Environmental Appeal Board

Fourth Floor 747 Fort Street
Victoria British Columbia
V8W 3E9
Telephone: (250) 387-3464
Facsimile: (250) 356-9923

Mailing Address:
PO Box 9425 Stn Prov Govt
Victoria BC V8W 9V1

Website: www.eab.gov.bc.ca
E-mail: eabinfo@gov.bc.ca

DECISION NOS. 2013-EMA-007(g) and 2013-EMA-010(g)

In the matter of two appeals under section 100 of the *Environmental Management Act*, S.B.C. 2003, c. 53.

BETWEEN:	Emily Toews Elisabeth Stannus	**APPELLANTS**
AND:	Director, *Environmental Management Act*	**RESPONDENT**
AND:	Rio Tinto Alcan Inc.	**THIRD PARTY**
BEFORE:	A Panel of the Environmental Appeal Board Brenda Edwards, Panel Chair Tony Fogarassy, Member Daphne Stancil, Member	
DATES:	April 27-May 1, May 11-15, June 1-5, June 8-11, and June 29-30, 2015	
PLACE:	Victoria and Kitimat, BC	
APPEARING:	For the Appellants:	
	Emily Toews	Richard Overstall, Counsel Natasha Gooch, Counsel
	Elisabeth Stannus	Christopher Tollefson, Counsel Anthony Ho, Counsel
	For the Respondent:	Dennis Doyle, Counsel Ann Maloney, Counsel Ben Naylor, Counsel
	For the Third Party:	Daniel Bennett, Q.C., Counsel Jana McLean, Counsel Matt Keen, Counsel Michael Manhas, Counsel

APPEALS

[1] In May 2013, Emily Toews and Elisabeth Stannus (the "Appellants") filed separate appeals against the decision of Ian Sharpe, a delegate of the Director, *Environmental Management* Act (the "Director"), Northern Region - Skeena, Ministry of Environment (the "Ministry"), to amend (the "Amendment") multimedia

permit P2-00001 (the "Permit"), held by Rio Tinto Alcan Inc. ("Rio Tinto"). The Permit authorizes the discharge of effluent, emissions, and waste from Rio Tinto's aluminum smelter located in Kitimat, BC. The Director issued the Amendment on April 23, 2013, pursuant to section 16 of the *Environmental Management Act*, S.B.C. 2003, c. 53 (the "*EMA*").

[2] Among other things, the Amendment authorizes an increase in the smelter's maximum daily limit of sulphur dioxide ("SO_2") emissions, which is specified in paragraph 4.2.2 of the Permit. Previously, the limit was 27 Mg/d (tonnes per day). The new limit is 42 tonnes per day.

[3] The Board has the authority to hear these appeals under section 100(1) of the *Act*. The Board's powers on an appeal are set out in section 103 of the *EMA* which provides that, on an appeal, the Board may:

> (a) send the matter back to the person who made the decision, with directions,
>
> (b) confirm, reverse or vary the decision being appealed, or
>
> (c) make any decision that the person whose decision is appealed could have made, and that the appeal board considers appropriate in the circumstances.

[4] The Appellants seek several orders from the Board, including an order setting aside, or alternatively suspending, paragraph 4.2.2 of the amended Permit. The Appellants also request that the Board order the Director to secure certain reports or studies, and conduct further public consultation, before rendering a decision on any new application that Rio Tinto may submit for an amendment to the Permit.

BACKGROUND

The Kitimat smelter

[5] Rio Tinto, formerly the Aluminum Company of Canada Ltd. ("Alcan"), established an aluminum smelter in Kitimat between 1950 and 1954. Alcan had been granted rights under the *Industrial Development Act* to the waters of the Eutsuk/Tahtsa water basin, in exchange for Alcan's commitment to create an aluminum industry in BC, thereby opening up the Province's north to industrial development. Construction began in 1951, and the first "ceremonial pour" was presided over by His Royal Highness Prince Philip in August 1954.

[6] When the project was constructed, the area was sparsely populated and accessible only by air and water. As part of the project, Alcan constructed two communities to act as homes for its workers and their families: Kitimat and Kemano. Kitimat was the "urban" hub for the aluminum smelter, and Kemano was built to accommodate workers and their families at the electrical power generating facility. Alcan owned much of the land in the Kitimat valley. Over time, Alcan sold parcels of land for commercial and residential development. The residential parcels of land contained an easement in favour of Alcan, recognizing Alcan's right to emit discharges into the air. These easements are referred to locally as "smoke easements".

[7] The smelter first operated under a series of permits issued by the Ministry under the *Industrial Development Act* and its successors, which authorized waste discharges into the environment including discharges to water, land and air.

[8] Eventually, the Province decided to move toward a "multi-media" approach to permitting, which would result in a single authorization for a permit holder to discharge different forms of waste. Alcan agreed to be the first heavy industry in BC to participate in the new permitting process. On December 7, 1999, Alcan received the Permit, which is a multi-media permit authorizing the discharge of effluent, emissions and waste. At that time, the Permit specified a maximum daily discharge of 27 tonnes of SO_2.

The Amendment

[9] Rio Tinto sought the Amendment in support of a project known as the Kitimat Modernization Project ("KMP"), which is designed to modernize and increase the production at the Kitimat smelter. In or about 2007, Rio Tinto approached the Ministry to discuss the KMP. Under the KMP, the decades-old vertical stud Soderburg technology for smelting aluminum will be replaced with modern "AP-40 pre-bake" smelting technology. The change in technologies is designed to increase the efficiency of aluminum production while controlling emissions. The modernized smelter will reduce certain emissions by capturing and filtering the exhaust process gases better. According to Rio Tinto, emissions of polycyclic aromatic hydrocarbons will be reduced by over 98%, greenhouse gas intensity will decrease by 36%, hydrogen fluoride emissions will decrease by 72% and total particulates will be reduced by 80%.

[10] Rio Tinto advised the Ministry that, as part of the KMP, SO_2 emissions would likely increase, because of the increased level of aluminum production and the corresponding increased consumption of petroleum coke. The sulphur content of coke is expected to increase given the diminishing market supply of low-sulphur content coke. According to Rio Tinto, SO_2 emissions are conservatively projected to reach an upper steady-state range of 42 tonnes per day once the plant is fully operational in about 2018. Rio Tinto expects that the KMP will, however, improve how SO_2 and other air emissions are dispersed, by using taller stacks. Previously, the old technology had resulted in emissions escaping passively from roof vents, whereas under KMP, the emissions will be collected, heated to 100 degrees Celsius and then vented out of two 200 foot-tall stacks at more than 60 km/hr. As a result, emissions are projected to disperse differently and further from the plant than under the old technology.

[11] The Ministry advised Rio Tinto that the KMP would require a "significant amendment" to the Permit within the meaning of the *Public Notification Regulation*, B.C. Reg. 202/94 (the "*Public Notification Regulation*"), which would trigger the public consultation requirements in the *Public Notification Regulation*. The adequacy of the public consultation process that was conducted is one of the issues in these appeals.

[12] A Ministry Environmental Protection Officer in the Northern Region - Skeena, Frazer McKenzie, was assigned to work exclusively on Rio Tinto's application for a permit amendment, to ensure that Rio Tinto and its qualified professionals were

aware of, and complied with, the statutory requirements, and that they provided technical information that would be useful to the Director in his decision-making process. In November 2007, Rio Tinto, the Province of BC, and Mr. McKenzie entered into an agreement (the "Secondment Agreement") pertaining to Mr. McKenzie's responsibilities in relation to Rio Tinto's application. The Secondment Agreement states that, for the term of the Agreement, Mr. McKenzie would be seconded to Rio Tinto to perform duties related to the KMP and Rio Tinto's application for an amendment to the Permit. It also states that Rio Tinto would reimburse the Province for Mr. McKenzie's salary and benefits, Mr. McKenzie would remain an employee of the Province, the Director would remain responsible for Mr. McKenzie's performance management.

[13] In December 2007, Rio Tinto and the BC Minister of Environment signed a Memorandum of Understanding on Sulphur Dioxide (the "2007 SO_2 MOU") governing the regulation of SO_2 emissions from the Kitimat smelter. In October 2011, Rio Tinto and the BC Minister of Environment signed an updated SO_2 MOU (the "2011 SO_2 MOU"), in which the substantive provisions were identical to the 2007 SO_2 MOU. Collectively, these two memoranda are referred to in this decision as the "SO_2 MOU".

[14] Article 1 of the SO_2 MOU sets out its purpose, as follows:

> The purpose of this MOU is to establish the performance objectives and adopt an adaptive management approach for SO_2 emissions after the Kitimat Modernization Program. Elements of the program for adaptive management include:
>
> a. completing science-based emission modelling;
>
> b. developing and implementing a science-based biophysical and ambient air monitoring program to measure ambient SO_2 concentrations and impacts;
>
> c. regulating the SO_2 emissions from the Kitimat Modernization Project until the end of 2018 according to the policy entitled "Pollution Control Objectives for Mining, Smelting and Related Industries in British Columbia, 1979 (Reprinted in 1989)", in its existing form on the effective date of this MOU; and developing and implementing SO_2 mitigation strategies if the emissions modelling and monitoring show potential adverse impacts related to SO_2.

[15] Article 2 of the SO_2 MOU sets out the principles of "collaboration" and "adaptive management". It states that Rio Tinto and the Minister will work in collaboration to fulfill the commitments in the SO_2 MOU, and actions to implement those commitments "will recognize the importance of taking a logical and systematic adaptive management approach to ensure the cost effective use of their human and financial resources."

[16] Article 3 of the SO_2 MOU sets out the commitments of Rio Tinto and the Minister, as signatories. In summary, Rio Tinto committed to "completing and implementing an SO_2 adaptive management program" to the Director's satisfaction,

and consulting with a public advisory committee about Rio Tinto's committed actions to fulfill the SO_2 MOU. The Minister committed to "actively supporting" Rio Tinto in fulfilling Rio Tinto's commitments under the SO_2 MOU, and working "closely and cooperatively" with Rio Tinto when it files its application for a permit amendment, and striving to reach a decision on the permit amendment in a timely manner. Article 5 of the SO_2 MOU provides that the SO_2 MOU would remain in effect until the Permit "is amended with regard to the commitments agreed to in this MOU."

[17] Articles 4, 5, and 6, respectively, address amendments of the SO_2 MOU, the duration of the SO_2 MOU, and confidentiality.

[18] Article 7 of the SO_2 MOU states as follows:

> The parties understand and concur that this MOU constitutes an administrative arrangement between the parties. Nothing in this MOU is to be construed as creating any financial, legal, or contractual relations between the Parties.

[19] On February 22, 2013, Rio Tinto submitted its application for an amendment to the Permit. In support of its application, Rio Tinto submitted a report titled "*Sulphur Dioxide Public Consultation Report*" dated April 3, 2013 (the "Consultation Report"), as well as a report titled "*Sulphur Dioxide Technical Assessment Report*" dated April 10, 2013 (the "STAR"). The STAR was prepared for Rio Tinto by ESSA Technologies Ltd. The STAR is a 3-volume report focusing on the SO_2 emissions from the modernized smelter and their predicted impacts on human health and the environment. The STAR consists of a 37-page Executive Summary (volume 1), a 450-page Technical Report (volume 2), and Appendices (volume 3). The STAR includes a review of scientific literature on SO_2 emissions and environmental receptors, an estimate of the smelter's SO_2 emissions before and after the KMP is implemented based on air dispersion modelling and data from ambient air quality monitoring stations, and an assessment of the predicted impacts of the SO_2 emissions on four receptors: human health, vegetation, soils, and surface water.

[20] The STAR establishes a study area which included a total area of 2,895 square km which is designed to include the main plume from the smelter, communities, and vegetation that might be affected by SO_2, and all soil and water receptors which might be affected by dry and wet deposition of sulphur. Generally, the study area extends from Kitimat northward through a valley to Terrace, an area which has been referred to as the Kitimat valley airshed.

[21] According to Rio Tinto's submissions, the air study in the STAR predicted atmospheric concentrations of SO_2, and sulphur deposition (expressed in kilograms per hectare per year of SO_4). The predicted SO_2 concentrations were used in the studies of human health impacts and direct impacts on vegetation. The predictions of sulphur deposition were used to address indirect impacts to vegetation through soils, and direct impacts on vegetation. These predictions were generated using a computer model called CALPUFF, which is discussed in more detail below. In summary, the CALPUFF model used two stages. First, the model was run using historic emissions from the smelter, so that those modelled concentrations of SO_2 and sulphur deposition could be compared to and validated against historic data

from monitored concentrations and deposition results, to test its outputs. The CALPUFF model was also run prospectively to predict SO_2 concentrations and sulphur deposition after KMP is operational, and these results informed the STAR's studies of the four receptors. The human health and vegetation studies used the frequency and magnitude of modelled exceedances of SO_2 concentration thresholds to predict impacts. The soils and surface water studies used exceedances of "critical loads" to predict impacts. Critical loads, in the context of acid deposition, means the largest amount of acid that can be deposited in an ecosystem without having long-term harmful effects. Then to assess impacts on the four receptors, a framework was developed to classify the risk by the probability (likelihood) of an impact occurring, and the consequence (seriousness) of such an impact. Depending on the likelihood and consequence of an impact, the risk was classified into one of four impact categories: low, moderate, high, or critical.

[22] The Director also considered two reports relating to the feasibility of options for reducing SO_2 emissions. Both reports were prepared by HATCH Ltd. The first report, dated July 12, 2012 and titled "*Sulphur Dioxide Reduction Options in the Primary Aluminum Industry*" ("HATCH #1"), was prepared for Environment Canada, and discusses SO_2 reduction options in general. The second report, dated April 17, 2013 and titled "*FEL1 Feasibility Report on Technical Options to Reduce SO_2 Emissions Post-KMP*" ("HATCH #2"), was prepared for Rio Tinto at the Director's request, and is specific to the KMP.

[23] On April 23, 2013, the Director issued the Amendment. As stated above, paragraph 4.2.2 of the Amendment increases the maximum daily limit of SO_2 emissions from the previous limit of 27 tonnes per day, to a maximum of 42 tonnes per day. In addition, paragraph 4.2.3 of the Amendment contains a revised list of the works authorized under the Permit. Paragraphs 4.2.4 to 4.2.7 of the Amendment add several requirements to the Permit, including requirements for Rio Tinto to: develop an environmental effects monitoring plan for the Director's approval; conduct a comprehensive review of the results of the environmental effects monitoring program by October 31, 2019; and, prepare a plan to expand the Public Advisory Committee for the smelter to include stakeholders in the Kitimat – Terrace airshed, and include the Public Advisory Committee in consultations regarding the design and results of the environmental effects monitoring plan.

[24] The Director provided a written rationale (the "Rationale") for his decision to issue the Amendment. The relevant portions of his Rationale state as follows:

> As the Director, I am satisfied that there is sufficient information to set requirements for the protection of the environment and human health, and specifically regarding the protection, identification, avoidance and mitigation of potential impacts of the proposed emissions of SO_2 to human health, and the environment. The information includes the permittee's final application report submitted on April 17, 2013, including public consultation record, all written communications to the Director from all sources, including members of the public, public groups, local governments, and the Haisla First Nation.
>
> Additional information requested and obtained from the permittee, provincial government sources, and independent sources of scientific

information were also considered. This included information regarding:

- potential for impacts of SO_2 to agriculture and domestic gardens, including soils and produce quality;
- potential for impacts of SO_2 to terrestrial animals, both wild and domestic;
- potential for impacts of SO_2 to lichens and edible mushroom resources in forested areas;
- information regarding the potential for conducting environmental effects and human health monitoring and assessment to track impacts, and for use of such results in later decision making, and
- information regarding the feasibility of SO_2 treatment options.

Environmental and human health effects monitoring and assessment requirements will ensure the existence of impact assessment information useful for future decision-making under Section 16(1) of EMA, which allow a Director to amend the requirements of a permit or approval, on the Director's own initiative, or on application by the holder of a permit or approval.

The modernized smelter is projected to reach stable operations, at full production in late 2018. Over this period, SO_2 emissions are predicted to increase from current levels to close to the permitted maximum of 42 tonnes per day. In the latter half of this period when full production is reached, RTA [Rio Tinto] intends to stabilize and optimize smelting processes. This gradual increase in SO_2 emissions and smelting process stabilization period provides an opportunity to employ an annual effects monitoring program in the ongoing regulation of SO_2 discharges from the smelter, as well as, an opportunity to review effects as emissions increase up to full production and smelting processes are stabilized.

Regarding cumulative effects management of the Kitimat – Terrace airshed, the environmental and human health effects monitoring program required in the permit amendment and the results from it will be useful in provincial regulatory processes associated with other proposed industries for the area in question.

Regarding the need for additional public participation in the provincial regulatory processes associated with smelter emissions, the requirement to expand the permittee's Public Advisory Committee will ensure that this occurs.

[25] Subsequently, Rio Tinto submitted an environmental effects monitoring plan for the Director's approval. On October 7, 2014, the Director approved Rio Tinto's *Kitimat Modernization Project Sulphur Dioxide Environmental Effects Monitoring Program: Program Plan for 2013 to 2018* (the "EEM Plan").

The Appeals

[26] In May 2013, eight separate appeals were filed against the Amendment, including the appeals by Ms. Toews and Ms. Stannus. Both Ms. Toews and Ms. Stannus live and work in Kitimat. Ms. Toews has asthma. Ms. Toews participates in outdoor activities in the Kitimat area, she is a dancer and teaches dance classes in her community. Ms. Stannus participates in outdoor activities in and around Kitimat, her home is located a few kilometres away from the smelter, and she teaches at a local school. Their grounds for appeal are discussed later in the "Background" section of this decision.

[27] After the appeals were filed, numerous preliminary matters arose including two judicial reviews of preliminary decisions issued by the Board regarding the appeals. As a result, the hearing of the appeals did not commence until almost two years after the appeals were filed. A brief summary of those preliminary matters is provided below.

[28] It should be noted that the Appellants did not request a stay of the Amendment pending the Board's final decision on the merits of the appeals. Consequently, the Amendment remained in effect, and Rio Tinto was able to continue to implement the KMP, after the appeals were filed.

The preliminary issue of standing to appeal the Amendment

[29] On June 18, 2013, Rio Tinto applied to the Board for an order dismissing the appeals on the basis that none of the eight appellants were a "person aggrieved" by the Amendment within the meaning of section 100 of the *EMA*.

[30] On August 17, 2013, one of the eight appellants withdrew his appeal.

[31] On October 31, 2013, the Board decided that Ms. Toews and Ms. Stannus were persons aggrieved. However, the Board concluded that the other five remaining appellants were not (*Lynda Gagne et al v. Director, Environmental Management Act*, Decision No. 2013-EMA-005(a) and 2013 EMA-007(a) to 2013-EMA-012(a)). Four of the five unsuccessful appellants sought a judicial review of the Board's decision.

[32] On March 14, 2014, the BC Supreme Court issued oral reasons directing the Board to reconsider whether the four appellants were persons aggrieved, and providing the Board with certain directions (*Gagne v. Sharpe*, 2014 BCSC 2077).

[33] As directed by the BC Supreme Court, the Board reconsidered whether the four appellants were persons aggrieved by the Amendment. On April 17, 2014, the Board concluded that they were not (*Lynda Gagne et al v. Director, Environmental Management Act*, Decision No. 2013-EMA-005(b), 008(b), 011(b), and 012(b)). Two of the four unsuccessful appellants sought a judicial review of the Board's reconsideration decision.

[34] On October 31, 2014, the Court issued oral reasons confirming the Board's reconsideration decision (Victoria Registry No. 14-3037).

[35] Meanwhile, the Board proceeded to address the appeals of Ms. Toews and Ms. Stannus.

Preliminary applications to amend the Notices of Appeal, to request document disclosure orders, and to adjourn the appeal hearing

[36] In addition to the preliminary issue of standing, the Board addressed numerous other preliminary matters. The Appellants applied three times to amend their Notices of Appeal. They also applied three times for orders requiring Rio Tinto to disclose certain categories of documents. In addition, the Appellants requested that the Director disclose certain categories of documents, which the Director did voluntarily. In addition, there were several requests to adjourn the appeal hearing. Below is a partial summary of those events.

[37] On August 14, 2013, although the Board had not yet decided the issue of standing, the Board advised the parties that it was tentatively scheduling the appeal hearing for the weeks of January 27-31 and February 3-7, 2014, assuming that there was at least one appellant with standing to appeal the Amendment.

[38] In letters dated November 25 and 28, 2013, former counsel for Ms. Toews and Ms. Stannus applied to adjourn the appeal hearing "generally".

[39] On December 4, 2013, counsel for the appellants whose appeals had been dismissed for lack of standing notified the Board that they anticipated filing a judicial review of the Board's decision on standing. They asked that the appeal hearing "be adjourned generally pending the final determination of this judicial review".

[40] By a letter dated December 13, 2013, the Board cancelled the appeal hearing that was scheduled for January and February 2014. The Board asked the parties to provide their availability for a hearing between March 24 and May 30, 2014.

[41] On January 14, 2014, the Board notified the parties that the appeal hearing was scheduled to commence on May 26, 2014.

[42] On March 19, 2014, the Appellants requested that the Board allow them to amend their Notices of Appeal by adding a ground for appeal alleging that the Director's discretion was fettered by a pre-existing agreement between the Province and Rio Tinto. By a letter dated March 19, 2014, the Board granted the Appellants' request subject to any objections from the other parties. The Board received no objections.

[43] On April 8, 2014, the Director requested an adjournment of the appeal hearing due to a medical condition. The Board granted the adjournment.

[44] On May 26, 2014, the Board held a pre-hearing teleconference with the parties. Among other things, the parties agreed to reserve four weeks for an appeal hearing commencing on October 6, 2014.

[45] On July 17, 2014, the Appellants made two applications to the Board. First, the Appellants asked to amend their Notices of Appeal by adding another new ground for appeal, alleging a reasonable apprehension of bias in relation to the decision to issue the Amendment. Second, the Appellants applied for an order requiring Rio Tinto to produce certain categories of documents. Rio Tinto objected to the applications.

[46] In a decision dated August 22, 2014, the Board granted the application to add the new ground for appeal, and partially granted the application for document disclosure (Decision Nos. 2013-EMA-007(b) & (c) and 2013-EMA-010(b) & (c)).

[47] On September 29, 2014, the Appellants applied to the Board for a second order requiring Rio Tinto to produce documents. They sought four categories of documents related to the alleged reasonable apprehension of bias.

[48] On October 2, 2014, the Board granted, in part, the application for document disclosure (Decision Nos. 2013-EMA-007(d) and 2013-EMA-010(d)).

[49] Also, on October 2, 2014, the Board held a pre-hearing teleconference with the parties. Among other things, the parties agreed to adjourn the appeal hearing scheduled to commence on October 6, 2014, and re-schedule it to commence on October 20, 2014, subject to the completion of document disclosure.

[50] On October 9, 2014, the Board held another a pre-hearing teleconference with the parties, and it was decided that the hearing would again be postponed, as the vetting of documents that the Appellants had requested from the Director was ongoing. The hearing was re-scheduled to commence on December 15, 2014.

[51] On October 16, 2014, the Appellants applied to further amend their Notices of Appeal by adding the EEM Plan under the heading “Details of Decision to be Appealed”. Alternatively, they sought to file two new appeals against the EEM Plan. In addition, the Appellants sought to expand the list of remedies they were seeking by adding remedies pertaining to the EEM Plan, and sought to file six new expert reports, all pertaining to the EEM Plan. In separate letters also dated October 16, 2014, the Appellants also advised that they intended to call two additional expert witnesses, and amend their statement of points.

[52] On November 10, 2014, the Board denied the Appellants’ application to amend their Notices of Appeal or alternatively file two new appeals. However, the Board granted the Appellants’ associated requests to amend their statement of points, file six additional expert reports, and provide notice of two new expert witnesses (Decision Nos. 2013-EMA-007(e) and 2013-EMA-010(e)).

[53] On November 19, 2014, the Appellants applied to the Board for a third order requiring Rio Tinto to produce certain categories of documents.

[54] On November 25, 2014, the Director advised that disclosure of the documents requested by the Appellants could not be completed before the hearing was scheduled to commence on December 15, 2014.

[55] On November 28, 2014, the Board cancelled the first week of the hearing that was scheduled to commence on December 15, 2014.

[56] On December 3, 2014, the Board denied the Appellants’ request for a third order requiring Rio Tinto to disclose documents (Decision Nos. 2013-EMA-007(f) and 2013-EMA-010(f)).

[57] On December 4, 2014, the Board held another pre-hearing teleconference with the parties. As a result, the Board ordered that the three weeks of hearing scheduled to take place in January 2015 was also cancelled, as the process of

disclosing documents that the Appellants had requested from the Director was ongoing.

[58] On February 5, 2015, the Board advised that the appeal hearing was re-scheduled to commence on April 27, 2015 for two weeks, followed by two more weeks in June 2015. After the hearing commenced, the parties and the Panel agreed to add further hearing days for closing arguments.

The Appellants' position on the appeals

[59] As a result of the Appellants' pre-hearing amendments to their Notices of Appeal, the Appellants' grounds for appeal and requested remedies changed between the time when the appeals were filed and when the appeal hearing commenced. Further changes occurred after the hearing commenced.

[60] Prior to the hearing, on April 2, 2015, the Appellants submitted a "Further Amended Statement of Points" in which they summarized their collective grounds for appeal as follows:

- The Director erred in determining that there is sufficient information to set requirements for the protection of human health and the environment with regards to the proposed SO_2 emissions.
- The Director erred in his assessment of potential impacts of SO_2 to human health.
- The Director erred in his assessment of potential impacts of SO_2 to local and regional agriculture.
- The Director erred in his assessment of potential impacts of SO_2 to the environment.
- The Director erred in his assessment of potential impacts of SO_2 to local and regional fisheries.
- The Director erred in his assessment of the SO_2 treatment options; in particular, the Director erred in his finding that no SO_2 scrubber installation is required for this permit amendment.
- The Director erred in his assessment of cumulative impacts of this project, including other current and proposed air emissions in the region.
- The Director erred in his finding that public consultation for this project is adequate.
- The Director's discretion was fettered by pre-existing agreement between the Province of British Columbia and Rio Tinto Alcan.
- The decision under appeal is invalid due to the presence of a reasonable apprehension of bias.

[61] In their Further Amended Statement of Points, the Appellants also indicated that they would be providing submissions regarding the legal test for issuing a permit amendment under section 16 of the *EMA*. In particular, they advised that they expected to argue that the Director failed to apply, or improperly applied, the

"precautionary principle or approach" and the "polluter pay principle" in exercising his discretion under section 16. They also advised that they expected to argue that the adaptive management approach adopted by the Director in implementing the Amendment (and later embodied in the EEM Plan) fails to protect the environment and does not comply with section 16.

[62] The Appellants' Further Amended Statement of Points also asserted that the Director's discretion was fettered by the requirement in the SO_2 MOU that the SO_2 emissions would be regulated according to the 1979 Pollution Control Objectives for the Mining, Smelting and Related Industries of British Columbia (the "1979 PCO's") until the end of 2018.

[63] In their Further Amended Statement of Points, the Appellants requested the following remedies:

- an order quashing the Director's decision to amend paragraph 4.2.2 of the Permit; and
- an order amending the Permit to require Rio Tinto to install scrubbers;
- or alternatively, an order sending the matter back to the Director with directions to reconsider his decision to allow the increase in SO_2 emissions from 27 tonnes per day to 42 tonnes per day, and reconsider his decision not to require Rio Tinto to install scrubbers at the Kitimat smelter.

[64] During the course of the hearing, the Appellants either expressly abandoned or did not pursue some of those grounds for appeal and some of the requested remedies. For example, at the outset of the hearing and throughout the evidentiary phase of the hearing, the Appellants sought an order amending the Permit to require Rio Tinto to install SO_2 scrubbers. A considerable amount of the hearing time and expert testimony was directed toward scrubbing technology. However, in their closing arguments, the Appellants did not request an order amending the Permit to require Rio Tinto to install scrubbers. The Appellants abandoned their submissions with regard to scrubbers, and instead asserted that it would be inappropriate for the Panel to make any orders regarding mitigation measures that should be used at the smelter.

[65] Also, the Appellants initially submitted that the Director erred in his assessment of potential impacts of SO_2 emissions on human health, the environment, and local and regional agriculture and fisheries. However, in their closing submissions, the Appellants abandoned their submissions with respect to the potential impacts on agriculture and fisheries. The Appellants' closing submissions only address the potential impacts of the SO_2 emissions on human health, soil, and vegetation.

[66] In addition, although the Appellants originally argued that the Director erred in his assessment of the cumulative impacts of the project, the Appellants' closing submissions only mention cumulative effects in the context of arguing that the Director provided inadequate reasons for his decision. The Appellants' closing submissions do not address whether section 16 imposes an obligation to consider cumulative effects. Similarly, the Appellants' closing submissions do not mention the polluter pay principle, or address its relevance to section 16 of the *EMA*.

[67] Although the Appellants had requested, and the Board granted, an amendment to their Notices of Appeal to add a ground asserting that both the SO_2 MOU and the Secondment Agreement fettered the Director's discretion, their Further Amended Statement of Points and their closing submissions only address the SO_2 MOU in relation to fettering. Thus, it appears to the Panel that the Appellants abandoned their argument with respect to fettering based on the Secondment Agreement. Further, in their closing submissions, the Appellants abandoned their argument regarding fettering insofar as the 1979 PCOs are concerned. They conceded that the Director did not rely on the 1979 PCOs in his decision-making process.

[68] The arguments and remedies that the Appellants pursued in their closing submissions have been summarized by the Panel, as follows:

- The Director's discretion was fettered by the adaptive management provisions in the SO_2 MOU and by pre-determining the appropriateness of an adaptive management approach to regulating SO_2 emissions under the Amendment.
- The Amendment is invalid due to a reasonable apprehension of bias arising from the Secondment Agreement; also, the Director erred by failing to provide adequate reasons for his decision to increase the daily SO_2 limit.

  In relation to the two points above, the Appellants request that the Panel find that: the Director's discretion was unlawfully fettered in rendering his decision to issue the Amendment; the circumstances surrounding the rendering of the decision to issue the Amendment give rise to a reasonable apprehension of bias; and the reasons given by the Director for his decision to issue the Amendment are legally inadequate. The Appellants also request that the Panel "exercise its power to cure these defects by way of a *de novo* determination consistent with" the remedies requested in relation to the point below (precautionary principle).
- The Director failed to apply, and render a decision that was consistent with, the precautionary principle, particularly in relation to the potential impacts of the increased SO_2 emissions on human health.

  In relation to this point, the Appellants request an order setting aside paragraph 4.2.2 of the Amendment; an order directing the Director to secure (before rendering a decision on any new application by Rio Tinto) certain information, assessments, and studies (described in more detail in the Appellants' closing submissions) related to the human health risks associated with the smelter emitting 42 tonnes/day of SO_2; and other such relief as the Panel deems appropriate.

  Alternatively, the Appellants request an order suspending the operation of paragraph 4.2.2 of the Amendment, unless and until the Director is satisfied that Rio Tinto's application for a permit amendment can be granted in a manner that is consistent with the requirements of section 16 of the *EMA* after having secured, reviewed and made public certain information,

assessments, and studies (described in more detail in the Appellants' closing submissions), related to the human health risks associated with the smelter emitting 42 tonnes/day of SO_2, and providing the public with an opportunity to be consulted on the foregoing matters; and other such relief as the Panel deems appropriate.

- The evidentiary basis for the Director's decision was inadequate, especially regarding soil acidification, impacts on human health and vegetation, and inadequacies in the public consultation process.

  In relation to this point, the Appellants request that the Panel: find that the public consultation process conducted before the Amendment was issued and before the EEM Plan was approved was inadequate and "exercise its power to cure this defect by way of a *de novo* determination consistent with" the remedies requested in relation to the point above (precautionary principle); and issue an order amending the EEM Plan to include additional requirements in relation to vegetation and soils and human health(described in more detail in the Appellants' closing submissions).

[69] It should be noted that, although the Appellants' submissions in the present appeals allege certain flaws or gaps in the EEM Plan, separate appeals against the Director's approval of the EEM Plan were filed in late 2014 by Unifor Local 2301, which represents approximately 950 workers at the smelter, and Ms. Toews and Ms. Stannus. On December 4, 2014, the Board rejected those appeals on the basis that the EEM Plan was not an appealable decision under the *EMA* (Decision Nos. 2014-EMA-003(a), 2014-EMA-004(a), and 2014-EMA-005(a)). However, the Board's decision was judicially reviewed by the BC Supreme Court.

[70] In 2015, the BC Supreme Court concluded that the Director's approval of the EEM Plan is an appealable decision (*Unifor Local 2301 v. British Columbia (Environmental Appeal Board)*, 2015 BCSC 1592). Although the BC Supreme Court's decision has been appealed to the BC Court of Appeal, in the interim, the Board complied with the BC Supreme Court's direction to reconsider its decisions rejecting the appeals against the EEM Plan. In that regard, the Board recently held that Unifor Local 2301 has standing to appeal the EEM Plan (*Unifor Local 2301 v. Director, Environmental Management Act*, Decision No. 2014-EMA-005(b), November 16, 2015), as do Ms. Toews and Ms. Stannus (*Emily Toews et al v. Director, Environmental Management Act*, Decision No. 2014-EMA-003(b) and 2014-EMA-004(b), November 27, 2015).

[71] Although the Panel makes certain findings in the present decision regarding the Appellants' concerns about the EEM Plan, it is important to note that this decision is not binding on any future panel that may hear the merits of the appeals regarding the EEM Plan.

The Director's position on the appeals

[72] The Director submits that the appeals should be dismissed and the Amendment should be confirmed. He submits that he considered whether the emissions authorized by the Amendment would have an unacceptable adverse effect on human health and the environment, pursuant to section 16 of the *EMA*.

He determined that the Amendment contained sufficient conditions for the protection of human health and the environment. He argues that the Appellants have the burden of proving, on a balance of probabilities, that the Amendment does not do so. He argues that he considered sufficient information before deciding to issue the Amendment and the public consultation process exceeded the statutory requirements. He submits that he had no legal obligation to consider cumulative effects or the precautionary principle, but he took a cautious approach in assessing the potential impacts of the Amendment.

[73] In addition, the Director submits that the evidence demonstrates that he did not fetter his discretion and the circumstances do not give rise to a reasonable apprehension of bias. He also submits that he provided adequate reasons for his decision. Alternatively, if the Board determines that there was a breach of natural justice in the Director's decision-making process, or that the reasons given for his decision were inadequate, he submits that the appeals were conducted as a new hearing of the matter which cured any procedural defects in his decision-making process.

Rio Tinto's position on the appeals

[74] Rio Tinto submits that the appeals should be dismissed. Rio Tinto maintains that the Amendment was issued after a thorough review of an extensive amount of technical and scientific analysis about the potential impacts of the SO_2 emissions, and after a public consultation process that exceeded the requirements of the *Public Notification Regulation*. Rio Tinto submits that the Appellants have failed to establish that the Amendment does not contain sufficient conditions for the protection of human health and the environment. Rio Tinto argues that none of the expert reports tendered by the Appellants establish that the Amendment will have significant impacts on human health or the environment. Furthermore, Rio Tinto submits that the Director had no legal obligation to consider the precautionary principle, cumulative effects, or the polluter pays principle. Moreover, Rio Tinto maintains that the hybrid *de novo* nature of the appeal process cured any procedural defects in the Director's decision-making process.

