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PROJECT DESCRIPTION
FOR THE PROPOSED AEC WEST LTD.
KAMIK 2D WINTER 2001/2002 SEISMIC PROGRAM

Prepared for:

AEC West Ltd.
Calgary, Alberta

Prepared by:

Inuvialuit Environmental & Geotechnical Inc.

Calgary, Alberta and Inuvik, Northwest Territories

October 2001
Project #5091-01

PROJECT DESCRIPTION
FOR THE PROPOSED AEC WEST LTD.
KAMIK 2D WINTER 2001/02 SEISMIC PROGRAM

Submitted by:

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DISTRIBUTION:

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4 Copies	Inuvialuit Environmental & Geotechnical Inc. Calgary, Alberta and Inuvik, Northwest Territories

EXECUTIVE SUMMARY

AEC West Ltd., a division of Alberta Energy Company, is proposing to conduct a 2D seismic program north of the North Storm Hills region and south of Kugmallit Bay during the winter of 2001/2002. The goal of the winter seismic program is to further delineate areas of interest on EL 385. The program includes five seismic lines for a total proposed line length of approximately 133 km. The program will be conducted on Inuvialuit 7(1)(a), 7(1)(b) and Crown land. Pending regulatory approval, the recording for the program is scheduled to begin in January/February 2002.

Veri-Illuq, a geophysical survey company, will conduct the seismic program for AEC. Inuvialuit Environmental & Geotechnical Inc. (IEG) has been commissioned by AEC to prepare this project description for the proposed seismic program. The project description has been prepared to meet the requirements of the Inuvialuit Land Administration (ILA), Indian and Northern Affairs Canada (INAC) and fulfill the Operating Guidelines and Procedures of the Environmental Impact Screening Committee (EISC).

The seismic program has been developed with the consideration of minimizing impacts on the environment and land users. Potential environmental concerns for the project may include temporary alteration of vegetation and wildlife habitat, as well as short-term wildlife displacement associated with increased activity. AEC is committed to employing a variety of mitigation techniques to minimize disturbance. Techniques include the use of tracked vehicles over frozen, snow-covered ground to minimize impacts to vegetation communities. Program activities will be completed prior to the arrival of the majority of the migratory bird species and will also be completed expeditiously to minimize impacts to resident wildlife. An environmental and wildlife monitor will provide supervision to ensure mitigation measures are implemented and environmental and wildlife concerns are addressed as encountered throughout the program. AEC and its contractors are committed to following these measures in order to minimize the risk of potential environmental impacts and disturbance of culturally and historically significant areas.

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1.0 CONTACT NAMES AND ADDRESSES

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2.0 REGULATORY APPROVALS

AEC West Ltd. (AEC) is applying to conduct a winter 2001/02 seismic program in the Inuvialuit Settlement Region. The proposed 2D regional program is located primarily in EL385, with lines extending onto the Tuk 1 block and SDL 32. The area is south of Kugmallit Bay and north of Parson's Lake (see Figure 1). The program will include 5 seismic lines for a total line length of approximately 133 km. The proposed program is on Inuvialuit 7(1)(a), 7(1)(b) and Crown land within the Inuvialuit Settlement Region (ISR). The primary agencies with jurisdiction over the project include the Inuvialuit Land Administration (ILA), Indian and Northern Affairs, Canada (INAC) and the National Energy Board (NEB).

Other agencies with regulatory interest in the approval process include: Fisheries and Oceans Canada (DFO) with reference to potential effects on fish and fish habitat; the Government of the Northwest Territories (GNWT) Resources, Wildlife and Economic Development (RWED), regarding wildlife and associated habitat; the Prince of Wales Northern Heritage Centre (PWNHC) for an archaeological and historical resources review and Environment Canada (EC) in regard to pollution prevention. The Environmental Impact Screening Committee (EISC) is an advisory committee responsible for screening all proposed projects on Crown Land. The EISC is also responsible for screening projects on Inuvialuit land should the ILA or other Inuvialuit agency refer it to them. When a screening occurs, the EISC's responsibilities are set out in clause 11(13) of the Inuvialuit Final Agreement (IFA), which reads:

> 11(13). On receipt of a project description, the Screening Committee shall expeditiously determine if the proposed development could have a significant negative environmental impact and shall indicate in writing to the government authority competent to authorize the development that, in its view:
>
> (a) the development will have no such significant negative impact and may proceed without environmental impact assessment and review under this Agreement;
>
> (b) the development could have significant negative impact and is subject to assessment and review under this Agreement; or
>
> (c) the development proposal has deficiencies of a nature that warrant a termination of its consideration and the submission of another project description.

Should the EISC determine the project may have a significant negative impact, the Project Description will be referred to the Environmental Impact Review Board (EIRB) or other equivalent environmental review process for a public assessment and review pursuant to clause 11(24).

