Paramount Resources Ltd.

Significant Discovery Licence 8, 2D Geophysical Program

Environmental Assessment EA0506-007

Round 2 Information Request Responses IR0506-007-15 to IR0506-007-23

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Submitted by:

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IR Number: IR0506-007-15 **(Source Ka'a'gee Tu First Nation (modified by MVEIRB))**

Reference: DAR Section D(1)

Preamble: *Paramount uses the phrase "low impact seismic" or "LIS" in referring to its seismic activities but does not explain the reference for the phrase.*

Request: *Please provide the origin, definition and details of "low-impact seismic" as that phrase is used by Paramount. Provide evidence to support Paramount's reponse.*

Response: The precise origin of the phrase "low-impact seismic" is unknown to Paramount. The definition and details of "low-impact seismic" as used by Paramount have their origin in guidelines established by Alberta Environmental Protection, Forest Management Division, Client and Field Services in 1994. The Geophysical Application Information form, which was filled out for all seismic exploration programs, contained a section and definition on Low-Impact Seismic. An example is shown below:

Low-Impact Seismic

Low-impact seismic (LIS) consists of various line clearing methods that result in varying levels of minimized disturbances to forest fibre and non fibre values. It is used in areas of timber concerns, sensitive soils, wildlife concerns, and recreation concerns. The combination of methods may include one or more of the following:

- Line construction up to 6 m wide
- Avoidance cutting
- Hand cut line
- Helicopter-assisted operations
- One pass operations
- Portable operations
- Meandering method of line clearing outside area of merchantable timber
- Any method which minimizes disturbance of ground cover
- Meandering method of line clearing through merchantable timber and cutblocks

These methods of line clearing must be identified on your preliminary plan map.

☒ Yes ☐ No Do you plan on carrying out any low-impact seismic on this program? If *YES*, please describe how LIS line cutting will be undertaken (including line width).

6m. AVOIDANCE CUT LINE TO BE USED IN LOW DENSITY MERCHANTABLE TIMBER.
UNMERCHANTABLE - CONVENTIONAL LINE TO BE USED
2.5m HANDCUT LINE + PORTABLE EQUIPMENT TO BE USED WITHIN THE BREAKS OF MOOSEHILLS LAKE.

The Geophysical Application Information form has evolved to the Geophysical Field Report. The relevant document which formally defines "low-impact seismic" is GFR Policy/Procedures – January 2002 17. This can be found on the Alberta Sustainable Resources website at http://www.srd.gov.ab.ca/land/pdf/PPD_2002.pdf. The portion which refers to LIS is reproduced below:

3.9 OPERATIONAL METHODS AND NEW LINE CONSTRUCTION

3.9.1 Line Construction

3.9.1.3 Line Method and Widths

The width of seismic lines falls into one of the following types. Most programs generally use combinations of line types. All widths noted below are considered the average. Any variation is not to exceed 0.5 m, except for conventional (straight). The measurements taken are to be averaged on a line-by-line and type-by-type basis. The types of lines are:

Minimal Impact Line NIL width

Low Impact Seismic (LIS) 1.0 - 4.5 m (the maximum width of any portion of an LIS line cannot exceed 5.0 m)

Conventional (straight) 1.0–6.0 m (the maximum width is 6.0 m)

Low Impact Seismic (LIS)

The objective of low impact seismic (also referred to as the "path of least resistance") is to create a narrow, continuously meandering line. This method reduces the line of sight to less than 200 m, avoids larger standing trees (*meandering avoidance)*, and leaves the soil and ground cover generally undisturbed. The line width can range from 1.0–4.5 m, and be a hand or mechanically cut line.

Note: Conventional (straight) lines with a 200 m line-of-sight pattern are not LIS lines.

Line cutting will vary with forest cover and density, terrain, line requirements and other factors. The average line width cannot exceed 4.5 m, and maximum line width cannot exceed 5 m. Generally line cutting will include several of the following:

Average line construction width of 4.5 m (meandering) or less, depending on the width applied for.

200 m maximum line of sight for wildlife reasons (see section 3.11.3).

Avoidance of standing timber.

Minimal disturbance of ground cover.