ISSUES

[75] In deciding these appeals, the Panel has addressed the following issues:

1. Whether the process that preceded the issuance of the Amendment was flawed due to breaches of natural justice or procedural fairness including:
   a. The nature of an appeal to the Board under the *EMA*.
   b. Whether the Director fettered his discretion by pre-determining the appropriateness of an adaptive management approach to regulating SO_2 emissions under the Amendment.
   c. Whether the Amendment is invalid due to a reasonable apprehension of bias arising from the Secondment Agreement.

d. Whether the Director failed to provide adequate reasons for his decision to issue the Amendment, particularly in regard to the increase the SO_2 emission limit.

2. What is the proper legal test for considering whether to grant a permit amendment under section 16 of the *EMA*?

   a. Does the precautionary principle apply in interpreting and applying section 16 of the *EMA*?

   b. Does section 16 of the *EMA* require the consideration of cumulative effects?

   c. Does the polluter pay principle apply in interpreting and applying section 16 of the *EMA*?

3. Whether the information before the Panel is adequate to confirm the issuance of the Amendment under section 16 of the *EMA*.

   a. Evidence regarding impacts on human health

   b. Evidence regarding impacts on soils

   c. Evidence regarding impacts on vegetation

   d. Adequacy of the public consultation process

RELEVANT LEGISLATION

[76] The following sections of the *EMA* are relevant to these appeals. Other relevant legislation is set out in the body of this decision.

Definitions

1 (1) In this Act:

...

"air contaminant" means a substance that is introduced into the air and that

(a) injures or is capable of injuring the health or safety of a person,

(b) injures or is capable of injuring property or any life form,

(c) interferes with or is capable of interfering with visibility,

(d) interferes with or is capable of interfering with the normal conduct of business,

(e) causes or is capable of causing material physical discomfort to a person, or

(f) damages or is capable of damaging the environment;

...

"**environment"** means air, land, water and all other external conditions or influences under which humans, animals and plants live or are developed.

...

"waste" includes

(a) air contaminants,

(b) litter,

(c) effluent,

(d) refuse,

(e) biomedical waste,

(f) hazardous waste, and

(g) any other substance prescribed by the Lieutenant Governor in Council, or the minister under section 22 …

…

Amendment of permits and approvals

16 (1) A director may, subject to section 14 (3), this section and the regulations, for the protection of the environment,

(a) on the director's own initiative if he or she considers it necessary, or

(b) on application by a holder of a permit or an approval,

amend the requirements of the permit or approval.

…

(4) A director's power to amend a permit or an approval includes all of the following:

(a) authorizing or requiring the construction of new works in addition to or instead of works previously authorized or required;

(b) authorizing or requiring the repair of, alteration to, improvement of, removal of or addition to existing works;

(c) requiring security, altering the security required or changing the type of security required or the conditions of giving security;

(d) extending or reducing the term of or renewing the permit or approval;

(e) authorizing or requiring a change in the characteristics or components of waste discharged, treated, handled or transported;

(f) authorizing or requiring a change in the quantity of waste discharged, treated, handled or transported;

(g) authorizing or requiring a change in the location of the discharge, treatment, handling or transportation of the waste;

(h) altering the time specified for the construction of works or the time in which to meet other requirements imposed on the holder of the permit or approval;

(i) authorizing or requiring a change in the method of discharging, treating, handling or transporting the waste;

(j) changing or imposing any procedure or requirement that was imposed or could have been imposed under section 14 or 15.

...

(7) If a director amends a permit or approval, the director

(a) may require that the holder of the permit or approval supply the director with plans, specifications and other information the director requests, and

(b) must give the holder of the permit or approval notice in writing of the amendment and publish notice of the amendment in the prescribed manner.

SUMMARY OF EVIDENCE

[77] During the 22-day appeal hearing, the Panel heard 19 days of testimony from 18 witnesses, (including the Appellants), 10 of whom were qualified as expert witnesses. In addition, the parties entered almost 170 exhibits into evidence, including numerous expert reports and technical documents. Much of the evidence focused on the technical merits of the Amendment.

Documents that were before the Director

[78] All of the information that was before the Director was introduced into evidence before the Panel, including: the 450-page STAR (and the hundreds of pages of appendices to that report); the 509-page Consultation Report outlining the public concerns raised during the permitting process, and Rio Tinto's response to those concerns; and, the 102-page EEM Plan. In addition, two binders of notes, emails, and photographs generated during the permit application process, and involving two of the three main Ministry employees who worked on the permit application process and reported to the Director, were admitted into evidence during the hearing, as were scores of other documents generated by, or sent to, the Director.

New documentary and video evidence

[79] In addition, the Panel received and considered documentary evidence that was not before the Director, including thousands of pages of evidence regarding the results of scientific literature research into SO_2 emissions, expert reports, studies, correspondence between the parties, and video evidence regarding the aluminum smelting process.

The witnesses and testimonial evidence

[80] The hearing involved technical and scientific testimony regarding: the aluminum smelting process; air emissions, including air dispersion modelling and standard setting for air quality; the impacts of SO_2 emissions on human health, vegetation, soil and water; and, the availability, costs and benefits of technology that may be used to reduce SO_2 and other emissions. The Panel heard this evidence from 16 technical and expert witnesses called by the Appellants, the Director, and Rio Tinto. These witnesses testified regarding both the scientific

studies and information presented to the Director in the STAR, as well as new studies and new data that became available after the STAR was finalized.

[81] The Panel heard from witnesses regarding: the modernized smelting process planned for KMP and the options available to reduce the SO_2 emissions from that process; the use of air dispersion modelling to predict the range and deposition of the plume of contaminants from the smelter; the predicted impacts of SO_2 emissions on human health, vegetation, surface water and soils, and the EEM Plan to monitor the impacts of the SO_2 emissions on the environment and human health.

[82] Below is a list of the witnesses who testified, including the subject areas in which the expert witnesses were qualified to testify.

[83] The Panel heard testimony from nine witnesses called on behalf of the Appellants, including each of the Appellants and seven witnesses who were called on their behalf, four of whom were qualified as experts and whose expert reports were admitted into evidence in the hearing.

[84] The following witnesses testified on behalf of the Appellants:

- Emily Toews, an Appellant;
- Elisabeth Stannus, an Appellant;
- Dr. Douw Steyn, Professor of Atmospheric Sciences, University of British Columbia, who was qualified as an expert in the areas of air pollution meteorology, air quality standard setting and monitoring; boundary layer meteorology; comparative jurisdictional approaches to air quality protection and mesoscale meteorology;
- Dr. Rock Ouimet, Forest Engineer, Forest Research Branch, Quebec Ministry of Natural Resources, who was qualified as an expert in critical load analysis of the sensitivity of forest ecosystems to atmospheric acid deposition, forest ecology and forest health, and weathering rates and soil formation in forest ecosystems;
- Greg Knox, Executive Director, Skeena Wild Conservation Trust;
- Natalie Suzuki, Air Quality Science Specialist, Environmental Protection Division, Ministry of Environment;
- Patrick Williston, Impact Assessment Biologist, Environmental Protection Division, Ministry of Environment;
- Dr. Mark Chernaik, Staff Scientist, Environmental Law Alliance Worldwide, Eugene, Oregon, who was qualified as an expert in air quality regulation and standard setting, and environmental science, with an emphasis on human health effects of exposure to pollutants in ambient air; and
- Dr. Brian Scarfe, President, BriMar Consultants Ltd., who was qualified as an expert in cost-benefit analysis, environmental economics, natural resources and energy economics, and economic analysis of public policy issues relating to natural resources and environmental management.

[85] Ms. Toews and Ms. Stannus testified regarding their knowledge of and involvement in the public consultation process that formed part of the application process. Each of them also testified about their concerns regarding the increased SO_2 emissions that would result from the Amendment. They both testified that they were not opposed to KMP, but they wanted the Panel to order the installation of scrubbing technology as a requirement of the amended Permit to reduce the impacts of SO_2 emissions.

[86] Mr. Knox testified regarding his involvement in the public consultation process that preceded the issuance of the Amendment.

[87] The four expert witnesses who testified on behalf of the Appellants were: Dr. Steyn, who testified regarding air pollution, air quality standard setting and monitoring and approaches to air quality protection; Dr. Scarfe, who testified as to the cost-benefit analysis of installing scrubbers on the gas treatment centres at KMP; Dr. Ouimet, who testified regarding the impacts on forests and soil from exposure to acid deposition (from SO_2 in the atmosphere) and the models that estimate that impact over time; and, Dr. Chernaik, a staff scientist with an American environmental law organization with expertise in air quality regulation and standard setting, and environmental science with emphasis on the human health effects of exposure to airborne pollutants.

[88] Further, the Appellants called two Ministry employees who were involved in the permitting process, but who the Director had not intended to call as witnesses. The first was Ms. Suzuki, an air quality science specialist employed in the Environmental Standards Branch of the Ministry, with expertise in airshed management. She testified regarding the Canadian National Air Quality Objectives and Standards, standards used in other jurisdictions, BC's Interim Ambient Air Quality Guidelines, and the standard setting process. The second Ministry employee called by the Appellants was Mr. Williston, a biologist and Environmental Impact Assessment Officer with the Ministry, who testified regarding his involvement in reviewing the vegetation, soil, and surface water components of the STAR.

[89] The following witnesses testified on behalf of the Director:

- Frazer McKenzie, Compliance Specialist, Environmental Protection Division, Ministry of Environment; and
- Ian Sharpe, the Director.

[90] Mr. McKenzie is the Ministry's lead Environmental Impact Assessment Officer, who was assigned fulltime to the KMP amendment application and applications for other related approvals. He testified regarding the permitting process and the gathering of scientific information to support Rio Tinto's application.

[91] The Director testified about his decision-making process. His Rationale for the Decision was introduced in evidence at the appeal. He testified that when he issued the Amendment, he was satisfied that he had sufficient information to set requirements for protection of the environment and human health; specifically, regarding the prediction, identification, avoidance and mitigation of potential impacts of the proposed emissions of SO_2 on human health and the environment.

[92] The Director testified that he was aware that the modernized aluminum smelter is predicted to reach stable operations and full production in late 2018. He stressed that the EEM Plan was an "add on" to the Amendment that would also provide useful information for future consideration in light of other proposed projects in the Kitimat area that may apply for air emission permits. He wanted to expand the Public Advisory Committee associated with the smelter's emissions, to allow the public to participate and be involved in the EEM Plan and its evolution. He noted that there would be annual reviews under the EEM Plan, and as new information becomes available, changes may be made to the Permit in the future, particularly after the comprehensive review concludes in 2019.

[93] The Director testified that he did not rush to make his decision. He testified that, although he received Rio Tinto's final application on April 17, 2013, the final version contained only minor changes to what had previously been presented during the public consultation process, and he could easily review those minor changes prior to making his decision on April 22, 2013.

[94] The Director further testified that, in reaching his decision, he considered:

- the STAR;
- the Consultation Report;
- correspondence received by him or Rio Tinto after the end of the formal public consultation process up to the date of the decision;
- all referral comments, with special attention to those from the Northern Health Authority and BC Centre for Disease Control because of their expertise in public health;
- advice from other Ministry staff, such as information from Mr. Williston regarding the potential for impacts on lichens, and from Marty Kranabetter at the Ministry of Forests, Lands and Natural Resources regarding the potential for impacts on mushrooms;
- the HATCH #2 report on the feasibility of scrubbers as a mitigation measure;
- information from Dr. Laurence regarding potential impacts on agriculture; and
- the first draft of Rio Tinto's environmental effects monitoring plan. The Director noted that he was dissatisfied with this first draft, and he instructed Rio Tinto to start afresh and address all four lines of evidence (i.e., impacts on human health, soil, surface water, and vegetation). Consequently, he included section 4.2.5 in the Amendment, which required Rio Tinto to submit an environmental effects monitoring plan for the Director's review and approval.

[95] Finally, the Panel heard the testimony of seven witnesses called by Rio Tinto, six of whom were qualified as expert witnesses. Their expert reports were entered into evidence. The following witnesses testified on behalf of Rio Tinto:

- David Marmorek, President, ESSA Technologies Ltd., who was qualified as an ecologist with expertise in the field of adaptive management, and modeling and evaluating the impact of acid deposition on watersheds, streams, lakes and aquatic biota;

- Greg Paoli, Principal, Risk Scientist and Chief Operating Officer, Risk Sciences International, who was qualified as an expert in risk assessment as it applies to human health including risk assessment methodology and the interpretation of those results for the purpose of supporting decision-makers;
- Anna Henolson, Managing Consultant, Trinity Consultants, who was qualified as an expert in air dispersion modelling and air quality analysis including CALPUFF, AERMOD, and other guideline dispersion models that have been approved by the U.S. Environmental Protection Agency ("EPA");
- Dr. Julian Aherne, Associate Professor and Canada Research Chair in Environmental Modelling, Environmental and Resource Studies, Trent University, who was qualified as an expert in the assessment of the impacts of sulphur and nitrogen emissions on terrestrial ecosystems, acid deposition, and the determination of critical loads;
- Gaby Poirier, General Manager of BC Operations, Rio Tinto;
- Johannes (Stephan) Broek, Director – Environmental Engineering and Technology, Light Metals, HATCH – Abu Dhabi PTY Ltd., who was qualified as an expert in methods of reducing SO_2 emissions including scrubbing and the associated costs; and
- Dr. John Laurence, Consulting Plant Pathologist and Special Assistant to the Regional Forester, Forest Services, USA, who was qualified as an expert on the effects of air pollution to vegetation, and exposure levels to air pollution that cause effects on vegetation.

[96] Mr. Marmorek testified about the use of adaptive management and modeling and monitoring the impacts of acid deposition on watersheds, streams, lakes, and aquatic life. Ms. Henolson testified regarding the use of air dispersion models, the development of the protocol and procedures to be used for air dispersion modelling for the study area identified in the STAR, the predictions for SO_2 in the study area produced by the model, and the retrospective analysis that was conducted to test the accuracy of the model's predictions. Mr. Paoli testified regarding risk assessment as it applies to human health. Dr. Aherne testified regarding the concept of critical load analysis, the use of critical load analysis in determining the impact of acid deposition on forest soils, and the results of the model that was developed for the study area to determine areas of risk that would be monitored in the EEM Plan. Mr. Broek testified regarding the smelting process to be used in the KMP, the strategies that might be implemented to remove SO_2 from emissions, and the factors to consider in determining the appropriate mitigation strategy. Dr. Laurence testified regarding the historical study of impacts on vegetation in the study area and the field monitoring program developed for the EEM Plan.

[97] It should be noted that not all of the evidence that was presented to the Panel is specifically referred to in this decision due to the large volume of material before the Panel. Nevertheless, the Panel considered all of the evidence and submissions that were provided.

DISCUSSION AND ANALYSIS

1. Whether the process that preceded the issuance of the Amendment was flawed due to breaches of natural justice or procedural fairness.

a. The nature of an appeal to the Board under the *EMA*.

[98] Many of the Appellants' grounds for appeal and submissions focus on alleged errors that were committed by the Director. However, the Appellants concede that the Director's procedural errors can be cured by the appeal process, given the Board's jurisdiction under the *EMA* to consider the evidence afresh and make any decision that the Director could have made under section 16 of the *EMA*. Specifically, the Appellants submit that the alleged fettering of discretion, the reasonable apprehension of bias, and inadequacy of the Director's reasons can be cured "by way of a *de novo* determination consistent with" the Appellants' requested remedies. The Appellants ask the Panel to, in effect, stand in the Director's shoes, and consider afresh Rio Tinto's application for a permit amendment.

[99] Pursuant to its authority under section 102(2) of the *EMA*, the Panel conducted these appeal as a "new hearing" in the sense that matters were heard "afresh" and the parties are able to present evidence that was not before the Director when he made his decision. As summarized above, that new evidence includes further scientific studies, data, and investigations that were not before the Director, as well as considerable evidence regarding the EEM Plan which was approved by the Director after the Amendment. More is known now about the nature and type of SO_2 monitoring that will occur. However, given that the evidence before the Panel also includes the record of information that was before the Director, the Appellants aptly characterize the hearing process as a "hybrid" *de novo* hearing.

[100] The Board has broad remedial powers under section 103 of the *EMA*. Under section 103(c), the Panel may make any decision that the Director could have made and that the Panel finds is appropriate in the circumstances. As a result, the Panel has considered the evidence that was before the Director, plus the new evidence that was presented at this hearing, and has considered whether to exercise any of its powers under section 103 of the *EMA*, including the power to make any decision that the Director could have made under section 16 of the *EMA*.

[101] In these circumstances, the Panel finds that if any defects occurred in the Director's decision-making process, the appeal process has cured them. As such, it may be unnecessary to address the merits of the Appellants' arguments alleging fettering, a reasonable apprehension of bias, and inadequate reasons for granting the Amendment. However, for greater certainty, the Panel has addressed each of those questions below.

b. Whether the Director fettered his discretion by pre-determining the appropriateness of an adaptive management approach to regulating SO_2 emissions under the Amendment.

The Appellants' submissions

[102] The Appellants submit that the legal test for fettering of discretion is set out in *Maple Lodge Farms v. Government of Canada*, [1982] 2 S.C.R. 2 ("*Maple Lodge Farms*"), at pp. 6 – 7, where the Supreme Court of Canada adopted the following reasons of the court below:

> The Minister may validly and properly indicate the kind of consideration by which he will be guided as a general rule in the exercise of his discretion,... but he cannot fetter his discretion by treating the guidelines as binding upon him and excluding other valid or relevant reasons for the exercise of his discretion... .

[103] The Appellants note that this decision was recently followed by the BC Supreme Court in *B.C. College of Optics Inc. v. The College of Opticians of B.C.*, 2014 BCSC 1853 (CanLII) ("*B.C. College of Optics*"). The Appellants also note that the Board recently considered the issue of fettering in *Shawnigan Residents Association et al v. Director's Delegate, Environmental Management Act* (Decision Nos. 2013-EMA-015(c), 019(d), 020(b), and 021(b), March 20, 2015) ("*Shawnigan Residents Association*"). In that case, the Board found at para. 341 that fettering did not occur because there was no allegation or evidence that the Ministry decision-maker "blindly followed Ministry policy".

[104] Throughout the appeal process, the Appellants submitted that the Director's discretion was fettered by the SO_2 MOU, which compelled the adoption of an adaptive management approach for assessing and managing SO_2 emissions associated with the KMP, even if it was uncertain whether that approach was consistent with the "protection of the environment" as provided in section 16 of the *EMA*. In their Further Amended Statement of Points, the Appellants submit that the 2011 SO_2 MOU precluded the Director from adopting a "precautionary approach" to determining whether, and on what terms, to grant a permit amendment. In their closing submissions, they assert that fettering prevented him from applying the "precautionary principle". They argue that he "blindly" adopted an adaptive management approach. They submit that the adaptive management approach allowed the Director to defer obtaining essential information/data, and to ignore key scientific uncertainties, when granting the Amendment. They submit that he deferred considering those matters until the EEM Plan is implemented.

[105] However, in their closing submissions, the Appellants submit that it was the Director's idea to use an adaptive management approach long before the SO_2 MOU was signed, but his discretion was fettered because his mind was closed to any other approach. The Appellants submit that the Director introduced the idea of adaptive management to Rio Tinto when the KMP was first discussed with the Ministry, and he ensured that an adaptive management approach was incorporated into the SO_2 MOU and the Secondment Agreement. They maintain that, as a result, most of the work related to Rio Tinto's application was carried out using an adaptive management approach, without seriously questioning the appropriateness of that

approach. In support of those submissions, the Appellants submit that the Director testified that, based on his past experience using environmental effects monitoring programs for permits associated with mine discharges, he advised an Assistant Deputy Minister for the Ministry to incorporate an adaptive management approach into the SO_2 MOU. In particular, the Appellants refer to the Director's testimony that "(T)he adaptive management approach was my idea. I was the one who said my past experience is such that something of this complexity needs to have a feedback mechanism, an ongoing feedback mechanism."

[106] The Appellants submit that, by March 2012, when Rio Tinto assembled a team of qualified professionals to begin working on the STAR, everyone assumed that Rio Tinto's application would be dealt with through an adaptive management approach. In support of those submissions, the Appellants note that the STAR refers to the SO_2 MOU and how adaptive management would be applied in the context of the STAR. The Appellants also refer to Mr. Marmorek's testimony that "… we were asked to work out a work plan and a team for doing a technical assessment and to develop an adaptive management approach. It was given to me that an adaptive management approach was the intended way that the Ministry of Environment wanted to proceed."

[107] In addition, the Appellants submit that the Director's request that Rio Tinto have the HATCH #2 report prepared shows that he was committed to assessing Rio Tinto's application based on an adaptive management approach. They submit that the Director requested preparation of the HATCH #2 report to regain confidence in the feasibility of SO_2 mitigation options after he found out that there was some doubt about the feasibility of scrubbers at the modernized smelter. In that regard, they note that he testified as follows:

> So I basically immediately required Rio Tinto Alcan to create a new site-specific, Kitimat-specific report outlining the feasibility, or lack thereof, of the various treatment options, as well as how they might manipulate their coke supply as it relates to sulphur content so that I could, in my own mind, prior to the decision, re-affirm that indeed they were ready, willing and able to institute scrubbing, should it be required, either in this decision that I was considering or at a future time should it be necessary. So that was the report called Hatch 2.

[108] Moreover, the Appellants submit that the Director testified that he "needed" to rely on an adaptive management plan when he decided to grant the Amendment, and they point to his testimony that:

> … I was convinced that at the – when I made the decision that I couldn't just rely on the concepts that were put in the STAR; that I needed to go to the next step and to say specifically Environmental Effects Monitoring program, review and approval, and that it could then be tailored in a – in a somewhat different way for the purposes I've described.

[109] As noted above, the Appellants acknowledge that the Board conducted a "hybrid" appeal hearing that included new evidence that was not before the Director, and the Board has the power to make any decision that the Director could

have made. They submit, therefore, that the Director's error can be cured by the appeal process, but the Panel should not restrict itself to considering the application for the Amendment "through the lens of an adaptive management approach in a blind fashion." However, the Appellants clarify that they "do not suggest that using an adaptive management approach is always wrong." The Appellants submit that the Panel should consider whether an adaptive management approach, or an alternative approach such as the precautionary one, is appropriate for adjudicating Rio Tinto's application under section 16 of the *EMA*.

The Director's submissions

[110] The Director acknowledges that a statutory decision-maker's discretion may be fettered by an outside influence, or alternatively, by determining the outcome of the decision without fully considering all of the relevant facts. The Director submits that the Appellants, however, have the onus of proving fettering and argues that they have provided insufficient evidence to establish, on a balance of probabilities, that the Director fettered his discretion. In support of those submissions, the Director referred to *Maple Lodge Farms* at p. 7, as well as the Board's decisions in *Harris v. British Columbia (Ministry of Health)*, [1996] B.C.E.A. No. 52 ("*Harris*"); *Rustad Bros. v. British Columbia (Ministry of Environment, Lands and Parks)*, [1995] B.C.E.A. No. 38 ("*Rustad Bros.*"), at p. 2; and *Penelakut First Nation Elders v. British Columbia (Ministry of Water, Land and Air Protection)*, [2004] B.C.E.A. No. 34 ("*Penelakut*"). The Director submits that those decisions of the Board echo the Supreme Court of Canada's perspective on fettering.

[111] In particular, the Director submits that there is no evidence that he "shut his ears" to concerns that were raised about Rio Tinto's application, that he was constrained by any outside factor, or that he failed to consider relevant information that was before him. Rather, he submits that the evidence demonstrates that, from the outset of discussions with Rio Tinto, he was aware of the need to be impartial and took deliberate steps to ensure that his discretion would not be fettered. The Director testified that he was consulted about the SO_2 MOU before it was signed by the Minister and he was instrumental in defining its terms. In fact, he indicated that the SO_2 MOU was driven by discussions at his level, and was not a "top down" fettering of his powers.

[112] The Director submits that, although he was entitled to consider the provisions of the SO_2 MOU in exercising his powers, he was not a signatory to it, and it was an administrative arrangement which created no binding legal or contractual relationship. The Director testified that he was confident that he could consider any portions of the SO_2 MOU that were useful to him and ignore others. He specifically sought legal advice on the content of the SO_2 MOU to safeguard against the possibility of being fettered by it.

[113] Regarding the SO_2 MOU, the Director testified, in part, as follows:

> And then the second thing was to advise [his supervisor] as to what in an MOU, given that there were many discussions on many things that could go into an MOU, what in the MOU would not fetter Mr. Sharpe as a decision-making – decision-maker. So that was the advice I was

> giving. And in the end, I knew that the MOU could be treated as guidance, certainly not as direction.

[114] The Director further submits that he advised Rio Tinto, both before and after the SO_2 MOU was signed, that the SO_2 MOU did not supersede the permitting process under the *EMA*. He was aware of his statutory mandate to set requirements for the protection of the environment and human health, and he advised Rio Tinto that there would need to be significant scientific investigations, and consultation with the public and First Nations, as part of the application process. Regarding the process of educating Rio Tinto's staff on the requirements for seeking a significant amendment to the Permit, the Director testified, in part, as follows:

> So in 2008, …an executive member of the company, is e-mailing to me and stating that he thought that the Kitimat Modernization Project no longer needed any authorization for SO_2, that he thought that the MOU … signed in 2007 would, in and of itself, serve as the authorization for an increase in SO_2. I needed to disabuse him of that notion, and so part of that e-mail is me doing that.
>
> …
>
> Yes, it was a lengthy process, I've referred to as "turning the ship", so making sure that executive in Rio Tinto understood that science – a scientific – a rigorous scientific approach to the significant permit amendment for SO_2 had to be done, that anything else would not be acceptable, actually couldn't be put before the decision-maker.
>
> …
>
> So, Rio Tinto was seeking an increase from the current 27 tonnes a day to upwards of 45 to 50 tonnes per day. We explained that an increase of this magnitude needs to be done through a significant permit amendment and that such an amendment must be supported by technical information that demonstrates, to the satisfaction of Mr. Sharpe, that such an increase would not cause negative impacts to the environment or human health.

[115] Turning to the terms of the SO_2 MOU, the Director submits that he did not apply the 1979 PCOs, referred to in Article 1 of the SO_2 MOU, in determining the SO_2 limit in the Amendment. Rather, he considered impact assessment methods, as set out in the STAR, based on a human health risk assessment, critical load analyses for soils and water, and the application of Canadian and American federal thresholds for tolerance in vegetation.

[116] Regarding Article 2 of the SO_2 MOU, the Director testified that a collaborative, iterative process was important to ensure that he had adequate, useful information before him as the statutory decision-maker. The collaborative approach envisaged in the SO_2 MOU was followed throughout the process. Also, the adaptive management approach was important given the complexity of the KMP. In his opinion, adaptive management allows for continual improvement, and he would require it in this case regardless of whether it was included in the SO_2

MOU, due to the complexity of the science used in the STAR to predict the effects of the SO_2 emissions. He testified that adaptive management is essentially "a feedback mechanism to evaluate past decisions." He explained his view of an adaptive management approach as follows:

> Well, I would say that the adaptive management approach in my mind at that time, even going back to 2007, was more about dealing with a feedback mechanism needed by a decision-maker to ensure that on an ongoing basis the predictions that are made are coming true, and if they aren't be able to act to ensure that things occur to make – to reduce any effects that might occur to the environment and human – and/or human health.
>
> So the concept that I had in my mind for adaptive management at the time of even the first MOU signature, was that adaptive management was inclusive of a continuous improvement approach towards science, the impact assessment work. …

[117] The Director submits that nothing in Article 2 of the SO_2 MOU binds him to adopting an adaptive management approach or to follow any particular adaptive management plan.

[118] Regarding the commitments set out in Article 3, the Director submits that those did not bind him to follow a specific path or achieve a specific outcome in deciding Rio Tinto's application. He notes that paragraph 1 of Article 3 states that Rio Tinto was committed to completing and implementing an SO_2 adaptive management program "to the reasonable satisfaction of the Director." The Director submits that, rather than fettering his discretion, this contemplates that he may reject any adaptive management plan proposed by Rio Tinto.

[119] The Director testified that Article 7 in the SO_2 MOU is a "no-fettering clause". It states that the SO_2 MOU is "an administrative arrangement" and nothing in it "is to be construed as creating any financial, legal, or contractual relations between the Parties." He testified that he treated the SO_2 MOU like it was a policy document which provided guidance, and he could "take it or leave it." He knew that he must remain independent and in his mind, he did so.

[120] Mr. McKenzie testified that he understood the SO_2 MOU to be a "guiding document" in the application process. He testified that the Director had expressed concern during the drafting of the SO_2 MOU that it should not fetter his discretion. Mr. McKenzie testified regarding notes that he had taken, and correspondence between the Ministry and Rio Tinto, indicating that Rio Tinto was repeatedly made aware that the SO_2 MOU could not fetter the Director's discretion.

[121] In summary, the Director submits that, whether taken as a whole or article by article, the SO_2 MOU did not compel any party to take specific action.

[122] Turning to the question of whether the Director determined the outcome of Rio Tinto's application without fully considering the relevant facts, the Director submits that he was clear in his communications with Rio Tinto that including adaptive management in the process did not presuppose any outcome for Rio Tinto's application. He advised Rio Tinto that, under an adaptive management

approach, the permitted SO_2 limit may increase, decrease, or remain the same. He submits that the inclusion of adaptive management in the process underscored the importance of a science-based approach in determining whether the Permit, if amended, would protect the environment. In that regard, he testified as follows:

> And also, I was – kept asking Frazer to pass on to the company through the workshops that I basically wouldn't be satisfied if they couldn't in some way answer the "so what" question, the "so what" question meaning, give me a sense of what the actual effects might be on a predictive basis, don't just compare your results to one guideline or another, which are basically proxies, whether they're modern or otherwise, proxies for what effects might be. So as a result of that, a new element not mentioned in the MOU which was highly relevant to answering the "so what" question, was introduced into the Terms of Reference and ultimately into the STAR, and that was the Dose-Response Analysis Assessment.

[123] The Director submits that, if he was bound by anything, it was to conduct a procedurally fair, legislatively-based, scientifically rigorous, and collaborative process, because this is what was required to be impartial in evaluating Rio Tinto's application. He submits that he assessed Rio Tinto's application in a careful, thorough, and open-minded way, and he considered an extensive amount of information including the STAR, the Consultation Report, and all comments provided by the public.

[124] Regarding the Appellants' allegation that, by "blindly" adopting an adaptive management approach, the Director precluded himself from adopting a "precautionary approach", the Director argues that he did, in fact, adopt a "precautionary approach" to assessing Rio Tinto's application. He testified that he took a "cautious approach" in making his decision. He submits that, based on the STAR and the other information that was before him, he was satisfied that the Amendment was protective of the environment and human health, but he was also convinced of the need to monitor actual impacts given the complexity of the science used to predict impacts. He notes that the STAR predicts the effects of the SO_2 emissions on the environment and human health, whereas the EEM Plan will serve to determine the actual effects of the SO_2 emissions. In that sense, he submits that the EEM Plan supports the decision to issue the Amendment, but the EEM Plan will not lead to information that would have been necessary for him to decide whether to grant the Amendment. He submits, in other words, that the EEM Plan did not affect his decision to grant the Amendment based on the applicable statutory test.

Rio Tinto's submissions

[125] Rio Tinto submits that the Appellants provided no evidence to show the Director's discretion was fettered. Rio Tinto maintains that the Board has previously held that an appellant must produce direct evidence in order to establish fettering of discretion: *Penelakut*.

[126] Rio Tinto submits that the "shifting sands of the Appellants' position on fettering" undermines the Appellants' argument. Rio Tinto notes that in an earlier

iteration of their Statement of Points, the Appellants alleged that the Director's discretion was fettered because, under the SO_2 MOU, the Ministry agreed to regulate SO_2 emissions according to the 1979 PCOs. But when it became apparent to the Appellants that the Director did not rely on the 1979 PCOs, the Appellants abandoned this argument. Instead, less than one month before the hearing, they began to allege that the Director's discretion was fettered by the SO_2 MOU on the basis that it required him to apply an adaptive management approach and precluded him from taking a precautionary approach.

[127] Rio Tinto submits that the Appellants rely solely on the SO_2 MOU to allege fettering in their Further Amended Statement of Points, but nothing in the SO_2 MOU supports a conclusion that the Director's discretion was fettered. Rio Tinto submits that the SO_2 MOU did not restrict how the Director would decide Rio Tinto's application, nor did it commit the Director to issuing the Amendment. Rio Tinto submits that the testimony of the Director and Mr. McKenzie establishes that they viewed the SO_2 MOU as a guidance document that was not binding, and that the Director's use of an adaptive management approach did not result from a belief that he felt bound by the SO_2 MOU.

[128] Rio Tinto submits that the testimony of Mr. McKenzie and the Director establishes that the Ministry was alive to the fact that the Director's discretion could potentially be fettered, depending on the terms of an MOU, and the Ministry took specific steps to include language in the SO_2 MOU to indicate that it created no financial, legal or contractual relations between the parties. Rio Tinto asserts that this language was inserted to ensure that the Ministry was not bound by any terms of the SO_2 MOU, so as not to fetter the Director's discretion.

[129] Rio Tinto also points to the Director's testimony that he decided to require Rio Tinto to take an adaptive management approach in applying for a permit amendment, well before the SO_2 MOU was signed. Rio Tinto submits that this is evidence that the choice to use adaptive management was a conscious exercise of the Director's discretion, and not the result of a belief that he was required to comply with the terms of the SO_2 MOU. Rio Tinto argues that this distinguishes this case from others where a decision-maker felt bound by a policy or other document.

[130] Rio Tinto argues that all of these factors indicate that the Director exercised his discretion independently, and he was not fettered.

[131] In any event, Rio Tinto argues that, even if the Director was fettered in his decision-making, that the hybrid *de novo* appeal process conducted by the Board cures any defects or deficiencies in the Director's decision-making process: *Imperial Oil Ltd. v. Regional Waste Manager* (Appeal Nos. 2003-WAS-007(b) and 2003-WAS-016(a), February 6, 2004), at pp. 5 - 6; *Eglin v. British Columbia (Ministry of Water, Land and Air Protection)*, [2001] B.C.E.A. No. 52, at paras. 29-30; and *Rustad Bros*.

The Panel's findings

[132] Before turning to the issue of fettering, the Panel notes that its findings under this sub-issue are limited to the question of whether the Director's discretion was fettered by either the SO_2 MOU or by pre-determining the outcome of Rio Tinto's application without considering all of the relevant facts. Although the

Appellants originally alleged that the Director was fettered by either, or both, of the SO_2 MOUs and the Secondment Agreement, the Appellants allege in their closing submissions that only the SO_2 MOU fettered his discretion. The Panel finds that the Appellants abandoned their argument with respect to fettering based on the Secondment Agreement. Even if they had not abandoned that line of argument, the Panel would have found that there was no evidence to support the assertion that the Director was fettered in the exercise of his discretion because of the existence of the Secondment Agreement. Additionally, although the Appellants' submissions regarding fettering imply that the precautionary principle, rather than adaptive management, should have been applied in this case, the Panel finds that the applicability or relevance of the precautionary principle must be determined based on the interpretation and application of section 16 of the *EMA*, which is addressed under Issue 2.

