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Contents

Order of Appearances	1
Enbridge Northern Gateway Panel 5	1
Examination by Mr. Chris Jones for the Province of B.C. (continued).....	1
Quantitative Risk Analysis	2
Hazard ID (HAZID) process.....	2
Scaling factors in detail.....	3
Tankers from Alaska to the continental US & the Selendang Ayu	3
Frequency of a total loss	4
QRA estimates are conservative by a factor of three.....	4
Advances in tanker design and operation	4
Scaling factors and powered groundings	5
Other questions about QRA methodology	5
Sensitivity analysis in the QRA	6
Examination by Dr. Ricardo Foschi, Mr. Brian Gunn and Mr. Chris Peter of C.J. Peter Associates	6
On QRA calculations and risk acceptability.....	6
Data unavailable to the public.....	7
Increases in tanker traffic from other projects	7
Request for data to be released	7
Simulations and vessel manoeuvrability.....	8
More on tanker safety	8
Wind speed and safe navigation	9

Order of Appearances

Enbridge Northern Gateway Panel 5

Shipping and Navigation

Mr. John Carruthers	Mr. Jerry Aspland	Mr. Jens Bay
Mr. Audun Brandsaeter	Mr. David Fissel	Mr. Al Flotre
Mr. Keith Michel	Mr. Steven Scalzo	Mr. Thomas Wood
Mr. Michael Cowdell	Mr. Henrik Kofoed-Hansen	

Examination by Mr. Chris Jones for the Province of B.C. (continued) 1238

Examination by Dr. Foschi, Mr. Gunn and Mr. Peter of CJ Peter Associates 1863

Examination by Mr. Chris Jones for the Province of B.C. (continued)

1238

Mr. Jones had a followup question from [[Exhibit B23-19](#), Adobe 72]: “Are the Standard Operating Procedures (SOP) the same as the port information handbook or the terminal

regulations?” Mr. Michael Cowdell replied, “Yeah ... the operational limits -- the environmental limits would be in the terminal regulations for the tanker transit.” 1243

Quantitative Risk Analysis

[Note: The Marine Shipping Quantitative Risk Analysis (QRA) [[Exhibit B23-34](#)] is an important document in Northern Gateway’s evidence relating to shipping. It was published by Det Norske Veritas (DNV), Mr. Audun Brandsaeter is one of its authors.]

Mr. Jones said his next line of questioning is about the QRA, but before going there he put up TERMPOL 3.15 [[Exhibit B23-15](#), Adobe 41] and asked about a statement there that “The QRA follows international best practice from the IMO definition of a Formal Safety Assessment (FSA)” He asked, “What is a formal safety assessment?” Mr. Brandsaeter said, “The formal safety assessment as lined out by the International Maritime Organization is, in fact, a formal way to perform a risk assessment. ... It gives procedures for how to go through the whole process of risk assessment” 1248

Mr. Jones asked if the FSA specifies or speaks to “the extent to which the factual foundation for the conclusions expressed in the report ought to be laid out in that report.” in the QRA. The question isn’t understood very well, and isn’t answered very well either. Mr. Brandsaeter said, “The FSA guideline does not explicitly state which databases, for instance, you should go to in order to establish the basis.” 1272

Mr. Jones said to Mr. Brandsaeter: “The other day in conversation with Mr. Tollefson you indicated that you thought a report like the QRA ought to be understandable to those who need to use it. ... Or words to that effect.” Mr. Brandsaeter agreed, and added, “Preferably it should be understandable to everyone, though, I think that is a wish that is difficult to accommodate.” 1292

Going to the executive summary in the QRA, Adobe 13, Mr. Jones quoted, “Overall risk levels are in line with that of other comparable terminals located on the west coast of Norway.” The quotation also notes that Kitimat is a longer run in confined waters but the vessel traffic is lower. Mr. Jones asked what terminals are referred to here. Mr. Brandsaeter said, Mongstad, Sture, Karsto. 1301