Note: In dense timber stands where LIS is not possible, conventional line types are permitted providing line of sight blockage is in place every 200 m.

IR Number: IR0506-007-16 (Source Ka'a'gee Tu First Nation)

Reference: DAR Section D(2)

Preamble: *Paramount refers to the use of mulchers as a method for reducing line widths to 4 m but only if mulchers were available for use on this project.*

Request: *Please comment on the likelihood that mulchers will be available for use on this project. If the use of mulchers is unlikely, please explain why.*

Response: The availability of mulchers, like any other equipment utilized by industry, is dependent on the laws of supply and demand. The use of mulchers has increased dramatically in the last few years as the geophysical industry has moved to reduce line-widths in environmentally sensitive areas. There are more mulchers available for hire in the market today than in the past. Nevertheless, when regulatory approvals are in hand, frozen ground conditions exist, and the call for the equipment and operators goes out, experience has shown that it can be difficult to obtain mulchers at the time they are needed.

IR Number: IR0506-007-17 (Source Ka'a'gee Tu First Nation)

Reference: DAR Section D(4)

Preamble: *Paramount states that lines will be hand-cut to a width of 1.75 m on steep slopes to allow the placement of geophones and a receiver tailspread but notes that there will be no source points.*

Request: *Please explain the comment about no source points. What information will be collected by the geophones if there is no source?*

Response: The reflection seismic method utilizes an impulsive energy source (at a source point) to create a sound wave which travels from near the surface of the earth down to reflective rock boundaries at depth where the sound wave "bounces" back to the surface. The sound wave that returns is recorded in all of the geophones (or receivers) that have been laid out along the seismic line.

In order to obtain high quality seismic data, the reflection method relies on the fact that different combinations of source points into the geophones along the line allows the same reflection point in the subsurface to be imaged (recorded) many times. The statistics that are built up in this way allow the reflected sound signal to add up so that it is stronger than other sound noises which are recorded at the same time. The more times that the same point is imaged, is related to the quality of the seismic data that is recorded. The number of times the same reflection point is imaged is called the "fold" of the seismic data. Even though no source points can be placed in a tailspread, there are reflections which are recorded from the last source point into the geophones in the tailspread.

The distance that some reflected sound information can be recorded from below is half way between the farthest geophone in the tailspread and the closest shotpoint. The quality of information obtained in the tailspread is not as good since the fold of the recording drops dramatically with the distance from the shotpoint.

IR Number: IR0506-007-18 (Source Ka'a'gee Tu First Nation(modified by MVEIRB))

Reference: DAR Section D(5)

DAR Section D(6)

Preamble: *Paramount does not provide a satisfactory answer to D(5). For example in answering D(5)(a), Paramount seems to imply that its proposed program will reduce the impacts on the environment as compared to a heli-portable project. However, Paramount provides absolutely no evidence to support this contention.*

Similarly, in answering D(5)(b), Paramount implies that the use of hand-cutting and helicopters is unsafe but provides no evidence to support this contention.

Paramount says that its proposed line widths represent the upper end of the spectrum but does not explain what factors require the use of these upper end line widths for this project.

Despite hand-cutting being specifically mentioned by the MVEIRB in D(6)(b), Paramount's response makes no mention of it.

Request:

1. *While recognizing that various species might be impacted differently, 1) contrast the potential overall impacts on wildlife due to various project alternatives in an impact matrix, and 2) rank the overall impacts of the various combinations of alternatives and suggest the optimal alternatives scenario that would achieve the objective of minimizing overall wildlife impacts due to noise, habitat disturbance, increased hunting access, etc.*

   The project alternatives which should be considered are:

   Project Timing – spring, summer, fall and winter

   Project Clearing Methods – hand cut, mulchers and bulldozer

   Project Data Collection – Standard Dynamite Drill, Enviro-Drill, Vibroseis, Mini-Vibrator

   Project Access Routes – only existing lines versus a combination of existing and new lines

   Project Access Methods– helicopter, ground vehicle

2. *Reference and provide statistics on accident and injury rates, for both Paramount and industry-wide, for 1) seismic projects as proposed by Paramount and 2) seismic projects utilizing hand-cutting and helicopter support.*
3. *Explain why Paramount is proposing to use line widths that are at the upper end of the spectrum.*
4. *Estimate the timber volume cutting requirements for 1.75 m wide lines versus 6 m wide lines.*

