



Paramount Resources Ltd.

Significant Discovery Licence 8, 2D Geophysical Program

Environmental Assessment EA0506-007

Developers Assessment Report

May 2006

Submitted by:

**Paramount Resources Ltd.
4700, 888 – 3 St. S.W.
Calgary, Alberta
T2P 5C5**

INTRODUCTION

Paramount Resources Ltd. (Paramount) submitted a land use permit application in September 2005 to the Mackenzie Valley Land and Water Board to acquire approximately 45 kilometers of 2D seismic. On November 23, 2006, Indian and Northern Affairs Canada referred the application to environmental assessment. The Mackenzie Valley Environmental Impact Review Board (MVEIRB) issued the Terms of Reference and Work Plan following the February 28, 2006 community issue scoping hearing in Hay River. Paramount has prepared this Developers Assessment Report (DAR) in response to section 4 of the MVEIRB Terms of Reference and Work Plan issued April 6, 2006.

The information provided by Paramount in the DAR contemplates that the data obtained from the acquisition of the proposed seismic program would be interpreted, at which point further assessment would be made as to whether sufficient hydrocarbon potential is perceived in the area. This assessment will determine if any further exploration activities are viable.

A Use of Traditional Knowledge in the SDL8 Program

Preamble: The Review Board attempts to ensure that aboriginal cultures, values and knowledge play an appropriate role in its determinations. The Review Board is committed to consider any traditional knowledge brought forward in its proceedings.

- 1) Please describe the steps taken by the Developer to work with traditional knowledge holders to incorporate traditional knowledge into the proposed SDL8 program;*

Paramount Response:

Paramount reviewed the Cameron Hills 2001 Traditional Knowledge Studies, which include SDL8. The first nation trapper highlighted in the studies as being the closest to the project area was retained to participate in a site review and project layout.

Traditional Knowledge holders were provided an opportunity to comment on the project through Paramount's Cameron Hills Project Update and consultation package that was distributed through band offices in August 2005.

- 2) Please describe how traditional knowledge and traditional knowledge holders have influenced the Developer's project design, impact assessment, and mitigation measures; and*

Paramount Response:

Though the 2001 Traditional Knowledge study does not indicate any traditional activity over the project area, Paramount incorporated its experience in the region and what has previously been advised by community members. Project design, impact assessment and mitigative measures address:

- Protection of permafrost
- Avoidance cutting to save larger trees
- Minimize line of sight to reduce animal predation
- Protection of vegetation to minimize erosion
- Minimize impact on wildlife by avoiding migrating times, nesting & mating seasons, forbidding harassment, hunting & trapping
- Participation of an aboriginal member in site selection
- Provision of employment opportunities
- Participation of an aboriginal monitor during line clearing

3) *Please provide the Review Board with any plans for future cooperation between the Developer and traditional knowledge holders in order to further incorporate, where applicable, traditional knowledge. For example, this may include consideration of monitoring programs and mitigation efforts.*

Paramount Response:

In addition to the participation of a first nation trapper in the project scouting, Paramount intends to offer an employment opportunity for one aboriginal monitor with traditional knowledge of the general area, during line clearing. The monitor's responsibility will be to highlight and document any potential traditional knowledge concerns identified in the program area.

Upon completion of the project, Paramount suggests that the same monitor that was present during line clearing, accompany the Indian and Northern Affairs land use inspector during the post land use inspection.

4) *Please provide a summary of any traditional knowledge (or local knowledge) that is available to Paramount concerning the specific SDL8 area. This should include, but not necessarily be limited to:*

- a. *Knowledge collected from the trappers who use the SDL8;*
- b. *Information from Paramount's 2001 Traditional Knowledge Study;*
and
- c. *Any other TK sources available to Paramount that may be applicable (i.e. harvesters from northern Alberta).*

Paramount Response:

There was no traditional use specified by any of the participants specific to SDL8 program area in the 2001 Traditional Knowledge Study, which included participation from Deh Gah Got'ie First Nation and Fort Providence Metis Nation; Ka'a'Gee Tu First Nation; K'atlodeeche First Nation and Hay River; West Point First Nation; and Dene Tha' First Nation in Alberta. These studies were previously provided to the MVEIRB under confidential cover, not to be placed on the public registry.