The NEB is the governmental authority competent to authorize the development within the meaning of the IFA. The NEB is also required to conduct an environmental screening of the project pursuant to the *Canadian Environmental Assessment Act* (CEAA), and to consider environmental impacts under its

jurisdiction to approve the development under the *Canada Oil and Gas Operations Act* (COGOA) and applicable regulations.

Approvals required for this project are summarized in Table 1 and applications are provided in Appendix A. AEC will contact the agencies listed as appropriate and will satisfy any requirements they may have in their respective areas of jurisdiction.

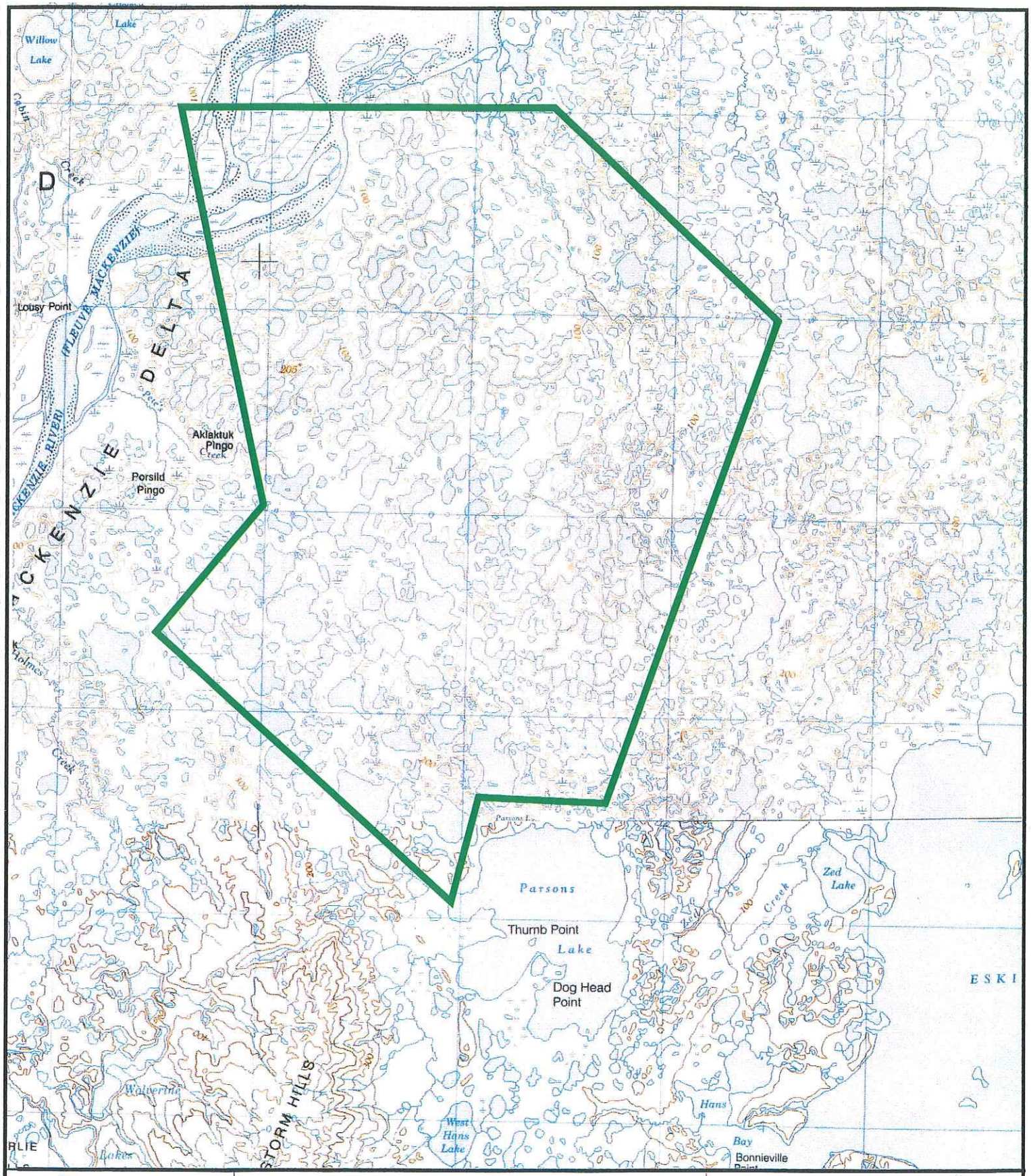
Table 1

Approvals Required

Agency	Approval Required/*Governing Legislation*	Status
Hans Arends Land Administrator Inuvialuit Land Administration P.O. Box 290 Tuktoyaktuk, NT X0E 1C0	Class A Land Use Permit *Inuvialuit Final Agreement*	Submitted on or before 2 November, 2001
Rudy Cockney District Manager, North Mackenzie District Indian and Northern Affairs Canada P.O. Box 2100 Inuvik, NT X0E 0T0	Land Use Permit *Territorial Lands Act* *Territorial Land Use Regulations*	Submitted on or before 2 November, 2001
Linda Graf Secretary Environmental Impact Screening Committee P.O. Box 2120 Inuvik, NT X0E 0T0	Approval on Project Description *Inuvialuit Final Agreement*	Submitted on or before 2 November, 2001
Terry Baker Team Leader, Exploration and Production National Energy Board 444 - 7th Avenue SW Calgary, Alberta T2P 0X8	Geophysical Operation Authorization *Canadian Environmental Assessment Act* *Canada Oil and GasOperations Act*	Submitted on or before 2 November, 2001
Gordon Wray Chair Northwest Territories Water Board 4920 – 52nd St., P.O. Box 1500 Yellowknife, NT X1A 2R2	Class B Water Licence *NWT Waters Act* *NWT Waters Regulations*	Submitted on or before 2 November, 2001

3.0 TITLE

AEC West Ltd. Kamik 2D Winter 2001/02 Seismic Program



Inuvialuit Environmental & Geotechnical Inc.

Proposed Regional Location of AEC West Ltd.
Kamik 2D Seismic Program

Scale 1:250,000

0 2 4 6 8 10
Kilometers

5091-01	October 2001	Figure 1

LEGEND

General Location of 2D Program Area

N
W E
S

4.0 DEVELOPMENT SUMMARY

4.1 Project Scope

AEC West Ltd., a division of Alberta Energy Company, is proposing to conduct a 2D seismic program north of the North Storm Hills region and south of Kugmallit Bay during the winter of 2001/2002. The goal of the winter seismic program is to further delineate areas of interest on EL 385 (Figure 2). The program includes five seismic lines for a total proposed line length of 133 km (Table 2). The program will be conducted on Inuvialuit 7(1)(a), 7(1)(b) and Crown land.