Response:

1. Given that it is recognized that various species might be impacted differently to noise, habitat disturbance, increased hunting access, etc it is problematic to assume that a meaningful ranking of the potential overall impacts on wildlife due to various combinations of seismic acquisition methods can be made. However, an impact matrix with a formula to define the potential overall impact was made and is show below. The formula considers that the time taken to carry out the various seismic methods is related to the impact on the wildlife. The ranking of the potential overall impacts in the impact matrix suggests that a mulched, 4m line acquired with buggy vibs might be the best choice for the program however the potential impact between the last three methods is more than likely equivalent. Use of existing lines with no regrowth would reduce the impact.

Line Clearing Method	Source Type	Access Mode	HDL	NF	LCTF	SPTF	RTF	SQRF	HAF	Potential Impact	Cost Factor
hand-cut	dynamite	heli-portable	1.75	1.0	1.25	2.5	1.25	1.50	1.0	21.97	3.00
mulcher	envirodrill	heli-assist	3.00	1.0	0.33	1.60	1.00	1.50	1.0	3.96	2.00
cat-cut	wheeled dyn	wheeled	4.50	1.0	0.33	1.00	1.00	1.50	1.0	3.22	1.25
mulcher	mini-vib	heli-assist	3.00	1.0	0.33	0.50	1.00	1.50	1.0	1.24	2.00
mulcher	buggy vib	wheeled	4.00	1.0	0.33	0.50	1.00	1.00	1.0	0.99	1.20
cat-cut	buggy vib	wheeled	5.00	1.0	0.33	0.50	1.00	1.00	1.0	1.16	1.00

Definitions/Notes

HDL: Habitat disturbance line width in meters. Greater line width equates to more disturbance

NF: Noise Factor, it has been assumed that all operations have the same noise impact.

LCTF: Line Clearing Time factor: Scaled according to the time taken to clear 1km of line for the method and line width.

SPTF: Source Placement Time factor: Scaled according to the time taken to drill 100 holes or acquire 100 vibrator points.

RTF: Recording Time factor: Scaled according to the time taken to record 1km of line.

SQRF: Seismic Quality Risk Factor: Approximates the chance that data would need to be re- acquired due to inadequate data quality.

HAF: Hunting Access Factor: Scaled according to ability for hunter to access line with an ATV. Line of sight is assumed to be limited to 200m in all cases.

Potential Impact: Defined by the mathematical relationship (HDL+NF+HAF)*LCTF*SPTF*RTF*SQRF . The HDL, NF, and HAF have been considered additive. This added result has been multiplied by all of the various time factors to yield the potential overall impact.

Cost Factor: This is the relative cost of each method. It has not been used in the Potential Impact calculation.

2. Industry wide statistics for accident and injury rates broken down in the categories conventional cat-cut seismic vs handcut heliportable were not found. Some general statistics were found on the BC-WCB website and are tabled below. Tables of statistics for both the Oil and Gas Industry as well as the Forestry Industry are shown below. Of note in the Oil and Gas statistics are the higher claims per year for seismic drilling vs seismic exploration. This may be showing that dynamite Shot Hole drilling leads to more injuries than vibroseis. The Forestry Industry statistics clearly show a much higher injury rate for manual tree falling and bucking vs mechanized tree falling. These statistics seem to illustrate the safety risk of hand cutting seismic lines. Another safety factor to be kept in mind is that the narrower, meandering lines may result in reduced access, which introduces additional safety issues such as longer response times for emergency medical care. Another safety factor is the greater number of worker exposure to the elements hours is much higher for the hand-cutting operation.

