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## **Order of Appearances**

### **Enbridge Northern Gateway Pipelines Panel #2**

#### Pipeline and Terminal Design and Engineering Panel

Ray Doering	Peter Acton	Barry Callele
Drummond Cavers	Tom Fiddler	Shane Kelly
Clive Mackay	James Mihell	Peter Wong

#### Examinations

Darryl Carter for Alberta Lands Ltd. 10760  
Rangı Jeerakathil for Enoch, Ermineskin, Samson Cree Nations 11225  
Richard Overstall for Northwest Institute for Bioregional Research 11528  
Andrew Hudson for the Joint Review Panel 11933

## **Examination by Darryl Carter for Alberta Lands Ltd. 10760**

Mr. Carter explained that Alberta Lands is the owners of District Lot 1476 in the Province of British Columbia (near Tumbler Ridge), and his questions are related to the route selection process, particularly with respect to the route through his client's land.

He described a lengthy process that began with his client discovering in 2005 that the Northern Gateway pipeline route was through his land, specifically, the Kinuseo Creek crossing. In correspondence with NGP at the time his client stated his opposition to this routing, and NGP indicated it would be investigating other routing options. In the May 2010 filing of the Application, the route had not changed, had not changed today, Mr. Doering stated that they are still investigating. 10865

### **Directional drill or bored crossing**

Mr. Cavers described some of the investigatory work that was done in 2006, including four drill holes to examine the possibilities with either a directional drill (HDD) or a bored crossing. "A directional drill is a fairly long hole that is drilled with directional curvature so that, basically, it curves underneath the creek. It starts -- because of the way that we have to drill it in a curved path, it starts a considerable distance typically on one side of the creek and ends up a considerable distance away on the other side. Whereas a bore is a shorter crossing drilled usually from a pit to another pit on the other side of the creek, usually in a straight line. 10920

Mr. Cavers explained that neither underground crossing method would be viable, and anticipated future erosion of the stream meant that the actual stream location would change during the life of the pipeline. The only alternative would be to make a substantial rock cut on hills to the south, so they preferred the original routing through Alberta Lands' property. 10953

### **Repeat the answer**

Mr. Carter established that NGP had undertaken to provide his client with the results of their geotechnical investigation, and he asked, "that never happened did it?" Mr. Doering said that a summary had been provided. 10960

Mr. Carter persisted with the question, leading to an objection from and an argument with NGP's lawyer, Ms. Estep, and then a vigorous argument with the Chairperson, Ms. Leggett. This drama unfolds between paragraphs 10967 and 11031, settles down for a moment, then resumes at 11049 until Mr. Carter completed his questioning at 11217.

For the record, NGP would have preferred a bored crossing but doubts that the conditions would be favourable, based on its nearby drill results, so an above-ground crossing is more likely.

## **Examination by Rangi Jeerakathil for Enoch, Ermineskin and Samson Cree Nations 11222**

Mr. Jeerakathil's clients are three nations located near the eastern end of the proposed Northern Gateway project, with communities west of Edmonton and south to Hobbema, AB.

### **Protective coatings**

His first questions are about protective coatings and cathodic protection, with reference to Section 5.3 in [Exhibit B1-5](#). Mr. Fiddler explains that fusion bond epoxy will be the "expectation in plans" as the base layer. "In situations where the soil is maybe more aggressive, whether it be from a cathodic protection perspective or because of some concerns with the type of backfill material, then fusion bond epoxy is still the base layer, the adhesive and polyethylene layers are applied over that. And then further to that where we have significant concerns ..., we'll use abrasive resistant coating." 11241

Mr. Jeerakathil asked whether the coatings have any impact with respect to the reclamation of the pipeline. Mr. Fiddler said that if he is asking, "is there an impact on the land or the soils" then "absolutely not." 11263

Mr. Jeerakathil asked if the coatings increase the useful life of the pipeline. Mr. Fiddler replied, "Yes, that's one of their significant purposes; to be a key contributor of the objective of mitigating external corrosion risks." 11266

The application says that "an internal pipe coating will not be needed," but Mr. Mihell said that is misleading and in fact "internal corrosion coatings do coat the bulk of the inside of the pipe," except at welds. 11269

As to corrosivity, Mr. Mihell referred to the discussion about this on the previous day and summarized that "dilbit is no more corrosive than conventional heavy oils." 11277 And the NGP witness panel stated that none of them know of an oil transmission pipeline that uses an internal coating. 11322

### **Cathodic protection**

There are two classes of cathodic protection: rectifier bed and anode bed. NGP will primarily use rectifier bed systems but might use "sacrificial" anode systems in some rocky terrain. 11338

### **Power requirements**

Mr. Doering said that they require a connection to the high voltage transmission grids for the pump stations, which has been a factor in locating pump stations. The other power requirement along the system is for remotely operated valves. They use less power, and will connect to the local distribution system where possible but where necessary they will use thermal electric generators fuelled by propane and backed up by solar panels. 11363

They will also need power at the tunnels.

