BLACKROCKMETALS

BlackRock Project

Iron ore exploitation at lac Doré geological complex

Volume 1. Main document

Answers to questions and comments, 2nd series from federal committee

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GENIVAR

BlackRock Metals Mining Project – Iron Ore Mine at the Lac Doré Geological Complex

Responses to the 2nd series of questions and comments from the Federal Committee

Canadian Environmental Assessment Agency

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TABLE OF CONTENTS

APPENDICES

1 INTRODUCTION

This document contains responses to the second series of questions and comments sent to BlackRock Metals by the Federal Committee (Canadian Environmental Assessment Agency), in relation to the project to mine the iron ore of the Lac Doré geological complex. It also responds to questions sent to the Federal Committee by the community of Mashteuiatsh.

It should be noted that since the filing of the impact study in November 2011, the project has been optimized. The optimization mainly focused on the location of the waste rock piles and fine and coarse tailings facilities, as well as the water management facilities (polishing pond, treatment and monitoring pond, discharge point, drainage ditches). A document presenting the project update and improvements was filed at the same time as this document responding to the Federal Committee's questions and comments.

The responses to the questions and comments (RQC) from federal government agencies are shown in **bold** and **blue** to make them easier to find in the text.

2 RESPONSES TO QUESTIONS

1. Questions and comments from Environment Canada

Our expert opinion concerns the following issues: protection of the aquatic environment and application of the Metal Mining Effluent Regulations, climate, air quality, greenhouse gases, migratory birds and their habitats, the migratory birds on the list of species at risk under the Species at Risk Act (SARA), wetlands, pollution prevention and environmental emergencies.

1.1 Context and general comments

This project involves the mining of an iron, titanium and vanadium deposit located near Chibougamau, in the Lac Doré area. The mining area would be about 2.5 km long and 100 to 400 m wide. BlackRock Metals Inc. plans to build an industrial complex to mine and process the ore in order to obtain iron concentrate. The iron concentrate will be shipped by train from the mine site to the port of Quebec or the port of Saguenay. In total, 152,165 Kt of ore will be mined from the pit to produce 38,335 Kt of concentrate. During the same period, 264,219 Kt of waste rock will be generated. In total, 423,633 Kt of material will be excavated. The mine site will involve the construction of a 161 kV hydroelectric power line approximately 30 km long, for which Hydro-Québec will assume full responsibility.

On December 23, 2011, Environment Canada sent the CEAA an initial analysis, in its areas of expertise, of the information provided by the proponent in the context of the environmental assessment of this project. On January 2, 2012, the CEAA sent the proponent a first series of questions and requests for missing information. On January 16, 2012, we provided a supplement to the preliminary version of the compliance analysis sent in December. The CEAA sent this new version of the analysis to the proponent on January 24, 2012. On March 2, 2012, we received a first response to the supplemental information request. Although the proponent responded to some of the items in this request, we are still waiting for a response to a number of other points. On April 5, we received an updated description of the BlackRock mining project concerning the rail line for transporting the concentrate.

According to the environmental impact statement, all infrastructure for the mining project will be consolidated in the Lac Jean watershed. This watershed includes many lakes and their tributaries and emissaries, all of which will be directly affected by the project. If the option to use water bodies frequented by fish is chosen, a study of the alternatives for the storage of mine tailings must be submitted. This study is currently missing from the environmental impact statement. Specific comments on this point are provided below.

1.2 Regulatory framework and the role of the government

The Canadian Environmental Protection Act, 1999 (CEPA) should be added to section 1.4 (Legal Framework) of the environmental impact statement. In addition to the regulations mentioned in the supplementary information, it would also be relevant to add the National Pollutant Release Inventory (NPRI), since the owners or operators of facilities that meet the criteria are required to report to the NPRI and this may even

be necessary before the mine becomes operational if the reporting requirements are met.

Once construction of an open-pit or underground mine begins, NPRI reporting may be necessary if the reporting criteria and thresholds are met. In this case, the report to the NPRI should include reporting of the substances present in the waste rock generated during the mine development (construction) phase. The reporting of waste rock would be included only if waste rock is not specifically excluded, in accordance with the NPRI notice. For more information on the reporting of waste rock, consult the Guidance for the Reporting of Tailings and Waste Rock to the National Pollutant Release Inventory (Environment Canada, December 2009): http://www.ec.gc.ca/inrp-npri/default.asp?lang=en&n=C115DEB3-1.

During the development (construction) phase, all NPRI requirements apply (e.g. emissions of the main atmospheric contaminants from stationary combustion equipment, releases into water from waste rock piles or other sources of effluents, dust from roads, etc.) if the reporting criteria are met.

For more information about the National Pollutant Release Inventory, consult: http://www.ec.gc.ca/inrp-npri/.

1.3 Protection of the aquatic environment and application of the MMER

The information concerning the MMER in the environmental impact statement, in particular on page 314, should be corrected: the MMER are regulations adopted pursuant to the Fisheries Act, the administration of which was delegated by Fisheries and Oceans Canada to Environment Canada.

1.3.1 Selection of sites and routes for facilities and infrastructure

In section 3.2.1 “Host Environment and Infrastructure”:

- Complete the list of “the planned infrastructure directly linked to the mining operation.” For example, add to this list the treatment and monitoring pond, the lower pool of the Lac Denis dam, the ditches for the collection of drainage water from the operations area, etc.

RQC-1

An optimized layout of various infrastructure components is shown on the map in Appendix 1. The list of planned facilities directly linked to mine operation comprises the following elements:

- **pit;**
- **processing plant and concentrator;**
- **crusher, conveyors;**
- **ore stockpile;**
- **garage and fuel storage areas;**
- **explosives and detonator magazines;**
- **haulage roads;**

- **(1) main waste rock pile;**
- **(1) secondary waste rock pile;**
- **(1) coarse tailings pile;**
- **(1) fine tailings pond;**
- **network of drainage ditches;**
- **fine tailings pond dams;**
- **pumping station and settling pond**
- **industrial water treatment plant and pond**
- **monitoring station at the discharge point.**

- Provide the general layout plan of the mine operations area, including all facilities and infrastructure related to mine operations, in an appropriate format, i.e. 1:15,000 or 1:20,000 scale topographic map.

RQC-2

See map in Appendix 1.

- Concerning the coarse tailings pile, provide the various scenarios that were considered for the disposal of coarse tailings. For each scenario, include all anticipated impacts.

RQC-3

See RQC-17.

- Provide all details on the construction of the waste rock and coarse tailings piles, considering their encroachment on lakes and streams (plan, cross section, elevation, etc.).

RQC-4

The study area borders on the drainage divide between the Saguenay and James Bay watersheds. The subwatershed hosting the project is the Lac Jean catchment, which itself flows into Lac Chibougamau.

The future mine site's catchment is thus surrounded by:

1) the drainage divide between the Saguenay and James Bay watersheds;

2) the Lac Bernadette catchment;

3) the Lac Armitage catchment;

4) the pit and processing plant are directly within the Lac Jean catchment, which is divided into two parts: downstream, the rugged topography creates a smaller catchment that flows southeast into Lac Jean;

5) the Lac Laugon catchment.

See also RQC-7 and RQC-17.

The map of the facilities and layout superimposed on the streams and lakes is provided in Appendix 1, and a cross-section is provided in Figure 4.14 of the impact statement (p. 142, Volume 1). Final plans will be submitted with the applications for the certificates of authorization for construction.

In section 3.2.2 “Selection Criteria,” the proponent indicates that the selection criteria for the various locations were based, among other references, on Environment Canada’s Guidelines for the Assessment of Alternatives for Mine Waste Disposal (September 2011). However, there is no indication as to how the use of these guidelines contributed to the assessment of the project, particularly since the criteria were not assessed according to the procedure set out in the guidelines. For example, these guidelines specify that at least three scenarios must be considered for the disposal of mine waste, including at least one exclusively land-based option.

In Tables 3.4, 3.5 and 3.6, various scenarios are presented for the location of certain infrastructure components:

- For each scenario, indicate on an appropriate scale map the locations considered.

RQC-5

Following project optimization, the location of the various facilities changed (see map in Appendix 1). The analysis of the various scenarios for the final layout for the mine tailings is presented in Appendix 2 (RQC-17).

- Table 3.5 indicates that option 2 for the tailings site in the Lac Armitage area would be the option with the largest footprint. However, this option is 115 ha compared to 176 ha for option 1 located near the pit. Explain.

RQC-6

The project has been optimized and the footprint for the coarse and fine tailings sites will be about 275 ha. Also see RQC-17, which presents the analysis of various options considered, and the final option selected.

- Complete this table by indicating, for each mine infrastructure component, the names of the lakes and streams that will be affected.

RQC-7

Based on the new layout (optimized project, see map in Appendix 1), the lakes affected are lakes B-1, B-3, B-6, B-7, B-8, B-9, B-11, B-12, B-13, B-14, Lac Denis and Lac Jean, along with their associated stream segments.

- **Pumping reservoir: Lac Denis;**
- **Discharge point: Lac Jean;**
- **Coarse tailings pile: lakes B-1, B-7 and B-9;**
- **Fine tailings pond: lakes B-3, B-6 and B-8;**

- **Waste rock pile: lakes B-11, B-12, B-13 and B-14.**

It should be recalled that the impact statement indicates that lakes and ponds B-1, B-6, B-3 and B-12 are unable to sustain life in winter (freeze solid), and that lakes B-8, B-9 and B-11 are bog lakes.

1.3.2 Waste rock dump and tailings impoundment area

In the environmental impact statement, a number of elements relating to the management of waste rock and tailings are incomplete or even missing altogether.

1.3.2.1 Tailings sites and waste rock platforms

In section 3.5 "Tailings Management Facilities and Waste Rock Pile," the proponent presents the options considered in terms of locations for storage of tailings and waste rock. One hypothesis presented is that the coarse tailings could be used to produce TiO_2 concentrate. However, we note that the rehabilitation plan provides for the gradual rehabilitation of this coarse tailings pile during the operation of phase 1 of the mining project (i.e. the project covered by the present environmental impact statement).

- According to the answers provided to Environment Canada's questions (March 2, 2012), the proponent is planning to use specially adapted management techniques to minimize the migration of organic soil in the tailings mass. What are these techniques?

RQC-8

Revegetation efforts will begin as soon as the first tailings bench is completed to minimize the migration of organic soils. The use of seeded straw mulch (hydro seeding) is also planned to accelerate revegetation of the completed benches.

Although the proponent refers in section 3.5.1 of the environmental impact statement to waste rock platforms that will be constructed for the deposition of coarse tailings, no explanation could be found concerning the function of the platforms shown in Figure 4.1 and located within the tailings site, the polishing pond and the settling pond.

- For each case where platforms or facilities are planned, indicate on an overlay map all lakes and streams that will be affected.

RQC-9

Following project optimization, the platforms (pads) shown in Figure 4.1 of the impact statement will no longer be required.

See map in Appendix 1, as well as RQC-7 for the lakes affected.

- Document the construction parameters for these facilities, such as height, quantity of material required, grades, analysis of anticipated flow, elevation, plan and cross-section views, etc.

RQC-10

See RQC-9.

- Specify the planned use and need for these facilities and the possible alternative scenarios.

RQC-11

See RQC-9.

Despite the information provided in Table 3.2, the environmental impact statement does not enable us to assess the relevance of the planned surface areas for the storage of waste rock, tailings and coarse tailings.

- Provide a more complete analysis on the use of these areas, for example maximum storage capacity versus anticipated use. In particular, it is difficult to understand why an area of 109 ha is required to store 42 Mm^3 of coarse tailings when approximately the same area (110 ha) is required to store 264 Mt of waste rock. Considering a conversion factor of approximately 3 t/m^3, this represents approximately 88 Mm^3, or double the quantity of coarse tailings. Explain.

RQC-12

Remember that following project optimization, the areas required are different from those presented in the impact statement filed in November 2011. In particular, we have taken advantage of the site topography to optimize the height and area of the fine and coarse tailings facilities.

The difference in the areas required stems from the size of particles stored in the tailings facilities and the waste rock piles. The tailings are made up of sand-sized particles, whereas the waste rock is much larger (30 cm to 1,500 cm), which allows for a larger pile with greater stability.

- Since the proponent provided very little information on the design and storage characteristics of the tailings site, it is impossible to assess the adequacy of the area proposed by the proponent relative to actual storage requirements.

RQC-13

See RQC-4, RQC-12, RQC-14 and RQC-17.

According to the information provided in the environmental impact statement, no dams appear to be required for containment of the coarse tailings.

- Confirm and document this statement.

RQC-14

The coarse tailings from the operation of this project are considered waste rock because they do not generate acid mine drainage (AMD) or any other trace metals (see RQC-21 and RQC-22). They consist of medium-sized sand, and it is easy to store them as rock without containing them in a reservoir or vast closed

facility. They can easily be stored in multiple layers, like a traditional waste dump. This considerably reduces their footprint

Water that drains into the ditches around the coarse tailings facility will flow into the first tailings pond.

- We remind the proponent that the Metal Mining Effluent Regulations require that a tailings impoundment area be confined by man-made or natural structures or by both.

BlackRock Metals based the coarse tailings containment on the MMER. See also RQC-14 and RQC-17.

Concerning section 4.4 “Tailings Management”:

- Provide the various options considered for the location of the coarse tailings pile, the fine tailings pond and the waste rock pile.

RQC-15

See RQC-17.

- According to the pilot test results, the coarse and fine tailings are similar in composition. Since there are plans to produce a TiO_2 concentrate from the coarse tailings, indicate how the areas currently planned for the deposition of the tailings will be sufficient and properly designed to store the tailings that will be generated.

RQC-16

Although BlackRock Metals is not yet in a position to determine whether a TiO_2 concentrate will be produced, this possibility has been taken into account in the tailings disposal design, volume calculations and space requirements.

1.3.2.2 Use of water bodies frequented by fish for the disposal of waste rock and tailings

Based on the information provided in the environmental impact statement, water bodies frequented by fish will be used as waste rock dumps and tailings impoundment areas, specifically lakes B-3, B-6, B-7, B-11, B-12, B-13 and B-14.

The use of natural water bodies frequented by fish for the disposal of tailings first requires an amendment to the Metal Mining Effluent Regulations (designation in Schedule 2 of the Regulations). The decision to proceed with this regulatory amendment ultimately rests with the Governor in Council. This designation must be preceded by an assessment of the alternatives in accordance with the requirements of the guidelines presented in the *Guidelines for the Assessment of Alternatives for Mine Waste Disposal* (Environment Canada, 2011).

That being said, the environmental impact statement does not provide any assessment of the alternatives in accordance with the above-mentioned guidelines. Two alternatives are briefly described in the environmental impact statement. In the responses to Environment Canada’s initial request, the proponent presents three alternatives (see Table 17 of the response document). However, the procedure used

does not appear to refer to the *Guidelines for the Assessment of Alternatives for Mine Waste Disposal* recommended by Environment Canada. Thus, the assessment method used fails to consider all environmental, technical, economic and socio-economic indicators, nor does it take into account the commencement of mining operations, the operation of the mine or the closure of the mine site.

We therefore request that the proponent:

- Demonstrate which of the options considered constitutes the best option for the disposal of mine waste from an environmental, technical, economic and socio-economic perspective, as described in the *Guidelines for the Assessment of Alternatives for Mine Waste Disposal* published by Environment Canada (September 2011 version).

RQC-17

The best option for tailings and waste rock disposal was determined from a thorough assessment based on Environment Canada's *Guidelines for the Assessment of Alternatives for Mine Waste Disposal.*

Appendix 2 presents the full analysis of the assessment underlying the choice of the selected option.

- Conduct an assessment of the alternatives considered. Present the detailed analysis and conclusions as well as the reasons for rejection and/or consideration.

RQC-18

See Appendix 2.

- Consider at least one alternative that should not have an impact on a water body frequented by fish (land-based option). This option, as described in the guidelines, was not considered by the proponent.

RQC-19

See Appendix 2.

- Explain how the configuration and boundaries of the tailings site were determined in order to permit a better understanding of the need for the complete or partial destruction of natural water bodies.

RQC-20

See Appendix 2.

1.3.2.3 Assessment of whether waste rock is deleterious

The analysis carried out by the proponent concerning the characterisation of the waste rock and the assessment and demonstration of whether the waste rock is deleterious or not is incomplete. In section 4.4.1 of the environmental impact statement, the proponent states that "Some of the inert, competent waste rock (6.3 Mm^3) will be used for the construction of infrastructure […]," but no study is

provided to demonstrate this. Since there are plans to dispose of part of the waste rock in a natural water body frequented by fish, the proponent is required to provide this demonstration so that Environment Canada can make a decision on the necessary regulatory measures. Unless the proponent can demonstrate that the waste rock is not deleterious, it must follow the *Guidelines for the Assessment of Alternatives for Mine Waste Disposal* and demonstrate that the use of a natural water body frequented by fish for the disposal of waste rock is the most appropriate option.

RQC-21

A waste rock characterisation study is currently underway. In all, more than 114 rock samples were collected from exploration drill core and subjected to various static tests to determine their acid-generating and metal-leaching potential.

Based on the proposed open pit design and drilling, six main lithologies are associated with the Lac Doré geological complex. In order of volume (of waste rock) to be extracted, the six lithologies are:

- **Anorthosite: 28%**
- **Leucogabbro: 25%**
- **Gabbro: 20%**
- **Pyroxenite:20%**
- **Diabase:7%**
- **Ferrogabbro: ore**

The volume for each lithology was estimated from geological cross-sections from exploration drilling, superimposed on the future pit outline. Only the lithologies with significant relative volume were designated as waste rock.

The static tests selected for waste rock classification were those required by the Directive 019, which are the acid-generating potential, metal content and toxic characteristic leaching procedure (TCLP). We will determine whether more tests are needed once the results have been compiled.

Acid-generating potential

Tests for acid-generating potential were conducted on all samples. Results showed that only 5 samples out of 113 showed acid-generating potential, which is marginal and means that the pile as a whole will not generate acid when exposed to air.

Metal-leaching potential

Toxic characteristic leaching procedure (TCLP) tests were done as required by Directive 019 for the mining industry. These tests are not representative of field conditions, even less so when the rocks are not acid-generating. In fact, the test is performed under acid pH conditions, which will not occur as the rock is not acid-generating. However, Directive 019 requires that this test be carried out and that waste rock be classified based on the results.

Consequently, under TCLP test conditions, several samples leach aluminum, copper and zinc. A few samples leach chromium and, we also noted, lead and mercury very marginally. Given that waste rock will not be leached by acid drainage, BlackRock has developed a protocol for testing metal-leaching potential under neutral pH conditions, which is realistic in terms of what will occur in the field. The protocol includes leach tests with water, and some tailings samples are currently undergoing kinetic testing in humidity cells. Results will be sent to the Federal Committee as soon as they become available.

See also Appendix 2 for the justification of the site selected for waste rock disposal.

1.3.3 Water management

1.3.3.1 Drainage conditions and water quality

The environmental impact statement is incomplete with respect to the collection and management of runoff and drainage water from the waste rock piles, coarse tailings, tailings site and mine operations area generally. Moreover, the study provides no analysis or assessment of discharges from these sites.

- Conduct an analysis of the discharges from the waste rock piles, coarse tailings and tailings site. This analysis should be carried out on the basis of the design of the structures and the characteristics of the materials on which the tailings and waste rock will be stored and confined.

RQC-22

Water that drains or seeps from the tailings facilities and waste rock pile will collect in the network of ditches surrounding the property. All the water will flow toward a monitoring point downstream from the property.

In terms of the quality of seepage water, static tests (TCLP leaching) done on the waste rock do not allow prediction of the quality of the seepage from the waste rock piles. Upcoming tests (see RQC-21) will allow us to better predict whether some metals will be problematic.

For the tailings, samples are currently being tested to better define the acid-generating and metal-leaching potential. The samples were produced in 2012 by COREM, where the metallurgical testing was done.

The samples produced were sent to the SGS laboratory in Lakefield, where kinetic testing in humidity cells began in August 2012. Results will be available in the fall of 2012 and will be sent to the Federal Committee. In addition to the kinetic tests, static tests were also done on the tailing samples. Preliminary results show that the tailings are not acid-generating. Results are not yet available for the leaching potential.

- Complete the analysis elements presented in sections 4.5.2.3 and 4.6.2 by specifying the methods for collecting runoff and drainage water, the potential contaminants, the planned methods for treating the contaminants and the

contingency measures planned in order to comply with the discharge standards of the *Metal Mining Effluent Regulations*.

RQC-23

Due to the activities inherent in mining operations, the risk of water contamination is mainly related to the presence of suspended solids in water and the risk of a hydrocarbon spill. The following measures will be taken to limit these risks:

- **All runoff and drainage water will collect in the network of ditches surrounding the property (see map in Appendix 1). All the water will ultimately be directed toward a monitoring point downstream from the property;**
- **All the water that comes into contact with ore, equipment, waste rock or tailings will be treated at a treatment station downstream from the polishing pond before being released into the environment;**
- **For added security, a dam will contain the treated water as needed before it is released into the creek upstream from Lac Jean.**

In section 4.5 “Water Management and Recycling,” Figure 4.1 and the text (p. 122) are not sufficiently detailed to permit an assessment of the drainage conditions of the mine operations area.

- Provide information concerning the drainage conditions on the entire mine operations site during the mine construction and operation period, i.e. natural management of water on the mine operations site (runoff, drainage water, diversion ditches, water catchment basins, structure design, etc.) in plan form and with a specific section of text.

RQC-24

During the construction phase, all water from excavation work and from the job site area will be intercepted by a pond of about 32 ha that will be built downstream from the construction site.

This pond will be positioned to intercept all water containing suspended solids (SS). If needed, a temporary facility equipped with a geopipe system will allow SS to precipitate before water is released into the environment.

During the mine operation phase, water from the entire site will flow into the subwatershed downstream from the property. A polishing pond of about 39 ha will be built downstream from the fine tailings pond. This pond will receive all water containing SS.

In summary:

- **All water from the site will be sent to the fine tailings pond;**
- **Some of the sediments in the water will precipitate naturally in the fine tailings pond;**

- **Overflow will spill into a first pond (polishing pond) located downstream from the fine tailings pond;**

- **A pumping station will be built to pump the needed water to the processing plant;**

- **Water will pass through a treatment pond and all water quality parameters will be measured. If needed, products will be added to bring the water up to various ministry standards;**

- **Water leaving the first treatment pond (polishing pond) will collect in a second pond (treatment and monitoring pond) to precipitate fine sediments and stabilize the water before sending it to the final discharge point;**

- **At the outlet of the second pond, flow and all other characteristics of the water will be measured before it is sent to the discharge point;**

- **If water quality measurements do not comply or the polishing pond is not functioning properly, the final discharge point will be closed and the technician will be notified;**

- **Corrective measures will be taken before releasing the water into the environment.**

- Complete Figure 4.7 “Water Balance” by including the drainage water from the coarse tailings piles and waste rock pile as well as the effluent from the treatment and monitoring pond, specifying the effluent discharge periods and the anticipated monthly volumes.

RQC-25

The figure for the water balance is presented in Appendix 3. Drainage water from the coarse tailings and waste rock piles are discussed in Appendix 4. The final effluents are shown in the table below. Note that the final effluent discharged toward Lac Jean will be recalculated as the project moves ahead; results will be sent to the Federal Committee as soon as they become available.