A first nation trapper from the general area participated in the project

scouting in order to provide input on line placement and to provide traditional knowledge and any concerns that relate to the proposed project. There were no concerns raised or additional traditional knowledge provided.

B Description of the Existing Environment

Preamble: While Paramount's LUP application to the MVLWB provides some biophysical description of the SDL8 area, the Review Board requires further information to help it in its determinations.

- 1) *Please provide the Review Board with a description of the surficial geology in the area, which should include, but not necessarily be limited to:*
 - a. *A discussion regarding the characteristics of glacial gravel deposits in the SDL8 area, including their size, depth from surface, composition and extent;*
 - b. *Maps which depict the surficial geology of the SDL8 area; and*
 - c. *Any other information regarding surficial geology characteristics in the SDL8 area which may have a potential influence on seismic exploration.*

Paramount Response:

Most of the surficial deposits that occur throughout Northern Alberta and the southern NWT were deposited during the Pleistocene glaciations that occurred between 25 and 12 thousand years before present. The Cameron Hills area is one of a number of highlands present throughout northern Alberta and the southern Northwest Territories. The Cameron Hills were glaciated with at least two phases of ice advance. Air photos and satellite imagery of the area, especially on the Cameron Plateau, show a striated surface comprised of sand and gravel ridges. Separating these highlands are major drainage ways and the subject SDL is located at the edge of such a drainage way at the base of the escarpment that defines the southeast edge of the Cameron Hills. SDL8 is located approximately 8 km to the southeast of the Cameron Hills. Surficial deposits will be a combination of glacial till comprising clays, silts, sands and gravels that were deposited in the drainage system during still stands of the glacial episodes or during the significant movement of water and sediment resulting from retreat of the glacial ice to the northeast. This glacial till is then most likely capped by recent deposits associated with the erosion of the Cameron Hills highlands into the same drainage system as a combination of coalescing alluvial fans mixed with fluvial sediment. The thickness of either sediment type is unknown as a detailed study of the surficial sediments has not been completed by Paramount nor is such a study available, that we are aware of. However, based on our understanding of the geology of this area, we believe that there is a good chance that unconsolidated surficial sand and gravel sediments would be present within the proposed seismic program area.

The Geological Survey of Canada has not mapped this particular area in detail and the only map available is at the 1:500,000 scale (Trout River Map

1371A) and indicates that shales of the Cretaceous Fort St. John Group will be present immediately below the glacial drift (see attached map section).

Past experience has shown that the presence of unconsolidated surficial sediments in areas of glaciation can affect the quality of seismic data records in a negative way. Industry and Paramount have had some success utilizing a surface energy source such as vibroseis to record higher quality records in these areas.

C Public Consultation

Preamble: The purpose of public consultation is to provide those who might be potentially affected by the proposed development with the opportunity to participate in the EA. Consultation with any community, aboriginal group or other organization with interests related to areas that might be affected by the development should be considered in this section.

- 1) *Please provide an account, in the form of a consultation log, of the activities that Paramount has undertaken to inform the public and solicit opinion regarding the SDL8 program. The consultation log, addition to identifying consultation dates, should give consideration to individuals and organizations consulted with, as well as discussion topics, a summary of views, and outcomes.*

Paramount Response:

The people referenced under the August 2005 consultation date received the Cameron Hills Project Update and consultation package specific to the proposed 2D seismic program on SDL 8, which forms part of the land use permit application. No comments were received by Paramount other than those forwarded by the Mackenzie Valley Land and Water Board from reviewers.

