

# LEGEND

- PROPOSED AEC KAMIK 2D PROGRAM
- ARCHAEOLOGICAL SITES SHOWN THUS
- EXPLORATION LEASE (EL) BOUNDARY
- EXISTING WELLSITE SHOWN THUS

Rev 1: Proposed Seismic Lines Lengthened



## AEC FIGURE 8 ARCHAEOLOGICAL AND CULTURAL SITES WITHIN THE VICINITY OF THE PROPOSED PROJECT MACKENZIE DELTA, N.W.T. SCALE : 1 : 200 000



DRAWN : B.T.	JOB NO. : 00-12215-MAP AEC-KAMIK-2D-FIG8
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## 12.0 PROPOSED MITIGATION AND ANTICIPATED ENVIRONMENTAL IMPACTS

AEC's Kamik 2D winter seismic program has been designed to acquire geophysical data, while mitigating impacts on the environment and land users. The following section and Table 18 identify how potential environmental and socio-economic impacts could arise during the seismic program; and discuss recommended mitigative measures to avoid or mitigate the potential impacts; and the significance of the residual impacts.

Without adequate mitigation, potential environmental impacts resulting from the winter seismic program may include: temporary disturbance to terrain, soils and permafrost, vegetation, terrestrial wildlife, aquatic resources, and traditional and other land uses. These potential environmental impacts were identified through the public consultation process, on-going discussions with various regulatory agencies, a review of existing literature and maps and a general knowledge of the project area developed through work on similar projects in the region.

General seismic activities will follow INAC *Environmental Guidelines: Northern Seismic Operations*. It is predicted that the use of mitigative measures by AEC and their seismic contractor, Veri-Illuq, will ensure that no significant residual impacts will occur as a result of the project. Inuvialuit environmental and wildlife monitors will be on site during operations.

The assessment criteria and definitions used in assessing the significance of each potential impact are provided below.

### SIGNIFICANCE CRITERIA

#### AREAL EXTENT

Local:	Impacts are limited to the seismic rights-of-way and camp.
Subregional:	Impacts may extend beyond the limits of the rights-of-way and camp, but are limited to within 1 to 50 km of the rights-of-way and camp.
Regional:	Impacts may extend beyond 50 km from the rights-of-way and camp to the entire region.

#### MAGNITUDE

Negligible:	No discernible impact.
Low:	Impacts would be restricted to a few individuals or only slightly affect the resource or parties involved; factors related to species' population levels would not be affected.
Moderate:	Impacts would affect many individuals or noticeably affect the resource or parties involved; factors related to a species' population levels would be affected to a degree that a change within natural limits of variability will occur; impacts would be socially tolerated.
High:	Impacts would affect numerous individuals or affect the resources or parties involved in a significant manner; factors affecting species' population levels would be altered to a degree that a change beyond natural limits of variability will occur.

### DURATION

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

### FREQUENCY OF OCCURRENCE

Isolated:	Occurrence confined to specified period.
Accidental:	Occurs rarely over assessment period ( <i>i.e.</i> , life of the project).
Occasional:	Occurs intermittently and sporadically over assessment period.
Periodic:	Occurs intermittently but repeatedly over assessment period.
Continuous:	Occurs continually over assessment period.

### PROBABILITY OF OCCURRENCE

Low:	Unlikely.
High:	Likely.

### LEVEL OF CONFIDENCE

Low:	Based on incomplete understanding of cause-effect relationships and incomplete data pertinent to project area.
Moderate:	Based on good understanding of cause-effect relationships using data from elsewhere or incompletely understood cause-effect relationships using data pertinent to project area.
High:	Based on good understanding of cause-effect relationships and data pertinent to project area.

### PERMANENCE OR REVERSABILITY

Reversible in short-term:	Impact can be reversed in less than one year.
Reversible in medium-term:	Impact can be reversed in 1 year or more, but less than 10 years.
Reversible in long-term:	Impact can be reversed in 10 years or more.
Irreversible:	Impact is permanent.

### RESIDUAL IMPACT BALANCE

Positive:	Net benefit or gain to the resource or affected party.
Neutral:	Neither a positive nor negative impact; or positive and negative impacts are balanced.
Negative:	Net loss to the resource or detriment to the affected party.

### RESIDUAL IMPACT SIGNIFICANCE

Significant Adverse Effect:	High probability of permanent or long-term residual effect of high magnitude on ecological, social, or economic sustainability that cannot be technically or economically mitigated or compensated.
Significant Positive Effect:	High probability of permanent or long-term positive residual effect of high magnitude on ecological, biological, social, or economic sustainability.
Unknown:	Potential significance cannot be defined with existing information or knowledge.
Not Significant Adverse Effect:	All other negative effects.
Not Significant Positive Effect:	All other positive effects.

Table 18

## Potential Environmental And Socio-Economic Impacts, Mitigation And Residual Impacts

Concern/Impact	Mitigative Measures	Areal Extent	Magnitude	Duration	Frequency	Probability	Confidence	Reversibility	Residual Impact Balance	Residual Impact Significance
1. <u>Permafrost and Permafrost Features</u>										
1.1 Disturbance of permafrost	.1 A minimum of 20 cm of snow will be left on all access trails and 20 cm on all seismic lines. Low ground pressure vehicles (tracks and Delta 3 units) will be used to mitigate permafrost disturbance. .2 The project will be completed under frozen ground conditions. .3 Vehicle movement will be restricted in the event of thaw or soft ground conditions. Equipment or vehicles will not be moved unless the ground surface is in a state capable of fully supporting the equipment or vehicles without rutting or gouging of the ground surface. Overland travel of equipment or vehicles will be suspended if rutting occurs. .4 An Environmental Monitor will be present to identify sensitive areas and advise on mitigation. .5 Line locations will avoid environmentally sensitive areas in keeping with all regulations.	Local	Low	Short-term	Accidental	Low	High	Reversible in short-term	Neutral	Not significant
1.2 Pingos	.1 All pingos will be avoided by a minimum of 150 m.	Local	Low	N/A	N/A	N/A	High	N/A	Neutral	Not significant
2. <u>Terrain and Soils</u>										
2.1 Disturbance to the soil profile (i.e. soil loss, compaction, admixing)	.1 Program will be completed under frozen ground conditions limiting soil disturbance caused by uprooting. .2 Any inadvertent surface disturbance will be repaired immediately. .3 Blasting will be restricted to isolated areas (shot holes) and will be conducted in accordance with all relevant regulations and safety guidelines. All explosive detonations will be confined and contained underground.	Local	Low	Medium Term	Accidental	Low	High	Reversible in medium-term	Neutral	Not significant

Concern/Impact	Mitigative Measures	Areal Extent	Magnitude	Duration	Frequency	Probability	Confidence	Reversibility	Residual Impact Balance	Residual Impact Significance
	<p>.4 Access routes and trails will be limited to seismic rights-of-way and ice access routes wherever possible.</p> <p>.5 Any soil or organic material displaced during operations will be replaced and compacted.</p> <p>.6 Tracked and low ground pressure wheeled vehicles will be used to minimize surface disturbance. Standard wheeled vehicles will only be allowed to operate on ice roads.</p> <p>.7 Equipment turnarounds will be restricted to designated locations. Turnarounds on ice roads or waterbodies will be utilized as often as possible.</p>									
2.2 Disturbance to erosion prone banks and slopes.	<p>.1 Snow/ice ramps will be constructed on riverbank slopes to prevent equipment disturbance and erosion.</p> <p>.2 Sensitive areas will be avoided by using detours.</p> <p>.3 Equipment operators will be instructed to not disturb the organic mat, and all access will be clearly marked to reduce the possibility of inadvertent surface disturbance.</p> <p>.4 If surfaces are disturbed in an area where drainage or erosion is a possibility, such as channels or lakes, erosion control measures will be employed.</p>	Local	Low	Short-term	Occasional	Low	High	Reversible in short-term	Neutral	Not significant
2.3 Disturbance to drainage	<p>.1 Snow bridges or ice roads will be constructed across drainages or waterbodies. Only clean snow and/or ice will be used for drainage crossings.</p> <p>.2 Drainages will be left free of debris.</p> <p>.3 V-notching of snow bridges will be performed upon completion.</p>	Local	Low	Short-term	Accidental	Low	High	Reversible in short-term	Neutral	Not significant
<b>3. <u>Vegetation</u></b>										
3.1 Loss of vegetation communities	<p>.1 Shrubby vegetation will be rolled over on seismic lines rather than cleared to accommodate natural regeneration. If clearing of shrubs is required a handheld brush mower will be used.</p> <p>.2 Right-of-way widths will be restricted to 8 m. Where two-way traffic or snow fencing is required, or for reasons of crew safety additional width may be required.</p>	Local	Low	Medium Term	Occasional	Low	High	Reversible in medium term	Neutral	Not significant

Concern/Impact	Mitigative Measures	Areal Extent	Magnitude	Duration	Frequency	Probability	Confidence	Reversibility	Residual Impact Balance	Residual Impact Significance
	.3 Disturbed areas will be stabilized to promote natural revegetation. .4 Tracked and low-pressure tire vehicles will be used to minimize disturbance to vegetation root zones.									
3.2 Potential disturbance to rare, sensitive or unique plant species or vegetation communities	.1 Seismic operations will occur in winter, coinciding with the dormant period for herbaceous plants. .2 Natural re-vegetation of rights-of-way will be promoted by avoiding disturbance of root zone.	Local	Low	Medium Term	Accidental	Low	High	Reversible in medium term	Neutral	Not significant
4. <u>Wildlife</u>										
4.1 Disturbance to wildlife	.1 Regular (daily) garbage patrols will be undertaken to remove materials (i.e. metals, plastics) that may be potentially harmful to wildlife. .2 All activity will be restricted to access routes, camp and seismic rights-of-way. .3 Inuvialuit Wildlife Monitors will be employed to assess potential wildlife conflicts in the area of operations. Environmental monitors may also assist in this role. .4 Known grizzly bear dens will be avoided by 50 m. If a bear is disturbed out of an unknown den a 300-500 m pullback of operations will occur. Known polar bear dens will be avoided by a minimum of 100 m. .5 Aircraft will maintain a ceiling of 300 m over large mammals during ferry flights and 600 m when flying point to point, where feasible..	Local	Low	Immediate to Short term	Accidental	Low	High	Reversible in short-term	Neutral	Not significant
4.2 Disturbance of wildlife migration	.1 Seismic operations will be completed prior to the arrival of and initiated after the departure of the majority of migratory bird species (mid-May) and after mating of caribou. Caribou calving occurs outside the program area. .2 Seismic operations will be completed expeditiously to minimize impacts to resident wildlife.	Sub-Regional	Low	Immediate to Short term	Accidental	Low	High	Reversible in short-term	Neutral	Not significant

Concern/Impact	Mitigative Measures	Areal Extent	Magnitude	Duration	Frequency	Probability	Confidence	Reversibility	Residual Impact Balance	Residual Impact Significance
	.3 Inuvialuit Environmental/Wildlife Monitors will be employed to assess potential wildlife conflicts in the area of operations. .4 Any windrows created by snow removal on the lines will be alternated every 500 m to provide unimpeded wildlife movement.									
4.3 Attraction of nuisance animals	.1 Kitchen wastes will be incinerated daily. .2 Camp wastes will be incinerated daily. .3 Wildlife will not be harassed or fed.	Local	Low	Immediate to Short term	Accidental	Low	High	Reversible in short-term	Neutral	Not significant
4.4 Encroachment on endangered species or important wildlife habitats	.1 Environmental/Wildlife Monitors will scout ahead of equipment in order to avoid potential conflicts with denning bears, where possible. Local RWED biologists and officers will be notified if a bear is encountered. Lines will avoid bear dens.	Local	Low	Immediate to Short term	Accidental	Low	High	Reversible in short-term	Neutral	Not significant
5. <u>Aquatic Resources</u>										
5.1 Erosion of stream banks and destabilization of slopes	.1 Snow ramps will be designed to minimize erosion and/or destabilization of slopes. .2 Detours will be utilized to avoid any steep slopes where activity may increase the erosion potential. .3 Tracked units and dozers will be equipped with mushroom shoes to reduce the possibility of surface disturbance. .4 Clean ice bridges will be constructed if ice thickness tests reveal that ice cannot support equipment loads. .5 If the surface is disturbed in an area such as channels or lakes where drainage or erosion is a possibility, control measures may include using earth breaks or cross ditches. .6 Channel crossings will be made at a level location wherever possible. Crossings will be scouted in advance and will be constructed at 90° angles. .7 When access routes parallel lakes or streams, the access will be more than 30 m from a waterbody, where feasible.	Local	Low	Short-term	Accidental	Low	High	Reversible in short-term	Neutral	Not significant

Concern/Impact	Mitigative Measures	Areal Extent	Magnitude	Duration	Frequency	Probability	Confidence	Reversibility	Residual Impact Balance	Residual Impact Significance
5.2 Disturbance to Fish or Fish Habitat	.1 Waste materials and debris will not be disposed of in or on waterbodies. .2 No hazardous materials will be stored on any ice surface of a waterbody or within 30 m of such a waterbody. .3 Water intake from waterbodies will utilize mesh screens on intake hoses to prevent disturbance to stream or lake bottoms and to prevent the entrainment of fish in accordance with the <i>Freshwater Intake End-of-Pipe Fish Screen Guideline</i> . .4 Because water will be drawn from the channels of the Mackenzie and larger lakes that are not landlocked, water sources and fisheries will not be affected by drawdown. .5 Dynamite shot holes on land will not be initiated within 50 m of any waterbody not frozen to bottom. .6 Charges will be set to a minimum depth below lakebed and sea floor as recommended by DFO (Wright and Hopky 1998). .7 Little or no drill cuttings will be brought to the surface. If any cuttings are brought to the surface, they will be disposed of in drill holes or a minimum of 30 m away from waterbodies. .8 Disturbance to creek banks will be minimized. The right-of-way width may be decreased at stream crossings to preserve riparian habitat.	Local	Low	Immediate	Accidental	Low	High	Reversible in short-term	Neutral	Not significant
5.3 Introduction of oil, fuel or other pollutant to waterbody	.1 Liquid fuels and oils will be stored in a closed system during transportation. .2 Fuel storage will include secondary containment. .3 Refueling hoses will be fitted with spill-proof fuelling mechanisms to prevent fuel leakage and spill during transfer. .4 Access routes will be on ice channels and down the lines. When access routes parallel lakes or streams, the access will be more than 30 m from the waterbody to prevent deleterious material from entering the waterbody and to prevent disturbance of banks that can result in sedimentation.	Regional	Moderate	Immediate to Medium term	Isolated	Low	High	Reversible in medium-term	Neutral	Not significant



Concern/Impact	Mitigative Measures	Areal Extent	Magnitude	Duration	Frequency	Probability	Confidence	Reversibility	Residual Impact Balance	Residual Impact Significance
	.5 Any deleterious material that accidentally falls into a waterbody will be removed. .6 In the event of a spill, the Fuel Spill Contingency Plan will be followed (Appendix B). .7 Spills will immediately be reported to AEC's Environmental, Health and Safety Coordinator, ILA and INAC. All accidental spills will be reported to the NWT Emergency Spill Response Line (867-920-8130), ILA, INAC and to John Korec, the Environmental Assessment Officer with the National Energy Board (403-292-6614). .8 Personnel will be trained in spill response procedures and equipment use.									
5.4 Snow fills/ ramps/ bridges can act as dams during break-up resulting in impacts to channels and banks	.1 Snow fills/ramps/ice bridges will be removed by V-notching upon completion of seismic operations and prior to break-up.	Local	Low	Short term	Accidental	Low	High	Reversible in short-term	Neutral	Not significant
<b>6. Interference with Other Land Uses</b>										
6.1 Possible conflict with wildlife harvesting in the area	.1 Public consultation with all local communities is ongoing to notify communities of seismic operations and timing.	Local	Low	Short term	Isolated	Low	High	Reversible in short-term	Neutral	Not significant
6.2 Trapline Operators	.1 Local trappers will be notified of seismic operations and timing. .2 Coloured lath will be present along seismic routes.	Local	Low	Short term	Isolated	Low	High	N/A	Neutral	Not significant
6.3 Traffic accident on winter access	.1 Only identified access routes will be used and traffic safety will be implemented.	Local	Low	Short term	Isolated	Low	High	N/A	Neutral	Not significant
6.4 Disturbance to snowmobile trails	.1 When an access route or seismic line crosses snowmobile trails utilized by community members, any debris from the seismic operation will be removed and the trail left clean and open.	Local	Low	Short term	Accidental	Low	High	N/A	Neutral	Not significant
6.5 Loss or damage to existing cabins	.1 AEC will discuss appropriate site-specific mitigation measures with cabin owners in the vicinity of the proposed project. Seismic operations will be set back 180 m from cabins.	Local	N/A	Short term	Isolated	Low	High	N/A	Neutral	Not significant

Concern/Impact	Mitigative Measures	Areal Extent	Magnitude	Duration	Frequency	Probability	Confidence	Reversibility	Residual Impact Balance	Residual Impact Significance
7. <u>Future Land Use</u>										
	1 The project is not anticipated to affect future land use by local or recreational users of the region.	Local	Negligible	Short term	Isolated	Low	High	N/A	Neutral	Not significant
8. <u>Archaeological, Historical or Palaeontological Sites</u>										
	1 Should any archaeological/palaeontological sites be discovered during operations, Veri-Illuq will immediately notify the environmental monitor, NEB conservation officer, INAC or inspector, appropriate Inuvialuit organizations and Prince of Wales Northern Heritage Centre. Operations will be suspended in the immediate area until written clearance is granted by all regulating bodies. 2 A minimum 30 m buffer between camps, access routes & seismic lines and archaeologically culturally important sites will be maintained. A 100 m buffer will be left, where feasible.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Neutral	Not significant
9. <u>Health or Environmentally Threatening Emergency</u>										
	1 In the event of an emergency, Veri Illuq's Emergency Response Plan will be implemented (Appendix B).	N/A	N/A	N/A	Isolated	Low	High	N/A	Neutral	N/A
10. <u>Abandonment and Restoration</u>										
	1 All equipment and materials will be removed from the area immediately following project completion. After the snow has melted, a reconnaissance of the area will be conducted to remove any materials that may have been obscured by snow, at the time of initial clean-up. 2 Equipment will be removed before spring break up to prevent permafrost and organic mat disturbance. 3 All garbage will be incinerated or transported to an approved facility. No waste will be left at a campsite.	Local	Low	Short term	Isolated	Low	High	Reversible in short-term	Neutral	Not significant



## 12.1 Implementation of Mitigation Measures

The goal of this section is to provide guidance for recommended environmental mitigation measures. It is important that the mitigation measures outlined in the project description are adhered to by the operator, the contractors, and the subcontractors.

### 12.1.1 *Communication, Responsibility, and Environmental Monitoring*

Communication of sensitive areas, assigning responsibility for ensuring that mitigative measures are implemented or adhered to, and environmental monitoring are key components in ensuring that the program is operated in an environmentally responsible manner. Measures to achieving compliance with the measures outlined in this project description and in permits are as follows:

- Prior to the commencement of activities, a meeting will be held in Inuvik with AEC management and the Veri-Illuq field crew. The meeting will review the terms and conditions associated with the regulatory approval and the mitigative measures to be employed. Any potentially subjective terminology will be clarified and defined with the field crew.
- Responsible parties (for instance, Party Managers and Observers) will be required to sign an indication of having read and understood Table 18 in this Project Description.
- Responsible parties will ensure that crews understand all of the components of Table 18 directly related to tasks they will be performing.
- Meetings (startup meetings and subsequent tailgate meetings) will be held to focus on environmental concerns, which may be encountered during upcoming tasks and where improvements can be made.
- The Party Manager and other supervisors should meet with the Environmental Monitor prior to start-up to explain the operations and discuss environmental concerns associated with the program.
- The Environmental Monitor should take an active role in meetings to provide guidance. Daily meetings can provide an opportunity for the environmental monitor to communicate concerns about observations in the field and to provide positive and constructive feedback about practices that are successful in mitigating impacts.
- The Party Manager will endeavour to be in daily or twice daily contact with the Environmental Monitor. This contact will ensure the Monitor is aware of the status of operations and will assist the Monitor in acquiring knowledge about all phases of seismic operations. An established relationship between the Monitor and operational staff will facilitate communications in the event of an environmental incident.
- Maps/diagrams indicating areas of environmental concern will be posted in visible and accessible locations within the camp and will be kept in all vehicles.

### ***12.1.2 Communication with Other Land Users***

#### **Hunters and Trappers**

With authorization from the trapper, warning signs may be posted where traplines are present. All hunters and trappers will be notified of the proposed project and its progress by communication with the local Hunter and Trappers Committee. Permitted, non-beneficiary hunters will be notified of the project through public meetings and ongoing communication with communities.

#### **Kunnek Resource Development Corporation (KRDC)**

KRDC's reindeer herding areas overlap with AEC's proposed program. To avoid any potentially negative interactions, KRDC, AEC and Veri-Illuq are currently negotiating a Memorandum of Understanding. A similar memorandum was agreed to by the parties for the AEC Burnt Lake 2001/2002 Seismic Program.

### ***12.1.3 Role of the Environmental Monitor and Wildlife Monitor***

A qualified Inuvialuit Environmental Monitor and Wildlife Monitor will be utilized to provide supervision to ensure mitigation measures are implemented and environmental and wildlife concerns are addressed as encountered. The monitors must have an appropriate combination of training, experience and knowledge of the local area to be successful in this role (specifics concerning the monitor/monitoring will be consistent with approval requirements). The Environmental Monitor will inform the Party Manager of incidents, which she/he deems to have the potential to cause unnecessary impact. The Environmental Monitor will prioritize her/his supervisory activities reflecting the potential significance of adverse impacts. It will also be the Environmental Monitor's responsibility to document relevant information for ILA, INAC and the operator.

An Inuvialuit Wildlife Monitor will be employed for the duration of the program to prevent and/or mitigate impacts to wildlife in the vicinity of the program and to handle interactions between wildlife and crews or equipment. The Wildlife Monitor will have knowledge of the local area and experience handling firearms. The Wildlife Monitor should attend daily meetings and communicate wildlife sightings or environmental concerns to the Environmental Monitor.

The monitors will flag areas where environmental concerns warrant avoidance (for instance, where the permafrost is deemed to be particularly sensitive, areas where wildlife habitat is of concern, and areas where vegetation should not be disturbed). The flagging will be a different colour than that used for the program and will be made known to all crew members during startup meetings and subsequent tailgate meetings.



## 12.2 Mitigation of Potential Impacts of the Program on the Environment

### 12.2.1 Soils, Terrain and Permafrost

The low organic matter content of soils in the proposed program area, and associated low levels of biological activity, limit the soil capacity to recover quickly from anthropogenic disturbance and pollution (Stonehouse 1999). Potential thermal disturbance to hummocks in the area may cause a loss of mound formation, however regeneration of hummocks has been observed (Mackay 1980). The extensive discontinuous permafrost of the region is maintained by vegetative cover, and is therefore susceptible to erosion if vegetation is damaged or removed. Sensitive terrain areas encountered within the proposed program area include the eroded banks of the Mackenzie River and associated channels. Several pingos have been identified close to proposed access roads and/or seismic lines.

These sensitive features will be avoided during line routing wherever possible. If plowing is required in areas that have drifted deeply, a minimum 20 cm of snow will be left on the line to avoid disturbance of the organic layer. Pingos will be avoided by a minimum of 150 m. Any detours will be clearly marked and all traffic on the lines will be confined to the seismic right-of-way. Where detours are not practical, snow/ice ramps will be constructed to minimize surface disturbance. Turnarounds will be made on lakes and waterbodies, wherever feasible. Operating under frozen ground conditions, the use of tracked equipment, and the cushioning effect of the snow will also minimize impacts to the soil profile and organic mat along seismic lines and access routes. With application of these mitigative measures, residual effects on soils, terrain and permafrost are concluded to be low magnitude, local in extent, and short- to medium-term (Table 18).

### 12.2.2 Vegetation

#### 12.2.2.1 Vegetation Community Composition

Calculations of the effects of the proposed project on vegetation communities and wildlife species richness were based on the program parameters outlined in Section 4. Lines from seismic activity conducted in the region by AEC in 2000/2001 will support access to some parts of the program area. The calculations of potential impacts on vegetation presented assume a complete removal of vegetation and wildlife habitat beneath seismic lines and access roads. In actuality, changes to habitat will not be complete, and are often short-term and reversible. Effects of the proposed project were calculated as the loss of a percentage of each landcover class affected.