Table 2

Seismic Line Set Details

Line	7(1)(a)		7(1)(b)		Crown		Total	
	Length (km)	Area (ha)	Length (km)	Area (ha)	Length (km)	Area (ha)	Length (km)	Area (ha)
02KAM-01	9.4	7.5	9.9	7.9	0	0	19.3	15.4
02-KAM03	0	0	25.8	20.6	0	0	25.8	20.6
02KAM-05	0	0	29.1	23.3	9.9	7.9	39.0	31.2
02KAM-07	0	0	24.1	19.3	6.2	5.0	30.3	24.3
02KAM-09	0	0	14.8	11.8	4.0	3.2	18.8	15.0
TOTAL	**9.4**	**7.5**	**103.7**	**82.9**	**20.1**	**16.1**	**133.2**	**106.5**

Veri-Illuq, a geophysical survey company, will conduct the seismic program for AEC. Veri-Illuq will provide the geophysical survey team, equipment and camp required to conduct the seismic program. Access construction for the program may begin in December 2001, data acquisition in January/February 2002 and the program is expected to be complete by April 15, 2002.

The approximately 65-person seismic crew will be housed in a mobile sleigh-mounted camp. The camp is designed to have minimal impact on the environment. Garbage will be hauled to the landfills in Inuvik and/or Tuktoyaktuk for disposal.

Tracked vibroseis equipment will be used as the primary energy source. To minimize environmental impacts, the use of wheeled vehicles will be restricted to ice roads. Only tracked vehicles and low ground pressure wheeled vehicles, such as Delta 3 units, will be allowed on the seismic lines. These vehicles exert minimal pressure on the tundra. Vibroseis will be used on land and lakes frozen to the bottom. Lines have been selected to avoid large waterbodies, which may not be frozen to the bottom, wherever possible. However, where a line proceeds across a waterbody not frozen to the bottom, cables will be laid

across the ice, with hydrophones planted on the bottom of the lake. Vibrator source points will then be 'stacked' around the waterbody.

Dynamite will be used on larger waterbodies where data cannot be collected using the vibroseis techniques outlined above. The charges will be drilled with a casing drilling rig and placed in accordance with DFO guidelines and offset distances (see Section 4.3.5). Techniques used to mitigate disturbance to fish and fish habitat within waterbodies during the course of the program are outlined in Section 12.0.

4.2 Field Reconnaissance

A field reconnaissance of a portion of the proposed Kamik program area was conducted by IEG on August 7th, 2001 on behalf of AEC. At the time of the reconnaissance, AEC was proposing to conduct a similar 2D program in the area, called Iomatkotak. The Iomatkotak program was subsequently cancelled. However, the reconnaissance conducted in the Iomatkotak program area does overlap with the proposed Kamik area.

