



# DEH CHO FIRST NATIONS

BOX 89, FORT SIMPSON, N.W.T. X0E 0N0

TEL: (867) 695-2355 FAX: (867) 695-2038

E-Mail: [dehchofn@cancom.net](mailto:dehchofn@cancom.net)



April 11, 2003

Alan Ehrlich

Mackenzie Valley Environmental Impact Review Board

Re: Western Geco Information Requests

Deh Cho First Nations submit the following Information Requests pertaining to Western Geco.

**Reference** Environmental Assessment Report (EAR),  
Section 1 – Introduction  
EAR, Section 6 – Regulatory Approvals  
EAR, Section 10.3.6 – Induced Development

**Preamble** WesternGeco (WG) notes that the program is not being conducted for one oil and gas company, but rather the seismic data will be available for purchase by all interested parties. The program is not connected with any plans for drilling in the river. WG states that the program is to tie together existing data from the Mackenzie Delta, Norman Wells and Fort Liard areas to assist with broad scale exploration planning.

In Section 6, WG notes that the Mackenzie River waters, riverbed and a buffer zone along the river have been withdrawn from development in the Deh Cho First Nations' Interim Land Withdrawals. The buffer zone is 1 km wide on both sides of the river.

In Section 10.3.6, WG states that, due to the completion of this seismic program, potential future 2D and/or 3D programs along the Mackenzie River

would be expected to occur on land, stopping short of the river edges.

- Request:**
- a) How wide will the strip of collected seismic data be?
  - b) Will the seismic data strip be confined to the area under the river or will the path of the seismic vessels also allow data to be collected from under the land as well? Please identify any areas within the Deh Cho region where seismic data under land will be collected.
  - c) As the Interim Land Withdrawals prohibit land-based seismic and oil and gas drilling within the 1 km wide buffer zone, please comment on the effect this will have on the sale and usefulness of the seismic data that is collected with this program.
  - d) Please comment on the potential of using directional drilling to gain access to oil and gas deposits identified by this program without breaching the 2 km wide buffer zone. Would directional drilling be possible without additional land-based seismic to refine drilling targets (i.e. Is the seismic data collected from this program going to be good enough to define drilling targets on its own?)

2) **To:** WesternGeco

**Reference** EAR, Section 3.2.3 - Airguns

**Preamble** WG says that the airguns will be towed 2.5 m below the water surface and that the airguns will be kept a minimum of 1 m above the river bottom to avoid kicking up silt and sand particles.

- Request:**
- a) What will WG do if depths of less than 3.5 m are encountered?
  - b) What is the basis for WG's determination that the airguns must be kept a minimum of 1 m above the river bottom?
  - c) How will WG know whether or not sediment is being disturbed?
  - d) What will WG do if sediment is being disturbed?

3) **To:** WesternGeco

**Reference** EAR, Section 3.2.3.1 – Array Configuration  
EAR, Appendix II, Figure 4  
EAR, Appendix III, Section 3.1.1

**Preamble** The main body of the EA report says that the two sub-arrays will be mounted with a 12 m separation. However, Figure 4 of Appendix II shows that a 17 m separation was used during the test programs. Section 3.1.1 of Appendix III says that a 10 m separation was used during the test programs.

- Request:**
- a) What separation was used between the two sub-arrays during the test program?
  - b) What separation will be used during the full seismic program?
  - c) If the answers to b) and c) are different, please provide the reasons for the change and discuss how the different separation distances will change the sound produced by the array. What are the implications of the change on applying test program data for predicting the impacts of the full seismic program?

4) **To:** WesternGeco

**Reference** EAR, Section 3.2.5 – Recording  
EAR, Section 3.2.5.2 – Program-Specific Details

**Preamble** Section 3.2.5 says that the streamers will be towed at a depth of 3 to 5 m. However, Section 3.2.5.2 says that the streamers will be used in water that is just 2 m or deeper.

**Request:** Please reconcile these two statements.

5) **To:** WesternGeco

**Reference** EAR, Section 5.1.2 – Depth of Array  
EAR, Appendix VII

**Preamble** WG writes that the airgun effects are diminished near the bottom both in terms of pressure (psi) and acoustic pressure (dB).

However, this seems to be contradicted by the definition of *Transmission Loss – Depth in Water Column* provided in Appendix VII. The definition says that received sound levels are generally quite low near the surface and that in some instances received sound levels can be relatively high near the bottom.

**Request:** Please reconcile these seemingly contradictory statements regarding sound levels at the bottom of the water column.

