all leaks immediately. | **CHECK FOR LEAKS** |
| 11.12 | The Permittee shall not use bladders for storing and/or transporting petroleum products. | **BLADDERS PROHIBITED** |
| 11.15 | The Permittee shall seal all container outlets except the outlet currently in use. | **SEAL OUTLET** |
| 11.16 | The Permittee shall mark all fuel containers with the Permittee's name. This includes 45 gallon drums. | **MARK CONTAINERS** |

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

| | | |
|---|---|---|
| 13.5 | 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** |

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

13.7 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).

13.9 The Permittee shall, while preparing the access road, make every effort to avoid covering or destroying traps or snares that may be found along these routes. **TRAPS PROTECTION**

13.10 The Permittee shall restore any trails used by trappers or hunters along access routes by slashing any and all trees that may fall across these paths or trails and by removing any other obstructions such as snow piles or debris that may be pushed across the trails. **TRAILS RESTORATION**

13.12 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**

## RECOMMENDED MITIGATION SUPPLEMENTARY TO PERMIT CONDITIONS

**Fuel Storage:**

- Fuel sloops located within 30 m 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 refuelling, the opening should be on the uphill side.
- Refuelling operations occurring outside an area described above should include a haz-mat/ drip tray under the tank receptacle.

**Equipment:**

- All equipment parked or 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 gray 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 15 kg or less at 18 metres depth to prevent excessive cratering. Other configurations of hole depth/ charge size may be acceptable as well.

## 10. 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

## 11. Likelihood of Occurrence

Of the identified adverse significant environmental effects in #10 are any likely to occur?

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

## 12. CEAA Determination /Recommendation

_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.

## 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? (Attach Comments to screening file.) | ___ Yes _X_ No |

## 14. Follow-up Program

None required by DIAND, NEB or NWT Water Board under CEAA. Regular licence, land use and operations inspections should suffice to identify any problems needing attention. However, prior to this, Anadarko Canada indicated that it too would carry out inspections of its programs along with Delta Trace and that an Inuvialuit Wildlife Monitor assigned by the local HTC would be on site to provide security and prevent wildlife interactions. Anadarko's post-program inspection would focus on: removal of debris from the program area; ensuring no vegetation had inadvertently been left in water courses;

documentation, reporting and reclamation of site disturbances; survey of lines to ensure that no surface disturbance especially at crossings etc had occurred ,and if so, sites will be reported for reclamation; removal of signage and other debris like flagging from access; and documentation of any archeological sites inadvertently disturbed. Anadarko will be working with CWS/EC to design a study on the effects of seismic activity in the Kendall Bird Sanctuary. In addition, the company is participating in a regional assessment of a sub sample of lakes within their exploration area.

Anadarko will conduct a post program inspection in the summer of 2002 to ensure that all debris has been removed. The area utilized within the Kendall Bird sanctuary will be inspected around mid September 2002, after all migratory birds have left the area . The company is also supporting an RWED study of the Bluenose caribou herd movements, as well as a grizzly bear denning survey, to assess effects of exploration activity.

| *Anadarko Canada Corporation* | *19 December 2001* |
|---|---|
| *Immerk Winter 2001/02 2D Seismic Program* | |

## 15. Authorization (continued next page)

**NWT Water Board (Lead RA)**

Greg Cook — Dec. 20, 2001

Prepared By: G. Cook — Date
Environmental Assessment Coordinator

Jan 17, 2002

Approved By: G. Wray — Date
Chairman

**DIAND Land Administration**

Dec 21/01

Reviewed By: R. Walker, RMO — Date

Dec 21/01.

Approved By: R. Cockney — Date
District Manager

**National Energy Board**

December 20, 2001

Reviewed By: L. Van Ham — Date
Environmental Specialist

Dec 21, 2001

Approved By: T. M. Baker — Date
Chief Conservation Officer

**Fisheries and Oceans**

Reviewed By: P. Cott — Date
Area Habitat Biologist

Approved By: P. Cott — Date
Area Habitat Biologist

## 15. Authorization - continued

**Fisheries and Oceans**

Reviewed By: P. Cott
Area Habitat Biologist

Date

Approved By: P. Cott
Area Habitat Biologist

Date

**Environment Canada, Canadian Wildlife Service**

Reviewed By: P. Latour

20/12/01
Date

Approved By (Decision Maker):

20/12/01
Date

## Appendix A: Subject Descriptors

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

agriculture
buildings
communications
defence
✔ energy
forestry
✔ industry
✔ inland waters
mining
oceans
✔ oil and gas
parks
transportation

## Appendix B: Geographic Place Name

see list provided **Tuktoyuktuk**

## APPENDIX C: Screening Checklist and Cumulative Effects Checklist

# 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 **November 20, 2001** to review the proposed project and, pursuant to subsection 6(1) of the CEAA Federal Coordination Regulations, inform NEB and the lead RA by **November 30, 2001** 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 |
|---|---|---|---|
| Environment Canada (Yellowknife)/CWS | X | X | |
| Fisheries and Oceans (Yellowknife) | X | X | |
| Health Canada (Edmonton) | | X | |
| Indian and Northern Affairs (Inuvik and Yellowknife) | X | X | |
| National Energy Board (Calgary) | X | | |
| Natural Resources Canada (Ottawa) | | | X |
| NWT Water Board | Lead RA | X | |