Date	Name	Company/Agency
Aug/05	Pierre Alvarez	CAPP
	Ian Scott	CAPP
	Chief Herb Norwegian	Deh Cho First Nation
	Chief Berna Landry	Deh Gah Got'ie Dene First Nation
	Bruce Hanna	Department of Fisheries & Oceans
	Winnie Cadieux	Enterprise Settlement Council
	Mike Fournier	Environment Canada
	Steve Harbicht	Environment Canada
	Albert Lafferty	Fort Providence Metis Council
	Deb Archibald	GWNT
	Bob Bailey	Team Leader, GWNT
	Brendan Bell	Minister, Industry, Tourism & Investment, GWNT

	Karen Cooper	GWNT
	Charles Dent	Minister, ECE, GWNT
	Premier Joe Handley	GWNT
	Charles Jacobson	GWNT
	Paul Kraft	GWNT
	Tom Lakusta	GWNT
	Michael Mageean	GWNT
	Rachel Marin	GWNT
	Michael Miltenberger	GWNT
	Dave Nightingale	GWNT
	Juanita Robinson	GWNT
	Albert West	GWNT
	Peter Vician	GWNT
	Paul Vieira	CEO, Hay River HSSA, GWNT
	Alan Hollingworth	Gowling, Lafleur & Henderson
	Diana Ehman	Town Hall of Hay River
	Karen Boudreau	President, Hay River Chamber of Commerce
	Paul Delorey	MLA, Hay River North
	Jane Groenewegen	MLA, Hay River South
	Andrew Forbes	INAC
	Mimi Fortier	INAC
	Andrew Graw	INAC
	Wayne Greenall	INAC
	Kate Hearn	INAC
	Bob Overvold	INAC
	Michael Vandell	INAC
	Dan O'Rourke	Consultant
	Chief Lloyd Chicot	Ka'a'gee Tu First Nation
	Chief Roy Fabian	Kátlodééche First Nation
	Michael McLeod	Minister, MACA & MLA, Deh Cho
	Liza McPherson	Superintendent, MACA
	Bob Wooley	Mackenzie Valley Land & Water Board
	Louise Mandell	Mandell Pinder Barristers & Solicitors
	Bharat Dixit	NEB
	Michel Mantha	NEB
	John Ramsey	Natural Resources Canada
	Charles Arnold	Prince of Wales Northern Heritage Centre
	Chief Dennis Deneron	Sambaa K'e Dene
	Chief Karen Felker	West Point First Nation
	Derek Neary	Editor, Deh Cho Drum
	Joseph Lanzon	JCL Consulting
July 16/05	Raymond (Roy) Buggins	Participated in scouting the program area. No concerns were raised.

D Seismic Exploration Practices and Alternatives

Preamble: The Review Board requires that Paramount further justify its intended approach to acquiring seismic data in the SDL8 area. Alternative approaches to conducting the seismic program should be considered in the DAR. The Review Board has listed a number of alternatives to carrying out the seismic program that should be considered in detail:

- 1) Please discuss the methods of seismic exploration that Paramount has recently carried out in other parts of the Northwest Territories, Alberta or British Columbia, and compare and contrast these with best environmental practices in the industry. If the techniques differ from those proposed for the SDL8 area, please account for the differences.*

Paramount Response:

Methods of seismic exploration can vary for each project area according to several factors. Primary factors include environmental conditions, safety considerations, seismic data requirements, equipment availability, and terms and conditions of program approval.

For example, in the Bistcho area of north-west Alberta approximately 80 km south of the NT border, Paramount has recently acquired a dynamite source 2D seismic program which was cut with a line width of 4.5m. The program was cut using low-impact (LIS) methods of line cutting as per best environmental practices in the industry. Lines were cut so that a continuous line of sight would not exceed 200m where sufficient vegetative cover is present. This project is within a caribou zone and the line of sight restriction is designed to reduce animal predation. Alternate windrowing was required every 400m. All wood debris and leaning trees were slashed, limbed, and bucked flat to the ground with the length of slashed wood debris not exceeding 2.4m. Another program in the Bistcho area where poor quality seismic records were related to unconsolidated gravels and sands at the surface was more successfully acquired using a vibroseis source. In this case, the same LIS method of line cutting was employed; however line widths were 5m due to the slightly greater width of the vibroseis equipment.