6) **To:** WesternGeco

**Reference** EAR, Section 3.2.4 – Source Controller  
EAR, Section 5 – Project Alternatives

**Preamble** In Section 3.2.4, WG concludes that ramping up has no effect and does not result in fish avoiding the airguns. However, WG intends to use ramping up anyway just as a precautionary measure.

Given that WG believes that ramping up is not effective, a discussion on alternatives that could be used instead of ramping up would be justified.

**Request:** Please describe any alternative technologies and/or procedures, and their effectiveness to achieve fish and wildlife avoidance, which could be used instead of ramping up.

7) **To:** WesternGeco

**Reference** EAR, Section 8.6.4 – Cultural and Historic Resources

**Preamble** WG concludes that since there are no land-based activities associated with the project, no residual impact to cultural and historic resources is predicted. This conclusion, however, reflects the perspective that only specific artifacts and sites are considered cultural resources. The perspective that the Mackenzie River itself is considered a cultural resource is not captured by WG's analysis.

**Request:** Please re-write Section 8.6.4 including the perspective that the Mackenzie River itself is a cultural resource to be protected.

8) **To:** WesternGeco

**Reference** EAR, Appendix II, Section 5.8 – Fish Cage Measurements  
EAR, Section 8.2.1.2 – Physical Effects of Airgun Operations on Fish  
EAR, Appendix III, Section 3.3.4.2 – Placement of

### Fish Cages

#### EAR, Section 9.2.1.1 – Near-field to Far-field Measurements

**Preamble** In Appendix II, WG notes that the nearest field measurement was made at the 8 m from the airguns while the actual fish exposure was at 1 m (since corrected to 2 m). The level at 2 m was predicted to be approximately 230 dB (peak based on near field measurements).

In Section 8.2.1.2, WG reaffirms that the exposure level (dB reported in peak sound levels) was 230 dB re  $\mu\text{Pa}$  at 2 m from the airguns.

In Appendix III, Section 3.3.4.2, WG states that the exposure level at 2 m from the airguns was 224 dB re  $\mu\text{Pa}$ .

In Section 9.2.1.1, WG writes that "Peak noise levels at 25 m from the airgun arrays were 244 dB re  $\mu\text{Pa}$ ".

- Request:**
- a) Please confirm that the 230 dB level at 2 m from the airguns was a calculated, not measured, value.
  - b) Please explain why the measurements were made at 8 m and not at 2 m.
  - c) Please explain which value was the actual exposure level at 2 m from the airguns, 230 dB or 224 dB re  $\mu\text{Pa}$ .
  - d) Please explain why cages were not placed at 25 m from the airgun arrays given that the data indicates a greater exposure level at 25 m than at 2 m or at the other two cage locations. As such, the information presented

by WG cannot seem to be considered to be the worst-case scenario.

9) **To:** WesternGeco

**Reference** EAR, Section 9.2.2.1 – Physical Impacts  
EAR, Appendix V, Page V-32

**Preamble** WG concluded that there was no short-term mortality and no physiological abnormalities of internal organs attributable to the sound pressure effects of caged fish exposed to ramp up procedures and airgun insonification by the 1500 in<sup>3</sup> airgun array.

WG's histopathological analysis of fish exposed at a distance of 2 m from the airgun array showed that there were no significant abnormalities of the hearing structures. Further, there were no signs of injury to the hearing organs of small or large-bodied fish exposed at various distances from the airgun. WG concludes that impacts on fish hearing due to the project are predicted to be negligible.

The "stunned" fish do not seem to have been separated or marked to distinguish them from the non-stunned fish. The stunned fish and the non-stunned fish were mixed together during the 48-hour holding period after the cage tests.

Appendix V contains notes from a Dec. 5, 2002 technical workshop. During the workshop, Steve Whidden stated that this test was a worst-case scenario and that, in reality, the fish would never have this sort of exposure.

Seventeen fish escaped during the 48-hour holding period.

- Request:**
- a) Why was 48 hours selected as the length of the holding period? Was that a long enough period for physical impacts to develop and be detectable?
  - b) The cages were placed 2 m, 85 m and 446 m away from the airguns. However, no large-bodied fish were placed in the 2 m cage. Large-bodied fish were only tested at 85 m. Why was this? How will this allow impacts on large-bodied fish to be predicted at close range?
  - c) Why were large-bodied fish only used in one trial?
  - d) The large-bodied fish used for the tests included 28 fish from 5 species. However, only 3 of the 28 fish were selected for histopathological analysis. All three of these fish were flathead chub. Given that there was an opportunity to collect data from 5 species, why were only flathead chub selected for histopathological analysis? How does the data from this species transfer to other large-bodied species? Are flathead chub considered to be more or less "hardy" than other large-bodied fish?
  - e) No whitefish species were used in the cage tests. Why not? Are the results from the other species transferable to the whitefish? Are whitefish more or less sensitive to noise than the species that were used?
  - f) WG uses the phrase "no significant abnormalities of the hearing structures", implying that there were "not significant" abnormalities. No information is provided on



these abnormalities. Please describe the abnormalities that WG observed but that were considered "not significant". Please explain why they were considered "not significant".