Table 1. Monthly discharges into the environment

Table 2. Daily discharges into the environment

Tableau 1 : Décharge vers l'environnement par mois

	janvier (m^3)	février (m^3)	mars (m^3)	avril (m^3)	mai (m^3)	juin (m^3)	juillet (m^3)	aout (m^3)	septembre (m^3)	octobre (m^3)	novembre (m^3)	décembre (m^3)	Total (m^3)
2014	0	0	0	0	0	0	0	0	0	0	0	0	0
2015	0	0	0	0	0	0	0	0	77 711	431 075	385 662	0	894 448
2016	0	0	0	56 475	112 950	112 950	651 452	577 183	526 667	451 938	135 540	0	2 625 155
2017	0	0	0	60 277	120 555	120 555	651 452	573 380	519 062	442 812	144 666	0	2 632 760
2018	0	0	0	60 277	120 555	120 555	651 452	573 380	519 062	442 812	144 666	0	2 632 760
2019	0	0	0	60 277	120 555	120 555	651 452	573 380	519 062	442 812	144 666	0	2 632 760
2020	0	0	0	56 475	112 950	112 950	651 452	577 183	526 667	451 938	135 540	0	2 625 155
2021	0	0	0	60 277	120 555	120 555	651 452	573 380	519 062	442 812	144 666	0	2 632 760
2022	0	0	0	60 277	120 555	120 555	651 452	573 380	519 062	442 812	144 666	0	2 632 760
2023	0	0	0	60 277	120 555	120 555	651 452	573 380	519 062	442 812	144 666	0	2 632 760
2024	0	0	0	56 475	112 950	112 950	651 452	577 183	526 667	451 938	135 540	0	2 625 155
2025	0	0	0	60 277	120 555	120 555	651 452	573 380	519 062	442 812	144 666	0	2 632 760
2026	0	0	0	60 277	120 555	120 555	651 452	573 380	519 062	442 812	144 666	0	2 632 760

Tableau 2 : Décharge vers l'environnement par jour

	janvier (m^3/j)	février (m^3/j)	mars (m^3/j)	avril (m^3/j)	mai (m^3/j)	juin (m^3/j)	juillet (m^3/j)	aout (m^3/j)	septembre (m^3/j)	octobre (m^3/j)	novembre (m^3/j)	décembre (m^3/j)
2014	0	0	0	0	0	0	0	0	0	0	0	0
2015	0	0	0	0	0	0	0	0	2 590	14 370	12 860	0
2016	0	0	0	1 880	3 770	3 770	2 1 720	19 240	17 560	15 060	4 520	0
2017+	0	0	0	2 010	4 020	4 020	21 720	19 110	17 300	14 760	4 820	0

The environmental impact statement, in particular sections 4.6 and 10.7, does not provide sufficient detail concerning the anticipated impacts on surface water and groundwater quality:

- Include the water management modelling results, the volumes, the various contaminants, their estimated concentrations, the extent of the receiving environments that will be disturbed, the anticipated impacts, etc.

RQC-26

No water management modelling was done. However, drainage and effluent discharges are discussed in RQC-25. Following new calculations of the water balance (study underway) and given the results on the toxicity of the waste rock and tailings (studies underway, see also RQC-21 and RQC-45), surface water quality and the anticipated effects could be discussed in more detail in a supplemental report for submission to the Federal Committee as soon as possible.

- Include in the various water balances for the site an estimation of anticipated precipitation and details on drainage conditions, management of water from the pit, groundwater and other water. The environmental impact statement should make it possible to study the anticipated changes to the hydrological and hydrogeological regime and the associated impacts, to estimate the effluent mixing zone, etc.

RQC-27

Following additional studies currently underway on the hydrological regime, changes and the related potential effects will be presented in a supplemental report that will be submitted to the Federal Committee as soon as possible.

The proponent indicates that excess water will be returned to the receiving environment via Lac Denis and that the water will thus meet the standards for discharge into the aquatic environment.

- Specify the location of the final effluent discharge point, i.e. the regulatory compliance control point.

RQC-28

The final effluent discharge point is the stream at the outlet of the treatment and monitoring pond, which flows into Lac Jean (see plan in Appendix 1).

In section 10.7 "Project Impact on Water Quality," the proponent writes: "As the groundwater level is very close to surface in this area […] the leached water would very quickly discharge into ditches built for this purpose."

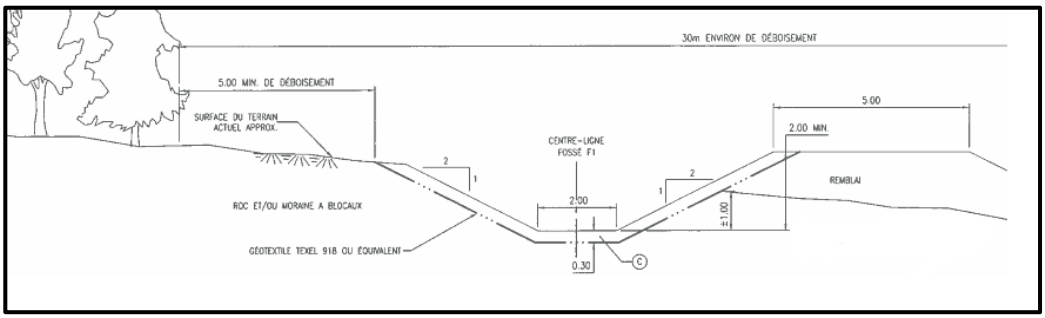
- Document in greater detail the existence and characteristics of these ditches, since no ditches for the catchment of this water are shown on the facilities location plan for the western part of the mine operations area (Figure 4.1, Volume 1, page 100).

RQC-29

The characteristics of the ditches are as follows:

- **minimum slope of 1% over the entire length;**
- **for ditches dug in till, installation of geotextile and riprap (to prevent erosion) on the bottom and sides;**
- **no geotextile or riprap is needed for ditches dug directly in bedrock.**

The following figure shows a representative cross-section of the planned ditches. The location of ditches is shown on the map in Appendix 1.



1.3.3.2 Process water balance

The process water balance (section 4.5.1) is incomplete and imprecise. The proponent indicates that process water requirements are 4,115 m^3/hour.

- Since the rate of production will increase over time (from 2 Mt of concentrate at the start of mining operations to 5 Mt after three years), specify the value used to estimate process water requirements.

RQC-30

BlackRock Metals has revised its production requirements (see project update document filed), particularly given the new location of the fine tailings pond downstream from the Lac Denis reservoir. The figure in Appendix 3 provides an estimate of water requirements.

- Revise the total balance in terms of process water required and quantities recycled based on the various anticipated production rates.

RQC-31

See Appendix 3.

- Adjust the balance of discharges to Lac Denis and to the receiving environment accordingly.

RQC-32

Following project optimization, the final effluent from the last treatment pond will flow toward Lac Jean. The balance of discharges to Lac Jean is presented in the table in RQC-25.

1.3.3.3 Ponds used for water recycling

According to the information included in section 4.5.2.3 of the environmental impact statement, sources of water fed to Lac Denis include precipitation and runoff over an area of approximately 2.7 Mm^2 of its catchment.

- Illustrate, on an appropriately scaled map, the area of the mine site that will drain toward Lac Denis, indicating the direction and anticipated volumes of flows. It should be noted that runoff from the operations area constitutes surface drainage and effluents within the meaning of the MMER. Release of this untreated runoff into Lac Denis would likely **constitute a violation of subsection 36(3) of the Fisheries Act**.

RQC-33

The table showing the anticipated volume of runoff that will end up in Lac Denis can be found on the first page of Appendix 4.

- Provide the water balance for Lac Denis. In fact, the impact statement does not mention the impact of the discharge of such a volume of effluent in addition to the effluent from the polishing pond to Lac Denis (the annual volumes of effluents

that will be discharged to Lac Denis far exceed the volume of the lake even once increased).

RQC-34

Following project optimization, all water collected and treated will be returned to Lac Jean. The water balance for the Lac Jean catchment will be submitted to the Federal Committee as soon as it is ready (see RQC-26).

- Assess the impact of the effluent discharges on the physicochemical water quality of Lac Denis and compare this quality against the Canadian Water Quality Guidelines for the Protection of Aquatic Life and the Quebec surface water quality criteria.

RQC-35

Following project optimization, all water collected and treated will be returned to Lac Jean. The effect of the final effluent will be discussed in a supplemental report still to come (see RQC-27).

In section 4.5.2.4 "Process Water Tank," it is stated that "This water (water for recycling) comes from […] and water reclaimed through percolation at the coarse tailings pile." There is no indication of the path the water from the coarse tailings pile will follow to the tank. However, section 4.5.2.3 indicates that runoff from Lac Jean catchment (in which the coarse tailings pile is located) will flow to the treatment and monitoring pond north of the waste rock pile by natural circulation.

- Specify the methods planned for the capture and treatment of runoff and drainage water from each coarse tailings pile.

RQC-36

The network of drainage ditches will collect runoff and drainage water from the coarse tailings piles (see map in Appendix 1).

Treatment of runoff and drainage water is discussed in RQC-23, RQC-37 and RQC-38.

1.3.4 Industrial water treatment

In section 4.6, the proponent states that "[…] Directive 019 specifies the physicochemical and toxicological properties that the mine effluent must meet at its final point of discharge."

- The Metal Mining Effluent Regulations (MMER) also specify standards for the final discharge of mine effluent.

The standards for final discharge of mine effluents that will be strictly adhered to by BlackRock are indeed from the MMER, as well as the MDDEP's Directive 019.

Although the polishing pond is designed so that the water resides there for 30 days, the environmental impact statement seems to indicate: 1) that the proponent was not

able to validate or estimate the effectiveness of water treatment with this retention time; and 2) that this retention time was determined more or less randomly. Despite the results obtained for the settling tests, it appears that these tests were performed with a very limited number of process water samples from the pilot plant.

- Specify, with sufficient details, the measures planned to ensure compliance with the MMER.

RQC-37

We plan to monitor SS three times per week, at intervals of at least 24 hours (Directive 019). The MMER also requires that BlackRock Metals do environmental effects monitoring (EEM) studies in accordance with prescribed criteria. The EEM studies will allow the effect of mining effluents on the aquatic receiving environment to be assessed, especially with regard to fish, fish habitat and use of the fish resources. BlackRock Metals will carry out its monitoring plan in compliance with the "Environmental Code of Practice for Metal Mines" available online at: http://www.ec.gc.ca/lcpe-cepa/default.asp?lang=En&n=CBE3CD59-1.

In summary, the processing plant, which will be built southwest of the treatment and monitoring pond (see map in Appendix 1) will meet the standards through implementation of a thorough monitoring plan and suitable technological solutions.

- Indicate the nature of the treatment chemicals that should be considered, the anticipated annual quantity, where they will be stored and the planned location of the permanent treatment facility.

RQC-38

The chemical products to be used for water treatment are ferrous sulphate, a flocculant additive, and lime. Dosage will be adjusted to treatment requirements. It should be recalled that BlackRock Metals is aiming to recycle as much water as possible, which will minimize the need for treatment.

The permanent treatment facility is located in the southwest part of the treatment and monitoring pond (see map in Appendix 1).

- Also include information on the effectiveness of the planned treatment system for controlling and reducing ammonia concentrations (this substance caused mortality episodes during toxicity tests on rainbow trout).

RQC-39

BlackRock Metals will be able to significantly reduce ammonia concentration by using explosives with low levels of water-soluble ammonia and by using minimum doses.

In section 4.6.2 "Water Volumes at the Final Effluents of Lac Jean and Lac Denis," the proponent states that "The final effluent of Lac Jean includes precipitation […]."

- Should not this read the final effluent from the treatment and monitoring pond?

RQC-40

Following project optimization (see new project description), the final effluent will be downstream from the last dam (treatment and metering pond), in a small creek that discharges into Lac Jean. The project facilities layout (Appendix 1) shows the location of the final effluent.

In the same section, the proponent states that "The overflow from Lac Denis is channelled to lake B-1. This other final effluent will also be subject to controls under Directive 019 and the MMER."

- Since the choice of final discharge point may have an impact in terms of the application of the MMER, clarify whether the final effluent discharge point considered is the overflow from Lac Denis or the overflow from the polishing/settling pond. It is important that the final discharge point for the effluent from Lac Denis be identified with certainty since Lac Denis may have to be added to Schedule 2 of the MMER depending on the scenario considered and presented in the environmental impact statement. In the event that this option is not selected, we remind the proponent that pursuant to section 36(3) of the Fisheries Act, "no person shall deposit or permit the deposit of a deleterious substance of any type in water frequented by fish or in any place under any conditions where the deleterious substance or any other deleterious substance that results from the deposit of the deleterious substance may enter any such water."

RQC-41

See RQC-40.

1.3.5 Characterisation of the ore, solid wastes and process water

The information provided on the characterisation of the ore and tailings is very cursory. The proponent is therefore encouraged to complete this section taking into consideration our main recommendations.

The environmental impact statement indicates that the characterisation of the tailings, which was carried out in two stages, is based on five "representative samples selected by BlackRock" and on a bulk sample of 400 kg selected by BlackRock Metals. In our opinion, this very limited sampling cannot be considered representative of the rock mass when no information is provided concerning the origin of the samples or their statistical representativeness relative to the rock mass studied.

- Consequently, the information needed to assess the representativeness of the sampling should be provided or, if necessary, additional samples should be collected in order to obtain representative results.

RQC-42

A program to characterise future waste rock, ore and tailings is currently underway, as indicated in RQC-21 and RQC-22. For the tailings, static and kinetic tests are being conducted on a sample of re-split drill core. This sample has been put through the entire process, the iron concentrate has been

extracted and the tailings are now being analysed. The results will be transmitted to the Federal Committee as soon as they become available.

Information on the characterisation of the ore, the geology, the various formations present, the boreholes drilled and their locations, the modelling of the deposit, the characteristics specific to each geological formation, including appropriate mapping, etc., is either not provided or only briefly mentioned in section 10.2.

- Complete the environmental impact statement by providing the information listed above, which we require in order to properly review the assessment conducted by the proponent of the various characteristics of the materials in question.

RQC-43

The geochemical characterisation report currently being prepared will provide all the information requested. However, some information is already available in the technical feasibility study, in terms of the deposit characterisation, geology, drilling programs and modelling of the mineralized zone. Deposit mapping is provided in the feasibility study. However, mapping of the various waste rock lithologies have not been modelled in 3D. It is not common practice to do so. We can estimate which rock types will make up the waste rock based on the drill core and geological cross-sections.

The environmental impact statement indicates generally that the various mineralized formations listed in section 9.1 as well as the waste rock contain less than 0.3% sulphur primarily associated with pyrrhotite and that they are not acid-generating (section 4.6). However, the same study provides very little information on the tests that were performed and the results obtained.

- Include the tests performed for the characterisation of the acidic drainage and leaching potential of the metals in each of the geological formations present, in both the mineralized zone and the waste rock.

RQC-44

As already mentioned, the geochemical characterisation study will answer these questions (see RQC-21 and RQC-22).

- Document their neutralization potential.

RQC-45

To determine the acid-generating potential of the waste rock, tailings and ore, the neutralization potential was determined by titration following the procedure set out in the modified Sobek method. Results will be provided to the Federal Committee in the geochemical characterisation report.

- Present the information according to the various analytical criteria set out in well-established and recognized procedures.

RQC-46

Results from the various geochemical characterisation tests will be compared to the Directive 019 criteria, which refer to those of the Soil Protection and Rehabilitation of Contaminated Sites Policy. They will also be compared to the MMER criteria.

In section 9, it is indicated that the purpose of the characterisation work performed with the 2011 samples was to determine the toxicity of the process water for *Daphnia magna*.

- Considering that the Metal Mining Effluent Regulations require that water discharged from the final effluent not be toxic to rainbow trout, it would also have been relevant to conduct toxicity tests on this organism.

RQC-47

During the operation phase, BlackRock Metals will comply with the MMER, which indeed require that the final effluent not be toxic to rainbow trout (*Oncorhynchus mykiss*).

1.4 Climate

1.4.1 Description of the climate (section 2.4.1)

"*The average annual temperature was 0°C with an average maximum of 16.3°C in July and an average minimum of –18.6°C in January.*"

- 16.3°C is the average monthly temperature in July, while the average maximum temperature in July is 22.2°C.
- -18.6°C (should be -18.8°C) is the average monthly temperature in January, while the average minimum temperature in January is -24.2°C.
- Source: Climate Normals 1971-2000 for Chapais 2 (http://climate.weatheroffice.gc.ca/climate_normals/results_e.html?stnID=6026&prov=&lang=e&dCode=1&dispBack=1&StationName=chapais&SearchType=Contains&province=ALL&provBut=&month1=0&month2=12)

BlackRock Metals takes note of these clarifications regarding climate description.

"*Total annual precipitation recorded at the station was 961.3 mm per unit area*":

- Inappropriate terminology. The phrase "per unit area" should be deleted.

BlackRock Metals concedes this point on terminology.

"*Rain accounted for 659.7 mm of precipitation, and snowfall for 301.7 mm.*"

- Snowfall amounts are expressed in centimetres.

The quantity of snowfall should indeed have read as being around 302 cm.

"*Environment Canada climate normals, based on Chibougamau meteorological data from 1971 to 2000, indicated 182.2 days (49.35%) per year of 0.2 mm (trace precipitation) of precipitation or more.*"

- This section mentions the Chapais station as well as the Chibougamau station, which is confusing. The data used for the modelling of atmospheric dispersion are from the *Chibougamau Chapais A* station (49°46'N, 74°32'W), while the climate normals are from the *Chapais 2* station (49°47'N, 74°51'W).

RQC-48

This weather data from different sources can indeed lead to some confusion for the reader. However, the general description of the climate would not really change, regardless of which statistical data is used. Regarding the data used in climate modelling, please see the comments in the two paragraphs below and the ensuing response in RQC-49.

"Compared to 1951-1980 statistics (Environment Canada, 1982), the average annual temperature increased by 0.1°C, while averages for January and July increased by a little more than one degree. Similarly, total annual precipitation increased by 41 mm."

- It is an error to use climate normals to deduce a trend. In addition, comparisons should be made using spatial rather than point data. For trends, reference should be made to the literature, which requires a separate paragraph and a little research.

RQC-49

BlackRock Metals confirms that climate normals cannot be used to deduce a climate trend.

According to the James Bay Advisory Committee on the Environment (Portrait and Known Environmental Impacts of Climate Change on the James Bay Territory (2007)), the foreseeable trends are increases in temperature and precipitation. The main climate trends observed during the period from 1970 to 2002 show that the average annual temperature increased by 1 to 1.5°C in the boreal forest zone, with warming especially pronounced since the mid-1990s. Recent climate models suggest an increase in temperature of about 4°C for the James Bay Territory and an increase in precipitation of 2 to 32% a day by 2050 compared with the 1961-1990 period. As a result, river flow and groundwater levels could increase.

"Between 1 January 2006 and 31 December 2010, wind roses at the Chibougamau-Chapais airport meteorological station indicated prevailing winds from the northwest, east and south-southwest, with an average speed of about 10.9 km/h."

- We generated wind rose graphs and tables presenting the wind data on an annual, monthly and seasonal basis. The annual wind rose produced based on the 2006-2010 data, like the one generated based on the cumulative hourly data from the station (1980-2012), indicates that the prevailing winds are from the west-northwest and south-southwest. It is therefore questionable to include winds

from the east in the prevailing winds since they are actually among the least frequent winds.

RQC-50

Indeed, and Figure 5.4 of the impact study (Volume 1, p. 165) in fact shows clearly that winds from the east are not frequent in the area.

1.4.2 Air quality

In section 5.1 "Background," the proponent reports that, for the purposes of the study, two modelling scenarios were considered for Phase 2: 1) mine start-up year 2014 and 2) operating year 2020.

- According to the data presented, the field and operating conditions change every year. Explain why the construction period scenario is combined into a single period from 2012 to 2014.

RQC-51

Although field and operating conditions change each year, the period corresponding to Phase 1 (PP period) is estimated at 20 months,[1] which is the infrastructure construction phase. During this period, which extends from 2012 to 2014, only the stationary generator emissions were considered. Fuel oil No. 2 consumption is estimated at 1,080,000 litres[1] for a total 20-month period. Emissions for this type of equipment were considered to be constant for the duration of this period.

Moreover, according to Table 4.2 of the impact study (Volume 1, p. 104), the amount of ore processed was deemed sufficiently low during the PP phase (construction phase) to regard particle emissions as negligible (see RQC-54).

Review of the atmospheric dispersion study (which will be filed with the Federal Committee shortly in a supplemental report) will take into account particulate matter (PM_{tot} and $PM_{2.5}$) and gaseous (SO_2, NO_x) emissions, for which standards have been defined in the existing *Clean Air Regulation* (CAR).

- Why are only two cases considered for the Phase 2 scenario, i.e. the start-up year and the 2020 target year? In our opinion, Phase 2 should be subdivided into individual mine operating years until 2029. Develop and justify the approach adopted.

RQC-52

Two modelling scenarios were considered for Phase 2, i.e., 2014 (Year 1), when mine operation will begin, and 2020 (Year 7), which is the target production year. According to Table 4.2 of the impact study (Volume 1, p. 109), total tonnage for Year 1 (2014) is at a minimum since it is the start-up year for mine operation. On the other hand, Year 7, corresponding to 2020, represents a peak for ore processed and a very high annual tonnage. The choice of these two

[1] BlackRock Metals, Environmental and Social Impact Assessment Statement - Iron Ore Mine – Lac Doré Geological Complex, Volume 1, November 2011, Section 5.3.1, p. 166

scenarios allows the impact on air quality to be assessed in a start-up context (Phase 2, Scenario 1) and during peak operations (Phase 2, Scenario 2), which is considered a "worst case" for air pollution emissions.

Section 5.2.1 "Atmospheric Dispersion Modelling System":

- Were the effects of the evolution and the changes at the surface and at height of the piles on the local meteorological data taken into account?

RQC-53

The evolution and changes at surface and at height of the piles on local climate data were not taken into account when processing weather data using the AERMET module as AERMET does not use these properties as input data for the model. On the other hand, evolution and changes at surface and at height of the piles were taken into account in the parameterization of the AERMOD model, which uses weather data processed with AERMET. Furthermore, the depth of the pit was taken into account by the AERMOD model for both Phase 2 scenarios.

In section 5.2.2 "Definition of Modelling Scenarios," it is reported that the only emissions considered are those resulting from the oil used to fuel the generators. It appears that the emissions related to the use of equipment and vehicles on the site are not considered for the entire construction period.

- Document this choice.

RQC-54

Emissions related to the use of equipment and vehicles on site were not considered for Phase 1 (PP period) modelling, as indicated in Table 4.2 of the impact study (Volume 1, p. 104). During this period, very little ore, waste rock and overburden will be moved, implying low haulage volumes and consequently, few pieces of heavy equipment on the roads. According to Table 5-6 "Annual major mine equipment requirements" in the feasibility study entitled "Feasibility study updated report – 3017003", only one haul truck will be operating on the mine site during the PP period. Consequently, dust emissions are considered negligible for this period.

Section 5.2.5 "Meteorological Data":

- The choice of the Chibougamau Chapais A weather observation station is appropriate for the surface data considering the distance (30 km to the west of the site), the local environment (fairly unobstructed meteorological ground, with no obstructions to the wind, with no nearby water bodies or bare ground) and the regional environment (fairly uniform terrain).

BlackRock Metals concurs with this choice.

- However, the choice of the Maniwaki radiosonde station for the upper air weather data is inappropriate, since this station cannot be considered representative of the site given the distance (450 km). Indeed, over a few hundred kilometres, the

data at altitude (as well as at the surface) can differ considerably, enough to induce errors in pollutant dispersion modelling.

- We recommend instead using North American regional re-analysis data, available at a resolution of approximately 30 km, for the 1979-2010 window, at three-hour intervals (00:00, 03:00, 06:00… 21:00). These data are taken from a recent meteorological model which incorporates past observational data, hence the term "re-analysis." These data have proven very useful in climatological studies.

RQC-55

Black Rock Metals concurs with the choice of the Chibougamau Chapais A weather station for surface data.

As for the choice of an upper air station, there are few of them in the province of Quebec. The Maniwaki station is the upper air station closest to the BlackRock Metals mine site. According to the MDDEP's *Guide de modélisation de la dispersion atmosphérique* (April 2005), mixing heights should be estimated using data from the upper air station most representative of the site (Section 4.8, "Hauteur de mélange", p.6), which in this particular case is the Maniwaki station.

Section 5.2.5 "Meteorological Data," Table 5.5:

- The choice of conducting the analysis according to two six-month seasons (rain season and snow season) is appropriate. However, the separate analysis in two directional sectors does not, in our opinion, use the most appropriate sectors. Indeed, since the site is located to the southeast rather that to the east of Lac Chibougamau, and given the fact that the lakes and the physical geography clearly have a NE-SW orientation, it would have been preferable to use a NW-SE rather than W-E separation (NE-SW rather than N-S transect).