Statistics for Petroleum (Oil & Gas) Industry by CU, 2000-2004

CU	CU Description	Current No. of Active Employers (2004)	#STD/LTD/FTL Claims (Averge per year)	Work Days Lost (Average per year)	Claims Costs Paid (Average Per Year)
704002	Oil or Gas Drilling	106	35	3,738	$1,320,101
	Oil or Gas Field Servicing (other				

http://www2.worksafebc.com/Portals/Petroleum/Statistics.asp 8/16/2006

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704003	than service rigs)	467	48	3,301	$1,117,678
704004	Oil or Gas Well Servicing (service rigs)	66	14	1,206	$596,898
704009	Seismic Exploration	42	14	1,710	$2,214,433
704010	Diamond Drilling, Seismic Drilling or Shot Hole Drilling	87	26	1,685	$577,923
704015	Geological, Geophysical, Geochemical Field Work	48	1	5	$80,410
704016	Oil & Gas or Mineral Exploration or Prospecting	168	16	1,598	$1,004,891
713018	Oil or Gas Production	406	11	816	$333,351
713019	Oil Refining, Recycling, Operation of Fuel Storage Tanks	100	64	4,643	$1,872,645
721038	Oil or Gas Pipeline Construction, Repair	296	50	4,982	$2,158,458
767005	Oil or Gas Transmission	18	10	416	$275,646

Statistics for the Forest Industry by CU, 2000 - 2004

CU	CU Description	Current Number of Active Employers (2004)	Injury Rate (Avg. per year)	#STD/LTD/FTL Claims (Avg. per year)	Work Days Lost (Avg. per year)	Claims Cost Paid (Avg. per year)
703001	Chem Brushing, Weeding, Tree Thinning, Spacing	21	19.8	12	862	$81,348
703002	Brushing, Weeding, Tree Thin, Spacing nes	333	17.9	124	6,968	$1,687,201
703003	Cable or Hi-Lead Logging	91	17.6	64	5,479	$2,359,624
703004	Dry Land Sort	62	8.2	32	2,354	$756,170
703005	Forest Fire Fighting	54	9.9	14	573	$449,199
703006	Ground Skidding or Log Loading	749	6.7	96	11,514	$6,823,138
703008	Integrated Forest Mgmt.	1,258	5	822	63,859	$35,824,702
703009	Log Booming	53	11.7	20	752	$508,991
703011	Log Processing	191	2.7	12	1,098	$546,457
703012	Logging Road Construction or Maintenance	293	4.6	29	2,037	$1,197,654
703013	Manual Tree Falling and Bucking	1,175	29.9	224	20,213	$12,070,329
703014	Mechanized Tree Falling	253	3.3	17	957	$407,226
703015	Shake Block Cutting	107	25.6	60	4,829	$3,532,095
703016	Tree Planting or Cone Picking	196	15	245	8,097	$1,532,676
732024	Log Towing	37	16.9	84	4,674	$1,284,696
732043	Helicopter Logging	35	12.8	29	2,104	$1,180,805
732044	Log Hauling	1,911	5.9	179	13,813	$6,386,711

http://www2.worksafebc.com/Portals/Forestry/Statistics.asp 8/16/2006

3. Paramount is applying for the maximum line width end of the spectrum to allow the use of vibroseis equipment which it feels is required to obtain the high quality of seismic data necessary to properly image its subsurface geological objectives. Further it is the opinion of Paramount that the use of conventional vibroseis in this prospect area due to surface geological conditions related to glaciation would minimize the risk of obtaining unusable data over the prospect. Although a 5m line width will allow the safe passage of the vibroseis equipment down the line, the 6m application width is to allow for the case where a heavy snow fall reduces the effective line width. If a heavy snow fall is not encountered, the lines would only be cut to 5m in width.

4. Assuming that the timber volume (tree density) is consistent over the area of cutting, the volume of timber cut will be 6/1.75 or 3.42 times as much for the 6m wide line as opposed to the 1.75m width line. This assumes that both programs would avoid cutting the heavy stands of timber through avoidance techniques.

IR Number: IR0506-007-19 (Source Ka'a'gee Tu First Nation)

Reference: DAR Section E(1)

Preamble: *The MVEIRB requested Paramount to provide the employment requirements for the project as proposed by Paramount but did not ask for the employment requirements for the alternative means of conducting the project.*

Request:

1. A listing of all employment requirements for the SDL8 program for the following project alternatives:

a. a heliportable seismic program with all hand-cut lines;

b. a vibroseis program as proposed by Paramount but with all lines hand-cut; and

c. a dynamite seismic as program as proposed by Paramount but with all lines hand-cut.