Local effects of the proposed project are minimal and are outlined in Table 19. In total, the AEC Kamik 2D seismic lines affect approximately 0.06% of the local area. Comparatively, the associated access roads affect an even smaller proportion of the area (approximately 0.03%). The largest terrestrial effects associated with the 2D seismic lines will be to the 'Tall Willow Alder' class (less than 0.02%), followed by the 'Low Willow Alder' class (less than 0.015%). As for the access roads, the largest terrestrial effects are associated with the 'Low Willow Alder' class (approximately 0.013%), followed by the 'Low Birch/Dwarf Shrub' class.

On a regional scale, the AEC Kamik 2D seismic lines and access roads affect approximately 0.004% and 0.002% of the area, respectively.

**Table 19**

**Effects Of The Proposed Project On Landcover Classes At Local And Regional Scales**

Landcover Class	AEC Kamik 2D					
	Line Area (ha)	% of Local Area Affected	% of Region Affected	Road Area (ha)	% of Local Area Affected	% of Region Affected
Graminoid	11.8	0.00937	0.00056	0.3125	0.00025	0.00001
Sedge	0.2	0.00015	0.00001	3.0000	0.00238	0.00014
Tussock Tundra	8.2	0.00650	0.00039	7.0625	0.00560	0.00033
Low Birch/Dwarf Shrub	0.6	0.00045	0.00003	8.6875	0.00689	0.00041
Low Willow Alder	16.2	0.01284	0.00076	16.9375	0.01344	0.00080
Tall Willow Alder	24.1	0.01914	0.00114	0.0625	0.00005	0
Woodland Conifer	0	0	0	0.375	0.00030	0.00002
Forest Conifer	0	0	0	0	0	0
Other Terrestrial	2.8	0.00218	0.00013	0.375	0.00030	0.00002
Ice, Water, & Aquatic Vegetation	13.6	0.01081	0.00064	3.0625	0.00243	0.00014
TOTAL	77.4	0.06144	0.00366	39.875	0.03164	0.00188

Few studies of human disturbance in the Arctic have addressed long-term impacts to tundra vegetation from winter disturbance. In general, the highest recovery of vegetation following disturbance occurs on sites that are initially minimally impacted (Emers et al. 1995). The most visible impacts to vegetation communities result from changes to the physical environment (e.g. exposed soil and increased thaw depth).

The seismic program is located in an area of generally low-lying vegetation, limited mainly to low and dwarf shrub communities, and to a lesser degree sedge and tussock tundra. Along seismic lines, shrubs extending beyond the snow pack will be walked over with a tracked machine, with impacts related to crushing and bending restricted to aboveground woody material, leaving root systems intact. Regrowth of willows occurs predominantly from extensive intact root systems. Provided that the peat layer is not removed, natural revegetation occurs quickly with little change to the original species composition (Hernandez 1972).

While compression of the aboveground plant material is likely to occur, the frozen ground prevents root compression from occurring. Wetter vegetation types are often more heavily impacted because of less resistance of the substrate to equipment. However, these communities often recover faster, partly due to increased soil temperatures (Ignatenko and Pavlov 1988, Harper and Kershaw 1996), the mechanism of



vegetative regrowth, and the release of nutrients from increased decomposition immediately following disturbance (Emers et al. 1995). This is observed in the rapid recovery of cotton grass (*Eriophorum* spp.) in areas with initial minimal impact (Emers et al. 1995).

Areas of dense shrub will be avoided to the extent feasible, while considering other environmental constraints of the area (e.g. setback distance from waterbodies). Where these areas are unavoidable due to erosion-prone slopes, and/or altering the line location may compromise crew safety, shrubs will be cut using hand held brush mowers, to a height where rolling over with equipment is possible. It is expected that minimal line clearing will be required for the program. Cleared vegetation and snow will be windrowed within the surveyed area and not pushed into standing vegetation or undisturbed areas. Frozen ground conditions, snow cover and the use of tracked vehicles will minimize impacts to vegetation communities. Crew members will be instructed to avoid multiple passes of tracked vehicles in areas of sensitive vegetation and terrain. In addition, overland travel of personnel and transport of equipment will be restricted to ice access and seismic lines. The project will be completed in the dormant season for plants. With application of these mitigative measures, residual effects on vegetation are concluded to be low magnitude, local in extent, and medium-term in duration (Table 18).

### 12.2.3 Wildlife

#### 12.2.3.1 Biophysical Analysis of Expected Changes in Wildlife Habitat

The 2D seismic lines of the proposed project will potentially affect less than 0.062% of the wildlife habitat in the project area (Table 20). The largest change associated with 2D seismic lines (approximately 0.03%) occurs in the amount of fair habitat (moderate species richness) affected.

The associated access roads of the proposed project will potentially affect less than 0.032% of the wildlife habitat in the project area (Table 20). The largest change associated with the roads (less than 0.017%) also occurs in the amount of fair habitat (moderate species richness) affected.

Regional effects of the 2D seismic lines and roads associated with the proposed project are minimal (less than 0.004%) in both instances (Table 20).

**Table 20**

#### **Effects Of The Proposed Project On Wildlife Species Richness**

Habitat Suitability	AEC Kamik 2D					
	Line Area (ha)	% of Local Area Affected	% of Region Affected	Road Area (ha)	% of Local Area Affected	% of Region Affected
Poor	16.0	0.01270	0.00076	3.4	0.00273	0.00016
Fair	37.9	0.03010	0.00179	20.6	0.01632	0.00097
Suitable	23.5	0.01865	0.00111	15.9	0.01260	0.00075
TOTAL	77.4	0.06144	0.00366	39.9	0.03164	0.00188

The proposed AEC Kamik 2D seismic project will result in limited impacts to vegetation communities and wildlife habitat at both the local and regional levels.

Total areas of wildlife habitat affected by the proposed project are quite small compared to the known home ranges or dispersal distances for most of the wildlife species modeled. Since habitat removal is limited, and in many cases short-term and reversible, other potential impacts, such as effects on dispersal, may become important. Seismic lines and roads often create dispersal corridors and sometimes impose dispersal barriers depending on the wildlife species in question.

Direct effects on wildlife will be short-term in duration. Project timing avoids potential wildlife interaction during critical periods, such as migration. Once the program is recorded, the equipment will move out of the area. Heli-assist may be required if the program runs late, daylight and weather conditions permitting. Environmental and wildlife monitors will identify any environmental and wildlife concerns during program operations and ensure that mitigation measures are implemented. Attraction of nuisance wildlife to camp locations will be mitigated by daily incineration of camp wastes.

Habitat alteration and loss could result in medium-term effects on wildlife. Impact on habitat quality will be species specific, depending on several considerations including range size and specific habitat requirements. Additionally, vegetation removal may reduce preferred forage, causing animals to tap into energy reserves. Alternately, the removal of vegetation may result in habitat enhancement by stimulating new growth (e.g. Emers et al. 1995) and providing movement corridors. Wildlife habitat will be protected by following guidelines for mitigating impacts on vegetation, soils, and terrain.

#### **Arctic and Red Fox**

Arctic fox spend most of the winter offshore on landfast ice scavenging the remains of seal carcasses killed by polar bears (Banfield 1974, Dome et al. 1982a), while red fox are more common south of the treeline (Martell et al. 1984). However, both Arctic and red fox may use dens in the program vicinity for shelter, resulting in potential program interaction either directly or due to impact to denning habitat. The slopes of river banks, ridges, eskers and moraines, which are generally preferred denning habitat for foxes, will be protected by following guidelines for mitigating impacts on soils and terrain. The program is not expected to interfere with breeding activities, which generally occur on the landfast ice. Pups are born from April to June following program completion. Therefore, potential program impacts are expected to be minimal.

#### **Caribou**

The proposed program area partly overlaps with the Bluenose West herd winter range as well as year round caribou harvesting grounds (TCCP 2000), presenting the potential for direct interaction and sensory disturbance. While some caribou may habituate rapidly to repetitive stimuli, depending on the severity (Bergerud 1974), female caribou and their calves usually exhibit a much higher sensitivity to surface development than do males and yearlings (Nellemann and Cameron 1996, 1998). Visible behavioural

responses can potentially result in elevated energy requirements for individuals and redistribution of the herd (Wolfe et al. 2000).

In the winter, portions of the caribou population may migrate to overwintering grounds south of the program area. RWED is continuing a Cape Bathurst/Bluenose-West caribou herd satellite tagging program. The study will provide information on caribou locations during the winter months to better understand habitat use in order to assess effects of exploration activities on herds. Disturbances that displace caribou from preferred winter range may increase their risk of natural mortality (Simpson et al. 1996). Should any caribou enter the immediate area of seismic activity, the detonation of shotholes will be stopped until the animals have left the area. Additional mitigation measures for caribou movement within the area during the time of operations include contact with RWED and the use of Inuvialuit wildlife monitors. No deliberate attempts will be made to force or control caribou movement.

Seismic lines and access roads intersecting caribou range may result in direct mortality through vehicle collisions. Fast moving vehicles are known to frighten caribou (Horejsi 1981), as does heavy traffic and people exiting their vehicles. Additionally, human activities can indirectly affect caribou by altering predator-prey systems, as predation by wolves may increase due to ease of travel (Bergerud et al. 1984). Similarly, linear developments may indirectly produce mortality by allowing human access into previously remote areas. Access will be restricted to waterbodies where possible, and the number of overland roads will be minimized by careful planning and shared access with other activities in the area. AEC and Veri Illuq will also work with the HTC's to consider options for limiting personal vehicle traffic. Where possible, corridors will be amalgamated to reduce the fragmentation effect of many small corridors. AEC will make every effort to restrict access travel to essential trips only, and where possible, vehicles will travel in a convoy, stopping only when necessary. Traveling slower and with increased vigilance will also reduce the effects of seismic lines and access roads.

Heli-assist may be used with daylight and weather conditions permitting. The response of caribou to aircraft overflight or nearby landing depends on many factors, but in general, the strongest reactions are elicited during calving, post-calving and winter (Wolfe et al. 2000). Caribou response to disturbance is generally of short duration, often lasting only seconds, and population-level effects have not been observed (Bergerud et al. 1984, Cronin et al. 1998). Caribou apparently respond more strongly to helicopter than fixed wing overflights only at low (i.e. <100 m above ground level) altitudes, and the response to both types of aircraft dissipates with increasing flight altitude (Wolfe et al. 2000). Wildlife may habituate to aircraft over time depending on the frequency and predictability of overflights. If used, aircraft will maintain a ceiling of 300 m on ferry flights and 610 m on point to point flights, whenever possible.

### **Grizzly Bear**

Activities associated with industrial winter operations may inadvertently approach denning grizzly bears. Given an estimated average population density of four bears per 1000 km<sup>2</sup>, the possibility of encountering a grizzly bear in the program area is low. Because waste is incinerated daily, any bears that may be active



during the program should not be attracted to waste produced on site. Disturbance of denning grizzly bears is expected to be minimal during this program.

Bears generally select dens 1 to 2 km from human activity, and seem to tolerate most activities that occur more than one kilometre from the den (Linnell et al. 2000). Activity in closer proximity to denning bears has been shown to cause variable responses (Harding and Nagy 1977, Reynolds et al. 1983, Jalkotzy et al. 1997). Some bears tolerate disturbance even inside the den, although bears may abandon dens in response to activity within this zone, especially early in the denning period. Grizzly bear dens are not easily identified without the assistance of telemetry data (Ian Ross pers.comm., Marsha Branigan pers.comm.). When available, the telemetry data will be used to identify dens. The RWED grizzly bear study will begin to provide information that can be used to assist operators in minimizing their impact to grizzlies. Known dens will be avoided by 50m and any additional requirements for a buffer will be discussed with RWED. If a previously unknown den is encountered and the bear is disturbed, activities will be pulled back by 300-500 m to allow the bear to return to its den.

### **Moose**

Lowland areas adjacent to the East Channel of the Mackenzie River are important moose habitat (Prescott et al. 1973 in Dome et al. 1982a). Impacts related to direct program interaction with moose are expected to be infrequent. However, the removal of food sources may potentially occur. Large herbivores have high total forage requirements that may be hard to meet under extreme winter conditions. To some extent, moose can reduce activity during periods of limiting food resources (Gillingham and Klein 1992).

While vegetation removal will be limited wherever possible, the creation of corridors from any vegetation and snow removal may allow easier access to food resources. Additionally, impacts that stimulate the regeneration of deciduous shrubs may positively affect moose, as they rely on young deciduous vegetation in both summer and winter.

### **Muskrat**

A study of the impact of seismic activity on muskrat populations in the Mackenzie Delta was conducted in the spring of 1976 (Westworth 1977). This study indicated that animals in close proximity (i.e. 15 m) to shot holes are likely to suffer some pathological effects from detonations; however as other factors may result in similar injuries, the finding was inconclusive. Injuries sustained by muskrat from detonation were postulated to be non-permanent with rapid recovery (Westworth 1977). The study suggested that following an initial rapid response to stress, muskrats quickly forget the incident, providing the stress is removed (Westworth 1977). However, no further long-term behavioural and physiological studies were conducted to substantiate this belief.

Waterbodies with visible pushups will be avoided during program operations, wherever possible. The DFO setback guidelines of 30 m from non-frozen waterbodies for vibroseis should provide a sufficient buffer zone. Where shot holes will be drilled in the beds of waterbodies, a casing drilling rig will be used to place charges to depth, in accordance with DFO guidelines. With the use of this technology and

appropriate setback distances, impacts to muskrat populations are expected to be minimal. Additional setback requirements for changes in variable substrate are described in Section 12.2.4 below.

### **Wolf**

Interaction with wolves in the program area is expected to be minimal, due to the large home ranges and the elusive nature of wolves. Wolves typically follow caribou herds to their overwintering habitat, which for the majority of the caribou population is south of the treeline and outside of the influence of program operations. Because impacts on their main prey base (caribou, moose, small mammals) are anticipated to be negligible, the overall impacts on wolves are also expected to be negligible.

### **Wolverine**

Wolverines occur at very low densities throughout the tundra (Martell et al. 1984, Wilson et al. 2000). Interactions with wolverines and negative impacts on the population will be negligible.

### **Shore Birds and Waterfowl**

Wetland habitat for shorebirds and waterfowl may be altered by water withdrawal from lakes or impacts to shoreline vegetation. Clearing of riparian vegetation will be minimized throughout the program area. AEC and its contractors will make every effort to complete operations by April, as outlined in Table 10. Ongoing communication and meetings between responsible parties will limit delays and ensure that timelines are maintained. The arrival and departure of waterfowl in the Mackenzie Delta is closely related to break up and freeze up, with the earliest arrival of ducks occurring in early to mid May. Loons, geese and swans also arrive at various times in May. Therefore, while there is potential for interaction with individuals that arrive at unusually early dates, direct impact to waterfowl during migration is expected to be negligible.

### **Raptors**

Habitat destruction is an important factor in determining survival rates in raptors. In the ISR, ground-nesting raptors are at higher risk for nesting habitat destruction. Nesting sites as far away as two or three miles from any construction activity, including camps, airports, blasting, etc. may be influenced (Watson et al. 1973). Linear disturbance, such as the construction of access routes, may degrade habitat for ground nesters such as snowy owls and may also displace important prey species for certain raptors. Direct mortality and injuries may result from collisions with ground vehicles. Additionally, the attraction of nuisance species to areas of development may increase predation on raptor nests (Yokel 1999). Raptors arriving in April may potentially be affected should program operations require the use of aircraft support. The Wildlife Monitor and crew members will report sightings of raptors in the area, and a minimum flight altitude of 150 m will be maintained in the vicinity of raptor nests.

Disturbances resulting in the temporary displacement from or abandonment of a nest may also adversely affect raptors. Each time an adult leaves the nest, it results in an impact. The adult expends energy that could be used in maintenance of their young, and nestlings are left unprotected from the weather and predators (Yokel 1999). On the recommendation of the Wildlife Monitor, program lines will be moved to avoid direct interaction with nest sites identified in the area. Campsites will be located a minimum of

500 m from any raptor nest sites (Yokel, 1999). The daily incineration of waste will prevent the attraction of potential predators to the area.

With application of mitigative measures, residual effects on wildlife are concluded to be low magnitude, local in extent, and short- to medium-term in duration (Table 18).

#### ***12.2.4 Aquatic Resources***

Water required for camp use and construction purposes will be withdrawn from large lakes and streams within the program area, where drawdown will not be an issue. Shallow waters near lake banks will be protected from erosion and sedimentation by following guidelines for mitigating impacts on permafrost and soils. The withdrawal of water from lakes in the area has the potential to alter the hydrological regime and decrease fish habitat. All intake lines will be fitted with screens, in accordance with DFO's *Freshwater Intake End-of-Pipe Fish Screen Guideline*, to avoid the entrainment of fish.

While impacts due to vehicles traveling on frozen waterbodies are not expected, environmental effects in fish-bearing water may occur through effects on riparian vegetation and alteration of stream channels. The use of tracked vehicles and snow/ice ramps will minimize compaction of soils and sediments. Clearing of riparian vegetation will be minimized throughout the program area.

Fuel storage will be managed to minimize the potential for accidental releases to waterbodies. The use of locking fittings for fueling procedures, adherence to setbacks, and secondary containment of storage tanks will reduce the potential for spills.

There will be no greywater released to waterbodies. Greywater will be hauled to a municipal facility for disposal. Alternatively greywater may be steamed off and any sludge produced hauled away for proper disposal at an approved landfill site.

When shooting waterbodies, concerns exist regarding potential negative effects of detonations on fish, sedimentation, the release of deleterious substances and the destruction of aquatic habitat. Pressure change in the water column varies with the properties of lakebed substrate; therefore it is necessary to qualify the material type to more accurately predict the residual energy following detonation (AquaScience 2001). While vibroseis will be the main energy source used to survey lakes along the program lines, supplemental dynamite infill has the potential to adversely affect fish and fish habitat.

A short-term reconnaissance/assessment of selected aquatic habitats within proposed program areas throughout the Delta was recently completed and the data is currently being analyzed. This program is in response to DFO's request for baseline information to more accurately qualify fish and fish habitat characteristics in waterbodies where dynamite charges will be placed below lakebeds. The program will measure physical and chemical parameters, including lake bathymetry, which will provide background information concerning the potential affect of seismic activity on fish and fish habitat. Consideration is being given to the continuous monitoring of parameters (particularly oxygen levels) using Data Sonde devices, which would be employed throughout the winter in both survey and control lakes.



On larger waterbodies, the explosive charges will be placed in such a manner to prevent potential fish habitat disturbance. The charge size used under lakes is expected to be 2 kg. The setback distance for specific substrate as recommended by DFO, outlined in Table 4 of Section 4.3.5, will be followed to prevent overpressure from occurring. Every effort will be made to ensure casing is placed into consolidated substrate. Little to no drill cuttings are brought to the surface. However, should there be any excess cuttings, they will be collected, removed from the ice, and disposed a minimum of 30 m away from the waterbody. Any blowouts or craters that occur will be dealt with immediately.

#### ***12.2.5 Archaeological Resources***

The proposed Kamik 2D seismic program may impact the Traditional Land Use site of TLU5. Mitigative strategies that AEC will adhere to consist of avoiding the known heritage sites located close to the proposed seismic program by a minimum 30 m buffer zone. Where possible, Veri Illuq will maintain a 100 m buffer. Because this area has traditionally offered rich natural resources, the potential for additional heritage sites to be located within this area is high. Should additional sites be discovered during this seismic program, the site will be flagged, and all operations suspended in the immediate area until the appropriate agencies grant written permission.

### **12.3 Mitigation of Potential Impacts of the Environment on the Program**

In planning the proposed program, extensive consideration was given to the potential effects the environment may have on the program and a series of mitigative measures and strategies to address any such potential effects has been developed.

#### **Ice Formation**

Warmer than average weather in late fall and early winter could delay ice formation. Warm weather coupled with an early or unusually heavy snowfall can also contribute to the slow formation of ice. Slow ice formation can delay the project start-date and requires strict adherence to safety measures in order to avoid accidents.

AEC is committed to implementing the following mitigation measures to address the potential effects on the project:

- The schedule developed for the program is very conservative. Surveying and access route construction on the program is scheduled to begin in January, which should allow for sufficient ice formation. The construction of access routes can also be delayed without compromising the program.
- Both electronic and physical ice profiling will be used throughout the program to ensure ice conditions are safe for travel and equipment.
- If thickening of ice on access routes is required, water will be withdrawn from large waterbodies and channels within the program area and used to flood the area.

**Sensitive Terrain:**

Areas of environmental sensitivity in the program area, for example high cutbanks, steep slopes and archaeological sites, are features of the environment, which will impact activities and have been considered during program planning. The following measures will be employed to ensure a safe working environment and to avoid the disturbance of sensitive areas:

- Detailed and extensive planning in the program area was conducted. All known areas of sensitivity, including archaeological sites identified and located during the summer of 2001, will be noted and mapped. During the program, line surveying will be completed using a combination of GPS and conventional surveying.
- Access routes were selected where slopes are minimal. Where slopes are unavoidable and high banks (> 1 m) hamper access, snow and/or ice ramps made of clean snow and water will be constructed to prevent erosion and disturbance by equipment.
- All pingos will be avoided by a minimum of 150 m.
- Known archaeological sites will be avoided by a minimum of 30 m and will normally be avoided, in practice, by at least 100 m. Similarly, steep slopes will be avoided by at least 25 m, both for crew safety reasons and to avoid prime grizzly bear denning habitat. Known grizzly dens will be avoided by a minimum of 50 m.

**Deep Snow**

Unusually heavy snowfalls can make it difficult to travel on lines. If the lines need to be cleared of snow, the program proceeds much more slowly and there is an increased potential for damaging vegetation while plowing. The following measures will be employed to mitigate the impacts:

- Specially designed tracked vibroseis equipment will be used. The tracked equipment can maneuver much more easily in deep snow, than can wheeled vehicles. Plowing lines is not expected.
- If plowing is required, dozers will be equipped with mushroom shoes to elevate the blade.

**Little or No Snow**

If little or no snow falls in the program area, it could be very difficult to move vehicles on overland access routes and lines. Twenty centimeters of compacted snow will be left on all lines and access trails to protect the underlying vegetation. Although not likely, should the snow cover be insufficient to meet this requirement, the following will be considered:

- Time, weather and daylight permitting, the program may be run using heli-portable techniques.

**Blowing and Drifting Snow**

Although every effort is made to ensure all garbage is collected and properly disposed of as the program proceeds, blowing and drifting snow during program operations make it very difficult to ensure no debris is left within the program area. To ensure all debris is removed from the program area, the following mitigative measures will be employed:

- All equipment and materials will be removed immediately following project completion.

- After the snow has melted, an aerial survey of the program area will be conducted to ensure no debris has been left on the lines or around the camp sites. Any waste will be picked-up and disposed in an approved landfill site.
- Some equipment has also been modified to make it more visible in dark, snowy conditions. For example, white absorbent cloths are being dyed in bright colours.

### **Early Ice Break-up**

The program has been designed to be complete before break-up. However, should ice conditions deteriorate earlier than expected, the following mitigation measures may be implemented:

- The remainder of the program, weather-permitting may be recorded with the assistance of helicopters. Although the preferred energy source is vibroseis, dynamite charges can be placed before break up, and detonated and recorded with the assistance of helicopters. This will allow for all equipment to be off the land and ice roads before snow and ice conditions deteriorate.

## **12.4 Mitigation of Impact of Accidents and Malfunctions on the Environment**

Accidents and malfunctions may affect safety and productivity on a seismic program, and may also negatively impact the environment. Strict adherence to environmental, health and safety policies reduces the likelihood of an accident. AEC and Veri Illuq have strict policies and are working with local companies to develop regional policies to be adhered to by all subcontractors on the program.

Should an accident occur, guidelines in the emergency response plan and/or fuel and oil spill contingency plan will be followed. All incidents are reported and each incident report is reviewed and consideration given for implementing measures to avoid future similar incidents.

Some of the accidents and malfunctions that may occur are described below, along with an indication of the likelihood of occurrence and the techniques used to minimize the effects of an accident:

### **Fuel/Fluid Leaks or Spills**

Fuel or fluid leaks and spills can lead to the contamination of soil and water. Contamination may negatively impact vegetation, wildlife and aquatics resources, as well as water quality.