Hazard ID (HAZID) process

Mr. Jones focussed on the description of HAZID methodology, and the HAZID workshop described in the QRA [Adobe 52], that, “A HAZID is a systematic, multidisciplinary, team-oriented exercise.” Mr. Brandsaeter described the system. Although risks are assigned values and are ranked quantitatively, “the hazard identification workshop as such is a qualitative one; we do not pay too much attention to the absolute figures, whereas the ranking and the relative ranking between hazards are more important because that is much easier for people who are not risk professionals to consider in such a workshop.” He also said the HAZID process is explained further down in the QRA. 1318

Mr. Jones’ questions continued on HAZID and “who then ultimately converts those into the scaling factors?” Mr. Brandsaeter described that process: if local factors are not

expected to have much influence compared to the world average, then we would assign a scaling factor of one, whereas if local input considered a factor to have a lower risk than other areas, then it would be assigned a factor lower than one, and opposite if it's higher. Mr. Keith Michel said the approach is "consistent with how marine risk assessments are done around the world, not just by DNV, by others as well." 1346

Mr. Jones asked why local fishermen or First Nations did not participate in the August 27, 2009, HAZID workshop in Vancouver. Mr. Cowdell said they wanted, "people that were familiar with the navigation of large commercial vessels on the B.C. coast." 1384

With respect to local meetings as part of the HAZID process, Mr. Jones asked about the statement in the QRA that "The consensus from meeting participants was that there was no condition along the proposed shipping routes that pose an unmanageable risk to safe marine navigation or berthing." He asked, "How was that consensus reached? Was that a unanimous vote or is this an impression of the author?" Mr. Brandsaeter said "This is the author's ... impression." 1395

Scaling factors in detail

Mr. Jones examined the development of scaling factors from the beginning. Mr. Brandsaeter said "The initial set of scaling factors was established during first days of May in 2009, by Peter Hoffman, Victor Freiburger, John Chrysostom, Mark Bentley. Mr. Jones asked about three related site tours taken in 2009 which Mr. Al Flotre appeared to diminish in importance: "You see ... the very steep high mountains and the corresponding deep water near the shore. But what other information you would gather by making a tour of the area, I think, would be very minimal compared to the amount of knowledge that you have already interviewed in the HAZID meeting [of August 2009]." 1406

Mr. Jones asked, "In preparing the QRA, did you look at any real world incidents?" Mr. Brandsaeter said there have been many accidents, "and that's why we will have to work primarily with the statistics. We cannot dig deep into individual accident. ... The most important aspect ... is to establish the probability of events happening." 1457

Tankers from Alaska to the continental US & the Selendang Ayu

Mr. Jones asked if there is statistical information available regarding the accident frequency in the route between Alaska and the continental United States? Mr. Brandsaeter said they did not look specifically into "TAPS", and instead applied world-wide accident statistics." Mr. Jones asked specifically about the Selendang Ayu spill; Mr. Michel and Mr. Steven Scalzo were both very familiar with it. Mr. Scalzo described the incident in dramatic detail. One of his company's tugs was able to slow the ship's drift for a few hours, then the tow rope broke where it had been chafing, and it was clear that conditions were too bad to "make up" another tow. Two helicopters came in to rescue the ship's crew, but one was "knocked into the water" by a wave, and six crew members died as a result. The ship foundered and broke in two, releasing most of the ship's bunker and diesel fuels. 1465

Mr. Scalzo said, “I give you all these details is because ... we wish we could have saved this ship but we didn’t have the right piece of equipment. ... [With] a tug like [the ones] proposed for this project ... this tragic accident would never have happened.” Mr. Jones said that assumes that those tugs would have would have the time to get to a vessel in distress. Mr. Scalzo said “That’s correct. ... The tugs would be within that route and strategically placed and available to respond very quickly to any incidents.” 1500