### **Loss of power**

Power loss at the pump stations would result in a reduced flow rate on the pipeline but the contents will be able to flow past the idled pump. A backup power source will be available to keep instrumentation and control mechanisms functioning. 11378

The cathodic protection systems require power, but “take some time to depolarize” so only a very lengthy power interruption would be a cause for concern. 11389

Mr. Callele said that power loss at the valves means that the valve remains at its last position, and control is lost. Mr. Doering interjected that “there's a plan for solar backup power there to allow for communications to continue.” 11381

Mr. Jeerakathil asked, “Would you continue to operate the pipeline if your -- if your leak detection system wasn't working due to a lack of power? 11393

Mr. Callele's response is that enough overlapping information will be available to permit safe operation of the system, that “losing one of the valve sites isn't enough to get you to a state or even a multitude of these to get you to a state where you would be so degraded that you'd be shutting down the pipeline.” 11395

He added, “We have made the commitment to have running, in a real-time mode, dual leak-detection systems that are complimentary to each other.” 11402

### **Depth of cover**

Looking at Table 5-5, Depth of Cover, Mr. Jeerakathil asked what limits have been established for maximum axle loads. Mr. Fiddler said that “We have a protocol. ... we deal with those on individual crossing requests.” 11422

With respect to avalanches, Mr. Cavers said that where the possibility exists, they bury the pipeline and do not locate above the surface in the area. “Our biggest concern from avalanches is not the loading, it's that the possibility of evulsion can occur. That means that the primary stream channel gets blocked by the avalanche and then the stream decides to cut over and flow somewhere else.” 11448

### **Aboriginal monitors**

Mr. Jeerakathil asked if the intention is to have Aboriginal monitors on site during construction. Mr. Doering said that would be the case “where there's been traditional use practices.” He did not know “whether that's going to apply across the board for this project.” 11506

Mr. Fiddler added that consultation in advance should enable them to avoid disturbing any sacred or significant sites.

## **Examination by Richard Overstall for Northwest Institute for Bioregional Research 11528**

Mr. Overstall began with the route selection criteria in Section 2.3.1 in [Exhibit B1-5](#). Mr. Doering said that the list is not in a priority or weighting order, that they are all considered, though not equally, and it is the job of the Route Review Committee to sort out conflicts and make decisions.

Mr. Cavers said that the Routing Committee has not had any disagreements, that they have been successful at reaching decisions by consensus, without a specific rating methodology.

### **More important than landowner concern**

Asked by Mr. Overstall if he could “foresee a situation where the Routing Committee ... could say this pipeline shouldn’t go ahead because ... it doesn’t meet the criteria” that it was given, Mr. Doering replied he would not foresee that situation. Mr. Overstall: Would the Routing Committee have that kind of authority?” Mr. Doering replied “Yes ... this committee has the ultimate authority in terms of determining the route.” He then cited the Alberta Lands decision on which Mr. Carter was focussed at the beginning of the day as an example of where the technical issues “were more important than that very specific landowner concern.” 11587

### **A safe pipeline, or a safer pipeline?**

Mr. Overstall noted the verbs used for revising the pipelines’ route in Pipeline Route Revisions, Section 2.4, is to “reduce, avoid, limit” – relative criteria – whereas the witness panel sometimes talk about a safe pipeline - which is an absolute term. “It’s safe or it’s not safe.” 11596

He asked, “You would agree, wouldn’t you, that as low as possible in terms of hazards could still be fairly hazardous? Mr. Mihell thought the ALARP principle - “as low as reasonably practicable” – would be helpful in understanding their approach. This discussion begins at paragraph 11604.

### **Why choose a 1 km wide corridor**

Mr. Overstall asked what was the geotechnical basis for choosing a 1-kilometre wide corridor? Mr. Cavers replied that it did not have a geotechnical basis, that it was “somewhat arbitrary,” and that they go outside the 1 km “to the extent necessary.” 11627

Mr. Overstall asked about the evidence they had in 2009 to choose Route Revision R. Mr. Cavers said that the selection goes back a number of years, and the geotechnical conditions including the geohazards are summarized on a kilometre-by-kilometre basis in Table B-1 in [Exhibit B1-14](#).

### **Risk and consequences**

Turning to risk analysis and consequences, Mr. Overstall brought up Table 4.2.4, Consequence Categories, in [Exhibit B-10](#). Mr. Cavers said that the hazard and the consequence information in this 2010 document has been replaced by the Semi-Quantitative Risk Assessment (SQRA) ([Exhibit B75-2](#)). The original table was “based on pipeline centric events” and was “done from geotechnical point of view.” It “was broadened out considerably in the SQRA.” 11665

A bit later, Mr. Mihell described the original work as “part of a preliminary” geohazard review, and not “an overall comprehensive risk assessment which look at all threats.” 11693

### **Semi-Quantitative Risk Assessment (SQRA)**

Mr. Overstall’s next set of questions attempted to understand what was included in the consequence areas noted in Section 5.2 of the SQRA. This discussion begins at 11705.