- Fuel and other deleterious substances may be introduced into the water should a vehicle fall through the ice on a lake or channel. To avoid an accident, both mechanical and electronic ice thickness profiling will be conducted throughout the program and maximum load size restrictions, compliant with transportation guidelines, will be strictly followed. With these mitigative measures in place, accidents are unlikely.
- All vehicles will abide by designated speed limits for access roads. This will reduce the chance of collisions occurring and the subsequent introduction of spilled fuel or materials in transport to the environment.
- All tanks are double walled with a self-contained spill tray. Trays are built with 110% of the capacity of each tank. The likelihood of any spill occurring through the double wall and exceeding the capacity of the tray is unlikely.



- All fuelling mechanisms are spill-proof and in some cases have undergone minor modifications, based on last year's experience working in the region, to ensure they are spill proof in all operating conditions. Given these safeguards the probability of a spill occurring is low.
- The tracked vibrators used on the program are equipped with numerous environmental safeguards. For example, should a hydraulic hose break, all hydraulic fluid would be contained in the unit. The likelihood of a malfunction occurring and overcoming the safeguards in place is unlikely.
- Slinging fuel with a helicopter will be kept to a minimum. If fuel slinging is required, rope slings rather than barrel slings will be used. Given that slinging fuel with a helicopter will be infrequent, the likelihood of a rope sling giving way is extremely low.
- Vehicles can have small fuel and fluid leaks which, if left untended, can accumulate and potentially contaminate an area. Effects are mitigated with the use of newer, well-maintained vehicles with drip pans. Spill kits are always on-hand should a leak occur.

### **Wastewater**

The inadvertent discharge of untreated, or insufficiently treated, wastewater can negatively impact water quality.

Should any malfunctions occur with the wastewater treatment system, wastewater can be trucked and disposed of in the nearest municipal wastewater treatment system, with permission from the municipality.

### **Drills**

Accidents involving possible ignition of gases surrounding drilling areas may negatively impact vegetation in the immediate vicinity.

All drills are winterized with tents and cabs for the safety of the operators. Accidents can occur if pockets of gas are encountered during drilling. In order to avoid accidents, and possible ignition, automatic shut off valves are installed on the drills. Given the shallow depth of the holes to be drilled and the cut-off mechanism, the likelihood of this type of accident occurring is low.

## **12.5 Follow-up Programs and Monitoring**

### **Post Program Monitoring**

Regulators will conduct an inspection of the program area, after the activities are complete. Prior to inspection by the regulators, AEC and Veri-Illuq will conduct an inspection with particular attention focused on:

- Removal of debris from the program area,
- Removal of signage, lath, flagging and cap leads where possible,
- Survey of water crossings to ensure no vegetation has been left in watercourses,
- Survey of lines and camp locations to ensure that no surface disturbance has occurred, particularly in areas with steep slopes and watercrossings. If disturbance has occurred,

locations will be reported to the regulators and reclamation efforts will be instigated if warranted,

- Where dynamite was used under lakebeds, shorelines are scanned for evidence of lath and cap leads,
- Any apparent off-line travel will be documented and,
- Archaeological sites with visible signs of inadvertent disturbance will be documented.

The post-project inspection by the regulators will also include a survey of the above items. If required, AEC or Veri Illuq will accompany the regulator on the survey. A post-inspection meeting will be attended to outline and confirm plans for remedial action, where warranted. Once remedial actions have been completed, regulators and community members may be taken on a reconnaissance flight of the area.

#### **Concurrent with program operations**

- An Inuvialuit Wildlife Monitor assigned or endorsed by the local Hunters and Trappers Committee (HTC) is on site during all phases of the operation. The monitor observes wildlife in the program area, attempts to prevent wildlife interactions, and provides security for the crew. The monitor reports to its HTC, which reports to the Inuvialuit Game Council (IGC).
- The Inuvialuit Land Administration assigns an Inuvialuit Environmental Monitor for both Crown and Inuvialuit Private lands. The monitor is provided with a copy of the project description and the permits and licenses assigned to the program. The monitor watches all aspects of the operation to ensure that mitigative measures are employed and adhered to. The monitor provides daily and weekly reports to the ILA, which are in turn provided to INAC, and is expected to communicate with Veri Illuq to ensure that any issues are resolved to the satisfaction of the monitor and ILA/INAC. ILA conducts a follow-up interview with the monitor to ensure there are no outstanding issues.
- During operations, regulators conduct regular inspections and there is frequent communication with the operator to address any issues which may arise.
- AEC will be placing dynamite in some lakebeds and will monitor a percentage of shotpoints for overpressure during detonation. This provides real-time monitoring of effects on aquatic resources.
- Support has been given to research being conducted by Resources, Wildlife and Economic Development (RWED) to monitor movements of the Bluenose West/Cape Bathurst caribou herd. The focus of the study is to assess the effects of exploration activities on caribou movement and distribution. The results of the study will contribute to continuing program planning.
- Support has also been given to a grizzly bear denning survey being conducted by RWED. The focus of the study is to collect data on grizzly bear denning sites and assess the effect of exploration activities on denning location and denning success, the results of which will contribute to ongoing program planning.
- AEC is participating in a regional assessment of a sub sample of lakes within their exploration license areas. The program will measure physical and chemical parameters,

including lake bathymetry, which will provide background information concerning the potential affect of seismic activity on fish and fish habitat. Consideration is being given to the continuous monitoring of parameters (particularly oxygen levels) using Data Sonde devices, which would be employed throughout the winter in both survey and control lakes.

- Shot hole monitoring will be conducted, as agreed to with DFO.

**Remediation of effects identified through program monitoring or post-program inspection:**

- Effects related to deposit of debris would be immediately rectified.
- Effects related to surface disturbance would be discussed with ILA/INAC to determine appropriate action. Where in-house expertise is not available, AEC would contract a specialist to determine an appropriate solution.
- An acceptable endpoint of remediation would be agreed to by the regulator and AEC.
- Remediation would take place within the growing season and the success of the remediation evaluated at agreed upon intervals (e.g. Inspection during the following growing season and if acceptable, a final inspection after a specified period. If not acceptable, further remedial actions and inspection at intervals until a satisfactory result is achieved).

**Remediation of effects identified through wildlife monitoring or harvest studies.**

- Remediation of effects would be discussed with the organizations conducting the monitoring and studies, for example the Department of Resources, Wildlife and Economic Development, Department of Fisheries and Oceans, the Inuvialuit Game Council and other interested parties.
- Mitigative measures and operational practices would be modified to respond to the concerns identified.
- AEC is working with local HTC's to establish harvest compensation agreements.

**Notification of ILA and INAC**

AEC, through their primary contractor Veri-Illuq, notifies the regulators through the inspection process, with weekly reports and through the provision of final report (as-built reports).

**Notification of the EISC**

There is no process currently in place for notifying the EISC about follow-up programs. Information can be provided in subsequent project descriptions or, if requested, follow up meetings can be arranged and documentation provided.

**Notification of the NEB**

NEB receives a notification and summary of all incidents as well as weekly reports from INAC and through the provision of a final report (as-built report).



### **13.0 EMERGENCY RESPONSE PLANS**

In the event of an emergency, Veri-Illuq's Emergency Response Plan will be followed (Appendix B) and the ILA, INAC and the NEB will be contacted immediately. In the event of a spill, the Fuel and Oil Spill Contingency Plan will be followed (Appendix B) the ILA, INAC, NEB and the NWT Spill Response Line will be contacted immediately as outlined in Appendix B.

### **14.0 CLEANUP, RECLAMATION, DISPOSAL, AND/OR DECOMMISSIONING PLAN**

Once recording is complete in one portion of the program, cable and geophones will be picked up and transported to a subsequent portion of the program. All lath, flagging and marking material will be removed and recycled where possible. The remaining materials will be incinerated or deposited in an approved landfill. Snow fills and ramps used for waterbody crossings will be V-notched upon completion of the program, allowing flowing water to remove fill during spring break-up, while preventing overflow onto the banks.

Equipment, materials and any other debris that cannot be incinerated will be removed from the project area prior to spring break-up and taken to an approved landfill. Any waste fluids and excess fuel or fuel containers will be removed from the project area and disposed of appropriately. Any hazardous waste will be documented in waste manifests.

### **15.0 OTHER ENVIRONMENTAL ASSESSMENT**

IEG (formerly Inuvialuit Environmental Inc. or IEI) prepared previous environmental assessments in the proposed AEC Kamik 2D seismic program area for the Explor Data Ltd. Mackenzie River Delta Winter 2001 Regional Seismic Acquisition Program and the AEC West Ltd. Mackenzie Delta Winter 2000/2001 Seismic Program. IEG has also prepared assessments for the Mackenzie River Delta Heritage and Biophysical Resource Surveys, which included survey work within the boundaries of the proposed AEC program area. The project descriptions are on file with the Environmental Impact Screening Committee and the National Energy Board. A number of assessments for proposed developments within the vicinity of the project area are currently underway.

### **16.0 COMMUNITY CONSULTATION**

AEC initiated public consultation with the communities and regional organizations potentially affected by the proposed exploratory seismic program in September 2001. Government representatives were also informed of the proposed project, exploration schedule and, where warranted, the technical details of the seismic program. This consultation has provided an opportunity for AEC to present the program to various groups, obtain information on the area from local residents and hear concerns raised regarding the project.

On September 28, 2001, IEG on behalf of AEC, sent an initial project notification along with a request for comments to all pertinent territorial, federal and Inuvialuit agencies with jurisdiction in the project area. The purpose of the notification was to provide agency representatives with an overview of the project and offer an opportunity for early comments and identification of concerns.

Representatives of AEC, Veri Illuq and IEG held meetings October 16-18, 2001 in the communities of Tuktoyaktuk, Inuvik and Aklavik to discuss issues of concern and mitigative measures to be adhered to during the project. At the meetings, project information was presented to various individuals and groups and input related to issues, concerns or questions were invited. A schedule of meetings is provided in Table 21. The environmental issues raised during community consultation meetings are listed below in Table 22. Additional issues related to program planning and opportunities are listed in Appendix D.

**Table 21**

**Consultation Meetings**

Consultation Group	Date	Location
Inuvik Public Meeting	October 17	Inuvik
Tuktoyaktuk Hunters and Trappers Committee	October 18	Tuktoyaktuk
Tuktoyaktuk Public	October 18	Tuktoyaktuk
Aklavik HTC, Community Corporation, Elders Committee and Public	October 29	Aklavik

**Table 22**

**Community Consultation Issues And Responses**

Community	Proponent
<b>Environment</b>	
Because of the timing of this program, we don't think there will be any conflict with the caribou hunting that we do in that area.	
We do use that trail to Husky Lakes or that 'Pole Road' quite a bit, so we would appreciate if you left it fairly smooth and didn't tear up the trail a lot.	Noted.

Community	Proponent
<p>We have some concern about private vehicles using the access routes. Did you have experience with that last year? We have been discussing ways to stop people from using those roads.</p>	<p>There were no reports last year of private vehicles using the access roads. We recognize this is a concern and for many reasons we would also like to ensure no private vehicles are on this road. We will be putting signs up stating that it is a private road. There has been some discussion with the Inuvik HTC about putting a gate on the southern road just outside of town. We may hire a couple of people from the HTC to be there monitoring the gate and we could look at doing the same thing at the northern end near Tuk. We should continue to discuss this.</p> <p>The overland routes are not being built with the intention of having regular, wheeled traffic on them. The creek crossings can also be removed, once the seismic equipment has crossed.</p>
<p>How well do the tracked vehicles work out on the tundra?</p>	<p>They work well for going over the snow and not disturbing the land. If there is not enough snow in some areas, we may have to build it up to a minimum of 20 cm. Occasionally we have to detour from the line, but we usually stay on the line, we don't make any right angle runs and we avoid double tracking. Veri-Illuq will take representatives from the community out to the area next summer to see how it looks after the snow has melted.</p>
	<p>Each week Veri-Illuq will post new maps in the communities showing exactly where they are working that week.</p>
<p>There are some archaeological sites near the river that you need to consider.</p>	<p>Yes. We have looked at our program in relation to known archaeological sites and have planned accordingly. The sites will be shown on the maps the Veri-Illuq maps.</p>
<p>Will shot holes on land be monitored? We had problems with holes blowing out last year in the Tuk area.</p>	<p>We intend to use vibroseis on the land portion of the program. Dynamite is only being considered on land if the program runs late in the season, which is unlikely. Every effort is made to place charges properly so no blowouts occur. Wayne Ross said that he personally would be responsible for ensuring that if a blow out should occur, it would be fixed immediately and the site would be recorded with GPS and reported to regulators.</p>
<p>How many roads will you be building and do you go close to Husky Lakes?</p>	<p>We are quite a distance west of Husky Lakes. We won't be building any new roads for this program. We will share a road with some of the other operators in the area. The routes the other operators have proposed have been used in the past. They are the old roads in that area. We may also access some of our lines using the seismic lines we shot in that area last year.</p>
<p>We have some concern with the migratory waterfowl being disturbed if the program runs into May. April 15<sup>th</sup> is good for a target finishing date, but if it runs much later, then there are some concerns.</p>	<p>Noted. We will make every effort to be completed on or before April 15<sup>th</sup>.</p>
<p>People are concerned about the number of vehicles going through the ice. You will need to have good ice checkers and a high standard.</p>	<p>We will try to do a better job this year. We have looked to addressing this. Most of the vehicles that went through the ice last year were off the established roads.</p>
<p>Caribou hunting is mainly restricted to river access later in the summer, so there is no concern here.</p>	



## 17.0 PERSONAL COMMUNICATIONS

Branigan, Marsha. Wildlife Biologist, GNWT, Resources, Wildlife and Economic Development, Inuvik, NT.

Chernoff, Eric. EIRB Secretary, Joint Secretariat -- Inuvialuit Renewable Resources Committees, Inuvik, NT.

Inuvialuit Elders. TEK Meetings as Part of the Operator's Biophysical Study in Aklavik, Inuvik, and Tuktoyaktuk, NT. July 11-13, 2001.

Nagy, John. Supervisor Wildlife Management, RWED, Inuvik, NT.

Ross, Ian. Research Biologist, ARC Wildlife Services, Calgary, AB.

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## Appendix A

### Appropriate Licences



# GEOPHYSICAL OPERATION AUTHORIZATION

Applicant: AEC West Ltd.

Operating Licence Number: 975

Land Use Permit Number: \_\_\_\_\_

Geographical Area: Inuvialuit Settlement Region, NWT

Grids or NTS Map Sheets: 107C

Interests: EL 386, Tuk 1, SDL 32

Description of Operation: 2D seismic operation using vibroseis as the primary energy source

## SPECIFICS OF OPERATION

Exclusive ☒

Non-Exclusive ☐

Participation ☐

Purchase / Reprocessing ☐

Proposed Commencement Date: December 2001

Proposed Completion Date: April 2002

Number of Personnel: 81

Number of Crews: 1

Data Acquisition Equipment I/O Recording Equipment

Estimated Kilometres: 133.2 linear kilometers

Vessel / Aircraft Names / Registration Numbers: To be determined

Energy Source: Vibroseis, dynamite on lakes with water under ice or as secondary energy source

Depth: 9 m below lakebed, 18 m depth on land

Charge Size: 2 kg below lakebed, 20 kg charge size

Source Parameters: Vibroseis: 50 or 60 m, Dynamite: 100 or 120 m

Detector Parameters: Vibroseis: 25 or 30 m

## OPERATIONAL CONTACT

Name: Veri-Illuq Geophysical Ltd., Wayne Ross, Manager Arctic Operations

Address: P.O. Box 2422  
Inuvik, NT X0E 0T0

Telephone: 867-777-3493

Cellular: 867-777-6381

Facsimile: 867-777-3493

## ESTIMATED EXPENDITURES

On-Interest

Off-Interest

Field Work: \_\_\_\_\_

0

Data Processing: \_\_\_\_\_

0

Interpretation / Laboratory: \_\_\_\_\_

0

## CONTRACTORS

Data Acquisition: Veri-Illuq Geophysical Ltd.

Data Processing: Veri-Illuq Geophysical Ltd.

Data Interpretation / Laboratory Studies: \_\_\_\_\_

*"I certify that I have complied with the notification, permitting and / or licensing requirements of all federal / territorial legislation that are applicable to this operation."*

Signed: \_\_\_\_\_

*Responsible Officer*

Title: \_\_\_\_\_

Senior Engineer and Project Manager

Name: John Duckett

Date: \_\_\_\_\_

Company: AEC West Ltd.  
3700 - 707 8<sup>th</sup> Ave. SW

Address: Calgary, AB T2P 1H5

Telephone: 403-261-2569

## AUTHORIZATION

*This operation is authorized under Section 5 of the Canada Oil and Gas Operations Act and is subject to the terms and conditions attached to this Authorization*

Signed: \_\_\_\_\_

*Chief Conservation Officer*

Date: \_\_\_\_\_

Office use only					
Application fee	Land use fee	General receipt no.	Date	Class	Permit no.
To be completed by all applicants				<input checked="" type="checkbox"/> New Application	<input type="checkbox"/> Amendment
1. Applicant's name and mailing address (full name, no initials) John Duckett Senior Engineer and Project Manager Western Region, AEC West Ltd. 3700 – 707 8 <sup>th</sup> Ave. SW Calgary AB T2P 1H5				Telephone no. (403) 261-2569 Fax no. (403) 716-2569	
2. Head office address As above				Telephone no. Fax no.	
3. Field Supervisor Wayne Ross, Regional Manager, Arctic Operations Veri-Illuq		Radio telephone. Cell: (867) 777-6381		Telephone no. (867) 777-3493	
4. Other personnel (Subcontractor, contractors, company staff, etc.) Veri-Illuq Geophysical Ltd. P.O. Box 2422 Inuvik, NT X0E 0T0					
5. Qualifications				Refer to Section 21 – Territorial Land Use Regulations.	
A (i) <input type="checkbox"/> a(ii) <input checked="" type="checkbox"/> a(iii) <input type="checkbox"/> b <input type="checkbox"/> c <input type="checkbox"/>					
6. (a) Summary of operation (Describe purpose, nature and location of all activities – refer to Section 22 (2) (b) – Territorial Land Use Regulations. (Use last page of form if additional room is required). AEC is proposing to conduct a 2D seismic program during the winter of 2001/2002. Vibroseis will provide the primary energy source for the program, with dynamite being used as a secondary energy source. A mobile sleigh camp will be used to support the seismic crew. Please refer to the attached project description for additional information.  (b) Please indicate if a camp is to be set up (Use last page to provide details)  A mobile sleigh camp will be used to support the seismic crew. Please refer to the attached project description for additional information.					
7. Summary of potential environmental and resource impacts (Describe the effects of the proposed program on land, water, flora & fauna and related socio-economic areas. (Use separate pages if necessary). Please refer to the attached project description.					
8. Proposed restoration plans (please use last page if required). Please refer to the attached project description.					
9. Other rights, licences or permits related to this permit application (mineral claims, timber permits, water licences, etc.) AEC has applied for a water licence from the NWT Water Board, a land use permit from the ILA and has submitted an application for a Geophysical Operation Authorization from the National Energy Board. Roads: <input type="checkbox"/> Is this to be a pioneered road? <input type="checkbox"/> Has the route been laid out or ground truthed? <input type="checkbox"/> Has funding been applied for (i.e. RTAP)? The program will use temporary winter access routes only.					

10. Proposed disposal methods

Drill Cuttings: Little or no drill cuttings are brought to the surface using the cased rig (refer to Section 4.3.5 of attached project description)

Garbage: Solid refuse will be incinerated and non-combustible material will be hauled out and disposed of at the Inuvik landfill. Veri-Illuq will track all waste produced during operations as part of regular safety reporting procedures.

Sewage (Sanitary & Grey Water): The sleigh camp is equipped with electric toilets that eliminate sewage waste through incineration. The resulting ash is inert and will be disposed of in the Inuvik landfill. Grey water that includes only shower water, wash water and kitchen water will be filtered and discharged to the surface.

11. Equipment (includes drills, pumps, etc.) (Please use last page if required)

Type & Number Please refer to Section 4.3.9 of attached Project Description	Size		Proposed Use
12. Fuels - Combustibles	( )	Number of Containers	Capacity of Containers
• Diesel		12	7560 litres
• Gasoline		2	1890
• Aviation Fuel		Maximum 6, only if necessary	
• Propane			
• Other			

13. Containment fuel spill contingency plans (Please attach separate contingency plan if necessary)

Please see attached project description.

14. Methods of fuel transfer (To other tanks, vehicles, etc.)

Please see attached project description.

15. Period of operation (includes time to cover all phases of project work applied for, including restoration)

December 2001 to August 2002

16. Period of permit (up to two years, with maximum of one year extension)	Start date	Completion date
2 years	December 1, 2001	December 1, 2003

17. Location of activities by map co-ordinates (attached maps and sketches)

Min Lat Deg	Min Lat Min	Max Lat Deg	Max Lat Min
68°	58'N	69°	16'N
Min Long Deg	Min Long Min	Max Long Deg	Max Long Min
133°	20'W	134°	10'W

18. Applicant

Print name in full John Duckett for AEC West Ltd

Signature

19. Fees

☒ Class A \$150.00

☐ Class B \$150.00

Land use fees:

\$150.00

16.1 ha Hectare @ \$50.00

\$805.00

Total Application and Land Use Fees

\$950.00

ILA Application # \_\_\_\_\_

INUVIALUIT LAND ADMINISTRATION  
APPLICATION FORM

All rights applied for are subject to the IFA, ILA Rules and Procedures and the laws of General Application.

---

LOCATION NAME/LOCAL NAME

Coordinates	<u>68°58'N - 69°16'N</u>	N	<u>133°20'W - 134°10'W</u>	W
UTM	<u>7650000 - 7685000</u>	N	<u>532000 - 565000</u>	E

---

If a heading does not apply to your application, please indicate N/A. If insufficient space, please attach a separate sheet(s).

**1. Name and mailing address of Head Office of Applicant:**

AEC West Ltd.  
3700 – 707 8<sup>th</sup> Ave. SW  
Calgary AB T2P 1H5

**Responsible officer or manager of Applicant:**

John Duckett, Senior Engineer and Project Manager

**Telephone and Fax:**

Tel: (403) 261-2569

Fax: (403) 716-2569

**2. Type of Right(s) applied for: (Note: If a Right-of-Way forms part of the general activity applied for, make a separate application for the Right-of-Way.)**

Land Use Permit (A)

**3. Type of Operation(s) to be carried out:**

AEC is proposing to conduct a 2D seismic program during the winter of 2001/2002. Vibroseis will provide the primary energy source for the program, with dynamite being used as a secondary energy source. A mobile sleigh camp will be used to support the seismic crew. Please refer to the attached project description for additional information.

**4. Planned duration of activities:**

Seismic exploration will be completed between January and April 2002. Program clean-up will be completed by August 2002. Refer to the table below and the attached Project Description for further details.



## Development Schedule

Project Activity	Estimated Time Frame
Planning	September – December 2001
Pre-Survey and Access Construction	December 2001
Set up Mobile Camp at Camp Location	December 2002
Drilling and Charge Placement at Select Locations	January/February 2002
Recording	January-March 2002
Final Clean-up	April; July – August 2002

\* Time lines given in the above table are approximate and subject to change depending upon variables such as weather or ice thickness on proposed routes of travel.

**5. Total Number of Personnel / Manpower requirements:**

Approximately 81 personnel

**6. Total Number of Inuvialuit employed:**

To be determined

**7. Names, addresses and functions of Inuvialuit contractors and sub-contractors:**

Veri-Illuq Geophysical Ltd.  
P.O. Box 2422  
Inuvik, NT X0E 0T0

**8. Names, addresses and functions of non-Inuvialuit contractors and sub-contractors:**

To be determined.

**9. Attach a concluded or proposed Participation Agreement or Access Agreement.**

**10. Planned surface requirements for land use / occupancy in hectares (ha):**

Seismic lines will cover a total of 106.5 ha. 7.5 ha are on 7(1)(a) lands, 82.9 ha on 7(1)(b) lands and 16.1 ha on Crown Land.

**Attach a 1:50,000 NTS map showing the location and a preliminary plan showing area, measurements and location of all buildings, work areas, etc.**

Please see attached project description.