There are numerous waterbodies and drainage courses in this area. The terrain is gently rolling with slopes in the area ranging from 15-20%. AEC are proposing to use straight lines where feasible, detouring only to avoid sensitive areas. Lines from last year's program are visible in areas where the surface vegetation has been compressed. Because the root systems are intact, this visible impact is expected to be short term. Impacts to surface vegetation will be lessened this year with the use of tracked vibroseis equipment.

Along the northern portion of the program, rolling terrain is encountered with some steeper slopes, ranging from 10% - 15%, located along the edges of waterbodies. Slumping has occurred along some shorelines exposing soil with no vegetation cover and creating sharp slopes (>30%), up to 3 m high. Although the shorelines are steep, detours should be possible within 50 – 75 m of the original line. Slopes are gentler along the southwest portion of the line. A number of pingos were geo-located during the reconnaissance. Pingos will be avoided by a minimum of 150 m.

VERITAS
Geophysical Integrity

134° 40'00" W
69° 20'00" N
134° 30'
134° 00'
133° 30'
133° 15'00" W
69° 20'00" N

TUK-2

(1)(E)

EL 385

INUVIK-2 (1)(A)

69° 00'
68° 30'
68° 22'00" N
134° 40'00" W
134° 30'
134° 00'
133° 30'
133° 15'00" W
68° 22'00" N

- Vertical Control Marker
- Horizontal Control Marker
- Cultural Feature
- Grizzly Bear Den Sites
- Access (updated 25Oct2001)
- Caribou Range
- Camp Site / Landing Strip (updated 25Oct2001)
- Well Tie
- Additional Survey Control
- 7(1)(b) Lands
- Pingo
- Ice Roads
- Alberta Energy Proposed 2D

AEC WEST LTD.
KAMIK
PROPOSED 2D PROGRAM 2001-2002

UTM ZONE 8N - NAD83 ... SCALE: 1:300,000 ... UPDATED 25OCT2001 ... z2480168_11X17.dgn

4.3 Seismic Program Description

4.3.1 Line and Access Route Selection

The location of the program was based on the interpretation of seismic data previously acquired in the area, and overlaps two programs conducted last year: the AEC West Ltd. Mackenzie Delta Winter 2000/2001 Seismic Program and the Explor Data Ltd. Mackenzie River Delta Winter 2001 Regional Seismic Acquisition Program. The intent of overlapping the programs is to further delineate potential hydrocarbon prospects.

Although four of the lines in the proposed Kamik program overlap with the Parsons Lake 3D program proposed by Conoco Canada Resources Ltd. (Conoco), data sharing between the programs is not feasible. In a 3D program, data are not recorded in line with the source, as they are in a 2D program. A 3D survey normally records data over a rectangular or square area from a source point in the middle of the area. Receivers are not laid out along the source lines, as in a 2D program, but are perpendicular to the lines. The differences between the 3D and 2D methods are significant enough that data cannot be extracted from a 3D survey and equated with a straight 2D line.

Line locations will avoid cabin locations, known heritage sites, environmentally sensitive areas, such as steep slopes and areas identified in the biophysical studies completed during the summer of 2001.

To the extent feasible lines will be straight with offsets or skidding used to avoid sensitive areas. Line surveying will be completed using global positioning system (GPS) navigation to allow AEC to choose the path of least disturbance along the line. Areas of sensitivity and paths of least disturbance will be identified through air-photo interpretation and will be ground-truthed using on-the-ground surveys during program planning.

Potential routes under consideration for primary access to the program area include the Parsons Lake Road/Pete's Creek Access to the northwest end of Parsons Lake and the south Parsons Access ('Pole Road') extending north from Inuvik to the south end of Parsons Lake. Conoco is currently considering both routes for access to their proposed Parsons Lake Winter 3D Seismic Program. AEC will share the chosen access route with Conoco. The route selected for access will depend on weather and ice conditions. Some of the access routes between the 2D lines may also follow seismic lines used by AEC in last year's Mackenzie Delta program. All potential access route locations are identified on the accompanying map (map pocket).

The criteria used for temporary winter access route selection includes:

- utilizing the Inuvik to Tuktoyaktuk winter road as primary access
- utilizing, to the extent feasible, lakes and waterbodies
- utilizing old seismic lines for access between the 2D lines identified in this year's program

- working with other operators to minimize the number of roads constructed
- minimizing disturbance to sensitive wildlife habitat, soil, hydrological and vegetated areas

4.3.2 Access Route Construction

Ice roads will be constructed primarily on lakes in the vicinity of the project area. Surface preparation will consist of clearing snow from the ice. Where lakes do not provide access to the project area, or where ice cover is insufficient to support the weight of the equipment, overland access routes may be required. Construction of overland access routes will consist of snow compaction along the routes chosen. Ground depressions encountered along the access routes may be filled with snow to smooth the surface. Dozer blades will be equipped with mushroom shoes to elevate the blade, leaving a minimum of 20 cm snow cover on the access route to prevent disturbance of the organic layer.