- g) Please confirm that the "stunned" fish were not separated or otherwise marked for later identification and that it is not known for certain that any of the stunned fish were sent for histopathological analysis. Please explain the rationale for not ensuring that stunned fish were analysed.
- h) Please explain why WG believes that, in reality, the fish would never have this sort of exposure. Given that WG is concluding that the fish do not show any avoidance behavior then it seems to be likely that there will be close range exposures.
- i) Please explain how the 17 escaped fish affected the data analysis and presentation of results.

10) To: WesternGeco

**Reference** EAR, Section 9.2.2.2 - Behavioral Impacts

**Preamble** WG cited numerous studies that reported avoidance behavior by fish exposed to noise. However, WG's test programs did not detect any avoidance behaviour. WG did cite one other study that also did not detect avoidance behaviour. Both WG's study and this other study concluded that fish distributions are naturally variable and that there was no statistically significant effect of the seismic survey upon fish distributions (i.e. no avoidance behaviour).

As the fish exhibited no avoidance behavior, WG also concluded that the project would not result in fish herding.

WG noted that both its 2002 test program and the other study that obtained similar results were the only studies found that used hydroacoustics to monitor fish movement. Given that finding and the fact that these two studies produced different results than other studies, WG should have followed up with a discussion on whether or not there is a problem with using hydroacoustics for this purpose.

- Request:**
- a) Please provide some rationale for why the two studies that used hydroacoustics produced results that differed from other studies. Does hydroacoustics not detect the avoidance behavior? Or is hydroacoustics more sensitive than the methods used in the other studies and the conclusions made by the others are incorrect due to their methods?
  - b) On page 7 of Appendix III, WG writes that "The data that we present, therefore, is a conservative estimate of the size and abundance of fishes...". As the term "conservative" varies with perspective, did WG mean to say that their estimates were low?

**11) To:** WesternGeco

**Reference** EAR, Section 9.2.2.2 – Behavioral Impacts  
EAR, Appendix III, Page 26 and Figures 5 to 7

**Preamble** WG's vertical acoustic monitoring consisted of doing transects across the river at various locations and at various times relative to the firing of the

airguns to measure the number of fish per cubic meter of water. Four transects were done in each of the three test areas. Each transect was completed 5 times: before ramp-up, after ramp-up, immediately in front of the airguns, immediately after the airguns and well behind the airguns. The data analysis concluded that the differences in the numbers of fish per cubic meter between times were not statistically significant.

- Request:**
- a) How wide are the transects? It is assumed that they are three-dimensional as the data is presented as fish/cubic meter.
  - b) The last paragraph on page 7 of Appendix III lists portions of the transect that could not be measured (top 1.5 m of the water, fish is close proximity to the bottom, etc.). Page 8 also says that 1 m of data from near the bottom was generally removed during data analysis.

In reviewing the data, it would provide some perspective on how completely the transect measured the fish/cubic meter in the river if the volume of the measured transect were to be presented as a percent of the volume of the cross-section of the river with the same width as the measured transect. For a wide, shallow portion of the river, much of the volume could fall within the areas that could not be measured and so the actual percent of the river cross-sectional volume that was measured could be much lower than a narrow, deep portion of the river.

- c) Please comment of the effectiveness of using hydroacoustic monitoring to detect fish movement given that the bottom 1 m of data

was excluded and the monitoring revealed that most fish were located in the deepest part of the channel.

- d) There are a few issues with WG's experimental design that DCFN wants to have discussed and explained by WG. They include the following:
  - i) WG's experimental design seems to assume that all fish in front of the seismic vessel will be pushed upstream as the seismic vessel moves upstream and so if there is fish herding, the number of fish in front of the vessel will steadily increase. In other words, the design assumption seems to be that the seismic vessel noise would form an impermeable barrier across the width of the river. This does not seem reasonable as there is likely going to be fish that move around the sides of the vessel.
  - ii) The experimental design does not seem to acknowledge any intra-day variability in fish populations. For example, measuring a transect at 10 a.m. for the "before ramp-up" sample and again at 5 p.m. for the "immediately in front" sample and concluding that there is no herding because the abundance of fish is the same does not acknowledge that there could be intra-day variability in the fish population at that location. Perhaps a certain percentage of the fish present in the 5 p.m. sample would not have been present if the airguns had not been

going off.