[133] The BC Supreme Court has held that an administrative decision-maker who blindly follows a policy, or closes his or her mind to the evidence, will have fettered their discretion. At para. 25 in *B.C. College of Optics*, the BC Supreme Court noted that the BC Court of Appeal discussed the concept of fettering in *Halfway River First Nation v. British Columbia (Ministry of Forests)*, 1999 BCCA 470 (CanLII), at para. 62:

> The general rule concerning fettering is set out in *Maple Lodge Farms Ltd. v. Canada*, 1982 CanLII 24 (SCC), [1982] 2 S.C.R. 2, which holds that decision makers cannot limit the exercise of the discretion imposed upon them by adopting a policy, and then refusing to consider other factors that are legally relevant… Government agencies and administrative bodies must, of necessity, adopt policies to guide their operations. And valid guidelines and policies can be considered in the exercise of a discretion, provided that the decision maker puts his or her mind to the specific circumstances of the case rather than blindly following the policy…
>
> [underlining added]

[134] Similarly, as the Board noted in *Shawnigan Residents Association* at para. 341, the BC Court of Appeal has stated that the issue of fettering arises where it is alleged that a decision-maker "failed to genuinely exercise its discretionary powers in an individual case, but rather made its decision on the basis of a pre-existing policy": *Phillips v. British Columbia (Workers Compensation Appeal Tribunal)*, 2012 BCCA 304 (CanLII), citing David Mullan, *Essentials of Canadian Law*, "Administrative Law" (Toronto: Irwin Law, 2001), at page 115. These judicial decisions indicate that the mere existence of a relevant policy does not necessarily amount to fettering. Rather, to avoid fettering, the decision-maker must not "close its mind" to the possibility that, in some cases, the circumstances may warrant not following the policy: *B.C. College of Optics*, at paras. 28 - 29.

[135] The Board has held that a party alleging that a decision-maker was fettered in the exercise of his or her discretion has the onus of providing evidence to substantiate the allegation on a balance of probabilities: *Penelakut,* at pp. 12 - 13.

[136] The Panel finds that the Appellants have failed to establish, on a balance of probabilities, that the Director's exercise of discretion under section 16 of the *EMA* was fettered, either by the SO_2 MOU or by having a "closed mind" about the particular circumstances surrounding Rio Tinto's application.

[137] Specifically, the Panel finds that there is no evidence that the Director was fettered by the SO_2 MOU. The Director's testimony, which was supported by Mr. McKenzie's testimony, is that he considered the SO_2 MOU to be non-binding on him and the Ministry. He did not feel that it required him to apply an adaptive management approach, and in any event, the evidence is that it was the Director who suggested that adaptive management be included in the SO_2 MOU. There is no evidence that an adaptive management approach was imposed on him by the SO_2 MOU or any other external factor. The Director testified that he supported the inclusion of adaptive management in the SO_2 MOU because it was a principle that he believed would be useful in the permitting process, and he would have required it of Rio Tinto regardless of whether it was mentioned in the SO_2 MOU. Adaptive Management requires monitoring actual impacts, assessing actual outcomes then checking whether those results support the predicted outcomes, and adjusting the project if outcomes are "worse" than predicted. This is an ongoing process. Although the Director believed that an adaptive management approach was an important part of the process, and that Rio Tinto needed to understand this, the evidence shows that the Director was alive to the need to ensure that he would not be fettered in the exercise of his discretion. When the SO_2 MOU was being drafted, he advised Ministry executives of the need to safeguard against any language that might be seen as fettering him in his decision-making.

[138] The Panel also finds that the Director's testimony that the SO_2 MOU merely provided guidance and did not fetter his discretion is consistent with the language in the SO_2 MOU. In particular, Article 7 clearly states that the SO_2 MOU does not create "legal, financial or contractual relations" between the Minister or Rio Tinto. Similarly, paragraph 1 of Article 3 states that Rio Tinto committed to completing and implementing an SO_2 adaptive management program "to the reasonable satisfaction of the Director." This language clearly contemplates that the SO_2 MOU was not intended to fetter the Director's discretion in assessing the merits of Rio Tinto's application.

[139] In summary, the Panel finds that it is evident from the language in the SO_2 MOU itself, and from the Director's and Mr. McKenzie's evidence regarding the SO_2 MOU, that the SO_2 MOU did not fetter the Director such that he blindly followed its provisions while refusing to consider any relevant evidence. Rather, the evidence is clear that the Director considered the SO_2 MOU to be, as stated in Article 7, merely an "administrative arrangement" that was not binding on the signing parties.

[140] Moreover, the Panel finds that there is no evidence that the Director had a closed mind as a result of using an adaptive management approach, or that he failed to puts his mind "to the specific circumstances of the case". On the contrary, the evidence shows that he carefully considered all of the relevant information that was before him, including the public's concerns about the SO_2 emissions, with an open and independent mind. The Director did not close his mind to any evidence or concerns that were presented to him during the permitting process. As information

came forward, he considered it, and when issues or concerns were presented to him, if he was not satisfied that they could be adequately addressed based on the existing information, he required further investigation and more information from Rio Tinto.

[141] The fact that the STAR discusses adaptive management, and Mr. Marmorek understood that the Ministry wanted to use an adaptive management approach, is not evidence that the Director's mind was closed to the relevant facts when it came to assessing the merits of Rio Tinto's application. The Director made it clear to Rio Tinto's staff that including adaptive management in the process did not presuppose any outcome for Rio Tinto's application. The evidence shows that the Director communicated to Rio Tinto's team of professionals that he expected Rio Tinto to provide scientifically sound analyses to support the permit amendment application, and that the impacts predicted in the STAR would be compared with the actual impacts measured through future monitoring and review under an environmental effects monitoring plan. The Director expected Rio Tinto to conduct a rigorous scientific analysis of the potential impacts of the SO_2 emissions before he made his decision, because the predicted impacts were a key factor in his decision-making process. The Panel finds that the Director's view that an important part of the permitting process is to require monitoring and review of actual impacts over time. These steps are essential elements of adaptive management, and their requirement does not indicate that he ignored relevant information about the predicted risks to human health or the environment when he decided to issue the Amendment.

[142] Finally, even if the Panel had found that the Director was fettered in his decision-making process, the Panel finds that the appeal process has cured any procedural defects that may have occurred in the Director's decision-making process.

[143] For all of these reasons, this ground of appeal is dismissed.

c. Whether the Amendment is invalid due to a reasonable apprehension of bias arising from the Secondment Agreement.

The Appellants' submissions

[144] The Appellants submit that Rio Tinto's involvement in, and support of, the position occupied by Mr. McKenzie gave rise to a reasonable apprehension of bias which invalidates the Amendment. In their closing arguments, the Appellants clarified that they do not dispute that Mr. McKenzie is a diligent, thorough, and hard-working employee of the Ministry. In fact, they stressed that the witnesses tendered by both the Director and Rio Tinto attested to his integrity and work ethic, as demonstrated in his performance evaluations. Nevertheless, the Appellants submit that a reasonable apprehension of bias is not about the character of an individual. Rather, they argue that a reasonable apprehension of bias is concerned with the context in which an individual is placed. They submit that Mr. McKenzie was placed in a secondment arrangement which would lead a reasonable person, having thought the matter through, to conclude that the Director would not have decided Rio Tinto's application fairly.

[145] All of the parties agree that the legal test for reasonable apprehension of bias was set out by L'Heureux-Dubé J., writing for a majority of the Supreme Court of Canada, in *Baker v. Canada (Minister of Citizenship and Immigration)*, [1999] 2 S.C.R. 817 ("*Baker*"), at para. 46. (also, *R. v. S. (R.D.)*, [1997] 3 S.C.R. 484).

[146] In *Baker,* the Supreme Court of Canada adopted the test for reasonable apprehension of bias that was first articulated by de Grandpré J., writing in dissent, in *Committee for Justice and Liberty v. National Energy Board*, [1978] 1 S.C.R. 369, at p. 394:

> … the apprehension of bias must be a reasonable one, held by reasonable and right minded persons, applying themselves to the question and obtaining thereon the required information… [T]hat test is "what would an informed person, viewing the matter realistically and practically—and having thought the matter through—conclude. Would he think that it is more likely than not that [the decision-maker], whether consciously or unconsciously, would not decide fairly."
>
> [underlining added]

[147] In *Baker*, at para. 45, Madam Justice L'Heureux-Dubé held that the duty to act in a manner free from reasonable apprehension of bias applies not only to the ultimate decision-maker, but may also apply to subordinate reviewing officers. Thus, when the Board decided the Appellants' application for an order compelling Rio Tinto to produce certain documents relating to Mr. McKenzie (*Emily Toews and Elisabeth Stannus v. Director, Environmental Management Act* (Decision Nos. 2013-EMA-007(b), 2013-EMA-007(c), 2013-EMA-010(b) and 2013-EMA-010(c)), the Board noted at para. 53 that the *Baker* test may, in certain circumstances, apply to subordinate officers:

> Finally, the Panel finds that, although the test for reasonable apprehension of bias pertains primarily to the person who made the impugned decision (i.e., the Director), the majority of the Court held at page 849 of *Baker* that, where subordinates of the ultimate decision-maker "play a significant role in the making of decisions," the duty to act fairly and with an open mind applies "whether they are subordinate reviewing officers, or those who make the final decision."
>
> [underlining added]

[148] The Appellants argue that the evidence clearly establishes that Mr. McKenzie worked very closely with the Director, and was the lead advisor to him regarding Rio Tinto's application. They note that in this capacity, Mr. McKenzie attended numerous meetings with the Director and Rio Tinto. He provided advice to the Director, such as bringing forward information about the critical load capacity of soil that ultimately convinced the Director to require such an approach in the STAR. He was one of three Ministry staff members who reviewed the draft STAR. Further, the Director and Mr. McKenzie "routinely debriefed" as to the latter's work.

[149] The Appellants assert that, because of their close working relationship, Mr. McKenzie must fall within the category of subordinate officers contemplated in

Baker "who play(ed) a significant role in the making of decisions". They argue that, in these circumstances, the Director owed a duty of fairness not to place Mr. McKenzie into a position where there may be a potential conflict of interest and which may give rise to a reasonable apprehension of bias. The Appellants do not identify the person to whom the Director allegedly owed this duty of fairness.

[150] The Appellants assert that the Director enabled and allowed Mr. McKenzie to be placed in a secondment arrangement that was "rife with potential conflicts of interest". They assert that the Director arranged for the Secondment Agreement, sought agreement from the Ministry's executive and Rio Tinto to enter into the Agreement, personally asked Mr. McKenzie to fill the secondment position, and played a role in drafting the Agreement.

[151] The Appellants assert that the Secondment Agreement stipulates that Rio Tinto would pay the salary and benefits, including disbursements for travel, accommodation and telecommunication expenses, for Mr. McKenzie who was to work exclusively on KMP permitting issues. The Secondment Agreement states that his scope of work included "advising Rio Tinto Alcan staff on issues pertaining to *EMA* permitting of discharges associated with the modernization of the smelter", but at the same time, he was also the "technical advisor [to the Director] carrying out the duties of an Officer" under the *EMA.* The Appellants note that the Secondment Agreement provides that Mr. McKenzie would have a "Rio Tinto Alcan Supervisor" who would provide regular performance reviews to the Director.

[152] The Appellants submit that the Director's testimony regarding the Secondment Agreement is at odds with the plain wording of the Agreement, and to the extent that there are inconsistencies, the plain wording of the Agreement should be preferred over the testimony of the Director. In effect, the Appellants invite the Panel to disbelieve the Director's testimony, summarized below, that certain provisions of the Secondment Agreement did not reflect the actual working relationship between the Ministry and Rio Tinto during the relevant time.

[153] Specifically, the Appellants point to the Director's testimony that the purpose of the Agreement was to obtain one full-time equivalent ("FTE") worth of funding which, for the first two years that the Agreement was in place, went to pay the salary of another employee who assumed Mr. McKenzie's former responsibilities, and thereafter was redirected to cover expenses in a different region which were given a higher priority by the Ministry executive. The Appellants assert that this testimony flies in the face of the plain language in the Agreement, which does not mention the term "FTE". They assert that a more logical explanation is that Rio Tinto was funding Mr. McKenzie's position and not various FTE's across the province. The Appellants also note that, according to the testimony of Mr. McKenzie and the Director, Mr. McKenzie did not have a Rio Tinto supervisor, and there was never an appraisal of his performance by Rio Tinto, contrary to the provisions in the Secondment Agreement.

[154] The Appellants submit that the plain language of the Secondment Agreement raises a reasonable apprehension that the Director was biased and would not decide Rio Tinto's application fairly.

[155] In addition, the Appellants argue that the public may have been concerned about Mr. McKenzie's position, because a member of the public wrote to the Minister asking for clarification about Mr. McKenzie's role in the public consultation process. The Appellants question why the Director did not respond to this letter.

[156] In summary, the Appellants submit that:

> … a reasonable person, having reviewed the Secondment Agreement realistically and practically - and having thought the matter through - would likely conclude that there was an apprehension of bias.

The Director's submissions

[157] The Director acknowledges that the Province entered into the Secondment Agreement with Rio Tinto, for the services of one full time position held by Mr. McKenzie. The Director did not execute that Agreement on behalf of the Province, but he testified that he was familiar with its content and was instrumental in obtaining it.

[158] The Director submits that the Agreement was for administrative convenience only; it was needed to ensure that the Province had the ability to dedicate the resources necessary to process Rio Tinto's application while continuing to meet the other obligations of the Ministry's regional office in Smithers.

[159] The Director further submits that the plain wording of the Secondment Agreement does not accurately represent the actual working arrangements between the parties. Specifically, the Director notes that, at all times, Mr. McKenzie remained an employee of the Province with all of the duties and responsibilities inherent in his position as an Environmental Protection Officer for the Ministry. At no time was Mr. McKenzie reporting to, or being evaluated by, anyone at Rio Tinto.

[160] The Director submits that the inquiry into whether there is a reasonable apprehension of bias is inherently contextual and fact-specific, and there is a high burden of proof on the party alleging bias: *R. v. S. (R.D.)*, [1997] 3 S.C.R. 484 ("*S. (R.D.)*"), at para. 141. The Director submits that, in the present case, the entire Secondment Agreement along with the witnesses' evidence about the nature of Mr. McKenzie's secondment arrangement should be examined, rather than select sections of the Agreement alone.

[161] The Director testified that the working arrangements between Mr. McKenzie and himself were deliberately managed in such a way as to ensure that the Director's independence as a statutory decision-maker would be protected throughout the decision-making process. Mr. McKenzie carried out his responsibilities as an Environmental Protection Officer after the Secondment Agreement was entered into, exactly as he had prior to the Agreement, with three exceptions: 1) his workload was restricted to Rio Tinto's application, rather than dealing with many issues involving a number of industrial entities; 2) he was instructed not to make recommendations to the Director regarding actions to be taken by the Ministry regarding compliance issues involving Rio Tinto, as he normally would have done; 3) he was instructed not to complete a Ministry Assessment of the completed permit amendment application for the Director's

consideration, as he normally would in his role as an Environmental Protection Officer.

[162] The Director testified that, throughout the permitting process, Mr. McKenzie worked from the same office as he always had; i.e., the Ministry's Smithers office. Also, he continued to be a Ministry employee with the same payroll number as he always had, with his pay being issued from the Province as it always had been. Mr. McKenzie reported to the Director, and his performance evaluations were carried out by the Director.

[163] Mr. McKenzie testified, and was cross-examined, regarding the Secondment Agreement. He stated that, after meeting with Rio Tinto to discuss the proposed KMP, the Director concluded that this would be a very large project that was going to be a resource burden for the Ministry. He testified that the Director initially considered a temporary assignment to provide capacity; i.e., a dedicated person to work on the project. He explained that temporary assignments are internal to government and would be government-funded. Ultimately, the Ministry decided to address the issue by means of the Secondment Agreement. He testified that once the Agreement was signed, he worked fulltime on the KMP. Nothing else changed: he worked from the same office as he had since 1986; he required the Director's approval to take vacations; and, the Director carried out reviews of his work performance. Mr. McKenzie testified that he did not have an office at Rio Tinto. When he was on-site at Rio Tinto, he was treated as any other "visitor" and had to be accompanied by a Rio Tinto employee. As to his authority to make decisions, Mr. McKenzie testified that after the Secondment Agreement was signed, the Ministry intentionally took away his "signing authority" for expenses.

[164] Mr. Williston testified that he was aware of the Secondment Agreement, and that it did not change his working relationship with Mr. McKenzie.

Rio Tinto's submissions

[165] Rio Tinto submits that Mr. McKenzie was in an investigatory role, to which the reasonable apprehension of bias principle does not typically apply. Rio Tinto submits that although there are cases, such as *Baker*, where a biased investigator has given rise to a reasonable apprehension of bias, those cases are different on their facts. Rio Tinto submits that *Baker* is distinguishable on its facts for several reasons:

- there was clear evidence that the investigatory officer did not approach his investigation with an open mind, whereas there is no evidence that Mr. McKenzie was actually biased or had a closed mind;
- the investigatory officer exhibited bias in his actions, rather than potential bias arising from the institutional framework in which he conducted his investigation;
- the investigatory officer made a subjective assessment about a person's character based on an interview that could not be externally validated and upon which the decision-maker made their decision, which is different from an advisor who shaped the scope of a scientific assessment that was independently verified by the decision-maker;

- the decision-maker used the investigatory officer's notes as his reasons for decision, whereas the Director deliberately separated himself from Mr. McKenzie's work, instructing him not to prepare the typical recommendation report, and the Director made an independent assessment based on the evidence before him; and
- given the importance of the decision at issue in *Baker* (deporting a person), the duty of fairness was much higher in that case than in the present case.

[166] Alternatively, if a reasonable apprehension of bias may be advanced against Mr. McKenzie, Rio Tinto submits that the *Baker* test has not been met. Rio Tinto submits that the mere existence of a funding arrangement is insufficient to establish a reasonable apprehension of bias. Rio Tinto notes that the Crown funds nearly all statutory decision-makers such as the Director and even judges. The Supreme Court of Canada has recognized that there must be an element of control over the decision-maker for there to be an apprehension of bias: *Canadian Pacific Ltd. v. Matsqui Indian Band*, [1995] 1 S.C.R. 3, at para. 75. Rio Tinto submits that there is no indication of control over the decision-maker in this case, given that the Ministry retained control over Mr. McKenzie's tenure, remuneration and administration. At no time did Rio Tinto pay Mr. McKenzie directly; rather, Rio Tinto's funding went into the Ministry's province-wide budget for salaries. The Director continued to provide Mr. McKenzie's performance reviews.

[167] In the further alternative, Rio Tinto argues that, even if there was a reasonable apprehension of bias in this case, any procedural defects in the Director's decision-making process are cured by the appeal process.

The Panel's findings

[168] The Appellants assert that the Ministry placed Mr. McKenzie in a "conflict of interest" which also resulted in a reasonable apprehension of bias on the part of the Director. However, the Panel finds that the Appellants tendered no evidence to support their assertion that Mr. McKenzie was in a conflict of interest, or to support their assertion that the Director was tainted because of anything that Mr. McKenzie said or did. The Appellants called no witnesses and produced no documentary evidence to suggest that the Director acted unfairly or was biased in anyway. The Appellants question why the Director did not respond to a letter that a member of the public sent to the Minister asking for clarification about Mr. McKenzie's role in the public consultation process. However, given that the letter was directed to the Minister and not to the Director, the Panel does not fault the Director for not responding to the letter.

[169] The Appellants' argument amounts to a bald assertion that the language of the Secondment Agreement, on its face and without more evidence, is enough to establish a reasonable apprehension of bias in regard to the Director and Mr. McKenzie in carrying out their duties. The Appellants also argue that the language of the Secondment Agreement should be preferred over the evidence as to how Mr. McKenzie's secondment was actually implemented, where there are inconsistencies between the Agreement and the witnesses' evidence. The Appellants provided no legal authority to support the proposition that the Panel should favour or accord greater weight to the plain wording of the Secondment Agreement over sworn

testimony about the actual working arrangements between the parties. The Appellants did not argue that the testimony of the Director or Mr. McKenzie lacked credibility or reliability. The Panel finds that assigning no weight to the Director's and Mr. McKenzie's testimony about how the Secondment Agreement was implemented would be contrary to the reasoning in *S. (R.D.)* at para. 141 that the impugned conduct or comments (or the impugned Agreement in the present case) should be "considered in the context of the circumstances, and in light of the whole proceeding."

[170] In *Baker*, the Supreme Court of Canada said that an alleged apprehension of bias must be a reasonable one, "held by reasonable and right minded persons, applying themselves to the question and obtaining thereon the required information". The Court has said that the test that the Panel must apply is "what would an informed person, viewing the matter realistically and practically—and having thought the matter through—conclude. Would he think that it is more likely than not that [the decision-maker], whether consciously or unconsciously, would not decide fairly?" An allegation that there was a reasonable apprehension of bias is a serious one which must be supported by evidence.

[171] The Panel finds that the Secondment Agreement acted merely as an administrative mechanism whereby the Ministry could recoup the cost of assigning one employee to work fulltime on Rio Tinto's application, when that employee would otherwise have been responsible for many other assignments. As a result, the Ministry could be satisfied that other work would not be delayed as a result of this assignment, as the Ministry was able to use the funds received under the Agreement to pay the full time equivalent of one Ministry employee's salary and benefits. The evidence is that, at first, the funds were used to pay for the services of one employee in the Smithers office to directly "backfill" for Mr. McKenzie. Later, the Ministry decided that it had higher priority needs elsewhere in the Province, and the funds were diverted to cover the costs of an employee in another region. The evidence shows that Mr. McKenzie never ceased to be a Ministry employee, on the government payroll, working from the same office as part of a team of Ministry employees reporting to the Director. The Director approved his vacation time and conducted his performance reviews. When he was onsite at the smelter, he signed in as a visitor and was required to be supervised by a Rio Tinto employee, as would any other guest. He had no office at Rio Tinto, nor did he have a Rio Tinto supervisor; he had a named contact person with Rio Tinto, but nothing more.

[172] Moreover, the Panel finds that Mr. McKenzie carried out his duties with respect to Rio Tinto's application in the same manner as he would deal with any other such application, with a few exceptions designed to protect against the very issues alleged by the Appellants. Mr. McKenzie was directed not to provide a recommendation to the Director, as he normally would, regarding any issues of compliance with the Permit or about the outcome of Rio Tinto's application. The evidence is that the Director specifically directed Mr. McKenzie not to make such recommendations to him, to protect against any allegations that the Director was biased or fettered in his decision-making.

[173] The Panel finds that, apart from those precautionary steps, Mr. McKenzie carried out his duties as he normally would in his role of overseeing the permit

application process and ensuring that the Director had the information that he would need to decide the application. The only change to his duties (apart from the limits regarding making recommendations) was that he was to dedicate his efforts to the Rio Tinto application, to the exclusion of other matters. There is no evidence that he failed to be objective in carrying out his duties. In fact, the reverse is true. The evidence in the hearing consistently showed that Mr. McKenzie constantly pushed Rio Tinto and its qualified professionals to ensure that the Director would have the best evidence before him to make his decision. Although Mr. McKenzie was the subject of the Secondment Agreement, all of the evidence supports the conclusion that he was a diligent and conscientious Ministry employee. Similarly, the evidence is clear that the Director did not blindly accept whatever information was provided to him, including any information from Mr. McKenzie. These facts are in contrast with the circumstances in *Baker*, where the notes of a subordinate officer were taken to be the very reasons for the decision-maker's decision, and those notes showed that the officer had not approached the case with impartiality.

[174] In summary, the Panel finds that an informed person, knowing the facts about how the Secondment Agreement was implemented, understanding Mr. McKenzie's duties and his working relationship with the Director, knowing the safeguards that the Director put in place to ensure his own objectivity, and then viewing the matter realistically and practically, having thought the matter through, would not conclude that there was a reasonable apprehension of bias in the present case.

[175] For all of these reasons, the Panel finds that this ground of appeal is without merit, and is dismissed.

d. Whether the Director failed to provide adequate reasons for his decision to issue the Amendment, particularly in regard to the increase in the SO_2 emission limit.

The Appellants' submissions

[176] The Appellants submit that the Director failed in his duty to provide reasons that are justifiable, intelligible and transparent, and as a result, the Amendment should be set aside. They submit that, from the Rationale he provided, others are unable to scrutinize and understand why he reached his decision to grant the Amendment. In support of those submissions, the Appellants rely on: *Dunsmuir v. New Brunswick*, 2008 SCC 9, at para. 47, [2008] 1 S.C.R. 190; *Vancouver International Airport Authority v. P.S.A.C.*, 2010 FCA 158 ("*YVR*"); and, *Sidhu v. Canada (Minister of Citizenship and Immigration)*, 2014 FC 176.

[177] In their Further Amended Statement of Points, the Appellants submitted that the Director's Rationale is legally inadequate to justify the Amendment. In particular, the Appellants submitted that the Director failed to adequately identify the information that he relied upon in making his decision. They also submit that the Director failed to explain how he assessed and weighed the information, and how he determined that the information was sufficient to justify a conclusion that the Amendment should be granted "for the protection of the environment".

[178] In their closing submissions, the Appellants assert that, as this appeal is in the nature of a *de novo* hearing, the Panel must assess the adequacy of the Director's reasons on a correctness standard, as the Director's decision is entitled to no deference from the Board.

[179] The Appellants submit that the Rationale should be assessed against the fundamental purposes for reasons, as set out in *YVR* at para. 16:

a. *Substantive purpose*: the substance of the decision and why the decision-maker ruled in the way it did must be understood;

b. *Procedural purpose*: parties must be able to decide whether to invoke their right of judicial review;

c. *Accountability purpose*: there must be enough information for a reviewing court to assess the decision's validity, including, where the standard is reasonableness, whether the decision falls within the range of acceptable outcomes; and

d. *Justification, transparency and intelligibility purpose*: justification and intelligibility relate to whether the basis provided for a decision is understandable and has some discernible rationality and logic. Transparency relates to whether others can scrutinize and understand what the decision-maker has decided and why.

[180] The Appellants appear to assert that the purposes for reasons described in *YVR* amount to a four part test that must be met, as they argue that the Director's Rationale falls "woefully short" when he wrote that he was:

> … satisfied that there is sufficient information to set requirements for the protection of the environment and human health, and specifically regarding the prediction, identification, avoidance and mitigation of potential impacts of the proposed emissions of $S0_2$ to human health, and the environment.

[181] The Appellants argue that the Director's reasons essentially amount to a statement that he considered certain types of information, and that this information was sufficient to satisfy him that the Amendment should be granted. The Appellants argue that, by failing to set out how the information justified granting the Amendment, the Director failed to fulfill the "substantive purpose" requirement referred to in *YVR*. The Appellants argue that the Director's reasons also fail the "procedural purpose" requirement in *YVR*, because the reasons do not identify what evidence he relied upon and what weight he ascribed to that evidence.

[182] The Appellants submit that the "accountability purpose" is not met because the reasons fail to inform the public what they should expect from the Amendment, and why the Amendment, as granted, adequately complies with provincial regulations and addresses risks to the environment and human health.

[183] Finally, the Appellants argue that the Director's reasons fail the "justification, transparency and intelligibility purpose" set out in *YVR*.

The Director's submissions

[184] The Director submits that he has no obligation under the *EMA* to provide reasons for his decision. Under section 16 of the *EMA*, the Director is obligated only to provide written notice of an amendment to the permit holder and the individuals who contacted him during the public consultation process.

[185] Section 16 of the *EMA* states, in part:

> **16** (7) If a director amends a permit or approval, the director
>
> (a) may require that the holder of the permit or approval supply the director with plans, specifications and other information the director requests, and
>
> (b) must give the holder of the permit or approval notice in writing of the amendment and publish notice of the amendment in the prescribed manner.
>
> (8) Despite subsection (7) (b), the director may give the notice by electronic means to an address provided by the holder of the permit or approval.

[186] The Director submits that, by providing written reasons (i.e., the Rationale) in addition to the notice required by section 16(7) of the *EMA*, he exceeded his statutory obligations.

[187] The Director testified as to the notice that he provided regarding his decision to grant the Amendment. He testified that he provided notice to the permit holder, Rio Tinto, and then to every person for whom he had a record, who had participated in the public consultation. The latter group included individuals who had written to either him or to Rio Tinto, as well as those to whom referral requests had been sent, such as local governments, the Haisla First Nation, Kitselas First Nation, Kitsumkalum First Nation, Environment Canada, and the Department of Fisheries and Oceans. As well, he provided notice of the Amendment to the Ministry's executive.

[188] Alternatively, the Director argues that, even if the Panel finds that he failed to provide sufficient reasons, this on its own is insufficient to justify quashing his decision. In that regard, the Director cites the Supreme Court of Canada's decision in *Newfoundland and Labrador Nurses' Union v. Newfoundland and Labrador (Treasury Board)* 2001 SCC 62, at paras. 9, 14, and 18, where the Court found that the reasons for a decision must be read in the context of the outcome, and it is sufficient if there is evidence that the decision-maker turned his or her mind to the substantive issues, and the resulting decision falls within a range of possible outcomes that are reasonable and justifiable in the circumstances. Subsequently, in *Labour Relations v. Driver Iron Inc.*, 2012 SCC 56, at para. 3, the Court clarified that a decision-maker does not have to comment on every issue that was raised, as long as the decision, when viewed as a whole and in the context of the record, is reasonable.

[189] The Director further submits that it would be impractical and unworkable for a decision-maker to provide written reasons that are responsive to the number and

range of concerns that were identified in the Consultation Report. The Director submits that he carefully considered the comments and the information provided, and then provided written reasons that were a summary of his decision.

[190] The Director notes that the Board has previously determined that it may consider the record to determine the reasonableness of a permit amendment (for example, see: *Valleyview Enterprises Ltd. v. British Columbia (Ministry of Environment, Land and Parks)*, [1999] B.C.E.A. No. 50). The Director submits that the record in this appeal is extensive and supports his Rationale.

[191] Finally, the Director submits that his Rationale was fair, reasoned and appropriate. The Director submits that, even if he owed a duty to provide reasons and his Rationale is insufficient to constitute the "reasons" for his decision, his decision ought not to be set aside, because the Panel had the opportunity to hear directly from him as to the evidence he considered and how he made his decision.

Rio Tinto's submissions

[192] Rio Tinto's submissions mirrored those of the Director. Rio Tinto added that any deficiencies in the Director's reasons have been cured by the *de novo* nature of the appeal process. Rio Tinto argues that, if the Panel determines the Amendment contains sufficient conditions for the protection of the environment, then any inadequacy in the Director's reasons are moot. In support of those submissions, Rio Tinto cites the Board's decisions in *Burquitlam Building Ltd. v. British Columbia (Ministry of Environment)*, [2013] B.C.E.A. No. 14; and, *Blueberry River First Nation v. British Columbia (Ministry of Environment)*, [2010] B.C.E.A. No. 26.

The Panel's findings

[193] Before the Panel considers whether the Director provided "adequate reasons" for his decision to issue the Amendment, the Panel must first be satisfied that the Director had a legal duty to provide the Appellants with written reasons for his decision. The Appellants have not argued that the Director owed them such a duty under the *EMA*. The Appellants simply cite *YVR* for the general proposition that, at common law, administrative decision-makers owe a duty to provide adequate written reasons for their decisions.

[194] The Panel finds that the decision in *YVR* does not support such a broad assertion. The Panel notes that, at para. 7 of *YVR*, the Court specifically stated that not all administrative decision-makers are required to provide reasons for their decisions in all circumstances:

> Nothing in these reasons for judgment should be taken as suggesting that all administrative decision-makers must give reasons in all circumstances. It depends. In *Baker v. Canada (Minister of Citizenship and Immigration)*, 1999 CanLII 699 (SCC), [1999] 2 S.C.R. 817 at paragraph 43, the Supreme Court regarded the common law obligation to provide reasons as a subset of the duty to afford procedural fairness to the parties. In that case, the Supreme Court held that a Minister deciding a refugee claim owed the claimant a duty of procedural fairness and, due to the importance of the decision to the claimant, the claimant needed to know why her claim was dismissed. *Baker*

> emphasizes at paragraphs 23 to 28 that the level of procedural fairness to be afforded depends upon the circumstances and may vary from no obligation whatsoever, to a high obligation. Finally, there are some administrative decision-makers that are not obligated to afford procedural fairness at all: *Knight v. Indian Head School Division No. 19*, 1990 CanLII 138 (SCC), [1990] 1 S.C.R. 653 at page 670.
>
> [underlining added]

[195] It is clear from the Court's findings above that the common law obligation to provide reasons for a decision is grounded in the duty of procedural fairness, and that administrative bodies are not necessarily required to provide reasons for their decision, depending on the circumstances.

[196] Some statutes impose an obligation on a statutory decision-maker to provide reasons for their decisions to certain persons. Here, the Director made a decision under section 16 of the *EMA* to issue a permit amendment to an applicant, Rio Tinto. Under section 16(7) of the *EMA,* the Director is obligated to provide written notice of his decision to the permit holder, and to publish notice in a prescribed manner. The Director did so. There is no statutory requirement for the Director to provide written notice of his decision to the Appellants.

[197] The Director went further than simply providing notice of his decision - he also provided written reasons for the decision in his Rationale, to assist others in knowing the process that he followed and the information that he considered in reaching his decision. He did so despite that fact that there was no statutory obligation for him to provide any form of written reasons for his decision.

[198] Furthermore, the Appellants have not addressed the question of whether, based on the principles of procedural fairness, the Director had a common law duty to provide them with written reasons for his decision. In *YVR*, the Court found at para. 16 that the decision-maker, the Canadian Industrial Labour Board, was acting in an adjudicative role and had a "procedural duty to receive and consider full submissions from the parties". In that context, the Court assessed the adequacy of the reasons provided to the parties. In contrast, the Director was deciding whether to grant a permit holder's application for a permit amendment; he was not acting in an adjudicative capacity, and the Appellants were not parties before him. In these circumstances, the Panel finds that the Appellants have not established that the Director had a common law duty to provide them with written reasons for his decision. Consequently, there is no basis for the Appellants to challenge the adequacy of the reasons provided in the Director's Rationale.

[199] For all of the above reasons, the Panel finds that the Director owed no duty, either under the *EMA* or based on the principles of procedural fairness, to provide the Appellants with written reasons for his decision to amend the Permit. Even if the Director had such a duty based on the principles of procedural fairness and had failed to provide adequate reasons for his decision, the Appellants have now heard the Director testify at length about his reasons for granting the Amendment. The Panel finds that any procedural defects in the Director's decision-making process are cured by the hearing before this Panel.

[200] As a result, the Panel finds that this ground of appeal is without merit, and is dismissed.

2. What is the proper legal test for considering whether to grant a permit amendment under section 16 of the *EMA*?

a. Does the precautionary principle apply in interpreting and applying section 16 of the *EMA*?

The Appellants' submissions

[201] At the outset of the hearing, the Appellants submitted that the Amendment may cause serious or irreversible adverse effects to human health and the environment (particularly soil, vegetation, and waterways), and therefore, the Director ought to have applied a "more precautionary approach" and should have ordered Rio Tinto to install SO_2 scrubbers. However, in their closing submissions, the Appellants abandoned their position with respect to any potential risk to waterways, and they no longer argued that the Director should have ordered Rio Tinto to install SO_2 scrubbers. To the contrary, the Appellants argued in their closing submissions that it would be inappropriate, based on current knowledge, for the Director to order the use of any particular mitigation measure such as SO_2 scrubbers.