If thickening of ice on access routes is required, water will be withdrawn from large waterbodies within the program area and used to flood the area. Water withdrawal methods will meet all regulatory guidelines (Section 4.4.3). Access will be over ice and snow where ice thickness is sufficient to safely carry equipment loads and overland sections will be kept to a minimum. Wheeled vehicles will only be allowed to operate on ice roads.

Both electronic and physical ice thickness profiling will be employed during the construction and use of access routes to evaluate ice conditions for safe travel. The Mackenzie Delta Oil and Gas Operators have developed a basic Health, Safety and Environmental Standards guidelines for work in the Mackenzie Delta region . Access routes will be selected where slopes are minimal. Where slopes are unavoidable and high banks (>1m) hamper access, snow and/or ice ramps made of clean snow and water will be constructed to prevent erosion and disturbance by equipment. Ice ramps will be constructed using water withdrawn from large waterbodies and channels.

4.3.3 Line Production

AEC utilized air photos provided by Tarin Resources Services Ltd. during the planning stages of line construction. The routes have been selected using data collected during the summer and fall 2001 heritage resources field surveys. The lines will be surveyed using a combination of GPS and conventional survey systems. Survey crews will proceed down the lines, identified by the geophysicists, using GPS receivers mounted on snowmobiles and Nodwells. To the extent feasible lines will be straight with offsets or skidding used to avoid wetlands or channels with water under the ice, as well as environmentally sensitive areas identified by the Environmental Monitor.

Energy source points will be positioned at 50 or 60 m intervals and receivers will be positioned at 25 or 30 m intervals. In those areas where dynamite is used, the energy source point intervals will be extended to 100 or 120 m. Existing data for the region is currently being processed and the final decision regarding

intervals will be based on the results of the analysis. Line widths will be 8 m. Additional width may be necessary where two-way traffic or snow fencing is required, or for reasons of crew safety.

Along the lines, source and receiver points will be marked with a wooden lath to denote each point and line for that portion of the program. Wooden lath and flagging will be retrieved at the end of operations and will be recycled where possible, incinerated or disposed in the Inuvik landfill.

Ice profiling will be used throughout the program on the seismic lines to calculate ice thickness and to determine if the ice is bottom-fast. In areas frozen to the bottom, the line will continue over the ice and be completed as designed.

4.3.4 Line Clearing

Vegetation in the program area is generally limited to grasses, shrubs and willows, up to approximately 2.5 m in height and minimal line clearing will be required for the program. A low ground pressure tracked Nodwell survey unit or snowmobile will be used to set out the line. Lath will mark the line at 60 m intervals. The tracked units will pack the snow on the lines and little clearing or plowing should be required. 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.

4.3.5 Energy Source/Shooting

AEC is proposing to use tracked vibroseis equipment as the primary energy source. Tracked vehicles were selected for the program to minimize potential environmental impacts. The tracked vehicles have been specially built for this purpose and will replace the wheeled, 'buggy' vibroseis units used by AEC in its 2000/2001 program.

Vibroseis will be used on land and on lakes frozen to the bottom. Waterbodies that are not frozen to the bottom will be undershot by stacking source points, with the vibroseis, around the edges. On waterbodies that are undershot, receiver cables will be laid across the ice, with hydrophones planted on the bottom of the lake (Table 3).

The vibroseis units are diesel-fuelled vibrators, equipped with large-footprint, low ground pressure, rubber tracks to minimize impacts on the tundra. Each unit has a metal pad that is extended down to the ground and positioned over each of the shot points along the line. The energy is then transmitted by exerting variable pressure on the metal pad, which is held against the ground by the weight of the vehicle.

Dynamite will be used on larger waterbodies where data cannot be collected using the vibroseis techniques outlined above. All waterbodies will be drilled using a specialized casing drill technology. The casing drilling rigs are a proven technology capable of achieving depths in accordance with DFO guidelines and offset distances. The technology was used extensively and successfully on Chevron

Canada Resources 2000/2001 Langley South 3D program and has been tested, with participation from DFO, on Parsons Lake in the summer of 2000.