RQC-56

Given that a new model for the atmospheric dispersion of contaminants is required (to be submitted to the Federal Committee later in a supplemental report), land cover will need to be revised and the new sector orientation will be taken into account by the new analysis. The methodology applied will be the one from the US EPA's "AERMOD Implementation Guide" (March 2009), which says that land cover must be determined at the weather station, which in this modelling exercise is the Chibougamau Chapais A station.

- How did you determine the surface parameters for the modelling domain, in particular for the Bowen ratio, for which the values appear to be low?

RQC-57

The methodology used to determine surface parameters is not specified in the report on the atmospheric dispersion of contaminants.

When revising the dispersion study, surface parameters such as surface roughness, the Bowen ratio and albedo will be reassessed using the US EPA's

method outlined in the "AERMOD Implementation Guide" (March, 2009). The determination of surface roughness is based on an inverse distance-weighed geometric mean using a 1-km radius zone around the measurement site and divided into several sectors spanning no less than 30 degrees. Surface roughness varies from one sector to the next to account for variations in land cover. The determination of the Bowen ratio and albedo are based on a simple unweighted geometric mean (independent of direction or distance) for a domain whose default dimensions are 10 km by 10 km centred on the measurement site.

In section 5.3.1 "Determination of Phase I Emission Rates (2012-2014)," the proponent states that the only emission sources considered by the proponent during the construction period are the combustion products of the generators.

- Since the site construction (and rehabilitation) activities are additional significant sources of emissions, particularly of particulate matter (PM), the proponent must take them into account in the assessment of air quality. It would be useful to assess the particulate (PM, PM_{10} and $PM_{2.5}$) and nitrogen oxide emissions during these phases in particular. If the proponent does not consider the emissions of these activities, this choice must be documented and justified.

RQC-58

Since site construction (and rehabilitation) activities are other sources of significant emissions of particulate matter (PM), these emissions of particulate compounds will be considered in the new atmospheric dispersion model (supplemental report to come).

Emissions of PM_{tot} and $PM_{2.5}$ particulate compounds and NO_x gaseous compounds will be taken into account for Phase 1 (PP period) modelling. Compounds selected for modelling are those for which the CAR proposes standards or threshold values (PM_{tot}, $PM_{2.5}$, NO_x, SO_2). The CAR does not provide a standard or threshold value for PM_{10} particulates.

Section 5.5.4 "Emission Mitigation Measures and Environmental Monitoring":

- Three categories of methods for reducing particulate emissions are described in this section. The selected method is not clearly identified in the environmental impact statement. Does the proponent plan to apply a combination of these three methods? Specify.

RQC-59

When the atmospheric dispersion model is revised (supplemental report to be submitted to the Federal Committee at a later date), there will be a section on the mitigation methods with which BlackRock Metals must comply.

- With respect to environmental monitoring, the proponent proposes the installation of an air quality sampling and measuring station, as well as an automatic weather station. We agree with this proposal, which will allow the proponent to ensure that the project does not cause adverse impacts. In the event that emissions exceeding the concentrations set out in the applicable ambient air quality

standards (Quebec Clean Air Regulation and National Ambient Air Quality Objectives (NAAQOs)) are observed, the proponent will have to take corrective measures.

RQC-60

BlackRock Metals undertakes to carry out the proposed environmental monitoring plan, and to ensure the effectiveness of the weather and sampling stations. Furthermore, should ambient air quality standards as set out in the applicable regulations be exceeded, BlackRock Metals will take the corrective measures required to remedy the situation.

Concerning Appendix 5.1 - Contaminant Emission Rates of the Two Generators (2x800 KW and 2x1200 KW) - (Construction Camp and Mining Site) Phase 1 – (2012-2014):

- The references shown in Tables A and B are incorrect. However, after verification, it seems that these are the references indicated in Chapter 3 of the environmental impact statement, which represent the emissions from the generators. The corresponding tables would then be Tables 3.4-1, 3.4-3, etc. Correct.

RQC-61

The references provided in Tables A and B in Appendix 5.1 are incorrect. The following corrections need to be made:

- **References in lines 1, 2 and 3 ("CO Emission Factor", "NO_x Emission Factor" and "SO_2 Emission Factor", respectively) should be replaced with the following reference: US-EPA, AP-42, Section 3.4, "Large stationary diesel and all stationary dual-fuel engines," Table 3.4-1, "Gaseous emission factors for large stationary diesel and all stationary dual-fuel engines".**
- **References in lines 4, 5 and 6 ("Total PM Emission Factor", "PM_{10} Emission Factor" and "$PM_{2.5}$ Emission Factor", respectively) should be replaced with the following reference: US-EPA, AP-42, Section 3.4, "Large stationary diesel and all stationary dual-fuel engines", Table 3.4-2, "Particulate and particle-sizing emission factor for large uncontrolled stationary diesel engines".**
- **References in lines 7 and 9 ("Formaldehyde" and "Benzene", respectively) should be replaced with the following reference: US-EPA, AP-42, Section 3.4, "Large stationary diesel and all stationary dual-fuel engines", Table 3.4-3, "Speciated organic compound emission factors for large uncontrolled stationary diesel engines".**
- **The reference in line 8 ("Volatile Organic Compounds (VOC)") should be replaced by the following reference: US-EPA, AP-42, Section 3.4, "Large stationary diesel and all stationary dual-fuel engines", Table 3.4-1, "Gaseous emission factors for large stationary diesel and all stationary dual-fuel engines". (TOC x 91%).**

Concerning Appendix 5.1 "Calculation of Contaminant Emission Rates – Phase 2 – Scenario 1 (2014)":

- There appears to be an error in the writing of the variable on the last line of Table C2: it should be TPM instead of $PM_{2.5}$. Correct.

RQC-62

The name of the variable in the second-last line in Table B of Appendix 5.1 is incorrect. The "$PM_{2.5}$" variable should be replaced with "TPM" (associated with the "TPM EMISSION RATE" parameter).

The second correction relates to Table C1, not Table C2. The name of the variable in the last line of Table C1 of Appendix 5.1 is incorrect. The "$PM_{2.5}$" variable should be replaced with "TPM" (associated with the "TPM EMISSION RATE" parameter).

- The distance used to estimate TPM inside the pit is 1,500 metres (Table D1). However, the distance used to estimate $PM_{2.5}$ is 1,000 metres (Table D2). The same approach was adopted for scenario 2 (2020).
  - Why were different distances used to estimate TPM and $PM_{2.5}$?
  - The distance travelled in the pit is the same for both scenarios for 2014 and 2020. Should not these distances be different?
  - Provide more details concerning the choice of these distances for estimating the TPM and $PM_{2.5}$ emission rates for the two scenarios considered.

RQC-63

Taking into account design modifications made to the waste rock piles and tailings facilities for the BlackRock Metals mine site (Appendix 1), updating the atmospheric dispersion model (supplemental report to come) implies a reassessment of the applicable haulage and distances for each scenario to be modelled. Particular attention will be paid to the coherence of these distances among the components modelled.

In section 5.3.1 "Determination of Phase 1 Emission Rates (2012-2014)" and in Appendix 5.1 (Contaminant Emission Rates of the Two Generators (2x800 KW and 2x1200 KW) - (Construction Camp and Mining Site) Phase 1 – (2012-2014)), Tables A and B, it is mentioned that the sulphur content is 2% according to Tables A and B.

- Is this the correct value of the sulphur content? The proponent must verify the sulphur content of the fuel used and the corresponding SO_2 emission factor in Tables A and B, then revise the calculations, if necessary.

RQC-64

The sulphur content of the fuel used, provided in tables A and B of Appendix 5.1 of the impact study, pertains to a percent value from the literature. BlackRock Metals will ensure that sulphur concentrations that apply to combustion engines used for heating are met, as described in the CAR. The Regulation permits the use of fuel with a sulphur content of lower than 1.5% for heavy fuel oil and 0.5% for light fuel oil.

The emission factor presented in US EPA document AP-42, Section 3.4, Table 3.4-1 for SO_2 is $1.01xS_1$, where S_1 is the percentage of sulphur in the fuel. This calculation method does not appear to have been used in Tables A and B of Appendix 5.1 (Phase 1). Revised calculations are therefore required for SO_2 emissions and will be presented in the revised version of the modelling study (to be submitted to the Federal Committee at a later date in a supplemental report).

- Also verify the SO_2 emission rates for the two generators (800 KW and 1200 KW) according to the diesel sulphur content determined.

RQC-65

See RQC-64

- In the event that the sulphur content and the emission rates are incorrect, the proponent should produce another estimate of atmospheric dispersion for SO_2.

RQC-66

Given that the SO_2 emission factor shown in line 3 of Tables A and B of Appendix 5.1 (Phase 1) is incorrect, a new model for the atmospheric dispersion of contaminants will be created and the necessary corrections will be made. (supplemental report to be submitted to the Federal Committee at a later date).

It should be noted that Environment Canada has verified the emission rates of the substances listed in Tables A and B. The rates estimated for CO, NOx, TPM, PM_{10}, $PM_{2.5}$ and benzene agree with the rates estimated by the proponent.

1.4.3 Greenhouse gases and climate change

In Chapter 4 of the environmental impact statement, “Project Description” (p. 98), the proponent states: “The mine site layout proposed by BlackRock Inc. aims to minimize the project footprint, greenhouse gas emissions and costs associated with ore transport.” Greenhouse gases (GHGs) are also mentioned in Table 3.5 *Mining Facilities – Key Site Selection Criteria*.

That being said that, the GHG issue is addressed too briefly in the environmental impact statement. A specific section should be devoted to the project impacts in terms of GHGs and air quality. While it is true that the proponent has provided some additional information in its responses to Environment Canada’s initial request, this information appears to only partially answer the question concerning GHGs. The annual emissions of gaseous contaminants (CO, NO_x, SO_2, benzene) are indicated, but not GHG emissions (mainly CO_2). It is stated that GHG emissions will be negligible, without however estimating these emissions for each phase of the mine life cycle (no mention is made of the contribution of heavy and other equipment). This point should therefore be completed. The proponent must therefore:

- List and estimate all anticipated GHG sources and document the mitigation measures planned to reduce the GHG emissions resulting from the project.

RQC-67

The analysis of GHG emissions and appropriate mitigation measures is currently underway. Projected GHG sources and planned mitigation measures will be included in a supplemental report that will be submitted to the Federal Committee as soon as possible.

- Determine the quantities of GHGs for each phase of the project, then estimate the contribution of the project emissions at the regional, provincial and national scale. The proponent must then indicate the category into which the project would fall in terms of relative magnitude of its contribution to GHG emissions (project with low, medium or high emission rates).

RQC-68

See RQC-67.

- Describe the methods or practices (including the best available technologies) that will be instituted to minimize GHG emissions during the entire life cycle of the project.

RQC-69

See RQC-67.

We would like to remind the proponent that the facilities that emit GHGs may be required to report these emissions in order to comply with or participate in future government or industry initiatives to manage GHG emissions.

According to the "Updated Project Description" received on April 5, 2012, the iron ore concentrate will be transported by train. In the addendum to the environmental impact statement which will be produced to assess the options and estimate the impacts, the proponent will have to take into account the emissions generated by locomotives.

- The proponent must be able to demonstrate that the emissions from locomotives are negligible. The proponent may have to conduct a study designed to illustrate the contribution of the activities involving locomotives, in particular at the transfer point at the mine since it is known that idling locomotives contribute significantly to air pollution when steps are not taken to reduce the contaminants produced by locomotives.

RQC-70

During the operation phase of the project, there will be only one rail transport per day, for some 365 trips per year.

The forthcoming supplement to the impact study (for the rail line) will take into account the contribution of activities related to locomotives. In this regard, Transport Canada has prepared a *Locomotive Emissions Monitoring Program*, available online, which includes a section on atmospheric emissions for idling trains:
http://www.tc.gc.ca/eng/programs/environment-ecofreight-about-voluntary-voluntaryagreementsrail-1844.htm

- Similarly, in order to reduce air pollutant emissions, we encourage the proponent to reflect on the steps that can be taken to reduce the associated pollution. The contribution of idling locomotives to atmospheric emissions is well documented in the literature. The proponent should therefore encourage operators to reduce idling time or use idling reduction technologies (for example, automatic shutdown and restart systems, diesel heating systems and systems to draw power from the electrical grid). The installation of pollution control systems would also contribute to a reduction in atmospheric emissions (catalytic converters, filters, etc.). Such devices could be incorporated in the locomotives (if they are not already) to reduce the atmospheric emissions of contaminants and greenhouse gases.

RQC-71

BlackRock Metals will plan for mitigation measures to reduce pollution associated with locomotive atmospheric emissions. Transport Canada has put together various strategies to adopt, which are available online at the following website:
http://www.tc.gc.ca/eng/programs/environment-ecofreight-about-voluntary-voluntaryagreementsrail-1855.htm

For instance:

Low idle

The rail lines are extending the application of the 'Low Idle' feature to more locomotives. This feature allows the diesel engine to idle at a reduced speed with a consequently reduced load from cooling fans and other parasitic equipment. The reduction in fuel consumption can be as much as 10 L/hr and, on the accepted duty cycles, can be up to 1.0 per cent of the fleet annual fuel consumption. The use of the low idle feature is limited in some cases, particularly in cold weather, by the need to supply sufficient power for battery charging and crew comfort equipment. All new Tier 2 locomotives are equipped with the low idle function as a standard feature.

Engine Anti-Idling Systems

Railways are installing devices on locomotives for both line-haul and yard switching services that will automatically shut down and restart the diesel engine to idle for a time to prevent radiator coolant freezing and to charge the batteries. These include auxiliary power units as well as the automatic engine stop/start (AESS) systems that new locomotives come equipped with. The latter extends the time during the warmer seasons when the locomotive engine can be shut down. Monitoring of line-haul locomotives equipped with a properly operating AESS system has shown annual average savings per locomotive of 30,000 L. Analyses of fleet operations indicate that the capital and installation costs of an auxiliary power unit to maintain critical systems for a shut-down locomotive can be recouped within 2.2 years.

- Where applicable, the section on the cumulative effects will have to be revised by incorporating scenarios that include the emissions from trains and idling in particular.

RQC-72

See RQC-86.

With respect to the proponent's response to Environment Canada's initial request concerning the sensitivity of the project to variations in climatic parameters, only the specific mitigation measure A4 (installation of a local meteorological measurement and contaminant sampling network, and a weather station) is mentioned by the proponent. This measure concerns the monitoring of particulate emissions to ensure compliance with applicable standards and the installation of a weather station. The proponent must examine, among other things, the potential impact of climate change on the project and the planned mitigation measures, where applicable. To complete the section on climate change, it is recommended that the proponent consult the reference mentioned below.

RQC-73

The document entitled *Incorporating climate change considerations in environmental assessment: General guidance for practitioners* was used for the section on climate change (see RQC-67). It is available on the Canadian Environmental Assessment Agency's website: http://www.ceaa.gc.ca/default.asp?lang=En&n=A41F45C5-1&offset=1&toc=show

1.5 Migratory birds and their habitats

1.5.1 Bird survey data and methods

As mentioned in our preceding correspondence, and despite the supplemental information submitted by the proponent (March 2, 2012), the information on bird surveys and on the description of bird environments and habitats is insufficient.

The environmental impact statement therefore does not enable us to assess the project's impacts on migratory birds. Considering the magnitude of the project (loss of approximately 650 ha of habitat, including 96.5 ha of wetlands), sectorial studies specific to the various groups of birds should have been carried out.

In fact, the supplemental information provided by the proponent is not very detailed and several items of information are missing (see below). The supplemental information provided by the proponent suggests that the bird surveys were not conducted according to generally recognized standards and, therefore, that there were no surveys specific to the various groups of birds. In addition, there does not appear to be any surveys in the terrestrial environment.

Although this project is located in the "north," where habitat is generally not the limiting factor and the human ecological footprint is small, human activities at the local scale (forestry, mining, transportation network, housing, etc.) have caused a number of changes in the environment since 1950. In addition, knowledge about migratory birds in the area is very limited and, therefore, insufficient.

- Environment Canada recommends a more scientifically rigorous approach (see documents provided in the reference section) in order to assess the project's impacts on migratory birds and their habitats, including specific field surveys.

RQC-74

Supplementary surveys of the various groups of birds and their habitats were done in the summer of 2012. The description of the methodology used and results obtained is provided in the technical report attached as Appendix 5.

1.5.2 Incidental take of eggs and nests

The proponent has not identified any mitigation measures specific to migratory birds, in particular to avoid the incidental take of eggs and nests, but also to prevent the deposit of substances that are harmful to migratory birds in waters frequented by migratory birds. Many activities that take place during the breeding season can cause unintentional destruction of migratory bird nests and eggs. This "incidental take" of nests and eggs is in violation of paragraph 6(a) of the Migratory Birds Regulations, which prohibits disturbing, destroying or taking a nest or egg of a migratory bird.

Concerning the application of the Migratory Birds Regulations, we provide the following general recommendations:

- Avoid engaging in potentially destructive activities during key periods in order to reduce the risk of nest destruction. For this project, it is recommended to avoid engaging in activities that could result in incidental take between May 1 and August 15. This key period was determined on the basis of the best available information. It does not constitute a "restriction period" and therefore there is no "authorized period." These dates are provided as **guidance**, in order to help the proponent determine the period when the risk of contravening the Migratory Birds Convention Act is particularly high.

RQC-75

BlackRock Metals will follow the recommendations and key periods identified as closely as possible when planning its construction and development activities.

- Develop and implement a management plan that includes appropriate preventive measures to minimize the risk of impacts and to mitigate any unavoidable impacts on nests. Note that elements of a management plan need to be decided on a case-by-case basis. It is the responsibility of the individual or company undertaking the activities to determine these measures.

RQC-76

To avoid incidental take of eggs and nests, prevention measures specific to migratory bird nests will be applied. These measures will be based on Environment Canada's "Avoidance Guidelines" document available on their website: http://www.ec.gc.ca/paom-itmb/default.asp?lang=En&n=AB36A082-1.

These avoidance guidelines represent advice to help reduce risks to migratory bird nests and eggs, and make proactive avoidance and mitigation decisions for any activities that might affect protected migratory bird species.

Thus, BlackRock Metals will determine appropriate preventive measures minimize the risk of impacts, and to mitigate any unavoidable impacts on nests,

and will present them to Environment Canada (Canadian Wildlife Service) as needed in a management plan.

1.5.3 Impacts of polishing pond and tailings sites

In section 12.3.7, the proponent does not indicate whether the tailings sites or polishing pond may impact wildlife that might frequent these water bodies. Do these water bodies pose toxicity risks to the birds that might use them? If so, the proponent will have to include management measures (section 11.3.3) in order to prevent birds from using them. We should point out that the Migratory Birds Convention Act was amended in 2005 to include the following prohibitions (section 5.1), which are relevant in the present case:

1) No person or vessel shall deposit a substance that is harmful to migratory birds, or permit such a substance to be deposited, in waters or an area frequented by migratory birds or in a place from which the substance may enter such waters or such an area.

2) No person or vessel shall deposit a substance or permit a substance to be deposited in any place if the substance, in combination with one or more substances, results in a substance — in waters or an area frequented by migratory birds or in a place from which it may enter such waters or such an area — that is harmful to migratory birds.

RQC-77

Waterfowl species and other waterbirds could use the treatment ponds (about 50 ha) safely, as the waste and tailings will not significantly affect the water quality (see also RQC-21, RQC-42 and RQC-44). The chemical composition of rocks in the area should not lead to the spread of heavy metals and cyanides.

The effluent water quality monitoring plan will help ensure that there will be no impact on birds. Scaring measures will be studied as needed.

1.5.4 Missing information

- Complete the data on birds with rigorous surveys and present the survey results and details on the methodology: the hours during which the surveys were conducted, the weather conditions, the types of surveys used (landbirds, waterfowl, waterbirds, other), the effort and distribution of the surveys, the methodological justifications, etc.

See Appendix 5.

- Complete Table 7.8 with the new data available, i.e. provide the list of all bird species likely to be found in the study area, including the species for which breeding reports are possible and probable, and add the 12 new species that were not directly observed during the initial surveys.

RQC-78

See Appendix 5.

- Document the potential impacts of the polishing pond and tailings sites on birds.

See RQC-77.

- Finally, the proponent does not appear to have assessed the project's effects on waterfowl hunting. The proponent should specify whether the project will have effects on this activity.

RQC-79

Given in particular the remoteness of sites suitable for waterfowl hunting (Rivière Armitage, Ruisseau Villefagnan, Lac Armitage and Lac Chibougamau), the project will not cause any adverse effects on this activity.

1.6 Species at risk

Despite the supplemental information filed by the proponent, section 7.2.2 on species at risk is incomplete. In particular, little information is provided on the types of terrestrial habitats present in the project area. Contrary to what is stated, the information available appears to indicate that habitats suitable for the various species at risk mentioned in our first series of questions and comments, i.e. the common nighthawk, the Canada warbler and the olive-sided flycatcher, are in fact present. We provide the following information on this subject:

- The common nighthawk breeds in a wide variety of open habitats with little or no vegetation, such as sand dunes, beaches, recently logged areas, burned-over areas, forest clearings, rocky outcrops, rock barrens, prairies, pastures, peatbogs, marshes, lakeshores and river banks. The species is also found in coniferous forests with or without deciduous trees.

- The Canada warbler is found in a variety of forest types, but is most abundant in wet, mixed deciduous-coniferous forest with a well-developed shrub layer. It also occurs in riparian shrub forests on slopes and in ravines, in old-growth forests with canopy openings and a high density of shrubs, as well as in stands regenerating after natural disturbances, such as forest fires, or anthropogenic disturbances, such as logging.

- The olive-sided flycatcher is most often associated with open areas containing tall live trees or snags for perching, which are required for foraging. This species generally forages from a high, prominent perches, from which it makes short sallies to catch flying insects, returning to the same perch. Open areas may be forest clearings, forest edges located near natural openings (such as rivers or swamps) or human-made openings (such as logged areas), burned forest or openings within old-growth forest stands; these forests are characterised by mature trees and large volumes of dead trees. There is evidence that birds nesting in harvested habitats experience lower breeding success than those nesting in natural openings. Generally, forest habitat is either coniferous or mixed. In the boreal forest, suitable habitat is more likely to occur in or near wetland areas.

Consequently, section 12.2.4 of the environmental impact statement does not enable us to assess the project's impacts on bird species at risk.

In order to assess the project's impacts on these species, the proponent must:

- Estimate the number of breeding pairs potentially affected by the habitat losses and changes.

RQC-80

See Appendix 5.

- Estimate the potential habitat losses for these species. The proponent should identify and locate the potential habitats for all species at risk in the study area in order to quantify the losses and, if applicable, minimize the habitat losses associated with the various project components.

RQC-81

See Appendix 5.

Furthermore, the potential habitat loss will be minimized by encouraging clearing activities outside of nesting periods.

- The results should also be presented in map form, including the position of the various structures.

See Appendix 5.

1.7 Wetlands

The assessment of the ecological functions of wetlands is incomplete, particularly concerning the "wildlife habitat" function. The information provided does not permit a full assessment of the losses of wetland functions caused by the project, in particular concerning the habitat functions for migratory birds, including waterfowl and waterbirds.

The Federal Policy on Wetland Conservation encourages responsible authorities to maintain the functions and values associated with wetlands throughout Canada.

It is indicated in section 12.6.2 that the project will cause a net loss of 96.5 ha of wetlands. The proponent proposes certain compensation measures, primarily designed for fish. It is recommended that all wetland functions (hydrological, biogeochemical, ecological and social) be considered when developing compensation measures in order to minimize the losses of wetland functions incurred. Hence, the proponent should:

- Determine all losses of wetland functions, including changes in surface area and functions for each wetland, so that these losses can be considered in the compensation measures planned for in the project.

RQC-82

See Appendix 5 for information on bird use of wetlands in the study area. The effects of wetland loss in terms of their function and area are also addressed.

1.8 Pollution prevention

1.8.1 Heavy machinery

In order to mitigate the impacts associated with the use of heavy machinery, we remind the proponent:

- To maintain the machinery, equipment and trucks used during the work in good repair, free of leaks of oil, gasoline or any other fluid that could pollute the environment.
- To repair defective machinery and vehicles as quickly as possible.
- Not to use machinery within 30 metres of a stream.