Frequency of a total loss

Mr. Jones asked a statement in the QRA, Adobe 140, “The frequency of a total loss is moderate in the CCAA, however, the return periods for a total loss on the remaining segments are large enough for the risk to be considered negligible. Segments 5, 8 and 9 ... have mitigated return periods of 57,000, 26,000 and 55,000, respectively.” Mr. Brandsaeter said, “Such ... events may happen, but we would then refer that to the total number of nautical miles sailed by ships worldwide. The probability for a certain project ... in a limited area ... is very, very low.” 1518

Mr. Jones asked about a HAZID-related meeting in Norway in 2009 [Adobe 64]. Mr. Brandsaeter said it was mainly to peer-review the scaling factors which “had already been set by those who had participated ... in the HAZID workshop, the tour in the area as well as the local interviews.” Mr. Jones asked if setting the scaling factors at this meeting in Norway is documented in the QRA. Mr. Brandsaeter said it was not. 1547

QRA estimates are conservative by a factor of three

Mr. Jones said he couldn’t follow the explanation during Mr. Tollefson’s questioning [[Vol 156](#), para 31558] that “the spill estimates [in the QRA] were conservative by a factor of three.” Mr. Michel put up TERMPOL [B23-9](#), Adobe 14 to help explain, noting that the number of spills has declined since 1990, and the number of ships per year has grown. In the QRA they took the average in the years 1990-2006. “If you compare that average to the 2008 value, it’s a three to one factor.” “There’s every reason to believe that downward trend will continue. ... In fact, the large spills have gotten to the point that there’s so few of them, it’s hard to statistically use that data.” 1567

Advances in tanker design and operation

Mr. Jones asked how it is that the number and volume of spills will continue to decline. Mr. Michel listed a number of tanker design improvements, beginning with the Oil Pollution Action of 1990 (OPA ’90) which mandated double hulls in the US and had liability requirements. In 1992, the IMO picked up the double hull standard. In 2005, access requirements allowed for inspection of all tanks on a tanker, and ship stability standards were introduced. 2006 saw common structural rules, coating regulations for ballast tanks, and inspections. 2007: enhanced coating and inspection standards. 2010: requirements for subdivision of tankers, and IMO’s double-hulling of bunker tanks. 2013: coating tops and bottoms of cargo tanks. 1605

Mr. Michel said, “What I listed are just the design, construction, maintenance and inspection aspects, but equally if not more important, is the way the ships are operated, and there have been major requirements that have gone into effect in that regard.” 1620

Scaling factors and powered groundings

Mr. Jones inquired about the scaling factors used for “powered groundings.” He and Mr. Brandsaeter engaged in a fairly detailed discussion, referring frequently to Table 5-7, “Unmitigated, scaled powered grounding incident frequency per nm for each route segment”, [QRA, Adobe 69] Of interest is Dixon Entrance, Route Segment 5, which has a reputation for extreme conditions. Mr. David Fissel said “The winds and the waves in Dixon Entrance are moderate by comparison to Hecate Strait and Queen Charlotte Sound, albeit larger than the confined channel areas. ... [They are] definitely less in Dixon Entrance than they are in other regions of the open water area, [though] the currents are a little stronger.” 1634

Mr. Jones said, “I don’t mean to be flip about this, but I’m assuming the world average includes really nice places where the weather is delightful... That’s why I questioned the characterization of Dixon Entrance as average.” Mr. Brandsaeter said the scaling factor here is concerned with the probability of powered grounding. 1663

Mr. Jones asked questions about segments 6 and 8, Caamano Sound and Queen Charlotte Sound. 1669

Mr. Flotre added that the currents in the confined channel assessment area (CCAA) are two to two and a half knots, but “we have 6,000 transits a year going through Boundary Pass and around Discovery Island at Victoria where currents often reach six knots.” 1676