Table 3

Energy Source Options

	Waterbody* with Bottom-fast Ice	Waterbody* not Frozen to Bottom	
		Small Waterbody (approx. < 400 m width)	Large Waterbody (approx. > 400 m width)
Fish Habitat Assessment	Unsuitable habitat for all life stages.	Potential habitat for all fish life stages.	Potential habitat for all fish life stages.
Preferred Seismic Energy Source	Vibroseis	Vibroseis undershot on sides of waterbody or dynamite under lake or channel bed.	Dynamite under lake or channel bed.
Waterbody Setback	Vibroseis no setback required. Dynamite as per land depth, if required.	30 m for vibroseis and 50 m for dynamite, away from waterbody on land, or below lakebed in waterbody as per DFO setback guidelines (Table 4).	Dynamite 9 m below lakebed hardpan in waterbody for a 2 kg charge, or as per DFO setback guidelines or as agreed to with DFO (Table 4).
Additional Mitigation or Field Work	No debris deposited on ice or in waterbody. No alteration of stream banks or substrate.	Record waterbody location, width and depth when using dynamite. GPS location of source points. No debris deposited on ice or in waterbody. No alteration of stream banks or substrate.	Record waterbody location, width and depth. GPS location of source points. No debris deposited on ice or in waterbody. No alteration of stream banks or substrate.

* Waterbody refers to lakes, river channels or offshore

The drills use a casing drill string (8.75 cm ID pipe), which is different from a standard (6.56 cm OD pipe) cased rig system. There are two methods of casing: with and without a flushing medium (water). In certain conditions, as the hole is drilled, the cuttings are compacted onto the sides of the hole by the action of the bit and casing. In other conditions, where a soft substrate is encountered for example, high-pressure water is pumped through the bit, in order to displace the cuttings at the bit into the sides of the drilled hole. Using either method, little or no cuttings are brought to surface.

The preferred drilling system uses a retractable or retrievable drill bit casing. This system utilizes a drill bit that is attached to the casing itself during drilling. The entire depth of the hole is drilled with the bit and casing connected. Once target depth is attained, the casing is reversed about four centimetres and the bit is then pulled up through the casing. The depth of the hole is re-measured to ensure the hole has not sloughed at the bottom and remains open to the required depth. The charge is loaded through the center of the casing and the cap wires are attached. Upon removal of the casing, ground material sloughs into the hole over the charge. The detonator leads are recovered as the casing is retrieved and their location is flagged. The charge can only be detonated by attaching a detonator to the leads.

AEC is continuing discussions with DFO to determine the best way to tamp the holes, if necessary, and will follow the recommendations of DFO in this regard. Core samples can also be taken using the retractable drill bit casing to determine substrate if required.

A 'knock-off' drill bit casing system may also be used. With this system, the drill bit is attached to the outside of the casing unit. When the required depth is achieved, the casing string is reversed slightly, then lifted from the bit. As with the retractable drill bit, the hole is then re-measured to ensure no sloughing has occurred and it remains open to depth. The charge is loaded, tamped as required and the casing is removed as noted above.

In certain substrate materials, greater sloughing may occur at the bottom of the hole with the retractable bit. If, upon re-measuring the hole, it is determined the hole has not remained open to the depth required, then the retractable bit will be removed and a 'knock-off' bit will be used. Based on experience in the region last year, it is expected that fewer than 10% of the holes drilled will require the use of the 'knock-off' bit.

The depths that can be achieved using the casing drill technology are in accordance with DFO setback distance guidelines revised in December 2000. This casing rig method does have flexibility allowing for increased depth of drilling during operations.

When drilling below waterbodies, drillers will be instructed to attain a minimum depth of 9 m below the consolidated material or hardpan at the bottom of the waterbody, or as otherwise agreed to with DFO. A maximum 2 kg charge will be placed below waterbodies. This combination of charge size and placement depth exceeds the requirements of DFO as shown in Table 4. A record will be kept of each drilled shot point noting the location, depth reached, size of charge, and other pertinent details. Random monitoring of the drilling process will occur daily by the Veri Illuq field supervisor, or as otherwise required.

Table 4

Setback Distance (M) From Centre of Detonation of an Explosive to Fish Habitat to Achieve 100 Kpa Overpressure Guideline (Wright And Hopky 1998)*

Substrate Type	Weight of Explosive Charge (kg)							
	0.5	1	2	5	10	25	50	100
Rock	**3.6**	**5.0**	**7.1**	**11.0**	**15.9**	**25.0**	**35.6**	**50.3**
Frozen Soil	3.3	4.7	6.5	10.4	14.7	23.2	32.9	46.5
Ice	3.0	4.2	5.9	9.3	13.2	20.9	29.5	41.8
Saturated Soil	3.0	4.2	5.9	9.3	13.2	20.9	29.5	41.8
Unsaturated Soil	2.0	2.9	4.1	6.5	9.2	14.5	20.5	29.0

* Setback distances were revised by DFO on December 6, 2000

4.3.6 Laying-out Lines

The primary mode of cable layout and retrieval will be line crew personnel supported by tracked units. Depending on weather, availability and daylight conditions, the lines may also be laid out with the assistance of helicopter. It is expected that helicopters would only be used if delays in the program necessitated laying-out lines more quickly or if the work must be extended after April 15th.