RQC-83

In its monitoring plan for the construction phase and the monitoring planned during operations, BlackRock Metals undertakes to comply with regulations and propose appropriate precautionary practices and measures to ensure that heavy machinery does not cause significant environmental effects.

1.8.2 Hazardous materials

Various petroleum products and hazardous materials will be used and stored at the mine site. We therefore remind the proponent of the main mitigation measures to be adopted when using chemicals:

- Use, store and handle hazardous products in accordance with applicable standards and regulations and according to the manufacturer's instructions.
- Ensure that a spill kit is available in order to recover hazardous products in the event of a spill.
- Ensure that no polluting substances affect streams.

See RQC-83.

1.9 Environmental emergencies

In section 11.3.2 of the environmental impact statement, the proponent outlines the risks associated with the transport, handling and storage of petroleum products. Here are our recommendations:

- Document the information on the petroleum products and hazardous materials that will be used and stored. On the basis of this information, determine whether the Environmental Emergency Regulations apply to the project facilities. Please refer to the Regulations available at the following link: http://laws.justice.gc.ca/eng/regulations/SOR-2003-307/index.html.

RQC-84

Fuel storage on site will be provided by:

- **Gasoline: two (2) ULC-S601-approved double walled 40,000-liter aboveground horizontal tanks; and**
- **Diesel: eight (8) ULC-S601-approved double walled 50,000-liter aboveground horizontal tanks.**

All tanks will be double-walled and equipped with a pump unit, piping and a refuelling device. On-site refuelling will be done by a fuel vehicle with a storage capacity of 18,500 litres.

Dynamite will also be used (see RQC-144 and RQC-145).

Aside from petroleum products and dynamite, BlackRock Metals will complete the list of hazardous materials and will be able to determine whether the Environmental Emergency Regulations apply to the project installations.

- Develop an emergency plan that includes the names of people and authorities to contact, as well as the response measures in the event of a spill.

RQC-85

BlackRock Metals will finish compiling the information on petroleum products and hazardous materials to be used and stored, and then will use this information to determine whether the Environmental Emergency Regulations apply to the project installations. Where appropriate, BlackRock Metals undertakes to finalize its environmental emergency plan, including measures to be implemented, and to submit a notice of preparation and a notice of implementation within the time limits prescribed by the regulations.

- Have and know how to use a spill kit.

Within the scope of the future construction and operations activities and future operating, BlackRock Metals has already provided for recovery kits in case of a spill, and to provide employees with appropriate related training.

- In the event of a spill of hydrocarbons or any other deleterious substance:
  - Take all necessary action to stop the spill and contain the product spilled;
  - Recover the product and restore the site;
  - Promptly call the Environment Canada (1-866-283-2333) or Environment Québec (1-866-694-5454) emergency hotline.

BlackRock Metals will propose these emergency environmental measures in the event of a spill of oil or any other harmful substance.

1.10 Cumulative Impacts

The section on cumulative impacts is incomplete. In particular, in section 12.5, wetlands and species at risk, which are valued ecosystem components, should be taken into consideration in the cumulative effects assessment.

- We recommend assessing the cumulative impacts on these two components by considering past and future activities, in particular mining activities, forestry activities and the future 161 kV power line.

RQC-86

The methodology applied for the cumulative effects assessment includes the following broad steps:

- **Identification of Valued Environmental Components (VECs), determination of the spatial and temporal boundaries considered for each of them and a description of the indicators used;**
- **Identification of projects, actions, events, etc. that might have affected the VECs, that currently affect them or that will affect them;**
- **The description of the VEC baseline states and their historical patterns;**
- **Identification of the cumulative effects for each VEC;**

To be selected as a VEC, an environmental component must:

- **highly valued by the affected communities or by specialists;**
- **Be prone of being disturbed or altered to a significant extent by the project.**

The following VECs were selected for a cumulative effects assessment within the scope of the impact study filed in November 2011:

- **Lakes and streams;**
- **Traditional land use;**
- **Use of the area for the exploitation of other resources;**
- **The economy and jobs.**

Several of the questions and comments from the Federal Committee dealt with the cumulative effects assessment. In particular, BlackRock Metals was asked to consider the following components:

- **Mining activities;**
- **Forestry activities;**
- **The 161 kV power line (HQ);**
- **The lakes affected by mining activities;**
- **The rail line build for the project;**
- **The marine terminal that will receive the mineral concentrate.**

The following description therefore complements the analysis carried out within the scope of the impact study filed in November 2011, as well as adding the wetlands and species at risk VEC.

Lakes and Streams

A number of natural lakes and streams will be completely or partly affected by the project (see also RQC-7). In addition to this project, there are other lakes and streams affected by old or ongoing mining activities or mining projects now being developed (often reactivations of old projects). However, the effect is spaced out over both time and space.

Forestry activities have little effect, as the companies that harvest the wood comply with the Regulation respecting standards of forest management for forests in the public domain (*Règlement sur les normes d'intervention dans les forêts du domaine de l'État* (RNI)) The same holds for the same power line proposed by Hydro-Québec.

The rail line will cross several streams. However, the surveys conducted (addendum on the rail line to be filed later) suggest that free movement of fish will only be needed for one crossing. Culverts will also be installed in accordance with best practice.

BlackRock's facilities at the marine terminal will not require work in a waterbody.

The cumulative effects for lakes and streams will be limited because the other past, present or future projects are remote from one other in both space and time. In addition, these projects are controlled by clear regulations that provide, among other things, for the implementation of mitigation and compensation measures.

Traditional Land Use

Traditional activities (hunting, fishing, trapping and gathering) in the region could be affected in various ways by other users of ancestral land, whether subject to an agreement or to land claims.

All mining and forestry activities in the region, whether past, present or future, can have an impact on traditional First Nations land-based activities, even though the effect is spaced out over both time and space. In addition, a number of forestry and mining projects have or will benefit from rehabilitation programs that will include revegetation of the used sites.

Given the small area affected, the power line will have an effect considered minor on traditional activities in the region. However, the rail line will be built on land that is used for traditional activities, including trapping. A low-amplitude effect is nonetheless anticipated, as wildlife will be disturbed only once a day (by the train), and the territory is vast and allows for the creation of other trap lines.

The facilities at the port in Saguenay will have no direct impact on traditional activities practiced in the region.

While low intensity, the cumulative effects on traditional activities practiced in the regional study area will nevertheless be felt. BlackRock Metals has had

numerous meetings with land users to ensure minimal effects, and the users even agreed to move and replace a hunting camp (see RQC-176).

Use of the area for the exploitation of other resources

The exploitation of other resources (mining, logging, fishing and hunting) could be affected by regional activities and the current mining project.

Mining of the iron ore of the Lac Doré geological complex by BlackRock Metals will not directly affect other past, present or future mining operations in the region. However, as the mineral resource is not renewable, mining of the BlackRock Metals site will diminish the known resource. The region is nevertheless mineral-rich, and some abandoned sites are currently being re-assessed with a view to mine production.

Although at this stage we do not know how much area will need to be cleared for the power line and rail line, at least several hundred hectares will be cleared. The study area straddles two management units (UA 026-64 and UA 025-51). For 2012, the summary of opportunities and attributions by forest management units in relation to Timber Supply and Forest Management Agreements (TSFMA) was 253,500 m³ for UA 026-64 and 2,087,700 m³ for UA 025-51. Thus, the deforestation caused by the project will not affect forestry activities, considering the small areas affected compared to the vast territory covered by forest.

In addition, due to project optimization and the cancellation of the rail transfer point, there will be considerably less pressure on the roads, particularly for logging road 210.

The other activities in the area and those related to the project will not affect ongoing hunting and fishing activities in the region.

BlackRock Metals activities and infrastructure at the Saguenay marine terminal will not affect the exploitation of other resources in the region.

Given that timber is a renewable resource, that mines are operated aver several decades and a vast territory, that the mining potential is very high and that companies are even planning to reactivate old areas that have now become economically viable, the cumulative effect of these various projects remains low.

Economy and Jobs

The various activities in the study area, whether mining or other, are usually independent of each other and do not affect the economics of other projects. If future forestry activities are planned in the vicinity of the study area, things can be coordinated and negative effects avoided through proper planning.

Thus, the BlackRock Metals project will have direct positive impact on employment and local and regional economic benefits. The cumulative effect is expected to be positive, and the same is true for all projects in the regional area, whether already past, present or future.

Wetlands and Species at Risk

All mining projects in the region, whether already completed or under construction, can affect various wetlands and species at risk. The most recent projects are optimized and take wetlands and identified species at risk into account. Given the legislation in effect, mine site rehabilitation will recreate potential habitats for species at risk. In addition, wetland losses caused by projects must be offset by compensation measures. Finally, projects must implement monitoring plans for potential effects on wetlands and species at risk, which allows corrective measures to be taken during operation.

Mine facility construction will affect approximately 204 ha of wetlands (bogs, marshes, swamps), which represents some 0.03% of the area selected for the impact study (70,000 ha). For the rail line, about 16 ha will be affected, which is considered negligible.

No species at risk (designated or likely to be designated) or exceptional habitats were observed in the study area (see Appendix 5).

The following table summarizes the overall effect of cumulative effects on the valuable environmental components selected for the impact study on the BlackRock Metals project.

Valued environmental components	Overall impact
Lakes and streams	Low negative
Traditional land use	Low negative
Use of the environment for the exploitation of other resources	Low negative
Economy and jobs	Moderate positive
Wetlands and species at risk	Low negative

It is mentioned several times that the project's primary impacts on waters frequented by fish are essentially the loss of lakes B-14 and B12, as well as their emissaries, due to the construction of the containment dam for the fine tailings pond and excavation of the pit. However, various other natural waters will also be affected in whole or in part by the project, including lakes B-3, B-6, B-7, B11, B13, B3, B6, B7, B8 and a number of streams.

- Consider these waters in the assessment of the direct and cumulative effects.

RQC-87

The lakes and ponds affected by the project are indicated in RQC-7. The lakes and streams inhabited by fish will have the same anticipated effects as those described in Table 12.3 and Figure 12.4 (Volume 2 of the impact statement). Recall that the impact statement indicated that lakes and ponds B-1, B-6, B-3 and B-12 were unable to sustain life in winter (freeze solid) and that lakes B-8, B-9 and B-11 are bog lakes.

For the cumulative effects, see RQC-86.

Consequently, the proponent will have to revise this section on cumulative impact. To this end, we encourage the proponent to consult the guides prepared by the Canadian Environmental Assessment Agency (see references).

According to these guides, a project-specific cumulative effects assessment must fundamentally:

1. Determine whether the project will have an effect on a valued ecosystem component.

2. If such an effect can be demonstrated, determine whether the incremental effect acts cumulatively with the effects of other actions, either past, existing or future.

3. Determine whether the effect of the project, in combination with the other effects, may cause a significant change, now or in the future, in the characteristics of the VECs after the application of mitigation for that project.

See RQC-86.

1.11 Environmental monitoring and follow-up

Section 14.1 “Environmental Monitoring” should be more detailed, specifying in particular how the work will be monitored in order to ensure that the mitigation measures planned in the context of the environmental assessment are effectively applied.

Likewise, concerning the environmental follow-up proposed by the proponent (section 14.2), we would like to remind the proponent that, in addition to the follow-up required under provincial and federal regulatory instruments, environmental follow-up must be able to provide answers to the following questions:

- Did the anticipated impacts occur?
- Were there more impacts than anticipated?
- Were the mitigation measures that were planned and carried out effective?

RQC-88

Environmental monitoring and environmental follow-up will be the subject of reports sent by BlackRock Metals to the appropriate regulatory authorities. These reports will answer the above questions and, if necessary, propose solutions to address specific issues that arise during the follow-up.

During construction, monitoring will be done by an independent team, while during operation and closure, it will be done by the BlackRock Metals environmental team.

As stated in the impact statement (Volume 2, p. 309), environmental monitoring work will be conducted by an environmental superintendent employed by BlackRock Metals and based in Chibougamau.

It will consist of ensuring compliance with environmental commitments and obligations. It will also allow us to check that the proposed mitigation measures are being incorporated into the project and to ensure compliance with the laws, regulations and other environmental considerations in the plans and specifications and the government decrees.

One of the activities of the monitoring plan is to ensure that all applications for the authorizations and permits required for project construction have been completed and that these authorizations and permits were received prior to starting any work.

At the very beginning of a work phase, a site meeting with the main contractor will be organized by the BlackRock Metals project managers and environmental personnel. This will be particularly intended to inform and educate personnel assigned to the site on the environmental and safety measures to be followed throughout the project construction period, as well as on how monitoring activities generally work.

During the various phases of construction, mitigation measures must be strictly monitored, especially for work done near lakes and streams. This will ensure minimal emission of particulate matter, petroleum products, etc. into lakes and streams.

Generally, the person in charge of environmental monitoring will visit work areas on a regular basis, take note of participants' strict compliance with various commitments, obligations, measures and other requirements, assess the quality and effectiveness of the measures applied and note any non-compliance seen. He will then report these observations to the site manager so that appropriate corrective actions can be agreed upon and adopted as soon as possible, as required.

As for environmental monitoring, monitoring reports required at both the federal and provincial level will indicate whether the anticipated effects have occurred or others have appeared, and whether the mitigation measures planned and implemented have been effective. It should also be recalled that federally, all mines subject to the MMER must submit, no later than March 31 of each year, a report on effluent and water quality monitoring studies conducted during the previous calendar year. The interpretive reports for biological monitoring studies will be submitted to the authorization officer in accordance with the provisions set out in Schedule 5 of the MMER. At the provincial level, a report containing the analytical results for each final effluent must be submitted and must highlight the incidents of non-compliance with departmental requirements and measures taken to prevent and eliminate the causes. The annual report must also include a section summarizing any rehabilitation work done during the year, including the sites and areas restored, as well as the monitoring measures put in place.

As part of the monitoring carried out in the course of construction of the infrastructure, dams and ponds, one factor that should be considered is the level of sediment resuspension and, if deemed necessary, steps should be taken to ensure compliance with the Canadian Water Quality Guidelines for the Protection of Aquatic Life – Total

Particulate Matter of the Canadian Council of Ministers of the Environment (CCME). These guidelines indicate that human activities should not cause an increase in suspended sediments of more than 25 mg/L when the background total particulate matter levels are less than 250 mg/L for short-term exposure. When background levels exceed 250 mg/L, human activities should not increase suspended sediment concentrations by more than 10% of the background total particulate matter level.

BlackRock Metals will pay particular attention to the extent of sediment resuspension and take the appropriate measurements to ensure compliance with Canadian recommendations on water quality (CCME).

In section 14.2.10 “Follow-up with the Community,” on the subject of the meetings of the monitoring committee, the proponent states that “These meetings should be open to members of the public so that they can stay abreast of the committee’s work and express their concerns.” We encourage this practice, which provides an opportunity to make the results of the environmental monitoring and follow-up public.

As indicated in the impact assessment (Volume 2, pp. 321 and 322), BlackRock Metals intends to promote the establishment of a regional monitoring committee and to hold public meetings to make the public aware of the committee's work and share its concerns.

1.12 General information on certain regulatory instruments managed by Environment Canada

1.12.1 National Pollutant Release Inventory (NPRI)

The National Pollutant Release Inventory (NPRI) is Canada’s legislated, publicly accessible inventory of pollutant releases to air, water and land, as well as disposals and transfers for recycling. The NPRI is managed by Environment Canada and currently tracks over 300 substances or groups of substances, listed in five different parts.

Reporting to the NPRI is mandatory under the Canadian Environmental Protection Act, 1999 (CEPA). The NPRI is not a survey or a voluntary program. Owners or operators of facilities that meet the NPRI reporting requirements published in the Canada Gazette, Part I, are required to report to the NPRI. Failure to comply with any provision of CEPA is an offence under the Act. If reporting is required, the deadline to submit an NPRI report is June 1 each year.

For more details concerning NPRI reporting requirements, consult the NPRI Web site at http://www.ec.gc.ca/inrp-npri/ or call 1-877-877-8375.

RQC-89

As reporting to the NPRI is required under the Canadian Environmental Protection Act, BlackRock Metals will report no later than June 1 of each year during the operation phase, starting as soon as the mining installations are in place.

1.12.2 Environmental Emergency Regulations

The Environmental Emergency Regulations require persons who own or manage specific toxic and hazardous substances at or above the specified thresholds to provide required information on the substance(s), their quantities and the maximum capacity of the largest container in which the substance is stored. Also, if these substances are stored in containers whose maximum capacity exceeds the specified thresholds, an environmental emergency plan must be prepared and implemented.

RQC-90

See RQC-85.

The Regulations contain a list of substances established under CEPA. If these substances enter the environment during an accident, they could have an immediate or long-term harmful effect on the environment or its biological diversity, constitute or may constitute a danger to the environment on which human life depends, or constitute or may constitute a danger in Canada to human life or health.

Anyone in Canada who owns or manages a listed substance in a quantity at or over the prescribed minimum quantity is required to provide Environment Canada, within 90 days after the day on which the quantity first equals or exceeds the prescribed threshold, with information on the quantity of the substance, along with the facility location. In addition, if this substance is stored in a container whose maximum capacity equals or exceeds the prescribed quantity, an emergency response plan must be prepared, a notice must be submitted indicating that an environmental emergency plan has been prepared within six months, the plan must be tested and a notice on the test must be submitted one year after the day on which the quantity of the substance equals or exceeds the prescribed threshold. The guidelines accompanying the EER suggest the use of a recognized method, such as that of the Major Industrial Accidents Reduction Council (MIARC) (http://www.craim.ca/). Any existing emergency plan may be used to satisfy the requirements of the Regulations.

Should the construction and operation phases require or demand management of a substance listed under CEPA, and in quantities equal to or greater than the threshold quantities allowed, BlackRock Metals undertakes to develop an appropriate action plan, as well as the notices required to meet regulatory requirements.

2. Questions and comments from Fisheries and Oceans Canada

DFO is of the view that the work and structures will likely cause harmful alteration, disruption or destruction of fish habitat (HADD), which requires an authorization under the Fisheries Act. However, the information provided is insufficient and does not enable DFO to determine the extent of the HADD. To pursue its analysis, DFO will therefore require the following information.

2.1 Description of the project components

2.1.1 Rail line

According to the last project update filed on March 27, 2012, BlackRock Metals plans to construct a rail line to connect the mining operations centre to the CN public rail line. The proposed route, 27 km long, will require the construction of structures to

cross various small streams, including a bridge crossing the stream located between Lac Jules and Lac Pillow (kilometre point 14+000).

Where permanent culverts have been installed, the guiding principle of DFO's approach to ensuring free fish passage is to preserve the natural hydraulic characteristics of the stream. To do this, the existing physical characteristics of the stream (width, slope and substrate) must be maintained to the extent possible.

For guidance, DFO recommends the criteria and measures presented in the document entitled "Lignes directrices pour la conception de traversées de cours d'eau au Québec," a copy of which is attached. DFO believes that full compliance with the design criteria and measures outlined in that document can ensure free passage of fish.

- The proponent must clearly indicate that its structure design will ensure free passage of fish. To this end, the proponent may either comply with the attached document entitled "Lignes directrices pour la conception de traversées de cours d'eau au Québec" or propose other design criteria that will achieve the same results.

RQC-91

BlackRock Metals undertakes to comply with the design criteria and measures presented the document entitled *"Lignes directrices pour la conception de traversées de cours d'eau au Québec"*.

Field surveys (addendum report to come on the rail line) have shown that only the crossing at PK 14+000 will require the establishment of a clear span bridge and the river crossings on the new rail line will not require structures allowing the free passage of fish.

- If the proponent believes that it is not necessary to ensure free passage of fish, it must explain why by demonstrating that there is a natural barrier to free passage of fish at or near the site of the work, or that the habitat upstream of the work is of marginal quantity and quality.

See RQC-91.

- The proponent must indicate if the planned bridge at kilometre point 14+000 will be a clear span bridge and whether it will be able to follow the recommendations in the DFO Operational Statement on Clear Span Bridges available on-line at: http://www.dfo-mpo.gc.ca/habitat/what-quoi/os-eo/qc/span-eng.asp.
- If the bridge requires the installation of structures below the ordinary high water mark (OHWM), provide a detailed plan of the structure, indicating the OHWM.
- Attach, if necessary, recent photographs of the sites of planned crossings.

RQC-92

The Jules river bridge (PK 14+000) will not be clear span, and will encroach on fish habitat. A rough plan of the bridge is presented in Appendix 6. The full authorization process (certificate of authorisation application with signed,

sealed plans and specifications) will be started as soon as the final design of the structure is complete. The area of encroachment will be considered in the fish habitat compensation plan (see RQC-95).

2.1.2 Treatment and monitoring pond

The proponent plans to construct a treatment and monitoring pond between lake B-3 and Lac Jean (Entraco, November 2011, Volume 1, Figure 4.1, page 100). The water from this pond will be released into Lac Jean. However, the environmental impact statement provides only an estimate of the annual flow from this final effluent starting in 2013 (Entraco, November 2011, Volume 1, Table 4.5, page 122).

- Provide the surface area of the treatment and monitoring pond and an estimate of the monthly flows over a one-year period.

RQC-93

The treatment and monitoring pond will cover an area of 10 ha (depending on water levels). Monthly flows for a one-year period are shown in the table in RQC-32.

2.2 Description of the project's effects on fish habitat

The industrial water requirements and the changes in the hydrographic network upstream of Lac Jean would cause a 50% decrease in the supply of water in the main tributary that feeds Lac Jean (e-mail from Jacqueline Leroux, March 2, 2012). As mitigation measure, the proponent is proposing to construct a 1.5 m high sill at the outlet of Lac Jean in order to maintain a water level in the lake that will ensure the survival of fish during low water periods.

- Provide the design details for the planned sill at the outlet of Lac Jean and demonstrate the effect of this structure on the water level in Lac Jean and, downstream, on the flow from its emissary and from Ruisseau Villefagnan. Demonstrate that free passage of fish will be maintained.

RQC-94

Following the project optimization, sills are no longer planned at the outlet of Lac Jean. Fish will therefore continue to have free passage between the lake and its tributary. Given the flow at the exit of the treatment and monitoring pond, no impact is anticipated at the outlet of Lac Jean.

2.3 Compensation

Based on the information available, the harmful alteration, disruption or destruction of fish habitat (HADD) (lakes, streams and floodable wetlands) would amount to just over 20 ha if the project is carried out as presented (preliminary estimate by DFO). Since the submission of the environmental impact statement, BlackRock Metals has presented eight compensation project proposals on six separate sites to compensate for residual losses of fish habitat: Lac Denis; Lac A-2 and its emissary; Ruisseau Villefagnan; Lac Bernadette and its main tributary; Rivière Armitage; and Ruisseau Wynne.

In the opinion of DFO, the compensation project proposals are not adequate:

- Lac Denis: The flooding of Lac Denis for the purpose of creating an industrial process water reservoir, as presented, would not make it possible to maintain fishery conditions likely to generate an acceptable gain for compensation purposes.

- Lac A-2 and its emissary: DFO considers the use of artificial propagation as proposed in Lac A2 a measure of last resort. In addition, based on the information available, brook trout are already present in the emissary of this lake and an impassable barrier in the upstream section of the emissary compromises migration. Added to this is the uncertainty about the impact of the drawdown of the water table in the vicinity of the pit on the water level of this lake, which has a surface area of approximately 3 ha and a maximum depth of 3 m. According to the most recent information received, the decrease in water level is estimated at 2% (e-mail from Jacqueline Leroux, March 2, 2012).

- Ruisseau Villefagnan: Brook trout are already present and there is little evidence that the proposed compensation projects will be able to increase recruitment. The lotic sections of the stream that support the brook trout populations are located in the heart of a northern pike ecological complex.

- Lac Bernadette and its main tributary (also called Ruisseau Bernadette): The operation of the pit planned for phase 2 of the BlackRock mining project will sever the hydrological connectivity of the main tributary that drains the water from Lac Yvette to feed Lac Bernadette. The tributary flows from south to north at the location of the future pit (Entraco, November 2011, Volume 1, Figure 2.1, page 26). Considering the probable decrease in water level in Lac Bernadette, a shallow lake (± 2 m), the effectiveness and sustainability of the objectives appear, at first glance, to be uncertain.