Other questions about QRA methodology

From the QRA, Adobe 67 Mr. Jones noted the comment that there would be, “‘use of pilot with local area knowledge” and the scaling factor is 0.9, so it would reduce the risk somewhat.’ He asked, ‘Could you explain to me how use of a pilot with local knowledge reduces the factors if, and I’m just quoting from the page there, “virtually all terminals worldwide require the use of local pilots”?’ Mr. Brandsaeter said, “Compared to other terminals of the world, the extent of the use of pilotage in this area will be rather extensive.” Mr. Flotre added that “Canada is one of the few countries in the world where, under compulsory pilotage, the pilot must have conduct of the vessel.” 1678

Returning to Table 5-3 “Scaling factors for incidents” [QRA, Adobe 65], Mr. Jones explored the method of deriving a final scaling factor from multiplying the individual factors. He asked if that could “have the effect of obscuring some of the scaling factors,” and proposed a somewhat extreme scenario. Mr. Brandsaeter said multiplication remains the best way of combining factors. Mr. Jones examined other aspects of the methodology used by DNV, such as why they chose a “per voyage” methodology. with Mr. Brandsaeter and Mr. Michel responding and explaining that the per voyage method allows them to identify size and frequency of tankers, whereas a volume based method would not do that. 1687

Mr. Jones asked how the per voyage methodology allows accurate assessment of the risk mitigation measures [Adobe 19]. Mr. Brandsaeter said the method allows for a different number of vessels in the outer segments, than in the common segments in the CCAA. He also explained why they selected tankers above 10,000 DWT: because the smaller ones

are largely concerned with local trade. In the QRA, local data for the types of incidents being assessed is rare or nonexistent, so a larger dataset was used. 1734

Sensitivity analysis in the QRA

Mr. Jones quoted from the QRA, Adobe 131: "In general, a risk reducing effect of 80% has been applied for groundings." Mr. Jones asked how that 80% figure was arrived at. Mr. Brandsaeter replied that it "is based on other work we have done previously where we have seen that this is the order of magnitude of the effect of using tugs with regard to reducing the probability of groundings." Mr. Jones: "[It's] not based on a specific study of the use of tugs for this project and in this area?" Mr. Brandsaeter agreed, and said that the study is confidential and will not be disclosed. Mr. Michel said, "I know of no casualties while a tanker's been tethered to a tug," and "Escort tugs are used in 20 to 30 ports around the world." Mr. Scalzo, whose business is operating tugs, particularly in Alaska and Puget Sound, also knew of no incidents. According to the QRA, other types of incident – collision for example – were only assigned a 5% reduction with rescue tugs. Mr. Jones explored in more detail about rescue tugs in the historical record (essentially, too few, and too few nm travelled, for it to be a meaningful factor, according to Mr. Brandsaeter.) 1769

Mr. Jones turned up Exhibit B2-9, Adobe 79 and quoted a DNV person who said, "Tankers will likely look very different in 50 years as [well as] mitigation measures," followed by "I believe a QRA should be done every 10 years." Someone from NGP said, "Actually, this is happening now in the Valdez area. ... The idea of Enbridge doing a QRA every 10 years is a good point to bring forward to the Marine Community Advisory Board." Mr. Jones asked if NGP is considering doing that. Mr. Cowdell said, "No" at the beginning of a longer reply in which he agreed with the technological change point and said, "it makes sense to pause periodically, ... and revisit the hazard assessments and the risk mitigations." Mr. Michel also agreed, but not to the 10 year detail. Mr. Cowdell again: "Transport Canada has undertaken their own pan-Canadian risk assessment." 1837

Examination by Dr. Ricardo Foschi, Mr. Brian Gunn and Mr. Chris Peter of C.J. Peter Associates 1863

Mr. Peter introduced his colleagues, Dr. Ricardo Foschi, and Mr. Brian Gunn, and indicated their credentials and areas of expertise. The Chairperson clarified the role they will play at these hearings – to ask questions of the evidence. 1863