[202] In their closing submissions, the Appellants argue that the Director was bound to apply the "precautionary principle" due to the public health risks raised by the Amendment. The Appellants assert that the Director's uncritical and enthusiastic reliance on an adaptive management approach "distracted" him from fulfilling his legal duty to apply the precautionary principle. He decided that adaptive management was an appropriate approach before turning his mind to the following key threshold question, as expressed by the New Zealand Supreme Court in *Sustain Our Sounds Inc v. The New Zealand King Salmon Co Ltd*, [2014] NZSC 40 ("*SOS*"), at para. 125:

> As to the threshold question of whether an adaptive management regime can even be considered, there must be an adequate evidential foundation to have reasonable assurance that the adaptive management approach will achieve its goals of sufficiently reducing uncertainty and adequately managing any remaining risk. The threshold question is an important step and must always be considered.

[203] The Appellants assert that serious questions arise when adaptive management is being used as a justification for addressing human health risks and uncertainties after (rather than before) issuing the Amendment. The Appellants submit that, where there is a real threat of serious or irreversible harm to human health, and there is a lack of full scientific certainty as to the nature of that harm and the efficacy and availability of mitigation options, decision-makers should not wait for definitive scientific certainty or causal proof of the harm.

[204] The Appellants submit that, given the *de novo* nature of the appeal process, the Panel must apply the appropriate legal principles, including the precautionary principle, when assessing the Director's decision to rely on adaptive management

as a means for regulating the health risks and uncertainties associated with the Amendment. They argue that, although the *EMA* does not explicitly refer to the precautionary principle, the Panel has a duty to interpret section 16 of the *EMA* in a manner that is mindful of, and consistent with, that principle. They argue that the duty to apply the precautionary principle in the interpretation and application of legislative powers is "clear". The Appellants submit that Canadian courts have used the precautionary principle as an aid to interpret laws aimed at protecting the environment in the following decisions:

- *114957 Canada Ltée (Spraytech, Société d'arrosage) v. Hudson (Town),* 2001 SCC 40 ("*Spraytech*");
- *Castonguay Blasting Ltd. v. Ontario (Environment)*, 2013 SCC 52 ("*Castonguay*"), at para. 20;
- *Morton v. Minister of Fisheries and Oceans*, 2015 FC 575 ("*Morton*"); and
- *Weir v. Environmental Appeal Board et al.,* 2003 BCSC 1441 ("*Weir*").

[205] The Appellants note that, in *Spraytech*, the Supreme Court of Canada observed at para. 31 that:

> The interpretation of Bylaw 270 contained in these reasons respects international law's "precautionary principle" which is defined as follows at para. 7 of the *Bergen Ministerial Declaration on Sustainable Development* (1990):
>
> > In order to achieve sustainable development, policies must be based on the precautionary principle. Environmental measures must anticipate, prevent and attack the causes of environmental degradation. Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

[206] The Appellants submit that in *Castonguay*, the Supreme Court of Canada reinforced the views it expressed in *Spraytech*, and relied on the precautionary principle to interpret section 15(1) of the Ontario *Environmental Protection Act*, R.S.O. 1990, c. E.19 (the "*Ontario EPA*"). The Appellants maintain that section 15(1) of the *Ontario EPA* made it an offence to discharge a contaminant into the environment. The Appellants note that in para 9. of *Castonguay*, the Court described the *Ontario EPA* as "Ontario's principal environmental protection statute" and held that "its status as remedial legislation entitles it to generous interpretation." The Appellants argue that in para. 20 of *Castonguay*, the Court relied on the precautionary principle in support of its conclusion that a broad purposive approach should be given to the interpretation of section 15(1) of the *Ontario EPA*, even though that Act makes no specific mention of the principle.

[207] The Appellants also rely on paras. 32 to 38 of *Weir*. They submit that the BC Supreme Court concluded in para. 38 of *Weir* that "the precautionary principle, as articulated in that decision [*Spraytech*], should help inform the process of statutory interpretation and judicial review" in relation to the former BC *Pesticide Control Act*, which did not expressly refer to the precautionary principle.

[208] Similarly, the Appellants submit that the Federal Court's decision in *Morton* reinforces the relevance of the precautionary principle even if a statute does not expressly refer to it. They submit that the judge in *Morton* relied on the precautionary principle to interpret the *Fisheries Act*, which does not expressly mention the principle, although the judge found it unnecessary to determine the "legal contours" of the principle (at para. 43).

[209] The Appellants argue that *Morton* is similar to the present appeal, in that the relevant Act does not mention the precautionary principle, and the Act's purpose is the protection of the environment or a public resource. Moreover, the Appellants submit that, as in *Morton*, a lack of scientific certainty about key issues in the appeal does not justify postponing precautionary measures, which may include adaptive management or mitigation measures to protect human health and the environment. The Appellants submit that the evidence adduced during the appeal hearing triggers an obligation to apply the precautionary principle, even if the science in relation to some of the key issues in the appeals is unresolved and somewhat conflicting, particularly in regard to the threat to human health posed by the increased SO_2 emissions. However, the Appellants submit that the Panel must go beyond the analysis undertaken in *Morton*, and must determine whether the adaptive management approach that the Director adopted is a legally adequate and appropriate precautionary measure, based on the evidence and the emerging legal principles.

[210] The Appellants acknowledge that the Canadian case law is "less clear" about when and how the precautionary principle applies. The Appellants submit that "leadership" on this has been provided by the courts of Australia and New Zealand in the following decisions:

- *SOS;*
- *Telstra Corporation Limited v. Hornsby Shire Council*, [2006] NSWLEC 133 ("*Telstra*"); and
- *Environment East Gippsland Inc v. VicForests* [2010] VSC 335 ("*East Gippsland*").

[211] The Appellants submit that these decisions address the nature of the precautionary principle and its relationship to adaptive management. The Appellants maintain that the Panel should consider and adopt a five-step approach, based on *Telstra* and *East Gippsland*, to apply the precautionary principle when reviewing the Amendment:

1. Is there a real threat of serious or irreversible damage to the environment?
2. Is it attended by a lack of full scientific certainty (in the sense of material uncertainty) as to the nature and scope of the environmental damage?
3. If the answers to 1 and 2 are yes, has the proponent demonstrated that the threat of damage to the environment is negligible?
4. Is the threat able to be addressed by adaptive management?

5. Is the precautionary measure alleged to be required proportionate to the threat in issue?

[212] The Appellants' submissions then address how the Panel should apply the five-step test to the evidence regarding human health effects.

The Director's submissions

[213] The Director submits that there is a distinction between the "precautionary principle" and adopting a "precautionary approach" in the regulatory world. The Director notes that in *Spraytech,* the Supreme Court of Canada adopted the following definition of precautionary principle:

> In order to achieve sustainable development, policies must be based on the precautionary principle. Environmental measures must anticipate, prevent and attack the causes of environmental degradation. Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.
>
> [underlining added]

[214] The Director argues that *Spraytech* does not establish a presumption that Canadian legislators intend their environmental statutes to reflect the precautionary principle. In *Spraytech*, the Court did not make a conclusive finding that the precautionary principle is currently a principle of customary international law; rather, the majority stated at para. 32 that:

> … there may be "currently sufficient state practice to allow a good argument that the precautionary principle is a principle of customary international law"…

[215] Further, the Director argues that even if there is a presumption that Canadian environmental statutes should be interpreted in a manner that is consistent with the precautionary principle, this presumption is rebuttable. The Director submits that clear statutory provisions must be followed even if they are contrary to international law, as stated in *Driedger on the Construction of Statutes*, (3rd ed.) 1994, at p. 333:

> … Canadian legislatures are not bound by international law and in any given case may choose to disregard it in pursuit of some other value or goal. In the event of a conflict between domestic legislation and international law, whether customary or conventional, domestic legislation prevails.

[216] In addition, the Director submits that the BC Court of Appeal has held the precautionary principle is not a mandatory rule of construction. In *Western Canada Wilderness Committee v. British Columbia (Ministry of Forests, South Island Forest District)*, 2003 BCCA 403 ("*Wilderness Committee*"), the Court of Appeal reviewed the decision of a District Manager regarding whether certain logging cutblocks met the requirements of section 41(1) of the *Forest Practices Code of British Columbia* (the "*Code*"), as it related to the spotted owl. The petitioner argued that the precautionary principle applied. The District Manager argued that the legislation could not reasonably be read as excluding any risk to forest resources, and if the

Legislature had intended to incorporate the precautionary principle into the *Code* it would have done so, as has been done in some other Canadian environmental statutes. In reviewing the District Manager's decision, the Court of Appeal considered the precautionary principle, and held as follows at para. 80:

> … Since the precautionary principle was not incorporated in the Code, and since I am satisfied that s. 41(1)(b) does not preclude the approval of an FDP if there is an element of risk to a forest resource, I am unable to find that Ms. Stern's failure to give full effect to the precautionary principle in her decision renders an otherwise reasonable decision, patently unreasonable.

[217] The Director also notes that the precautionary principle was considered by the BC Supreme Court in *Blaney et al v. British Columbia (Minister of Agriculture, Food and Fisheries) et al*, 2005 BCSC 283 ("*Blaney*"). In that case, the petitioners argued that gaps in scientific knowledge made it impossible to prove that aquaculture posed no risk to wild salmon, and therefore, the decision under review should not have been allowed. However, at para. 45, the Court found that:

> I agree with the respondents that the precautionary principle does not require governments to halt all activity which may pose some risk to the environment until that can be proven otherwise. The decisions on what activity to allow and how to control it often require a balancing of interests and concerns and a weighing of risks. This is exactly the kind of situation which requires consultation, discussion, exchange of information, and perhaps accommodation.

[218] The Director argues that, similar to *Blaney*, the precautionary principle does not apply in the present case, as there are no threats of serious or irreversible damage to any of the four receptors studied in the STAR and represented in the EEM Plan.

[219] The Director notes that the Board has previously considered the relevance of the precautionary principle. The Director refers to the Board's decision in *Shuswap Thompson Organic Producers Association v. Deputy Director, Pesticide Control Act* (Appeal Nos. 97-PES-04/05 and 97-PES-06, May 28, 1998), which involved an appeal under the former *Pesticide Control Act*.

Rio Tinto's submissions

[220] Rio Tinto submits that there is no basis in law or fact to suggest that the Director ought to have, or the Panel should, apply the precautionary principle. Rio Tinto submits that the Board has previously held that the *EMA* does not require consideration of the precautionary principle in granting a permit (or permit amendment): *Haida Gwaii Marine Resources Group Assn. v. British Columbia (Ministry of Water, Land and Air Protection)*, Appeal No. 2005-EMA-007(a), [2006] B.C.E.A. No. 8 at para. 68. Rio Tinto submits that the Board has also held that the precautionary principle does not inform statutory interpretation where it has not been expressly incorporated into the legislation under which an appealed decision is made: *Burgoon v. British Columbia (Ministry of Environment)*, Decision Nos. 2005-WAT-024(c), 2005-WAT-025(c), 2005-WAT-026(c), [2010] B.C.E.A. No. 15, at para. 129.

[221] In addition, Rio Tinto submits that the Board provided a useful summary of the law regarding the precautionary principle in relation to the *EMA* in *City of Cranbrook v. Assistant Regional Water Manager*, Decision No. 1999-WAS-023(c), April 9, 2009 ("*Cranbrook*"), at paras. 37 – 40 and 45 - 46. Rio Tinto argues that *Cranbrook* makes it clear that, although the *EMA* contemplates a cautious or preventative approach to permitting decisions, it does not require the application of the precautionary principle.

[222] In any event, Rio Tinto submits that the circumstances of the present case do not warrant the application of the precautionary principle. Rio Tinto maintains that the precautionary principle requires a risk of "serious or irreversible damage" as stated in *Spraytech* at para. 31, and the Appellants have not established that in this case. Rio Tinto submits that Dr. Scarfe was the only one of the Appellants' experts who discussed the need to use the precautionary principle or a precautionary approach, and he admitted that by this, he was simply advocating for a cautious approach, not the precautionary principle at law. Moreover, Rio Tinto argues that the risks to the four receptors studied in the STAR are not of serious consequence and are generally reversible, making the precautionary principle inappropriate in this case. Even with the conservative assumptions underlying the STAR, all of the impacts to the four receptors were classified in the two lowest levels of risk: either low or moderate.

[223] Rio Tinto maintains that the conservative assumptions that underlay the STAR reflect a "prudent and cautious approach" to the Amendment, and that the way the Director approached his decision-making in this case was "a careful, cautious approach that was science-based." Rio Tinto argues that the STAR is "sound" and the EEM Plan acts as a "safety mechanism" to ensure that the actual impacts are the same as those projected under the STAR.

[224] In support of those submissions, Rio Tinto referred to Mr. Marmorek's testimony. He testified that the adaptive management approach taken in the STAR and the EEM Plan is consistent with a prudent and cautious approach. Mr. Marmorek testified that there is a difference between the precautionary principle and a precautionary approach. The former is used where there is a need for severe restrictions on human activity because of a high likelihood of a severe impact. The latter is used where there is not a high likelihood of a severe impact, but rather, where the effects are predicted to be low or moderate - but where there is still a need to monitor and adjust activity as necessary.

The Panel's findings

[225] The Board has previously held that the precautionary principle does not inform the interpretation of the permitting provisions in the *EMA*. Rather, the Board has consistently held that a "cautious" approach should be adopted in assessing applications to emit waste under the *EMA*: (for example, see: *Cranbrook*, at pp. 9 to 11; and *Shawnigan Residents' Association et al v. Director, Environmental Management Act* (Decision Nos. 2013-EMA-015(c), 2013-EMA-019(d) 2013-EMA-020(b) 2013-EMA-021(b), March 20, 2015) ("*Shawnigan*"), at pp. 50 to 52). In those previous decisions, among others, the Board found that the phrases "precautionary principle" and "precautionary approach" are used in international treaties and some Canadian environmental statutes, but neither of these phrases is

found in the *EMA* (or its predecessor, the *Waste Management Act*). In *Cranbrook*, the Board explained the difference between the precautionary principle and a precautionary approach. In both cases, the Board concluded that, had the legislature intended for decision-makers to apply the precautionary principle or use a precautionary approach in exercising their discretion to issue or amend permits under the *EMA*, the legislature could have expressly indicated that, but it has not.

[226] In addition, the Board noted in those previous decisions that the precautionary principle and precautionary approach have each been defined in more than one way in different international treaties and Canadian statutes, and therefore, it is unclear which definition or version would apply in the context of the *EMA*. It is difficult to determine how statutory decision-makers would apply these concepts or approaches without a statutory definition in the *EMA* or a consistent legal meaning in other statutes. While the Appellants attempt to address this by asserting that guidance is provided by case law from other Commonwealth jurisdictions, the Panel finds that those decisions are not binding on Canadian courts or tribunals. Moreover, the primary case that the Appellants rely on, *Telstra*, involved an appeal under Australian legislation that expressly adopts the precautionary principle and requires it to be applied to decision-making, unlike the *EMA* (see paras. 13, 110, 113, 121 and 122 of *Telstra*). As such, *Telstra* does not provide assistance in interpreting and applying the *EMA*.

[227] While this Panel is not bound by previous decisions of the Board, the Panel finds that the Board's approach in those previous decisions is consistent with the Court of Appeal's findings in paras. 77 and 80 of *Wilderness Committee* that the legislation cannot reasonably be read as excluding any risk to public natural resources or the environment, and if the Legislature had intended to incorporate the precautionary principle into the legislation it would have done so. As discussed below, the Panel finds that the *EMA*, similar to the legislation in *Wilderness Committee*, does not contemplate that permits may only be approved if the result will be zero risk to the environment.

[228] The Panel also finds that in both *Spraytech* (at para. 32) and *Castonguay* (at para. 20), the Supreme Court of Canada characterized the precautionary principle as an "emerging" principle of international law. In neither of those cases did the Court conclude that the precautionary principle is such a widely accepted principle of customary international law that it should be presumed to inform the interpretation of Canadian environmental statutes. Moreover, contrary to the Appellants' submissions, the Panel finds that in para. 20 of *Castonguay* the Court did not rely on the precautionary principle to support a conclusion that a broad purposive approach should be given to the interpretation of section 15(1) of the *Ontario EPA*, even though that Act makes no specific mention of the principle. Rather, the Court stated that section 15(1) of that Act "is also consistent with the precautionary principle", after the Court had already spent several paragraphs interpreting section 15(1) based on the wording and purpose of section 15(1) in the context of the *Ontario EPA*. Saying that a statutory provision, having already interpreted its meaning based on its purpose and wording, is "also" consistent with the precautionary principle, is not the same as saying that the provision must be interpreted in a manner that is consistent with that principle.

[229] In any event, the Panel finds that *Castonguay* can be distinguished on the basis that it involves an Ontario statutory provision that has a different purpose than section 16(1) of the *EMA*. Although the Appellants maintain that section 15(1) of the *Ontario EPA* made it an offence to discharge a contaminant into the environment, the Panel finds that this is not what section 15(1) does. As the Court stated at para. 13, *Castonguay* involved the "the reporting requirement in section 15(1)" of the *Ontario EPA*. The Court found that section 15(1) of the *Ontario EPA* requires the reporting of contaminant discharges that are "out of the normal course of events…" (see paras. 12, 20, 24, 37). The Court interpreted section 15(1) of the *Ontario EPA* as "excluding many every day, routine activities" such as the discharge of fumes from driving a car (para. 24). In contrast, section 16(1) of the *EMA* is neither a reporting requirement nor is it directed at discharges that are "out of the normal course of events". Rather, section 16 of the *EMA* (together with section 14) involves permits authorizing the routine discharge of "waste" (defined in section 1 of the *EMA* as including "air contaminants") into the environment, subject to requirements for the protection of the environment. For example, industrial facilities such as smelters routinely emit waste, including air contaminants, as part of the normal course of their operations. As such, the Panel finds that the purpose and objective of section 16 of the *EMA* is completely different from the Ontario provision that was discussed in *Castonguay*. Consequently, the Panel finds that *Castonguay* provides no assistance in interpreting section 16 of the *EMA*.

[230] Regarding *Morton*, which is under appeal to the Federal Court of Appeal, the Panel finds that the Court clearly stated that its decision did "not rest or depend on the application of the [precautionary] principle" (see paras. 43 and 96). Thus, the discussion of the precautionary principle appears to be *obiter dictum*, and the Panel finds that *Morton* does not stand for the proposition that the precautionary principle should be assumed to inform the interpretation of Canadian environmental statutes.

[231] Furthermore, the Panel finds that *Weir* can be distinguished on the basis that it involved the application by the Board of a legal test that applied under pesticide control legislation that is no longer in force, and that had very different objects and statutory language compared to section 16(1) of the *EMA*.

[232] In summary, the Panel finds that the case law cited by the Appellants provides no assistance in interpreting section 16 of the *EMA*, and the Appellants have not established that this Panel should diverge from the Board's previous approach to appeals involving the *EMA*'s permitting provisions, by applying the precautionary principle. On the contrary, the Panel agrees with the Board's findings in previous cases that a "cautious" approach, involving a comprehensive technical analysis of the potential harm that the proposed emission may cause to human health and the environment, should be adopted in assessing applications for permits to emit waste, and amendments to such permits, under the *EMA*. That approach was summarized in *Shawnigan* at para. 284, as follows:

> … a cautious approach is not the same as a "zero tolerance" approach. The *Act* provides a legislative scheme that authorizes the introduction of waste into the environment provided that any risk to the

> environment can be properly controlled, ameliorated and, to the extent possible, eliminated.

[233] In *Shawnigan*, the Board noted that the *EMA* creates a scheme that deals with competing interests of permitting waste to be introduced into the environment but also imposing requirements for the protection of the environment. In that regard, the Board's decision in *Shawnigan* adopts the analysis in *Xats'ull First Nation v. Director, Environmental Management Act* (Decision No. 2006-EMA-006(a), May 9, 2008), at paras. 108 to 11:

> There is a tension inherent in this scheme. The tension is between protecting the environment and authorizing the introduction of waste into that same environment. Although the government has a broad goal or policy of protecting the quality of the environment for present and future generations, it is also faced with a society that generates a great deal of waste that needs to be disposed of. This waste includes "effluent" that, by definition, may injure or be capable of injuring the health or safety of a person, property or a life form, or may damage or be capable of damaging the environment. How can this waste be disposed of in a manner and still protect the environment?
>
> The Panel finds that this *Act*, like its predecessor the *Waste Management Act*, reflects a policy of compromise. This policy was described by the BC Supreme Court in *BC Minister of Environment, Lands and Parks (MELP) v. Alpha Manufacturing* (1996), D.L.R. (4th) 688, as follows:
>
> > … it is abundantly clear from the *Waste Management Act* as a whole that it represents the legislative policy of controlling, ameliorating and where possible, eliminating the deleterious effect of pollution on the environment in a broad sense. The means adopted are in great measure the provision of permits and approvals before potentially polluting activities can be undertaken.
>
> On appeal, the Court of Appeal expressly agreed with the conclusions above (*British Columbia (Minister of Environment, Lands and Parks) v. Alpha Manufacturing Inc.*, (1997), 150 D.L.R. (4th) 193 (B.C.C.A.)).
>
> Thus, the *Act* is not an example of a zero tolerance, or zero harm approach. Permits may be issued allowing waste into the environment (defined as the air, land, water and all other external conditions or influences under which humans, animals and plants live or are developed). The environmental impact of the waste is to be controlled, ameliorated and, where possible, eliminated.

[234] The Board also commented on the statutory scheme in the *EMA* (and its predecessor the *Waste Management Act*) in *Cranbrook*, at paras. 40 to 44:

> The permit in this case authorizes Cranbrook to do something that is otherwise prohibited under the statute; namely, to introduce waste into the environment. "Waste" is defined in section 1 of both the *EMA* and *WMA* to include "effluent". Although the parties dispute the actual

> harm that may be caused by allowing the elevation of lagoon #2 to exceed 824 metres ASL [above sea level], the parties agree that the discharge is "effluent" within the meaning of the legislation. "Effluent" is defined in section 1 of the *WMA* as follows…
>
> Thus, in order for a substance to fall within the scope of the definition of "effluent", the substance need not actually injure, interfere, or cause damage in the ways described above. Rather, a substance is "effluent" if it is "capable" of doing the things listed above. This implies that a preventative approach should be taken when regulating the discharge of effluent into the environment.

[235] This Panel agrees with that analysis, and adopts the cautious approach described in the Board's previous decisions. Similar to the definition of "effluent", "air contaminant" is defined to mean a substance introduced into the air that "injures or is capable of injuring" human health or any life form, or "damages or is capable of damaging the environment", among other things. Thus, when assessing an application under section 16 of the *EMA* to amend a permit authorizing the emission of air contaminants, a cautious and technically rigorous approach should be taken when assessing the potential risks of injury to human health or damage to the environment. Harm or damage that may be caused by the emissions should be controlled, ameliorated and, where possible, eliminated. However, not all harm or damage will be eliminated, given that the permitted emission of "air contaminants", by its very definition, includes substances that are capable of causing injury to human health and/or damage to the environment.

[236] For all of these reasons, the Panel rejects the Appellants' assertion that the Director was, and this Panel is now, obligated to consider the application of the precautionary principle to Rio Tinto's application for an amendment to the Permit. This ground of appeal is dismissed.

b. Does section 16 of the *EMA* require the consideration of cumulative effects?

The Appellants' submissions

[237] Although the Appellants originally argued that the Director erred in his assessment of the cumulative impacts of the project, the Appellants' closing submissions only mention cumulative effects in the context of alleging that the Director provided inadequate reasons for his decision. Given that the Appellants' closing submissions did not address why or how the Director erred in his assessment of the cumulative impacts, it appears that they have abandoned this argument. Therefore, the Panel is not obliged to address this argument. However, the Panel will briefly address it out of an abundance of caution.

The Director's submissions

[238] The Director submits that he had no legal obligation to consider cumulative effects, but he did so by investigating the status of proposed liquid natural gas projects in the area. He testified that he was unable to obtain sufficient information about those projects to conduct a cumulative effects assessment. None of those

projects were reasonably proximate in time to allow for such an assessment. In any event, the Director argues that any liquid natural gas facility that may be developed in the future would have to undergo a permit application process.

[239] Furthermore, the Director argues that the Board has previously held that a decision-maker is not required to consider the cumulative effects of human activity when issuing a water licence: *Xwemalhkwu First Nation v. British Columbia (Ministry of Environment)*, [2013] B.C.E.A. No. 1, at paras. 255 – 263 ("*Xwemalhkwu First Nation*"). The Board has also found that cumulative effects must be more than hypothetical; they must be real or expected: *O'Leary v. British Columbia (Ministry of Health)*, [1997] B.C.E.A. No. 15.

Rio Tinto's submissions

[240] Rio Tinto submits that the Director had no obligation under the *EMA* to consider cumulative effects, and in any case, the Appellants provided no evidence of an imminent new project that will alter the emissions profile of the Kitimat airshed.

[241] In addition, Rio Tinto submits that the Director testified that he considered whether cumulative effects were a factor in assessing the application for the Amendment, and he concluded that none of the liquid natural gas projects proposed for Kitimat were far enough advanced to provide the details necessary for a cumulative effects assessment.

The Panel's findings

[242] In *Xwemalhkwu First Nation*, the Board found at para. 255 that the question of whether a statutory decision-maker is obliged to consider the broad cumulative environmental impacts of human activity prior to issuing a water licence is a question of statutory interpretation, and the answer must be found by examining the provisions of the relevant Act, which in that case was the *Water Act*.

[243] Similarly, this Panel finds that the relevant provisions of the *EMA* must be considered in determining whether the Director was obliged to consider, for the purposes of assessing Rio Tinto's application under section 16, the cumulative impacts of future projects that may, if they proceed, produce SO_2 emissions. The Panel finds that the Appellants have pointed to no provisions in the *EMA* that expressly or impliedly indicate that the Director was obliged to consider the cumulative effects of SO_2 emissions from other facilities that may be built in the area sometime in the future.

[244] The Panel further finds that, even if the Director was obliged to consider such cumulative effects, he testified that he made inquiries about the proposed projects, but was unable to obtain sufficient information to assess cumulative effects. As such, the Panel finds that the possible emissions from projects that may (or may not) proceed in the future are too speculative to be considered by the Director, or by the Panel. Accordingly, this ground of appeal is dismissed.

c. Does the polluter pay principle apply in interpreting and applying section 16 of the *EMA*?

The Appellants' submissions

[245] In their Further Statement of Points, the Appellants submitted that the Director erred by failing to apply the "polluter-pays principle" to the permitting process. However, during the appeal hearing, the Appellants called no evidence to support that submission. In their closing submissions, the Appellants did not mention the "polluter-pays" principle, nor did they provide any authority for their assertion that the Director was required to consider this principle.

[246] Although the Appellants appear to have abandoned this argument, the Panel will briefly address this issue out of an abundance of caution.

The Director's submissions

[247] The Director's closing submissions do not address the polluter pays principle. However, the Director submitted in his Statement of Points that this aspect of permitting is addressed under the *Permit Fees Regulation* under the *EMA*, which imposes annual fees for the discharge of SO_2. In that regard, the Director testified that, under section 4.2 of the Permit, Rio Tinto must pay an annual fee of $128,893,23.00 for the discharge of SO_2.

Rio Tinto's submissions

[248] Rio Tinto submits that the Director had no legal obligation to apply the polluter-pays principle to a decision under section 16 of the *EMA*. Rio Tinto argues that, although the polluter pays principle is central to the contaminated sites remediation scheme in Part 4 of the *EMA*, the test for issuing a permit amendment under section 16 includes no notion of the polluter pays principle.

The Panel's findings

[249] The Panel finds that the Appellants have not elaborated in what exactly they mean by the "polluter pays principle", or how it should apply to section 16 of the *EMA*. They have failed to point to any provisions in the *EMA* that expressly or impliedly indicate that the polluter pay principle applies when considering application for permit amendments under section 16(1) of the *EMA*.

[250] The Board has previously considered the polluter pays principle in the context of the *EMA* and its predecessor, the *Waste Management Act*. This principle has been found to underlie the provisions in those Acts that address the remediation of contaminated sites. For example, in *Thomas Lawson v. Deputy Director of Waste Management* (Appeal Nos. 1998-WAS-014(c), 030(a), 034(a) and 1999-WAS-015(a), September 19, 2001), the Board discussed the statutory scheme that imposes liability for the remediation of contaminated sites. At pages 32 to 34 of that decision, the Board concluded that the polluter pays principle is one element of the statutory scheme of liability for remediation, but persons who benefit from activities that cause contamination may also be liable for remediation.

[251] Similarly, at page 26 of *North Fraser Harbour Commission et al v. Deputy Director of Waste Management* (Appeal Nos. 98-WAS-14(b) and 98-WAS-28(a),

August 23, 1999), which was upheld by the Supreme Court of Canada *(British Columbia Hydro and Power Authority v. British Columbia (Environmental Appeal Board)*, [2005] 1 S.C.R. 3, 2005 SCC 1), the Board stated as follows regarding the polluter pays principle:

> The Panel agrees that an important purpose of Part 4 is to make polluters pay for cleaning up contamination that results from both their actions, regardless of whether those actions occur in the past or the present. This serves the public interest in preventing and reducing harm to the environment and human health, and correctly places the costs of clean up on those responsible, rather than on tax payers.

[252] The Panel finds that the polluter pays principle is incorporated into Part 4 of the *EMA* with respect to liability for remediating contaminated sites. However, the present appeal does not involve a "contaminated site" within the meaning of the *EMA*. Rather, this appeal involves an amendment to a permit that authorizes the discharge of waste from an industrial emitter.

[253] The Panel finds that this ground of appeal is without merit and is dismissed.

3. Whether the information before the Panel is inadequate to confirm the issuance of the Amendment under section 16 of the *EMA*.

The Parties' general positions

[254] In his introduction to the Appellants' closing arguments, counsel for Ms. Stannus stated that the:

> …key objective both Appellants sought here was to ensure better transparency, better information and to secure some kind of assurance that this decision under review can be revisited by an independent party in an independent venue, and they are confident, and I think content that that is exactly what is happening here, that is exactly what's happening here. And as we arrived at the end of this hearing I think it became more and more evident to them that their concerns around the adequacy of the information around the transparency, that that really underscored in the end what was needed, from their point of view what was needed out of this process, which was a remedy that responded to and which fixed those deficiencies in the information base, in the data available at the time that this decision was originally made. Their position is that even now, after this *de novo* hearing with the benefit of extra additional evidence being brought, their position is that even now those information gaps persist and through this hearing it's become even more evident how important those gaps are to the ultimate decision that needs to be made.

[255] In the Appellants' closing submissions, they submit that there is insufficient evidence for the Panel to conclude that the Amendment provides adequate protection for human health, soil and vegetation from the impacts of the increased SO_2 emissions. The Appellants submit that the scientific and technical basis for granting the Amendment is deficient in relation to human health, soils and vegetation. Regarding soils and vegetation, the Appellants focus on the alleged

inadequacy of the information in the STAR. Regarding human health, the Appellants submit that there are significant gaps in the analyses in the STAR, and based on the evidence presented at the appeal hearing, the increased SO_2 emissions present a real threat of serious and irreversible harm, such that the precautionary principle should be applied. They acknowledge that the precautionary principle does not apply where there is full scientific certainty, or where the evidence of risk does not rise to a minimum degree of certainty. However, the Appellants submit that the test to be applied is whether there is "reasonable scientific plausibility" to the associations between: (i) the potential increase in the incidence of asthma associated with exposure to SO_2 gas; (ii) premature mortality (which includes death caused by heart attacks, serious asthma attacks, or respiratory infections) associated with exposure to SO_2 gas; and (iii) premature mortality associated with exposure to secondary formation ("SF") particulate matter up to 2.5 micrometers in size ("PM2.5")[1], of which SO_2 is a precursor.

[256] Under the broad topic of inadequate information, the Appellants also argue that the public consultation process conducted before the Amendment was issued was inadequate.

[257] In general, the Director submits that the increased SO_2 emissions pose no threats of serious or irreversible damage to human health or the environment. He maintains that he carefully considered the information before him, and concluded that any effects would not meet the threshold of serious and irreversible. The Director submits that he was satisfied there was sufficient information to set requirements for the protection of the environment and human health, and specifically regarding the prediction, identification, avoidance and mitigation of potential impacts on human health and the environment.

[258] The Director submits that the qualified professionals who wrote the STAR used a conservative approach to predict effects, and he adopted a careful, considered approach before making his decision. The Director testified that he was satisfied that the risk associated with the increased SO_2 emissions was low for vegetation, and moderate for human health and the acidification of soil. As a result, he concluded that there would be no unacceptable impacts to the environment and human health.

[259] In addition, the Director maintains that he required the effects of the emissions to be monitored, to confirm whether the predictions of the STAR were accurate. The Director submits that the EEM Plan is an "add-on" to the Amendment, and does not form the basis for the Amendment. The Director submits that the EEM Plan was added to ensure that a future decision-maker would have sufficient information to confirm the predictions in the STAR, and monitor the impact of the emissions on the Kitimat valley on a regular and ongoing basis. He submits that the EEM Plan established key performance indicators ("KPI's"). If

[1] Secondary formation of PM2.5 occurs in the atmosphere through reactions involving substances such as SO_2, nitrogen oxides, volatile organic compounds, and ammonia.

these KPI's are "triggered", then mitigation measures in the EEM Plan are implemented to avoid irreversible harm to the environment or human health.

[260] Generally, Rio Tinto submits that the evidence establishes that the Amendment is sufficiently protective of human health and the environment. Rio Tinto submits that post-KMP, all emissions will decrease significantly except for SO_2. Polycyclic aromatic hydrocarbon emissions will decrease by 98%, greenhouse gases will decrease by 36%, hydrogen fluoride emissions will decrease by 72%, and total particulate matter emissions will decrease by 80%. Also, as a result of new works at the smelter, including the enclosed pots, gas treatment centres and emission stacks, there will be greater dispersion of emissions away from the residential areas of Kitimat. Rio Tinto submits that the Panel could reject the appeals based on the strength of the information in the STAR alone, as the STAR relied on high quality analysis and a number of conservative assumptions. Rio Tinto argues that the STAR's analysis and conclusions are sound, and were confirmed by the witnesses' testimony.

[261] The Panel has organized its discussion and analysis of this issue according to the sub-issues addressed in the Appellants' closing submissions:

a. evidence regarding impacts on human health

b. evidence regarding impacts on soils

c. evidence regarding impacts on vegetation

d. adequacy of the public consultation process

[262] Although the Appellants' Further Amended Statement of Points also addressed the adequacy of the evidence regarding the potential impacts on surface water bodies such as lakes, the Appellants called no evidence in that regard, and the Appellants appear to have abandoned that line of argument in their closing submissions. Consequently, the Panel will not recount the evidence provided by the Director or Rio Tinto regarding surface water, and the Panel need not address this line of argument.

a. Evidence regarding impacts on human health

The Appellants' submissions

[263] With respect to the potential impacts of the SO_2 emissions on human health, the Appellants rely on their submissions related to the precautionary principle. In particular, the Appellants submit that the increased SO_2 emissions pose a real threat of serious or irreversible harm to human health, and there is significant scientific uncertainty as to the nature and extent of the harm and the causal relationships giving rise to the harm. The Appellants submit that documented human health effects are associated with exposure to increased PM2.5; specifically, there is a scientifically established causal relationship between exposure to PM2.5 and premature mortality. They note that SO_2 is a precursor to PM2.5. Also, the Appellants submit that there is uncertainty surrounding the relationship between exposure to increased SO_2 levels and the incidence of asthma and premature mortality. The Appellants submit that there is no "safe level" of exposure to PM2.5

or SO_2 with respect to those health endpoints, which the Appellants maintain are irreversible.