- Finally, while the proposals concerning Rivière Armitage and Ruisseau Wynne have merit since they target walleye and lake whitefish, they are not sufficiently documented to allow DFO to make any decisions on the relevance and adequacy of the anticipated gains. Indeed, knowledge of the problem and a detailed project proposal are required so that we can assess the acceptability of this compensation option.

DFO therefore recommends that the proponent propose new possible compensation options. Considering the difficulties involved in devising compensation projects, evaluating their suitability, ensuring that they are well-designed and properly implemented and followed up, the compensation approach should favour the implementation of large projects rather than several small, geographically scattered projects.

In order for a project to be used as a compensation project, it must first be approved by DFO and must lead to either the creation of fish habitat, the restoration of degraded fish habitat or the improvement of natural habitat for a given species or function.

Although DFO can advise proponents throughout the process, it is the responsibility of the proponent to find, propose, carry out and monitor the effectiveness of a compensation project to offset the residual HADD of fish habitat for which the

proponent is responsible. Once a satisfactory compensation project has been identified, it constitutes a condition of authorization issued under subsection 35(2) of the Fisheries Act.

In some instances, DFO may require a letter of credit from a bank covering the costs of the compensation and monitoring and follow-up measures. In this case, the proponent will have to provide DFO with a breakdown of these costs.

RQC-95

BlackRock Metals recently held discussions with the MNRF and DFO to decide on an appropriate compensation plan for fish habitat deterioration, disruption or disturbance. Due to optimization of the project and the location of infrastructure, including the rail line, the areas initially determined will change, but government agencies and BlackRock Metals have already agreed on the development of lake trout spawning grounds in Lake Chibougamau as compensation.

The compensation plan will be submitted to the DFO, including the breakdown of costs attributable to its development. It should also be noted that the proposed spawning grounds will be located on the Wapachee family trap line, and will be developed with the help of Cree trappers (catches, use of boats, infrastructure development, etc.).

2.4 Information required

As a guide, a compensation project proposal must usually include the following:

- Exact location (latitude and longitude, lot number, municipality, RCM, etc.) of each site to be developed and its ownership;
- The baseline conditions of the site targeted by the development using a description of the environmental characteristics (biological, hydrological, physical and chemical), an estimate of the quality of the aquatic environment targeted and a description of the problem to be corrected. Ideally, the description of the environment should be accompanied by photographs taken from the ground and dated;
- Description of the nature of the compensation work (action, structure, method, schedule);
- Fish species covered by the development;
- Fish habitat functions that will be generated (feeding, reproduction, nursery, refuge, growth, migration);
- The benefits for fish habitat (extent (area), effectiveness, interest) over the current situation;
- The repercussions for components of the environment other than fish habitat.

The type and amount of information to be provided can vary depending on the type of environment or development concerned. Proponents are therefore encouraged to consult DFO to determine the information requirements for each case. The purpose of

this approach is to avoid investing too much time and effort in documenting an option that may not be approved.

The compensation plan to be submitted to the DFO (see RQC-95) will take the above elements into consideration.

3. Questions and comments from Natural Resources Canada

3.1 Hydrogeochemistry

Document(s) Reviewed
EIS Vol. I: 4; Vol. II 11.3, 14, Appendix 12.2

Context

BlackRock Metals Inc. intends to develop an iron ore mining project south of Chibougamou in Quebec. Deleterious effects on receiving environments are expected to be constrained by natural buffering capacity and non-acid generating mining waste as determined through pilot studies. An identified risk to receiving waters and aquatic ecology is the potential input of fine suspended clay minerals (e.g., chlorite).

In addition to a preliminary environmental audit that could not yield much quantitative data on site characterisation and rehabilitation activities from previous land use, an effective baseline survey was conducted in aquatic receiving environments and control sites (surface water quality, sediment quality). The survey served to establish baseline environmental conditions and to explore potential options for compensation measures (i.e., aquatic habitats).

The proponent also stated that an environmental compliance auditing program will be implemented to ensure that the relevant regulations are respected.

The quality of the water released into the environment will be controlled by regulating equipment to prevent any imbalances in the receiving environment.

The proponent has not made its monitoring program explicit in terms of the intended monitoring stations. A schedule for the frequency of sampling was proposed based on regulatory requirements.

NRCan Conclusions

For monitoring programs to be effective, they need a benchmark for comparison and/or established targets. Ideally, the proponent would choose to use the same techniques as for the baseline studies and the same or a subset of the sampling stations in lakes and streams. Frequency of monitoring, as dictated by regulation, should be amenable to a timely response by the proponent for adaptive management should any critical exceedances be detected.

NRCan infers that the “regulating equipment” at the Final Treatment and Monitoring Centre (FTMC) is one form of monitoring to control suspended fine solids (e.g., by adding flocculent if needed and re-directing the effluent).

Recommendations:

1. NRCan recommends that the proposed location of the sampling stations in lakes and streams be identified.

RQC-96

BlackRock Metals is preparing a program to characterise the initial state of the environment, which will include characterisation of the natural lakes and streams and those potentially affected by the project. This characterisation will take place before the infrastructure is built. A monitoring plan will then be executed in accordance with the regulations in effect.

Surface water sampling was initiated in July 2012 in various locations on and around the future mine site.

2. NRCan requests confirmation that the intended purpose of the FTMC is to control suspended fine solids.

RQC-97

The final treatment pond with monitoring station will serve to control suspended solids (SS) and all other parameters that must meet the quality criteria and standards set out in the Metal Mining Effluent Regulation (MMER) and the MDDEP's Directive 019. In addition, BlackRock Metals will do everything it can to comply with the effluent discharge objectives (EDO) transmitted to it by the MDDEP.

3.2 Geotechnical aspects and natural risks and hazards

3.2.1 Granular materials

Document(s) reviewed

EIS Volume 1, Sections 1, 2-1 to 2-4, 2-6, 3-1 to 3-8
EIS Volume 2, Sections 4-1 to 4-8, Sections 10 to 14
EIS Volume 3, Appendices 3-2, 10-2, 12-1 to 12-3, 13

Context

Natural, low-permeability materials are required for construction of the impervious cores of the dams, as well as at the camp sites and the garage.

NRCan conclusions

According to the proponent, "The impervious cores of the project's dams are made of compacted glacial till." The requirements for this type of waterproof material are estimated at 574,720 m^3 for the impoundment structures. Some 15,000 m^3 and 20,000 m^3 of glacial till are required at the construction camp and garage, respectively. Overall requirements therefore amount to 609,720 m^3."

"The glacial till must be sourced from borrow pits near the mineral deposit. These are borrow pits listed in GESTIM, which by definition have already been operated. Although their total volume (3,125,000 m^3) is much higher than the project glacial till requirements (609,720 m^3), the quality of the material and its impermeability in

particular is yet to be determined. Some of the borrow pits may be unusable or only partially usable. However, there is an extensive drumlin (borrow pit No. 13) some three kilometres long, not listed in GESTIM, running parallel to Lac Bernadette on the east side. Glacial till is also available below the drumlin. The quantity and quality of this material must nevertheless also be determined."

Recommendations

3. In the event that the material from the borrow pits near the mineral deposit and from borrow pit No. 13 does not meet the requisite qualitative and quantitative criteria (especially impermeability), NRCan would like to know whether BlackRock Metals has an alternative strategy and how it plans to implement that strategy.

RQC-98

All dams will be built with an inner wall made of bituminous waterproofing membrane to ensure that it is fully leak-proof. Dam cores will be built with mine waste rock or till excavated from surface of the pit. The amount of till on the surface of the pit is very difficult to quantify as it is very thin, but we expect to recover a small quantity. If thicknesses are sufficient in and around the fine tailings pond, some of the till can be used to for dam construction.

3.2.2 Design and stability of the containment dams and stockpiles

Document(s) reviewed

Volume 1, Section 4.8 and Appendix 13

Context

The mine site contains several large infrastructure components, including the waste rock piles which receive the deposit host rock, a coarse tailings pond which receives the coarse, non-magnetic tailings that is adjacent to the waste rock piles, and the fine tailings and polishing ponds which receive all tailings from the magnetic separation smaller than 150 µm. Design criteria were applied and stability analyses were performed for these infrastructure components, as well as for the dam at the Lac Denis site.

NRCan conclusions

The description of the design of the containment dams presented in section 4.8.1 does not appear to be consistent with the diagrams shown in Figure 4.14. Also there is no mention of the impermeable membrane as presented in Figure 4.14 or in the figures provided in Appendix 13 on the rehabilitation plan.

In section 4.8.2, it is indicated that the geotechnical data used were derived from the site investigation, the literature and past experience with the soils of the region.

However, reference is made only to the work performed by LVM (although the bibliographical list indicates BBA); no other specific documents are mentioned.

Table 4.9 in section 4.8.2 shows the safety factors calculated for dam stability. However, the relationship between the dam stability results and the typical sections of these structures and their eventual location, as shown in Figure 4.14, is unclear. The

relationship between the structures shown in Figure 4.14 and the infrastructures such as the piles, tailings site and dams is also unclear.

For the calculation of the stability of the waste rock and coarse tailings piles, it is indicated that the thickness of the in-situ material underlying the piles ranges from 2.2 to 6 m. What scenario or scenarios were used in calculating stability? Single average value of the thickness or various scenarios?

It is indicated that the waste rock piles and the coarse tailings pile will be accumulated on glacial and organic materials. However, these materials will deform and be compacted under the weight of the overlying material. Was the rate of compaction estimated? Does this compaction pose a risk to the stability and integrity of the tailings and the adjacent structures?

In section 14.2.7 concerning the monitoring of containment dam stability, it is indicated in Table 14.7 that a detailed inspection will be carried out every three months or after exceptional weather events or seismic activity. What is meant by exceptional weather events? And what would be the minimum magnitude of an earthquake following which a detailed inspection might be conducted?

Recommendations:

NRCan would like to have clarifications on the above-mentioned points, specifically:

4. a more detailed and complete presentation of the dam profiles;

RQC-99

A typical dam cross-section is shown in the dam stability study in Appendix 7, and can also be seen in Figure 4.14 of the impact statement (Volume 1, p. 142). The final design will be presented on signed and sealed plans with the application for the certificate of authorization for construction.

5. an accurate and detailed bibliography;

RQC-100

The bibliography relating to the geotechnical parameters of the study area is as follows:

NATIONAL RESEARCH COUNCIL OF CANADA. 2010. *2010 National Building Code of Canada*. Institute for Research in Construction, 1,235 p.

JOURNEAUX ASSOCIÉS. 2011. *Construction des digues. Mine BlackRock, Chibougamau, Québec. Note n^{o} L1215131*, 7 p.

LVM. 2011a. *Concentrateur. Site : BBAF-BH-2024 à 2026 et 2054, Chibougamau (Québec)*. Rapport d'étude géotechnique, 23 p. + Appendices.

LVM. 2011b. *Concasseur. Site : BBAF-BH-2003, 2004 et 2053, Chibougamau (Québec)*. Rapport d'étude géotechnique, 26 p. + Appendices.

MINISTÈRE DES RESSOURCES NATURELLES. 1997. *Guideline for preparing a mining site rehabilitation plan and general mining site rehabilitation requirements.* Service des titres d'exploitation du ministère des Ressources naturelles du Québec and the Ministère de l'Environnement et de la Faune du Québec, 61 p.

NAVAL FACILITIES ENGINEERING COMMAND. 1982. *Soil Mechanics: Design Manual 7.01*. Updated in 1986, 348 p. + appendices.

6. clear explanations of the relationship between the stability calculations for the impoundment structures, type and location of infrastructure (tailings site, Lac Denis);

RQC-101

Appendix 7 contains a stability study for the dams that will surround and contain the fine tailings management facility. Dam locations are shown on the map in Appendix 1.

7. the scenarios used for the thickness of the in-situ material underlying the tailings sites in the stability calculation;

RQC-102

The thickness of the soil on which the dams will sit was taken into account. The soils on which the waste rock and tailings will be placed are granular. As these soils are not clay, any compaction that will take place will be limited and immediate, so during construction, not over the long term. Settling will occur during the dam construction or deposition of the tailings and waste rock. The soil will also be compacted before the dikes are built.

8. the impact of the compaction of the in-situ material underlying the tailings piles and sites; and

RQC-103

BlackRock Metals only anticipates slight settling given the nature of the underlying materials. This slight settling will occur immediately during dam construction or deposition of the tailings and waste rock. We therefore do not expect any negative impact due to compaction.

9. definitions of an exceptional weather event and of the minimum earthquake magnitude threshold.

RQC-104

An exceptional climatic event is a phenomenon that has been caused by the abnormal intensity of a natural agent (rain, hail, snow, etc.).

All earthquakes, whatever their magnitude, are picked up by seismograph networks. The minimum threshold is thus one that can be recorded by the network. In addition to the regular inspections under the applicable regulations, a dam inspection could be initiated in the event of an earthquake of magnitude

greater than 4 (magnitude determined during the preparation of the emergency response plan). Note that the region is not really conducive to earthquakes, and that the episodes recorded are below magnitude 3 (see RQC-146).

3.2.3 Seismicity

The area of the project is not considered a seismically active zone. For this reason, no special study will be required to define the seismic hazard at the site. The seismic provisions of the existing codes will be sufficient.

3.3 Hydrogeology

Document(s) reviewed

Volume 1, sections 1-3 and sections 4-7
Volume 2, section 10 and Appendix 11

3.3.1 Context

The documents provided are very well written and include many figures and tables, thereby facilitating the readers' understanding. However, certain points concerning the site's hydrogeology and environmental monitoring should be clarified. The comments that follow have been divided into four topics: water balance, well characteristics and hydrogeological properties, numerical model and environmental monitoring.

Following the comments on these four hydrogeology-related topics (Sections 3.3.2, 3.3.3, 3.3.4 and 3.3.5), Section 3.3.6 presents the questions and comments from NRCan, followed by responses from BlackRock Metals.

3.3.2 NRCan conclusions - Water balance

How were the water balance values in Table 10.1 determined? Was runoff calculated with the SCS (Soil Conservation Service) curves? Was potential evapotranspiration estimated using the Thornthwaite method? What grid was used to determine this budget? A single grid?

It is stated on page 155 that total annual precipitation is 961 mm/year. However, for the water balance presented in Table 10.1 (p. 156), the total precipitation is 835 mm/year (a difference of 126 mm/year, or 13%, which is fairly significant). Why? Was it calculated for a specific year? This type of "average" assessment is generally based on data for long periods of time (20 or 30 years). Using a higher P_{tot} would further increase the recharge, which already seems high for this region.

It is stated on page 165 that "Unit recharge occurs primarily by infiltration from precipitation and from a few headwater lakes such as Lac Coco and Lac Laugon." Does this mean that the water table is lower than (i.e. below) Lac Coco and Lac Laugon? This would be very surprising. It is more likely that the water table is at the level of the lakes in this region (as is moreover shown in Figure 10.15).

Manual flow measurements should have been taken for various rivers that traverse the study site. Ideally, gauging stations should have been installed at the same time the boreholes were drilled and the monitoring wells were installed. Even with data for

one year, orders of magnitude for the various rivers could have been obtained and this could have been used as a tool to calibrate the model.

3.3.3 NRCan conclusions - Well characteristics and hydrogeological properties

Given the description of the rock (Vol. 1, p. 41: "weakly metamorphosed volcano-sedimentary [and] igneous"), it is surprising that this rock is "so" permeable (10^{-6} m/s) in the first 15-20 m. Could graphs (or electronic data) of the slug tests be made available?

Were the logs of the 26 boreholes (monitoring wells PO-1 to PO-26) not provided because they do not show anything new relative to the geological maps?

The till is described as sandy (Vol. 2, p. 273). However, the hydraulic tests show relatively low values, in the order of 10^{-6} to 10^{-8} m/s. Were particle size analyses performed?

How were the specific yields determined? From the literature? If so, provide a reference.

Do all of the monitoring wells (PO-1 to PO-26) have casings that go deep enough relative to the surface deposits so that the hydraulic test is not always testing both rock and sandy till simultaneously? It would be a good idea to add the depth (or thickness) of the surface sediments to Table 10.4 (or even Table 10.7).

A number of other wells/boreholes ("AE" and "SW" and "TG-HW" type) are also presented in Figure 10.5, but no information is provided in the report. Are these data available (e.g. borehole logs, borehole depth, water level)? They would provide considerable additional information (including for the piezometric map and the calibration of the numerical model).

What is the difference between the TG and BH geotechnical boreholes presented in Tables 10.5 and 10.6? The depth of the geotechnical boreholes as well as the depth of the water table should be indicated in Tables 10.5 and 10.6. Perhaps the last depth interval tested (presented in Table 10.6) is the deepest. However, it is indicated that the geotechnical boreholes are deeper than the monitoring wells (15 m or less) and the last depth interval presented always ends before reaching a depth of 15 m.

The proponent should also specify whether deeper boreholes (between 20 and 300 m) were drilled. If this is not the case, would it not be prudent to do so and to conduct hydraulic tests? Otherwise, how does one estimate the flow that will have to be pumped into the pit (from a depth of 250 m), the water table drawdown and the spatial extent of that drawdown?

Given the fact that Lugeon tests were conducted, it would be useful to provide the water levels of the various depth intervals to determine whether there are vertical gradients.

Since the water table almost reaches the surface, does the ground become easily flooded during periods of heavy rain? What is the average annual drawdown of the water table?

How was the piezometric map obtained from the measurements generated, i.e. what interpolation or kriging method was used? What were the parameters? If kriging was used, it would be useful to present the experimental and theoretical variograms. How many points (data) were used? In Figure 10.12, only the 26 monitoring wells are shown. Adding the water levels in the geotechnical boreholes would provide considerable additional information (the number of data would probably double). These data could be used in the same way as the other data or as secondary variables (with less impact) in co-kriging.

3.3.4 NRCan conclusions – Numerical model

What is the purpose of the numerical model developed? Was it to verify whether the recharge values estimated with the water balance, combined with the average K values obtained with the hydraulic tests, do indeed yield such a high water table? The problem is that without verifying the flow, the drains imposed in the model can discharge any quantity of water and it is thus difficult to determine whether the estimated recharge is representative. It seems surprising that there could be 244 mm/year of recharge even with a K value of 10^{-6} m/s at the surface.

How was the perimeter of the modelled area determined? The boundaries of the model were often set at less than 2-3 km from the study area, and this model contains many imposed piezometric heads, which significantly constrains the model. Why was the modelled area so small? Since the piezometry is reported to be very similar to the topography, it is probably safe to assume that the Lac Jean catchment also corresponds to the groundwater basin. This area (14.4 km^2) could have been used, even if the calibration could only have been carried out on the known piezometric heads in the mine area. At least a minimum annual flow (provided in Figure 10.2) could have been used to calibrate the base flow. Using only hydraulic heads does not permit “robust” (reliable) calibration. In addition, it is not indicated how the constant heads on the periphery of model were determined. With the piezometric map?

What do the five different layers in the Modflow model represent? In Figure 10.9, there is reference to only three layers with K values that decline with depth. How was the K value of 10^{-8} m/s for the last layer assigned?

Is the surface till layer represented in the model? One has the impression that this is not the case because of the three K values provided in Figure 10.9. Is this layer combined with the surface rock? Indeed, till must be present since that is where the water table is often found. This point should be clarified in the text.

What is the recharge in mm/year imposed in the model? This figure is not mentioned anywhere. 244 mm/year?

How were the K values assigned for the horizons below the first 20 m if no hydraulic tests were conducted at these depths? By trial and error? At present, the pumping flow rate and the spatial extent of the drawdown are based solely on the results of an overly constrained model.

Figure 10.16 shows the drawdown in the east pit (phase #1). However, the “drain” function that was used in Modflow was probably placed at the centre, since the simulated drawdown appears to be only 30 m at the perimeter of the pit, whereas the pit will have to be completely dry (and therefore have to attain a uniform depth of

250 m) once the excavation work is carried out. The spatial extent of the maximum drawdown in the area will therefore probably extend a bit further. With a drawdown of 250 m for the entire pit, a drawdown of 0.5 m would "spread" further than the estimated distance of 1,000 m. The drawdown in the area of the mine building could therefore also be higher than estimated (Vol. 2, p. 191: "Drawdown intensity would be nearly 200 m in the immediate vicinity of the mine."). Since a well will have to be drilled for the site's water requirements (Vol. 2, p. 274 "the drinking water supply for the construction camp will come from a drilled well"), this is not a trivial point.

It would have been useful to have a cross-section diagram illustrating the effect of the drawdown once the pit has been dewatered. Figure 10.15 shows only the groundwater level at pit mid-height. In addition, on the basis of this diagram, there would appear to be a risk that the fine tailings pile will collapse into this pit.

In order to assess the results of a simulation, it is good practice to add the coefficient of determination (R^2) on the graph showing the simulated data versus the measured data. In addition, calculations of the root mean square error (RMSE) as well as the mean bias (simple calculation of the tailings between the observed values and the modelled values) with and without absolute values should be added, which would provide some indication of the quality of the modelling.

Were data from the 26 monitoring wells used for the graph in Figure 10.10? There are only about 20 points in the graph. Why weren't the water levels in the geotechnical boreholes used? Water levels are certainly available since hydraulic tests were conducted. Since a permanent regime was modelled, mean values, even from another year, can be used, which would provide a better control.

It is stated on page 188 of Volume 2 that "recharge and evapotranspiration type boundary conditions are also sensitive." Does Modflow consider ET?

Because of the system of NNE-SSW faults (Vol. 1, p. 41), the extent of area affected by the drawdown resulting from pumping of the pit could have a much more elongated shape (since the model does not consider the coefficient of anisotropy). Pumping tests in deeper wells (200 m) would provide an answer to this question.

3.3.5 NRCan conclusions - Environmental monitoring

Groundwater quality could be affected by the following activities: the creation of pits by blasting and the disposal of tailings in the uncovered fine tailings pond, coarse tailings pile and waste rock dump. There is no mention whatsoever of environmental monitoring in the existing monitoring wells. A regular sampling and analysis program should be carried out to ensure that groundwater is not affected by the mine activities.

The water table around the pits should also be monitored, since the explosive used may leave nitrates (or nitrate residues) in the water. Steps should also be taken to ensure that drinking water standards (10 mg/L NO_3-N) are met in the two drinking water supply wells that will be used for the mine.

It is not clear whether there will be drains around the various tailings piles (fine, coarse and waste rock). All this water must be collected and analyzed before it can be released into the environment (e.g. into a stream). It is indicated on page 114 of Volume 1 that the overflow will be discharged to Lac Denis by gravity ("Any excess

water from the polishing pond is transferred to Lac Denis by gravity."). Are there any planned measures to ensure that contaminated water, that has not been analyzed and rated as acceptable to be discharged, is retained?

The groundwater level in the monitoring wells will have to be checked periodically to keep track of drawdowns around the pit.

Even though acidic drainage does not appear to be a problem since the rock tends to be alkaline, it is important that all water from the piles be captured via drains and that the quality of this water be monitored, since it could also contain various contaminants (e.g. metals, nitrates, hydrocarbons). As mentioned in the report, for the same reason, it will also be necessary to monitor the water quality in the pit and its periphery once the pumping stops.

What is meant by "it [the water pumped from the pit] will therefore be sent to the fine tailings pond before being transferred to the polishing pond" on page 189 (Vol. 2)? Why must the water be transferred to the fine tailings pond and not to a basin, pond or tank?

On pages 189-190 of Volume 2 it is stated that "As the groundwater level is very close to the surface in this area, which is at the foot of a hill, the infiltration potential is very low and the leached water would very quickly discharge into ditches built for this purpose." In fact, the opposite is true, a very high groundwater level generally promotes contamination. Is the location of the drains indicated, and if so, where? They are not shown in Figure 10.15.

How will the coarse tailings and waste rock piles be isolated from the soil in order to avoid infiltration (it is stated on page 190 of Volume 2 that "Very little infiltration is expected under the waste rock and coarse tailings piles.")? By membranes?

It is stated on p. 114 of Volume 1 that "In a full cycle, from the use of water at the concentrator until its return, 10% of the volume is lost." How can you make such a claim? Is this an estimate based on other similar mines?