Each of these two methods, or a combination of methods, may be used to deploy equipment. When helicopters are used, they will drop bags of recording equipment at pre-determined locations on the receiver lines, or the helicopter will move bins of equipment from a Nodwell in one location to a Nodwell in a forward location. Line crews on the ground will unpack the bags of equipment, lay-out the equipment and connect all the appropriate cables to form a continuous line of geophone strings. Cable and geophones will be laid along the side of the tracked receiver lines.

4.3.7 Recording

The recording unit (doghouse) will be positioned on a Nodwell or similar vehicle, and will travel down the line, hooking up to the cable at the appropriate locations. As the vibrators input a signal at each source point on the source line, the unit records information collected by the geophones and writes the information to tape. If dynamite recording is used, a shooter will travel down the source line, connect cap leads to the shooting unit, and detonate the charges for recording. The recording crew should average a minimum of 250 source points of production per day depending upon weather, access conditions and recording parameters.

Subject to helicopter availability and environmental constraints, the recording unit may also be positioned by helicopter at suitable locations on the lines to allow connection of the seismic line data cables. If helicopter support is used to lay-out lines or position the recording unit, 30 m diameter helipads may be required at points located approximately every two km. Lakes will be used as much as possible for helipads, although the lack of vegetation on the tundra will minimize the impacts of helicopter landing.

4.3.8 *Personnel Required*

Project Manager	1	Recording Crew Mgr	1
Survey Supervisor	1	Clerk	1
Chief Surveyor	1	Mechanic	2
Surveyors	4	Vibe Tech	2
Drill Push	1	Observers	1
Drill Foreman	1	Coordinators	2
Drillers	2	Vibe Operators	5
Drill Helpers	2	Line Truck Drivers	5
Paramedic	2	Troubleshooters	1
HSE Advisor	1	Helpers	12
Camp and Catering	5	Fuel Drivers	1
Camp Mechanic	1	Vibe Operators – Nights	5
Advance Clerk	1	Helpers – Nights	5
Bulldozing	6	Troubleshooters – Nights	2
Snocat	1	Observer	1
Grader Operator	1	Ice Profilers	2
Delta 3 Water	1	**Total**	**81**
Delta 3 Fuel	1		

4.3.9 *Equipment Required*

The specific seismic survey equipment is provided by Veri-Illuq as part of their contract with AEC. Subcontractors provide the remainder of the equipment, with the majority of the equipment coming from Inuvialuit contractors.

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

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 vibe tech/mechanic unit.
1	Foremost – 110C track Party Manager unit.
4	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

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

4.4 Camp

Although the program will require a total of 81 personnel, not all of the personnel will be on-site at the same time. A maximum 65-person seismic crew will be housed in a mobile sleigh camp. The camp will be situated along the main access routes, wherever possible.

The sleigh camp used for the 2D program will consist of three strings of trailer-type sleigh equipped structures. The camp will travel utilizing existing camp locations where possible and disturbance will be minimal. Figure 2 shows proposed camp locations. The camp will be electrically heated with three generators providing power to the camp.

The following breakdown further details the camp layout:

String A
Trailer 1 – Water Melter and Generator
Trailer 2 – Utility area and washrooms (male/female)
Trailer 3 – 8 Man sleepers
Trailer 4 – 8 Man sleepers
Trailer 5 – 8 Man sleepers (optional)

String B
Trailer 1 – Food Storage and Generator
Trailer 2 – Kitchen
Trailer 3 – Dining/Recreation Trailer
Trailer 4 – Office/Sleeper
Trailer 5 - First Aid/Medic quarters Trailer

String C
Trailer 1 – Workshop and Generator
Trailer 2 – 8 Man sleepers
Trailer 3 – 8 Man sleepers
Trailer 4 – 8 Man sleepers
Trailer 5 - 8 Man sleepers

4.4.1 *Fuel Storage*

Fuel storage for the sleigh camp will consist of six individual sleighs, each holding two, 2000 US gallon (7560 litres) diesel fuel tanks. Two additional sleighs will each carry 500 US gallon (1890 litres) of gasoline. The total volume of fuel storage for the 2D program will be 94 500 litres. If helicopters are used on the program, aviation fuel may also need to be stored. Approximately six barrels of fuel would be stored at any one time, if necessary, with the camp.