**11. Planned length of Right-of Way in kilometers (km):**

A total of 133.2 linear km of seismic line are planned. 9.4 km of seismic line are on 7(1)(a), 103.7 km on 7(1)(b) and 20.1 km on Crown land

**12. Waste and/or drilling fluid disposal arrangement (fuel fired forced air incinerator or specify other method):**

Little or no drill cuttings are brought to the surface using the casing rig (refer to Section 4.3.5)

**Garbage:**

Solid refuse will be incinerated and non-combustible material will be hauled out and disposed of at the Inuvik landfill. Veri-Illuq will track all waste produced during operations as part of regular safety reporting procedures.

**Sewage (Sanitary & Grey Water):**

The sleigh camp is equipped with electric toilets that eliminate sewage waste through incineration. The resulting ash is inert and will be disposed of in the Inuvik landfill. Grey water that includes only shower water, wash water and kitchen water will be filtered and discharged to the surface.

**13. Equipment, vehicles, and facilities to be used (type, number, size, purpose, weight, etc.):****Advance Equipment**

2	FN60 Nodwell ice profiling units
1	6000 gallon water unit, mounted on high boy track trailer
3	D6 Cats
1	Delta 3 water units
8	Snowmobiles

**Support Equipment**

2	D7R Bulldozers
1	D7G Bulldozer
1	977 Bulldozer
2	Bombardier Plus ME Snow Cats
1 +	Delta 3 units for utilization as water trucks and for fuel hauling

**Survey & Recording Equipment**

5	Input/Output "X" model track-mounted vibrators, utilizing a peak force of 62,000 lbs.
1-3	TVS60 - 16 man track personnel carrier.
5-7	Foremost - 110C track cable geophone units.
1	Foremost - 110C track recorder.
1	Foremost - 110C track charging unit.
1	Foremost - 110C track fuel support unit.
1	Foremost - 110C track vibrate tech/mechanic unit.
1	Foremost - 110C track Party Manager unit.
4	Snowmobiles

**Drilling Equipment**

2	3 way drills (casing) mounted on FN110 Nodwell Carriers
1	FN110 drill support unit

**Ground Support Equipment based out of Inuvik:**

2	2000 ¾ ton Suburbans
	Crew Cab - 1 ton flat deck truck
	Crew Cab - 1 ton standard GCM truck
1	¾ ton Extended Cab truck

**14. Fuels to be used (type, number of containers, capacity, etc.):**

**Diesel:** 6 fuel sleds with two 7560 litre fuel tanks each = 90720 litres

**Gasoline:** 2 fuel sleds with one tank 1890 litres each = 3780 litres

**Aviation Fuel:** 6 barrels will only be stored if a helicopter is necessary

**Propane:** None

Please refer to Section 4.4.1 of the attached project description for additional information.

**15. Method of emptying and filling fuel containers:**

All tanks and fuelling procedures will adhere to safety standards outlined within the Veri Illuq Fuel and Oil Spill Contingency Plan. Please refer to Appendix B in the attached project description.

**16. Please attach FUEL/OIL SPILL CONTINGENCY PLAN.**

Please refer to attached project description.

**17. Radio Equipment to be utilized with identification #:**

To be determined.

**18. Emergency First Aid Facilities:**

Please refer to attached project description.

**19. Potable Water Requirements:**

Drinking water will be trucked to camp from the nearest community and will travel with the camp and crew using a Delta 3 unit.

**20. Attach a detailed project description expanding on the information given above and including any additional relevant information.**

Please refer to the attached project description.

**21. Where the applicant applies for a Right pursuant to Subsection 7(18) of the Agreement, attach copy of the right or interest granted by Canada on the basis of which this application is being made.**

**22. Fee calculations (based on ha and/or km as per current ILA Fee Schedules(s):**

Upon receipt of an invoice, payment in the full amount will be couriered to ILA within 30 days.

\_\_\_\_\_  
Name of Representative and Title

\_\_\_\_\_  
Company Name

\_\_\_\_\_  
Signature of Representative

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature of Land Administrator

\_\_\_\_\_  
Date

\_\_\_\_\_  
Location

Issuing ILA Office: Inuvialuit Land Administration  
P.O. Box 290  
Tuktoyaktuk, NT  
X0E 1C0  
Telephone: (867) 977-2202 or (867) 977-2466  
Fax: (867) 977-2467

Schedule III  
(Subsection 6(1))

APPLICATION FOR LICENCE, AMENDMENT OF LICENCE, OR RENEWAL OF LICENCE

APPLICATION/LICENCE NO:

1. Name and Mailing Address of Applicant

John Duckett, Senior Engineer and Project Manager  
AEC West Ltd.  
3700 - 707 8<sup>th</sup> Ave. SW  
Calgary, AB T2P 1H5  
Telephone: (403) 261-2569 Fax: (403) 716-2569

2. Address of Head office in Canada if incorporated

As at left

Telephone:

Fax:

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

The proposed Kamik 2D seismic program is on the Tuktoyaktuk Peninsula, approximately 25 km southwest from Tuktoyaktuk in the Inuvialuit Settlement Region, NWT. Please see the attached project description for additional information and a detailed map.

Latitude 68°58'N - 69°16'N

Longitude 133°20'W - 134°10'W

4. Description of Undertaking (describe and attach plans)

AEC are proposing to conduct a 2D seismic program during the winter of 2002. The proposed program includes five seismic lines for a total line length of approximately 133.2 km. The program will be supported by a mobile sleigh camp to house the approximately 81 personnel.

5. Type of Undertaking

1. Industrial   X    
2. Mining and milling         
3. Municipal       

4. Power         
5. Agriculture       

6. Conservation         
7. Recreation       

8. Miscellaneous (describe)       

6. Water Use

To obtain water   X    
To cross a watercourse         
To modify the bed or bank of a watercourse         
Other (describe)       

Flood Control         
To divert water         
To alter the flow of, or store, water       

7. Quantity of Water Involved (litres per second, litres per day or cubic metres per year, including both quantity to be used and quality to be returned to source)

Total water withdrawal rates are expected to be 80 m<sup>3</sup> per day over the course of the project. Water will be extracted at a point where a seismic line or access road intersects with the river, and intake hoses will be screened in accordance with the *DFO Freshwater Intake End-of-Pipe Fish Screen Guideline*.

Water required for ice access, building snow ramps and possibly for a supplementary camp source will be obtained from large lakes in the vicinity of the program area. No water will be taken from a land-locked waterbody where drawdown and related fisheries concerns may be an issue.



SCHEDULE III – *Concluded*APPLICATION FOR LICENCE, AMENDMENT OF LICENCE, OR RENEWAL OF LICENCE - *Concluded*

## 8. Waste Deposited (quantity, quality, treatment and disposal)

**Garbage:**

Solid refuse will be incinerated and non-combustible material will be hauled out and disposed of at the Inuvik landfill. Veri-Illuq will track all waste produced during operations as part of regular safety reporting procedures.

**Sewage (Sanitary & Grey Water):**

The sleigh camp is equipped with electric toilets that eliminate sewage waste through incineration. The resulting ash is inert and will be disposed of in the Inuvik landfill. Grey water that includes only shower water, wash water and kitchen water will be filtered and discharged to the surface, with any sludge hauled away for proper disposal at an approved landfill site.

## 9. Other Persons or Properties Affected By This Undertaking (give name, mailing address and location; attach list if necessary)

Consultations were conducted in the surrounding communities and the local Hunters and Trappers Committees have been contacted regarding the project. Please refer to attached project description for additional information.

## 10. Predicted Environmental Impacts of Undertaking and Proposed Mitigation

Please refer to Section 12.0 of the attached project Description.

## 11. Contractor and Sub-Contractors (names, addresses and functions)

Veri-Illuq Geophysical Ltd. (Seismic Contractor)  
P.O. Box 2422  
Inuvik, NT X0E 0T0

## 12. Studies Undertaken to Date (attach list if necessary)

IEG (formerly Inuvialuit Environmental Inc. or IEI) prepared previous environmental assessments in the proposed AEC Kamik 2D seismic program area for the Explor Data Ltd. Mackenzie River Delta Winter 2001 Regional Seismic Acquisition Program and the AEC West Ltd. Mackenzie Delta Winter 2000/2001 Seismic Program. IEG has also prepared assessments for the Mackenzie River Delta Heritage and Biophysical Resource Surveys, which included survey work within the boundaries of the proposed AEC program area. The project descriptions are on file with the Environmental Impact Screening Committee and the National Energy Board. A number of assessments for proposed developments within the vicinity of the project area are currently underway.

## 13. Proposed Time Schedule

Project Activity	Estimated Time Frame
Planning	September – December 2001
Pre-Survey and Access Construction	December 2001
Set up Mobile Camp at Camp Location	December 2002
Drilling and Charge Placement at Select Locations	January/February 2002
Recording	January-March 2002
Final Clean-up	April; July – August 2002

\* Time lines given in the above table are approximate and subject to change depending upon variables such as weather or ice thickness on proposed routes of travel.

Start date December, 2001 Completion date August 2002

NAME \_\_\_\_\_

TITLE \_\_\_\_\_

SIGNATURE \_\_\_\_\_

DATE \_\_\_\_\_

## FOR OFFICE USE ONLY

APPLICATION FEE

Amount: \$ 30.00 \_\_\_\_\_

Receipt No.: \_\_\_\_\_

WATER USE DEPOSIT

Amount: \$ \_\_\_\_\_

Receipt No.: \_\_\_\_\_

**NORTHWEST TERRITORIES WATER BOARD**

**ONSHORE OIL AND GAS  
EXPLORATION DRILLING  
QUESTIONNAIRE**

**FOR**

**WATER LICENCE APPLICATIONS**

**Prepared by:  
Department of Indian Affairs and Northern Development  
Water Resources Division  
August 1999  
Version 5.07**

## **Introduction**

**The purpose of this questionnaire is to solicit supplemental information from an applicant to support their application for a water licence (or renewal). It is anticipated that the completion of this questionnaire will reduce delays arising from the Northwest Territories Water Board having to solicit additional information after an application has already been submitted. This information will also be useful during the environmental assessment and screening of your application, which must be undertaken prior to development and approval of a water licence.**

**The applicant should complete the questionnaire to the best of his/her ability, recognizing that some questions may not be relevant to the project under consideration. For questions that do not relate to his/her operation, the applicant is requested to indicate "N/A" (Not Applicable).**

**If any questions arise while completing the questionnaire, the applicant may wish to contact the Northwest Territories Water Board at (867) 669-2772. If your question is that of a technical nature please contact the Regulatory Approvals Section of the Water Resources Division, Department of Indian Affairs and Northern Development (INAC), at (867) 669-2651.**

**Chairman,  
Northwest Territories Water Board**



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**If space is insufficient for any of the responses on this questionnaire, use the back of the sheet or attachments.**

**List attachments in Appendix 1.**

**Print or type your responses.**

## SECTION 1:

### PRELIMINARY SITE ASSESSMENT

DATE: August, 2001

#### 1.1 APPLICANT

COMPANY NAME: AEC West Ltd.

ADDRESS: 3700- 707 8<sup>th</sup> Ave. SW

Calgary, AB T2P 1H5

PROPERTY NAME/EXPLORTION LIC. #: EL385, Tuk1, SDL 32

CLOSEST COMMUNITY: Tuktoyaktuk

LATITUDE/LONGITUDE OF WELL CENTRE (Degrees, minutes, seconds):

Project Area

68°58'N - 69°16'N

133°20'W - 134°10'W

#### 1.2 PRIMARY COMPANY CONTACT:

NAME: John Duckett

TITLE: Senior Engineer and Project Manager

CONTACT NUMBER: 403-261-2569

ALTERNATE CONTACT NUMBERS: \_\_\_\_\_

#### 1.3 FIELD CONTACT:

NAME (If known): Wayne Ross

TITLE (If known): Regional Manager, Arctic Operations, Veri-Illuq Geophysical Ltd.

CONTACT NUMBER: 867-777-3521

#### 1.4 INDICATE THE STATUS OF THIS APPLICATION:

NEW APPLICATION

☒

RENEWAL

☐

IF RENEWAL, INCLUDE LICENCE NUMBER: \_\_\_\_\_

**1.5 SITE HISTORY**

INDICATE IF THIS SITE CONTAINS ANY KNOWN:

FORMER WELL SITES	<u>Yes</u>
WASTE DUMPS	<u>N/A</u>
FUEL AND CHEMICAL STORAGE AREAS	<u>N/A</u>
SUMP AREAS	<u>N/A</u>
WASTE WATER DISCHARGE LOCTIONS	<u>N/A</u>

**DESCRIBE SITES AND REFERENCE THEM ON THE MAP IN QUESTION 1.6**

Refer to 1:50 000 scale map in project description

**1.6 ATTACH MAPS DRAWN TO SCALE SHOWING LOCATIONS OF EXISITNG AND PROPOSED: see Project Description**

CAMP FACILITIES,  
WELL SITE(S),  
SUMPS,  
WATER SOURCES,  
FUEL AND CHEMICAL STORAGE FACILITIES,  
DRILLING MUD STORAGE FACILITIES,  
DRAINAGE CONTROLS,  
TRANSPORATION ROUTES (SEASONAL AND ALL WEATHER)\*,  
ELEVATION CONTOURS,  
LOCATIONS OF WATERBODIES  
DRAINAGE PATTERNS FOR WELL AND CAMP SITES.

(Contour map of site provided)

**\* Clearly identify crossings over water courses greater than 5 mat ordinary high water mark.**

Please see attached project description.

**1.7 DESCRIBE THE PROPOSED OR CURRENT METHOD OF FRESHWATER WITHDRAWL, THE TYPE AND OPERATING CAPACITY OF THE PUMPS USED AND THE INTAKE SCREEN SIZE.**

Water required for ice access, building snow ramps and possibly for a supplementary camp source will be obtained from large lakes in the vicinity of the program area. No water will be taken from a land-locked waterbody where drawdown and related fisheries concerns may be an issue.

Total water withdrawal rates are expected to be 80 m<sup>3</sup> per day over the course of the project. Water will be extracted at a point where a seismic line or access road intersects with the river, and intake hoses will be screened in accordance with the *DFO Freshwater Intake End-of-Pipe Fish Screen Guideline*.

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**1.8 ESTIMATE MAXIMUM DRAW DOWN AND RECHARGE CAPABILITY OF THE RIVER OR LAKE FROM WHICH FRESH WATER WILL BE DRAWN. QUOTE DRAW DOWN IN CENTIMETRES, OR, STATE PERCENTAGE OF FLOW WITHDRAWN.**

Less than 1% withdrawn

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**1.9 INDICATE IF PERMAFROST IS EXPECTED TO BE ENCOUNTERED UNDER:**

CAMP FACILITIES	<u>Yes</u>
WELL SITE	<u>N/A</u>
ACCESS ROUTES	<u>Yes</u>
SUMPS	<u>N/A</u>
OTHER	<u>          </u>

**1.10 INDICATE ANY POTENTIAL FOR ENCOUNTERING ARTESIAN AQUIFERS OR LOST CIRCULATION WITHIN THE SURFACE HOLE (TO CASING DEPTH)**

N/a

---

**1.11 ATTACH A DESCRIPTION OF THE SURFICIAL GEOLOGIC AND HYDRO-GEOLOGIC CONDITIONS IN THE IMMEDIATE VICINITY OF THE WELLSITE**

N/a



## SECTION 2:

### WATER USE AND WASTE DISPOSAL

- 2.1 OUTLINE ALL WATER USAGE IN THE DRILL PROGRAM, CAMP FACILITIES, AND ROAD CONSTRUCTION. INDICATE THE SOURCE AND VOLUME OF WATER FOR EACH USE.

	Source	Use	Average Volume (m <sup>3</sup> /day)
1.	Channels of the Mackenzie River and/or large waterbodies	Camp facilities, ice access and snow ramps	80 m <sup>3</sup>
2.			
3.			
4.			
			TOTAL: 80 m <sup>3</sup>

- 2.2 WILL DRILLING WASTES CONTAIN DETRIMENTAL SUBSTANCES INCLUDING, BUT NOT LIMITED TO, OIL BASED OR INVERT MUDS AND HIGH SALINITY FLUIDS?

YES \_\_\_\_\_ NO \_\_\_\_\_

IF YES, INDICATE SUBSTANCES:

N/A

- 2.3 INDICATE THE TOTAL ESTIMATED VOLUME OF DRILLING WASTES

N/A \_\_\_\_\_ CUBIC METRES

- 2.4 INDICATE METHODS FOR DISPOSAL OF DRILLING WASTES.

N/A	SUMP
N/A	DOWN HOLE (REQUIRES NEB APPROVAL)
N/A	ON-SITE TREATMENT (PROVIDE PLAN)
N/A	OFF-SITE (GIVE LOCATION AND METHOD OF DISPOSAL)

- 2.5 IF A SUMP IS BEING USED, ATTACH THE FOLLOWING INFORMATION N/A  
SCALE DRAWINGS AND DESIGN OF SUMPS,  
CAPACITY IN CUBIC METRES,  
BERM EROSION PROTECTION,  
SOIL PERMEABILITY AND TYPE

RECYCLING/RECLAIMING WATERS,  
SURFACE DRAINAGE CONTROLS,  
ABANDONMENT PROCEDURES.

**2.6 WILL A CAMP BE PROVIDED?**

YES

☒

NO

☐

**2.7 IF YES, THEN INDICATE THE CAPACITY AND THE EXPECTED MAXIMUM  
NUMBER OF PERSONS THAT WILL BE ACCOMMODATED.**

CAPACITY

65

PERSONS

MAXIMUM ACCOMMODATED

65

PERSONS

## **SECTION 3:**

### **CONTINGENCY, ABANDONMENT AND RESTORATION PLANNING**

- 3.1 ATTACH THE PROPOSED OR EXISTING CONTINGENCY PLAN WHICH DESCRIBES COURSE OF ACTION, MITIGATIVE MEASURES AND EQUIPMENT AVAILABLE FOR USE IN THE EVENT OF SYSTEM FAILURES AND SPILLS OF HAZARDOUS MATERIALS (IN COMPLIANCE WITH NWT WATER BOARD GUIDELINES FOR CONTINGENCY PLANNING, 1987).**  
See attached Project Description
- 3.2 ATTACH AN INVENTORY OF HAZARDOUS MATERIALS ON THE PROPERTY (AS DEFINED UNDER TRANSPORTATION OF DANGEROUS GOOD REGULATIONS).**  
See attached Project Description
- 3.3 ATTACH AN OUTLINE OF PLANNED ABANDONMENT AND RESTORATION PROCEDURES.** See attached Project Description

## SECTION 4:

### ENVIRONMENTAL ASSESSMENT AND SCREENING

Your application and other project details, such as this questionnaire, will be sent out for review by local aboriginal and public groups as well as territorial and federal government agencies. Their comments regarding the significance of project impacts are considered before a decision is made to allow the project to proceed. Because formal assessment and screening of water licences was only initiated in about 1989, applicants will find that this process may be required even if the project has been built and in operation for several years. However, if your project has been previously screened a further assessment may not be required, or a more limited process may be used. This will depend on individual circumstances, including the stage of the project. Some projects may need a higher level of review or submission of more information before being screened.

- 4.1 HAS THIS PROJECT EVER UNDERGONE AN INITIAL ENVIRONMENTAL ASSESSMENT, INCLUDING PREVIOUS OWNERS?

YES X NO ☐

IF YES, BY WHOM / WHEN: Submitted by Inuvialuit Environmental and Geotechnical Inc. – see attached project description

- 4.2 HAS BASELINE DATA BEEN COLLECTED FOR THE MAIN WATER BODIES IN THE AREA?

YES ☐ NO X

IF YES, ATTACH DATA.

- 4.3 HAS BASELINE DATA BEEN COLLECTED AND EVALUATED WITH RESPECT TO THE BIOPHYSICAL COMPONENTS OF THE ENVIRONMENT POTENTIALLY AFFECTED BY THE PROJECT (WILDLIFE, SOILS, AIR QUALITY).

YES X NO ☐

IF YES, ATTACH DATA.  
See Project Description

- 4.4 ATTACH A DESCRIPTION OF ALL PROPOSED AND EXISTING ENVIRONMENTAL MONITORING PROGRAMS.  
N/A

- 4.5 HAS A COMMUNITY CONSULTATION PROGRAM BEEN INITIATED?

YES X NO ☐



**IF YES, PROVIDE DETAILS OF THE PROGRAM.- See Project Description**

**SECTION 5:**

## LIST OF ATTACHMENTS

[illegible]

## **Appendix B**

### **Emergency Response Plan And Fuel And Oil Spill Contingency Plan**

**NWT / YUKON**

**EMERGENCY RESPONSE PLANS**

**FOR:**



**VERITAS DGC**

25 Oct 2001

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# **EMERGENCY RESPONSE PLANS NWT & YUKON 2001-2002**

## **Overview**

These Emergency Response Plans developed for the projects within the confines of the NWT and Yukon is provided in the following document. It includes Medical Emergencies, Fire Evacuation, Man or Equipment Through the Ice, Bear Protocol, and Missing Man or Vehicle, Fire Protection and Prevention, Environmental Protection, and Problem Specific ERPS.

The following general provisions are a brief overview of the ERP plans which will be in place prior to the start-up operations on any sites within the confines of the NWT and Yukon jurisdictional boundaries. In addition, the Veri-Illuq Health Safety and Environment Manual will be available and may be referred to during an emergency.

In the event of an emergency situation the local emergency agencies will be utilized as much as possible. This will include but not be limited to air-medevac and utilization of government resources, i.e. Coast Guard search and rescue, etc.

All efforts and resources of Veri-Illuq will be utilized to meet these goals and commitments towards protection of life, protection of the environment, and prevention of all incidents regardless of type or size.

# **1. MEDICAL EMERGENCIES**

Paramedics will be present in all camps at all times whenever possible. The paramedics will be fully trained and equipped to meet the NEB Oil and Gas Occupational Safety and Health Regulations. In the event of a medical emergency the Veri-Illuq emergency response plan will be put into use. If the emergency requires medical evacuation of the victim, the local air-charter service will be utilized if no other means are available or adequate in nature. In the event an aircraft is available on site, weather fixed or rotary wing aircraft will be utilized for transport of the patient. The use of fixed wing will be dependent on the availability of a landing strip at time of the incident. Depending on the severity of the injury further medical evacuation may be required to a larger facility such as Yellowknife. This will be accomplished with the use of the local air medevac system currently in place or by the use of regular airline service if feasible. Decisions regarding the medevac of injured personnel will reside with the attending paramedic, which should include consultation with the site supervisor.

At job start-up and at all orientation briefings all workers will be advised that regardless of size, all injuries will be reported, recorded, and treated appropriately by the onsite medical staff. At no time will any worker be permitted to work on the site until cleared by appropriate medical personnel.

The site supervisor will ensure that at least monthly and at the start of any new job a mock ERP drill will be conducted to test the system. The results of these tests will be reported in accordance with SOP.

## **2. FIRE**

### **General Provisions**

In the event of a fire in camp, the Veri-Illuq fire evacuation plan will be immediately put into place. All crewmembers will report to the designated fire muster area (which will be identified immediately after each camp move). A head count will be taken to ensure the location of all personnel and to account for their location.

In the event the camp is destroyed or uninhabitable, all personnel will be moved to the closest facility able to accommodate the crew. This will be an onsite decision by the site supervisor. In the event of an injury the medical emergency response procedure will be utilized.

At job start-up and any time deemed necessary by the site supervisor, the fire evacuation plan will be tested. This will include mustering all personnel at the designated area and a head count will be conducted.

Vehicles will be parked in such a manner as not to hinder firefighting capabilities, and in a fashion to encourage a rapid and safe removal to an inert area when there is an actual fire.

### **Fire Protection**

The prevention of fires is of utmost importance. Good housekeeping and equipment maintenance must be followed to keep fire hazards at a minimum. Within the NWT and Yukon prospects, fire can destroy protection from the elements and wildlife, and must be avoided at all costs. An error that causes a fire within the camp area can paralyse a crew and put it into dangers that are completely avoidable. Towards this, fire protection and prevention is a priority on our sites.

One of the biggest fire hazards in the seismic industry is when a worker makes a fire on line and then walks away without extinguishing the fire properly. In heavily wooded or bushy areas this can lead to a serious fire. If it is absolutely necessary to make a fire for survival, you must extinguish the fire completely before leaving the area.

Caution must always be exercised as to hazards that may be present intermittently within a given seismic operation. A hazard absent at a given place one day may be present the following day. Therefore, always caution others with respect to the changing circumstances that create these hazards. In locations where a fire or an explosion may occur, the below listed rules must be followed.

All fires must be reported immediately. An incident report must also be completed and must include all known or reasonable surmised details as an additional report may be required by governmental agencies.