Is the flotation step carried out at the concentrator or in a pond or ponds? Before releasing water to the environment, testing for the standard substances should be carried out (such as those identified in Tables 10.8 and 10.9), but the organic chemicals that will be used for the flotation step should also be included. The material safety data sheets for the following chemicals are provided in Appendix 11: gasoline, diesel, heating oil, butane, potassium sulphate, potassium salt, potassium hydroxide, polyacrylamide, polypropylene glycol (monomethyl ether), dipropylene glycol, monopropylene glycol and 2-ethylhexanoic acid.

3.3.6 Recommendations

NRCan would like clarifications on the above-mentioned points, specifically:

Water balance

10. How were the water balance values in Table 10.1 determined?

RQC-105

This is an Excel spreadsheet for determining an order of magnitude for a given area. Evapotranspiration is calculated using the Thornthwaite method. The spreadsheet also uses a runoff coefficient estimated at 0.3, a soil retention capacity of 0.05, a wilting point of 0.01 and a root zone depth of 1,000 mm.

11. Why is there a difference in the annual precipitation on pages 155 and 156 (Table 10.1)?

RQC-106

As noted in the RQC-48, the use of climate statistics from both the Chapais and Chibougamau meteorological stations has led to some confusion (precipitation of 961.3 mm in the text and 834.7 mm in the table).

The corrected balance using the same method leads to a unit recharge of 274 mm/year. The corrected balance is shown below.

CALCUL DE L'ÉVAPOTRANSPIRATION POTENTIELLE (FORMULE DE THORNWAITE)

Mois	T (C) moy	i	F	ETP
Janvier	-18.40	0.00	0.76	0.00
février	-16.80	0.00	0.8	0.00
mars	-9.40	0.00	1.02	0.00
avril	-0.50	0.00	1.14	0.00
mai	7.40	1.81	1.31	61.39
juin	13.60	4.55	1.33	103.19
juillet	16.10	5.87	1.34	119.57
août	14.50	5.01	1.23	100.64
septembre	9.20	2.52	1.05	58.93
octobre	3.00	0.46	0.93	20.63
novembre	-5.00	0.00	0.77	0.00
décembre	-15.30	0.00	0.72	0.00
	I	20.22	ETP/an	464.35
	a	0.83		

BILAN HYDRIQUE SOMMAIRE

Données estimées

Coefficient de ruissellement:	0.3
Capacité de rétention:	0.05
Point de flétrissement	0.01
Profondeur de zone racinaire: (mm)	1000
RAS max: (=d*(Cr-Pf)) (mm)	40
Surface de réalimentation: (m²)	1000000

Résultats

Rélimentation unitaire: (mm)	273.84
Réalimentation totale: (m³/d)	750.24
Réalimentation totale: (GUSPM)	137.54

Tableau des données

Mois	*P*	*R*	*I*	*ETP*	*ETR*	*∕RAS*	*RAS*	*∕S*
Janvier	60.90	18.27	42.63	0.00	0.00	0.00	40.00	42.63
Février	38.70	11.61	27.09	0.00	0.00	0.00	40.00	27.09
Mars	49.40	14.82	34.58	0.00	0.00	0.00	40.00	34.58
Avril	55.40	16.62	38.78	0.00	0.00	0.00	40.00	38.78
Mai	77.50	23.25	54.25	61.39	61.39	-7.14	32.86	0.00
Juin	95.90	28.77	67.13	103.19	99.99	-32.86	0.00	0.00
Juillet	120.70	36.21	84.49	119.57	84.49	0.00	0.00	0.00
Août	105.30	31.59	73.71	100.64	73.71	0.00	0.00	0.00
Septembre	125.00	37.50	87.50	58.93	58.93	28.57	28.57	0.00
Octobre	89.10	26.73	62.37	20.63	20.63	11.43	40.00	30.31
Novembre	83.40	25.02	58.38	0.00	0.00	0.00	40.00	58.38
Décembre	60.10	18.03	42.07	0.00	0.00	0.00	40.00	42.07
Totaux	**961.40**	**288.42**	**672.98**	**464.35**	**399.14**			**273.84**

Légende:

P	Précipitation	***∕RAS***	Variation de l'eau disponible
R	Ruissellement	***RAS***	Eau disponible par les plantes
I	Infiltration	***∕S***	Réalimentation unitaire
ETP	Évapotranspiration potentielle		
ETR	Évapotranspiration réelle		

12. Is the water table lower only under the lakes such as Lac Coco and Lac Laugon? (Vol. 2, Page 165)

RQC-107

These lakes are located at the top of a topographic ridge. Vertical gradients indicating a direction of flow down on the hills are frequently observed. It is quite natural to assume that a lake can release water to the aquifer if it is located in these conditions. In any case, this assumption has no impact on the results of the hydrogeological study.

13. Manual flow measurements should have been taken for the various rivers traversing the study site.

RQC-108

This is true, but difficult to put into practice because of the presence of many streams that are difficult to access. Spot measurements were nevertheless done at 24 stations. This is mentioned in Section 8 of the impact study. These are very localized measurement given the average residence time of the groundwater in the aquifer; furthermore, currents are very slow and the lakes are fed by numerous wetlands.

At this stage, the sampling data collected is sufficient to assess the project's impact. However, before starting the work and site operation, BlackRock Metals undertakes to prepare a more complete picture of the surface water by conducting a sampling program will be used to establish a baseline for the area. The methods and approaches recommended by Environment Canada for characterisation of aquatic environments in the metal mining technical guidance for environmental effects monitoring (EEM) (EC 2011) will be proposed.

Well characteristics and hydrogeological properties

14. Is it possible to make available the graphs (or electronic data) of the slug tests on which the description of the rock was based? (Vol. 1, page 40)

RQC-109

Yes, of course. In fact, all the graphs have been prepared and are contained in Appendix 10.3 of Volume 3 of the impact statement. The base data used to prepare these graphs can be provided on request.

15. Why were the logs of the 26 boreholes (monitoring wells PO-1 to PO-26) not provided?

RQC-110

They have all been prepared and are contained in Appendix 10.2 of Volume 3 of the impact statement.

16. Were particle size analyses conducted in order to arrive at the conclusion that the till is sandy (Vol. 2, page 273)?

RQC-111

This is a visual description from boreholes drilled in the field. Drilling reports frequently indicate the presence of sand in the descriptions of the overburden. Test pit reports also mention this. Nevertheless, the presence of 10 to 30% silt helps reduce the hydraulic conductivity of till, even if most of the particles are the size of sand and gravel. The orders of magnitude obtained are therefore consistent.

17. How were the specific yield values determined?

RQC-112

There are no specific yield values for hydrogeology mentioned in the impact study.

18. Do all of the monitoring wells (PO-1 to PO-26) have casings that go deep enough so that the hydraulic test is not always testing both rock and sandy till? It would a good idea to add the depth (or thickness) of the surface sediments to Table 10.4 (or even Table 10.7).

RQC-113

Boreholes with a strainer that only intersect the bedrock have a top 1 to 3 m from the interface, and are sealed with a bentonite plug.

19. Are the borehole logs, borehole depth, water level, etc. of the wells/boreholes ("AE" and "SW" and "TG-HW" type) presented in Figure 10.5 available?

RQC-114

Drilling reports frequently indicate the presence of sand in the descriptions in the overburden. Test pit reports by the LVM laboratory also mention this. Final-format data are nevertheless available (except water level) and were taken into account in the hydrogeological study.

20. What is the difference between the TG and BH geotechnical boreholes presented in Tables 10.5 and 10.6? The depth of the geotechnical boreholes as well as the depth of the water table should be indicated in Tables 10.5 and 10.6.

RQC-115

The TG boreholes are inclined and were drilled in the axis of the future pit. They were 177.6 m, 128.6 m, 239.1 m and 148.5 m deep, respectively. BH boreholes are vertical geotechnical boreholes drilled in the area of the processing plant or areas where infrastructure is to be built. These boreholes were approximately 12 to 17 m deep.

21. Specify whether deeper boreholes (between 20 m and 300 m) were drilled.

RQC-116

Deep boreholes were drilled (TG boreholes). It would indeed be interesting to do hydraulic tests. However, it should be noted that in most projects, bedrock

permeability decreases with depth. This trend is reflected in the packer tests done, even if they do not reach significant depths. If permeability was high, there would not be near-surface water levels at the top of such a hill.

22. Since Lugeon tests were conducted, the water levels of the various depth intervals should be provided to determine whether there are any vertical gradients.

RQC-117

The site notes submitted do not contain this information; they only show related pressures and flows.

23. Since the water table almost outcrops, does the ground become easily flooded during periods of heavy rain? What is the annual drawdown of the water table on average?

RQC-118

No annual monitoring has been done to date.

24. What interpolation or kriging method was used to generate the piezometric map?

RQC-119

Piezometer levels were obtained using the numerical model. Unlike models, statistical methods do not take into account the material properties and boundary conditions. At the time of the hydrogeological study, water level measurements in the geotechnical boreholes were not available.

NRCan recommendations – Numerical model

25. What is the purpose of the numerical model developed?

RQC-120

The objective of the model is first and foremost to help in the overall understanding of the hydrogeological system, by testing various hypotheses and comparing simulations to field data. The model can also represent piezometer readings better than with statistical methods, as it takes into account the real properties and boundary conditions. Finally, the model allows the drawdown caused by the project to be estimated. There is duality of recharge-conductivity; you can not adjust one without adjusting the other. Many combinations are possible, but it would be difficult to justify hydraulic conductivities very different from those measured.

26. How was the perimeter of the modelled area determined?

RQC-121

The strategy for determining the perimeter of a model is to choose, if possible, natural, physically identifiable limits, failing which the equipotential curves and lines of flow can be used. In this case, the western and eastern boundaries correspond to major streams (Rivière Armitage and Lac Armitage to the west,

and Ruisseau aux Sables and Rivière Boisvert to the east). The north and south boundaries do not correspond to streams. We therefore used constant loads near the topographic surface, as we assume that the groundwater level matches this surface fairly closely.

The perimeter of the model was defined by comparing the water balance for the boundary conditions before and after pit development; the model does not calculate any significant increase in the contribution from the boundary conditions. This leads us to conclude that the imposed head lies outside the area of influence of the pit, and that the distance is therefore adequate.

The modelled area is very suitable because the boundaries are outside the area of influence. In addition, it would be useless, not to say counter-productive, to further enlarge the study area, as larger mesh would be required, which would erode model precision. The essential thing is that the imposed head boundaries not interfere with the drawdown area. This is not the case, as there would have been an increase in the inflow in the model from the constant heads. Lac Jean is included in the modelled area; it covers 130 km² (13 km x 10 km).

The use of hydraulic heads only does not allow for reliable model calibration, but spot flow measurements in slow-flowing streams fed by wetlands are equally unreliable.

27. What do the five different layers in the Modflow model represent?

RQC-122

The five layers are the bedrock, but with a gradual decrease in hydraulic conductivity.

In terms of the last layer, the K of 10^{-8} m/s was assigned by assumption; it is a reasonable order of magnitude for this type of rock.

28. Is the layer of till at the surface represented in the model?

RQC-123

No, because it is too thin. Attempts were made to represent it, but it was dry in many places and it was very difficult to make the model converge.

29. What is the recharge in mm/year imposed in the model?

RQC-124

As indicated on page 181 of Volume 2 of the impact statement, the potential recharge imposed in the model is 244 mm/year; however, it is not used everywhere.

Figure 1 in Appendix 8 shows the distribution of the recharge. The model was built using a uniform recharge rate. Then, the model removed the layer of water that could not penetrate the ground because it was already saturated almost to surface. We thus find ourselves with recharge areas located on topographic

ridges, while recharge is nil in the valleys and, in general, in areas of resurgence.

30. How were the K values assigned for the horizons below the first 20 m if no hydraulic tests were conducted at these depths?

RQC-125

The most plausible assumption is that hydraulic conductivity decreases with depth. This tendency was shown with Lugeon tests as well as deep boreholes, for which average permeability throughout the entire geological section is low. In the various simulations, a vertically-constant hydraulic conductivity clearly leads to a significant deviation from the observations. If the model is too constrained, all parameter combinations would calibrate the model.

31. The spatial extent of the maximum drawdown in the area will probably extend further than anticipated in the assessment (Vol. 2 page 189). This could affect the drinking water supply of the construction camp (Vol. 2, p. 274).

RQC-126

Drain boundary conditions were used for the pit perimeter as well as for its base, not only at the center. The established drawdown is due to the fact it is difficult for it to exceed two-thirds of the saturated thickness of an aquifer. It then forms a seepage surface on the pit walls. We might then get water inflow on the walls, like in many mines and quarries, to the degree that the effective drawdown never reaches the bottom of a pit.

32. It would have been useful to have a cross-section drawing illustrating the effect of the drawdown once the pit has been dewatered.

RQC-127

This cross-section is schematic; furthermore, there is considerable vertical exaggeration. Figure 2 in Appendix 8 shows a 3D block and cross-sections where we see that the drawdown zone is three-dimensional. This figure shows that the zone would be larger at depth than on surface.

33. To assess the results of a simulation, it would be a good idea to add the coefficient of determination (R^2) to the graph presenting the simulated data versus data measured.

RQC-128

There are many statistics shown in Figure 10.10 in Volume 2 of the impact statement, including mean deviation, mean absolute deviations, standard deviation, root mean square, correlation coefficient and, most importantly, normalized root mean square, which measures the error as a function of the distance between the highest and lowest head.

34. Were the data from the 26 monitoring wells used for the graph in Figure 10.10 and why weren't the water levels in the geotechnical boreholes used?

RQC-129

The six wells that are not shown on the graph are located in the rail transfer area, which is not part of the area modeled.

Water levels were not provided in the geotechnical boreholes. During these tests, only flow-pressure pairs were recorded.

35. Does Modflow consider evapotranspiration? (Vol. 2, page 188)

RQC-130

The boundary condition is called "evapotranspiration". This is an imposed head boundary condition that prevents the level of the water table from rising above ground level. The input parameters are a maximum water layer per surface unit and extinction depth. The flow removed from the model is proportional to the extinction depth. Thus, even with a very rough recharge, this function allows us to "refine" the effective recharge, because it removes excess water in flat and low-permeability areas.

36. Pumping tests in deeper wells (200 m) would make it possible to determine whether the spatial extent of the drawdown resulting from pumping of the pit might have a much more elongated form.

RQC-131

We disagree, because these are ancient faults that are not conduits for water flow. Permeabilities in boreholes theoretically located in the fault zones were compared to boreholes in massive zones, and there was no clear trend.

In addition, this would constitute very localized data; an extremely high number of piezometers would be required to accurately measure the drawdown.

Environmental monitoring

37. Groundwater quality could be affected by the blasting activities and disposal of the tailings. It would be advisable to conduct regular sampling and analyses in the existing monitoring wells during environmental monitoring.

RQC-132

BlackRock Metals undertakes to carry out a regular groundwater monitoring program, including analysis of samples from existing monitoring wells.

38. The water table around the pits should also be monitored and steps should be taken to ensure that drinking water standards (10 mg/L NO_3-N) are met in the two drinking water supply wells that will be used for the mine.

RQC-133

BlackRock Metals undertakes to carry out monitoring in accordance with appropriate criteria to ensure the quality of drinking water at the mine.

39. It is not clear whether there will be drains around the various tailings piles (fine, coarse and waste rock). All water (contaminated) from the piles must be collected and analyzed before it can be released to the environment (e.g. into a stream).

RQC-134

Catchment ditches will be dug around the fine and coarse tailings storage facilities (see map in Appendix 1). All the water at the site is routed downstream from the mine site for treatment prior to being released into the environment.

40. The groundwater level in the monitoring wells will have to be checked periodically to keep track of drawdowns around the pit.

RQC-135

BlackRock Metals undertakes to monitor the groundwater in the monitoring wells in order to keep track of the potential drawdown around the pit.

41. Even though acidic drainage does not appear to be a problem, it is important that all water from the piles be captured via drains and that the quality of this water be monitored, since it could also contain various contaminants. As mentioned in the report, it will also be necessary to monitor the water quality in the pit and its periphery once the pumping stops (for the same reason).

RQC-136

All the water at the site is routed downstream from the mine site for treatment, and a monitoring system will ensure that the water is monitored before final discharge.

42. What is meant by “it [the water pumped from the pit] will therefore be sent to the fine tailings pond before being transferred to the polishing pond” (Vol. 2, page 189)? Why must the water be transferred to the fine tailings pond and not to a basin, pond or tank?

RQC-137

Mine water charged with SS due to the various pit activities will be then sent to the two treatment ponds via the fine tailings pond, which is upstream.

It should also be recalled that some of the treated water in the polishing pond will be reclaimed and sent to the processing plant for ore processing.

43. Is the location of the drains mentioned on p. 189 in Volume 2 indicated, and if so where? Since it is anticipated that the leached water would therefore quickly discharge into ditches built for this purpose, show the drain locations in Figure 10.15.

RQC-138

The waste rock and coarse tailings piles drain naturally into various ditches (see map in Appendix 1). The stones and sand in the coarse tailings (about 1 mm) are porous materials that do not hold water.

44. The proponent has estimated that there will be very little infiltration under the coarse tailings and waste rock piles. How are they isolated from the soil in order to avoid infiltration?

RQC-139

The waste rock piles and tailings ponds of the BlackRock Metals project are not isolated from the bedrock, as is customary at other mine sites. It should be recalled that the site selected for the various installations does not have any used sources of groundwater or usable aquifers. Finally, all drainage from the mine site will be controlled and captured by a network of ditches and treated before being released into Lac Jean.

45. How can you claim that, in a full cycle, from the use of water at the concentrator until its return, (only) 10% of the volume is lost (Vol. 1, page 114)?

RQC-140

In principle, there are four major sources of water loss:

1) **The coarse tailings: the coarse tailings are placed in the pile with about 15-18% water content. We hope to recover 50% of this water into the fine tailings pond, but the rest of the water in these tailings will be lost.**
2) **The fine tailings: when the fine tailings settle, they will carry water with them.**
3) **The concentrate: the concentrate needs at least 5.5% water content, which can increase to 8 to 10% during the summer months.**
4) **In the calculations, the boiler water used to dry the concentrate was considered as lost during the winter months. However, this water was supposed to be collected in the filtrate tanks and the separator tank. Note that this water was considered as lost to be more conservative.**

We also estimated that 68% of the discharged water could be reused in the process, while 32% of the water remains with the solid tailings and was therefore unavailable for recirculation.

46. Is the flotation step carried at the concentrator or in a pond or ponds? Before releasing water into the environment, testing for standard substances (such as those identified in Tables 10.8 and 10.9) should be carried out.

RQC-141

The flotation stage takes place in the processing plant. The usual elements will be monitored in accordance with the applicable regulations.

3.4 Acidic drainage and metal leaching, including tailings, waste rock and mine effluents

Documents Reviewed

Volume 2 Section 9

Context

The ore body is a vanadium-titanium rich, magnetite-ilmenite formation, with some minor occurrences of pyrrhotite. Analysis of the waste rock, and fine and coarse tailings determined total sulphur content below 0.3%.

NRCan Conclusions

Although fairly low, a 0.3% sulphur (S) cut-off should not be used as the only means of assessing acid rock drainage potential (ARD). Static tests would ensure that the tailings contain sufficient neutralization capability (NP) to neutralize acidity generated from oxidation of any sulphidic minerals (i.e. pyrrhotite). Even low levels of sulphide can lead to ARD if the neutralizing potential is insufficient to neutralize the generated acid. Care must be taken when working with materials with low AP or NP, as even minor variations can affect the drainage chemistry.

More comprehensive acid-base accounting procedures should be done on the samples. Although total sulphur analyses were done on the waste mine components, the sulphur analysis should include sulphate-S and sulphide-S. Neutralization potential tests (NP) should be carried out that include detection of iron carbonates (i.e. siderite). In addition, the neutralization potential ratio (NPR) should be provided to assist in evaluation of risk of acid generation.

Based on the results of these tests, the proponent may need to consider strategies to prevent/mitigate ARD.

In addition, there is a possibility that sulphidic-containing country rock may be encountered during mining operations, which may pose a risk for acidic generation. The proponent should also consider management measures to handle any potentially acid generating rock that is encountered.

Recommendations

47. Static tests need to be done to ensure that the tailings contain sufficient neutralization capability and more comprehensive acid-base accounting procedures should be done on the samples. Recommended procedures for analysis are described in Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials (Price, 2010) MEND 1.20.1.

RQC-142

See RQC-44, RQC-45 and RQC-46.

48. A systematic sampling and testing program of waste rock and tailings should be undertaken during operations.

RQC-143

Even though all testing done to date showed no problems, BlackRock Metals undertakes to monitoring for acid drainage and metal leaching potential in the tailings and waste rock management facilities during the operation phase.

3.5 Explosive facility

If you plan to use temporary installations before the installation of the permanent ones, please include them when providing the following information:

49. Provide a description of the construction for the explosive factory: assembly and installation (number of structures, description of purpose, dimensions, machinery required, time required).

RQC-144

Explosives will be delivered to the site by truck. They will be stored in a safe place, in compliance with the distances prescribed by the regulations and best practice. Primers and detonators will be stored separately (see map in Appendix 1).

50. Provide a description of the infrastructure, including explosives and innovation systems magazines, fuel storage, ammonium nitrate storage, maintenance/wash area, process vehicles and their parking area, offices, warehouses and buildings. Explain how the locations respect the safety distances required by the Explosives Regulatory Division (ERD).

RQC-145

As mentioned in RQC-144, BlackRock Metals will store the explosives, detonators and primers. There will therefore be no need to use water for storage, and washing and treatment facilities are therefore no longer needed.

51. Describe the fuel and ammonium nitrate storage plans, including maximum quantity at each facility (permanent and temporary). This should include the liquid effluent assessment plans and an evaluation of worst case scenario (i.e. accidental explosion) and emergency plan.

Given that BlackRock Metals is only storing, no effluent is anticipated from the explosives magazine. The magazines are located at a safe distance from mining activities, and the usual emergency measures will apply in the event of accidental detonation. The emergency response plan is currently being prepared and will be available at a later date.

Earthquake risks

52. Please give more detailed information (i.e. more scientific data and source of information, what is the emergency plan?)

RQC-146

As stated in the impact statement (p. 40), earthquakes in the study area are rare and of low magnitude. In addition, the seismic acceleration for the region is very low, at a PGA of 0.036 g according to the 2010 National Building Code or Zone 1 (A=0.05) according CAN/CSA-S6 06.

Natural Resources Canada (NRCan) has collected the seismic bulletin data available from the National Earthquake Database (NEDB) since 1985. Searches

for earthquakes and other recorded events can be done on the NRCan website: http://www.earthquakescanada.nrcan.gc.ca/stndon/NEDB-BNDS/bull-eng.php.

NEDB search parameters were as follows: Date-time January 1, 1985 to the present; earthquake depth 0 to 100 km; magnitude -3 to 9.9; radius 100 km from the project centre coordinates (49° 48' 30" N and -74° 02' 45" W); and finally, types of event quakes, mining events and blasts.

This search returned 13 recorded episodes, including the following three earthquakes:

- **Magnitude 2.5 earthquake 72 km north of Albanel (January 30, 2010);**
- **Magnitude 2.5 earthquake November 12, 1996 (Eastern background seismic zone);**
- **Magnitude 2.1 earthquake 49 km south of Chibougamau (November 16, 1997).**

The other 10 episodes recorded related to confirmed or probable blasts (8) or rockbursts (2) recorded between 1994 and 2007.

Safety features in relation to potential earthquakes will be included in BlackRock Metals' specific emergency response plan, which is currently being prepared.

4. Questions and comments from the Cree Regional Authority (CRA)

These questions and comments are an addition to the first series of comments sent to the CEAA by the CRA on January 12, 2012 and forwarded to the proponent on January 24, 2012. The CRA has received no answers to these questions to date.

Based on the modification to the project submitted by BlackRock Metals on March 27, 2012, it appears that a rail line will be built between the future operations site and the CN rail line. The proponent has indicated that an addendum to the environmental impact statement will be prepared in order to assess the possible options for this rail line and to estimate the potential impacts. The questions that follow do not consider this change, since no information concerning the potential impacts has been provided.

The questions and comments that follow may sometimes overlap with certain information that may be provided by various federal departments. As a result, we deemed it advisable to address a few questions to the federal departments involved to ensure that similar questions are not sent to the proponent and also to consult their specialists on issues of concern to us so as to confirm or eliminate certain questions. The proponent could also respond to these questions and comments.