- iii) Typically, impact assessment requires the establishment of a baseline for comparative purposes. Please explain why WG did not establish a baseline for the transects by measuring the fish abundance the day before and/or after the tests.
- e) Please explain the source of the numbers used in the first three lines on page 26 of Appendix III.
- f) Please explain why on 5 occasions in Figures 5 to 7, there are two data points shown for Pre Ramp.

12) To: WesternGeco

**Reference** EAR, Section 9.2.2.2 – Behavioral Impacts

**Preamble** For the horizontal acoustic monitoring, WG placed a transducer at a depth of 2.5 m and aimed it parallel to the airguns and the water surface in the downstream direction. The transducer was used to determine the direction of travel of fish through the volume of water sampled by the transducer.

- Request:**
- a) Please identify where the horizontal acoustic monitoring was done and how many times it was done.
  - b) Why was only the downstream direction monitored? It seems more reasonable that a reaction would be obtained more readily from a fish coming from the upstream direction towards the noise than from a fish moving downstream away from the noise.

- c) The transducer was placed on the port side of the vessel and about 4 m to the side of the airgun array. Why wasn't a transducer placed on both sides to obtain a more complete view of the water behind the airguns?
- d) Please estimate the volume of water monitored by the horizontal acoustics taking into account the effective monitoring distance and the diameter spread of the acoustic signal. Using the effective monitoring distance, calculate the volume of water in the cross-section of the river with the same width as the effective distance of the acoustics. Calculate the percentage of the cross-sectional river volume that was monitored by the horizontal acoustic monitoring.
- e) The fish movement was marked as being a) moving towards the airguns; b) moving away from the airguns; or c) continuing along their original path down river. A weakness of this system seems to be that if a fish was moving away from the airguns but moved faster due to the noise without changing direction, this was not recorded as an effect. Please comment on this.
- f) It seems as though the horizontal monitoring should have consisted of 4 transducers: downstream port, upstream port, downstream starboard and upstream starboard. Why was this not done?

13) To: WesternGeco

**Reference** EAR, Section 9.2.2.2 – Behavioral Impacts

**Preamble** WG cites numerous studies that found impaired fishing success. However, WG concludes that its project is unlikely to adversely impact fishing success due to some feed-back it received from community monitors during the 2002 test program that catches were not affected and due to the fact that the test programs did not demonstrate any avoidance behavior by the fish.

Although the conclusion seems reasonable if there truly is no avoidance behaviour, WG did not attempt to explain why its research differed from other research.

**Request:**

- a) Please attempt to explain why WG's research results contradict other research results.
- b) Given that other research that has indicated impaired fishing success, would it be appropriate for WG to attach a length of time qualifier to its conclusion of no impact? If yes, then what time period is reasonable?

14) **To:** WesternGeco

**Reference** EAR, Section 9.2.3 - Wildlife

**Preamble** The 2002 test program resulted in very low encounter rates with semi-aquatic mammals. WG has also committed to shutting down operations if a semi-aquatic mammal is within 1000 m of the project. Given these reasons, WG concludes that impacts are likely to be of low significance.

**Request:** Describe the applicability of the encounter rate data from the northern portions of the Mackenzie River

to the Deh Cho portion of the Mackenzie River and the Liard River. Are encounter rates expected to be higher or lower in the Deh Cho region?

15) **To:** WesternGeco

**Reference** EAR, Section 8.3 - Wildlife

**Preamble** WG notes that a significant proportion of the Canadian population of Trumpeter Swans nest in the Southeastern Mackenzie Mountains but does not say how that fact will affect the project.

**Request:** Please describe how the fact that a significant proportion of the Canadian population of Trumpeter Swans nest in the Southeastern Mackenzie Mountains will affect the project and how the project could affect the swans.

16) **To:** WesternGeco

**Reference** EAR, Section 3.3.3 – Wildlife  
EAR, Section 8.5 – Traditional Land Use

**Preamble** In Section 3.3.3, WG states that June is the more sensitive nesting period for most waterfowl, however, the seismic vessels will not be in the vicinity of key nesting areas at that time.

In Section 8.5, WG states that key migratory bird terrestrial habitat occurs in parts of both the Mackenzie River and Liard River watersheds in the Deh Cho region.