[264] The Appellants argue that the Director relied heavily on the dose-response analysis in the STAR, which focused on "respiratory responses" associated with SO_2 gas exposure. The Appellants point to the Director's testimony that he considered "a moderate outcome for the prediction of the potential for increased airway events among the sub-population of asthma and COPD [chronic obstructive pulmonary disease] sufferers of less than one percent" and that "these episodes are reversible". The Appellants submit that the STAR failed to consider the potential increase in the incidence of asthma associated with exposure to SO_2 gas, the potential for premature mortality associated with exposure to SO_2 gas, and the potential for premature mortality associated with exposure to SFPM2.5.

[265] Regarding exposure to SO_2 gas, the Appellants submit that the STAR's authors decided based on a literature review that it was unnecessary to consider whether there was a relationship to the incidence of asthma or premature mortality, because the U.S. EPA had concluded that no causal relationship between SO_2 exposure and those health endpoints had been established in the scientific literature. Specifically, section 3.4 of the STAR considered the *Integrated Science Assessment for Sulfur Oxides – Health Criteria* (U.S. EPA, 2008) (the "2008 ISA Study") and some scientific literature published after the U.S. EPA Review. On the basis of the 2008 ISA Study and the literature review, the STAR concluded that scientific literature suggests that SO_2 gas "does not induce respiratory diseases in healthy people" and that there is "suggestive evidence of a relationship between short term SO_2 (sic) and mortality, but the evidence is not sufficient to infer a causal relationship".

[266] The first health endpoint that the Appellants discuss is the relationship between exposure to SO_2 gas and the incidence of asthma. The Appellants submit that the STAR did not investigate the relationship between SO_2 levels and the incidence of asthma, because the 2008 ISA Study concluded that the evidence regarding SO_2 levels and asthma incidence was "inadequate to infer a causal relationship". However, the Appellants note that the 2008 ISA Study was limited to studies conducted up to 2006/2007. Also, the Appellants submit that the STAR cites six of eight studies which show a positive association between SO_2 exposure and the incidence of asthma. Further, the Appellants point to studies conducted in BC (2010) and Quebec (2005), as discussed by Dr. Chernaik (his testimony is summarized below), which examined the relationship between the incidence of asthma and elevated levels of SO_2 combined with other air contaminants such as particulates. The Appellants submit that, together, all of this evidence regarding the incidence of asthma associated with exposure to SO_2 gas meets the threshold of showing a "real threat" to public health that is "serious or irreversible", as there is "reasonable scientific plausibility" that increases in the incidence of asthma are positively associated with exposure to SO_2 gas.

[267] The second health endpoint that the Appellants discuss is the relationship between exposure to SO_2 gas and premature mortality. In that regard, the STAR states that the evidence is "suggestive but not sufficient to infer a causal relationship" between short-term exposure to SO_2 and premature mortality. The

Appellants acknowledge that the evidence is only "suggestive of a causal relationship". However, the Appellants submit that the evidence meets the threshold test of showing a "real threat" to public health that is "serious or irreversible", because there is "reasonable scientific plausibility" that premature mortality is positively associated with exposure to SO_2 gas.

[268] Although the 2008 ISA Study concluded that the evidence regarding exposure to SO_2 and premature mortality is only "suggestive of a causal relationship", the Appellants submit that the 2008 ISA Study stated that the risk of mortality (both cardiopulmonary and respiratory) increases by 0.4 – 2% for every 10 parts per billion ("ppb") increase in SO_2 concentration. The Appellants submit that, according to Dr. Chernaik, the 2008 ISA Study's conclusions regarding mortality associated with SO_2 exposure led to stricter U.S. EPA air quality standards, because the U.S. EPA used mortality as the health endpoint when measuring the benefit of reducing sulphur oxides emissions for the purposes of a cost-benefit analysis as part of its regulatory impact assessment.

[269] Furthermore, the Appellants submit that the causal relationship between PM2.5 (which would include SFPM2.5) and mortality was found to be much stronger in the U.S. EPA's 2009 *Integrated Science Assessment for Particulate Matter* (the "2009 ISA Study"). The Appellants maintain that, according to Dr. Chernaik, a study conducted in China (2012) "confirms that there's a suggestive causal relationship between SO_2 levels and how many people die on a particular day…." The Appellants note that the Chinese study states that "[t]he increased mortality that was found in Chinese cities is similar in magnitude per unit of increase of SO_2 concentration to the risks found in other parts of the world".

[270] The third health endpoint that the Appellants discuss is the relationship between PM2.5 (including SFPM2.5) and premature mortality. The Appellants submit that there is a scientifically established causal relationship between exposure to PM2.5 and premature mortality, according to the 2009 ISA Study. In relation to this issue, the Appellants argue that the scientific uncertainty is not whether there is a causal linkage, but rather, how and to what extent SFPM2.5 arising from the smelter post-KMP will cause premature mortality in the Kitimat airshed. The Appellants submit that an assessment of SFPM2.5 was omitted from the STAR, because the Director advised technical staff not to assess the effect of new PM2.5 emissions associated with the KMP, but rather to focus on SO_2 as a gas. The Appellants maintain that SFPM2.5 was scoped out of the STAR based on two factors according to the Director's testimony: the modernized smelter will have lower primary discharge emissions of PM2.5, which would be approximately the same as any increase in SFPM2.5 caused by the increase in $S0_2$ to 42 tonnes a day; and, the majority of the SFPM2.5 as a product of SO_2 would not necessarily occur in the populated parts of the Kitimat area, due to the 60-metre high stacks on the gas treatment centres.

[271] The Appellants maintain that Rio Tinto has produced dispersion modeling results for the expected concentrations of SFPM2.5 pre- and post-KMP in Ms. Henolson's expert report, which was presented in evidence during the hearing, but no dose-response analysis capable of analyzing the health effects of this data has

been put into evidence. Therefore, scientific uncertainty remains with respect to the impact of increasing SFPM2.5 levels as a result of the KMP.

[272] In terms of human health risks, the remedies that the Appellants request in relation to the Amendment itself are summarized as follows:

- an order setting aside paragraph 4.2.2 of the Amendment (which authorizes the maximum daily SO_2 limit of 42 tonnes per day); and
- an order directing the Director to secure, prior to rendering a decision on a new application, certain information or reports regarding the human health risks associated with the SO2 emissions from the smelter operating at full capacity post-KMP, including the potential for increased incidence of asthma and premature mortality.

[273] The Appellants also sought a number of alternative remedies associated with paragraph 4.2.2 of the Amendment. The Appellants seek a further remedy in relation to the EEM Plan, which is discussed below.

[274] Regarding the EEM Plan, the Appellants maintain that it lacks a KPI for human health, since there are currently no indicators to provide an early warning as to whether the increased SO_2 emissions are leading to: (a) increased respiratory responses; (b) premature mortality; or (c) the onset of asthma. While there is an informative indicator for human health (i.e., the predicted annual number of SO_2 associated respiratory responses based on a three year rolling average), the EEM Plan states that the KPI for health "will be updated when provincially applied SO_2 ambient air quality guidelines come into effect", and data collection to support the KPI will only commence once the KMP "reaches full metal production capacity". In addition to the lack of KPI, the Appellants submit that there are no thresholds for increased monitoring or receptor-based mitigation with respect to health, nor are there current thresholds for facility based-mitigation for human health.

[275] The Appellants note that, in October 2014, the Province issued an interim objective of 75 ppb for 1-hour maximum ambient SO_2 concentrations (99^{th} percentile value over one year). The Appellants submit that, if the provincial interim objective for SO_2 were to apply as an interim standard in the EEM Plan, and if a threshold regarding a certain number of exceedances over a given time period were set in the EEM Plan, then the mitigation measures set out in Table 18 of the EEM Plan could be considered without having to wait for the collection of three years of data regarding the informative indicator (the predicted annual number of SO_2 associated respiratory responses based on a three year rolling average). In that regard, the Panel notes that Table 18 of the EEM Plan lists several SO_2 reduction options, and their potential range of reduction and their timelines for implementation. Table 18 states that certain options, such as procuring lower sulphur-content coke or importing anodes with lower sulphur content, could be implemented within six months, but installing scrubbers would take five to eight years to implement.

[276] In terms of a remedy in relation to the EEM Plan, the Appellants request an order declaring that the human health portion of the EEM Plan is inconsistent with the precautionary principle, and is of no force and effect. However, the Appellants

also stated in their closing submissions that it would be inappropriate to direct any specific mitigation strategy, such as the installation of scrubbers, at this time.

[277] The Appellants called Dr. Chernaik to testify about the alleged deficiencies in the STAR regarding human health risks. He was qualified by the Panel to give expert testimony in the subject matter described in the Summary of Evidence, above.

[278] Dr. Chernaik explained that "asthma" is an allergic disorder that results when people are sensitive to an airborne allergen; when the allergen lands in the person's airways, it causes the airway to constrict. Dr. Chernaik testified that current estimates are that one in seven people have asthma (12 - 14% worldwide), and that a lot of research is being undertaken to try to determine why the global incidence of asthma is increasing. Dr. Chernaik also testified that there is emerging evidence that some people may have a predisposition to asthma, with sensitivity developing in the first year of life. Dr. Chernaik explained that another respiratory disease, COPD, occurs when the lining of epithelial cells or epithelium in a person's lung is impacted; the capacity of the lungs declines. This condition is commonly seen in individuals who have had exposures to tobacco smoke, silicate and asbestos. COPD has similarities to asthma, in that the patient's airways are restricted, but the cause of the restriction is different.

[279] Dr. Chernaik testified regarding the relationship between SO_2 and the formation of PM2.5, as discussed in his expert report dated March 24, 2014. Dr. Chernaik explained that SO_2 gas reacts with water to form sulphate, which is a gas that can react with ammonia to form solid ammonium sulphate particles known as SFPM2.5. He stated that the U.S. EPA is so convinced of the relationship between PM2.5 and premature mortality, and of the fact that SO_2 is a precursor to SFPM2.5, that it decreased the numerical limit for SO_2 in the National Ambient Air Quality Standards to 75 parts per billion or 196 $\mu g/m^3$. He testified that the U.S. EPA has estimated that 2,300 premature deaths per year are avoided by the lowered SO_2 standard.

[280] Dr. Chernaik testified that the STAR has two main flaws: it fails to account for the human health impacts of SFPM2.5, and it does not compare and contrast the benefits to human health of modernizing the smelter with or without scrubbers.

[281] Dr. Chernaik testified that the STAR does a good job of characterizing and understanding the respiratory incidents that are anticipated in those individuals who have previously been diagnosed with asthma or COPD, but fails to provide a quantitative assessment of premature mortality and the incidence of asthma (i.e., the number of people who actually develop asthma) caused by SO_2. In his opinion, this is a serious omission.

[282] Dr. Chernaik was also critical of the literature review in the STAR. In his view, the STAR's authors rely heavily on the seven-year old 2008 ISA Study in their literature review, and they were selective as to the health endpoints they chose to quantify. Only where the 2008 ISA Study determined that scientific evidence was "sufficient to infer a causal relationship" did the STAR examine the issue further. Therefore, the STAR only assessed "respiratory responses" (the number of airway constrictions that a person with asthma or COPD may experience) associated with

SO_2, and did so using a dose-response analysis. In quantifying only the number of projected respiratory responses, the STAR's authors missed the "big ticket items", as he put it. That is to say that the authors failed to account for the incidence of premature mortality as a result of heart attack, asthma attack, or respiratory infections. Dr. Chernaik testified that respiratory events may be characterized as examples of morbidity (i.e., incidents leading to a loss of enjoyment of life), whereas mortality refers to the loss of life. The failure to include the projections for premature mortality caused by exposure to SO_2 emissions was a serious omission, in his view.

[283] Dr. Chernaik explained that the distinction between morbidity and mortality is that a person may have a respiratory response and completely recover (i.e., the impact is reversible), whereas if a person develops asthma when none previously existed, or if a person dies prematurely as a result of SO_2 exposure, these are irreversible impacts of SO_2 exposure.

[284] Dr. Chernaik testified that the 2008 ISA Study was the most comprehensive study, at the time, of the impacts of SO_2 on human health. He noted that the 2008 ISA Study concluded that the evidence was "suggestive" of a causal linkage between SO_2 exposure and mortality, but the linkage was limited by other factors (e.g., co-pollutants that were present).

[285] Dr. Chernaik discussed three other studies regarding the linkage between SO_2 exposure and human health that were not addressed in the STAR: a 2005 study by Pénard-Moran et al, titled "Long-Term Exposure to Background Air Pollution Related to Respiratory and Allergic Health in School Children", involving 4,900 school children in Quebec; a 2010 BC study by Clarke et al, titled "Effect of Early Life Exposure to Air Pollution on Development of Children Asthma", examining the increasing incidence of asthma in school children; and, a 2012 study by Chen et al, titled "Short-Term Exposure to Sulfur Dioxide and Daily Morality in 17 Chinese Cities", involving millions of people in 17 Chinese cities. He was critical of the STAR's literature review for overlooking those studies. In his expert report, Dr. Chernaik also listed as a source, but did not reference in his report, a 2010 Pan-Asia study by Kan et al, titled "Short Term Association between sulphur dioxide and daily mortality" which examined the stated association between SO_2 and daily mortality in Bangkok, Thailand and three Chinese cities.

[286] Dr. Chernaik said that the results of the 2012 Chinese study should have informed the STAR, as that study confirmed a large body of earlier work which concluded that there is a causal relationship between the amount of SO_2 in the air and the number of people who die each day. In his opinion, the association between SO_2 and mortality is quantifiable, and such an analysis should have been undertaken in the STAR.

[287] Dr. Chernaik testified that it is more important to study the number of deaths, and whether you have asthma as a result of exposure to SO_2, than to study the number of asthmatic events that you might otherwise have, assuming you already have asthma. He also criticized the STAR for assuming that respiratory responses will be limited to one per day, after which asthmatics will either stay indoors, restrict their activities, or take medication.

[288] Dr. Chernaik testified that he researched the area of BC involved in this appeal for his expert report dated August 1, 2014, and found that there is a higher rate of death from various causes, including emphysema, bronchitis and asthma, in that area compared to elsewhere in BC, based on data from the Northern Health Authority.

[289] Dr. Chernaik was also critical of the STAR for not recognizing the circumstances of Kildala Elementary School in Lower Kitimat, which he says will have higher ambient levels of SO_2 after the KMP is implemented, as it is more proximate to the smelter than other schools in the area.

[290] Dr. Chernaik was also critical of the STAR for failing to consider the impact of the "capping inversion aloft"; i.e., the point in the atmosphere when a contaminant plume rises no more, regardless of the height of the stacks. Weather conditions determine the cap height. He stated that the capping inversion can be affected by cold, wind and other factors which, in his opinion, were not considered in the STAR.

[291] Dr. Chernaik testified that, in his opinion, the EEM Plan does not remedy the STAR's deficiencies, as the EEM Plan addresses neither the formation of SFPM2.5 nor the question of scrubbing versus not scrubbing. Dr. Chernaik was also critical of the EEM Plan for not considering that there may be more ammonia in the Kitimat airshed in future. He testified that LNG plants and other projects planned for the area, such as an oil refinery, will affect the amount of ammonia in the air that is available to transform SO_2 into PM2.5. He expressed concern that Rio Tinto's modelling expert assumed the presence of 0.5 ppb of ammonia which, in his view, is inadequate.

[292] Dr. Chernaik conceded that the STAR is exemplary in quantifying ambient levels of pollutants below standards - all the way to zero - but, he stressed that the STAR wrongly interprets the impact of the levels of pollutants.

[293] Dr. Chernaik was critical of the STAR for failing to consider and compare the costs of the KMP and its impacts on human health, if scrubbing technology was utilized or not. Given that the Appellants abandoned their argument regarding scrubbers, the Panel will not consider Dr. Chernaik's evidence in this regard.

[294] In summary, Dr. Chernaik testified that the STAR fails to:

- properly interpret the health consequences regarding increasing emissions of SO_2;
- recognize that particulate levels would be increasing and that there is no level below which there are no health effects from PM2.5 exposure;
- consider the effect of the capping inversion on the contaminant plume from the stacks; and
- consider that other facilities are on record to be developed (such as an oil refinery and a BC Hydro facility) and may use increasing amounts of ammonia. The Province is contemplating standards for nitrogen dioxide ("NO_2") so that LNG projects may have to use ammonia injection to control their nitrogen oxides ("NO_x") emissions.

[295] Under cross-examination by the Director's counsel, Dr. Chernaik conceded that that there is no certainty that LNG facilities will ever be built, or what their emission levels would be if they are built. He stressed that he was still concerned, based on his assumption that natural gas would be used as a power source at future facilities. However, he agreed that electricity could also be used as a power source, and if electricity is used, there would be no concern about emissions. He also acknowledged that he assumed that ammonia injections in a process known as selective catalytic reduction would be used to reduce the amount of NOx being emitted, as it is the most effective way to reduce NOx. This process can create more ammonia gas in the atmosphere, which is then available to combine with SO_2 to form SFPM2.5. However, he agreed that if he was wrong in those assumptions, there may not be an issue regarding the cumulative impacts of emissions of SFPM2.5 in the Kitimat airshed.

[296] Dr. Chernaik also conceded that PM2.5 raises different issues than SO_2, and its impact on human health is very different because particles can lodge in the lungs. Although he stressed that SO_2 is a precursor for SFPM2.5, he agreed that the concern then is not about SO_2 as a gas, but rather, fine particulate matter that, in his view, needs to be studied.

[297] Dr. Chernaik agreed with the statement put to him by the Director's counsel that if the source (i.e., the modernized smelter) that creates SO_2 also causes a decrease in PM2.5, there would be an offset for SFPM2.5 that might result from SO_2 emissions, which is what the Director concluded. In other words, there would be less PM2.5 emitted directly from the smelter because of the KMP. However, Dr. Chernaik continued to state that it would be preferable to use scrubbers at the smelter, so that there would be less SO_2 to act as a precursor to SFPM2.5.

[298] Under cross-examination by Rio Tinto's counsel, Dr. Chernaik made a number of further concessions. For example, he agreed that the CALPUFF air dispersion model used in the STAR is one of the preferred models used by the U.S. EPA. He also accepted that the qualified professionals who prepared the STAR accurately predicted SO_2 levels with the model for both pre-KMP and post-KMP scenarios. He also accepted that the analysis in the STAR assumed that 3.8% sulphur content coke would be used at the smelter, and SO_2 emissions would be 42 tonnes per day; i.e., a worse-case scenario.

[299] Dr. Chernaik also conceded that he misunderstood the health data that he had obtained from the Northern Health Authority. He acknowledged that the data was not specific to Kitimat, but rather, related to the entire northwest region of BC. He conceded that he cannot prove his theory that excessive SO_2 levels in Kitimat are already impacting human health; i.e., while there are higher mortality rates in the northwest region than in BC as a whole, he cannot say why that is and how Kitimat fits in to that analysis. He acknowledged that it would be important to know if something else is effecting human health in northwestern and northeastern BC, given the higher than average incidence of other respiratory health effects such as bronchitis. He conceded that before any conclusions could be drawn, it would be important to know more about co-pollutants in the airshed, such as motor vehicle emissions, second hand smoke, and other industrial emissions, to determine whether there are airshed issues attributable to the smelter that are currently

impacting human health in Kitimat. He agreed that, if Kitimat is one of the smaller communities in the northwest, this would further reduce the impact on human health in the community, as compared to the entire northwest region as depicted in the study.

[300] Finally, Dr. Chernaik conceded that 99% of the total health benefits to the community that he was concerned with are attributable to a decrease in PM2.5. He acknowledged that the Canadian Council of Ministers of the Environment has targeted a standard of 10.0 mg/m^3 for PM2.5 in 2015, and 8.8 mg/m^3 by 2020. He conceded that Ms. Henolson's calculations of PM2.5 post-KMP would be below those targeted standards. Although her calculations indicate a small increase in ambient PM2.5 levels, these levels are still predicted to be significantly below the provincial standard of 8.0 mg/m^3.

[301] Dr. Chernaik agreed that the capping inversion that he was concerned about may have been considered in the CALPUFF model, so that there may not be a dispersion problem during certain weather events.

[302] Dr. Chernaik further conceded that the 2008 ISA Study considered the Quebec study that he referenced, and concluded that "overall studies do not provide sufficient evidence to conclude that long-term exposure to SO_2 has an effect on asthma, bronchitis or respiratory symptoms". He acknowledged that in his expert reports, he did not consider a recent study from Northern Israel which concludes that studies conducted elsewhere did not reveal conclusive evidence of SO_2 being associated with these conditions.

[303] The Appellants called Dr. Steyn to testify regarding air quality modelling. The Panel qualified him as an expert in the subject matter described in the Summary of Evidence, above. Although Dr. Steyn is not qualified as a health expert, the Panel considered his evidence regarding predictions of air quality due to the relationship between air quality and potential health effects.

[304] Dr. Steyn testified that Rio Tinto's current monitoring network in Kitimat does a "pretty good job" of determining long-term changes from industrial emissions or changes in the environment. In his first expert report, he expressed concern that the Amendment was based on BC's current ambient air quality standards, which are, in his opinion, "out of date" and very "lax" in comparison to international standards. He was critical of the STAR for not evaluating the air quality model to determine whether its predictions would be born out in real time. Also, in his view, Ms. Henolson's work evaluating the model was "unacceptably simplistic".

[305] Dr. Steyn testified that his concerns remained after considering the EEM Plan because, in his view, the adaptive management approach uses the environment and people in Kitimat as "guinea pigs" whereby changes are not made to the smelter's emissions until harm is demonstrated after three years of data has been gathered showing exceedances of current or future standards. Dr. Steyn noted that respiratory responses in individuals with restrictive airway disease, such as asthma, are most closely linked to short-term peak exposure to SO_2, and yet the EEM Plan uses 1-hour averages as its shortest time period. In the absence of a short-term standard for SO_2, any conversions of data from a longer term to a short term time frame may be inaccurate given variables such as meteorological conditions,

topography, etc. He was also critical of the EEM Plan for using a "mixed" network of both "passive" and "continuous monitoring". The former measures air pollutants that pass naturally over a chemically active puck, which is then sent to a laboratory for analysis to determine the amount of pollutant that has interacted with the puck over several days. The latter draws air into a monitoring station on a continuous basis. He stated that the correlation of data between a passive and continuous sample will be very low, and therefore, not useful. He also questioned the adequacy of the number and location of monitoring stations proposed in the EEM Plan for the Kitimat valley.

[306] In response to questions by counsel for the Director, Dr. Steyn conceded that the U.S. EPA's National Ambient Air Quality Standards for SO_2 use rolling three-year data, just as does the EEM Plan. He also conceded that there are established protocols for gathering monitoring data and establishing monitoring locations, which are designed to take into account the variables of concern to him regarding converting data gathered over a longer term to a shorter term. When advised that the EEM Plan actually relies on four continuous monitoring samplers, he continued to assert that he doubted whether that was sufficient.

[307] Counsel for Rio Tinto asked Dr. Steyn if his concerns regarding the location of the monitors would be addressed if he knew that the air quality monitoring network would undergo a review and rationalization process, to ensure that the monitoring stations are placed in the right locations to monitor the emissions from SO_2 in the Kitimat valley. Dr. Steyn replied that it would. Counsel then questioned whether Dr. Steyn came to the hearing with "fairly rigid views regarding industrial air policy". He acknowledged that his views may be "controversial". Counsel asked Dr. Steyn whether he recalled testifying as an expert for appellants on three previous occasions where industrial air emissions permits were under appeal, and where his opinion had been rejected by the Board on each occasion. Dr. Steyn professed not to recall those events, stating that they were not "notable events" in his life. He acknowledged that he was not aware of the difference between "informative indicators" and "performance indicators" as those terms are used in the EEM Plan. He further acknowledged that he had assumed that any reductions in emissions would only occur after three years of non-compliance. He also acknowledged that his use of the term "guinea pigs" to describe people in Kitimat was "rather blunt" and "possibly inappropriate" in the circumstances.

The Director's submissions

[308] The Director testified that he took a "cautious" approach to the permitting process, and he considered a great deal of scientific and technical information about the predicted effects of the SO_2 emissions. The Director emphasized that his decision was based on information provided in the STAR, the Consultation Report, the MATCH #2 report regarding the feasibility of scrubbing technology, and a letter from Rio Tinto committing to participate in a health study for the region led by the Province. He also considered a February 15, 2013 letter from the Northern Health Authority, which provided comments on the first draft of the STAR, and particularly the portions of the STAR dealing with potential impacts on human health.

[309] In the Director's view, the qualified professionals who prepared the STAR used a conservative approach to predict the effects of the SO_2 emissions. He

testified that the STAR relies on an ambient air quality methodology using the CALPUFF air dispersion model, which over-predicts the concentrations of emissions across the landscape. An analysis of SO_2 levels recorded at four air monitoring stations in the Kitimat area (Service Centre, Lower Kitimat, Upper Kitimat, and Kitamaat Village) found, on average, a 227% over-estimate of the ambient concentration of SO_2 compared to the model's predictions. The analyses in the STAR also assumed a "worst case" scenario with SO_2 emissions being at the maximum permitted at full operations of KMP at 42 tonnes per day. The Director testified that he was satisfied that the risk associated with the increased SO_2 emissions was moderate for human health. He submits that the emissions will result in no serious and irreversible harm to human health.

[310] The Director testified that the 1979 BC Pollution Control Objectives were included as a comparative objective in the STAR. In addition, the U.S. EPA's Primary National Ambient Air Quality Standards and the World Health Organization standards for SO_2 were used as other comparator objectives in the STAR. Ultimately, the Director decided that the dose-response relationship between respiratory incidents and SO_2 levels was the most informative measure in determining whether the Amendment was protective of human health.

[311] The Director testified that he gave special attention to the input he received from the Northern Health Authority, the BC Centre for Disease Control, and the Ministry of Healthy, because the Environmental Protection Division of the Ministry does not have health expertise. The Director testified that it was important to him that the Northern Health Authority's February 15, 2013 letter to Rio Tinto, which was copied to him, stated in part:

> A review of the STAR report by Northern Health, with extensive consultation with the BCCDC [BC Centre for Disease Control], found that the effort to characterize the health risks associated with the proposed Sulphur Dioxide emissions was objective and reasonable. Overall, we felt that the approach was acceptable, the conclusions were generally consistent with the wider literature, and the mitigation efforts were appropriate.

[312] The Northern Health Authority's February 15, 2013 letter also made a number of recommendations for further study, including the impact of cold weather on the health effects of SO_2 exposure, and the impact of SO_2 on children. The Director testified that this research was undertaken, and the results were included in the final version of the STAR. The letter also recommended that there be a rigorous air quality monitoring network, and real-time air dispersion modelling should be maintained. The letter also requested a study of direct health effects in the Kitimat area, and it recommended a health advisory system to alert people to adjust their activities or move indoors if air quality is negatively impacted.

[313] As a result of those recommendations, the Director approached the Ministry of Health to discuss the feasibility of requiring a health study as a condition of the Amendment. The Ministry of Health advised that it would be inappropriate for industry to carry out such a study. Rather, government should be leading such a study for a number of reasons, such as to protect the privacy of individuals whose health data would be used in the study, and due to the need for public consultation

before designing such a study. Given this advice from the Ministry of Health, the Director obtained a written commitment from Rio Tinto to participate in any such health study that the Province might undertake. This commitment was provided in a letter dated October 7, 2014, from Gaby Poirier, Rio Tinto's General Manager of BC Operations, to the Director. After considering all of the input from the health agencies, the Director was satisfied that the Amendment was sufficiently protective of human health, and the EEM Plan would address the ongoing monitoring concerns.

[314] The Director explained that the STAR's omission of an analysis of PM2.5 was not an oversight. The Director testified that PM2.5 was deliberately excluded, as he had undertaken a scoping exercise to determine if particulate emissions from the smelter would remain the same, decrease, or increase post-KMP. Based on his calculations, particulate emissions post-KMP would remain essentially the same as under the previous smelter configuration, as the decrease in directly emitted particulates would be equivalent to the increase in the secondary formation particulates resulting from the increased SO_2 emissions. The Director submits that this was later confirmed by Ms. Henolson's investigation and calculations.

[315] Regarding the Appellants' assertion that the EEM Plan lacks a KPI for human health, the Director submits that, on the contrary, it does contain a KPI for human health. The Director points to the EEM Plan at p. 11, where it states as follows:

> As an interim metric, a dose – response health risk metric is used to inform the EEM program of the health risks associated with KMP derived SO2 emissions. Following 2019 or when a provincially approved SO2 ambient air quality guideline is established, both section 3 and table 5 of the EEM program will be updated to include the new air quality guidelines and associated SO2 management actions.

[316] The Director maintains that, although there is currently no provincially approved SO_2 ambient air quality guideline, the framework for this KPI is well established. The Director testified that his intent for this KPI was that it would be governed by the Canadian Ambient Air Quality Standards ("CAAQS"), which are expected to be published in early 2016, as he believes this will be the best possible standard. Specifically, the Director testified that:

> … For human health, what I was wanting to do was to make sure that the actual trigger was a guideline that had in some way been vetted either by the province for the purpose or by Canada. And so I put in the metric, which is basically ambient concentrations of SO2 where people live, but the trigger is yet to be picked. And it would be based on the Canadian ambient air quality standard, which was scheduled for publication in late 2015 and has now been changed to early 2016. …

[317] The Director argues that, given that the KMP is not yet fully operational, and is expected not to be fully operational until 2018, there is time to wait until the CAAQS are published. In the alternative, the Director notes that he has the statutory authority to impose requirements on Rio Tinto at any time, and he may do so if there is a demonstrated need for the human health trigger to be established before the CAAQS are established.

[318] Regarding the CAAQS, the Director submits that this standard will be arrived at after fulsome scientific review and public consultation across a large number of potentially affected industries, as was confirmed by the testimony of Ms. Suzuki, who is a provincial representative on the Board that is making recommendations for the CAAQs. Ms. Suzuki testified that she believes that CAAQS are to be published early in 2016. The Director submits that it was reasonable to establish the framework for the KPI for the human health line of evidence, and allow room for an appropriate Canadian–set guideline to be placed into the EEM Plan, for the long-term benefit of monitoring the Kitimat valley airshed.

Rio Tinto's submissions

[319] Rio Tinto submits that the Appellants failed to discharge their burden of establishing that the Amendment is not sufficiently protective of human health. Rio Tinto submits that the evidence before the Panel establishes that:

(a) The KMP will result in an overall reduction to human health risk. While SO_2 levels are increasing, other pollutants such as polycyclic aromatic hydrocarbons and hydrogen fluoride are decreasing significantly and resulting in improved human health effects, according to Mr. Paoli's evidence.

(b) The analysis performed in the STAR, and supported by Mr. Paoli's testimony, establishes that the health impacts of the Amendment cannot be determined by looking at the amount of SO_2 emitted. Rather, one must look to the amount of SO_2 present at ground level in the residential areas of Kitimat.

(c) The health risk assessment analysis performed in the STAR, and the evidence of Mr. Paoli, also establishes:

(i) the Amendment would result in 150 to 200 "respiratory responses" annually among asthmatics, when compared to a "no smelter" scenario. "Respiratory response" is a sensitive indicator, defined as an increase in airway resistance that is measurable in a clinical setting but may be undetectable to the person experiencing it.

(ii) when comparing emissions pre- and post-KMP, only two additional "respiratory responses" will occur each year among asthmatics.

(d) SFPM2.5 from SO_2 from the KMP is "minimal", broadly similar pre- and post-KMP according to Ms. Henolson's testimony, and PM2.5 is not a concern with respect to the Amendment according to the Director. The health implications from this emission are similar pre- and post-KMP, according to Mr. Paoli's testimony.

(e) The EEM Plan will allow Rio Tinto and the Ministry to regularly assess the predicted annual number of SO_2-associated respiratory responses, and also includes a commitment to incorporate provincially applied SO_2 ambient air quality guidelines once they come into effect.

(f) Rio Tinto has committed to participating in a health study, in the event that there are additional development projects that proceed in the

Kitimat airshed. The health study is to be conducted by a public body, at their own recommendation.

[320] Regarding the STAR, Rio Tinto submits that the literature review, based on scientific literature published between 2008 and the end of October 2012, reached the following conclusions (at p. 71) which were applied in the health risk assessment analysis:

1. Data from literature reviewed by the Scientific Advisory Committee of the U.S. EPA in 2008, and findings from more recent studies, consistently demonstrate a link between short-term exposure to SO_2 and respiratory morbidity. The evidence is sufficient to establish a causal relationship.
2. Scientific literature suggests that SO_2 does not induce respiratory diseases in healthy people, but rather exacerbates existing diseases.
3. Individuals with pre-existing respiratory diseases, in particular with asthma, are susceptible to the effects of SO_2. SO_2 causes a decrease in lung function accompanied by respiratory symptoms in exercising asthmatics. Physical exercise increases lung ventilation and SO_2 uptake.
4. There is suggestive evidence of a relationship between short term SO_2 and mortality, but the evidence is not sufficient to infer a causal relationship.
5. There is inadequate evidence for a causal link between short-term SO_2 exposure and non-respiratory morbidity, and between long-term SO_2 exposure and any health outcome.
6. Information on populations potentially vulnerable to the effects of SO_2 (e.g., individuals with low socio-economic status) is limited.
7. Both SO_2 and cold temperatures are known to exacerbate asthma symptoms during exercise. There is some evidence of synergy at high SO_2 concentrations from clinical studies, but the overall evidence is inconsistent. It is not currently possible to quantify the potential for increased risk.

[321] Rio Tinto submits that the health risk analysis relied on air modelling data of hourly SO_2 concentrations at four locations (Service Centre, Lower Kitimat, Upper Kitimat, and Kitimaat Village), for three years, between the hours of 6 a.m. and 10 p.m. Rio Tinto summarizes the modelled results, which are detailed in Figure 9.1-1 of the STAR, as follows:

- In all residential areas, over 90 percent of the one-hour average SO_2 concentrations were less than 10 $\mu g/m^3$.
- In all areas, more than 99% of the one-hour average SO_2 concentrations are less than 100 $\mu g/m^3$.

[322] Rio Tinto notes that the vast majority of one-hour average SO_2 concentrations are predicted to be below 10 $\mu g/m^3$, which is well below 1-hour standards in other jurisdictions. For example, the U.S. EPA standard is 196 $\mu g/m^3$,

the standard in Metro Vancouver is 450 µg/m^3. The most frequent hourly average SO_2 concentrations are in the range of 0-1 µg/m^3, and hourly average SO_2 concentrations exceeding 200 µg/m^3 (approximately the U.S. EPA standard of 196 µg/m^3) occur very infrequently. Rio Tinto submits that Dr. Chernaik did not dispute these results. In summary, Rio Tinto submits that the modelled results predict that the ambient levels of SO_2 post-KMP are low overall, including in residential areas.

[323] Rio Tinto submits that the STAR's health risk assessment went beyond merely comparing the predicted ambient SO_2 emissions to air quality standards; rather, the STAR used the U.S. EPA's dose-response relationship to determine health impacts. Specifically, the STAR uses a dose-response curve developed by the U.S. EPA that determines the probability of a "respiratory response" for exercising individuals with asthma at varying five-minute peak SO_2 concentrations. Rio Tinto submits that Dr. Chernaik agreed that the STAR's use of a dose-response relationship was "exemplary". Rio Tinto notes, for example, that the U.S. EPA's dose-response curve shows that the probability of a respiratory response is less than 0.05% at a five-minute peak SO_2 concentration of less than 200 µg/m^3.