## General Guidelines

Gasoline, paint thinners, diesel oil, kerosene, and other fuels must never be used for anything other than what they are intended. Fuels and other petroleum products can be absorbed through the skin and become health hazards as well as fire hazards. Vapours from petroleum products can be harmful when inhaled, and can be fire hazards when absorbed into clothing. Gasoline, especially, is to be used only as a fuel for internal combustion engines.

Use the following precautions to help prevent fires:

- 1) Smoking in bed is prohibited at any time.
- 2) Smoking, fire or the use of an ignition source is prohibited in/on:
  - a) Areas where NO SMOKING signs are posted.
  - b) Any area or part of a building in which flammable liquid vapours may be present.
  - c) The vicinity of fuel tanks, or other vessels containing or having contained oil or other flammable liquids.
  - d) The vicinity of an oil or gas well.
  - e) The vicinity of a pipeline pump or other machinery or equipment transporting or containing hydrocarbons or other flammable liquids.
  - f) The vicinity where there has been or is a leak of flammable liquids.
  - g) The vicinity of gas operated chemical pumps.

**NOTE:** The term “in the vicinity of” is defined as a minimum distance of 30 metres from a flammable or combustible gas source.

- 3) Matches and cigarette lighters must not be taken into areas containing flammable materials. NO SMOKING signs will be conspicuously posted. Strike anywhere matches and disposable butane lighters are not permitted in hazardous or high temperature areas.
- 4) Designated areas must be established for the storage of flammable liquids. All chemicals, including fuel, must be properly labelled as per WHMIS Guidelines.
- 5) Areas used for storage of fuels, kerosene, solvents, and other flammable liquids should be clearly marked as **NO SMOKING AREAS**.
- 6) Cans of oil and kerosene, oily rags, waste, etc., are prohibited near stoves, furnaces, or gas fires.
- 7) Oily rags, waste, and other combustible materials must be stored in covered, metal containers to prevent fire from spontaneous combustion.
- 8) Solvents and engine oils must be disposed of in an environmentally sound manner and according to local requirements.
- 9) Flammable liquids (i.e. gasoline, paint thinners, diesel oil, kerosene, etc.) must not be used as a cleaning agent. Use specially manufactured cleaning solvents to clean parts and hands.
- 10) Flammable aerosols (i.e. paints, insect spray, and most paint remover, etc.) must not be used near open flames or other sources of ignition.
- 11) Flammable liquids must be stored in a well ventilated, proper storage container.
- 12) Engine-magnetos, spark plugs, or other ignition devices must not be tested in places where flammable gas or vapours are present.
- 13) Pressurized flammable gas must not be used as a propellant in spray equipment or air operated tools, filling tires, etc.

- 14) Designated areas must be established for smoking. Place discarded matches, cigarette butts, and other smoking materials in ashtrays or suitable containers.
- 15) When entering areas with tall or dried grass, or wooded areas, check your vehicle often for any trash, twigs, leaves, limbs, or grass. Turn the engine off, set the emergency brake, and remove any of these items that are near the exhaust systems, especially around the manifold or catalytic converter systems. Wear gloves to prevent injury to the hands when removing these items. Park the vehicle in the clearest, most convenient area, and try not to park in high grass. Keep close watch on the vehicle and be prepared to extinguish a fire as quickly as possible.
- 16) Gasoline or other flammable products must be transported or stored in approved safety containers. Plastic containers manufactured for food products and other non-petroleum products are not suitable for petroleum products. Petroleum products may cause rapid deterioration of this type of plastic container.
- 17) Smoke detectors must conform to building code regulations for fire protection. In addition smoke detectors must be placed in battery shack, recorder, and mechanics workshop.

**REMEMBER! LABEL ALL CONTAINERS AS TO THEIR CONTENTS!**

***DON'T TAKE CHANCES: REMEMBER FIVE GALLONS OF GASOLINE EXPLODES WITH AS MUCH FORCE AS 415 LBS. OF DYNAMITE.***

## **Fire Classification / Extinguisher Guidelines**

### **Portable Fire Extinguishers - General Requirements**

Veri-Illuq will provide portable fire extinguishers and shall mount, locate and identify them so that they are readily accessible to employees without subjecting the employees to possible injury.

Only approved fire extinguishers shall be used.

Fire extinguishers shall be maintained in a fully charged and operable condition and kept in their designated places at all times except during use.

### **CLASSIFICATIONS OF FIRES ARE:**

CLASS A: Fire involves ordinary combustible materials such as paper, wood, cloth and some rubber and plastic materials. Fires of this type can be *fought by smothering the fire with water, foam, loaded steam or multi-purpose dry chemical*. The use of sand, water, confinement, etc., puts out these fires by cutting off the oxygen supply. Water also reduces the temperature.

CLASS B: Fire involves flammable or combustible liquids, flammable gases, greases and similar materials, and some rubber and plastic materials. A smothering or combustion-inhibiting effect is necessary to extinguish Class B fires. Fires of this type are best *fought with foam or loaded steam equipment, dry chemical, or carbon dioxide-type extinguisher*. Typical Class B liquid spill fires occur when flammable or combustible liquids accumulate under motor vehicles, fuel skids, and when spillage occurs around diesel equipment, bulk fuel storage areas and maintenance shops. (NOTE: Water is heavier and when sprayed on the fires splashes and spreads the fire by sinking below the surface of the material.)



CLASS C: Fire involves energized electrical equipment. Fires of this type present the problem of potential electrical shock. This type of fire can be *fought with carbon dioxide or dry chemical-type mixtures*. Typical electrical fires include ballasts on fluorescent light fixtures, electric motors, battery charging stations, junction boxes, transformers, circuit breakers, and control panels. (NOTE: When electrical equipment is involved, always fight the fire as if the electrical current were on, unless you have definitely established that the electric current is completely cut off from the equipment involved in the fire. Water is a good conductor of electricity; DO NOT USE WATER ON ELECTRICAL FIRES.)

Common blasting agents used in seismic operations are often oxidizers (Nitrocarbonite, Ammonium Nitrates). They create their own oxygen as they burn. Smothering cannot fight these fires. Confinement of these materials during burning only increases the temperature and creates an explosion. *These fires must be flooded with water from the bottom up.* DO NOT CONFINE THE FIRE!

### **HOW TO USE A FIRE EXTINGUISHER:**

1. HOLD FIRE EXTINGUISHER UPRIGHT, PULL RING PIN! (Rupture cartridge if applicable)
2. DIRECT DISCHARGE AT BASE OF FLAMES IN SWEEPING MOTION
3. GRADUALLY DIRECT IT FORWARD OR AT REMAINING MATERIAL THAT IS BURNING

### **RANGE DISTANCES:**

9 m to 12 m for Water/Stored Pressure Extinguishers - Class A fires

1 m to 1.5 m for CO2 Extinguishers - Class B & C fires

5 m to 7.5 m for Dry Chemical (Multi-Purpose) Extinguishers - Class A, B & C fires

**NOTICE: WORKPLACE USERS OF FIRE EXTINGUISHERS SHOULD RECOGNIZE W.H.M.I.S. HAZARD SYMBOLS AND UNDERSTAND ALL RELATED MATERIAL SAFETY DATA SHEETS**

**NOTE: ALL EXTINGUISHERS REQUIRE ANNUAL SERVICING OR SERVICING AFTER USE.**

## **Fire Equipment Locations**

Fully charged and inspected fire extinguishers shall be located in positions and locations such that they are readily available. At least one extinguisher, of a suitable type, shall be positioned near the access door to the area it is designed to protect. The locations of the fire extinguishers and their type are as follows:

**VEHICLES (COMPANY OWNED OR LEASED)** - Each vehicle in service must be equipped with a 5 lb. ABC Dry Chemical fire extinguisher. Mount the extinguishers inside the cab on the driver's side of the vehicle.

**STAGING AREA (RECORDING)** - Mount a 20 lb. ABC Dry Chemical fire extinguisher near the access door of the staging trailers.

**RECORDER** - Mount a 10 lb BC CO2 fire extinguisher in the recorder and a 5 lb. ABC Dry Chemical extinguisher inside the cab on the driver's side of the vehicle.

**VIBRATORS** - Mount a 5 lb. ABC Dry Chemical extinguisher in the cab, on the driver's side and a 20 lb. ABC Dry Chemical fire extinguisher on the vibrator. (NOTE: the fire extinguisher must be easily accessible to the driver and be no more than 1.5 m above the ground.)

**HELICOPTER STAGING AREA** - Each staging area shall have either an ABC Dry Chemical or BC CO2 extinguisher of appropriate size to extinguish any fire at the site (typically a 20 lb ABC extinguisher).

**FUEL BOWSER** - Each fuel bowser must have 2- 20 lb. fire extinguisher available for immediate use.

**FIELD OFFICE** - Place a 5 lb. fire extinguisher near the access door of the office.

**DRILL PUSH** - The vehicle must be equipped with 2- 10 lb. BC CO2 fire extinguisher. Mount one in the front of the cab on the driver's side and one in the rear. NOTE: The rear fire extinguisher must be approved for explosives, and must be protected from the explosives by a wood casing.

**VIB TECH TRUCK w/ FUEL SLOOP** - The vehicle must be equipped with 2-10 lb. ABC fire extinguishers on the rear of the vehicle and a 5 lb. ABC extinguisher in the cab, on the driver's side

***NOTE: Dry chemical extinguishers are ineffective when the powdered chemical becomes compacted. It is recommended that these extinguishers be mounted horizontally on vehicles so that the vibration does not cause the powder to pack down.***

### **3. MAN OR EQUIPMENT THRU THE** **ICE**

Due to the fact the crew will be working on areas including lakes and watercourses, there is the possibility of ice fracturing possible allowing men or equipment to fall through. At no time will ice crossings be performed prior to the ice being checked for thickness and stability, with the use of the ice profiling guidelines provided. In the event an incident should occur every effort would be given to protect life and limb. The emergency response plan will be implemented immediately; keeping in mind the possible need for more advanced equipment or trained people to assist in this rescue. Flotation devices with a recovery line will be carried on designated vehicles.

## **4. BEAR PROTOCOL**

**Purpose:** To provide guidelines for assuring the prompt reporting, investigation, and documentation of bear sightings or incidents.

**Scope:** These procedures apply to all sightings and interactions with bears, regardless of type, when operating north of the 60<sup>th</sup> parallel (NWT and Yukon operations).

**Responsibilities:** The senior site supervisor has overall responsibility for this protocol, and may make changes in consultation with the HSE personnel and the Operations Supervisor as deemed necessary to fit any exigent circumstances.

### **Operating Sites**

The camp will consist of stationary units including kitchen facilities, recreation, sleeping areas, washrooms, offices, shops, generator rooms, and storage areas. In the camp, most of the workers will transit on foot between these buildings, especially between the dining area, sleeping quarters, and shops. The site set-up will be constructed in such a manner that at no time could a bear become trapped or cornered. Workers will receive instructions on observing for bears when they leave buildings. Entrances to all buildings within the camp will be properly illuminated at all times to aid in the spotting of bears. Posted signs will be placed on the inside of the doors.

Sleigh camps will be established with the rows being set-up not further apart than 30 meters, so that if a bear is encountered the workers will have a short distance to gain access to protection.

Prior to start-up of all jobsites, and whenever new workers enter the site for the first time, they will receive proper instruction regarding bears, and these protocols. At no time will workers or visitors be permitted on the site without a proper briefing.

Bear courses will be available from the HSE advisor on the crew, and with advance booking from DRWED (Tim Devine) at 867-777-7230.

### **Solid Waste Management**

Any garbage generated on the sites will be disposed of by incineration. A skid-mounted incinerator will be used for this, and will operate for approximately 8 hours per day. If it is deemed necessary, this operation will continue past these hours to reduce the total amount of waste that is being stored inside the facilities.

Any resulting ash that is produced from the incineration process will be transported back to Inuvik for disposal at the proper facility when necessary, but at least twice weekly.

Any and all waste products that are deemed proper to burn are to be bagged and stored inside the facility until the worker conducting the burning is ready. At no time is solid waste to be stored outside, as it may attract bears or other wildlife.

At the discretion of the site supervisor, an electric fence may be erected to keep bears out of the area.

## **Exclusion Zones**

As previously discussed in this document, it may be appropriate or necessary to establish an "exclusion zone" if bear dens are located or if bears are disturbed from their dens. If possible and permitted by job planning, supervisors should attempt to record this section of the prospect nearer to the end of the job. If this is not possible, consideration should be given to utilization of local indigenous personnel for protection of the crew while within these exclusion zones.

Establishment of exclusion zone distances outside these stated guidelines should be determined thru discussion with the wildlife monitor, site supervisor, HSE personnel, and the Department of Resources, Wildlife Economic Development (DRWED) 867-777-7230.

There are three possible scenarios that are most likely to occur:

1. **A Wandering Bear.** While it is unlikely that a bear will wander onto the prospect and near workers, we must be prepared to deal with this situation. **Any bear seen on the job site will cause an immediate notification of the wildlife monitor, site supervisor, and HSE advisor. In addition, all workers within 500 meters of this animal are to seek immediate shelter within a vehicle or building.** The wildlife monitor shall assess the situation, observe the bear for its intent, and determine a proper course of action to be taken in consultation with the site supervisor. At no time will the bear be approached by any workers for any reason other than at the direction of the site supervisor.
2. **A Located Occupied Den.** Dens which are occupied by a hibernating bear will cause an immediate cessation of work and removal of personnel within 500 meters of the den, and a notification to the wildlife monitor, site supervisor, and HSE advisor. At the discretion of the site supervisor, DRWED may be notified to determine the best course of action to be taken.
3. **Denning Bear Disturbed.** Veri-Illuq understands that disturbing a hibernating bear is unsuitable for both the bear and for the workers. Towards this, **all workers will immediately retreat from the area to a distance of not less than 500 meters and into immediate shelter within a vehicle or building.** This action will cause notification of the wildlife monitor, site supervisor, and HSE advisor. **The wildlife monitor will immediately begin long distance surveillance** outside the 500 meter exclusion zone, and report his/her findings on an hourly basis to the site supervisor. **Additionally, the crew will remain outside the exclusion zone for the remainder of the day of incident plus 24 hours.** This time zone gap will permit the bear to return to its den and to re-enter hibernation stage. **Workers traveling past this point on the prospect after this time frame shall be in the presence of an armed wildlife monitor. At no time after the point of emergence of the bear shall any worker be within the confines of the exclusion zone without an armed escort.**



## **Bear Encounters**

As our first priority, we must ensure that any persons on our sites are properly trained, protected, and operating in such a manner as to prevent bear encounters. However, in the unlikely event that an encounter occurs, the following procedures are to be followed:

- Any time a bear, regardless of type, is seen on the prospect, the crew as an entity and the crew supervisor are to be notified immediately. Any bear sightings should be reported to DRWED (**Inuvik 867-777-7308 and Tuk 867-777-2350 daytime, and cell for after hours in Inuvik at 867-777-1185**)
- The bear shall not be harmed in any way except when it is deemed necessary by the wildlife monitor for immediate human safety. Attempts to dissuade the animal from contact with the workers and the camp will be made with repeated attempts before a decision will be made regarding other more harsher methods such as destroying the bear. This can include the use of bear bangers, the firing of rubber bullets. It is the wildlife monitors job to deter the bear, and other workers should only be involved if their assistance is requested. If the bear is not deterred, with the above methods DRWED may decide to trap and relocate the bear.
- Workers in the camp will proceed and remain indoors until advised by the site supervisor that the situation is resolved. Workers on line will proceed to vehicles and remain inside until advised otherwise by the supervisor.
- If the bear takes refuge underneath the camp or remains within a dangerous distance, DRWED should be contacted for assistance
- Any stand-alone vehicles with workers who encounter a bear are to remain in the vehicle until the animal has left the area. Additionally, notification with the site supervisor is to be made immediately including a GPS location and description of the situation. Vehicles should slowly retreat from the area and the wildlife monitor should be called in to make an evaluation of the situation. For more information see the above topic titled “exclusion zones”.
- Areas identified as probable denning sites or areas found to have a den site on it should be avoided. If the den is found after the work has been partially completed, consideration should be given towards shooting this area last to avoid disturbing the animal. The site supervisor should establish an exclusion zone around the den area, and this is to be communicated to the workers on a regular basis. Additionally, the hazard map and new worker / visitor briefings should reflect this information.

## **Personnel Control / Access**

On the sites being operated, there is a small but present danger from polar bears, grizzly bears, and if workers are exposed in the southern part of the Inuvik region they may also encounter black bears. Towards this, there needs to be protocols established and explained by site supervisors to minimize the hazard.

Typically, both grizzly and black bears will hibernate thru out the winter. However, female polar bears that are pregnant will den all winter. Females who are not pregnant may not den, and male bears will be active all winter.

As this is a relatively low but ever present hazard in these regions, the following guidelines are established for the protection of personnel:

- At no time will any person within the confines of the prospect or employed on the sites approach any bear for any reason including photographic opportunities and curiosity.
- Bears and other wildlife will not be fed or harassed in any fashion by any persons on these prospects.
- All personnel on site will work with at least one other individual, and have at least one operational radio. All workers will be in full awareness of their surroundings and keep an eye out for bears or any other wildlife. Any type of wildlife seen should result in the wildlife monitor being contacted.
- The project manager or site supervisor is responsible for ensuring that all bear sightings are communicated immediately thru out the crew and will determine the best course of action to be taken in consultation with the wildlife monitor. DRWED will be informed as soon as possible.

## **Wildlife Monitors**

The main bear strategies for the wildlife monitors are as follows:

- Assist site supervisors in bringing overall awareness of bears to all personnel on the crew.
- Advise and counsel site management and HSE advisors regarding sleigh camp set up, working locations, and possible bear signs or difficulties.
- In the extreme circumstance where life or limb is in acute danger, the monitor will take extreme action with their weapon to protect human life. If there is no other option, the monitor will destroy the bear. At no time will the monitor destroy wildlife which is not an immediate threat.
- Routine and regular daily tasks will include observations for bears within the confines of the prospect. This will include but will not be limited to visual searches, advanced scouting for work areas, and any other tasks assigned by the site supervisor.

## **Denning**

It should be discussed with personnel about the area that that polar and grizzly bear dens could be established by the animals wherever there is a change in the relief enough to get accumulation of snow. This includes small ridges, pingos, pressure ridges, and any small depressions in the overburden. If there is a requirement to detour around areas of relief, it is better to take the southern route as bears tend to den on southern exposures. Establishment of exclusion zones must be considered when dens become discovered.

## **5. MISSING MAN OR VEHICLE**

During inclement weather there is the possibility of men or equipment becoming lost in white-out conditions. If this should occur all remaining personnel will be accounted for and will remain in camp until the site supervisor gives further direction. At no time will personnel be sent out in white-out conditions to perform a search. This is to reduce the possibility of further personnel becoming lost. If possible the vehicle guidance/tracking system will be utilized to establish last known co-ordinates and when weather permits a grid type search will commence. Should weather permit both fixed wing and helicopter support would be further utilized in a search at the discretion of the site supervisor.

## **6. ENVIRONMENTAL ISSUES**

### **General Provisions**

The environment today has rapidly become a far more important matter than most people realize. The depletion of some parts of our protective ozone layer, the contamination of great areas of the world's fresh water supply, the ever increasing amount of man-made particles in the air we breathe, and the vast piles of garbage, thrown away with out much concern, are all environmental issues that must be of greater concern to all of us. The NWT and Yukon are very environmentally sensitive areas, and must be treated with a great deal of care to avoid contaminating or damaging this pristine wilderness.

Fortunately, Veri-Illuq operation produces very little if any environmentally unfriendly by-products. While this fact is comforting, we still engage in practises which require the use of some hazardous materials and must also handle some of these materials as waste. Some of our shop procedures may produce harmful vapours from which we must protect our workers and ensure that these vapours are collected and disposed of in an appropriate manner.

In addition to this, we use some materials not necessarily hazardous or toxic that can be recycled.

Transportation of these hazardous materials is covered under the Transportation of Dangerous Goods Act and Regulation of which we are well aware of and competent in the compliance thereof. These same materials must be stored and handled for their intended purpose.

This section will identify the products and procedures, the handling, disposal and recording of results when dealing with hazardous materials. By charting these materials throughout their use, following the remainder and observing their end result, we can best determine who is responsible for handling the process and means of disposal.

Provincial spill clean-up and reporting requirements are more comprehensive and more frequently enforced than Federal or Municipal requirements. These are generally under the Transportation of Dangerous Goods Regulations and Occupational Health and Safety Regulations, both having some specific reporting requirements.

As each jurisdiction has different reporting categories, we must make ourselves knowledgeable of the requirements in each province and territory.



## Penalties

The Canadian Environmental Protection Act (CEPA), in brief states that one of its objectives is to see that land disturbed by our operations must be returned to its "equivalent land capability".

Should an inspector find an operation in default of any of the regulations they may issue an Environmental Protection Order (EPO), which could result in:

- A security deposit being required in an amount sufficient to ensure proper reclamation costs.
- Operations may be ceased.
- Reclamation must be conducted.
- If the reclamation is not satisfactory, forfeit of the security deposit.

When operations are carried out which contravene any sections of the various environmental regulations, as previously noted, restraining orders may be issued for the company to cease further activity. Depending on the seriousness of the breach of such regulations, individuals may be liable to penalties ranging from as low as \$2,000.00 to as high as \$1,000,000.00 for more serious breaches. Such minor offences as making untrue statements in a manifest or unauthorized transportation of waste materials could result in a penalty not exceeding \$200,000.00.

A person who "intentionally causes damage to or loss of the use of the environment, or shows wanton or reckless disregard for the lives or safety of other persons causing a risk of death or harm to other persons" may be liable to a fine.

Fines for corporations can be quite large. These examples are included to indicate the gravity with which we must concern ourselves when dealing with the environment today. We are long past the days of "toss it away" or "sweep it under the carpet". The importance of an effective and active Environmental Committee must surely be understood. This committee must be formed and be comprised of members from all branches of the company. They must be allotted time to become familiar with all the acts and regulations which pertain to Veri-Illuq operations not only in Canada but also in all locations.

If due diligence has been practised in our care of hazardous materials, waste or surplus goods and in the clean up of our everyday operations, following acts and regulations, we cannot be found negligent nor subsequently fined or imprisoned. On the other hand, if due diligence is not part of the standards which we set for ourselves, it is possible for responsible parties to be fined heavily and/or sentenced to jail. These responsibilities follow all the way up to management and directors of a public company.

# **Geophysical Operations Environmental Impact**

Geophysical operations affect the environment in a number of ways; and having knowledge of these issues helps reduce the impact. The following information is to be applied whenever and wherever possible to ensure that we conduct minimum exposure to the environment. This includes applying all procedures and principles from both the governmental jurisdictions as well as industry best practices.

Wildlife and environmental monitors are good sources of information and their opinions and concerns are to be considered by site supervisors when deciding on a course of action on the prospect. If a resolution on site cannot be met during a difference of opinion, the consultation of the HSE personnel and company management is to be involved to ensure that a suitable solution is found.

Measurement of impacts on the environment is to be done on a daily basis, and reporting of anything outside the set standards is to be included in reports to the company, including an incident report within the confines of VIMS.

## **Environmental Sensitive Concerns**

Following are some Environmental Sensitive Concerns that can be addressed at HSE - Operations Meetings and at regular meetings of an Environmental Committee. These concerns must be discussed with crew personnel to keep abreast of current issues.

### **Water:**

Surface and ground water must be safeguarded by careful practices in the field operations. Drinking water reserves, wildlife habitats and recreational usage are based on water quality. These safe practices include the following:

- Checking of all vehicles (regardless of type) for leaks from any source, including fuel, oil and other petroleum lubricants.
- Keeping all POL fuelling areas properly protected from contamination by the use of spill pads, containment areas, and proper procedures, and
- Training and education of site personnel regarding both the sensitivity of the environment as well as proper procedures.

### **Vegetation:**

Disturbance of vegetation may result in subsequent erosion and can raise aesthetic issues. Removing or driving over plant vegetation can also have a bearing on the nesting or feeding patterns of wildlife. In the NWT and Yukon jurisdictions, this will include but not be limited to travelling on established routes and obeying instructions from the site supervisor regarding proper environmental practices.

**Wildlife:**

All personnel must be alert to the presence of animal wildlife when operating on the prospect. Operating procedures may cause a temporary relocation of animals. Special care must be taken to reduce the effect on nesting, feeding and migration patterns. For more detailed information refer to Wildlife Awareness within this section.