4.1 Questions for Health Canada (HC)

The following answers are taken from Health Canada's responses to the Cree Regional Authority (CRA).

4.1.1 Air quality

1. What are the HC air quality requirements that the proponent must comply with (regulations, policy, guidelines, guides)?

RQC-147

At the federal level, applicable air quality reference criteria for human health are the Canada-wide standards and the national objectives for ambient air quality. However, Quebec had not ratified the Canada-wide Accord on Environmental Harmonization nor the Canada-wide Environmental Standards Sub-Agreement, from which these standards and objectives arise. That being said, the usual requirements apply at the provincial level. BlackRock Metals will comply with the requirements set out in the MDDEP's *Guide de la modélisation de la dispersion atmosphérique* (April 2005), as well as with the air quality standards in the Quebec *Clean Air Regulation*.

2. **5.2.1 Atmospheric dispersion model – *AERMOD***

Q: *Does HC consider the AERMOD model adequate to assess the impacts on air quality for this project?*

RQC-148

Health Canada has no expertise relating to atmospheric dispersion models.

AERMOD is an appropriate tool for assessing the effects of this project on air quality. AERMOD is one of the atmospheric dispersion models recommended by the MDDEP's *Direction du suivi de l'état de l'environnement* for second level studies (MDDEP, 2005). This type of study is required when one of the following conditions is met:

- **the project is located in an industrial park;**
- **there are several emission sources;**
- **the sum of modelled and ambient (background) concentrations is equal to or greater than 80% of the applicable limit;**
- **the project is located at the edge of a body of water;**
- **there are sources of toxic or hazardous pollutants.**

3. "Tables 5.10 and 5.11 give heavy metal concentrations in parts per million (ppm) for the ore and waste rock." **Volume 1, p. 177**

Q: *In HC's opinion, should atmospheric emissions of titanium dioxide and vanadium be measured? Should these components be part of a monitoring program?*

RQC-149

According to HC, based on results of modelling done within the scope of the impact assessment, vanadium concentrations in the air (estimated at 5% of the limit) should not pose a problem.

As for titanium dioxide concentrations, they were not estimated by modelling; there are no provincial or federal criteria for that substance. However, for discussion purposes, the Ontario limit (34 µg/m³ over 24 hours) can be used as a reference.

The workers' camp is located approximately 9 km southwest of the Phase 1 pit and about 6 km south of the Phase 2 pit (Armitage). Figure 5.7 (modelling results, TPM Concentrations – 24 Hours, Phase 2, Scenario 1) shows that at the southern end of the modelling domain, model concentrations of total suspended particulates are already below 34 µg/m³. Concentrations at the workers' camp, a few kilometres to the south, would be even lower.

The same conclusion applies to the fishing and hunting camps and Chibougamau residents, which are even further away than the workers' camp.

As for monitoring, total suspended particulates will be monitored. As vanadium emissions are solid (and as such, are included in total particulates), it will be possible to estimate them based on monitoring results and vanadium concentrations measured in the ore mined from the pit, the final concentrate and the waste rock (Tables 5.10 and 5.11 of the impact assessment statement).

4. "**Impact significance** - During the construction phase, air quality will be altered essentially by the emission of the above-mentioned dust and air pollutants. Despite the high resistance of this component vital to life and the regulations governing it, the intensity of the impact remains low on the basis of the modelling results; the overall impact is therefore minor. The operation phase is when the intensity of the impact will be highest. Most of the pollutants will be below regulatory limits, but some (chrome and TPM) could exceed Quebec's applicable criteria during summer months. These contaminants could be dispersed by the wind around the mine site or the rail transfer point. For these reasons, there is an impact of intermediate significance that lasts throughout the operation phase." **Volume 2, p. 275**

Q: *Does HC anticipate impacts on the health of workers and users due to air quality? If so, what would these impacts be? In HC's opinion, should a toxicology study be conducted?*

RQC-150

Health Canada is not mandated to assess effects on workers' health while they are at work (occupational health and safety). This is a provincial responsibility.

However, as far as the workers' camp is concerned, based on modelling results, Health Canada does not expect any effect given the distance between the camp and the mine.

The MDDEP criteria were established following an assessment of toxicological risks, with the view to protecting human health. Compliance with these criteria therefore implies zero or negligible risk to human health. In Health Canada's opinion, a toxicological study (toxicology risk assessment) should not be necessary.

5. It is stated on page 173 that “Under normal circumstances, the trucks will feed the ore directly to the crusher. However, in the event of a power failure or crusher technical issue, the ore will be temporarily stockpiled near the crusher.”

Q: *What measures will be taken to limit the dispersion of suspended particles into the ambient air and fine particles 2.5 µm (PM 2.5) or smaller in diameter at this location?*

RQC-151

Indeed, BlackRock Metals did not include this stockpile in this modelling, because of its temporary nature.

However, based on emission rates calculated for the concentrate stockpiles at the outlet of the concentrator (finer-grained than the ore stockpiled near the crusher) and the temporary and occasional nature of the stockpile, it is likely that emissions from this temporary stockpile near the crusher will be negligible compared to other emissions; the rate of emissions from the concentrate stockpile is several orders of magnitude smaller than from haulage, drilling and blasting (although the amounts of contaminants emitted also depends on other factors, such as the surface exposed to the wind). Again, given the distance separating the mine from Chibougamau residents and the workers’ camp, Health Canada considers it unlikely that there will be any effects.

The usual method for controlling $PM_{2.5}$-type fine particulates is spraying. In the event of crusher failure or technical problems, this mitigation method could be used.

4.1.2 Noise

6. What are the HC noise requirements that the proponent must comply with (regulations, policy, guidelines, guides)?

RQC-152

Health Canada does not have noise-related guidelines or enforceable noise thresholds or standards.

Health Canada's approach to noise assessment is to consider a variety of internationally recognized standards for acoustics (i.e. US EPA, CAN/CSA ISO and World Health Organization). Health Canada’s guidance document entitled *Useful Information for Environmental Assessments* provides a more in-depth description of factors to be taken into account when assessing noise exposure by human receptors.

7. “The study only looked at the impact of noise on the environment, and did not consider the potential effects of worker exposure to noise. The location of the mine site relative to downtown Chibougamau and the built environment significantly diminishes the risk of noise impact on the population. The area in question is located in a remote area southeast of Lac Chibougamau, and the nearest residences are a dozen kilometres away. Given these circumstances, certain assumptions were made to simplify the noise study. Outdoor noise levels were roughly estimated for the sole purpose of determining the maximum

distance at which noise from the mine would exceed a significant threshold." **Volume 1, p. 191**

Q: *The potential impacts of the exposure of workers and territory users (trappers, sport hunters) to noise were not considered. In HC's opinion, will noise be an issue for this project?*

RQC-153

As is the case for air quality, Health Canada is not mandated to assess impacts on workers' health while they are at work (occupational health and safety). This is a provincial responsibility.

8. "[...] the effects of noise on the health, comfort and wellbeing of people working at the mine or mining facilities are not within the scope of the elements considered for the environmental impact study;" **Volume 1, p. 205**

Q: *What are the HC requirements concerning the assessment of the effects of noise on worker health?*

RQC-154

See RQC-153.

4.2 Questions for the Department of Fisheries and Oceans (DFO)

We have noted that several answers to the first series of questions are pending, in particular concerning:

- the surface area of the treatment pond that will be built downstream of lake B-3;
- the monthly flows from the discharge point downstream of the treatment and monitoring pond (downstream of lake B-3);
- the stream crossings that need to be improved or built so that free passage of fish will be ensured where necessary.

1. **Q:** *On reading the compensation measures proposed by the proponent, it appears that several compensation projects (or the potential need for such compensation projects) have not yet been determined for various lakes and tributaries or streams. Is there a need to assess the impacts of the compensation options proposed by the proponent? Is there a minimum life span that should be planned for these projects? Are the objectives for monitoring the effectiveness of these fish habitat loss compensation measures established by DFO or by the proponent? What is the involvement of territory users in determining these compensation projects?*

RQC-155

The DFO did not respond to this question from the Cree Regional Authority. See also RQC-95 for compensation measures planned by BlackRock Metals.

4.3 Questions for Environment Canada (EC)

The following answers are taken from Environment Canada's responses to the Cree Regional Authority (CRA), except for RQCs 156, 162, 165, 168, 170 and 172.

1. Note in Table 9.6: "Note: In terms of tailings sulphur content, it should be noted that the five samples used to make the ore composite contained 0.06, 0.11, 0.15, 0.03 and 0.03% sulphur respectively, for an average of 0.08%. The 0.17% and 0.18% sulphur contents of samples ENBRA-66 and ENBR-74 show that this element becomes concentrated in the non-magnetic tailings. However, the sulphur content does not exceed the regulatory criterion of 0.3%." **Volume 2, p. 147**

Q: *The analysis of the NP/AP (neutralizing potential/acid potential) ratio is not provided. This analysis is necessary in order to determine whether or not the ore has an acid-generating potential (AGP). The proponent should demonstrate that the number of samples is sufficient for the mass of the total geological unit in order to determine the AGP.*

RQC-156

See RQC-44 and 45.

2. **Settling of Process Water** "To accelerate settling, process water from the primary and secondary magnetic separators will be mixed before being sent to the fine tailings pond. However, in an operating setting, the effect of the wind combined with the steady flow of water in the settling ponds could obviously cause the fine particles to remain in suspension for longer than in the laboratory." **Volume 2, p. 151**

Q: *What are the proponent's objectives concerning fine particles in suspension? How does the proponent plan to meet its objectives?*

RQC-157

For effluent quality to meet the discharge guidelines in the *MMER*, suspended solids in the settling ponds must be allowed to settle. BlackRock Metals conducted several settling tests in beakers to determine the solids settling velocity and time and obtain a preliminary estimate of the settling time required to meet SS discharge guidelines at the outlet of the polishing pond in the tailings facility. The beaker test results suggest a settling time of 13 days to reach 17 mg/L SS. However, under actual operational conditions, the SS-laden water will be subjected to winds and a constant influx of mine effluent into the tailings pond and thus the polishing pond, which will result in mixing that will increase particle settling times. More than 13 days will therefore be necessary for solid particles to settle. BlackRock Metals has therefore set a retention time of 30 days in the mine effluent treatment ponds to ensure compliance with *MMER* and Directive 019 standards.

3. **Tailings and Polishing Pond Management (11.3.3)** "Tailings pond operation is the mining industry activity most likely to have a severe impact on the environment. The project's three types of solid waste (waste rock, coarse tailings and fine tailings) have a higher neutralizing than acid-generating potential. The most significant environmental risk is dam failure, which would lead to the discharge of metals and

suspended solids in the receiving environment. To minimize this risk, the pond is located in the upstream portion of the catchment.

Q: *Why is the fact that the pond is located in the upstream portion of the catchment an advantage?*

RQC-158

In the context of this iron ore mining project at the Lac Doré geological complex, only the fine tailings will be contained by dams. The waste rock and coarse tailings will be piled (dumps). The tailings ponds contained by dams are ideally positioned at the head of the catchment to limit water influx and the amount of water to be managed, among other things, and thus minimize the risks associated with an inrush of water that could damage the dams and potentially lead to dam failure, with its related environmental and economic impacts. Should dam failure occur, only one catchment would be affected, and the environmental impact would be localized. In general, government entities encourage the use of a single catchment.

4.4 Aquatic environment

4. **ANALYSIS OF METALS IN BIOMASS (FISH AND BENTHOS)** "Biomass analyses done at the mine site in 2001 were reviewed to assess the potential for metals to enter the food chain. Two species of fish were selected for assessment of metals in biomass: the northern pike, a piscivorous species, and the white sucker, a benthivorous and insectivorous species. Table 8.29 shows biomass metal concentrations for Lac Denis, Lac Jean and Ruisseau Villefagnan (average, maximum), as well as the average length of analyzed individuals and their total number for each station (N)." **Volume 2, p. 111**

Q: *In EC's opinion, what data should be collected by the proponent in order to obtain the data required for a baseline environmental study, given the fact that the lakes affected by the project are small and considering the seasonal and annual variabilities. Can Ruisseau Villefagnan be considered a control lake since it is identified as a compensation measure implementation area (Vol. 2, p. 66)? If not, why was no control lake sampled?*

RQC-159

Control lakes (not affected by the project) were sampled (Lac Bernadette, lakes B-15, 16 and 17, Lac Coil and lake B-5), but no fish tissue from these lakes was analyzed.

Environment Canada's Environmental Effects Monitoring plan (EEM; *MMER*, Schedule 5) requires that mercury be monitored by measuring its concentration in tissues from an indicator species of fish, but only when the mercury concentration in the final effluent reaches a certain threshold.

5. **8.4 REFERENCE DRAINAGE SYSTEMS** "There are three reference drainage subsystems in close proximity to the project: the Lac Bernadette, Lac Coil–B-5 and Ruisseau Villefagnan systems. The three subsystems differ both in the size of their catchments and in the species they host. They contain both lentic (Bernadette, Lac Coil–B-5) and lotic (Ruisseau Villefagnan) habitats. Although Ruisseau Villefagnan is

classified as a control site, it is described in Section 8.9, which deals with compensation measure implementation areas." **Volume 2, p. 66**

Q: *What criteria were used in selecting the control lake? Aren't the control lakes too close to the project activities?*

RQC-160

As a result of project optimization, the discharge point will be in a stream flowing into Lac Jean (see map in Appendix 1). These waters will therefore not contaminate lakes B-4 and B-5. In addition, Figure 10.16 of the impact statement shows that, according to hydrogeological modelling, water table drawdown will not reach those two lakes.

For atmospheric emissions, modelling of the atmospheric dispersion of pollutants shows that the total suspended particulates (TSP) concentration is highest in the southern sector of the mine area and, as such, does not appear to pose a problem in the vicinity of the control lakes.

6. **8.4.1 Lac Bernadette** "Lac Bernadette is located west of the mining infrastructure development area and is not affected by the project. From upstream to downstream, this 2.4-km long lake drains Lac Yvette and lakes B-15, B-16 and B-17. Its emissary flows into Rivière Armitage (Figure 8.2)." ***p. 66***

Q: *Isn't the access road located between Lac Yvette and Lac Bernadette? Will Lac Bernadette therefore be affected?*

RQC-161

Figure 8.1 of the impact statement shows that the road runs east of Lac Bernadette. Should the road end up between two lakes and cross streams, structures (bridges and culverts) will be duly installed in accordance with best practice and the applicable technical guidelines to protect the aquatic environment and, where appropriate, the free movement of fish. As a result, Lac Bernadette will in no way be affected by the access road.

7. PHYSICOCHEMICAL QUALITY OF SURFACE WATERS (8.5) "Results of in situ surface water analyses of the 22 sampling stations (lacustrine and lotic settings) are shown in Table 8.21. More detailed results for the eight stations for which laboratory analyses were performed are shown in Table 8.22."

Q: *A single sampling campaign was carried out (three days in August 2011). In EC's opinion, what data should be collected by the proponent in order to obtain the data required for a baseline environmental study, given the fact that the lakes affected by the project are small and considering seasonal and annual variabilities.*

RQC-162

See RQC-108.

8. "Thus, from an ecotoxicological standpoint, because of their peculiar properties, waters in the study area can play a role in minimizing potential impacts of mining activities. Alkalinity, for instance, is an important factor for both fish and benthic

species, not only because it tends to buffer water pH, but also because its major constituents (carbonates and bicarbonates) complex with most metals, thereby reducing their toxicity. These local conditions must therefore be considered in assessing ecotoxicological risks related to the mining project." **Volume 2, p. 96**

Q: *Is an ecotoxicological risk assessment required by Environment Canada?*

RQC-163

From consultation with Environment Canada, it appears that an ecotoxicological risk assessment is not required. It should be recalled that, pursuant to the MMER and the EMM program, monitoring of water quality in the receiving environment and of the fish and benthos will be undertaken as soon as the mine comes under the *MMER*.

9. "Analytical results (Table 8.24) serve to constrain background concentrations for several metals, as well as pH values, some mineralization parameters (calcium, magnesium, potassium and sodium), and total organic carbon, total phosphorus and total cyanides. Of the metals analyzed, arsenic, cadmium, chromium, copper, lead and zinc are the only ones to which CCME guidelines apply. For the 14 stations sampled, mean concentrations calculated for these metals are below suggested interim sediment quality guidelines, which are concentrations above which adverse biological effects are frequently observed." **Volume 2, p. 102**

Q: *A single sampling campaign was carried out (a few days in July 2011). In EC's opinion, what data should be collected by the proponent in order to obtain the data required for a baseline environmental study, given the fact that the lakes affected by the project are small and considering the seasonal and annual variabilities.*

RQC-164

After consulting with Environment Canada, it appears that the sediment quality picture as presented is acceptable, as it is unlikely that sediment quality will change over time. Thus, additional sediment sampling would not provide any any further insight.

10. "Results from analyses performed in 2001 on sediments from water bodies in the area of the mine site are reported in Table 8.25. This data, as well as the 2011 data for which precise geographical coordinates of sampling sites were recorded (Table 8.26), will be used to monitor changes in physicochemical and granulometric parameters in the project area." **Volume 2, p. 106**

Q: *A single sampling campaign was carried out (a few days in July and August 2011.) In EC's opinion, what data should be collected by the proponent in order to obtain the data required for a baseline environmental study, given the fact that the lakes affected by the project are small and considering the seasonal and annual variabilities.*

RQC-165

See RQC-108.

11. "Leach test results indicate that only a very small proportion of metals present in the sediments is dissolved, even under acidic conditions. Excluding major cations

such as calcium and magnesium, all metals analyzed had concentrations below the analytical detection limit, with the exception of the following: aluminum, arsenic (Ruisseau Villefagnan), barium, cobalt, iron, manganese and zinc. Leach test results shown in Table 8.27 reflect extreme theoretical conditions and are not representative of conditions normally encountered in lakes and watercourses in the study area. In summary, the analysis of metals in sediments highlights the fact that all metals for which the CCME has set guidelines (arsenic, cadmium, chromium, copper, lead and zinc) have concentrations below these limits. Metal solubilization generally increases with decreasing pH. The low proportion of metals released at a pH of 4.9 suggests a relatively low risk of sudden release of metals, particularly during spring snowmelt, compared to other lakes and watercourses in Quebec. The relatively high pH of waters in the study area (average pH of 7.85), relative abundance of organic matter (198,000 mg/kg organic carbon on average) and sediment grain size (27% of particles, on average, the size of silt and clay) are all factors that significantly limit metal bioavailability." **Volume 2, p. 108-109**

Q: *Does EC consider the characterisation of metals in sediments important? If so, what are these metals and what form of the metals should be characterised (aluminum, barium, cobalt, manganese, iron)?*

RQC-166

Sediment characterisation prior to project development is an important part of the environmental impact assessment. For the mining project at hand, it was carried out in various lakes in the study area (see results in Table 8.24 of the impact statement).

Important metals to characterise in the exposed and control environments for comparison purposes are listed in the CCME's *Canadian Sediment Quality Guidelines*, as well as in the list of parameters to characterise included in the MDDEP's Directive 019 for the mining industry.

12. "A sample collected south of Lac Laugon shows the highest concentrations of copper, lead, zinc, selenium and mercury. Most of the samples had high copper and lead concentrations and in some cases exceeded limit values. Copper and lead concentrations are clearly linked to the many sulphide showings in the area. Analytical results show that six of seven samples analyzed had copper concentrations exceeding the Superior Province background concentration of 50 mg/kg, while copper concentration in the seventh sample (48 mg/kg) was similar to background. As for lead, five of the seven samples exceed the background concentration for the Superior Province (40 mg/kg). Zinc concentrations in soil are generally below background for the Superior Province (120 mg/kg), a single sample having a concentration equal to this value. No samples were collected directly from the mineralized zone." **Volume 2, p. 109**

Q: *Why were no samples collected directly from the mineralized zone? Isn't it necessary to know the chemical characteristics of the soils that will likely be most disturbed by the project activities?*

RQC-167

The sampled soils are tills that form the overburden covering the bedrock in the area. Samples were taken in the immediate vicinity of the project on the assumption that the same soil type is present everywhere in that area.

13. **ANALYSIS OF METALS IN BIOMASS (FISH AND BENTHOS) (8.7)** Table 8.29 Average Metal Concentrations (Maximum Values in Parentheses) Measured from the Flesh of Four Species of Fish Caught in the Project Area in 2001.

Q: *Only two species (northern pike and white sucker) are indicated in Table 8.29. Isn't it relevant to know what the other two species are?*

RQC-168

This is in all likelihood a mistake in the title of Table 8.29 in the French version. In the preceding page, it states that: *"Two species of fish were selected for assessment of metals in biomass: the northern pike, a piscivorous species, and the white sucker, a benthivorous and insectivorous species."*

14. "Possible groundwater contamination would affect a limited area within the site boundaries. For these reasons, the significance of the impact is considered minor." **Volume 2, p. 274**

Q: *What data support the claim that groundwater contamination would affect only a limited area?*

RQC-169

The conclusion that groundwater contamination would be localized is based on groundwater modelling (see Volume 2, p. 188 and after). This is explained in the section on "sources of direct and indirect impact" and in the section on "impact significance". The analytical data/results on which this interpretation is based are in the sections dealing with environmental characterisation of the ore and waste rock in the mineralized zone and of the tailings (Volume 2, 9.1 - 9.4).

As for the risks associated with infiltration of hazardous substances, a qualitative risk assessment is presented taking into account the mitigation, prevention and monitoring measures to be implemented over the life of the project.

Issues raised by Environmental Canada regarding the incomplete nature of sections dealing with mine drainage and metals leaching from the various materials involved are addressed in RQC-44.

15. "The duration of the impact is long, as there is a risk of groundwater contamination throughout the life of the project. Based on the available information, groundwater contamination is unlikely once the mine closes." **Volume 2, p. 274**

Q: *What is nature of this information concerning the likelihood of groundwater contamination once the mine closes?*

RQC-170

See RQC-169.

16. **Residual Impact (Lakes and Streams)** "The application of mitigation measures should significantly reduce the impact on surface water quality. The original flow will be altered permanently by the presence of mine tailings. However, the entire volume of water taken from the environment for processing purposes can be returned to its original watershed (Lac Jean) at the end of operations. The residual impact should be minor." **Volume 2, p. 273**

Q: *Are the mitigation measures sufficient to back up the claim that the residual impact will be minor?*

RQC-171

BlackRock Metals considers that, given the mitigation measures put forward, all the parameters that must meet the criteria and standards established in the *MMER* and the MDDEP's Directive 019 at the discharge point and attempts to comply with the effluent discharge objectives (EDOs) transmitted by the MDDEP, it is possible to state that the residual impact will be minor. Furthermore, the monitoring plan that will be filed as part of the certificate of authorization applications will ensure compliance with these standards and regulations.

17. **Residual Impact (Fauna)** "Despite the application of current and specific mitigation measures and the mine site rehabilitation plan, some habitats will never be restored to their original condition, particularly in the tailings area and the pit. The dynamics of wildlife populations in these sectors will therefore be altered permanently." **Volume 2, p. 283-284**

Q: *Is this a major significant impact (aquatic and terrestrial wildlife combined)? What is the conclusion concerning the significance of the residual impact?*

RQC-172

Impacts on fish and wildlife are very local and in large part restricted to an environment already disturbed by logging. The residual impact is therefore deemed low. See Appendix 5 on this topic.

4.5 Questions and comments concerning use of the territory

1. **Local Study Area** "The local study area covers 700 km2, encompassing an area between Route 167 and the northeastern part of Lac Chibougamau (Baie Girard). This area will be affected by iron ore mining and processing operations (site of the open pit, processing plant, garages, warehouses, waste rock pile, tailing sites, power line) and by shipping operations (access road, rail transfer point). The working scales (1:50,000, 1:20,000 and 1:15,000) were sufficiently detailed to survey all elements of the environment affected by the project (soil, fish habitat, water and air quality, groundwater, archaeological potential) and to reflect the state of the environment prior to mine start-up." **Volume 1, p. 24**

Q: *What is the local study area for the assessment of the impacts on the socio-economic environment and on the use of the territory?*

RQC-173

The local study area within which the impact on the socio-economic environment and land use were assessed is the same as that defined in the environmental impact statement (Section 2.1.2, p. 24). This local study area covers about 700 km^2, which provides a good assessment of the expected impact on these two components of the human environment that will be affected by the project infrastructure and activities.