2. Estimates of total project equipment costs and labor costs for the project as proposed by Paramount versus the 3 alternative means outlined in the first part of this IR.

Response:

1a. A heli-portable seismic program with all hand-cut lines could have the following employment requirements**:**

1 Advance man x 23 days

2 cat operators x 23 days

2 truck driver for personnel carrier x 34 days

2 Surveyors x 15 days

6 sawmen x 22 days

3 packers x 22 days

1 Party manager x 12 days

20 recorders x 12 days

1 Aboriginal monitor x 22 days

1 medic x 35 days

1 cook x 34 days

1 cook assistant x 34 days

2 camp attendants x 34 days

1 helicopter

4 heli-drills

12 heli-drill operators

1 Drill push/powder custodian x 12 days

1b. Paramount would not consider the hand-cutting of 5-6m wide vibroseis lines when a safer, quicker, and more cost effective mechanical means of clearing the lines is available. Clearing the seismic lines in this manner is somewhat analogous to giving consideration to clearing the snow off a highway with shovels.

1c. Paramount would not consider the hand-cutting of 4-4.5m wide dynamite lines when a safer, quicker, and more cost effective mechanical means of clearing the lines is available. Clearing the seismic lines in this manner is somewhat analogous to giving consideration to clearing the snow off a highway with shovels.

2. It is estimated that a heli-portable seismic program would cost on the order of 3 times more than that of the vibroseis project proposed by Paramount.

IR Number: IR0506-007-20 (Source Ka'a'gee Tu First Nation)

Reference: No reference provided

Preamble: *The COGOA requires Development Plans and Benefits Plans prior to the undertaking of certain oil and gas activities on frontier lands.*

Request: *Is there a Development Plan and Benefits Plan in place for SDL 8? If yes, please provide copies. If no, please describe the timing and process that will be used by Paramount in developing and obtaining approval for these documents.*

Response: If and when Paramount determines that potentially economic oil &/or gas reserves have been located on SDL 8, Paramount will submit a Development Plan to the National Energy Board for their approval and a Benefits Plan to Indian and Northern Affairs Canada.

IR Number: IR0506-007-21 (Source Ka'a'gee Tu First Nation (modified by MVEIRB))

Reference: No reference provided

Preamble: *A harvester compensation agreement (HCA) is a KTFN requirement for companies such as Paramount that wish to work on KTFN traditional lands.*

Request: *Is it Paramount's opinion that the SDL8 program will have a significant adverse impact on harvesting in the development area? If so, has Paramount established a process to compensate harvesters for losses incurred? Please describe and provide details of the process if it has been established.*

Response: It is Paramount's opinion that the project applied for will not be cause for a significant adverse impact on harvesting. As Paramount stated in the DAR "**t**here is some potential for hunting and trapping as wildlife presence was noted in terms of sightings and signs (scat, browse and tracks) of: white-tail deer, caribou, moose, beaver and wood frogs. The fishing potential is moderate to very low as there are limitations to the water depth, shortage of pool habitat, remoteness of the area and access limited to the winter period. In the 2001 Traditional Knowledge Study, the participating Aboriginal groups did not indicate traditional use specific to SDL 8. Paramount is not aware of traditional land use or resource harvesting undertaken on the project lands that would require specific mitigative measures be implemented. As stated earlier in this document and in the land use permit application, mitigative measures applied to other projects in the region have been incorporated into the project."

IR Number: IR0506-007-22 (Source Ka'a'gee Tu First Nation)

Reference: No reference provided

Preamble: *Paramount has been conducting a seismic line revegetation study in the Cameron Hills.*

Request: *Please provide a copy of the seismic line revegetation study and discuss how the results of this study can be used to improve this project.*

Response The Paramount initiated seismic line regeneration survey has not yet been completed.

IR Number: IR0506-007-23 (Source Ka'a'gee Tu First Nation)

Reference: No reference provided

Preamble: *Paramount should have an environmental protection plan manual.*

Request: *Please provide a copy of the environmental protection plan manual for this project*

Response: The environmental protection measures are incorporated within the land use permit application submission and as such there is no environmental protection plan manual.