- 2) Please discuss the availability of methods to reduce the width of seismic cutline for either dynamite- or vibroseis-based seismic exploration in the SDL8 area. If in Paramount's opinion, there is no opportunity to reduce cutline widths, please provide detailed justification for this.*

Paramount Response:

The applied for 6m cut line width represents the maximum possibility that might be required in the LUP for the proposed program. Our application contemplates the use of either dynamite or vibroseis as a source. This would allow us to use either method should, for example, equipment availability become an issue. Under normal winter conditions, when using cats to construct the lines, the line width would be 4.5m for a dynamite program, and

5m for a vibroseis program. Should a winter with extreme snowfalls occur, our experience has shown that an additional 1m of line width may be required to accommodate the snow on the line and still have enough room for equipment movement, hence the 6m line width maximum applied for. In recent years industry and Paramount have successfully utilized mulchers as an alternative to cats to reduce cutline widths. If mulchers were available for use on this project it would be possible to reduce the line width under normal winter conditions to 4m for use in either the dynamite or vibroseis source options.

- 3) *Please justify the proposed windrow break frequencies suggested for the SDL8 program (400m). How does the proposed windrow break frequency compare to the best industry practices occurring in other parts of the Northwest Territories, Alberta or British Columbia?*

Paramount Response:

Paramount has used various windrow break frequencies as part of their approval conditions. For example alternate windrowing at 400m was an approval condition for a recent program in the Bistcho area of Alberta. Permit approvals in the NT in the Liard area and the Cameron hills areas have the condition of making breaks in the windrow of at least 7 meters wide at intervals of not more than 330 meters. The windrow of brush and debris in either case is lain flat and compact. These methods of windrowing compare favorably for best industry practices for cat cut lines.

- 4) *Please describe what method of seismic exploration Paramount proposes to use in the steeply sloping western portion of the SDL8 area. How will the method mitigate against potential erosion and sedimentation in this area?*

Paramount Response:

For those portions of the seismic lines which are in the steeply sloping western portion of the SDL8 area erosion bars will be installed and the area will be reseeded where erosion control is required. The steepest portions of the slopes will be hand-cut to a 1.75m line width to allow the placement of geophones and a receiver tailsread (ie. No source points).

- 5) *Please discuss the applicability of using helicopter-based seismic exploration to carry out the SDL8 seismic program. This discussion should include:*
- a. *Seasonal factors in conducting a heli-seismic operation (i.e summer vs. winter);*
 - b. *Safety considerations (during all seasons);*
 - c. *Potential effects to wildlife (during all seasons);*

Paramount Response:

Heli-portable may be the most appropriate choice under some circumstances, for example very steep mountain conditions or very remote locations; however, it has several operational constraints that limit its appropriateness under certain conditions.

Seasonal

Paramount proposes conducting the seismic in winter under frozen ground conditions to reduce impact on the environment. During the winter, limited daylight conditions reduce the working day to an impractical length.

Safety

The hand-cutting of the very narrow seismic lines is inherently more dangerous than other methods of line construction. The use of helicopters to transport the portable drilling rigs from shot point to shot point as well as movement of all personnel and line equipment also increases the safety risk.

- 6) *Please discuss the applicability of using low-impact seismic techniques to carry out the SDL8 seismic program. The discussion should include:*
- a. *Use of low-impact drills ("enviro-drills");*
 - b. *Use of hand cutting or tree mulchers to clear access;*
 - c. *Safety considerations;*
 - d. *Potential effects to wildlife;*

Paramount Response:

Paramount is proposing to use low-impact seismic LIS techniques to carry out the SDL8 seismic program. The use of avoidance techniques to minimize the cutting of merchantable timber, and the reduction of line-of-sight on cutlines to reduce animal predation are the key components which define the method. There is a range of line widths in the industry best practices LIS definition. A 4.5m to 5m vibroseis line or 4m dynamite line represents the higher line width end of the spectrum. If a dynamite program was conducted, it is possible to reduce the line width to 3m by clearing the lines with mulchers and utilizing small drills (Bombies or enviro-drills). In areas where the objective of the survey is very shallow it is possible to operate a mini-vibrator on a 3m mulched line. The objectives for the SDL8 program are too deep to make use of the mini-vibrators. Any of these LIS techniques can be conducted in a safe manner. The use of any of these LIS seismic techniques, especially when combined with access controls, minimizes the potential effects to wildlife. At this time, it is Paramount's preference to utilize the vibroseis source so as to acquire the best quality data possible to minimize the necessity to have to reacquire the data if results are poor. Depending on equipment availability, the use of mulchers or the dynamite acquisition method could be employed, and line widths would vary accordingly.

E Impacts to the Human Environment

Preamble: Assessment of the human environment (social, economic and cultural) is an important part of any EA in the Mackenzie Valley, in relation to both the identification of potential adverse impacts on the human environment and of public concern.

- 1) *Please provide a listing of all employment requirements for the SDL8*

program for both vibroseis- and dynamite-based seismic programs.

Paramount Response:

A vibroseis project 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 2 days
 - 2 Surveyors x 15 days
 - 2 chainers x 15 days
 - 4 Slashers x 22 days (see note below)
 - 1 Party manager x 9 days
 - 20 recorders x 9 days
 - 1 Aboriginal monitor x 22 days
 - 1 medic x 30 days
 - 1 vibrator tech x 9 days
 - 3 vibrator operator x 9 days
 - 1 cook x 34 days
 - 1 cook assistant x 34 days
 - 2 camp attendants x 34 days
- Note: if mulching methodology is utilized, slashing personnel are reduced significantly

A dynamite project would require all of the above, excluding the 1 vibrator technician and the 3 vibrator operators, in addition to:

- 1 Drill push/powder custodian x 8 days

- 2) *Please discuss Paramount's strategies, plans or commitments with respect to maximizing the proportion of the SDL8 workforce that are NWT residents, aboriginal persons, and residents of potentially-affected communities;*

Paramount Response:

Paramount will request an updated list of available & qualified services from communities then provide these lists and contact information for community employment coordinators to the primary seismic contractor for bidding purposes. The Cameron Hills Update has already informed communities of potential employment opportunities. Paramount will adhere to Indian and Northern Affairs Canada Statement of Principles for providing opportunities to northerners.

- 3) *Please identify the contractor and subcontractor goods and services required for the SDL8 program with consideration to the opportunities for local businesses to supply the required goods and services for the proposed development. Discuss any plans, commitments or strategies Paramount has for maximizing business opportunities for NWT-based companies.*

Paramount Response:

The types of equipment that may be required are outlined in the land use permit application section 4.5 Equipment. Please refer to the response given in 2) above for commitments and strategies.

- 4) *Please describe any potential direct and indirect effects that the SDL8 program may have on hunting, fishing, trapping and other activities for persons and organizations from the potentially-affected communities; and*

Paramount Response:

There 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.

- 5) *Identify all measures required, and commitments made, by Paramount to mitigate against adverse effects on both traditional land use and resource harvesting from the land.*

Paramount Response:

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.

F Vegetation

Preamble: Disturbance to vegetation in the SDL8 area, and its associated effects to wildlife habitat, were noted in the Hay River Community Scoping Hearings. The Review Board requests the following information regarding vegetation.

- 1) *Please discuss the suitability of the seed mixes, which Paramount employs for erosion control in the main Cameron Hills area, for use in the SDL8 area.*

Paramount Response:

It is anticipated that little or no erosion will take during the line cutting activity as Paramount will conduct this activity during the winter months and instruct its equipment operators to not disturb the duff or moss layer. All woody debris will be slashed into 2-metre lengths or less and bucked to lie flat. The debris will be pushed into windrows on one side of the seismic line

with breaks every 400 metres of at least 10 metres in length. These activities will lessen the opportunity for erosion to occur.