[324] The STAR applied the U.S. EPA's dose-response curve to the modelled (predicted) SO_2 concentrations post-KMP (figure 9.1-2 in the STAR). Rio Tinto submits that, at the most frequent hourly average SO_2 concentrations (i.e., below 10 µg/m^3), the likelihood of a respiratory response is the lowest (i.e., at or near zero). Based on all of the plotted data, the STAR predicted 150 to 200 respiratory responses among physically active susceptible individuals with asthma and/or COPD annually in the post-KMP scenario, compared to a "no smelter" scenario. No respiratory responses were expected for individuals without respiratory diseases like asthma or COPD, or for individuals with respiratory diseases who were not physically active. Among the individuals who were predicted to experience a respiratory response, the spectrum of consequences ranged from mild (which might not be felt by the individual) to more severe, but Rio Tinto notes that Mr. Paoli testified that most of them would be "mild". Rio Tinto submits that, overall, comparing pre- and post-KMP scenarios, the number of respiratory responses increased by two, according to Mr. Paoli.

[325] Rio Tinto maintains that the STAR took a conservative and cautious approach to the health risk assessment, and the conservative aspects of the assessment may be summarized as follows:

- The STAR's health risk assessment relied on air dispersion modelling that over-predicted SO_2 concentrations by 227% on average,
- The STAR used the most conservative definition of "respiratory response" from the four options used by the U.S. EPA, which defined it as an indicator of "moderate or greater bronchoconstriction."
- The STAR assumed 75% of the 1,200 susceptible individuals are physically active 200 days per year, yielding 180,000 exercise events per year; half of exercise events (90,000) occur outdoors and half indoors; and, SO_2 concentrations would be higher as a result of residents opening their windows and creating outdoor SO_2 concentrations even while indoors.

[326] Rio Tinto submits that the net effect of these conservative assumptions is to generate an estimate of health risk that is likely to be higher than the actual risk. Rio Tinto notes that it engaged a third party physician, Dr. Chris Carlsten, Associate Professor of Respiratory Medicine and Chair in Occupational and Environmental Lung Disease at the University of British Columbia, to review the STAR's section regarding human health impacts. In a March 19, 2013 letter to Rio Tinto, Dr. Carlsten characterized the STAR as "excellent", "thorough and well researched" and "reach[ing] reasonable conclusions", noting the "stellar international reputation" of one of its primary authors, Dr. Krewski of Risk Sciences International Inc. Dr. Carlsten concluded that he did not find any gaps or pitfalls in the STAR, and that the SO_2 increases post-KMP "can be considered trivial in terms of health effects". Rio Tinto also received comments from the Northern Health Authority and the BC Centre for Disease Control on the STAR, as discussed above.

[327] In addition, Rio Tinto submits that, while the STAR supports the conclusion that the Amendment is sufficiently protective of human health, the EEM Plan adds an additional layer of protection for human health, as it allows Rio Tinto to compare the modelled atmospheric SO_2 concentrations in the STAR against actual data.

[328] Rio Tinto submits that Dr. Chernaik's evidence does not undermine the conclusions in the STAR regarding human health, particularly in light of the evidence of Ms. Henolson and Mr. Paoli, which is summarized below.

[329] Rio Tinto called Ms. Henolson to testify regarding the air dispersion modelling used in the STAR. She is one of the authors of the STAR, and was qualified by the Panel to give expert testimony in the subject matter described in the Summary of Evidence, above.

[330] Ms. Henolson testified that air dispersion modelling is used by decision-makers when deciding whether to approve a facility, and therefore, it is important that any estimates based on modelling are conservative; e.g., that the model uses the maximum emission rates, as was used in the air dispersion modelling done for the STAR and for her report. She noted that, because she had air quality data from the pre-KMP operations at the smelter, she was able to conclude that the model would over-predict effects. In fact, the estimates from CALPUFF over-predict the concentrations of SO_2 emissions at monitoring stations by 227%, calculated for three years at three locations, for 1-hour, 3-hour, 24-hour and annual averages. In other words, the actual ambient air quality concentrations of SO_2 in the Kitimat region were significantly lower than predicted in the model.

[331] In response to Dr. Chernaik's concerns that the STAR and the EEM Plan do not consider SFPM2.5 that may result from SO_2 emissions combining with ammonia from future facilities, Ms. Henolson testified that she was asked, as part of the Kitimat Airshed Study conducted after the STAR was concluded, to establish the secondary PM2.5 formed from SO_2 for the KMP for the same regions that were used in the STAR for human health considerations. The results showed that PM2.5 concentrations arising from the KMP are minimal compared to the BC Ambient Air Quality Objective for PM2.5, and concentrations actually improve in residential areas of Kitimat post-KMP. The modelled results were then compared to actual data collected from two of the Kitimat monitoring stations (Riverlodge and Whitesail) for the years 2005 - 2012, inclusive. The actual data showed that PM2.5

concentrations are less than 50% of the BC standard for all years at both locations, and are generally lower than in other communities in BC.

[332] Ms. Henolson testified that it is not possible to take into consideration the impact of emissions from future facilities, for several reasons. First, for a modelling analysis of PM2.5 in the event that those facilities are built in the future, she would need to know the quantities of emissions from those facilities, stack locations at those facilities, stack parameters, and other data associated with the facilities, none of which is available yet. Second, there is no indication that the facilities will use the selective catalytic reduction technology that produces ammonia. She explained that early information is that LNG facilities may use technology known as dry-low-NOx emission redactors, which do not produce ammonia.

[333] Rio Tinto maintains that, according to Mr. Paoli's evidence, the scientific studies cited by Dr. Chernaik were considered either in the 2008 ISA Study or the STAR's update of the scientific literature, and none of the articles altered the conclusions reached in the 2008 ISA Study or the STAR. Specifically, Rio Tinto submits that: the Quebec study (Pénard-Moran) was expressly considered in the 2008 ISA Study; the BC study (Clark et al) was considered in the STAR literature review but did not isolate SO_2 from other contaminants, and therefore, cannot be used to reach any conclusions about SO_2 impacts alone; and, the Chinese study (Chen et al) and the Pan-Asian study (Kan et al) were considered in the STAR literature review, but were not cited because, according to Mr. Paoli, the results in both studies were confounded by NO_2 as a co-pollutant, making it impossible to attribute premature mortality to SO_2.

[334] Moreover, Rio Tinto submits that it is important to note that the 2009 ISA Study does not modify the conclusion in the 2008 ISA Study that the association between SO_2 concentrations and mortality is "inadequate to infer a causal relationship" (for long-term SO_2 exposure) and "suggestive of a causal relationship" (for short-term SO_2 exposure). Rio Tinto notes that, at pages 6-7, the 2009 ISA Study states that most of the studies that observed associations between 24-hour SO_2 concentrations and daily mortality were conducted in years and cities with high levels of particulate matter, "making it difficult to quantitatively determine whether the observed associations were the result of SO_2, PM, or a combination of both pollutants." Furthermore, Rio Tinto submits that the evidence of Mr. Paoli and Ms. Henolson establishes that modelled SFPM2.5 concentrations, and the associated health risk, are not expected to be materially different post-KMP.

[335] Regarding the EEM Plan, Rio Tinto submits that Canadian guidelines for ambient SO_2 concentrations (i.e., the CAAQs) are currently being developed, and it is appropriate to wait for approved guidelines in light of the timeline to bring the smelter up to full production and the forthcoming CAAQs. Rio Tinto submits that it would be inappropriate to apply the provincial interim objective for ambient SO_2 levels to the smelter as a KPI in the EEM Plan, because the provincial interim objective policy states that it is intended to apply to applications made under the *EMA* after October 20, 2014, and not to existing facilities. Rio Tinto also submits that, according to Ms. Suzuki's testimony, the provincial interim objective for SO_2 was developed on an expedited basis and only representatives of the natural gas industry were consulted outside of government, whereas the CAAQs process

involves a detailed consideration of the appropriate guideline for SO_2, including broad stakeholder consultation.

[336] Rio Tinto notes that, in the meantime, the informational indicator for health will use monitored data to compare ambient data against predicted data, which can be used to ensure that the adverse number of respiratory responses is as predicted in the STAR. In addition to the requirements in the EEM Plan, Rio Tinto notes that it has committed to participate in a health study on respiratory health and the SO_2 emissions related to industrial activity in the Kitimat airshed.

[337] Mr. Paoli was called as a witness by Rio Tinto. The Panel qualified him as an expert in the subject matter described in the Summary of Evidence, above. He was part of a team that conducted the health risk assessment in the STAR. He also provided a short expert report dated September 5, 2014 describing the overall change in health risk from pre-KMP to post-KMP emissions, based on changes in ambient concentrations of four air contaminants in residential and commercial regions of the Kitimat area: polycyclic aromatic hydrocarbons, fine particulate matter (PM2.5 and PM10), SO_2, and hydrogen fluoride. His report was based on the information in the STAR and other reports, including the 2009 ISA Study regarding fine particulates.

[338] Mr. Paoli testified that the team tasked with addressing health risks associated with SO_2 for the STAR began by using the U.S. EPA's literature review results for the period up to 2008, when the 2008 ISA Study was issued. The team then carried out its own formal literature review, gathering studies to determine whether the 2008 ISA Study was outdated. They searched for any studies of SO_2 impacts on human health dating from 2008 to 2012. Mr. Paoli explained that Dr. Shilnikova (Risk Sciences International Inc.), the epidemiologist on the team, did most of the work, while Dr. Daniel Krewski (Risk Sciences International Inc.), Dr. Chen (University of Ottawa, Respiratory Medicine), and Dr. Michael Jarrett reviewed and discussed her results.

[339] Section 3.4.1 of the STAR summarizes the results of the 2008 ISA Study, which looked at different contaminant exposures and health effects, and then categorized them in a causal relationship hierarchy as "causal", "likely to be causal", "suggestive of a causal relationship", "unlikely to be causal", or "no causal connection". The 2008 ISA Study characterized the relationship between short term exposure to SO_2 and mortality as being "suggestive" of a causal link; i.e., some studies concluded there is evidence of a causal relationship, and others concluded that there is no evidence of a causal relationship. The difficulty the team had in using the results of these studies is that the studies often look at multiple pollutants rather than single pollutants, and even those that look at single pollutants may really be multiple pollutant situations where they studied the pollutants one-by-one. This creates what is known as a "confounding" problem, where it is impossible to isolate the effect of any single pollutant. Given this difficulty in showing a causal link, the team decided that it would be appropriate to use the 2008 ISA Study's conclusion that there is a "suggestive" causal link.

[340] Mr. Paoli testified that the 2008 ISA Study has concluded that the evidence is "inadequate to infer presence or absence of evidence" that exposure to SO_2 causes asthma. In other words, the evidence does not meet either of the "suggestive" or

"likely" criteria. After reviewing the literature since 2008, the STAR team concluded that it was still appropriate to conclude that the weight of evidence is inadequate to infer that respiratory effects occur from long-term exposure to SO_2 at ambient concentrations.

[341] Mr. Paoli testified that the 2008 ISA Study limited its work to morbidity, and the STAR team followed their classifications and chose not to pursue exposure to SO_2 gas and premature mortality.

[342] Mr. Paoli testified that he and the Director discussed the appropriate threshold to use in a risk assessment for human health. Mr. Paoli suggested that the STAR use the dose-response analysis used by the U.S. EPA, rather than exceedances of a standard, because exceedances of a standard do not necessarily mean there will be health effects. Further, there will be very few exceedances of a standard in a given year. To predict health outcomes, he recommended that the STAR should consider all levels of SO_2 exposure, and not focus on exceedances. The dose-response analysis is designed to predict the number of respiratory events per year that susceptible persons will experience at different levels of SO_2 exposure. He noted that a "respiratory event" does not equate to an asthma attack, it simply means that there has been a measurable constriction of the person's airway. The person may not even feel or be aware of the event. This approach was adopted in the STAR.

[343] The results of the dose-response analysis indicated a 0.25% increase in respiratory events post-KMP, as compared to if there was no smelter at all. In the context of a risk-assessment analysis, the draft STAR characterized the risk as one that had a moderate risk of "mild consequences" that was "unlikely to occur" and that would infrequently affect the sub-group of susceptible individuals in the population. The Northern Health Authority reviewed the draft STAR, and expressed the view that the characterization of the risk should change given that an individual with asthma had a risk of requiring hospitalization for a respiratory event. As a result, the STAR was amended to include the Northern Health Authority's preferred characterization of the risk as one that had "serious consequences" but was "very unlikely to occur".

[344] Mr. Paoli testified that the STAR's assessment of the risks to human health included four conservative assumptions: (i) it used the U.S. EPA's dose-response relationship, which is the most conservative threshold; (ii) the frequency of exercise by asthmatics and other susceptible individuals was assumed to be the same as the general population; (iii) a high frequency of exercise was assigned to the susceptible population (i.e. four times per week, on average); and (iv) the STAR included mild and more severe outcomes, thus predicting more responses.

[345] In a December 18, 2013 report to Shawn Zettler of Rio Tinto, Mr. Paoli noted that STAR's health impacts assessment team was tasked with providing an opinion to Rio Tinto (for submission to the Director) on the overall change in health risk that might be expected in moving from pre-KMP to post-KMP emissions for four types of pollutants. The team was to look at health risks posed by exposure to polycyclic aromatic hydrocarbons, PM2.5, SO_2 and hydrogen fluoride. The team concluded that there would be a reduction in health risks post-KMP for polycyclic

aromatic hydrocarbons, the risks were similar pre- and post-KMP for PM2.5 and for SO_2, and there was a reduced risk to health from hydrogen fluoride.

[346] Mr. Paoli understood the skepticism that members of the public might have regarding the conclusions reached in the STAR. He testified that it is natural to assume that a significant increase of SO_2 emissions would lead to a significant decrease in ambient air quality, which might lead to increased risk of health effects. However, he explained that post-KMP, the location, velocity and temperature of the emissions will be different, as will be the height of the stacks. Each of those factors affects the dispersion of emissions. For example, Kildala Elementary School will have an improvement in air quality post-KMP, because of the changes to the dispersion of emissions. In his opinion, when all of those changes are considered, the result is that the overall health risk associated with the transition to the post-KMP scenario is expected to be reduced. This is the net result of a substantial reduction in the emissions of cancer-causing substances, with the risks of other pollutants remaining at a similar level pre- and post-KMP.

[347] In response to Dr. Chernaik's concern that the STAR did not consider the formation of secondary PM2.5 from SO_2, Mr. Paoli testified that PM2.5 levels will not change significantly pre- or post-KMP; there will only be a small percentage increase. He also noted that the EEM Plan will monitor PM2.5 regardless of source; i.e., whether from SO_2 secondary formation or not.

[348] Mr. Paoli testified that under the EEM Plan, the air quality monitoring network will undergo a review and rationalization process, to ensure that the monitoring stations are placed in the right locations to monitor the emissions from SO_2 in a variety of locations in Upper and Lower Kitimat, near the Service Centre and in Kitamaat Village. Until a new provincially approved SO_2 ambient air quality guideline is approved, the EEM Plan will continue to use the dose-response analysis to predict the number of SO_2 associated respiratory responses. Once new provincial guidelines are in place, the EEM Plan will be updated. If there are exceedances of the guidelines following three years of applicable data (which is already being collected), then emission reduction will be managed as set out in the EEM Plan.

[349] Mr. Poirier, the General Manager of BC Operations for Rio Tinto, testified on behalf of Rio Tinto. He discussed the pre-bake technology which will be used post-KMP. Under the new technology, pre-baked anodes are baked in a new furnace where all fumes are captured at the fume treatment centre, thereby reducing emissions. Further, the alumina ore will be fed to the pots by an automated system that provides better control and feeds the alumina in small amounts, thereby reducing greenhouse gas emissions. All of the pots are "hooded" so that 98% of the emissions are captured and only 2% escape through the roof vents, whereas 75% of emissions escaped pre-KMP. Further, at the gas treatment centres, the emissions that are captured are put in contact with the alumina ore so that the fluoride gases and particulates are then recycled into the pots. Finally, the remaining gases are emitted from 200 foot high stacks at a speed of 60 kilometres per hour and a temperature of 100 degrees Celsius, so that they are dispersed over a much greater area than pre-KMP.

[350] Mr. Marmorek was called by Rio Tinto to testify with respect to adaptive management and its role in the permitting process and the EEM Plan. The Panel qualified Mr. Marmorek as an expert in the subject matter described in the Summary of Evidence, above.

[351] In his expert report dated November 28, 2014, Mr. Marmorek defined "adaptive management" as a systematic process for improving management, policy and practices by learning from the outcome of operational processes. He noted that the key characteristics of adaptive management include that there:

a. is an acknowledgement that there are uncertainties in the project to be managed;

b. exists a selection of policies and practices to be applied;

c. will be implementation of a plan with monitoring of key response indicators (i.e., the EEM Plan); followed by

d. an analysis of the outcome and an incorporation of the results into future decision-making.

[352] Mr. Marmorek testified that both the STAR and EEM Plan are based on conservative assumptions. The STAR over-estimates the predicted results, specific uncertainties are identified and steps are taken to reduce those uncertainties. The EEM Plan identifies specific thresholds to increase monitoring or trigger mitigation. It identifies trends and triggers monitoring below the threshold for mitigation. He noted that the empirical effects of the KMP will be known and this will provide the "earliest possible warning of trends and receptors with unacceptable impacts".

[353] Mr. Marmorek indicated that KPI's are important as they provide an early warning system. Mr. Marmorek identified the KPI's in the EEM Plan. For human health, the KPI is the number of predicted respiratory response events in a year. This acts as an early warning. The total number of predicted respiratory responses over one year, in five minute intervals, will be monitored and compared to the STAR predictions. This will enable them to determine what is changing, when and where, and react appropriately.

The Panel's findings

[354] The three health endpoints that were the focus of the Appellants' submissions regarding human health impacts were all characterized as alleged gaps or omissions in the STAR. The Appellants have the onus of providing sufficient evidence to establish, on a balance of probabilities, that the terms of the Amendment are not sufficiently protective of human health, taking into account the cautious and prudent approach that the Panel has found (under Issue 2) applies to section 16 applications. For the reasons that follow, the Panel finds that the Appellants have not met that onus.

[355] Before turning to the Panel's specific findings regarding the three health endpoints, the Panel will briefly address the Appellants' arguments regarding the burden of proof under the precautionary principle. The Panel has already found under Issue 2 that the precautionary principle does not apply to the interpretation or application of section 16 of the *EMA*. As such, the Panel need not address

whether the Appellants have established that the SO_2 emissions authorized by the Amendment present a real threat of serious or irreversible harm to human health. However, the Panel also finds that the Appellants have not met that onus. Specifically, even if the Panel had found that the precautionary principle applies (which it does not), the Appellants acknowledge that the precautionary principle does not apply where "the evidence of risk does not rise to a minimum degree of certainty", which the Appellants characterize as "reasonable scientific plausibility".

[356] For the reasons that follow, the Panel finds that the Appellants have not established that, even in a so-called "worst case scenario" of the maximum SO_2 emissions allowed under the Amendment, there is "reasonable scientific plausibility" that: (i) the incidence of asthma in the Kitimat airshed is likely to increase as a result of exposure to SO_2 gas emissions from the smelter; (ii) premature mortality (including death caused by heart attacks, serious asthma attacks, or respiratory infections) in the Kitimat airshed is likely to increase due to exposure to SO_2 gas emissions from the smelter; and (iii) premature mortality in the Kitimat airshed is likely to increase due to exposure to PM2.5 (including SFPM2.5 formed from SO_2) from the smelter. Thus, the Panel finds that, even if the precautionary principle applied, the onus would not shift to the Director or Rio Tinto to show that the threat to human health is negligible.

[357] In terms of the predicted health impacts that are addressed in the STAR, the STAR's conclusions were not challenged by the Appellants. The STAR indicates that people with pre-existing respiratory diseases such as asthma and COPD, estimated to be 12% of the population, are susceptible to the effects of SO_2. SO_2 causes a decrease in lung function accompanied by respiratory symptoms in exercising people with asthma or COPD. The STAR concludes at p. 401 that "the number of restricted airway events due to SO_2 in this population is expected to be less than 1%." Although SO_2 exposure will result in a range of health consequences, from serious (e.g., emergency room visit) to mild (symptoms that may be undetectable to the person), the STAR states that "increasingly severe health outcomes are also increasingly infrequent." When comparing emissions pre- and post-KMP, only two additional "respiratory responses" will occur each year among people with pre-existing respiratory diseases.

[358] The evidence provided by Mr. Paoli added further information about potential health impacts. He compared emissions of four substances from the smelter pre- and post-KMP (as supported by the air dispersion modelling in the STAR and in Ms. Henolson's subsequent report). His report predicts that there will be a net reduction in health risks post-KMP as there will be a reduction in health risks from polycyclic aromatic hydrocarbons, similar health risks pre- and post-KMP from PM2.5 and SO_2, and a reduced health risk from hydrogen fluoride. Mr. Paoli's evidence in this regard, and the dispersion modelling in the STAR and Ms. Henolson's report, were not challenged by the Appellants.

Adequacy of the evidence of a relationship between exposure to ambient concentrations of SO_2 gas and the incidence of asthma

[359] The Appellants acknowledge that the 2008 ISA Study concluded that the evidence regarding long-term exposure to ambient concentrations of SO_2 gas and asthma incidence was "inadequate to infer a causal relationship". This is the

second lowest of the five tiers that the 2008 ISA Study utilized to organize the weight of scientific evidence for determining causal relationships between exposure to a substance and a heath endpoint. This means that the U.S. EPA concluded that the evidence did not meet either the "likely" criterion, or even the "suggestive" criterion. The Panel notes that, contrary to Dr. Chernaik's initial evidence, Mr. Paoli confirmed that the 2005 Quebec study was considered in the 2008 ISA Study.

[360] Although the Appellants are correct that the 2008 ISA Study was limited to studies conducted up to 2006/2007, the Panel finds that the health impacts assessment in the STAR included a literature review of additional studies that were published from 2008 to October 2012. Mr. Paoli confirmed that the 2010 BC study, which Dr. Chernaik thought was not considered in the STAR, was reviewed by the STAR's health impacts assessment team as part of that literature review, despite the fact that it was not cited in the STAR. Mr. Paoli explained that the 2010 BC study was not cited because it did not isolate SO_2 from other contaminants, and therefore, it could not be used to reach conclusions about the health impacts of SO_2 gas alone.

[361] Under cross-examination, even Dr. Chernaik agreed that "unless you can look jointly at the various air pollutants in multi-pollutant models, there's a risk of spurious outcomes". Moreover, Dr. Chernaik agreed that the concern in terms of human health is not so much about SO_2 as a gas, but rather fine particulate matter, of which SO_2 gas is only a precursor.

[362] Mr. Paoli's evidence is that, after considering all of the studies, the health impacts assessment team for the STAR concluded that the weight of evidence was still inadequate to infer that respiratory effects occur from long-term exposure to SO_2 at ambient concentrations. The Panel agrees. The Panel finds that, although the 2010 BC study examined the incidence of asthma in relation to levels of SO_2, "confounding" affects the conclusions that can be drawn from that study about SO_2 alone. The Panel finds that the evidence presented by the Appellants, including the Quebec study (which was considered in the 2008 ISA Study), the 2010 BC study, and Dr. Chernaik's evidence, do not change the conclusion in the 2008 ISA Study. The evidence does not support a conclusion that the evidence is even "suggestive" of a causal relationship (and certainly not "likely" to be a causal relationship) between exposure to ambient concentrations of SO_2 gas and the incidence of asthma. Rather, the Panel finds that the evidence reinforces the conclusion in the 2008 ISA Study that the evidence is "inadequate to infer a causal relationship" between exposure to ambient concentrations of SO_2 gas and the incidence of asthma. In any event, as is discussed in detail below, there is undisputed evidence that the air dispersion modelling in the STAR supports a conclusion that the SO_2 emissions post-KMP will be dispersed over a greater area than before, and ambient SO_2 concentrations in the populated areas of Kitimat are highly unlikely to exceed the U.S. EPA standard.

[363] Alternatively, and in addition, the Panel finds that the evidence does not support a conclusion that there is "reasonable scientific plausibility" that increases in the incidence of asthma are positively associated with exposure to SO_2 gas at ambient concentrations. Moreover, the evidence does not meet the threshold of showing that SO_2 gas poses a "real threat" of increasing the incidence of asthma.

Adequacy of the evidence of a relationship between exposure to SO_2 gas and premature mortality

[364] The 2008 ISA Study concluded that the "epidemiological evidence on the effect of short-term exposure to SO_2 on all-cause (non-accidental) and cardiopulmonary mortality is suggestive of a causal relationship at ambient concentrations". The 2008 ISA Study describes "suggestive of a causal relationship" as follows:

> Evidence is suggestive of a causal relationship between relevant pollutant exposures and the health outcome, but is limited because chance, bias and confounding cannot be ruled out. For example, at least one high-quality study shows a positive association but the results of other studies are inconsistent.
>
> [underlining added]

[365] The Panel notes the difference between "suggestive of a causal relationship" and "likely to be a causal relationship", as defined in the 2008 ISA Study. The 2008 ISA Study describes "likely to be a causal relationship" as follows:

> Evidence is sufficient to conclude that a causal relationship is likely to exist between relevant pollutant exposures and the health outcome but important uncertainties remain. That is, a positive association has been observed between the pollutant and the outcome in studies in which chance and bias can be ruled out with reasonable confidence but potential issues remain. For example: a) observational studies show positive associations but co-pollutant exposures are difficult to address and/or other lines of evidence (controlled human exposure, animal, or mechanism of action information) are limited or inconsistent; or b) animal evidence from multiple studies, sex, or species is positive but limited or no human data are available. Evidence generally includes replicated and high-quality studies by multiple investigators.
>
> [underlining added]

[366] Thus, the "likely" category contemplates that, after considering the body of scientific evidence, important uncertainties still exist but there is less uncertainty than under the "suggestive" category.

[367] According to Dr. Chernaik, the 2012 Chinese study "confirms that there's a suggestive causal relationship between SO_2 levels" and mortality. He also stated "we can learn [from the 2012 Chinese study] that the association between SO_2 and mortality is quantifiable". However, Mr. Paoli confirmed that the 2012 Chinese study and the 2010 Pan-Asian study were reviewed by the STAR's health impacts assessment team as part of their literature review, but were not cited in the STAR because those studies did not isolate SO_2 from other air contaminants. Specifically, the results of both studies were confounded by NO_2, a co-pollutant. Mr. Paoli explained that it was impossible to attribute premature mortality to SO_2, because the effects disappeared when adjusted for NO_2. Dr. Chernaik agreed that any evidence of an association between SO_2 and premature mortality in the study was limited by confounding.

[368] Based on the evidence, the Panel finds that the 2012 Chinese study and the 2010 Pan-Asian study do not alter the conclusion in the 2008 ISA Study that the "effect of short-term exposure to SO_2 on all-cause (non-accidental) and cardiopulmonary mortality is suggestive of a causal relationship at ambient concentrations". Importantly, the evidence does not support a conclusion that there is "likely" to be a causal relationship between exposure to ambient concentrations of SO_2 gas and premature mortality.

[369] Moreover, the Panel finds that, even if there was sufficient evidence to establish a "likely" causal relationship (which has not been established), the STAR predicts that the concentrations of SO_2 gas emissions are highly unlikely to exceed the U.S. EPA standard of 196 $\mu g/m^3$ in the populated areas of Kitimat. The 60-metre high stacks and associated gas collection and treatment works will cause the SO_2 emissions to disperse differently than in the past. The STAR's health risk assessment assumed that emissions were at the maximum permitted level of 42 tonnes per day, and relied on the CALPUFF model for dispersion modelling. That model over-predicted SO_2 concentrations by 227% on average, compared to monitoring results of current emissions. Assuming that this "worst case scenario" did occur, the STAR concludes that SO_2 concentrations should still be well below U.S. EPA standards 99% of the time in the residential and commercial areas of Kitimat. The STAR also predicts that the majority of one-hour average SO_2 concentrations will be below 10 $\mu g/m^3$, and the most frequent hourly average SO_2 concentrations are in the range of 0-1 $\mu g/m^3$. Dr. Chernaik did not dispute those results. In fact, Dr. Chernaik agreed that the CALPUFF air dispersion model used in the STAR is one of the preferred models used by the U.S. EPA, and that the STAR accurately predicted SO_2 levels with the model for both pre-KMP and post-KMP scenarios.

[370] Based on the evidence, the Panel finds that the modelled results in the STAR predict that the ambient concentrations of SO_2 post-KMP will be low overall, and well below U.S. EPA standards 99% of the time in the residential and commercial areas of Kitimat. The STAR also predicts that, when the U.S. EPA's dose-response curve is applied to the predicted SO_2 concentrations post-KMP, the probability of a respiratory response is less than 0.05% at a five-minute peak SO_2 concentration of less than 200 $\mu g/m^3$. A respiratory response is not as serious as premature mortality (i.e., a respiratory response is reversible, whereas mortality is irreversible). However, the Panel finds that the STAR used the most conservative definition of "respiratory response" from the four options used by the U.S. EPA, which defined it as an indicator of "moderate or greater bronchoconstriction." The STAR also considered a range of respiratory events (from mild to serious, including emergency room visits) that susceptible persons would experience at different levels of SO_2 exposure. The STAR chose to examine the relationship between SO_2 gas exposure and morbidity in people with pre-existing asthma or COPD. The Panel finds that this is an acceptable approach.

[371] Alternatively, and in addition, the Panel finds that the evidence provided by the Appellants does not support a conclusion that there is "reasonable scientific plausibility" that premature mortality is positively associated with exposure to SO_2 gas at the ambient concentrations that are predicted to occur post-KMP. The Appellants' evidence does not meet the threshold of establishing that SO_2 gas

emissions from the smelter, as authorized under the Amendment, pose a "real threat" of premature mortality.

Adequacy of the evidence of a relationship between exposure to PM2.5 (including SFPM2.5) and premature mortality

[372] According to the 2009 ISA Study, there is a scientifically established "causal" relationship between exposure to PM2.5 and premature mortality. According to the 2009 ISA Study (in Table 1-3 at p. 1-21), this means that "(t)he pollutant has been shown to result in health effects in studies in which chance, bias, and confounding could be ruled out with reasonable confidence." There is also undisputed evidence before the Panel that SO_2 gas in the atmosphere is a precursor to SFPM2.5 in certain conditions, such as when ammonia is also present in the atmosphere.

[373] However, there is undisputed evidence from the Director, Ms. Henolson, and Mr. Paoli that the net effect of the smelter's post-KMP emissions will be neutral in regard to the concentrations of PM2.5, including SFPM2.5, and the associated health impacts. The evidence is that lower levels of PM2.5 will be emitted directly from the smelter, and this reduction in the primary discharge of PM2.5 will be approximately the same as any increase in SFPM2.5 caused by the increase in $S0_2$ to 42 tonnes a day post-KMP. Moreover, the Panel finds that there is insufficient evidence to conclude that future projects proposed for the Kitimat area will produce ammonia emissions which contribute to SFPM2.5. At this point in time, it is merely speculation that there will be future projects in the Kitimat area that will produce ammonia emissions.

[374] Furthermore, the evidence shows that the majority of the SFPM2.5 as a product of SO_2 is not likely to occur in the populated parts of the Kitimat area. As discussed in the findings above, the 60-metre high stacks and associated works post-KMP will cause the SO_2 emissions to disperse differently than in the past, and it is predicted based on the CALPUFF model that SO_2 concentrations, even at 42 tonnes per day, will be well below U.S. EPA standards 99% of the time in the residential and commercial areas of Kitimat. Moreover, after the STAR was finalized, Ms. Henolson used the CALPUFF model to predict the PM2.5 concentrations (including SFPM2.5) post-KMP. She testified that her results predict that PM2.5 concentrations post-KMP in residential areas will actually improve. In addition, Dr. Chernaik conceded that Ms. Henolson's estimated concentration of 8.0 mg/m^3 for PM2.5 is below the standards targeted by the Canadian Council of Ministers of the Environment (10.0 mg/m^3 in 2015, and 8.8 mg/m^3 by 2020).

[375] For all of these reasons, the Panel finds that, even in a so-called "worst case scenario" of the maximum SO_2 emissions allowed under the Amendment, the amount of PM2.5 (including SFPM2.5) in the Kitimat airshed is unlikely to increase, or that any adverse health effects associated with PM2.5 (including SFPM2.5 formed from SO_2) from the smelter will increase. Alternatively, and in addition, the Appellants have not established that there is "reasonable scientific plausibility" that premature mortality in the Kitimat airshed is likely to increase due to exposure to PM2.5 (including SFPM2.5 formed from SO_2) from the smelter post-KMP.

Summary of the Panel's conclusions regarding human health risks

[376] In summary, based on all of the evidence, the Panel finds that the Appellants' have not met the onus of proof required to warrant setting aside or suspending paragraph 4.2.2 of the Amendment, or ordering the Director to obtain further information (i.e., literature review, quantitative assessment, etc.) regarding the risks that the SO_2 emissions authorized under the Amendment pose to the three health endpoints that were addressed by the Appellants.

[377] In addition, the information before the Panel regarding the risk to human health associated with the increased SO_2 emissions, including the information in the STAR and the expert evidence presented at the hearing, confirms the Director's conclusion that the risk to human health is moderate, in that it is acceptable but should be subject to monitoring to confirm that the actual impacts match those predicted. The Panel finds that this conclusion reflects a cautious and conservative approach, given the assumptions used in the STAR's dispersion modeling and the health impacts assessment. The conclusion that the human health impacts are "moderate" is very cautious given that Dr. Carlsten, an independent medical doctor and professor of medicine who reviewed the STAR, concluded that the SO_2 increases post-KMP "can be considered trivial in terms of health effects", and given that the Northern Health Authority and BC Centre for Disease Control concluded that the STAR's "approach was acceptable, the conclusions were generally consistent with the wider literature, and mitigation efforts were appropriate."

[378] Furthermore, although the Appellants note that, in October 2014, the Province issued an interim objective for 1-hour maximum ambient SO_2 concentrations (99^{th} percentile value over one year), the Panel finds that it was prudent for the Director to include an informational measure for human health (i.e., expected respiratory response events) in the EEM Plan pending the approval of the CAAQs, given that the KMP is not expected to be fully operational until 2018, and the CAAQs are expected to be published in 2016. This will still allow time for the collection of three years of monitoring data, which the CAAQs will likely require. In the alternative, the Panel finds that the Director may impose further requirements on Rio Tinto at any time, including if there is a demonstrated need for a human health trigger to be established in the EEM Plan before the CAAQs are approved.

[379] The Panel finds that this ground of appeal is without merit and is dismissed.

b. Evidence regarding impacts on soils

The Appellants' submissions

[380] The Appellants note that the STAR discusses the risk to soils from acidification caused by primary SO_2 and secondary sulphate deposition from SO_2 emissions. This portion of the STAR included a literature review, and an impact assessment based on "critical load". According to the literature review, acidic deposition is caused by SO_2 emissions that react with other compounds in the atmosphere to produce aqueous, gaseous, or particulate deposition on the ground. If acidic deposition is greater than the maximum that a broad landscape feature can receive over the long-term without damage to specified biological components (i.e., the critical load), the critical load is said to be exceeded.