Mr. Doering explained that the “high consequence areas” are those identified by the Joint Review Panel plus a few that were included to bring the SQRA into alignment with how Enbridge in the USA and Canada evaluates consequence areas.

Looking at one of the listed areas, “watercourses with endangered or harvested fish species” Mr. Overstall asked for more information about which species are included or excluded, and which watercourses would consequently be designated as consequence areas. The details, it is noted in the SQRA, are in Appendix B. Mr. Overstall notes that Appendix B provides exactly the same information. 11711

He concluded this examination with the question, “So if something isn’t specifically mentioned there, it’s probably not included in the risk analysis? Mr. Doering agreed, “It would not have been considered as a consequence area.” 11746

### **Lamprey Creek route revision**

Mr. Overstall had a few questions about the routing changes between Route Revision U and the newest Route Revision V in which, according to Mr. Doering, the pipeline has been moved from lower in the watershed where landslide hazards exist to above the canyon. 11761

### **The difficulty with moving the evidence**

Mr. Cavers stated that Revision V has not been issued yet because it entails a renumbering of the entire route. Mr. Overstall said he understood this, but “it’s very, very difficulty for someone who’s an intervenor who is looking at testing the evidence if, in fact, the evidence is always moving.” 11784

“There’s not much point in us talking in detail now at this stage about the geohazards along the Morice River, because we don’t have a route matched with evidence that we can then discuss and, if we did, we may well agree with you, there’s a wonderful change, but we really don’t know.” 11801

### **Gosnell Creek, Wedeene River, expanded mapping**

Looking next at the terrain and features in the Gosnell Creek routing, Mr. Overstall questioned the adequacy of the mapping technique, specifically with respect to some of the features indicated as hazards, and some not so indicated. 11807

Mr. Cavers said that with respect to this area they will be acquiring more LiDAR, he agreed with Mr. Overstall that another feature does appear to be a rockslide, and “we do appreciate the input that Mr. Schwab is having.”

Extensive discussion follows in the transcript on features in these areas that need more analysis. Mr. Overstall and Mr. Cavers found themselves in agreement on much of this. But when Mr. Overstall expressed frustration at the moving target, and the difficulty it presents to intervenors, Ms. Estep jumped and the Chairperson responded by asking Mr. Overstall for his next question. 11882

Mr. Overstall asked Mr. Cavers, “Were you considering expanding that corridor of geohazard mapping to include a sort of more -- in certain areas where it’s critical, a sort of ridge-to-ridge type mapping?” 11890

Mr. Cavers and Mr. Doering both replied to this question, speaking to the value of expanded mapping versus tabular presentation of geohazard information. Mr. Cavers said “We will be expanding our look up the slope.”

Mr. Overstall’s final question to Mr. Cavers and NGP was whether they would consider in some of these areas full surficial geology mapping of the area?” Mr. Cavers was not receptive to this idea: we don’t view it as a foundation. 11910

### **Examination by Andrew Hudson for the Joint Review Panel 11933**

Mr. Hudson said he had questions in seven areas.

#### **Waste rock at the east portal of the Clore Tunnel**

How high is the waste rock expected to be at the two waste areas? Mr. MacKay replied that two different approaches are being considered, and depending on the construction method chosen, the wastes will end up in different places. Keeping that in mind, the east portal waste sites could take six to eight metres of fill, or 100,000 to 150,000 m<sup>3</sup> of material. 11939

#### **Lateral migration**

With respect to a geohazard at the Clore River, NGP states that “...the crossing needs to be set back to account for conceivable lateral migration.” Mr. Hudson asked what this term means. Mr. Cavers said that there’s a tendency for the river to shift its banks laterally and “we don’t have the full picture here yet.” He said that in fact they are not sure where the tunnel entrance will be yet. 11965

#### **Burnie River Protected Area**

Mr. Hudson asked if the construction camp would be in the protected area. Mr. Doering explained that when the protected area was created, the Province of BC left its designation such that pipelines, both Pacific Trails and Northern Gateway, can be routed through it. NGP is also looking at alternate camp locations, and “there may be some tweaking.” 11983

### **Faulting in the tunnels area**

In early evidence, NGP stated it would be doing “further investigation of the main faults” in the tunnels area. Mr. Hudson asked if that investigation had happened. Mr. MacKay said it had not. Asked what is the contingency plan if it is discovered that tunnels are not possible, Mr. MacKay said that they had assembled a review panel of international tunnelling experts and the conclusion was they could complete the tunnels. 12004

### **HDD vs micro-tunnelling**

Mr. Hudson asked for a brief description of micro-tunnelling and some of its benefits. Mr. MacKay explained that a micro-tunnel is a bored tunnel. It is used widely in urban construction and in Europe. The boring machine is remotely controlled. The description and discussion begins at 12015.

### **If neither HDD or micro-tunnelling are feasible**

Mr. Hudson asked what they might do if neither HDD nor micro-tunnelling were feasible. Mr. MacKay replied that there is an evolving technology referred to as, “micro-tunnelling, micro tunnel direct pipe” or they might look at isolated open-cut. 12060