## Federal Approvals

| | |
|---|---|
| DIAND/INAC: | *Territorial Lands Act*- Land Use Permit |
| NEB: | *Canada Oil and Gas Operations Act* - 5(1)(b) Authorization |
| NWT Water Board: | *NWT Waters Act* - Type B Water Licence |
| DFO | *Fisheries Act* - potential s.32 Authorization |
| Environment Canada: | Migratory Birds Convention Act, Regulations - Bird Sanctuary Permit |

## Section 8 Requirements of the CEAA Federal Coordination Regulations

With respect to section 8 of the Federal Coordination Regulations, the RAs prepared a joint determination of the scope of the project, the factors to be considered, and the scope of those factors as follows:

*J. Scope of the Project*

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

   The RAs consider the principal project to be the proposed seismic operations and camp, related to hydrocarbon exploration in the Mackenzie Delta area, Northwest Territories.

2. Other associated physical works or physical activities that must be undertaken to carry out the project.

The RAs note that for the project to proceed to completion, the physical works and activities listed in **Table A** below would need to be undertaken.

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

No further hydrocarbon exploration-related activities have been identified in relation to the physical works and activities for the proposed Project. Any additional hydrocarbon exploration activities would be subject to future examination under the *NWT Waters Act*, *Canada Oil and Gas Operations Act* and/or *Territorial Lands Act* and, consequently, under the CEAA.

***B. 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.

***C. Scope of the Factors to be Assessed***

The following spatial and temporal boundaries, as defined in the Inuvialuit Environmental and Geotechnical Inc. Project Description[2] for the Project, are suggested.

1. Spatial Boundaries
   - Local: Impacts would be limited to the seismic rights-of-way and camp;
   - Subregional: Impacts might extend beyond the limits of the rights-of-way and camp, but would be limited to within 1 to 50 km of the rights-of-way and camp; and
   - Regional: Impacts might extend beyond 50 km from the rights-of-way and camp to the entire region.

2. Temporal Boundaries
   - Immediate: Impact duration would be limited to less than two days;
   - Short-term: Impact duration would be longer than two days but less than one year;
   - Medium-term: Impact duration would be more than one year but less than ten years; and
   - Long-term: Impact duration would extend ten years or longer.

**Section 9 Requirements of the CEAA Coordination Regulations**

The RAs agreed to a CEAA determination date of 19 December, 2001 for taking a course of action under subsection 20(1). Each RA for this joint screening made its own independent CEAA determination.

---

2 Inuvialuit Environmental and Geotechnical Inc., October 2001, "Project Description for the Proposed Anadarko Canada Corporation Immerk Winter 2D Seismic Program".

**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**
(✓ check all the items appropriate to this project)

✓ access road (winter)
- ✓ construction (snow clearing, snow compaction )
- ✓ abandonment/removal
- ___ modification e.g., widening, straightening

✓ automobile, aircraft or vessel movement
✓ blasting (seismic)
__ building
✓ burning (or transported to Inuvik or Tuk)
___ burying
___ channelling
__ cut and fill
✓ cutting of trees or removal of vegetation (line clearing)
___ dams and impoundments
- __ construction
- ___ abandonment/removal
- __ modification

___ ditch construction
___ drainage alteration
✓ drilling other than geoscientific (seismic)
__ ecological surveys
___ excavation
✓ explosive storage (dynamite)
✓ 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
- ✓ stream crossing/bridging (ice roads)
- ___ tunnelling/underground
- ✓ other, explain: shooting seismic ,camp operation, water withdrawal

✓ accidents or malfunctions (Check if there is a possibility for malfunctions and accidents with this project). Describe. ✓ risk of spills and leaks; ✓ discharge of improperly treated wastewater; and ✓ potential for ignition of shallow gas during drilling.

✓ effects of environment on project (e.g., beaver dams). Describe: weather conditions delaying project start-up in the fall or causing early break-up and disruption of winter dependent project activities in the spring; sensitive terrain affecting routing; deep snow affecting site drainage and recovery of garbage; lack of snow resulting in exposure of portions of the lease and subsequent potential impacts to vegetation, terrain and Project use of the lease site; migratory bird arrival into the Delta and sanctuary areas completion of seismic program in the spring (i.e., order of line completion, use of helicopters for program support).