On QRA calculations and risk acceptability

Dr. Foschi began by calling up [Exhibit AQ-1](#), a Notice of Motion and evidence submitted by Brian Gunn, and explained the meaning of the table and his impressions of the calculations and the information being presented. He asked if the probabilities shown in the table are "too high or reasonably low that you can accept them". Mr. Brandsaeter responded that the QRA's purpose "was to estimate a realistic risk level for the proposed operation. It was never part of my mandate to consider risk acceptability". Mr. Foschi's next question was unanswered because it was considered to have been answered in response to his first question. 1872-1896

Dr. Foschi moved on to comparing the spill risk calculations in the QRA with that of other risk calculation scenarios in Canada, and asked about justification of the much higher risk levels from NGP than acceptable levels in Canada. Mr. Michel responded that the comparison of structural design failure probability to that of “the risk of an oil spill from an entire transportation system”, isn’t appropriate. Mr. Carruthers again indicated the purpose of the QRA: “to understand the risks and then understand the impact of the mitigation”, stating that with the mitigation techniques they’ve described, they think they “have a safe project”, comparing it to what is done around the world, and calling it a “world-class project.” 1897-1916

Still referring to the QRA, Dr. Foschi then asked if it would have been “more useful to study the uncertainty in the calculated return periods as a result of uncertainty in the scaling factors”. Mr. Brandsaeter indicated that he thought the subject had already been thoroughly discussed in previous answers, and reiterated that a sensitivity analysis was applied to assess uncertainty. Dr. Foschi’s subsequent question around necessity of doing a “more complete study of the uncertainty in the return periods”, was responded to by Mr. Cowdell who felt they had “completed an acceptable level of marine risk analysis. It’s similar to other types of studies that have been accepted by Transport Canada”, reiterating their confidence in the safety of their project. 1932-1960

Data unavailable to the public

Discussion then moved to the unavailability of the data that were used for calculations in the QRA. Mr. Gunn asked if a written format of the discussions of the data could be made available for those concerned with the scaling factors. Mr. Cowdell indicated that he didn’t think anything further could be added. 1963-1991

Increases in tanker traffic from other projects

Dr. Foschi then asked about the expected large increase in tanker traffic from LNG and other developments involving tankers, which could add significant traffic to NGP’s projected numbers. He and Mr. Gunn asked how these numbers have been accounted for in the sensitivity analysis in the QRA. Discussion turned to whether or not this topic had already been thoroughly covered in previous days at the hearing. 1993-2040

Dr. Foschi and Mr. Gunn moved to asking if the panel agreed that NGP “needs to reconcile their risk estimates with the large number of additional LNG and other vessels”. After some debate, Mr. Cowdell stated that they feel they do not need to revisit their risk analysis “based on current forecasts of LNG projects”, and Mr Michel indicated he thinks it is “unlikely that all those projects would be... approved and actually go ahead.” Implying that the risk of collision increase is not much higher than what they have calculated. 2040-2056

Request for data to be released

Mr. Gunn stated the difficulty of assessing the project and its calculations without having access to the data it is based on, from the LRF (Lloyd’s Registry) accident database. Some discussion ensued about whether or not it was viable for the intervening engineers to purchase the data, and whether or not NGP has a responsibility to provide the data.

After further discussion, a request was put forward by Mr. Gunn that NGP undertake to make the database available. Mr. Crowther indicated that the undertaking was “unreasonable”. The Chairperson explained that the intervenors needed to file their request as a motion and invited them to continue with their questions of the panel in the meantime. 2059

Simulations and vessel manoeuvrability

Dr. Foschi diverted the focus of his questions to the proposed navigation technology, asking about simulations reported in the QRA, [Exhibit B23-19](#), Adobe 17. Mr. Jens Bay discussed the navigation simulations that had been run and further explained the results presented on Adobe 44. Dr. Foschi asked about the currents in Wright Sound in relation to the results of the simulations. In his response, Mr. Flotre disagreed with Dr. Foschi’s characterization of the turbulent currents in the area. He stated that today’s technology makes collisions avoidable, and disagreed that it is a dangerous place. Discussion on the simulations continued. 2082-2138