**Erosion:**

Erosion is a gradual, natural process caused by wind and water. The rate of the erosion process can be altered by simply driving over and killing vegetation in a desert region. Utilizing proper erosion control measures can reduce the effects to steep slopes, high winds, rapid water flow or freezing conditions.

**Air:**

Two factors that can disturb wildlife and animals are emissions and noise. Properly designed and maintenance procedures can reduce the effects of exhaust and odours release into the air.

**Waste:**

While some wastes can be disposed of on site or in local landfill sites, others may require transportation to an authorized recycling or disposal facility. Wastes can include camp refuse or used oil products. An important concept when dealing with waste disposal is to remember the cradle-to-grave concept. If you produce the waste, you are responsible for it forever. It is important to choose a hauler and a facility that are responsible and reliable. The liability of the company is not minimized or eliminated simply because the waste is no longer in our possession.

In addition, we have a company wide motto that states that "we take only data, we leave only footprints". On these prospects, this is to be the letter of the law. That is to say that no garbage, no POL, and no contaminants of any kind is to be allowed to remain on the site after we have left at the end of the season.

Burnable garbage is to be disposed of in the incinerator, and any recyclable waste is to be properly stored, transported and disposed of in accordance with company guidelines. Personnel unsure of what constitutes proper handling are to see the site supervisor or HSE advisor for guidance.

**Archaeological:**

Archaeological sites are generally of historical or cultural significance. If a suspected site is discovered, crew must not disturb the site and the proper authorities contacted. Until a

resolution or determination of the status of the site is completed, encroachment into the area is forbidden.

## **Land Operations**

### **Start Up:**

Environmental issues must be discussed at the job start up safety meetings. Issues will include, environmental planning, reporting procedures, emergency response plan, and site-specific sensitive areas within the prospect along with operating procedures.

### **Clearing:**

When clearing areas for geophysical operations, whether preparing helipads, lines, access routes, the objective is to have a safe working environment for personnel as well as minimizing our impact on the environment.

### **Hand Cut Lines:**

Work planning should be done to minimize the width of a cut line and the amount of vegetation disturbed. Snags must be cut to prepare a safe working environment. Snags that are discovered to have a wildlife value (nests, animal habitation) must be left and a “no work area” around the tree created. Fire prevention measures must be adhered to.

### **Access Roads:**

Utilize existing routes as much as possible. Isolated trees or stands of vegetation should be left undisturbed if possible. (To minimize timber loss, skid access routes around these areas.)

Keep the width of the access route to minimum, especially at river crossing. Take particular care not to block or cause further erosion at river crossings.

### **Helipads:**

Use existing or natural clearings rather than clearing new ones. Plan helipads in areas with the least amount of vegetation, use hilltops, or next to water bodies.

## **Recording Crew Operations**

Line truck drivers must only drive on designated routes and roads. Attention to fire prevention in the form of only smoking in designated areas for non-heli-portable operations and no smoking requirements for heli-portable operations. Progressively clean up lines, shot holes and staging areas, remove all debris, garbage, pin flags, survey stakes, flagging etc.

### **Air Travel:**

Flight paths and approaches must be planned to minimize stressing wildlife and people. Aircraft must be kept an appropriate distance from sensitive wildlife areas, cliff faces where nesting birds or animals may be.

## **Shot Holes**

Ensure shot holes are deep enough and small enough to prevent the hole from cratering. Do not drill holes deeper than the permit regulations. Ensure that offsets are in accordance with regulations when used at structures and water bodies. Clean all debris from the shotpoint location, and adequate measures must be taken to smooth out cuttings.

Crews utilizing vibrators as an energy source must ensure that no environmental damage occurs from POL spills such as blown hoses or leaking equipment.

### **Wet Holes:**

Backfill wet holes to just above the standing water to protect aquifers. (Use loading poles to ensure proper backfill.) Other authorized methods may be used to fill the remainder of the hole in accordance with jurisdictional regulations.

### **Flowing Holes:**

Attempt to plug the flowing hole immediately, and notify the site supervisor, who will then notify the proper authorities. If the flow is too great for backfilling procedures, an inflatable plug can be placed at the top of the aquifer to stop the flow.



# **Hazardous Materials**

## **Fuels and Oils:**

### **Storage**

In all instances fuel storage areas will have a spill containment system in use, which will protect soil and ground water. Fuel storage facilities must be kept a minimum of 100 metres and downhill from any body of water where possible. Storage areas must be located on stable terrain or in natural depressions separated from water. Secondary containment systems such as a berm which can contain 110% of one container and any rainfall will be utilized on all sites north of the 60<sup>th</sup> parallel.

Fuel containers must be inspected routinely for leaks; and deficiencies must be reported to the person in charge for speedy corrective measures. Fuel trucks must have a valve located between the output of the tank and the fuelling hose to enable the operator to isolate a leak.

### **Lubricating Oil**

Lubricating oil must be recycled in accordance with local and company regulations and practices. At no time will POL come in contact with the ground.

### **Refuelling**

Refuelling operations must be done so that there is no spillage. Avoid refuelling near streams or lakebeds. Place drip pans or absorbent materials under leaking or unsealed connections. Do not fill vehicles or tanks to a maximum capacity; leave room for expansion or vehicle movement.

The fuel handler must never leave the refuelling operation while it is progress.

All mechanics must take measures to utilize a secondary catchment system, sheets of plastic placed under the vehicle or sufficient drip trays must be used.

## **Leaks and Spills:**

Tools and materials must be available to employees to clean up any spills or drips. After cleaning up a site mark it on the map for follow up inspection. Waste fuels, oils, lubricants, hydraulic fluids, solvents and certain paints must be stored in their properly labelled containers. Mechanics should be encourage to substitute and use less hazardous chemicals

Proper catch precautions must be utilized, drip pails, absorbent materials, leak free hoses and connections.

CFC (chlorofluorocarbon) products and aerosol propellants should not be used, except with refrigeration equipment where a closed recovery recharge system is employed.

Remediation work for all Provinces and Territories must include an immediate response to take corrective actions to stem, restrict, or contain the flow or spill. Steps must be taken to return the spill site to its previous condition or within the jurisdictional guidelines.

## Wildlife and Livestock

The interaction between geophysical operations and animals can vary greatly depending on the area of operation and the kind of animal. There are times of the year when wildlife is more sensitive to our operations. Such times include mating, birthing, denning and spawning.

Stay clear of wildlife areas marked on the hazard identification map to avoid denning, nesting, spawning, migration and feeding areas.

Hunting and trapping of animals by any workers is strictly forbidden. Wildlife must only be destroyed if it threatens the workers safety and then only when all other deterrents have been exhausted. Crew members should not purchase wildlife killed for consumption or souvenir made from animals which would encourage locals to exploit wildlife.

Precautions must be taken to avoid putting wildlife or livestock to flight. **Intentional harassment of animals is not permitted.**

No pets of any kind are permitted to be on the crews.

## Environmental Responsibilities

The following Environmental Responsibility Chart covers all commodities that Veri-Illuq handles. Of those commodities the only ones of great volume are petroleum fuels. While this is covered under the Transportation of Dangerous Goods Act, there are situations such as the following incident:

### Scenario

A 20,000 litre fuel sloop has been brought in for the helicopter contractor. All of the regulations seem to be adhered to but the camp site slopes towards an unnamed creek. The creek is well off in the dense bush and does not appear to present a problem as the access road and program do not cross this creek.

Setting up the large tanker poses no problem. Regulations require a berm to be placed around the fuel sloop so the cat hired for the job proceeds to build a berm by pushing frozen earth up around the tank, but in the process the edge of the blade gets too close to the piping and cracks the threads opening the 4" pipe which allows jet fuel to spill. In a

panic to get back from the fuel that is spraying up the cat makes a manoeuvre that sprays fuel up onto the hot manifold that starts a fire.

The cat operator, already very close to the burning fuel jumps off the cat and runs for help.

- the fire extinguisher on the cat cannot be reached
- the fire extinguishers for the fuel sloop are not set up yet
- the berm is not completed and burning fuel pours downhill towards heavy brush and a creek
- the helicopter is not at the site yet
- the only fire extinguishers available are 100 meters away at camp.

At this point fire extinguishers are not of any use as the fire is too big. The source cannot be turned off as the pipe is broken on the supply side. A heavy stand of spruce trees is ready to catch fire and if the surplus fuel doesn't burn it will drain into the creek.

The likelihood of this happening is not great. Equipment damage, lost lives, burnt timber and pollution of the water is all possible.

We could learn many things from this scenario:

1. Locate fuel sloops/tanks in a level area where there is no possibility of a spill flowing into a watercourse.
2. Have fire-fighting equipment nearby and available as soon as the fuel is on-site.
3. Use bladder type dykes that will work in freezing conditions.

Insurance is bought to cover our company from losses greater than is encountered in everyday business. We are the insurance to cover the company from extreme loss. We have been trained to fight forest fires prior to conducting heli-portable operations in the spring. We must include training and planning for the unexpected, and we must prepare for prevention of extreme loss.

There is one other way we can prepare for loss of petroleum products from our equipment. Line trucks, vibrators and other vehicles as well as sub-contractors all have oil leaks to some degree, particularly on hydraulic systems. Effort must be made to clean the equipment more frequently and replace worn parts.

## **Recyclable Responsibilities**

It shall be the responsibility of the supervisor in each of the office and shop departments to determine the dollar value of waste materials, make arrangements for either pick up or delivery of these products and obtaining the best price for that product, if a value can be negotiated.

Those office and shop supervisors shall determine, by talking with the RCM and/or coordinator and mechanics if there is sufficient value in the field generated recyclable

materials to warrant shipping them into Calgary or whether it would be more cost efficient to dispose of the waste in rural deposits, such as UFA Co-ops.

**Note: It is not sufficient for Veri-Illuq or our appointee to deliver our waste to a collection point and assume that they will handle our waste correctly. It is our obligation to determine whether those who accept our waste are handling this material in an environmentally correct manner.**

If this field/office co-ordination cannot be accomplished, someone must be appointed to research the cost efficiency to make a determination.

An Environmental Disposal Form is enclosed which is to be submitted by each crew, office and shop along with other monthly reporting to the HSE Manager. This report can easily be estimated by the co-ordinator of each crew and a supervisor in the office and shops, which indicates the quantities recycled. If, for example, a product such as waste oil is only picked up once in six months, report it only as picked up, not as dumped into a collection container. The report should reflect only the final disposition of a product as far as Veri-Illuq is concerned.

Some shop processes produce hazardous vapours that must be monitored both for hazard to workers and hazard to the atmosphere.

At no time is any waste product to touch the surface of the ground. Mechanics, for instance, must use spill pans and absorbent pads when changing oil on trucks. Fuelling points must have preventative measures in place to stop leaks and spills from contaminating the overburden, or waterways. All recyclable products must be returned for proper disposal. Our goal is to leave Mother Earth healthy.

## Emergency Spill Response

At Veri-Illuq, one of our goals is the protection of our employees, the general public, the waterways, water tables and general land areas from harm. The environment and the ecosystems are very fragile, and in the event of an uncontrolled release we need to ensure that we limit the environmental damage to the smallest amount possible. Furthermore, the key to limiting damage is **prevention**. This is conducted by jobsite inspections, frequent audits of crews and equipment, training, and general observations of areas that will be most impacted if an uncontrolled release occurs.

Spill response is not limited to special training for certain individuals. It is the responsibility of all employees to understand the basic methods of preventing, controlling, cleaning up, and reporting of spills. Anytime that there is a spill, there are hazards to both the environment and to our workers. These hazards can be devastating if the chemical involved is not stopped at the source, controlled at the flow, absorbed where able, and impact assessed prior to and after the fact.

Under the Canadian environmental protection act, we must show that due diligence was utilized if a spill occurs. This means that by law we must do everything that a reasonable person would do under similar circumstances. For example, if a leak occurred in a fuel bowser at staging, you would need to plug the leak with any means available, build a berm around the bowser, put absorbent pads on the chemical, and notify the proper environmental authorities and other regulatory boards as necessary.

In addition, it is against the law to withhold information, or give wrong or misleading information to an environmental protection officer. These individuals are special constables, and they have enforcement powers that are designed to deter individuals who are unwilling to cooperate in an investigation. Therefore, the following will be a regulated practice at Veri-Illuq:

### **ASSISTANCE AND FULL COOPERATION WILL BE GIVEN TO ENVIRONMENTAL**

### **PROTECTION OFFICERS AT ALL TIMES DURING AN INVESTIGATION**

Preparation and planning in the advance stages of our operations play a crucial role in determining the amount of damage that occurs to the environment if an uncontrolled release occurs. Take for instance, the fuel sloop at one of our camps. If the sloop is placed away from a creek or stream, the amount of damage that would occur from a spill would be significantly different than if the same sloop was placed on a high slope that runs into the water course.

# **Spill Response Primary Objectives**

There are **four primary objectives** when dealing with an uncontrolled release of hazardous substances. They are, in order of importance and sequence of handling:

## **SAFETY OF PERSONNEL**

## **RESCUE**

## **SPILL CONTROL**

## **ENVIRONMENTAL CONSERVATION**

### **Safety of Personnel**

Nothing that we do in emergency spill control is as important as the safety of the individuals involved in the incident. At Veri-Illuq, if any portion of the response procedures is dangerous to the safety or well being of the worker it will not be conducted. That is to say, if a plan needs reworking, this will be conducted prior to proceeding.

### **Rescue**

Any personnel who may have been injured due to a spill need to be removed from the area immediately, keeping in mind the anatomy and severity of the injury. You should remember that the hazardous material involved may be dangerous to the injured worker, or dangerous to the type of rescue and material used.

### **Spill Control**

Spill control methods utilized are to be concerned with protecting people, the waterways, the water tables, and all other aspects of environmental conservation. This means that we need to do everything possible to stop, control, and clean up any releases to minimize the danger and subsequent problems after the fact. Proper techniques in spill control are to be taught to personnel on crews, and this information is to be disseminated to new workers as soon as possible after arriving on the crew.

### **Environmental Conservation**

Efforts at spill control clean up are concentrated upon protection of the workers, the environment, and limiting the amount of damage to the area. Workers should have the phone contact numbers of appropriate agencies on site at all Veri-Illuq jobs to facilitate their ability to receive proper, knowledgeable assistance from various professionals.



## **Hazardous and Recyclable Products**

Anytime that we have hazardous or recyclable wastes they have to be sent to the proper facility for either disposal or recycling as the situation dictates. In either case, the shipper must receive the **two** documents that are generated during this process. The first one is from the company that is transporting the product from our site. This document will show the name of the shipper, the type and quantity of the chemical, and the date of pick-up. The second and most important paperwork is from the receiver, which is the end recipient of the product. This document will show that the chemical that was sent from you via the carrier, and that they have received it as stated. If at this point you have received both these documents, we have met the requirement for due diligence and are able to show that our waste product has been handled properly to the best of our knowledge.

Occasionally the carrier and the receiver of the product is one and the same. This does not release our responsibility to having to receive both documents. Again, we must show that the product has either been recycled or disposed of in a proper manner. These waste chemicals belong to us from cradle to grave, and therefore we must ensure that they are handled properly. Irrespective of what the shipper may tell you, we must receive both documents, and these are kept on file for two years. While this is not a regulation specific to the Canadian Environmental Protection Act, it is required under the Transportation of Dangerous Goods Act.

## **Spill Reporting Quantities**

There are spill-reporting quantities that are included in this section, but there are also requirements for who is to report this. They are:

- a) the person who releases or causes or permits the release of the substance
- b) the person having control of a substance that is released (unless they have reasonable grounds to believe that the spill has already been reported)
- c) a police officer or employee of a local authority or other public authority who is informed of or who investigates a release of a substance (unless they have reasonable grounds to believe that the spill has already been reported), and
- d) an employee of a local authority or other public authority.

In addition to the reporting quantities, we need to report any quantity of spills that may have an adverse effect or has the potential to cause an adverse effect. This also includes any quantity if it enters the water tables or waterways.

# **Release Reporting**

## **When to Report the Release**

The release should be reported as soon as a person knows or ought to have known of the release. This means that at the first available opportunity, not when it is convenient and the emergency has been handled.

### **NORTH WEST TERRITORY**

Environmental 24 hour Spill Reporting (867) 920-8130

National Energy Board, John Korec, Chief Conservation Officer (403) 292-6614 (w)  
(403) 275-6256 (h)

### **YUKON / INUVIK**

Environmental 24-hour Spill Reporting (867) 667-7244

## **SPILL REPORTING QUANTITIES**

<b><u>CLASS AND DIVISION</u></b>	<b><u>QUANTITY OR LEVEL</u></b>
1	ALL
2.1	AT LEAST 100 L *
2.2	AT LEAST 100 L *
2.3	ALL
2.4	ALL
3	AT LEAST 200 L
4	AT LEAST 25 Kg
5.1	AT LEAST 50 Kg OR 50 L
5.2	AT LEAST 1 Kg OR 1 L
6.1	AT LEAST 5 Kg OR 5 L
6.2	ALL
7	ANY DISCHARGE EXCEEDING 10 mSv/h AT PACKAGE SURFACE AND 200 mSv/h AT 1 METRE FROM THE PACKAGE SURFACE
8	AT LEAST 5 KG OR 5 L
9.1	AT LEAST 50 Kg
9.2	AT LEAST 1 Kg

**NOTE \* DENOTES CONTAINER CAPACITY**

**NWT, Yukon, Inuvik all have a zero tolerance policy on any spill amounts. They must be reported to the Chief Conservation Officer of the National Energy Board, and the Environmental 24 hour spill reporting number, both found on the release reporting form.**

## **SPILL CONTROL COMMAND FUNCTIONS**

There are 10 basic command functions that the spill response team will utilize to help them to control and clean up a hazardous substance release:

- 1) Establish a command position
- 2) Quickly ascertain the details of the incident
- 3) Establish communications with radios and telephones
- 4) Determine and establish a safety zone
- 5) Organize groups, and develop an attack plan
- 6) Utilize command from the Standard Operating Procedure framework
- 7) Study, assess, and rework the plan as necessary
- 8) Orchestrate the plan with the senior Veri-Illuq employee on site
- 9) Solicit and commission additional units as required
- 10) Return to first position and terminate attack / defence posture

After the spilled chemical has been identified, the following information is to be determined and documented from the MSDS:

- 1) Physical and chemical characteristics
- 2) Physical hazards of the chemical
- 3) Health hazards and signs & symptoms of exposure
- 4) Routes of entry into the body and maximum exposure levels
- 5) Reactivity hazards
- 6) Environmental concerns

## **7. FIELD ERP**

As every work group with Veri-Illuq has at least one hand-held radio and every vehicle has a crew radio, make sure every employee/subcontractor is instructed in radio use and protocol. A radio call will put you in immediate contact with a superior who can direct you in a solution to your emergency. (See RADIO COMMUNICATION Section in this manual)

Every vehicle is provided with a current *Emergency Response Plan* updated for each location. If you are the operator of that vehicle, ensure that the latest ERP is posted on the sun visor of the driver's side. You can obtain a copy of the ERP from the field office, co-ordinator, or recorder.

If an incident occurs involving serious personal injury or vehicle collision or upset, the severity may govern the actual procedure to follow. This is a general guide:

- 1) If an emergency, break in by stating, "This is an emergency." (If an extreme emergency the call is, "MEDIC, MEDIC, MEDIC ". This is \_\_\_\_\_ and state the problem.) **ALL RADIO COMMUNICATION WILL CEASE IN THE FIELD AT THIS TIME AND ALL PERSONNEL WILL STOP WORKING UNTIL THEY ARE GIVEN FURTHER DIRECTION** (for bears the call is "bear bear bear").
- 2) Attend to the injured, remove from danger if possible, render first aid, and keep warm.
- 3) If a fire is involved, only attempt to put it out if you are trained in fire protection and you are not at risk.
- 4) Contact your supervisor for more instructions.
- 5) Secure the area.

Once the field crew supervisory people have been notified they will follow the next reporting sequence:

- 1) Notify the H.S.E. Manager.
- 2) Notify the appropriate Operations Supervisor.

The Project Manager, Recording Crew Manager or Clerk will determine from information supplied whether to contact the following:

- 1) The nearest ambulance and medical facility.
- 2) Alternate helicopter and/or air Medevac service.
- 3) Other local industrial first aid, ambulance or helicopter.
- 4) Local Police or RCMP.
- 5) Fire department, Forestry, Environmental Agencies or any other state departments as may be applicable for the incident and area worked.

- 6) The nearest WCB, OH&S or other agency if the injury is of a serious nature or in the case of a fatality. **NOTE: This will be done by the H.S.E. Manager.**

**When we have a First Aid Attendant on the project they will be called at the outset and the Attendant will be able to assess the situation and will determine the next required action to take.**

If you arrive at the scene of a vehicle collision where injuries have occurred, Veri-Illuq encourages you to stop and offer assistance.

Should this situation happen to you.

- 1) Pull your vehicle off to the side out of harms way and turn on your beacon and four-way flashers about 300 ft (100 m) from the incident site. Do this on both sides if two vehicles are available.
- 2) Leave a flag person with safety vest to control traffic.
- 3) First aid trained persons are to proceed to the injured and offer help.
- 4) Radio for local police and/or ambulance service as is necessary.
- 5) Continue to offer assistance as long as needed or until relieved by authorities.
- 6) Notify your superior of the situation as soon as convenient.

## **8. HOTEL, MOTEL AND CAMP ERP**

The Field Clerk will always keep a record of rooms that personnel and visitors are assigned. Do not change rooms without making corresponding changes to records.

Like all buildings, hotels, motels and camps can have fires. Plan what to do when you check in. You won't have time to plan during a fire.

**When you arrive at a camp, motel, hotel or any type of accommodation, always make yourself familiar with the location of all fire fighting equipment, fire alarm pull stations and emergency exits.**

### **HOTEL AND MOTEL:**

- 1) Find two exits nearest your room. Be sure they are unlocked and unblocked. Count doors between your room and exits so you'll have a reference point if it's smoky.
- 2) When you hear an alarm, act, don't investigate.
- 3) If fire is in your room, get out and close the door. Once out, report the fire. Pull fire alarm and/or shout "FIRE-FIRE-FIRE".
- 4) If the fire is not in your room, leave if you can. First, feel your door. If it is cool, open it slowly and go to the nearest exit. Crawl in smoke. Fresh air will be at the floor. Take your key so you can go back if you can't use your exits.
- 5) Never use elevators during a fire. They could stop at the fire floor.
- 6) If your room door is hot, don't open it. Your room may be the safest place to be. Seal all cracks with wet towels, shut off fans and air conditioners. Signal at your window. Call the fire department and wait to be rescued.
- 7) **Take adequate clothing for protection from the elements and gather at the MUSTER AREA to allow for head count.**

### **CAMP RESPONSE PROCEDURE:**

- 1) Pull fire alarms and/or shout "FIRE-FIRE-FIRE". Continue this throughout entire camp yourself or assign to another person.
- 2) Assess fire and attempt to extinguish with available fire extinguishers.
- 3) **If unable to extinguish or contain the fire, an evacuation and head count procedure must be instituted.**

### **BUILDING EVACUATION:**

- 1) Remove people from each room in an orderly manner, closing windows and doors when leaving.
- 2) If room is smoke filled, don't panic, lower yourself to below smoke level (breathable air at floor level) and creep or crawl to nearest exit.



- 3) If exit door is hot, do not open. Exit through other door or window.
- 4) **Take adequate clothing for protection from the elements and gather at the DESIGNATED AREA to allow for a head count.**

**EMERGENCY RESPONSE TEAM:**

**The Emergency Co-ordinator will assign person to:**

- a) check all buildings and rooms to assure all have been vacated;
- b) take a head count and institute a search if everyone is not accounted for;
- c) assign people to remove vehicles if they are at risk;
- d) cut power and propane supply to buildings on fire or at risk; and
- e) extinguish or contain fire only if minimal personal risk is involved.

**MEDIC:**

- 1) Report to office and await instructions from Emergency Co-ordinator.
- 2) Treat any burns or related injuries.
- 3) Plan evacuation of any injured to the hospital if necessary.

**CLERK:**

- 1) Assure that head count is accurate and account for all personnel.
- 2) Radio/phone for fire fighting assistance from outside sources, fire department or other nearby camps or industrial operations.
- 3) Advise company/client through regular channels as soon as appropriate when local situation is under control.