**Potential Project Effects**
(✓ 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 (caribou, whales, bears)
25. ✓ impact to small mammals
26. ✓ impact to fish
27. ✓ impact to birds (population & habitat)
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: removal of vegetation & habitat

**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 First Nation 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 artifacts
48. ✓ impact to local aesthetics
49. ✓ impact to archaeological or historical site
50. __ other,
explain _____

**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**

(✓ check all the items appropriate to this project)

___ agriculture

__ forestry
- ___ commercial
- __ domestic

✔ fishing

✔ hunting/subsistence

✔ other: biophysical, heritage inventory, aquatics, Cape Bathurst caribou, grizzly bear denning and Kendall Island Bird Sanctuary studies

__ 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

✔ 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 (cabins in Project area)

✔ other: biophysical/heritage inventory

✔ other: oil and gas exploration activities, including past, present and imminent drilling and seismic projects; (see section 6 and Table 5 of the project description)

**Effects from other Resource Uses**
(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 (sewage, drill wastes etc)

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 First Nation traditional use
39. ✔ impact to community
40. ✔ impact to industry
41. __ impact to community health
42. ✔ change in work force or community 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_____

**Cumulative Environmental Effects - Comparison of effects identified in Tables A and B**

As noted earlier, the cumulative effects assessment (CEA) is based on the information provided by Anadarko in the Project Description for the Immerk 2D seismic program, winter 2001/2001. Anadarko notes that project activities, in combination with other projects and activities in the study area, have the potential to add to:

- disturbance of denning polar bears which over time may affect the productivity of the southern Beaufort Sea population;
- enhanced access for traditional harvesting and permitted hunting of the Bluenose-west/Cape Bathurst caribou herd;
- increased human disturbance of caribou as well as denning grizzly bear;
- cause wildlife habitat loss and/or alteration;
- disturbance of aquatic habitats;
- consultation fatigue of interested public;
- periodicity of employment (i.e., winter), recent increase in oil and gas activity and limit of local trained, available labour limits the socio-economic benefits accrued to local communities; and
- increases in land use conflicts in traditional use areas (i.e., trappers, cabin users).

The following is a description of potential cumulative adverse effects that may occur as a result of the Anadarko Immerk Project overlapping in time and space with other known or imminent projects (matching of effects from Tables A and B).

| Matching Numbers | Description of potential cumulative adverse environmental effects |
|---|---|
| 1,3,6,21,31 | Deposits into water bodies, such as from fuel spills, excess sediments etc, potential changes to drainage from construction, stream blockage etc all have the potential to negatively affect wildlife species dependent upon them as a water source or habitat component. These types of effects may be exacerbated by the release of similar types of pollutants from other nearby operations, including known oil and gas exploration sites, staging areas and camps. Aquatic habitat disruption could also occur as result of combined winter disturbance within the project area (e.g., the suspension and transfer of sediments from seismic detonations may have effects on water quality and fish habitat that extend beyond the immediate area of program impact). |
| 7,10 | Changes in air quality, plus ice fog, may occur from the running of diesel/gas engines for the duration of this and other similar winter projects being conducted. VECs may be affected through reduced air quality, and ice fog could contain contaminants, and indirectly through effects to local vegetation and habitat. |
| 11 | Noise levels resulting from project related components, such as running of vehicles, dynamite charges etc. can expect to increase, potentially compounded by similar activities in other exploration camps. These areas may have traditionally experienced lower levels of human use, and so may increase the impact on local bird and mammal populations. The area contains the Kendall Migratory Bird Sanctuary, in which birds are expected to be least affected by noise at this time of year. |
| 21,24,25,26,27, 29,31,14, 15, 16, | Several species of birds and mammals may potentially be disturbed through habitat alteration and loss, aquatic impacts from blasting, spills, movement of vehicles etc. For example, increased disturbance to polar and grizzly bears may occur as a result of combined winter disturbance within the project area. Cumulative disturbance may result in avoidance of traditional denning areas. Increased access provided through winter road construction, seismic line clearing etc. may provide additional opportunity for increased hunting pressures on caribou and other species, as well as disturbance to bear dens that often occur on slopes. Land use activities associated within and related projects may affect caribou herd movements, and hence the accessibility and potential hunting success for dependent subsistence hunters and sports hunters. |

| | |
|---|---|
| 33,34,37,38,39, 46, | Local aboriginal residents in particular rely on subsistence harvesting and trapping, fishing activities to supplement their lifestyle and may be the main source of food and income for some. There are key hunting areas for beluga whale, goose and caribou as well as trapping areas that may fall within the project area, and be potentially affected by this and other like activities in the region. |
| 39, 40,42 | This project and the numerous other projects past, current and planned, are all having an impact on the lives of area residents, who have seen this type of potential boom and bust cycle before. The wage economy may not be welcomed by all, and can be short lived, with changes also occurring to their traditional activities as a result of jobs and increased activity out on the land by industry. Such increased activity can also bring prosperity to the region. Such lifestyle changes has for some, contracted hunting ranges as harvesting became limited to weekends and holidays. At this stage however, exploration is a limiting factor, and drastic changes such as that which occurred here in the 1970-80s may not materialize. |
| 47,48, 49 | The project activities, as well as those from related projects, can result in the potential for increased disturbance to known or unknown archeological sites, local cabins, cultural landmarks and leave less than desirable changes to the visual landscape (e.g., winter road and seismic cutlines). |

## Attachment 1 - Proponent's Mitigation Measures

See attached Table 19 from the Project Description.