All tanks for the sleigh camp will have secondary containment with spill-proof fuelling mechanisms. All tanks and fuelling procedures will adhere to safety standards outlined within the Veri Illuq Fuel and Oil Spill Contingency Plan (Appendix B). Spill recovery and fire fighting equipment will be present at all times.

4.4.2 *Wastewater Treatment and Disposal*

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

The camp is also equipped with an incinerator. Solid refuse will be incinerated and non-combustible material will be hauled out and disposed of at an approved landfill. Veri-Illuq will track all waste produced during operations as part of regular safety reporting procedures.

4.4.3 *Water Use*

Utility water for the sleigh camp will be obtained using a snow melter, as well as water from local lakes or streams as required. Drinking water will be trucked to camp from the nearest community and will travel with the camp and crew using a Delta 3 unit.

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^3 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*.

5.0 ALTERNATIVES

The proposed program has been located to maximize the quality and location of the seismic data collected. The program area was positioned using existing data from the 2D programs conducted by AEC and Explor Data in 2000/2001, as well as past seismic programs and geological data from exploratory wells in the project area. Alternative locations will not fulfil the geophysical survey requirements of the program. However, the positioning of the seismic lines may be adjusted as necessary to mitigate any potential impact identified prior to or during the program operations. If new information on archaeological sites becomes available after submission and/or approval of this program, AEC will modify its program accordingly in order for sites to be left undisturbed.

If delays in the program necessitate extending the program beyond April 15th, dynamite will be used as a secondary energy source on the land portion of the program. Any shot holes on land will be drilled to a depth of 18 m and loaded with a maximum charge of 20 kg. The drills will be equipped with air compressors. If any water is required for drilling purposes, it will be removed from local channels and large lakes. Detonation of charges and recording would be completed with the assistance of helicopters.

6.0 CUMULATIVE EFFECTS

Cumulative effects refers to environmental and socio-economic impacts that occur when activities or disturbances overlap in time or space. It is now recognized that the combined effects of unrelated individual projects or activities can result in an accumulation of human caused changes that may be different in nature or extent from the effects of the individual activities (MacDonald 2000, Ormerod and Watkinson 2000). Potential cumulative effects pertinent to the AEC Kamik Winter 2D Seismic Program include cumulative habitat alteration in the study region, disturbance of wildlife species causing wildlife to avoid areas, and the disturbance of resource harvesting activities during the winter of 2001/2002.

Potential cumulative effects were assessed qualitatively by relating the proposed program to other activities in a region that encompasses all current lease holdings (Figure 3). The regional cumulative effects assessment area was chosen to reflect both regional spatial requirements of some of the key VECs and the interests of current exploration and development initiatives. The significance, extent, duration, magnitude and residual effects criteria used in this section are defined in Section 12.0, Proposed Mitigation and Anticipated Environmental Impacts.

Analyses of cumulative effects in this screening document are qualitative. Discussions regarding cumulative effects assessment are currently ongoing between the Joint Secretariat and industry representatives, on how to best determine cumulative impacts of development within the Mackenzie River Delta on a regional scale over a longer time frame. The EIRB and EISC are cooperating with Kavik Axys Ltd. to prepare guidelines for assessing cumulative effects (Chernoff, Pers. Comm.).

525000 530000 535000 540000 545000 550000 555000 560000 565000 570000

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7700000 7695000 7690000 7685000 7680000 7675000 7670000 7665000 7660000 7655000 7650000 7645000 7640000

69°20'00" 69°10'00" 69°00'00"

BURNT LAKE

A.E.C. EL 384

Crooked Lake

Willow Lake

Whitefish Station

Kittigazuit

EL 385

A.E.C.

A.E.C. 387

Channel

River

A.E.C. EL 385

SWIMMING POINT BASE CAMP

EL 385

PARSONS

GULF SDL 32

SDL 30

SDL 62

PETRO

N

LEGEND

- PROPOSED AEC KAMIK 2D PROGRAM
- 3D PROGRAMS PROPOSED BY OTHER OPERATORS
- PREVIOUS 3D PROGRAMS BY OTHER OPERATORS
- PREVIOUS 2D SEISMIC PROGRAMS
- PREVIOUS HISTORICAL SIESMIC FROM 1965 TO 1992
- EXPLORATION LEASE (EL) BOUNDARY
- EXISTING WELLSITE SHOWN THUS

Rev 1: Proposed Seismic Lines Lengthened

AEC

FIGURE 3

HISTORICAL AND CURRENT ACTIVITIES RELATED TO OIL AND GAS DEVELOPMENT IN THE VICINITY OF THE PROPOSED PROGRAM

MACKENZIE DELTA, N.W.T.

SCALE : 1 : 200 000

Inuvialuit Environmental & Geotechnical Inc.

INUKSHUK Geomatics Inc.

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