[381] The STAR notes that "critical loads are highly dependent upon base cation weathering rates" (p. 296). Soil acidification occurs when the rate of base cation[2] losses from the soil (which may be caused by acid deposition from the atmosphere to the ground, or other causes such as forestry) exceeds the rate of addition of base cations (through mineral weathering). The Appellants submit that the STAR relied on bedrock geology to stratify the soil samples, despite recognizing that, for much of the study area, the overlying surficial geology is disconnected from the underlying bedrock (due to glaciation, for example), and therefore, the soil may contain a different suite of minerals than the underlying bedrock. The Appellants argue that the STAR relied on a threshold for critical loads (in this case, the ratio of base cations to aluminum) of Bc:Al = 1. The Appellants submit that this threshold would protect western hemlock trees, the dominant tree species in the region, from root damage. The root damage occurs from elevated aluminum in the soil, due to a loss of base cations. Aluminum is a common component of the soils in the study area. The Appellants assert that the Bc:Al = 1 threshold would not necessarily protect other types of trees in the area.

[382] The Appellants note that, in late 2012, Mr. Williston reviewed the draft STAR, and questioned whether it was valid to use bedrock geology maps to determine the location of sensitive soils in the region. In a December 7, 2012 email to Mr. McKenzie, Mr. Williston expressed concern that, "… for a significant proportion of the study area, the soils are not related to the bedrock." In an April 3, 2013 memo to the Director, Mr. Williston expressed concern that other species in the study area are more sensitive than western hemlock; for example, he stated that paper birch has a Bc:Al ratio of 2, aspen has a ratio of 6, and some fir species have a ratio of 10. Moreover, in an April 17, 2013 email to the Director, Mr. Williston stated as follows regarding the Bc:Al ratio of 1:

> This ratio is not protective for other tree species found in the study area including lodgepole pine, paper birch, aspen and possibly black cottonwood. Other studies have used a ratio of 10. Further discussion is required to determine the most appropriate Bc:Al ratio for the study area, or whether more than one should be applied, and what the consequences would be for soil critical load mapping.

[383] The Appellants submit that the information on adverse environmental effects due to soil acidification that was available to the Director, in the STAR and from his staff, was insufficient for him to set requirements for SO_2 emissions that would protect the environment. In particular, the Appellants argue that the literature review, monitoring methodology, analysis, and conclusions were incomplete and flawed in that they:

A. relied on the stratification of soil sample data by bedrock type when much of the Kitimat valley bottom that will be subject to the modeled sulphate deposition is underlain by a complex of surficial geological deposits including, glacial, fluvoglacial, glaciomarine and organic derived soils;

---

[2] The glossary in STAR describes "base cations" as "an alkali or alkaline earth metal (Ca2+, Mg2+, K+, NA+)

B. relied on 51 soil sample sites, a number that had not been statistically justified given the 11 bedrock geological units used to stratify the critical load data, let alone the far greater number of bedrock and surficial geological units that are known to immediately underlie the area's soils;

C. did not provide a level of uncertainty around the critical load estimates that the use of only 51 soil sample sites and other assumed model inputs engendered;

D. relied only on soil sample sites that were in forested, mineral soil areas easily accessible by road, which restricted the sampled sites to areas:

i. with deep (50 cm.s or more) soils;

ii. largely outside of the modeled sulphate deposition path;

iii. largely outside of the surficial deposit complex between Kitimat and Lakelse Lake;

iv. outside of organic soils, which are extensive between Kitimat and Lakelse Lake;

v. outside of high elevation sites with thin, bedrock-derived soils known to have low weathering rates and high sensitivity to acidification;

E. chose a critical load threshold of Bc:Al = 1, which preserved the roots of some conifer trees in the area, but not the roots of other conifers and most deciduous trees;

F. provided three estimates of critical load exceedances based on "optimistic," "uncertainty" and "highly conservative" scenarios, none of which provide any assurance of environmental protection, given the:

i. coarse-grained and inappropriate bedrock geology stratification;

ii. highly uncertain data from the relatively few and restricted soil sample sites that are totally unrepresentative of thin-soiled, high-elevation sites and organic soils, and largely unrepresentative of the high sulphate deposition area of complex surficial deposits between Kitimat and Lakelse Lake;

iii. use of the Bc:Al = 1 ratio.

[384] The STAR concluded at p. 403 that, post-KMP, "the risk of impact is moderate for soils – an acceptable impact but in need of closer scrutiny with moderate monitoring." At p. 402, the STAR noted that soils in the region "are dominated by silicate minerals, are generally acidic and have a moderate sensitivity to acidic deposition." It went on to state that:

> Under the post-KMP deposition scenario there is only a small area (0.25 to 0.41 km^2 on land mostly owned by RTA) that is predicted to receive S [sulphur] deposition in excess of the critical load; this area is immediately adjacent to the smelter facility and receives the greatest amount of modelled S deposition. The level of exceedance in this area

> is very high, as such it is considered highly likely that soils will acidify beyond an acceptable level. However the area with exceedance of soil critical loads (0.25 to 0.41 km^2) represents 0.02% of the study area and is restricted to two of the bedrock categories. Soils in 99.98% of the study area will receive S deposition below critical loads.

[385] The Appellants characterize those conclusions as an "optimistic view." The Appellants point out that the STAR also considered more sensitive scenarios. In particular, the STAR described:

- an "uncertainty scenario" of 2.19 km^2 of exceedances based on the lowest base cation weathering rate for each bedrock category (at pp. 402 and 403 of the STAR); and
- a "highly conservative estimate" of 30.98 km^2 of exceedances based on the lowest base cation weathering rate for any bedrock category (sample OG003, with a base cation weathering rate of 33.8 meq/m_2/yr, but which does not include the allowance for base cation removal with logged trees) (at p. 297 of the STAR).

[386] The Appellants also submit that, in the EEM Plan, the KPI's for soils are unworkable for a number of reasons, including that they continue to rely on bedrock types and the ratio of Bc:Al = 1 as a threshold, which does not protect some tree species. In addition, the Appellants assert that the KPIs for soil exclude any monitoring or consideration of organic soils and non-forested soils, including those in alpine areas, all of which are the more sensitive to acidification. The Appellants criticize the long-term soil acidification KPI for several reasons, alleging (among other things) that it will rely on results from only three soil sample plots to monitor the whole study "domain".

[387] In summary, the Appellants submit that the Director had insufficient information on which to determine if the EEM Plan met the requirements of paragraph 4.2.5 of the Amendment, and therefore, on which to approve the EEM Plan.

[388] The Appellants summonsed Mr. Williston as a witness to provide evidence regarding the direct impact of SO_2 on the acidification of soil. Mr. Williston testified that he was one of three Ministry employees, apart from the Director, who were involved in reviewing the STAR. Mr. McKenzie reviewed the entire STAR, Mr. Williston reviewed the portions regarding vegetation, soil and surface water, and Ben Weinstein reviewed the air dispersion modeling and human health impacts.

[389] Mr. Williston testified that in the spring of 2013, he questioned whether the critical load analysis using a Bc:Al ratio of 1, as set out in the STAR, would be sufficiently protective of all of the types of vegetation in the area. He explained that this ratio was used to determine the "critical load" for a single plant or coniferous species; i.e., the amount of sulphur deposition that the vegetation can withstand without being adversely impacted. He noted that a ratio of 1 protects some species, but not all. Other studies have used a ratio of 10, and he wanted that issue explored further in the EEM Plan. He was also concerned that this ratio relied on data regarding bedrock geology, and failed to account for the fact that, in some areas such as valley bottoms, the surface soil might not be directly related to

the mapped bedrock below, given that rocks and boulders were deposited in benches or "terraces" in the area by retreating glaciers.

[390] Dr. Ouimet testified on behalf of the Appellants with respect to the alleged deficiencies in the STAR and the EEM Plan regarding protecting soil from the impacts of acidification caused by sulphur deposition. He was qualified by the Panel to give expert testimony in the subject matter described in the Summary of Evidence, above. He provided two expert reports, dated July 16, 2014 and October 15, 2014. Dr. Ouimet testified that, other than himself, Dr. Aherne is one of only two experts in critical load in Canada.

[391] Dr. Ouimet testified that, in his opinion, the STAR would pass through the scientific (peer review) process and be published. However, he raised a number of concerns about the soil acidification analysis in the STAR.

[392] Dr. Ouimet testified that there has been little study in Canada or Europe regarding the amount of acid deposition that soil can tolerate. He was particularly interested in being involved in this appeal process as, to his knowledge, this is the first time that a document such as the STAR has been used to estimate critical load for a smelter. He was concerned that critical load was being used to justify an increase in pollution.

[393] Dr. Ouimet testified that, in his opinion, "something went wrong" in the analysis of the soil samples in Kitimat, as reported in the STAR. In his view, the critical load identified in the STAR is actually double the capacity of the soil. He did not think that the average critical load should have been used in the calculations, as this would only protect 50% of the ecosystem.

[394] Dr. Ouimet also testified that CALPUFF is not a good dispersion model because it has many limitations, such as it is not recommended by the U.S. EPA for modelling atmospheric deposition within 50 kilometres of the emission source. In his opinion, the AERMOD model should have been used.

[395] Dr. Ouimet testified as to other concerns that he had about the STAR, as expressed in his first expert report, dated July 16, 2014. For example, he stated that the STAR had not taken climatic conditions into account, something that would be very important in this case given the significant amount of precipitation that the area receives. He was also concerned the STAR calculated critical load assuming: 1) soil is 50 cm deep; and 2) the forest in the area consisted of western hemlock trees. In his opinion, there are other soil thicknesses that are important, as many vegetation types exist in soils that are less than 50 cm deep, such as dry hemlock. He saw this as an important point, because soil depth is directly related to weathering. In other words, if there is more soil, there is more protection against acidification. If a different soil depth had been sampled, a higher risk level may have resulted.

[396] Dr. Ouimet was also critical of the number of soil sample sites used in the STAR. The STAR used four to six sample sites for each category of soil, but in his opinion, a lot of samples are needed where soil is highly variable. In his opinion, at least 10 sites are needed to provide 40% precision, and 100 sites would be needed to achieve 10% accuracy. In his opinion, taking one sample for an area of 4,000 ha is just a "guess". He described the sampling in the STAR as "very small". He

acknowledged that the estimation of critical loads used in the STAR was "good", as was the chemistry. Further, in his expert report and his testimony, he stressed that the bedrock in the area is not related to the soil mineralogy, and that the STAR should have used biogeoclimatic data instead of bedrock data.

[397] In his second expert report, Dr. Ouimet criticized the STAR's use of a Bc:Al ratio of 1. Dr. Ouimet explained in his testimony that, as soil acidifies, "the good cations cannot deal" (with all of the aluminum), and "the aluminum begins to percolate out of the soil".[3] He stated that a Bc:Al ratio of 1 means the "good" cations (the base minerals) are very low, but the soil is not yet damaged. Dr. Ouimet testified that this ratio will still protect roots of plants, but the soil is losing fertility, and plant growth may be affected. The forest will start to decline. In his opinion, the use of a Bc:Al ratio of 1 means that the trees will live, but the soil is not protected for the future. In his opinion, the choice of such a ratio is a policy choice that should be made by government, and not by the qualified professionals who prepared the STAR. In Dr. Ouimet's opinion, the STAR should have used a Bc:Al ratio of 10 to protect soil for the future and to protect the roots of trees.

[398] Dr. Ouimet was highly critical of the monitoring proposed at p. 9 of the EEM Plan, where the KPI's for vegetation are noted as visual monitoring and the informative indicator is yearly chemical analysis. He stated that acidification is difficult to detect, and waiting until a visual impact is apparent in vegetation is too late, as microorganisms in the soil are very sensitive to acidification. In his opinion, if this threshold is reached, chemical recovery of the soil "will take decades" and biological recovery "may take centuries". Waiting for damage to appear is not a good management strategy.

[399] Under cross-examination by counsel for Rio Tinto, Dr. Ouimet acknowledged that he has neither designed nor used a CALPUFF model.

[400] Dr. Ouimet also acknowledged that portions of his first expert report were written or suggested by the Appellants' legal counsel. In addition, he acknowledged that portions of his first expert report were not his opinion, and were outside of his area of expertise. For instance, he acknowledged that he copied portions of his report directly from U.S. EPA reports and then attempted to apply them to this situation, such as the references to the usefulness of CALPUFF for distances of greater than 50 kms.

[401] Dr. Ouimet conceded that Ms. Henolson's response to his expert reports addressed most of his concerns. When shown the appropriate references in the STAR, Dr. Ouimet acknowledged that climatic conditions in the area had been included in the STAR's modelling.

[402] Dr. Ouimet also conceded that the EEM Plan is tracking the decrease in the base cation minerals, monitoring changes in soil chemistry and not just visual harm to trees or plants, and will be reporting on an annual basis, rather than after 10 years as he had assumed. He also agreed that there are, in fact, 51 soil sampling sites, and that the lowest values from those sites will be used in monitoring, rather

---

[3] The Panel wishes to note that Dr. Ouimet testified in English, which is not his first language, and he noted for the Panel that at times he had difficulty explaining certain concepts.

than the average (which he had assumed would be used), such that there is more protection for the soil, and therefore for vegetation, than he had thought.

[403] When an earlier draft of his second expert report was put to him in cross-examination, he acknowledged his comment that "(m)ost of the methodology followed in the STAR to evaluate forest critical loads of acidity can be qualified as good". That statement did not appear in the final draft of that report which was entered as an exhibit at the hearing.

The Director's submissions

[404] The Director made no final submissions with respect to the risk of soil acidification associated with the increased SO_2 emissions post-KMP, but the Director testified that he was satisfied, based on the STAR and the other information before him, that the risk of soil acidification associated with the increased SO_2 emissions post-KMP was moderate. He added that he relied on the technical information in the STAR, as well as a letter from Dr. Laurence which discussed the possible harm that SO_2 may cause to agriculture products and soil.

[405] The Director testified that the STAR made predictions based on conservative assumptions. In addition, the EEM Plan identified the (residual) uncertainties that existed and that needed to be reduced; KPI's were then identified and will be used to monitor actual effects. Then, monitoring steps were identified that will be followed. In this way, the empirical effects of the KMP will be known, and this will provide the "earliest possible warning of trends and receptors with unacceptable impacts". For soil, the EEM Plan has two KPIs (spatial deposition and weathering of base cations) which provide advance warning of trends, and will identify where weathering is occurring and at what levels of exposure before the soil shows any adverse effects, so that corrective action can be taken before harm occurs.

Rio Tinto's submissions

[406] Rio Tinto submits that the Appellants have not discharged their burden of establishing that the Amendment is not sufficiently protective of soils. Rio Tinto argues that the STAR's analysis of the potential effects on soils is robust. Rio Tinto submits that it is important to remember that critical loads predict risk, and do not indicate damage: a "critical load" is the maximum load of acidic deposition that an ecosystem can receive over the long-term without damage to specified sensitive biological components.

[407] Rio Tinto maintains that, in the STAR, the potential impact of the SO_2 emissions on soils was determined by modelling the predicted sulphur deposition in a given location, and then subtracting the soil's critical load for that location. If the predicted sulphur deposition exceeds the soil's critical load, a negative ecosystem impact will occur in time. Relying on Dr. Aherne and his colleagues, who Rio Tinto maintains are leading experts in this field, the STAR predicted that the critical loads for soils would be exceeded in only 0.01 to 0.02% of the study area, on land immediately adjacent to the smelter. Rio Tinto submits that this critical load analysis was based on conservative assumptions, including a maximum emissions scenario and conservative modelling of sulphur deposition. Rio Tinto argues that many of the STAR's conclusions about critical loads in soil have been tested and

confirmed by work carried out in 2014 under the EEM Plan and in related regional studies, which reinforces the reliability of the STAR's conclusions.

[408] Rio Tinto submits that Dr. Ouimet's criticism of the STAR's approach to critical loads reflects misunderstandings of the data and the technique, as well an attempt to replace well-accepted methods with a new and highly theoretical approach. Rio Tinto maintains that Dr. Aherne provided complete answers to all of Dr. Ouimet's questions and concerns.

[409] Moreover, Rio Tinto submits that Dr. Aherne's expert evidence should be preferred over Dr. Ouimet's when the two conflict, because Dr. Aherne's experience is broader and he has field experience in Kitimat. Furthermore, Dr. Aherne's testimony should be preferred, and the Panel should assign little to no weight to Dr. Ouimet's opinion evidence, because Dr. Ouimet strayed outside of his mandate as an objective expert, and became an advocate for the Appellants. In that regard, Rio Tinto argues that the BC Supreme Court has attached little weight to expert evidence where the expert showed a lack of objectivity, neutrality and independence, becoming an advocate for a party to litigation: *Shearsmith v. Houdek*, 2008 BCSC 997, at paras. 8 and 11. Also, it is a serious omission when an expert selectively omits evidence that is favourable to one party to a dispute, which may indicate the expert is acting as an advocate for one side: *Lee v. Jarvie*, 2010 BCSC 1852, at para. 126. Rio Tinto also notes that the Board has rejected expert evidence where that evidence was outside the scope of the expert's expertise: *Burgoon v. British Columbia (Ministry of Environment)*, Decision Nos. 2005-WAT-024(c), 2005-WAT-025(c) and 2005-WAT-026(c), at paras. 55 - 57.

[410] Rio Tinto submits that the following factors point to a conclusion that Dr. Ouimet is an advocate for the Appellants' cause, and that this inappropriately influenced his evidence:

(a) In his first report, Dr. Ouimet states that he has confined his comments to matters within his expertise, yet he strayed into giving opinions on the CALPUFF modelling approach used in the STAR. Under cross-examination, Dr. Ouimet admitted that whole sections of his expert report that related to CALPUFF were outside his expertise.

(b) In addition to admitting that they were outside his expertise, Dr. Ouimet admitted that some sections of the air modelling section of his first report were reproduced nearly verbatim from other published papers. Dr. Ouimet also admitted that he had never reviewed one of the references cited in that report. Under cross-examination, he was unable to explain how copied conclusions from difference sources pasted into the same paragraph related to one another from a technical perspective. The result is an improper attempt to pass off "cherry-picked" copied and pasted critical statements as the careful application of objective expertise.

(c) Counsel for the Appellants were involved in drafting Dr. Ouimet's reports. In his testimony, Dr. Ouimet was unable to identify which parts of his first report were added by counsel for the Appellants. The evidence also establishes that a draft of Dr. Ouimet's second report

was edited after submission to counsel, to remove comments which were favourable to Rio Tinto. The associated areas of his first report remained unaddressed and uncorrected until cross-examination.

(d) Dr. Ouimet made several inflammatory statements during his testimony that are indicative of bias.

[411] Ms. Henolson testified that, contrary to Dr. Ouimet's testimony, CALPUFF is the appropriate model to use for the KMP for a number of reasons. First, the U.S. EPA has stated that for long-range transport (i.e., distances greater than 50 kilometres), CALPUFF is the preferred model. Here the plume may extend to Terrace, a distance of more than 50 kilometres. Second, CALPUFF is the suggested model in areas where there is complex terrain, like the Kitimat region, as the existence of mountains, valleys, and changes in wind direction affect the dispersion of a plume. Third, CALPUFF is the only model that can address different source-type capabilities; i.e., issues of buoyancy. Here, the pot room vents emit hot air which will be dispersed from very tall stacks, and therefore, buoyancy must be taken into account in any model. Finally, CALPUFF is the only model that can address issues of calm winds and inversion events that result in emissions being "trapped".

[412] Dr. Aherne testified for Rio Tinto regarding the acidification of soil. He was qualified by the Panel to give expert testimony in the subject matter described in the Summary of Evidence, above. Dr. Aherne is one of the authors of the STAR.

[413] Dr. Aherne testified that critical load is an effects-based approach to determining the long-term impacts of emissions of sulphur and nitrogen on receptors. He stated that using this approach requires looking at the concentration of chemicals in the soil, and then setting the concentration that protects roots, to determine the critical load that should not be exceeded for the receptor. The approach is widely used in Europe, Asia, and Canada, and increasingly in the U.S. Dr. Aherne testified that his task for the STAR and for a subsequent independent assessment of airshed quality in the region, commissioned by the Province in October 2013 and known as the Kitimat Airshed Assessment or Kitimat Airshed Study, was to generate maps across a region. Then, using accepted methods and established thresholds, he was to generate the best estimate of predicted exceedances. He stressed that exceedance of the threshold predicts risk; it does not necessarily equate to actual harm.

[414] He explained that the STAR used a Bc:Al ratio of 1 because it is the most widely accepted critical load for coniferous trees, which are more tolerant of acidification than deciduous trees. Anything above this ratio has the potential to damage the roots of trees. A Bc:Al ratio of 10 was used as the accepted level for deciduous trees.

[415] Dr. Aherne testified that Dr. Ouimet's criticisms of the STAR are unfounded, and his statements are inaccurate and misleading. For example, Dr. Aherne testified that a Bc:Al ratio of 1 is widely used for policy purposes, and is protective of the environment that is of concern in the STAR. Further, the STAR was not limited to western hemlock, as Dr. Ouimet suggested. Rather, the STAR assessed 100% of the forest ecosystems in the study area, but 18% of the study area is not

forested (i.e., is urban, or not treed). Dr. Aherne stated that, although the STAR used an approach based on bedrock geology, it was only one "layer" in a multi-layer approach. The STAR also considered the surficial geology in the study area, contrary to Dr. Ouimet's evidence.

[416] Dr. Aherne testified that soil samples were taken from 51 sites representing all eleven of the bedrock categories in the studied area. The sites were randomly selected across the grid area that was selected to represent the site. Most of the sites were sampled to a depth of up to 50 cm to ensure that a sufficient depth was being sampled to allow for tree roots, but in a few places there was insufficient soil material to sample to that depth, so they sampled what was available. Dr. Aherne testified that the weathering rate varied significantly because of coarse materials in the soils. He explained that they removed the coarse material from the soil at the sample site, which reduced the soil depth, and then removed organic matter (by burning). The remaining mineral soils were sampled to a depth of 50 cm, and they studied the mineralogy of the soil to establish the weathering rate. This process was repeated for 51 sites with varying weathering results. Then the lowest weathering rate was used to establish critical load.

[417] Dr. Aherne was satisfied that the sampling campaign effectively captured the sensitive surficial deposits in the area. Exceedances of the critical load were noted in less than 1.6% of the study area. Under rigorous uncertainty testing, exceedances did not change; 95% of the mapped ecosystem is protected.

[418] In response to Dr. Ouimet's concerns that Bc:Al is not the appropriate criterion, Dr. Aherne testified that the STAR used a multi-criterion approach: pH; calcium:Al ratio; and the Bc:Al ratio of 1. All of those criteria were used, and it did not alter any of the results in the STAR.

[419] Dr. Aherne testified that he was also involved in developing the soil sampling program for the EEM Plan. The EEM Plan will benefit from the fact that there is now more soil data than there was when the STAR was prepared. Some areas to the south of the Kitimat valley were not captured in the STAR, and those areas have been added to the soil sampling program for the EEM Plan. There are now fixed soil plots where 16 samples will be taken at five depths, every five years, for each region that will be sampled according to the EEM Plan.

[420] The EEM Plan will also have the benefit of data acquired from other projects. For example, as noted above, Dr. Aherne was involved in the Kitimat Airshed Assessment which used a further 31 sample sites, and that data is now available for study as part of the EEM Plan. In addition, LNG Canada has sampled another 19 to 20 sites, and that data should be available as well. Finally, a Master's student of Dr. Aherne's is carrying out a study involving forest plots in the area, which will be another source of soil data. As a result, there will be much more soil data, as time passes, to use for study and comparison. Dr. Aherne noted that future studies may rely on another approach of categorizing and describing changes in soils due to acidification; i.e., the Regression Kriging approach. The first regional assessment using the Regression Kriging approach was the Kitimat Airshed Assessment, but Dr. Aherne has since taken the revised soil weathering plane created by this approach and applied it to the STAR, and it did not change the results.

[421] Dr. Aherne explained the thresholds based on the KPI of rate of change in the cation pool in soils that would trigger further monitoring, receptor-based mitigation and facility-based mitigation.

[422] Mr. Marmorek testified that the EEM Plan establishes two KPI's – spatial deposition of sulphur in the soils and acidification or loss of base cations from the soils. He commented on the mitigation triggers for both receptor-based mitigation and facility-based mitigation and advised that the triggers were precautionary.

The Panel's findings

[423] The Panel agrees with Rio Tinto's submission that Dr. Aherne's evidence should be preferred over Dr. Ouimet's when the two conflict. The Panel finds that Dr. Aherne's experience is broader than Dr. Ouimet's, and he has field experience in Kitimat whereas Dr. Ouimet does not. In addition, the Panel finds that Dr. Ouimet strayed outside of his area of expertise. Further, the Panel is troubled by the fact that Dr. Ouimet acknowledged that portions of his expert report were simply copied from other publications, and that he did not review the references cited in his report. This seriously undermines the "expert" nature of his report. Dr. Ouimet was clearly motivated to testify on behalf of the Appellants because of his professional concerns regarding the use of critical load analyses to support an application for a permit to emit industrial waste into the air. The Panel is concerned that his opinions and his reports may have been tainted by that fact. Overall, the Panel finds that Dr. Ouimet's evidence was largely discredited in cross-examination, and should be given little to no weight.

[424] Further, the Panel does not agree with the Appellants that the information in the STAR, on which the Director relied, regarding the stratification of soil types, especially in the Kitimat valley bottom, makes the soils assessment unreliable. Put another way, the Panel does not accept that, in a significant portion of the study area, that the soil is unrelated to the bedrock type so as to make the soil sample data unreliable. The Panel accepts the evidence of Dr. Aherne, one of the authors of the STAR and an expert in this subject who has field experience in the Kitimat valley, that the differences in soil types were considered in the STAR's assessment and reporting. Soil samples were taken from 51 sites representing all eleven of the bedrock categories in the studied area. Further, the Panel notes that the sites were randomly selected across the grid area that was selected, so as to ensure that they were representative of the site. In any event, bedrock geology was only one component of the STAR's analysis; surficial geology was also taken into consideration.

[425] As to the number and location of the sampling sites, the Panel is satisfied that 51 soil sample sites was sufficient for the purpose for which they sampled, and the Panel notes that the monitoring of soil under the EEM Plan will benefit from the much larger data set available as a result of over 50 additional sampling sites that have been established as part of the Kitimat Airshed Assessment study, the investigations undertaken by LNG Canada, and the proposed work by a Master's degree student working in the area. Even if there are any deficiencies in the location or distribution of the sampling sites, and the Panel does not find that there are any such deficiencies, the Panel is not convinced that those deficiencies undermine the reliability of the conclusions in the STAR on which the Director

relied. For each of the 51 sample sites, after coarse material and organic material was removed from the soil, the remaining mineral soil was sampled to a depth of 50 cm, the mineralogy of the soil was studied, and a weathering rate was established. The 51 sample sites had varying weathering rates. Then, the lowest weathering rate was used to establish critical load. The Panel finds that this approach is prudent, cautious, and appropriate in the circumstances. The Panel notes that some areas which were not sampled for the STAR have now been added to the soil sampling program for the EEM Plan. There are now fixed soil plots where 16 samples will be taken at five depths, every five years, for each region that will be sampled according to the EEM Plan.

[426] The Panel is satisfied that a critical load threshold of Bc:Al = 1 is appropriate, as it is the most widely accepted critical load for coniferous trees and most of the study area consists of coniferous forests. Further, a Bc:Al = 10 was used for deciduous trees where appropriate, in the STAR. The Panel notes that the STAR did not rely entirely on the Bc:Al ratio of 1; rather it used a multi-criterion approach which also included consideration of pH and the Calcium:Al ratio. The Panel finds that, in the absence of credible evidence to the contrary from the Appellants, this multi-criterion approach provided the Director with the best available evidence regarding the risk of acidification of soil in the area.

[427] The Panel finds, based on the information in the STAR and the evidence of Dr. Aherne, that the soil monitoring plan in the EEM Plan, including the KPI for soil and the threshold(s) for mitigation action, is scientifically sound and complies with paragraph 4.2.5 of the Amendment. Paragraph 4.2.5 of the Amendment states as follows:

> 4.2.5 Environmental Effects Monitoring Plan
>
> The Permittee shall submit an Environmental Effects Monitoring (EEM) plan for review and approval by the Director on or before December 30, 2013 and shall implement the EEM plan upon approval. The EEM plan shall, at a minimum, include effects monitoring methods and actions along four lines-of-evidence: human health; vegetation; terrestrial and aquatic environments. The EEM plan shall also include impact threshold criteria either for emission reduction or other mitigations that, when exceeded, would trigger emission reduction and/or other mitigation.
>
> [underlining added]

[428] The Panel finds that the two KPIs for soil (i.e., sulphate deposition and critical load) will allow for an early warning of changes to the soil before any harm occurs to vegetation. The Panel finds that the triggers for mitigation action in the EEM Plan are designed to be prudent, cautious, and forward-looking.

[429] In summary, based on all of the evidence, the Panel finds that the Appellants' have not established, on a balance of probabilities, that the analysis in the STAR regarding predicted impacts on soil, or the provisions of the EEM Plan with respect to soil monitoring, are flawed such that the Panel should order amendments to the EEM Plan to require additional mapping of soil parent material in the study area, changes to the soil sampling program, and/or changes to the

critical load threshold. The information before the Panel, including the STAR and the new evidence provided during the hearing, confirms the Director's conclusion, based on a cautious and conservative approach, that the risk to soils from the increased SO_2 emissions is moderate, in that it is acceptable but should be subject to monitoring to confirm whether the actual impacts match the predicted impacts. The Panel also finds that the soil monitoring program in the EEM Plan meets the requirements of paragraph 4.2.5 of the Amendment.

[430] The Panel finds that this ground of appeal is without merit and is dismissed.

c. Evidence regarding impacts on vegetation

The Appellants' submissions

[431] The Appellants submit that the information available to the Director in the STAR on harm to vegetation was insufficient for him to set requirements for sulphur dioxide emissions that would protect the environment. In particular, the literature review, monitoring methodology, analysis and conclusions were incomplete and flawed in that they:

A. considered the effects of SO_2 emissions only on plant leaf chlorosis and necrosis;

B. noted, but did not discuss or take into account, that the symptoms in conifer needles for sulphur and fluoride effects were similar;

C. because of the focus on leaf toxicity, considered only high concentration SO_2 exposures over the relatively short-term (less than 8-hours);

D. did not consider other potential symptoms of emission toxicity such as changes in tree morphology, physiology and anatomy;

E. did not consider potential effects of SO_2 emissions on non-vascular plants, such as lichens, mosses and liverworts, or the use of these plants as sensitive indicators of SO_2 pollution; and

F. did not consider the effects of relatively low, but still anomalous, emission concentrations over periods longer than eight hours, for example, over years or decades.

[432] The Appellants also criticized the KPI for vegetation in the EEM Plan. The KPI for vegetation relies on visible vegetation injury that must be caused by SO_2 resulting from the KMP. The EEM Plan provides a methodology for determining KMP causality if the increased monitoring threshold is reached:

> Assess ambient SO_2 concentration data, meteorological conditions, the nature of the injury to foliage (i.e. assess consistency with the known form of impacts to foliage of SO_2) and estimates of KMP emissions versus all other emission sources.

[433] The Appellants submit that the KPI for vegetation is "unworkable" for a number of reasons, including that it relies only on leaf chlorosis and necrosis, which are subjective, and it does not consider other plausible symptoms of vegetation

injury by SO_2 such as plant morphology, physiology and anatomy. Also, there is no process for determining whether observed effects are caused by SO_2 or some other contaminant, and there is no consideration of using more sensitive vegetation indicators such as lichens.

[434] In summary, the Appellants submit that the Director had insufficient information on which to determine if the EEM Plan met the requirements of paragraph 4.2.5 of the Amendment, and therefore, on which to approve the EEM Plan.

[435] The Appellants called Mr. Williston, a Registered Professional Biologist employed by the Ministry, to provide evidence regarding the direct impact of SO_2 on vegetation. As noted above, Mr. Williston reviewed the portions of the STAR regarding vegetation and soil, and in the spring of 2013, he questioned whether the critical load analysis using a Bc:Al ratio of 1, as set out in the STAR, would be sufficiently protective of all of the types of vegetation in the area.

[436] Mr. Williston also testified regarding concerns that he had in the fall and winter of 2012 regarding lichen, a species at risk which is particularly sensitive to acidification. He proposed a "lichen study" to monitor acid deposition in the Kitimat valley. After initial investigation, however, it appeared that there were not sufficient amounts of lichen in the area to support such a study.

[437] Mr. Williston explained notes and photographs in his field book, where he had recorded his observations in the field. He noted areas of pine mortality near Onion Lake, severely pruned western red cedar but lots of lichens in the Pine Trial North area, and what he called a "lichen desert" in the Enso Forest Recreation Site where he would have expected to see lichen. Other areas, such as the Little Nadine Drainage Area, were better populated with lichen.

[438] Under cross-examination by the Director's counsel, Mr. Williston acknowledged that he began his involvement with the Rio Tinto permitting process in October 2012 shortly after he was hired, but the Ministry had begun its work with Rio Tinto and its qualified professionals much earlier.

[439] Mr. Williston also acknowledged that the purpose of the soil plots that he had discussed was a silviculture study for the Ministry of Forests, Lands and Natural Resources, and was not related to the KMP. He agreed that, of the tree species that are natural to the Kitimat valley, in the silviculture study area, some will be crowded out or doing poorly for a variety of reasons which have nothing to do with exposure to SO_2 emissions.

[440] In addition, Mr. Williston agreed with the suggestion from the Director's counsel that many of his concerns were incorporated into the STAR. He also acknowledged that some of his concerns which were not resolved in time to be incorporated in the STAR, would be resolved by the implementation of EEM Plan. He testified that this was a reasonable way to deal with uncertainties. He agreed that most of the uncertainties that he had identified in an earlier draft of the EEM Plan have been resolved. For example, at p. 18 of the EEM Plan, there is a commitment that the critical load modelling will be re-run with additional sulphur deposition factored into the equation. Mr. Williston acknowledged that at p. 25 of the EEM Plan, there is a further example of his concerns being incorporated.

Specifically, the monitoring plan will address the issue of the critical load model being refined to address the glaciofluvial soil, which was an issue that he had raised.

[441] Under cross-examination by counsel for Rio Tinto, Mr. Williston acknowledged that the STAR was the first technical assessment report that he had reviewed. He agreed that he is not an expert in freshwater biology, bedrock geology, glaciofluvial morphology, critical loads, or base cation ratios, despite the fact that he was asked to comment on those subjects.

[442] Mr. Williston agreed with the suggestion put to him by counsel for Rio Tinto that hemlock needles are a reasonable alternative to lichen to monitor the impacts of SO_2 emissions on vegetation, if no lichen is available. Hemlock needles are used because hemlock are not sensitive to SO_2 emissions, and the needles will absorb the sulphur deposition so it can be extracted, measured and monitored.

The Director's submissions

[443] The Director testified that, based on the STAR and the information provided by Mr. Williston before the Amendment was issued, he was satisfied that the risk associated with the increased SO_2 emissions was low for vegetation. The Director added that he also considered an April 11, 2013 letter from Dr. Laurence (which was included as the final page in the Consultation Report) regarding the effects of SO_2 on the quality of vegetables and fruits. In that letter, Dr. Laurence stated that exposure to SO_2 does not result in a deposit of material on leaf surfaces, and he was not aware of any literature indicating that SO_2 affects the taste of vegetables or fruit. In fact, anecdotal evidence from Europe and the US indicates that high quality produce and fruit are grown in areas that have SO_2 concentrations in excess of those predicted to occur in the near vicinity of the smelter.