Seeds from species that are both endemic to the project region and suitable for revegetation programs are seldom available in commercial quantities. However if it does come to pass that erosion occurs, then we will use the following seed mixture already approved by the **National Energy Board** and the **Government of the Northwest Territories** for the Cameron Hills area namely:

<u>Seed Species</u>	<u>% Composition</u>
Regreen wheat x wheatgrass	15
Awned wheatgrass	25
Fall Rye	50
Slender wheatgrass	10
Total	100

This seed mixture will require a seeding rate from 10 kg/ha to 20 -30 Kg/ha and use a fertilizer mixture of approximately 20/20/20 (N-P-K). If the fertilizer application is a one time event, then the subsequent die off of this grass type will allow for propagation of adjacent native species.

- 2) *Based on the example of forest re-growth in the cutlines cleared in the 1960's in the SDL8 area, please discuss the following:*
- a. *The amount of re-growth that has occurred in the SDL8 area on old cutlines, including a consideration of tree heights reached;*
 - b. *The amount of time that it will take for vegetation in the proposed cutlines to reach a climax [mature] stage.*
 - c. *The composition of the plant communities that have re-grown in the area;*
 - d. *The habitat value of the re-grown vegetation during vegetative succession following the program, and the wildlife species that prefer it, as compared to the habitat value of climax [mature] vegetation and the wildlife species that prefer it.*
 - e. *The quality of the future re-grown vegetation as it pertains to economic use;*
 - f. *The potential impacts to the forest health that re-clearing of the re-grown seismic lines may have, and the potential for this to lead to degradation of the area.*

Paramount Response:

As the proposed linear disturbance is small in relation to the size of the project area [approximately 5.2 km by 3.7 km], the vegetation regrowth will be out of sync with the surrounding tree species for a period of time.

Aerial reconnaissance was conducted on SDL 8 and good regrowth along the pre-existing cutlines was observed. Generally, aspen has been the tree species that has regrown naturally even in forest blocks of white and black spruce bisected by the 1960 cutlines. This regrowth tends to be between 25 and 75% of the surrounding forest height.

Ground-truthing at two suitable landing locations, not on the seismic lines, noted Labrador tea, prickly rose, woodland horsetail, bog cranberry, stair-step moss and bunchberry plant species.

G Cumulative Effects

Preamble: Pursuant to Section 117(2)(a) of the MVRMA, the Review Board considers cumulative effects in its determination. The following items are required for consideration of cumulative effects:

- 1) *Please identify which Valued Components of the environment may, in the opinion of Paramount, be affected by multiple human activities or developments.*

Paramount Response:

Paramount is not aware of any other multiple human activities or developments other than this seismic program (cut, survey and record) conducted over a maximum 40 day period during a single winter season.

- 2) *Please identify past, present and reasonably foreseeable human activities (including but not limited to the activities of Paramount) that may affect the Valued Components identified above. In addition to describing these activities, include the following:*
 - a. *A discussion of human activities considered, but not included and the rationale for that decision; and*
 - b. *The rationale for activities you have included.*

Paramount Response:

There 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.

- 3) *Please predict the combined effects of the developments identified in (2) on the Valued Components identified in (1). Your prediction should include but not be limited to the following:*
- a. *Potential effects to the Valued Components of the environment likely to result from the proposed development in combination with past, present or reasonably foreseeable developments; and*
 - b. *The contribution of the SDL8 development to these larger cumulative effects.*

Paramount Response:

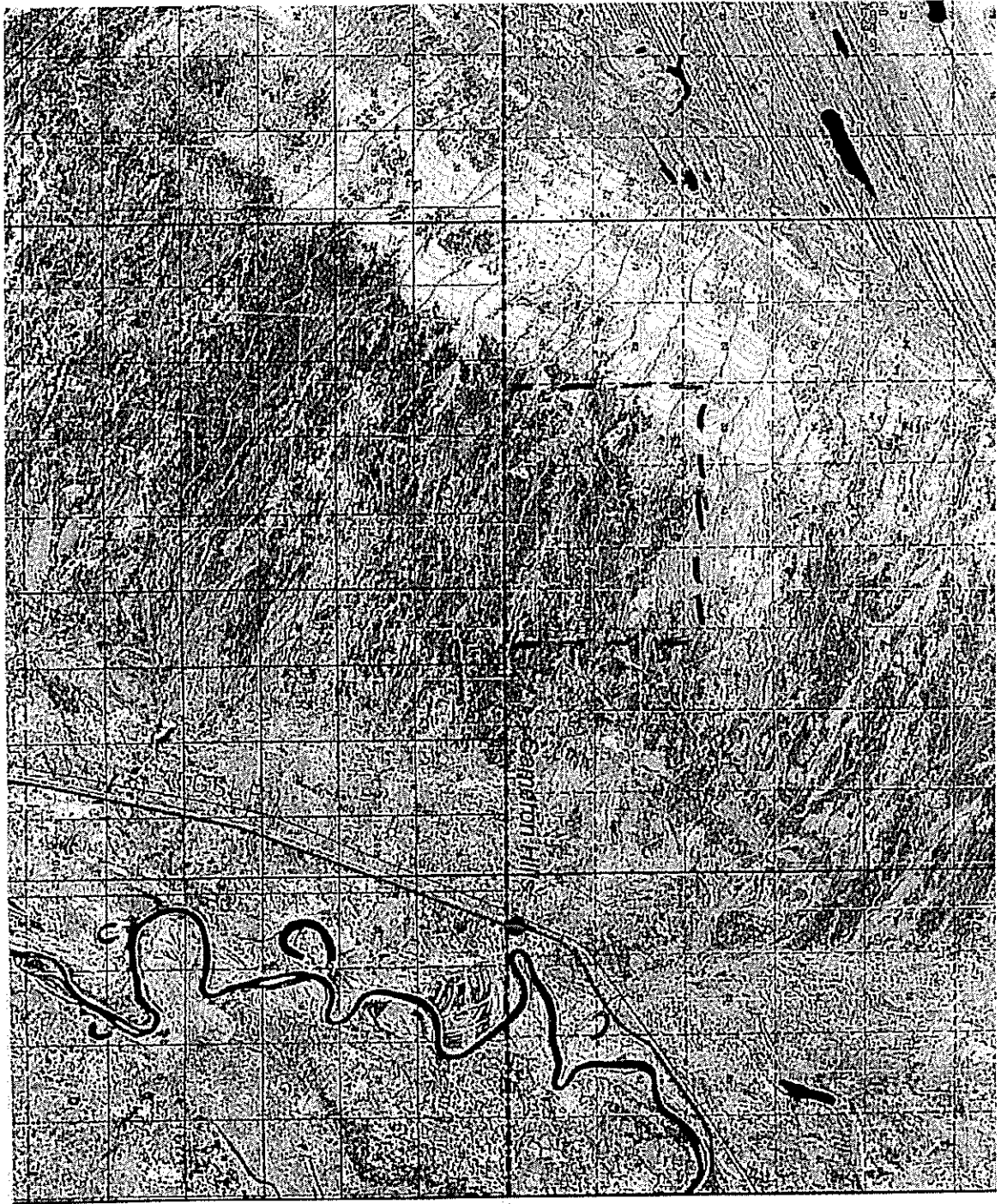
As the proposed seismic program is limited in scope and timing, Paramount predicts the impacts of its activities to also be limited in scope.

- 4) *Describe how Paramount plans to manage its activities to minimize or avoid contributing to these cumulative effects.*

Paramount Response:

This is a plan of an activity that has a number of stops along the way. It begins with this proposed 2 D seismic acquisition. The results from the seismic program will determine whether Paramount ceases any further exploration activity on SDL 8 or goes forward with a more definitive seismic program (2D and /or 3D) or proceeds with drilling a well.

It is Paramount's intent to obtain the highest quality seismic possible using quality technology to ensure success and to minimize the need to re-shoot seismic. Paramount proposes to utilize the vibroseis method, but will consider drilling several test holes to determine the extent of sub-surface gravel deposits which will determine if the dynamite method as a future option.



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