**NOTE: Smoking in bed may be your last resting place.**

## **9. HELICOPTER ERP**

When a helicopter must set down because of an emergency the following procedures must be observed.

- 1) Follow orders from the pilot.
- 2) Tighten your belt. Remove and secure your glasses, dentures, pens and other personal items. Note the location of life rafts and survival kits. Be prepared to deploy them should the pilot not be in a position to do so.
- 3) Select an orientation point. This should be a fixed part of the helicopter such as the bracing underneath the seat. Grasp this tightly during an emergency so that you will maintain a reference point. This cannot be a moveable part such as a door handle.
- 4) Brace for impact. Stay strapped to the helicopter seat. Keep one hand firmly on your seat belt, near the buckle, not on it. Keep the other hand on your orientation point.
- 5) Wait for the pilot's command to open windows or doors. Do not attempt to exit until the blades have completely stopped.
- 6) Should the pilot be unconscious or unavailable to take command, the most senior person will take charge. Survival becomes an individual responsibility. DO NOT pan or hamper the survival of others.
- 7) Be prepared to assist others who may be disoriented or incapacitated. Remove everyone from danger and commence first aid as necessary.

# **10. DANGEROUS GOODS ERP**

An incident involving dangerous goods is any leak or loss of containment that may present a hazard to the safety and health of our workers, the public or the environment.

- 1) If the escaped dangerous goods might burn, explode or cause breathing problems, remove all persons to a safe distance.
- 2) Attempt to eliminate the escape of dangerous goods from the source. For example, close valves, plug leak, collect spilled product, if it can be done without risk.
- 3) Contact your Project Manager or Recording crew Manager if you are in doubt about a containment or clean-up procedure or if the situation may become out of control.

As a reminder, workers are to ensure that if they are operating with dangerous goods over the 454/500 rule they must comply with the TDG act and regulations.

## **Bottled Compressed Gas Release - Cautions**

- 1) Propane and Acetylene escaping may burn or explode.
- 2) Nitrogen does not burn nor does it support combustion.
- 3) Oxygen does not burn but supports combustion.
- 4) All escaping liquids can cause severe frostbite.
- 5) If possible without risk, turn off leaking valve, turn bottle to allow gas rather than liquid to escape.
- 6) Excessive quantities of all gases could asphyxiate.
- 7) Remove all bottles from a fire if possible and not hazardous.
- 8) Cool any release gases with water spray, not stream.
- 9) Withdraw from area if leaking gases cause a rising sound.
- 10) Vessels may explode and ruptured vessels may rocket. Stay away from vessel ends.
- 11) In battery acid spills, the fumes are toxic. Ventilate the area. Flood spills on skin with generous quantities of water. Go to eye-wash station for splash on eyes and use as directed. Dilute all contaminated areas with lots of water. Handle batteries and containers with neoprene gloves. Dispose of used batteries and acid in an approved manner.

## **Dangerous Goods Spill Emergency Contact**

N.W.T. Emergency Measures Organization (403) 873-7554  
Yukon Environmental Protection and Assessment (867) 667-3436

## **Hazardous Waste**

In addition to "Dangerous Goods" or "Hazardous Materials" we also deal with a considerable amount of what we term collectively as "Hazardous Waste."

This will include used motor and transmission oils, gear oils, hydraulic and brake fluids, anti-freeze and cleaning solvents, etc. These waste materials cannot be spilled on the ground or into domestic or storm drains. They must be contained, marked clearly and disposed of legally at sites authorized to accept these materials.

It will be the responsibility of the site supervisor or his appointee (i.e. the mechanic) to determine where and how hazardous wastes may be legally and properly disposed of in each area worked.

Incidents concerning an emergency involving Dangerous Goods release or injury must be reported to the Director General Dangerous Goods in Ottawa on a Schedule IX Form 2 report within 30 days of the occurrence.

The Environmental Disposal Form must be completed at the end of each month. Therefore, it is necessary to keep notes of the disposal of all such waste material for accurate reporting.

# **11. EXPLOSIVES ERP**

If an incident involving explosives occurs which has the potential to inflict serious injury or considerable damage, the following procedure must be implemented:

- 1) Attend to the injured, remove from danger if possible, render first aid, treat for shock, keep warm.
- 2) Put out the fire if possible and you are not endangered.
- 3) Remove all persons to a safe distance and secure the area.
- 4) If the vehicle containing explosives is burning, consider that it will burn to detonation and maintain a minimum distance of 300 meters as well as protecting people from possible flying projectiles.
- 5) Notify the Project Manager of all details.
- 6) Ensure that the local RCMP, fire department and medical facility are notified.
- 7) Ensure that OH & S/WCB and the Federal Chief Inspector of Explosives are notified.
- 8) Ensure that management and the client are notified.
- 9) Notify CANUTEC at (613) 996-6666 if necessary. **DO NOT ATTEMPT TO RETURN TO VEHICLES UNTIL THE FIRE IS OUT AND IT HAS COOLED DOWN. THIS MAY TAKE SEVERAL HOURS AND GUARDS MUST BE MAINTAINED AT THE SITE UNTIL THE EXPLOSIVES (OR REMNANTS) HAVE BEEN REMOVED BY QUALIFIED PERSONNEL.**

A Dangerous Occurrence report (Schedule IX Form 2) must be filed for such an incident within 30 days of occurrence.

If necessary, the following list of explosives distributors will put you in touch with someone who is well qualified to advise you about the characteristics of the specific explosives you are dealing with:

Ace Explosives	(403) 291-4300
Austin Powder Co.	(403) 243-5566
Explosives Limited	(403) 255-7776
Western Explosives	(403) 236-9160

**Contact the Veri-Illuq Manager of Safety in the event of any incident concerning explosives or any irregularities concerning quality, packaging or product count.**

## **12. FOREST FIRE ERP**

All personnel working on heli-portable operations in B.C. will have been trained in basic forest fire fighting. Similarly most persons working in other forest areas will have had fire fighting training also. Fire fighting equipment will be kept at staging areas.

When a fire is spotted or suspected:

- 1) Radio your site supervisor and give the details and location.
- 2) Notify the helicopter to divert his activities and assist where directed.
- 3) Notify Forestry or other applicable government agency.
- 4) Establish a "Fire Captain" and organize an assault on the fire, establish fireguards and/or secure the area as applicable.
- 5) Do not allow single persons to fight fires or send a crew without maintaining radio contact.
- 6) During all fire fighting operations, keep a constant inventory of all personnel. Do not allow individuals or groups to get caught in backfires or dead ends. At day's end or shift changes, double-check all head counts.
- 7) Co-operate with Forestry or Land Use officials as directed.

The following numbers apply for fire reporting:

N.W.T.	1-800-661-0800
Yukon	1-888-798-3473



## **13. EMERGENCY CONTACT NUMBERS**

The following is a compilation of emergency numbers that are useful in the event of an incident that is not normally encountered. Additional numbers can be found on the site specific ERP:

<b>Spill Reporting (NWT)</b>	<b>(867) 920-8130</b>
<b>Spill Reporting (Yukon and Inuvik)</b>	<b>(867) 667-7244</b>
<b>TDG Spill (NWT)</b>	<b>(403) 873-7554</b>
<b>TDG Spill (Yukon)</b>	<b>(867) 667-3436</b>
<b>Forest Fire Reporting (NWT)</b>	<b>1-800-661-0800</b>
<b>Forest Fire Reporting (Yukon)</b>	<b>1-888-798-3473</b>

# DEFINITIONS

The following definitions are provided as a source of information for all levels of employees to utilize. This is not an exhaustive compilation of HSE terminology but rather it specifically addresses this document.

**CEPA:** Canadian Environmental Protection Act. This act is applicable in the NWT.

**HSE Advisor:** Health, Safety, And Environment Advisor. This is the designated individual who assists both site supervisors and parent company management with the day-to-day safety operations on the site. While the site supervisor is ultimately responsible for the overall safety on the site, the HSE advisor will be delegated some day to day routine tasks to assist the crew.

**POL:** Petroleum, Oil, And Lubricants. These are refined hydrocarbons which come in liquid and semi-solid forms and are typically used in the operation of vehicles, aircraft, and other forms of operating machinery.

**Site Supervisor:** This term specifically refers to the senior Veri-Illuq management person whom is responsible for the overall operation on the site. Normally this is the project manager, but in his absence it is his delegate or other supervisory person who is trained and capable of forming appropriate decisions on behalf of the company.

**SOP:** Standard Operating Procedure. This is a standardized method of conducting operations with regard to similar situations on different operating sites

**TDG:** This is the transportation of dangerous goods, and references the applicable federal act and regulations under the same name.

**454 / 500 Rule:** This rule under the TDG act and regulations delineates that any vehicle carrying 454 litres or 500 kg of dangerous goods is required to comply with the act.

**Exclusions Zones:** These are areas that are designated as no enter areas for crew members due to a bear difficulty within the designated confines.



**AEC**

**ALBERTA ENERGY COMPANY**

**FUEL & OIL SPILL  
CONTINGENCY PLAN**

**for the**

**AEC WEST LTD. KAMIK 2D**

**SEISMIC PROGRAM**

**2001-2002**

# **FUEL AND OIL SPILL CONTINGENCY PLAN NORTHWEST TERRITORIES**

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## **INTRODUCTION**

### **Purpose of Plan**

The purpose of this plan is to provide a safe response strategy should a fuel or oil spill occur. This action plan provides a response to protect human life, to minimize the environmental effects, and to follow proper procedures of a cleanup operation.

AEC has contracted Veri- Illuq, of Inuvik, to conduct this seismic data acquisition program. Contact names and numbers listed in this document are primarily those of the prime contractor, Veri-Illuq

The crew conducting this project is using approximately 10,000 litres per day. The fuel, which is carried in fuel sloops mounted on sleighs, moves with the crew from one location to another every 2-4 days. This document, including Appendix I, applies to this present method of conducting operations. In the event that a stationary camp is used, spill containment methods as described in Appendix II will be utilized.

### **Exploration and Support Program Description**

Project Name: AEC West Ltd. Kamik 2D Seismic Program

Stage Area: Veri-Illuq facilities in Inuvik, NT

Location of Fuel

Transfer Sites: Latitude: N69° 00.554'  
Longitude: W133° 44.383'

Latitude: N69° 09.931'  
Longitude: W134° 13.804'

Fuel Delivery: Ongoing

Administration: Veritas DGC Land  
2700 – 61<sup>st</sup> Ave S.E.  
Calgary, Alberta  
T2C 4V2

Phone: (403) 257-6700

## **FUEL AND OIL SPILL RESPONSE EQUIPMENT**

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### **SLEIGH CAMPS**

The following small inventory of oil spill response equipment will be maintained at the sleigh camp locations and fuel transfer sites:

- 1 3" Fuel transfer pump c/w hoses, couplings, etc.
- 1 Roll of Sorbent Blanket
- 4 Non-steel scoop shovels
- 2 205 litre empty drums with lids off
- Plastic sheeting for lining dikes
- Dump truck-probably contracted

### **Summer Equipment**

- Oil skimmer
- Oil spill containment booms

### **Logistic Support**

Crew Equipment:

- 4 x Caterpillar D7 Dozers
  - 3 x Caterpillar D6M Dozers
  - 1 x Caterpillar Challenger Dozer
  - 1 x Caterpillar 977 Utility Dozer
  - 3 x Nodwell FN 60
  - 8 x Nodwell FN 110
  - 1 x Chieftan Recording Unit
  - 2 x Foremost Delta 3 (1 fuel hauling unit only, 13,600 litre capacity)
  - 5 x Vibrator Units
-

4 x Fuel sleighs, each equipped with two, 10,000 litre tanks. A spill containment tub has been constructed below the tanks with a capacity of 110% of the total volume.

1 x 60-man Camp

6 x Snowmobiles

### **Fuel Delivery and Transfer Description**

The fuel will be trucked from Inuvik to the fuel transfer site via the winter road. Bulk fuels will be off-loaded by means of a hydraulic pump and a hose between the fuel truck and the fuel transfer sleigh or Delta 3. The fuel is transported to the camp by the Delta 3.

- |           |   |   |
|-----------|---|---|
| Delivery: | 1 | 16,000 liter Fuel Truck transporting fuel from Inuvik to Fuel Transfer Point.   |
|           | 1 | Foremost Delta 3, Super Terra Tire Units, weight 15,000 Kg., ground bearing pressure 8 lbs. Per square inch, transporting fuel from Fuel Transfer Point to camps. |

Each fuel supply vehicle or bowser should be equipped with spill kits containing a 30 or 40 gallon container, sorbent, non-sparking safety shovels, personal protective equipment and a spill response pocket guide.



## CONTACT LISTS

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### Government

NWT	24 Hour Spill Line	(867) 920-8130 (867) 873-6924 (fax)
ILA	Tuktoyaktuk Hans Arends <i>Land Administrator</i>	(867) 977-2202
DIAND	Inuvik Rudy Cockney <i>District Manager</i>	(867) 777-3361
DIAND	Inuvik Rob Walker <i>Resource Management Officer</i>	(867) 777-3361
GNWT	Yellowknife <i>Environment Protection Services</i>	(867) 873-7654
N.E.B.	Rick Turner (Occupational Safety & Health) E-mail: <a href="mailto:rturner@neb.gc.ca">rturner@neb.gc.ca</a> <i>Operations Inspector</i>	(403) 299-3868 (office) (403) 257-0840 (home)
	Rick Fisher E-mail: <a href="mailto:rfisher@neb.gc.ca">rfisher@neb.gc.ca</a> <i>Operation Specialist</i>	(403) 299-2798 (office) (403) 220-0893 (home)
	Chris Knoechel E-mail: <a href="mailto:cknoechel@neb.gc.ca">cknoechel@neb.gc.ca</a> <i>Petroleum Engineering Specialist</i>	(403) 299-3866 (office) (403) 241-0047 (home)
	Andrew Graw E-mail: <a href="mailto:agraw@neb.gc.ca">agraw@neb.gc.ca</a> <i>Drilling Engineering Specialist</i>	(403) 299-2790 (office) (403) 547-3073 (home)
	John Korec E-mail: <a href="mailto:jkorec@neb.gc.ca">jkorec@neb.gc.ca</a> <i>Environmental Assessment Officer (Spills)</i>	(403) 292-6614 (office) (403) 275-6256 (home) (403) 370-6256 (cell)
	Terry Baker E-mail: <a href="mailto:tbaker@neb.gc.ca">tbaker@neb.gc.ca</a> <i>Chief Conservation Officer</i>	(403) 299-2792 (office) (403) 239-5032 (home)

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John McCarthy	(403) 299-2766 (office)
E-mail: <a href="mailto:jmccarthy@neb.gc.ca">jmccarthy@neb.gc.ca</a>	(403) 240-2354 (home)
<i>Chief Safety Officer</i>	

Laura Van Ham	(403) 299-2769
E-mail: <a href="mailto:lvaham@neb-one.gc.ca">lvaham@neb-one.gc.ca</a>	(403) 208-0267
<i>Environmental Specialist</i>	

Calgary Main Office	(403) 292-4800
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Operations Main Fax	(403) 292-5876
Alternate Fax	(403) 292-5875

**NWT SPILL REPORTING- 24 HOUR SPILL LINE: (867) 920-8130**  
**FAX (867)873-6924**

NEB Spill Reporting	
John Korec	(403) 292-6614 (office)
<i>Environmental Assesment Officer</i>	(403) 275-6256 (home)
	(403) 370-6256 (cell)

Hazardous occurrences (as prescribed under section XVI of the *Canada Oil and Gas Occupational Safety and Health Regulations*) are to be reported to the NEB immediately. The NEB also requires immediate notification of any accident or incident requiring medivac.

### **Alberta Energy Company (AEC)- Calgary**

<u>Position</u>	<u>Person</u>	<u>Location</u>	<u>Phone Number</u>
Project Manager	John Duckett	Calgary	(403) 261-2569
Senior Geoph.	Dave Baer	Calgary	(403) 261-2578

### **Veritas DGC Land/Veri-Illuq - Calgary/Inuvik**

<u>Position</u>	<u>Person</u>	<u>Location</u>	<u>Phone Number</u>
Crew Supervisor	Alan Wong	Calgary	(403) 257-6758 (403) 257-6801 fax (403) 605-7094 cell
Base Manager	Wayne Ross	Inuvik	(867) 777-3493 (867) 777-3493 fax
Crew Manager	Dwayne Meyer	Field Camp	(600) 701-4160 (403) 813-5798

## **SCOPE OF SPILLS**

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### **Foremost or Fuel Sleigh**

Diesel fuel spill on frozen ground, snow or ice from a vehicle accident or valve or tank leak while transporting fuel from Inuvik to Fuel Transfer Location or from the Fuel Transfer Location to field equipment.

### **Vehicle Fuel Transfer**

Diesel fuel spill on frozen ground, snow or ice while transferring fuel from fuel truck to Foremost or fuel sleigh and from Foremost or fuel sleigh to field vehicles.

## **1.0 VEHICLE AND EQUIPMENT FLUIDS**

Spills of hydraulic fluids, transmisson fluids or glycol etc, due to accidents (breakage or rupture of tanks, hoses, connections and break through on ice etc).

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## Industry Operators

### **Petro Canada** Swimming Point

Ray Adams (Senior Logistics Supervisor)

(867) 777-4942

(867) 777-6103 (cell)

Petro Canada has agreed to provide assistance and equipment for any serious spills, 24 hours a day.

### Equipment for Spill Response

A list of additional spill recovery equipment, available from Petro Canada at Swimming Point, is attached in Appendix I of this document. In addition to the equipment listed in Appendix I, the seismic crew will have access to a large container, in the event of larger spills. The size of the container is approximately 3.04m wide x 4.88m long x 2.44m high. (~36,000 litres)

## **INITIAL RESPONSE ACTIONS**

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Upon discovery of a spill, the first person on the scene:

- Protects the safety and lives of anyone in the spill area.
- Isolates or removes any potential ignition sources if safe and possible.
- Locates likely source or cause of spill and stops flow or release (do not take unnecessary risks).
- Assess the likely size, extent and conditions of spill.
- Notifies immediate supervisor with information\*
- Controls access to area until assistance arrives.
- Attempts to contain spread of spill, using available equipment and materials.
- Records all relevant information for reporting purposes.
- Notifies the NEB of any uncontrolled spills or spills in excess of 0.15m<sup>3</sup> (1 barrel), resulting from NEB Authorized Operations.

\* Upon notification that a spill has occurred, the supervisor will notify NWT 24 hour spill report line (867) 920-8130, fax (867) 873-6924.

## **SPILL RESPONSE COUNTERMEASURES**

Seismic operations will be conducted during the winter months only. Countermeasure procedures have, however, also been included to cover a spill during the summer months.

## **Winter Spills on Land**

### **Detection**

Areas are usually snow covered and limits are highly visible.

Probing will locate spill area under a depth of snow.

### **Containment**

Build frozen snow dikes to contain spill.

Use plastic sheeting to line face of dike.

### **Recovery**

Pump liquid product into empty drums or tanks for future acceptable disposal.

### **Transportation**

TDG (Transportation of Dangerous Goods) waste manifest if necessary.

### **Contaminated Snow Cleanup**

Use mechanical and hand equipment to scrape up product-in-snow mixture and load into dump trucks or other suitable container.

Haul product-in-snow mixture to a suitable site with disposal or container facilities. Eg. MATCO in Inuvik.

### **Caution**

If terrain conditions indicate long term terrain damage may result by bulldozer scraping, then hand cleanup may be necessary with a final cleanup done as the snow melts and the terrain surface starts to thaw.

### **Burning**

If a spill is moving toward a higher environmental or safety concern, an immediate burning may be desirable i.e. creek, open water or residences. This decision will be made by the Field Supervisor or Party Manager. Every effort will be made to protect the spill area from other combustible materials before burning. All residue after the burn is to be picked up and disposed of in accordance to applicable laws. Contractors should, whenever possible, consult with DIAND inspector for permission before burning any fuel or oil.



## **Winter Spills on Ice**

### **Caution**

Be sure to check ice thickness for load bearing capacity.

### **Detection**

Determine perimeter of spill area.

### **Burning**

If the spill is moving towards cracks in the ice or open water then an immediate burning may be desirable. This decision will be made by the Field Supervisor or Party Manager. All residue after the burn is to be picked up and disposed of in accordance to applicable laws. Contractors should, whenever possible, consult with the DIAND inspector for permission before burning any fuel or oil.

### **Containment**

Construct frozen snow dikes or ice trenches around perimeter of spill for containment.

Prevent escape of product into cracks

- dike off
- seal with snow\water mixture.

### **Transportation**

TDG (Transportation of Dangerous Goods) waste manifest if necessary.

### **Recovery**

Recover pumpable product and store in steel drums or tanks for future disposal.

### **Cleanup**

Pick up contaminated snow using mechanical equipment or hand labour.

Store in steel drums for future disposal or transport by means of dump truck to a disposal site.

Use sorbent to clean up remaining contained product.

Recover sorbents used and place into steel drums for future disposal.

## **Summer Spills in Water**

### **Recovery-Skimmer**

Use an oil spill skimmer to recover spilled fuel, if spill is too large to recover with sorbents.

Store recovered small volumes of fuel and water in steel drums.

Store larger volumes or recovered fuel and water in empty fuel tank on barge for transfer to a remote recycling or acceptable disposal site. If necessary, a TDG waste manifest may be required.

## **Summer Spills on Land**

### **Containment**

Construct dikes, oil containment booms or drainage trenches to prevent fuel spills from migrating (particularly into water).

### **Recovery**

Pump liquid product into empty drums or tanks for future acceptable disposal.

### **Transportation**

TDG waste manifest if necessary.

### **Clean-up**

Use sorbents to clean up remaining surface oil and fuel. Recover sorbents used and place into steel drums for future disposal.

### **Burning**

Immediate burning may be desirable to prevent the spread of fuel as decided by Field Supervisor or Party Manager. Pick up residue after burn has been completed. Contractors should, whenever possible, consult with the DIAND Inspector for permission before burning any fuel or oil.

## **Soil Removal**

Contaminated soil may be removed to storage for acceptable disposal. In most cases, however, contaminated soil should be left in place and the hydrocarbon contaminant allowed to biodegrade. Enhancement of this process through use of amendments may also be warranted.

GNWT Resources, Wildlife and Economic Development recommends that use of this method be done in consultation with DIAND, Municipal and Community Affairs & GNWT.

## **Disposal**

The following are a number of methods available in the project area for the disposal of oil spill products. All methods will be in accordance to Land Use Permit conditions.

### **1. In-Situ Burning at Spill Site**

In the case of a major spill, some of the fuel released at the site may be disposed of through in-situ burning. Precautions must be taken to ensure fire cannot burn back to fuel storage tanks. Contractors should, whenever possible, consult with the DIAND inspector for permission before disposing any fuel or oil.

### **2. Waste oil may be transported to disposal facilities in Inuvik. MATCO Transportation owns and operates an oil burning furnace.**

## SPILL REPORTS

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**ALL SPILLS, REGARDLESS OF SIZE, ARE TO BE REPORTED TO THE NWT- 24 HOUR SPILL REPORT LINE (867) 920-8130, FAX (867) 873-6924.**

- 1) Any spill which is a violation, or
- 2) Any spill reported to the 24-hour spill report line or government agency
- 3) Any associated safety and health incidents are reportable to the NEB
- 4) Any spill which has received or may receive public news media attention, **MUST BE REPORTED**.
- 5) Any hazardous occurrence (i.e. spills that can or do adversely affect the environment) **MUST BE REPORTED** to the NEB, regardless of size.

Diaries of the on-site personnel are the primary sources of information. The accounting group provides the summary analysis and cost breakdown of the cleanup operation. The report should include the following:

- Analysis of events leading up to the spill, cause of the spill, type of oil or fuel spilled, duration of spill, chronological description of all areas contaminated by the spill and extent of contamination.
  - Cleanup procedures utilized in each area, including duration of activities, number of personnel involved in the cleanup, days and number of equipment employed.
  - Description of weather conditions, and river currents and how they affected the movement of the spill and the cleanup conditions.
  - Analysis of the success of cleanup in each area contaminated, and evaluation of equipment used.
  - Description of environmental protection measures and their success.
  - Initial statement of environmental impacts.
  - Statement of property damage.
  - Summary of total volume of the spill and volume recovered, and estimates of the fate of the oil lost including approximate amount lost to each natural process.
  - Statement of damage to company property as well as damage to the property of others, including details of cause, type and content of damage.
  - Salvage operations and their success (if applicable).
-

- A list of all government personnel and other authorities contacted including date, time and title.
- If news released, government communications and records of interviews
- Summary cost breakdown of cleanup, including equipment, manpower, materials, accommodation, transportation and claims.
- Summary of injuries or deaths caused by the spill or occurring during cleanup
- Suggestions to improve cleanup operations during future responses
- Summary analysis of what went right and what went wrong including reporting procedures.
- All spills or potential spills of petroleum products or other hazardous material must be reported to the 24-hour Spill Report Line to ensure that an investigation is undertaken by the appropriate government authority.
- Any hazardous occurrences, i.e. spills that can or do affect the environment, and lost-time incidents must be reported to the NEB (OSH regulations).