[444] In addition, the Director testified that he made his own inquiries to satisfy himself regarding the impact on vegetation. For example, the Director spoke with Mr. Williston about the potential impact on lichen, and spoke with Marty Kranabetter in the Ministry of Forests, Lands and Natural Resources regarding the potential impact on mushrooms as this concern was raised by a member of public during the consultation process. After considering all of this information, the Director was satisfied that the potential impact of increased SO_2 emissions on vegetation post-KMP would be low.

Rio Tinto's submissions

[445] Rio Tinto submits that aluminum smelters emit two major pollutants to the atmosphere that can be toxic to vegetation: hydrogen fluoride and SO_2. A monitoring program to catalogue visible effects of fluoride on vegetation in Kitimat has been in place for over 40 years. Since 1997, this monitoring program also documented the concentration of sulphur in vegetation, and made observations of the visible effects of SO_2 on many species. Rio Tinto notes that Dr. Laurence has overseen this program since 1999, and he revised this program in 2010.

[446] Rio Tinto maintains that SO_2 effects on vegetation have not historically been of concern in Kitimat for two reasons. First, sulphur is an essential element for plants, and accordingly, the concentration required to cause direct injury to plants

is high, in the parts per million range. Second, the SO_2 emissions from the smelter pre-KMP have been modest, and there has been little to no evidence of direct injury to vegetation in the past.

[447] Rio Tinto notes that the STAR described how a field monitoring network has been used to assess impacts from emissions in the past. Sampling for this monitoring network used western hemlock, in part because it is not so sensitive to any pollutant that the needle tissue is killed even on low exposure, which would stop the plant from continuing to absorb pollutants and therefore not be useful for testing exposure to emissions. A sampling crew visits each site annually to collect needles and photograph trees, and a qualified professional accompanies the sampling crew and makes observations on the health and conditions of all vegetation at the site every other year.

[448] Using this historical monitoring data, the STAR determined the relationship between sulphur emissions and sulphur concentration in vegetation, and the relationship between sulphur concentration in foliage and distance from the Rio Tinto Alcan smelter. The STAR also analyzed output from the CALPUFF modelling, and compared that data against thresholds to indicate concern derived from the literature. Since plants are dormant in the winter, the analysis separated out exposures occurring during growing season, defined as April 15 to September 15, from those during the course of the entire year. The STAR based its thresholds of concern on the Canadian Objective and Guideline and the U.S. EPA Secondary National Ambient Air Quality Standard (p. 204). To provide a conservative standard, the STAR also included a threshold of one-half the U.S. EPA standard.

[449] Rio Tinto notes that the STAR concludes at p. 279 that the modeled concentrations exceed the thresholds of concern for vegetation only a few times, and that the receptors with exceedances are restricted to three locations near the smelter, for the most part. Based on this data, the STAR determined that the probability of direct effects on vegetation is low (p. 285). For thresholds of concern both pre-KMP and post-KMP, there are fewer exceedances post-KMP than pre-KMP. For example, the U.S. EPA standard is not exceeded, and there are only a few places and times where the conservative half-U.S. EPA standard is exceeded (p. 285). Given those results, the STAR predicted that the effects of SO_2 emissions on vegetation will be restricted to those described in the “Very Unlikely” and “Minor” categories (p. 286).

[450] The STAR acknowledges that the specific sensitivity of local lichen species to SO_2 was unknown, but Rio Tinto argues that their continued presence in the area was also unknown. Also, at p. 288, the STAR indicates that, outside of an area in the general vicinity of the smelter, there were no exposures above the 10 ug/m_3 annual concentration that the World Health Organization determined to be protective of lichens.

[451] Rio Tinto also addressed the KPI for vegetation in the EEM Plan. Rio Tinto notes that in addition to the KPI for vegetation, which is visible vegetation injury caused by SO_2 (assessed based on the protocol set out in the EEM Plan), sulphur content in hemlock needles will be used as an informative indicator. For both the KPI and the informative indicator, whether visible injury is causally linked to the post-KMP emissions will be assessed based on SO_2 concentration data,

meteorological conditions, the nature of injury (i.e. whether consistent with SO_2 injury), and estimates of post-KMP SO_2 emissions versus all emissions sources.

[452] Rio Tinto argues that the Appellants have not challenged any of the STAR's vegetation conclusions through expert evidence. Rio Tinto argues that Dr. Laurence's expert report (his testimony is summarized below) indicated that Dr. Ouimet's concerns have been considered and are of no concern. Further, Rio Tinto submits that Mr. Williston was not tendered as an expert witness, and therefore, his evidence cannot be taken for proof of impacts to vegetation. In any event, Dr. Laurence's evidence shows that Mr. Williston's past concerns were fully addressed through the STAR and the EEM Plan. Rio Tinto submits, therefore, that all of the STAR's vegetation analysis is uncontroverted by any evidence, and the Appellants' criticisms of the EEM Plan are minor and without merit.

[453] Dr. Laurence was called to testify by Rio Tinto as the qualified professional involved in the STAR with respect to vegetation. The Panel qualified him as an expert in the subject areas described in the Summary of Evidence, above. His expert report dated November 24, 2014 was entered into evidence. Dr. Laurence was one of the authors of the STAR.

[454] Dr. Laurence testified that Rio Tinto's vegetation inspection program, which he has overseen since 1999, involves surveying the area looking for signs of visible injury to vegetation, taking samples for laboratory analysis, and assessing the health of vegetation with respect to emissions, disease epidemics, insect infestation and other possible harmful sources. In response to a concern expressed by Dr. Ouimet that harm to vegetation may be "subtle", Dr. Laurence indicated in his expert report that measuring subtle effects of air pollutants is not practicable, and that visible injury is a widely accepted indicator of potential effects. He also noted that the European standards for vegetation are not exceeded in Kitimat, except in the immediate vicinity of an industrial area that has been impacted by numerous historical industrial operations. The European standards are set to protect vegetation from exposures that do not cause visible injury.

[455] Dr. Laurence stated that SO_2 emissions are not a cause for concern with respect to vegetation in the Kitimat area, because sulphur is naturally an essential element for plants (plants take it up from the atmosphere and soil), and exposures have not been in the range reported to cause effects on vegetation. Also, he studied the post-KMP predictions from the air dispersion modelling, and concluded that the predicted levels are not likely to cause visible injury to vegetation. He stated that this is consistent with the fact that he has not observed sulphur damage to vegetation in the years he has been conducting surveys in the area. In fact, in his opinion, the impacts on vegetation from SO_2 are likely to improve post-KMP.

[456] Dr. Laurence testified that the STAR uses a conservative threshold for assessing impacts of SO_2 on vegetation. He chose one-half of the U.S. EPA standard (e.g. 1307 $\mu g/m^3$ for 3 hours) to provide an early-warning that would trigger mitigation.

[457] Dr. Laurence testified that he developed the sampling program for vegetation in the STAR. The same vegetation study that was carried out in the STAR will be continued in the EEM Plan on alternate years, looking for visible injury to plants.

Dr. Laurence testified that the EEM Plan is designed to provide a way to test the STAR's conclusion that it is unlikely that SO_2 will adversely impact vegetation. The monitoring team will continue to survey and sample the area annually, looking for any signs of visible injury to vegetation. Hemlock needles will continue to be sampled to determine sulphur deposition, and mitigation will be triggered if visible injury is detected. If visible injury is observed, then there will be an assessment of the ambient air quality data, the meteorological data, and the post-KMP production data from the smelter, to find the potential causes of the injury to the plants. If there are severe and repeated symptoms of SO_2 injury that can be attributed to the smelter's emissions, or if there are symptoms of smelter-related injury at locations more than 15 kilometres away from the source, then emission reductions will be triggered. In addition, hemlock needles will be collected every year, and their sulphur content will analyzed in a laboratory. If there is an increase of the threshold set in the EEM Plan, then visual inspections will be increased to annually.

[458] Dr. Marmorek testified that there is a rich data set, going back decades, in Kitimat for vegetation. In addition to the analysis of field data from the sampling program, the STAR team analyzed output from the CALPUFF dispersion modelling, using results from 2006, 2008 and 2009, and calculated the frequency of exposures and the number of receptors where concentration exceeded thresholds of concern. Similar calculations were made assuming pre-KMP conditions. The analysis isolated the exposure pertinent to the growing season. While the STAR predicts a decrease in observed effects from SO_2 on vegetation post-KMP, if there is an unexpected increase, monitoring studies can find out which plants are affected, when, where, and at what levels of exposure. Mr. Marmorek testified that the STAR's air quality threshold, which is one-half of the U.S. EPA standard, is a conservative guideline for vegetation impacts. He noted that the KPIs for vegetation in the EEM Plan allow the monitors to identify a chemical change before biological changes occur.

The Panel's findings

[459] The Panel is satisfied that the information available to the Director, including the STAR and the other information he considered regarding the potential harm to vegetation, was sufficient for him to set requirements for SO_2 emissions that would protect vegetation. The Panel finds that the scientific information and conclusions in the STAR, and the new evidence before the Panel including the testimony of the authors of the STAR's vegetation components and the vegetation monitoring program in the EEM Plan, was uncontroverted.

[460] The Panel notes that Dr. Ouimet testified that he was concerned that the effects of SO_2 emissions on vegetation might be subtle and might not be evident on a visual inspection. However, the Panel finds that visual inspection is widely accepted in the scientific literature as a method for monitoring SO_2 effects on vegetation. Further, there has been a visual inspection and sampling program for vegetation in the Kitimat area since 1999. The results of that program demonstrate that European standards, which are designed to protect vegetation from SO_2 exposures that do not cause visible injury, have not been exceeded in Kitimat except in areas in the immediate vicinity of the smelter that have been subject to many different industrial operations over a prolonged period of time. This established vegetation "inspection program" includes visual inspection of

vegetation, followed by laboratory analysis of samples. The results of that program demonstrate that SO_2 exposure pre-KMP has not been shown to cause harm to vegetation in the area. Further, dispersion modelling suggests that SO_2 emissions post-KMP are unlikely to cause visible injury to vegetation. Dr. Laurence testified that this prediction is consistent with the fact that he has not observed sulphur damage to vegetation in the years he has been conducting surveys. In his opinion, the impact on vegetation will actually be improved post-KMP. The Panel notes that the Appellants did not challenge this statement by Dr. Lawrence. The Panel accepts the analysis and conclusions in the STAR regarding the potential impacts of the increased SO_2 emissions on vegetation.

[461] Mr. Williston originally suggested that lichen be used as an indicator of the potential effects of SO_2 on vegetation in the area as he was concerned about that at-risk specie's sensitivity to acid deposition. It became apparent that was not feasible given the relative dearth of lichen available for study and the fact that the species in question was not present throughout the study area. For the purposes of the vegetation monitoring component of the EEM Plan, Mr. Williston acknowledged that hemlock needles are a suitable alternative for monitoring acid deposition such as from exposure to SO_2. The Panel accepts that a lichen study is not practicable and that the monitoring of the sulphur content in hemlock needles is a scientifically justifiable alternative.

[462] The Panel finds that the vegetation monitoring plan in the EEM Plan, including the KPI for vegetation (i.e., visible injury caused by SO_2), supplemented by the informative indicator (i.e., sulphur content in hemlock needles) and the thresholds for mitigation (i.e., severe and repeated symptoms of SO_2 injury outside of Rio Tinto's properties or symptoms of SO_2 injury causally related to the KMP >15 km from the smelter), are scientifically sound and comply with paragraph 4.2.5 of the Amendment.

[463] In summary, based on all of the evidence, the Panel finds that the Appellants have not established, on a balance of probabilities, that the analysis in the STAR regarding predicted impacts on vegetation, or the provisions of the EEM Plan with respect to vegetation monitoring, are flawed such that the Panel should order amendments to the EEM Plan to require additional surveys, research and analysis. The information before the Panel, including but not limited to the information in the STAR, confirms the Director's conclusion, based on a cautious and conservative approach, that the risk to vegetation is low, in that it is acceptable but should be subject to monitoring to confirm that the actual impacts match the predicted impacts. The Panel also finds that the vegetation monitoring program in the EEM Plan meets the requirements of paragraph 4.2.5 of the Amendment.

[464] The Panel finds that this ground of appeal is without merit and is dismissed.

d. Adequacy of the public consultation process

The Appellants' submissions

[465] The Appellants assert that there was inadequate public consultation prior to issuing the Amendment. The Appellants argue that the basis for the Amendment was inadequate due to deficiencies in the public consultation process, given the

complexity, scope and implications of the decision. Also, the Director ignored requests to extend the time for public consultation. However, the Appellants note that the *Public Notification Regulation* does not provide for public consultation in the permitting process. Rather, it provides for "notification" to certain parties.

[466] The Appellants point out that, under sections 3(d) and 8(1) of the *Public Notification Regulation*, the Director may require that an applicant provide additional information beyond what is otherwise stipulated in the *EMA* and the *Public Notification Regulation*, and may require the applicant to meet with certain people.

> **3** The applicant must, on the request of a director, provide the director with one or more of the following:
>
> ...
>
> (d) information respecting any other matter the director considers relevant to the application.
>
> **8** (1) The applicant must, if required by a director, offer to meet with any person or persons who, in the opinion of the director, may be adversely affected by the discharge, emission or storage, to explain and clarify the intent of the application and to describe the discharge, emission or storage and its potential effect on the receiving environment.

[467] The Appellants assert that sections 3 and 8 of the *Public Notification Regulation* formed the basis for an August 11, 2011 memo from the Director to Rio Tinto in which the Director set out his expectations regarding the consultation process, including a requirement that Rio Tinto develop and submit a consultation plan for his approval.

[468] The Appellants submit that consultation requires more than creating the Consultation Report. They say that adequate consultation requires that those affected by the decision, and interested members of the public, must have time to absorb the information that is presented to them, engage technical assistance if needed to understand the information, and to inform the Director of their concerns. They assert that those conditions were not met.

[469] In support of those submissions, the Appellants point to the testimony of Mr. McKenzie about concerns that were brought to him by members of the public regarding the adequacy of time to consider such a large volume of information.

[470] Mr. Knox, Ms. Stannus, and Ms. Toews provided testimony in support of the Appellants' submissions.

[471] Mr. Knox testified that on February 27, 2013, he saw a notice that Rio Tinto had placed in the Terrace Standard newspaper regarding a public meeting as part of the consultation process. He said that he saw the notice after the public meeting took place in Kitimat, but before the public meeting in Terrace. Mr. Knox testified that he did not attend either meeting, but he asked someone from his organization to attend and report back to him. He did, however, attend the private meeting that Rio Tinto scheduled for the benefit of Ms. Stannus, at her invitation, which is discussed below.

[472] Ms. Stannus testified that she saw the notice in the newspaper regarding the public consultation meetings in Kitimat and Terrace, but she did not attend either of the meetings. Later, in March 2013, she heard about the public consultation meetings at a social gathering. She stated that a teacher who attended the Terrace meeting told her that Rio Tinto planned to increase the smelter's emissions of SO_2, and that she had understood that the plan was "to shoot it up in the air and everything would be fine". Ms. Stannus said that this concerned her. Consequently, she contacted Rio Tinto and requested a meeting. She was told that there had already been two public consultation sessions and 20 small group meetings, but Rio Tinto agreed to host a special meeting for her on Easter Monday, April 1, 2013, at the office of the smelter. Ms. Stannus and her invitees attended this meeting. During the meeting, a representative of Rio Tinto, Shawn Zettler, went through the STAR thoroughly with her. She found the information to be "overwhelming". Mr. Zettler advised her that she could write to the Director with any concerns, and she did. The Panel was provided with a copy of her letter to the Director, dated April 1, 2012, in which she expresses concerns about the increased SO_2 emissions. The Panel is satisfied that Ms. Toews wrote the letter to the Director on April 1, 2013, after her meeting with Mr. Zettler, and that the year indicated on the letter is a typographic error.

[473] Ms. Toews also testified about the consultation process. She testified that she first found out about Rio Tinto's plan to apply for a permit amendment in 2009, while she was living in Williams Lake. She acknowledged that she had also seen the newspaper ads in 2013 regarding the public consultation process, and she recalled receiving written materials in the mail from Rio Tinto about the proposed KMP on more than one occasion between January and March 2013.

[474] Under cross-examination, Ms. Toews admitted that she was aware of three public consultation meetings in Kitimat, but she had personal commitments such that she was unable to attend any of the meetings. She was also aware of the written materials that Rio Tinto had mailed to the public, and the technical information that it made available at the public library. She testified she did not pay much attention to the material at the time.

The Director's submissions

[475] The Director submits that permit amendments authorizing a greater than 10% increase in emissions are considered to be "significant amendments" which trigger certain requirements under the *Public Notification Regulation.* Specifically, notice of the proposal must be posted onsite, provided to local government, posted in the BC Gazette, and in local newspapers. In addition, the *Public Notification Regulation* provides the Director with the discretion to impose additional requirements.

[476] In this case, the Director imposed a number of additional requirements on Rio Tinto, including:

- conducting interactive consultation with the public, that must extend beyond Kitimat to include Lakelse and Terrace;
- developing a consultation plan and submitting it to the Director for approval;

- preparing a report, after the consultation process was concluded, with an issues tracking table identifying the effectiveness of consultation at engaging the audience;
- identifying a means of follow-up for issues that could not be immediately addressed;
- making information about the application available in both the Kitimat and Rio Tinto public libraries, and at the Rio Tinto smelter office, in both electronic and hard copy forms;
- conducting communication with Rio Tinto's established Public Advisory Committee and Environmental Consultation Committee for the smelter, and with the Haisla Nation and at open houses; and
- addressing anything that came up during the consultation process, and identifying Rio Tinto's response in the package presented to the Director for consideration along with the application, the STAR, and the Consultation Report.

[477] In addition, the Director testified that he provided Rio Tinto with detailed instructions regarding what was expected in the way of consultation with First Nations, including consultation beyond the First Nation with whom Rio Tinto had historically engaged.

[478] The Director testified that Rio Tinto was delegated the responsibility to carry out the notifications and conduct meetings with the public, as he had required of them, subject to Ministry oversight. Before the start of the consultation process, Rio Tinto prepared a consultation plan for the Director's review, and he approved it. The Director testified that implementation of the consultation plan took place in early 2013, and was detailed in the Consultation Report. The Director testified that he required Rio Tinto to extend the public consultation period to 31 days, rather than the requirement of 30 days under the *Public Notification Regulation*. Even after this period had concluded, the Director continued to receive public input up to the date of the Amendment.

[479] The 509-page Consultation Report was introduced as evidence at the hearing. The Consultation Report identifies the location of the public notices posted onsite and in print media. Notice of the public meetings was posted online, in print media, on the radio, on public notice boards, by email, and on Rio Tinto's internal website (for employees). The Consultation Report identifies the date and location of 16 public consultation meetings, and 18 media articles about the project. Before consultations with the public began, Rio Tinto provided information packages to stakeholders, including the public. Fifteen locations were identified where packages of information regarding the application could be obtained by interested persons. In addition, the copies of the complete STAR (not limited to the Executive Summary) were posted in public libraries. As part of the public consultation process, Rio Tinto also met with a number of interested groups and non-profit societies in the area, including: the Kulum Land Management Group in Terrace; the Douglas Channel Watch in Kitimat; and, the K-T Industrial Development Society.

[480] The Consultation Report notes that invitations to consult were also extended to local governments including the District of Kitimat, City of Terrace, and the Regional District of Kitimat-Stikine. Also, special invitations were extended to the

Haisla, Kitselas and Kitsumkalum First Nations, and offers to meet were extended to the Chief and Council on two occasions. Mr. McKenzie testified that, in addition to the public consultation that was conducted, Rio Tinto provided information to, and consulted with, Environment Canada and the Northern Health Authority, which in turn, obtained feedback from the BC Centre for Disease Control. The Department of Fisheries and Oceans was also contacted, but it chose not to provide input.

[481] The Consultation Report notes that special letters were sent to the mayor of Terrace, and to Kitimat and Terrace physicians. In addition, the Consultation Report includes a third party health impact assessment written by Dr. Chris Carlsten, the Chair of Occupational and Environmental Lung Disease, and the Director of the Occupational Disease Clinic, at the University of British Columbia.

[482] Ministry staff attended all but one of the public consultation meetings, to observe Rio Tinto's conduct, record issues of public concern, and answer questions regarding the permitting process or the Ministry's role in it. Mr. McKenzie and Mr. Williston attended many of the public meetings, and they provided the Director with regular briefings about the issues that arose during the meetings. The Director explained that, with respect to the meetings he attended, he did so primarily to observe the concerns that were raised by the public, and to confirm that Rio Tinto was responsive to public concerns, but he occasionally answered questions regarding the regulatory process.

[483] The Consultation Report sets out the stakeholder comments and questions that were sent directly to the Director from agencies, local governments, individuals, and a local church. The report also identifies the questions and concerns raised by the public during the consultation process, together with Rio Tinto's proposed resolution of the issues. As a result of concerns raised during the public consultation process, the Director required that Rio Tinto provide him with additional information regarding the feasibility of treatment options for SO_2 (which was addressed in the HATCH #2 report), and the effect of SO_2 on agricultural resources (which was addressed in the final version of the STAR). Other issues that arose during the consultation process concerned the potential impacts of SO_2 on lichens, amphibians, and edible mushrooms. The Director made inquiries of Ministry staff and other agencies regarding those issues, and he concluded that there would be no unacceptable or imminent impacts. He further concluded that those concerns could be addressed in an environmental effects monitoring plan.

[484] The Director testified that he was satisfied that both the statutory requirements of the *Public Notification Regulation*, and the additional requirements he imposed on Rio Tinto, were complied with. He described the consultation process as "thorough". Ultimately, the Director concluded that the public consultation was sufficient for him to identify the nature and depth of the public concerns, and to satisfy himself that those concerns were, or would be, addressed.

Rio Tinto's submissions

[485] Rio Tinto submits that it met or exceeded the legal requirements for public notification and consultation.

[486] Rio Tinto submits that the Board has previously held that the purpose of the *Public Notification Regulation* is to provide notice to local residents and property owners of an application, to increase the likelihood the decision-maker has all of the relevant information: *Kootnikoff v. British Columbia (Ministry of Environment, Lands and Parks)*, [1997] B.C.E.A. No. 28. Similarly, the Board held in *Shawnigan*, at para. 196:

> The consultation process is a mechanism used to inform the public, and other relevant agencies, about an application that has been submitted to the Ministry for consideration, and to solicit input on any issues or concerns; in particular, environmental impact concerns…

[487] Rio Tinto submits that it published Environmental Protection Notices in February 2013 in the BC Gazette, the Northern Connector newspaper, the Terrace Standard newspaper, and the Kitimat Northern Sentinel newspaper, as detailed in the Consultation Report. In addition, Rio Tinto advertised public consultation meetings as follows: in the online editions of the Kitimat Daily and Kitimat Northern Sentinel newspapers from February 25-28, 2013; by radio with Astral Media from February 25-28, 2013; in the print editions of the Kitimat Northern Sentinel and Terrace Standard newspapers on February 27, 2013; again in the Northern Connector newspaper on March 1, 2013; by news bulletin, email notice, and internal web posting with the Ingot/Blueprint Spot News and eRoom posting to Rio Tinto employees on February 28 and March 14, 2013, and by means of a public notice boards at Lakelse Lake and Jack Pine Flats on March 1-4, 2013.

[488] In addition, Rio Tinto sent special letters of invitation to: the Chief Councillor and Council for the Kitselas and Kitsumkalum Band on February 25 and 27, 2013, respectively; the Mayor of the City of Terrace on February 28, 2013; and the Kitimat and Terrace physicians on March 15 and 18, 2013, respectively.

[489] Further, between February 28 and March 5, 2013, Rio Tinto provided copies of its application package to: Kitimat & Terrace Public Libraries; the smelter's Public Advisory Committee; District of Kitimat; Regional District of Kitimat-Stikine; the City of Terrace; Haisla Nation Council; Northern Health Authority; Environmental Protection Division of the Ministry; Environment Canada, Environmental Protection Division and Aluminum and Alumina Mining and Processing Division; Department of Fisheries and Oceans, Canada; Ministry of Forests, Lands and Natural Resource Operations; Lakelse Lake Watershed Society; and, the Kitselas and Kitsumkalum First Nations.

[490] Between February 18 and March 25, 2013, Rio Tinto conducted 22 public consultation meetings. At each public consultation meeting, Rio Tinto posted large "story boards" around the room, explaining the KMP. Representatives of Rio Tinto and its qualified professionals gave a presentation on the KMP, and then opened the floor to questions from the public. On April 1, 2013, Rio Tinto held a further private meeting with Ms. Stannus, at her request.

[491] Minutes from all of the meetings, including public input at the meetings, together with letters of comment or opinion directed to Rio Tinto or the Director (and forwarded to Rio Tinto) after the meetings, were included in the Consultation

Report. A summary of key stakeholder comments or concerns was provided, as was Rio Tinto's proposed response to the issues that were raised.

[492] The Public Advisory Committee for the smelter, which was formed in 1996, was involved in the consultation process, and was expanded as a result of a Director's requirement during the permit amendment process to include both Terrace and Kitimat stakeholders.

[493] During cross-examination by the Appellants' counsel, Mr. Marmorek agreed that the information presented at the public consultation meetings may have been difficult for the public to digest, and that, in hindsight, it would have been an improvement to have a weekend-long public consultation session. Mr. Marmorek also agreed that it would have been beneficial if stakeholders were involved in the beginning of the process to set objectives for the STAR and the EEM Plan.

The Panel's findings

[494] The *Public Notification Regulation* provides for certain mandatory notice requirements. Section 4(2) of the *Public Notification Regulation* states:

> **4** (2) Every person who applies for an amendment to a permit or approval must give notice of the application as set out in Column 4 of Schedule A.

[495] Rio Tinto's application was for a "significant amendment" to the Permit, as defined in section 1 of the *Public Notification Regulation*. Therefore, under Schedule A of the *Public Notification Regulation*, Rio Tinto was required to post notices of its application onsite at the smelter, in local newspapers, in the BC Gazette, and to give notice to local municipalities and regional districts.

[496] The *Public Notification Regulation* also provides the Director with the discretion to require an applicant to conduct notification beyond the mandatory requirements in the *Public Notification Regulation*. The Appellants point to section 3(d) of the *Public Notification Regulation*, which provides the Director with the discretion to require that an applicant provide additional information to the Director. The Appellants also point to section 8 of the *Public Notification Regulation*, which is more relevant. Section 8(1) provides the Director with the discretion to require an applicant to "offer to meet with any person or persons who, in the opinion of the director, may be adversely affected by the discharge, …to explain and clarify the intent of the application and to describe the discharge, …and its potential effect on the receiving environment." Under section 8(2), the Director "may specify the form, location, time, date, agenda and any other details of the meeting required by subsection (1)." In addition, the Panel notes that section 6(9) of the *Public Notification Regulation* provides that a director "may require the applicant to mail or deliver a copy of the application to any other person, agency or group who, in the opinion of the director, would have an interest in the application".

[497] The Panel finds that the mandatory provisions in the *Public Notification Regulation* require applicants for a "significant amendment" to provide notice of their application to certain local government bodies and through publications or postings that may be seen by the general public. Only the discretionary provisions of the *Public Notification Regulation*, if any are imposed by a director, require an applicant to do more than that, as indicated in sections 6(9) and 8.

[498] The Panel notes that most of the notification requirements in the *Public Notification Regulation* are directed to applicants, rather than a director. None of the provisions in the *Public Notification Regulation* state that a director "must" consider any information that is provided in response to notices that have been provided. In that regard, section 7(2) of the *Public Notification Regulation* provides that the director "may take into consideration" any information received after the 30-day period prescribed by section 7(1) "if the director has not made a decision on the" application for a permit amendment. Section 7(1) provides that a "person who may be adversely affected by" the granting of an amendment to a permit may, within 30 days after the last date of posting, publishing, service or display required by the *Public Notification Regulation*, notify a director in writing stating how that person is affected. Thus, a director who receives such information from an affected person "may" take that information into account, but he or she is not strictly required to do so.

[499] The Panel finds that the Director required Rio Tinto to provide significantly more notice than is required by the mandatory provisions in the *Public Notification Regulation*. Among other things, he required Rio Tinto to post information about the proposal on its website, in email bulletins, on an internal website for employees, on public notice boards, and on local radio. The Director also required that consultation with First Nations extend beyond the First Nation with whom Rio Tinto had a longstanding relationship, and Rio Tinto extended invitations to the Haisla, Kitselas and Kitsumkalum First Nations. When only the Haisla responded, Rio Tinto sent special invitations to the Chiefs and Council of the other two First Nations.

[500] Furthermore, Rio Tinto extended invitations to the mayors of Kitimat and Terrace. In addition, Rio Tinto consulted with the local physicians and special interest groups. Rio Tinto made information packages available at 15 locations, and mailed out packages to local residents. When requested, Rio Tinto held special meetings for small groups, including one of the Appellants.

[501] At the public meetings, Rio Tinto had story boards of information posted around the room, and packages of information were available. Rio Tinto brought in their technical experts to present information and answer questions from the public. Ministry employees were present at the meetings to answer inquiries and monitor the process. When public concerns were expressed, those concerns were documented, Rio Tinto noted its efforts to answer concerns, and the entire process was recorded in the comprehensive Consultation Report that was provided to the Director.

[502] In addition, the Panel notes that Rio Tinto notified other relevant federal and provincial agencies, and consulted with those agencies who expressed interest in the process. In particular, the Northern Health Authority was consulted extensively by Rio Tinto and the Director.

[503] In short, the Panel finds that information about Rio Tinto's application was disseminated far and wide to persons and agencies that may be interested or affected in the proposal. The statutory requirements for notice were exceeded in both scope and duration. The Panel is satisfied that Rio Tinto complied with the *Public Notification Regulation* and the additional requirements that were imposed by

the Director. Rio Tinto provided all of the information that the Director sought, and Rio Tinto met with the individuals, agencies, and groups as directed. The Panel notes that the Director extended the notice and consultation period by one day beyond the duration by the *Public Notification Regulation*. Even after the formal period for consultation had ended, the Director continued to accept public input and investigate issues of concern.

[504] The Panel is also satisfied that the Appellants were aware of Rio Tinto's application, and the public meetings and information that were available to them. Recognizing that the Appellants reported competing demands for their time, they nonetheless chose not to attend any of the public sessions and not to obtain information packages that were publicly available. The Panel notes that when one of the Appellants expressed concern, after all of the public meetings had concluded, Rio Tinto accommodated her by scheduling a private meeting with her on a statutory holiday. The Panel finds that the public does not have a right to endless consultation, or to personalized consultation that occurs when, where, and how a member of the public might prefer.

[505] The Panel accepts that Rio Tinto's application involved a substantial amount of technical information that may have been difficult for some members of the public to understand and review. In hindsight, Rio Tinto's experts acknowledged that longer consultation sessions, spread over a couple of days, might have been helpful. However, the Panel agrees with the finding in the Board's previous decisions, cited above, that the purpose of public consultation is to inform and solicit input from the public and other relevant agencies about an application, so that the Director is aware of the nature and extent of public concerns, and may consider those concerns and determine whether they were addressed to his satisfaction. The Panel finds that the public consultation process that occurred in this instance met that objective.

[506] Moreover, the Panel finds that the Director was satisfied, based on the oral and written information that was provided to him and the information obtained at any meetings that he attended, that the STAR covered most of the issues of concern that the public raised, and where it did not, he could address the remaining concerns through the EEM Plan. The Panel finds that this was a reasonable approach in the circumstances.

[507] The Panel finds that, for all of these reasons, this ground of appeal is without merit and is dismissed.

DECISION

[508] In making the decision on the appeals, the Panel has carefully considered all of the evidence before it, and the submissions and arguments made by each of the parties, whether or not they have been specifically referenced in this written decision.

[509] For the reasons set out above, the Amendment is confirmed.

Recommendations:

[510] The Panel acknowledges that the Rio Tinto smelter has been a key part of life in the Kitimat area for decades and continues to be so, to this date. Much has changed since the early days of the smelter's operation, and more may change in the future. The Amendment and the EEM Plan reflect the fact that the new modernized smelter will result in significantly reduced emissions. That is all to the good, but it does not mean that there is nothing more that can be done to address the concerns of residents regarding air quality in the area. The Panel wishes to offer recommendations for the consideration of the Ministry and the Director on a forward-looking basis recognizing that air quality continues to be a concern for residents, whether that air quality is a result of emissions from the smelter, other potential industrial emitters, vehicle exhaust, or whatever the source.

[511] The Panel understands that the Province expects to have provincially-adopted and applied SO_2 ambient air quality objectives or guidelines by early 2016. The Panel offers recommendations for consideration in the event that does not occur.

[512] The Panel heard tangential evidence that the issue of SO_2 emissions and their impact on human health is an area of concern and is the subject of a study in adjacent northern regions of the Province; e.g., the Panel understands that an air quality study was ongoing in the Prince Rupert area at the time of the hearing. That study was not directly relevant to the Amendment, and so has not been referenced in the body of this decision, but the Panel is hopeful that information from that study may be informative for the Director going forward.

[513] For the above reasons, and notwithstanding that the Amendment is confirmed, the Panel makes the following recommendations for the Director's consideration:

- The Director consider requiring that the human health section of the EEM Plan is updated to provide KPIs for facility-based mitigation actions based on provincially-adopted and applied SO_2 ambient air quality objectives or guidelines and in the event that such objectives or guidelines are not adopted by the end of 2017 or prior to the smelter reaching full operational capacity under the KMP, whichever occurs first. Then the Director consider requiring that the EEM Plan be amended to include, as the KPI for facility-based mitigation action, the current SO_2 ambient air quality objective or standard set in order of preference, by the Canadian government, the U.S. EPA, or the World Health Organization.
- By December 31, 2016, the Director engage with Ministry executive to secure their support for, and action to encourage, a provincially-led Kitimat region health study, based on the development of a feasibility assessment for such a study.
- In the event that the Province undertakes a regional health study for the Kitimat region, the Director take all reasonable steps to ensure that Rio Tinto participate in that health study, as provided in the October 7, 2014 letter from Gaby Poirier, Rio Tinto's General Manager of BC Operations, to the

Director re: "Commitment Letter for Participation in an Industrial Emissions related Kitimat Respiratory Health Study".

- The Director consider the results of any Kitimat region health study that is conducted, and determine whether any amendments are required to the Amendment or the EEM Plan.
- The Director consult with the Ministry of Health, the BC Centre for Disease Control, and the Northern Health Authority regarding the results of the 2015 Prince Rupert Airshed study.
- The Director consider the results of the May 2015 Prince Rupert Airshed study, and its applicability to the conclusions reached in the health sections of the STAR, and that the Director determine whether any amendments are required to the Amendment or to the EEM Plan as a result of information obtained from that study, to improve the protection of human health and the environment.
- The Director secure the support of the Ministry to request that the Province develop a health advisory system for the Kitimat region to alert residents to issues of air quality that may impact their health, and that the Ministry's Clean Air Branch work toward developing a Kitimat SO_2 Public Advisory policy as part of that health advisory system.
- The Ministry post information obtained from the Rio Tinto air quality monitoring network in the Kitimat valley on the Ministry's website.
- The Director require that Rio Tinto invite interested members of the Public Advisory Committee to observe the annual vegetation surveys, and provide the Public Advisory Committee with annual reports of the results of the monitoring carried out under the EEM Plan.

"Brenda Edwards"

Brenda Edwards, Panel Chair
Environmental Appeal Board

"Tony Fogarassy"

Tony Fogarassy, Member
Environmental Appeal Board

"Daphne Stancil"

Daphne Stancil, Member
Environmental Appeal Board

December 23, 2015