Dr. Foschi brought up Adobe 19, and asked several questions about the statement, “*Therefore it is safe to navigate the design ships through these areas.*” Mr. Cowdell again stated that the routes are safe and that the simulations were conducted to “confirm that the proposed routes can be safely navigated by the designed ships”. Continued discussion surrounded associated collision risks and mitigation techniques. 2173-2214

Mr. Gunn asked further details about the simulations, bringing up Adobe 55-56. Similar assurances were given by Mr. Flotre about the safety of the manoeuvres and areas in question. [Exhibit 23-18](#), Adobe 15 and 31 were brought up, and further questions of current speed and tidal influence were posed. The witnesses again made confirmations as to the safety of the proposal. 2219-2320

More on tanker safety

Mr. Gunn, Mr. Fissel and Mr. Cowdell discussed weather stations used for navigation, in regards to who would operate them as well as the construction of new ones. 2319

Still on [Exhibit 23-19](#), Mr. Gunn brought up Adobe 34, and asked more about the safety of hypothetical tanker traffic scenarios. Mr. Cowdell indicated that the question couldn’t be answered because it had not been simulated. Mr. Cowdell then confirmed Mr. Gunn’s inquiry that some information on the page was improperly worded. 2341-2361

Referring to the QRA, Mr. Gunn asked if it “is fair to say that the report has a bias to showing successful examples”. Mr. Cowdell responded by highlighting the various measures taken to ensuring safety of the tanker navigation and traffic. 2363-2377

Further dialogue around the simulations and text from various pages of the same exhibit continued. Mr. Cowdell responded with similar comments, “there’s always an additional scenario that could have been completed; the ones that were completed, we feel are appropriate... I emphasize that a lot of these runs do not deal with everyday occurrences, they deal with exceptional circumstances that test the very limits of... what might be expected” 2379-2432

Wind speed and safe navigation

Mr. Gunn called up AQ9, Adobe 2, noting the statement regarding maximum 77 knot wind speeds at Bonilla Island, also noting a statement about pilots waiting for less than 40 knot wind speeds for safe arrival and departure at Kitimat marine terminal, on Adobe 54 of [Exhibit B23-18](#). He questioned if this discrepancy would result in significant tanker traffic delays. Mr. Fissel and Mr. Cowdell indicated that the two wind speeds were referring to different areas, and that the environmental operating limits had not yet been set, but would be set in the future “in consultation with the Pacific Pilotage Authority, the tug operator shipping companies and relevant government agencies.” Mr. Bay, Mr. Fissel and Mr. Flotre added their thoughts and confidence in the viability of safe navigation through the area. 2441-2481

Continuing with questions on the simulations reported and the models used in them, Mr. Gunn asked about the validity of reduced wind speeds indicated in the reports, and of wind and tidal data used in the models, and was again met with confidence from the witnesses that the numbers reported were realistic and consistent. 2516-2571

Referring to [Exhibit 23-24](#), Adobe page 100 and several others, Mr. Gunn continued with questions on the simulation runs. In particular he asked if the safety level assigned to the runs whose outcomes reported that the towlines would likely break, should be lowered. Mr. Scalzo indicated that synthetic lines with more capability would be used instead of those in the reports. 2573

Mr. Gunn then asked about the runs profiled in [Exhibit 23-25](#), Adobe 27-32. He pointed out that there are “a number of runs in Lewis Passage that utilize 100 percent of tug power to control the tanker”, and asked if the panel agreed that this means “there is no margin of safety”, and that the safety ratings should thus be downgraded. Mr. Bay and Mr. Scalzo disagreed with Mr. Gunn’s statement, stating that tugs have intermittent horsepower ratings that can be 25 percent higher and indicated that it is “normal for tugs to run day in and day out at 100 percent.”