## SPILL REPORTING PROCEDURE

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1. Fill out "**SPILL REPORT**" form as completely as possible before making the report.
2. Report **IMMEDIATELY** to Yellowknife using the 24-hour Spill Report Line.

**24-HOUR SPILL REPORTING LINE (867) 920-8130**  
**FAX (867) 873-6924**

**NOTE:** Telephone calls can be made collect by informing the Operator that you wish to report a spill.

RCMP Communications may be used if other means are not available.

### **Additional Information or Assistance**

Department of Indian Affairs and  
Northern Development Water Resources  
Yellowknife

Phone: (867) 920-8240  
Fax: (867) 669-2716

Environment Canada  
Environmental Protection Branch

Phone: (867) 669-4710  
Fax: (867) 873-8185

National Energy Board  
Exploration and Production Team  
Calgary

Phone: (403) 299-3926  
Phone: (403) 292-6614  
Fax: (403) 292-5876



**FUEL & OIL SPILL  
CONTINGENCY PLAN**

**for the  
AEC WEST LTD. KAMIK  
SEISMIC PROGRAM**

**2001-2002**

24 Hour Report Line  
(867) 920-8130  
Fax (867)873-6924

## 2.0 SPILL REPORT

(Oil, Gas or Other Materials, i.e. Hazardous Chemicals, etc.)

<b>2.1</b>	Report Date	Date and Time of Spill if Known
<b>B</b>	Location and Map Coordinates (if known) and Direction if Moving	
<b>C</b>	Party Responsible	
<b>D</b>	Product Spilled and Estimated Quantities (Provide Metric Volumes/Weights if Possible)	
<b>E</b>	Cause of Spill	
<b>F</b>	Is Spill Terminated or Continuing	
<b>G</b>	Extent of Contaminated Area	
<b>H</b>	Factors Affecting Spill or Recovery – Temperatures, Wind, Snow, Ice, Terrain, Buildings, etc.	
<b>I</b>	Containment – Naturally, Booms, Dykes or Other. No Containment	
<b>J</b>	Action, if any, Taken or Proposed to Contain, Recover, Clean-up or Dispose	
<b>K</b>	Do you Require Assistance	If so, what Form
<b>L</b>	Hazard to Persons or Property or Environment – Fire, Drinking Water, Threat to Fish or Wildlife	
<b>M</b>	Comments and/or Recommendations	
Reported by		Position, Employer, Location
Reported to		Position, Employer, Location
		Telephone



# MACKENZIE DELTA PROJECT EMERGENCY RESPONSE PLAN

## SECTION 7.0 EQUIPMENT LISTS

2000-12

### SPILL CLEAN UP KITS (continued)

Swimming Point - Winter based major spill response	Comments
Large truck based	For responding to a larger spill in winter
12 Aluminum shovels (scoop)	
Chain saw (18")	
Portable lights (See light kit list)	
3 Portable generators (5000 watt or larger)	
Fuel in CSA approved portable containers	
Safety kit (equipment as listed below)	
Sorbent - socks (15 bale /bbl)	
Sorbent - pad (25 bale /bbl)	
Sorbent - loose (10 bale/bbl)	
Two - 1 Cubic metre totes	
2 Pick axes	
4 Large impervious tarps	
Tool box	
5 Boxes of XXL Disposable coveralls	
Documentation kit	
5 Boxes of vitron or nitrile gloves (winter lining)	
Diesel Herman Nelson heater	
Lubes	

#### Notes:

Tool Box should include: 3/8 socket set, crescent wrench (8" and 10"), multi-tip screwdriver, pliers, utility knife, wire cutters flat file, hack saw, claw hammer, ball peen hammer, chainsaw file and screwdriver, pipe wrench (18", 24"), tin snips, allen wrench set, duct tape, tie wire, electrical tape.



## MACKENZIE DELTA PROJECT EMERGENCY RESPONSE PLAN

### SECTION 7.0 EQUIPMENT LISTS

2000-12

#### Safety Kit

	Winter
Blankets	6
Chainsaw chaps	1
First aid kits	10 man
Highway vests	10
Highway cones	12
Emergency winter clothing	5 insulated coveralls

#### Light Kit

	Winter
Extension cords 30 amp -100 feet - yellow	2
Extension cords 15 amp -100 feet - yellow	8
Extension cords 30 amp -50 feet - yellow	4
Flood lamps (500 watt)	8
Flood lamp stands	4
Flood lamp bulbs spare	8
Flashlights - x-proof	12
Spare batteries	12
Flares	12

**APPENDIX 'II'**

**FUEL & OIL SPILL  
CONTINGENCY PLAN**

**for the  
AEC WEST LTD. KAMIK  
SEISMIC PROGRAM**

**2001-2002**

## APPENDIX II

### Arctic Spill Control Containment and Recovery General Guidelines

Following are a number of guidelines for oil spill containment in the Arctic. These guidelines are not specific but rather are of a general nature. Included is a description of the techniques employed for the construction of snow and ice containment dikes.

#### **A. PRINCIPLE OF CONTAINMENT**

1. Confine spill to smallest manageable area possible.
2. Channel flow to containment area (e.g., figure A1 & A2).
3. Keep spill out of running water.
4. Location and size of the containment area must be decided before the time of the event in contingency planning considering:
  - the safety of personnel.
  - the safety of the rig, camp, etc.
  - the scope of the spill.
  - the condition of the ice or tundra surface.
5. The following table will serve as a guide for the size of containment areas.

AREA OF CONTAINMENT IN SQUARE METERS  
FOR INDICATED DEPTH OF FLUID

<u>Volume in M3</u>	<u>0.15m</u>	<u>0.30m</u>	<u>0.46m</u>
160	1040	520	340
320	2030	1040	700
760	5200	2600	1700
1600	10400	5200	3500
3200	20800	10400	7000
7600	52000	2600	17300
16000	104000	5200	34700

## **B. CONTAINMENT**

1. Snow dikes can temporarily contain oil spill on ice
2. Good unbroken ice will support oil in depths as follows:

<u>Ice Thickness</u>	<u>Oil Depth</u>
0.5 meters (1.5 ft.)	0.15 meters (0.5 ft.)
1.0 meters (3.3 ft.)	0.30 meters (1.0 ft.)
1.5 meters (5.3 ft.)	0.45 meters (1.5 ft.)

The size of the containment area and depth of liquid becomes dependent upon ice thickness.

3. If ice thickness is inadequate to support construction equipment for spill containment, a spill will be left undisturbed and will be cleaned up as soon as ice conditions permit.

## **C. SNOW DIKE CONSTRUCTION ON ICE**

The ice surface inside the dike area should be scraped clean of snow if possible. Oil mixed with snow produces a mulch which makes disposal difficult.

1. Establish and stake perimeter of area to be diked.
2. Windrow snow approximately 1 (one) meter high with Cats and Graders onto the staked dike perimeter in the same fashion as snowplowing a road, utilizing snow from both sides of the dike. Cats must use an angled blade for this type of work.
3. Spray water onto the windrow at a rate of approximately 14 cubic meters (3,000 gallons) per 200 meters of windrow.
4. Level windrow with Cat using a straight blade and pack snow with tracks, establishing the first layer or first 0.3 meters (1 ft.) of dike.
5. Re-water the dike and pack with cat tracks, water at approximately the same rate as before or until the snow packs well. Underwatering will cause the snow to stay loose. This may be corrected by adding more water. Over watering will cause the cat tracks to sink into the mash snow. This may be corrected by dozing and mixing loose snow into the mash until the material will pack.



6. For the second layer or second 0.3 meters (1 ft) of dike, doze or grade 0.5 meters (1 foot) of dike, doze or grade 0.5 meters (1 ½ ft.) of snow onto the existing dike and water at the same rate as before.
7. Level top of dike, re-water and pack with cat tracks.
8. Steps 6 and 7 are to be carried on until the desired height has been reached.
9. The final finishing of the dike will be done by a grader using a snow-wing to cut a 2:1 backslope, rolling surplus material to the top of the dike where it will be leveled by the Cat.
10. A final spray of water over the top and the slopes of the dike will consolidate the material and prevent wind erosion.

The estimated time to build a dike as described above 1 meter high and 4.5 meters wide, is approximately three hours per bulldozer for 30 meters (100 feet) of dike, providing that snow and equipment are readily available.

#### **D. SURFACE PREPARATION FOR DIKE CONSTRUCTION ON TUNDRA**

1. Clean and smooth the tundra surface at least 15 meters (50ft) wide of snow to both sides of the perimeter of the area to be diked.
2. Spray water onto the cleared area, starting at the highest point, as a certain amount of water will migrate under the tundra toward the lower area. Allow water to freeze and re-water as required to transform the active layer into solid ice.
3. Blade snow in thin, 3 cm to 8 cm (1-3") layers over the area utilizing the snowbanks from both sides, water the snow and blade and pack this water saturated material over the area to obtain a proper seal across the rough tundra. The amount of water required to prepare the tundra surface will depend on the depth and on air voids present in the active layer. Time required will depend on frost conditions.
4. After the first section of the surface cover is completed, dike construction can proceed as outlined in Section C.

## **E. POLYTHENE DIKE LINER INSTALLATION**

1. Cut V shape slot 30 cm deep and 15 cm wide into ice with powersaws or ditch witch on the dozed inside of dike, as close to the base of dike as possible.
2. Remove any loose ice or snow from the slot.
3. Lay polythene over dike as shown on Figure A-3 making sure that the sheeting will fit into the V slot and extend 30 cm to 45 cm beyond the slot.
4. Install one 5 meters x 30 meters polythene sheet at a time. (Each sheet should cover a minimum of 3 meters with next sheet.)
5. Backfill the V slot with water and loose snow and freeze the liner into position.
6. Cover the polythene liner with loose snow at a 4 to 1 slope to prevent wind damage. This is to be done very carefully and the operator should be assisted by a man on the ground to prevent damaging the liner.
7. After the liner has been covered sufficiently, the backslope is to be sprayed lightly with water to consolidate the snow and thus prevent wind erosion.

FIGURE A1:  
GENERAL GUIDELINE  
CHANNEL FLOW FOR FLUID CONTAINMENT

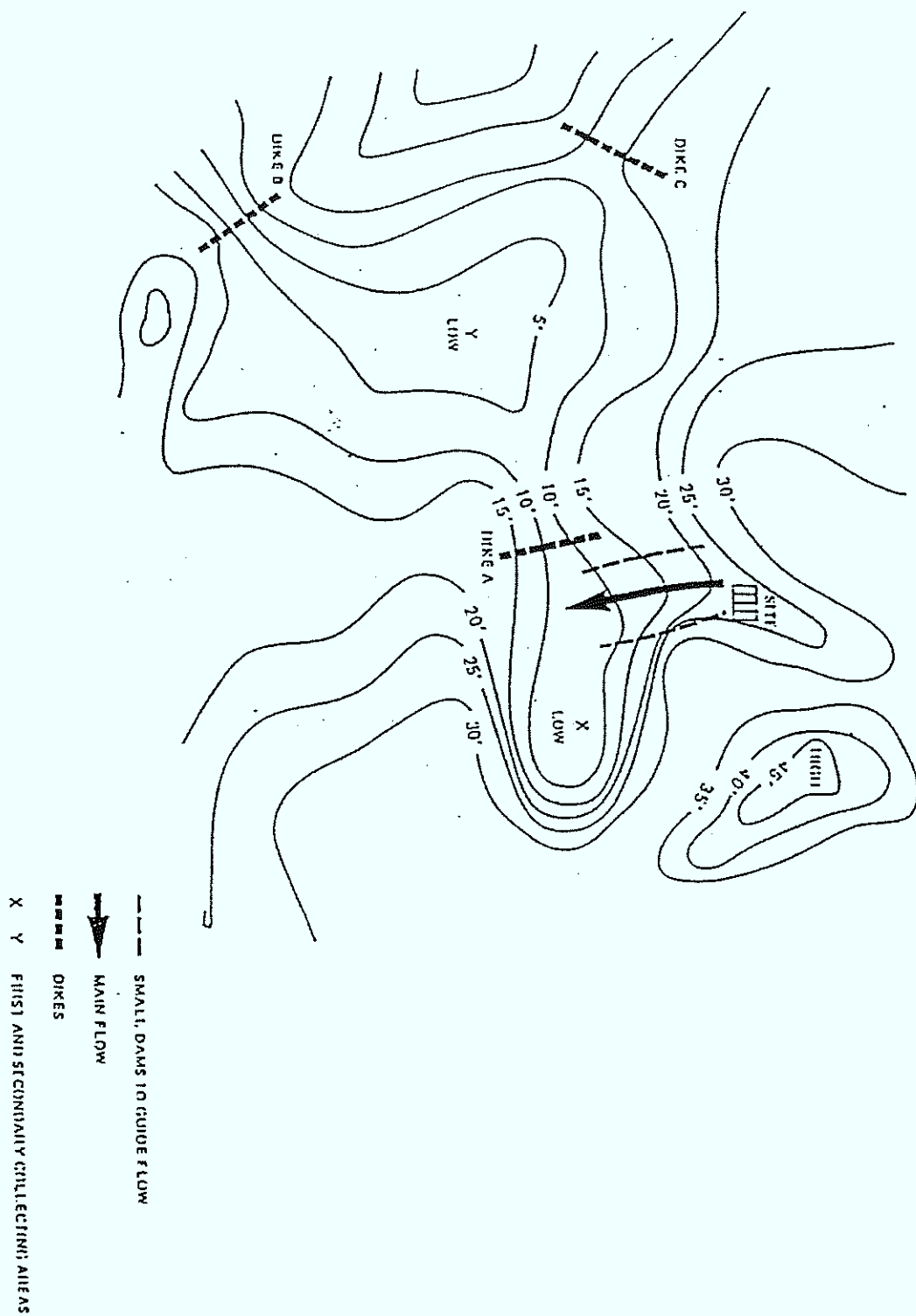
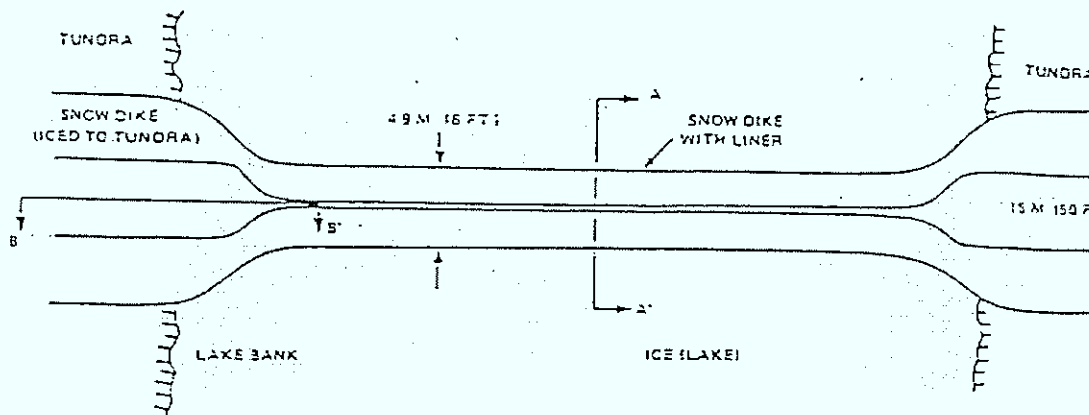
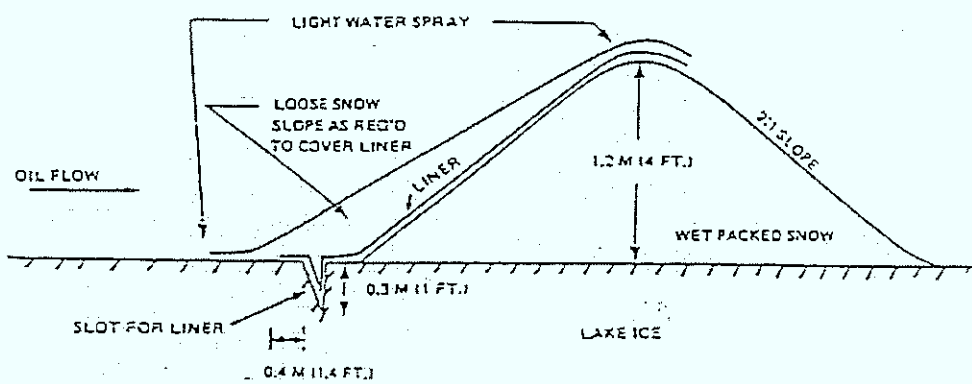


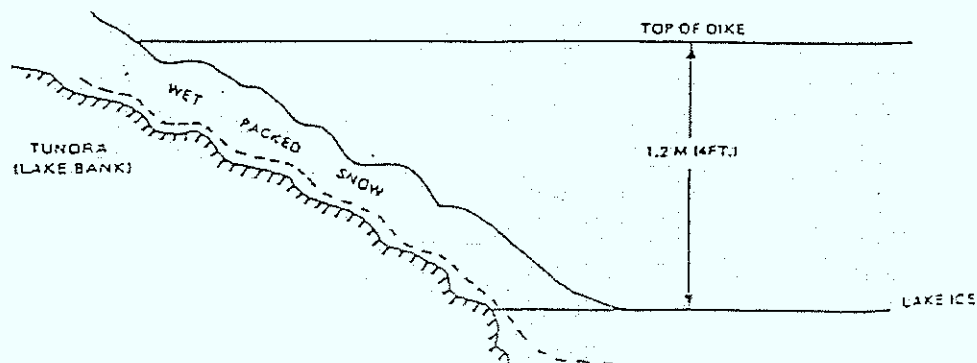
FIGURE A3:  
GENERAL GUIDELINE  
OIL SPILL CONTAINMENT PLAN - DIKE DESIGN  
PLAN VIEW



SECTION A-A'



SECTION B-B'



## Appendix C

### Description Of Landcover Classes Identified In Biophysical Project

## Appendix C

### Description Of Landcover Classes Identified In Biophysical Project

GIS software was used to conduct a classification of a satellite image of the Mackenzie Delta region. Twenty distinguishable vegetation classes were identified. Details of the classification and an in-depth discussion of the spatial distribution of the classes throughout the Mackenzie Delta region are presented in the biophysical report entitled 'Vegetation Classification and Wildlife Habitat Suitability Modeling in the Mackenzie Delta Region' (IEG 2001). Below is a summary of composition of each class.

The classification resulted in several spectral classes that corresponded to rock and other highly reflective materials. Based on the spatial relationships of these spectral classes, three categories of rock were identified. 'Rock' primarily corresponds to the most highly exposed rock surfaces at high elevations in the Richardson Mountains, while 'Barren Rock' corresponds to exposed rock surfaces at lower elevations. 'Rock / Urban' often corresponds to small mineral deposits in the mountains, delta, or upland tundra regions, as well as some structures in urban areas.

'Sparse Vegetation' and 'Mountain Tundra' are commonly found in the mountains; 'Sparse Vegetation' at higher elevations and 'Mountain Tundra' at lower elevations. Occasionally, vegetation in the uplands along the eastern edge of the delta is classified as 'Mountain Tundra'.

'Graminoid' is mainly composed of grasses, but sedges are sometimes included within this class. Vegetation classified as 'Graminoid' is most heavily concentrated on Richards Island, but is also found in small patches throughout the Mackenzie Delta region. 'Tussock Tundra', mainly dominated by cotton grass, is located throughout the region outside of the delta, with high concentrations in the mountains, Richards Island, and northern Tuktoyaktuk Peninsula. In contrast to 'Tussock Tundra', 'Sedge' is found within the delta, as well as most of the surrounding areas. As the name implies, most vegetation that corresponds to the 'Sedge' class are members of the sedge genus, *Carex*.

A large patch of sparse vegetation and soil is located in an area southeast of Inuvik that burned during 1997. The spectral class corresponding to this region was labelled 'Burn / Regrowth'. Outside of the burned area, this vegetation type is scattered.

Shrub is a major component (44%) of the vegetation within the Mackenzie Delta region. Shrub, including various species of *Salix* (willow), *Alnus* (alder), *Betula* (birch), *Ledum* (Labrador Tea), *Vaccinium* (berry), *Arctostaphylos* (blackberry), *Rubus* (cloudberry), and other genera, is found among all habitat types within the study area. Three classes of shrub were distinguishable.

'Tall Willow Alder' represents shrubs less than 1.5 m that are predominately *Salix* or *Alnus* species. Although found throughout the Mackenzie Delta region, 'Tall Willow Alder' is most concentrated in the

delta. The understorey of this class varies from sparse herbaceous vegetation when the canopy is closed, to low shrubs when the canopy is open.

In contrast, 'Low Willow Alder', shrubs with heights between 0.25 – 1.5 m, have their highest density on the tundra, south of Husky Lakes and on the Tuktoyaktuk Peninsula. In addition to the characteristic *Salix* and *Alnus* species of 'Low Willow Alder', a sparser cover of dwarf shrub or herbaceous vegetation may also be present

'Low Birch / Dwarf Shrub' is a community is less than .25 m in height and is dominated by *Betula* species or other dwarf species, mainly *Ledum* and the berry species, *Vaccinium*, *Arctostaphylos*, and *Rubus* . In addition to these dominant species, the 'Low Birch / Dwarf Shrub' sometimes includes a sparse cover of herbaceous plants. Found throughout the Mackenzie Delta region, 'Low Birch / Dwarf Shrub' has a thin distribution within the delta.

Although found scattered throughout most of the Mackenzie Delta region, except the Tuktoyaktuk Peninsula, 'Woodland Conifer' is most densely spread in the Peel Plain and uplands south of the Husky Lakes. Within this plant community, the dominant tree species, *Picea glauca* (white spruce), is sparsely distributed (less than 25% of the total vegetation cover) with various understorey components including reindeer lichen, and low or dwarfed shrub. In some places, the stunted trees have branches with few needles.

The 'Forest Conifer' community consists of tall, open canopy *P. glauca* trees with a dense understorey of tall and low shrubs, and herbaceous flowering plants. Patches of this community are mainly located in the delta and Peel Plain.

Infrequently found within the Mackenzie Delta region, 'Forest Deciduous' is predominated by *Betula* (birch) and *Populus* (poplar and aspen). Small patches of this community are scattered in the Peel Plain, delta and upland hills.



## **Appendix D**

### **Additional Comments from Community Consultations**

## Appendix D

### Additional Comments from Community Consultations

Community	Proponent
<b>Program Details</b>	
You say that you may use an access into Parsons Lake to move some of your equipment. Will you be sharing with other operators.	Yes, we are planning to share the access roads that Conoco are proposing to build in that area. If the ice on the river is bad again this year, then we may use Conoco's overland road from Inuvik north to Parsons – this is sometimes called the Pole Road or the Husky Lake trail. Then we will go west along the Pete's Creek trail or on the overland route west of Parsons to Lucas Point.
Will you be crossing Husky Lake?	No
What kind of camp will you be using?	We will be using a sleigh camp.
Will you have monitors on the program and what authority do they have?	Yes. We will have an environmental monitor from the ILA and a wildlife monitor from the local HTC. The environmental monitor can require operations to be temporarily suspended, if the terms of the permit are not being met and there is cause for concern. Sometimes the plans have to change in the field. What looked like a good creek crossing the fall, may not be a good crossing the in the winter and the program may have to detour. We need to work these things out with our monitors and report to the ILA once a week.
<b>Contracts/Training/Employment</b>	
Do you think you will have any employment opportunities for women?	Veri Illuq will be hiring someone for the office in Inuvik and probably two assistant administrative clerks to work in the field. All of the jobs are open to everyone that is available and willing to work.
Will you participate in our career days in the community schools.	Yes. We will definitely participate.
Where do you have your office?	Veri-Illuq has an office in Inuvik and travels once a month to other communities to attend hamlet meetings.
Next time we would like you to come to our meeting with your joint-venture partners.	Noted.