**Request:** a) Has WG identified any sensitive nesting sites in the Deh Cho and what are the sensitive periods? What will WG do around these sites? What are the potential impacts?



- b) Please identify the key migratory bird terrestrial habitat sites potentially impacted by this project. What are the potential impacts?

17) **To:** WesternGeco

**Reference** EAR, Section 9.2.11 – Socio-Economics  
EAR, Appendix XII – Benefits Plan  
EAR, Appendix V, Page V-15

**Preamble** WG was informed in a meeting with the Deh Cho First Nations on May 8, 2002 that the communities were interested in discussing project benefits.

WG has submitted a Benefits Plan to DIAND for approval under the *Canada Oil and Gas Operations Act (COGOA)*. WG developed and submitted this Benefits Plan to DIAND on December 16, 2002 without discussing the contents of the plan with the Deh Cho First Nations. Although *COGOA* does not specifically require such consultations, the relationship between the company and the communities would be stronger had such consultations occurred and the Benefits Plan been developed to reflect community issues.

**Request:** Besides the lack of a legislative requirement for doing so, please explain WG's rationale for developing and submitting a Benefits Plan to DIAND for approval without consulting with the Deh Cho communities specifically on the contents of that Plan.

18) **To:** WesternGeco

**Reference** EAR, Section 9.2.11 – Socio-Economics

## EAR, Appendix XII – Benefits Plan

**Preamble** The Benefits Plan states “WesternGeco will provide fair and equitable compensation, **consistent with applicable territorial policies** (emphasis added), to individuals involved in hunting, trapping, and fishing in the event of adverse impacts demonstrated to result from project-related activities”.

**Request:** As there are no territorial policies on this issue, please describe in full (i.e. discuss procedure, liability, burden of proof, dispute resolution, etc.) how WG will handle any requests for compensation.

19) **To:** WesternGeco

**Reference** No Reference

**Preamble** WG does not discuss any shutdown areas within the Deh Cho region.

**Request:**

- a) Has WG identified any areas within the Deh Cho region where the program will shut down for the prevention of environmental impacts or to avoid navigational problems? If yes, please identify those areas and describe the potential impacts/problems that WG is attempting to avoid.
- b) Regardless of the reasons why, in the event that the Deh Cho communities identify exclusion zones where the communities do not want WG to operate, will WG agree to the communities' requests?

20) To: WesternGeco

**Reference** EAR, Appendix V, Page V-6

**Preamble** During a March 6, 2002 consultation meeting in Jean River River, WG stated that the seismic data could be sold for prices in the range of \$1000 to \$5000 per kilometer and that the total project cost will be \$7.5 to \$8 million dollars Canadian. However, WG has incurred significant costs since that time that have raised the project costs and would be expected to raise the sale price.

- Request:**
- a) Please provide revised estimates of the project costs and the potential sale price of the seismic data both on a per kilometer basis and total project basis.
  - b) Please provide the same information as in a) but just for the Deh Cho region.

21) To: WesternGeco

**Reference** EAR, Appendix III, Section 1.1 – Uniqueness of this Study

**Preamble** WG identifies that there were three important questions were addressed by the acoustic monitoring. They were:

- 1) Does the channel structure of the river focus sound energy along the channel and facilitate longer-range propagation along the river than in a normal ocean environment?
- 2) Does high frequency energy propagate to longer ranges in the fresh water than in salt?
- 3) How do features such as deep and

meandering channels, sand bars, varying river width and different bottom types influence the propagating sound field?

**Request:** Please discuss the issue of using the Mackenzie River acoustic results to predict the acoustic results in the Liard River. Please describe the similarities and differences between the Mackenzie and Liard Rivers that allow WG to use the Mackenzie River results as a surrogate for completing a test program on the Liard River.

22) **To:** WesternGeco

**Reference** EAR, Section 10.2 – Existing, Planned and Potential Disturbances

**Preamble** WG states that it will maintain a minimum 5 km separation between the WG and NRS seismic operations.

**Request:** Please describe the rationale for selecting the 5 km distance.



# DEH CHO FIRST NATIONS

HEAD OFFICE-HAY RIVER DENE RESERVE (ADMIN BUILDING)

BOX 38, HAY RIVER RESERVE, N.W.T. X0E 0R0

BRANCH OFFICE-BOX 89, FORT SIMPSON, N.W.T. X0E 0N0

TEL: (867) 695-2355 FAX: (867) 695-2038



## Facsimile

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To:

ALAN EHRLICH

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766-7074

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