2. **Archaeology (2.3.8)**

Q: *The methodology used for the study of the cultural, archaeological and historical heritage of the study area is not detailed.*

RQC-174

Archaeological heritage

Some 15 potential archaeological sites were identified between Route 167 and Lac Chibougamau, north of the deposit, including the rail transfer point, the access road corridor and the mine site itself (pit, tailings facilities, plant). Over 500 test pits excavated at sites with archaeological potential confirmed the absence of artefacts or historically- or prehistorically-significant objects.

Methodology

Prior to the archaeological survey, a literature search was conducted to check for the presence of known archaeological sites in and around the project sites. For each project, an information request, including the location of the road project on a 1:50,000 map, was sent to the *Ministère de la Culture, des Communications et de la Condition féminine du Québec* (MCCCFQ)'s *Service Inventaire des sites archéologiques du Québec* (ISAQ) so as to draw up a list of all inventoried sites within a 10-km radius of the development project.

An archaeological research permit application was then submitted to the MCCCFQ. A permit was issued (11-COTM-01) on the basis of a favourable ruling by the *Commission des biens culturels*.

The work site was located using aerial photographs, topographic maps and the construction project plan. A meticulous visual inspection of the site was then done to identify areas where test pits could not be dug (marshes, steep slopes, backfilled areas, bedrock or other areas of major disruption). All field observations and descriptions (environment, work undertaken, stratigraphy, etc.) were recorded by the project archaeologist. Digital photography records were systematically collected over the entire area to be surveyed.

Test pits were dug every 10 to 15 m along one or more transects, depending on the width of the site to be surveyed. The archaeological test pits, generally 2,500 cm^2 in size, were cut out with a shovel to remove the surface vegetation then excavated with a shovel or trowel, depending on the soil type.

The content of the pits was systematically examined and, in some cases, screened using a 6-mm mesh. The maximum depth depended on soil type, but was always determined based on the presence of buried natural deposits deemed barren. After all relevant data were collected (and recorded on standardized forms), the pits were backfilled.

Cultural and historical heritage

The methodology used to collect cultural and historical heritage data is based on an information search and review of available documents, knowledge of the area and the project, discussions with Native people with traditional knowledge of the study area and finally, discussions with various interested organizations, communities and individuals.

The closest permanent dwellings are more than 10 km away, and conducting more in-depth research on the heritage value of these buildings was not deemed necessary.

3. **Tourism** "For information purposes, 30 or so users were encountered between the rail transfer point and the deposit in June 2011. They were either bear hunting or fishing in Lac Armitage. During the same period, accommodation at Chibougamau hotels and outfitters were hard to come by, illustrating the popularity of wildlife harvesting in the area." **Volume 1, p. 34-35**

Q: *Please provide exhaustive data on sport hunting in the regional project area. Explain the limitations inherent in the data collected by the proponent.*

RQC-175

The regional project area overlaps with hunting zones 17 and 28, for which 2011 statistics were as follows:

- **caribou: 0**
- **white-tailed deer: 0**
- **moose: 94 (zone 17) and 3,594 (zone 28)**
- **black bear: 75 (zone 17) and 507 (zone 28)**

These figures are taken from big game hunting statistics compiled by the MRNF on the following website: http://www.mrnf.gouv.qc.ca/english/wildlife/statistics/index.jsp#hunting.

Factors limiting the accuracy of these official data have to do with the extent of the territory covered by the hunting zone (not for the immediate vicinity of the study area), hunting data provided by Native communities and potential poaching.

4. **Land Use and Built Environment** "In the project's local study area, the built environment amounts to the hunting camps of the Wapachee family (tallyman, trap line O-59) along logging road 210. These seasonal hunting camps (Rabbit Camp) will be directly affected by ongoing concentrate transport activities. These camps should be moved to a spot chosen by the tallyman and his family. In the Lac Vimont sector

(Domaine-du-Roy RCM), about 12 km southeast of the deposit, there are also secondary residences occupied on a seasonal basis. All told, land use is primarily associated with the hunting and fishing seasons." **Volume 2, p. 248**

Q: *Has the Wapachee family agreed to move its camp? The assessment of the impacts on the built environment cannot currently be considered complete knowing that the tallymen of trap lines O57/M-57 and O-60 and other territory users may not have been met. (see Appendix 1.3 6. Community Meetings)*

RQC-176

The Wapachee family has indeed agreed to move its Rabbit camp, and BlackRock Metals has agreed to cover the costs, by building a similar building to that which is currently at Rabbit camp. The Wapachee family is currently in the process of deciding where the new camp will be located and how it will be used. BlackRock Metals is in ongoing discussions with the family to determine the features of the new camp.

The various regional land users will have the opportunity to express themselves at upcoming open house events.

5. **Sources of Direct Impact** "The project's direct impact on the built environment (Camp Wapachee) is caused essentially by traffic on road 210. Traffic volume will be heavy with the start of the construction phase and will grow in the operation phase. During operation, the regular passing of trucks carrying iron ore concentrate to the rail transfer point on a daily basis, along with movements of workers and suppliers, will have a significant impact. Noise, dust and the emission of atmospheric contaminants will compromise environmental quality and the safety of road and hunting camp users." **Volume 2, p. 284**

Q: *What will be the project's impact on the health and safety of users using the road to get to their camps or to engage in traditional or sport hunting and fishing activities?*

* *This impact will likely have to be re-assessed in light of the changes made to the project in March 2012.*

RQC-177

As a result of project optimization (document submitted to the Federal Committee at the same time as this report), the iron ore concentrate will no longer be transported by hundreds of truck as everything will be done by train, with the rail line starting near the mine. Thus, there is no longer any anticipated potential impact on user safety.

6. **Impact on the Human Environment – Land Use - Sources of Direct Impact** "From the start of construction, land use will be affected by the traffic generated by work at the workers' camp, the rail transfer point and the mine site and for construction of the access road. On construction sites, land use will be affected on an isolated basis, but intensive use of road 210 by workers will make it difficult for others to use the road. Some 600 hectares of land will gradually change vocation. The impact will extend into the operation phase because of mining activities, the presence of equipment (tailings facilities and processing plant) and the heavy traffic on road

210. Hunting and fishing activities will be compromised in the vicinity of the mining facilities and the road linking the rail transfer point with the mine site. Third parties exploiting primary resources will also have to deal with this new reality. It should be specified, however, that the harvesting of wildlife resources near the facilities is, in any case, incompatible with safety criteria associated with mine operation." **Volume 2, p. 285**

Q: *The presence of a camp for several hundred workers could have an effect on sport hunting and fishing and on poaching if mitigation measures are not implemented. Has the proponent met with the Hunting, Fishing and Trapping Coordinating Committee in order to hear their views on the measures necessary to minimize the adverse impacts on the wildlife resources in the study area?*

RQC-178

BlackRock Metals cannot act en lieu of the relevant authorities in dealing with hunting and fishing activities on land close to its operations. However, BlackRock Metals is looking at restricting access to the resource by applying the following measures: firearms will not be allowed on the mine site or in the construction camp; keeping food in individual rooms will not be allowed at the construction camp; and workers will not have access to camp kitchens and freezers. During the operation phase, workers will be shuttled by bus and will not remain on the mine site after working hours.

Anyone with concerns about this impact will be able to voice them during open house events.

7. **Impact on the Human Environment – Land Use** The specific mitigation measures include: "US3 In collaboration with the Association Touristique Régionale and with hotelkeepers, produce and disseminate documentation for hunters and fisherman who use the territory for walleye fishing and bear hunting. Promote alternate access routes to the territory and specify the dangers involved in tourism activities along road 210 between the rail transfer point and the mine site." **(Volume 2, p. 293, US3)**

Q: *What alternate access routes to the territory is the proponent referring to?* (The purpose of this question is to determine whether this specific mitigation measure could have other impacts on use of the territory.)

RQC-179

These alternate access routes will no longer be needed, as there will no longer be truck transport between the mine site and the planned rail transfer point site. As a result of project optimization, the concentrate will be loaded onto a train right next to the mine site.

8. **Impact Significance** "Resistance of the land use component is considered high because the project heavily compromises other valued non-industrial activities around road 210 and the mine site, although it complies with municipal zoning. The intensity of the project's impact on the environment is high because it heavily compromises or limits use of this component for the population and traditional users of the territory. The latter have rights enshrined in the JBNQA. The extent or scope of the impact is

local because it extends over a linear band about 30 kilometres long. Apart from the access road that is already in place (road 210), the road to be built (along the route of an old logging road) and the workers' camp (a temporary facility for construction), the project's impact on land use is considered major. The duration of the impact is medium and will be felt continuously during construction and throughout the life of the project. The impact will produce lesser effects for a few years after operations end, taking account of the time required to dismantle the facilities and rehabilitate the site." **Volume 2, p. 285-286**

Comment: *It is difficult to ascertain from the proponent's assessment what impact the project will actually have on use of the territory since some users do not appear to have been met, which means there is not a complete picture of the use of the study area: this makes it difficult to know to what extent the study area is used for traditional or sport hunting and fishing purposes. What are the valued areas or areas of interest for the Cree, the wildlife species harvested, the travel routes affected, etc. (see request for information sent to the proponent in January 2012).*

As the entire project lies within trap line O-59, a thorough description of land use in this territory was established during interviews with the tallyman, Philip Wapachee, and his family. Transcripts of these interviews are presented in Appendix 9.

5 Questions and comments from Health Canada

5.1 Air quality

Health Canada has reviewed the air quality component of the environmental impact statement of the BlackRock mining project. Our opinion is provided below.

According to the modelling results, during the construction period, the atmospheric pollutant concentrations resulting from project will meet Quebec air quality criteria2 as well as the National Ambient Air Quality Objectives.[3]

During the operation period, the forecast concentrations of total particulate matter (TPM) as well as chromium slightly exceeded the criteria. With the application of the mitigation measures described in the report (e.g. use of dust control agents, covering the fine tailings with a layer of water, avoiding vehicle idling), TPM emissions should be reduced by 80% (consequently, chromium emissions should also decline).

On page 179 of Volume 1, it is mentioned that the proponent will install an air quality sampling and measuring station for TPM, $PM_{2.5}$ PM_{10} by 2012. The duration of this sampling is not clear.

RQC-180

BlackRock intends to set up this air quality sampling and monitoring station before mining activities begin. The station will allow for continuous measurement and analysis of TPM, $PM_{2.5}$ and PM_{10}, before, during and after mine production, as planned.

[2] http://www.mddep.gouv.qc.ca/air/criteres/fiches.pdf

[3] CCME 1999. *Objectifs nationaux afférents à la qualité de l'air ambiant au Canada : processus et état.*

The duration of sampling includes the pre-production phase (construction), as well as the first seven years of production (2014-2020). Air quality measurements allow the effectiveness of dust mitigation and control measures to be determined.

In Health Canada's view, the anticipated changes to air quality during the construction and operation phases of the BlackRock mine should not have adverse effects on the health of the neighbouring populations.

However:

- *Health Canada encourages the proponent to continue air quality monitoring during the operation period in order to ensure that the concentrations of pollutants emitted are within applicable criteria;*

Indeed, as mentioned on page 321 of the impact statement (Section 14.2.6), during mine operation, BlackRock Metals will measure air quality at the mine site to assess the effectiveness of atmospheric emissions mitigation measures at the source and thus check for compliance with atmospheric quality standards pursuant to the Regulation respecting the quality of the atmosphere. An air quality sampling station will be set up southeast of the mine site (down the prevailing wind direction) before the beginning of the operation phase.

- *It will be important to conduct an atmospheric dispersion study in anticipation of the mining of the deposit located to the southwest of the current project and to consider the cumulative effects (i.e. the mining of the new deposit plus the mining of the current sector);*

Looking longer term, should the Armitage deposit become economically feasible, BlackRock Metals will carry out an atmospheric dispersion study for the new operation.

For cumulative effects, see RQC-86.

- *Health Canada suggests focusing particular attention on the principles of "Keeping Clean Areas Clean" (KCAC) and "Continuous Improvement (CI)": the air quality criteria and guidelines are not acceptable levels of pollution. They should not be considered thresholds below which health effects do not occur. In this spirit, Health Canada suggests that projects aim not to maintain the status quo, but to improve air quality, established criteria and guidelines notwithstanding.*

BlackRock Metals will look closely at this suggestion when preparing its air quality environmental monitoring and follow-up plans.

Concerning the other issues, at this stage, Health Canada cannot undertake to provide an opinion on human health since too much essential information is missing from the environmental impact statement. In some cases, this would require going back into the field and conducting additional studies to complete the data collection. Hence, the following is a very general overview of the information that we require in order to issue an opinion on human health.

5.2 Food contamination

This heading relates to the metal contamination of traditional foods (e.g. foods that are trapped, hunted or fished, products of small-scale agriculture and foods gathered in the wild, such as fruits and berries).

Atmospheric contaminants and contaminated water are likely to contaminate plants and animals in the area by deposition from the atmosphere into soil and water. When the area is used for trapping, hunting, fishing and/or gathering, consumption of the biocenosis can pose a health risk to users.

Entraco's environmental impact statement confirms that the Cree and Innu in the region make use of the territory, but provides no information on the species hunted, trapped or fished, the quantities consumed, where they are harvested, the current and anticipated levels of contamination, etc. To issue an opinion on this type of impact, Health Canada requires this information, which can be obtained by means of a survey on consumption and use of the territory.

RQC-181

The consumption patterns of the Wapachee family who uses this land (trap line O-59) are presented in the land use study in Appendix 9.

5.3 Impact of noise

Blasting, crushing, heavy machinery and trucking are all likely to raise the ambient noise level and affect the health of the surrounding population. A noise survey based on provincial government requirements is provided in the environmental impact statement. However, the study does not distinguish between night-time and day-time noise levels. Health Canada's approach is based on the anticipated changes between day-time and night-time levels, current and projected, in inhabited areas and on the characteristics of the noise (i.e. impulsive or tonal). Hence, in order to issue an opinion on the effects of noise on human health, Health Canada requires this information.

RQC-182

Remember that the area affected by mining activities is a remote area southeast of Lac Chibougamau, and the closest permanent dwellings are some 10 km away. The tallyman is the only person to use this area, and he does so on an occasional basis.

The night-time and day-time noise levels will be similar as the concentrator and equipment will be operating continuously. Furthermore, there is no longer any intensive haulage as there is no more rail transfer point at a significant distance from the mine site.

Blasting will only be carried out in daytime, and only at a rate of once or twice per week.

Finally, it should be recalled that in the environmental impact statement filed in November 2011, BlackRock Metals undertook to conduct various noise-related monitoring activities.

Health Canada does not provide advice on exposure to noise in the workplace or on the impact of noise on the occasional occupants of cottages. However, when workers are housed in workers' camps on or near the site, they are considered temporary residents and may be part of our review.

Health Canada recently published a document entitled "Useful Information for Environmental Assessment," which describes in greater detail the expertise of Health Canada as well as our expectations concerning information on human health to be included in an environmental assessment. This document can be downloaded at: http://www.hc-sc.gc.ca/ewh-semt/pubs/eval/environ_assess-eval/index-eng.php

6 Questions and comments from the Agency

Section of the EIS and CEAA questions and comments

1.1 Overview

- What work is planned in the port of Saguenay or the port of Quebec for storage and shipping of the ore? Should this work be included in the scope of the project?

RQC-183

BlackRock Metals plans to use various facilities at the port in Saguenay (Grande-Anse sea terminal) to ship its ore. The main port facilities that will have to be set up at the Saguenay port are the following:

- **an automatic car unloader;**
- **a gallery conveyor (closed);**
- **a bucket wheel reclaimer;**
- **a warehouse (closed and heated in winter) ;**
- **a tube conveyor or standard gallery conveyor (closed);**
- **a ship loader.**

The ore will be transported via the Saguenay port rail line to the automatic car unloader, which is located in an enclosed building with an operator control booth. Once unloaded, the concentrate will be sent to the warehouse via a gallery belt conveyor. The warehouse will be closed and heated in winter to keep the ore from freezing. The bucket wheel reclaimer will be used to pick up the ore to be sent to the ship loader. The ore will then travel on a roughly 2-km-long tube conveyor to a ship loader with closed galleries that will load the concentrate into the ship's holds.

The concentrate handling circuit is a closed circuit designed for zero dust emissions for maximum environmental protection.

Thus, few impacts are expected, given that:

- **the spaces required for the warehouse, conveyor and ship loader are already built;**

- **the train unloading space is within a closed warehouse and the conveyor is also enclosed, so that there will be no dust or noise;**
- **concentrate will not be stored in an open space or on the ground, so no leaching;**
- **the only possible source of dust is during loading, but there are easy-to-implement mitigation measures, such as skirts at the outlet to the loading vent, loading speed and height adjustments, etc.**

In terms of project scope, it should be mentioned that the work and activities that will take place at the shipping port and at the mine site will be carried out in separate, different (physical and human) environments. The two sites are roughly 275 km apart. Thus, the port activities are a related project for which there will be a separate environmental assessment. In addition, the work and activities at the shipping port may be carried out by a different legal entity rather than BlackRock Metals.

Once more detailed engineering is available, an assessment of the potential impact of the shipping facilities will be submitted to the Federal Committee as a supplemental report.

- Update the summary, which will specifically include the following elements:
  - a concise description of all key aspects of the project;
  - a succinct description of the consultation conducted with Aboriginal groups, the public and government agencies, including a summary of the issues raised and solutions found and/or suggested during these consultations;
  - an overview of the project's main effects and the proposed mitigation measures;
  - the proponent's conclusions and significant determinations from the assessment.

If needed, a summary will be prepared once the notice of receivability has been received. It will include all updates required for a good overall understanding of the project.

- Identify Mashteuiash in Figure 1.1.

RQC-184

Appendix 10 includes a modified version of Figure 1.1 that now shows the location of the community of Mashteuiash.

1.2 Project Location and Scope

- Has the conveyor as an option for transporting the concentrate been abandoned? If not, it must be included in the options.

RQC-185

Yes, this option has been abandoned.

- The power line: what is the status of the project at Hydro-Québec? Include these impacts in the cumulative effects analysis.

RQC-186

According to information provided by Hydro-Québec, the power line is currently at the design and route selection stage.

See RQC-86 for the cumulative effects assessment.

- The boundaries of the JBNQA territory as well as the boundaries of the trap lines should be added to Figure 1.2.

RQC-187

The boundary of the JBNQA territory coincides with the watershed divide, as drawn on the map in Appendix 1. The trap line boundaries remain somewhat vague, but Figure 2.1 of the impact statement is still the best reference.

- Assess the option of transporting the concentrate by rail.

RQC-188

BlackRock Metals filed a notice of project modification on March 27, 2012. The plan is to build a 27-km rail segment linking the future mine site to the CN railroad. The rough route of this rail segment is presented in Appendix 11.

BlackRock Metals will prepare an addendum to the impact statement that will include a description of the potential impacts of the selected option.

1.6 Iron Ore Market

- Page 14 mentions the possibility of recovering the titanium contained in the ilmenite. When would this occur? What technologies will be used and what are their potential environmental impacts?

RQC-189

Following project optimization, BlackRock Metals is still considering the possibility of recovering the titanium contained in the ilmenite, although it is still weighing various scenarios (technologies, disposal methods, metallurgical assays) for this distinct project. Should the titanium recovery project be realized at some stage, new authorizations would be sought.

1.8.1 Provincial and Federal Governments

- The proponent should consider specifically addressing the concerns of the community of Oujé Bougoumou, which are mentioned in the appendix to the guidelines.

RQC-190

The concerns of the Oujé-Bougoumou community will be addressed by BlackRock Metals through two initiatives that are currently underway. First,

discussion group meetings have already been held in which issues addressed to date include training, jobs and the environment. Second, a capacity study focusing on members of the community will be carried out pursuant to the Impact and Benefit Agreement (IBA) for the BlackRock Metals project. This study will be supervised by an economist from Emploi-Québec.

Once these two initiatives are complete, the related reports will be promptly forwarded to the Federal Committee.

1.8.2 Native Communities

- In the past, mining companies have left behind a large quantity of tailings. Has the impact of these tailings been documented? Has the communities' perception of these tailings been documented?

RQC-191

The impact of tailings left behind by various mining companies is not well-known. The MRNF should be contacted for further details. As for the issue of how these tailings are perceived by the communities, it does not fall within the scope of the impact assessment.

1.8.5 Private Organizations

- The owners of the outfitter Pourvoirie J.G. Bou and of the Pomerleau fishing camp should be contacted during the public consultations.

RQC-192

These individuals will have the opportunity to express their views at open house events (to be held shortly) and at the eventual public hearings.

1.8.6 Conclusion

- The study states that "the public and the communities appear to indicate positive sentiment toward the project." Is there evidence of this?

RQC-193

No hard evidence of positive sentiment can be produced, as this is based on informal discussions and comments during presentations and consultations carried out by the BlackRock Metals team.

2.1.2 Local Study Area

- Incomplete list of environmental components, e.g. migratory birds.

RQC-194

Indeed, the list of natural and human environmental components is incomplete, and the succinct list that appears in this section of the impact statement should have ended with an "etc.". For a complete list of environmental components,

please see the impact statement table of contents, as well as Section 12.1 on environmental components.

2.2 Methodology for Data Collection

- Methodology must be explained in greater detail, in particular on the nature of discussions with Aboriginal peoples as well as the surveys.

RQC-195

A predevelopment agreement was signed in February 2012 between the Grand Council of the Crees, the Oujé-Bougoumou Community and BlackRock Metals, which included the following elements: consideration of jobs and business opportunities for Crees, a commitment by BlackRock Metals to move the Wapachee family hunting camp, community support for the environmental authorization process, and a commitment by the parties to prepare an IBA (Impact and Benefit Agreement) relating to mine construction and operation.

A discussion group was also created that includes members of the Oujé-Bougoumou Cree community and particularly to discuss socio-economic issues. The IBA is currently being developed and will include topics such as training, jobs and business opportunities for Crees, culture and the environment.

The survey methodology pertaining to the physical environment is described in the document in Appendix 5.

2.3 Human Environment

- The impact on the logging camp on the shores of Lac Vimont.
- Trailer on the edge of Lac Audet; three hunting camps along forest road 210. Include these users in the consultation.

RQC-196

Lac Vimont is far enough away that it will not be affected by the project, and effects along Route 210 will be greatly reduced as a result of the rail transfer point option being abandoned.

People who use these locations will have the opportunity to share their views during the future public hearings.

2.3.3.1 Cree Communities

- There is no information on the use of the territory by the tallymen of trap lines O-57/M-57 and O-60, or by any other Cree users.

RQC-197

The entire project will be developed within the boundaries of trap line O-59. This trap line belongs to Philip Wapachee, with whom numerous meetings were

held and who also took part in the impact assessment. In addition, a study of land use by the Wapachee family in this area is presented in Appendix 9.

- Has the information concerning the use of trap lines O-57/M-57 and O-60 been obtained? If so, provide this information.

RQC-198

See RQC-197.

- Despite the fact that several trap lines are mentioned in the environmental impact statement, why was only one tallyman met individually? In the same vein, there is considerable discussion about the mitigation measures for trap line O59, but not for the others.

RQC-199

The entire project will be developed within the boundaries of trap line O-59. BlackRock also met with John Metabie (Mistissini tallyman) in September 2011.

- The proponent is encouraged to consult the communities more widely, in particular the community of Mistissini.

RQC-200

BlackRock Metals made a general presentation to the Mistissini Band Council on July 16, 2012. It has also started public consultations in Cree communities in the area, and the Mistissini community will be consulted as part of this process. The report on this activity will be submitted to the Federal Committee as soon as possible.

Appendix 12 includes minutes of recent meetings with discussion groups (Chapais, Chibougamau, Oujé-Bougoumou and regional training and employment organizations). The community of Mistissini was asked to appoint people to participate in a Mistissini discussion group similar to those for the Oujé-Bougoumou, Chibougamau and Chapais communities. BlackRock Metals is still awaiting an answer from the community of Mistissini.

2.3.3.2 Innu Community

- Do the Innu of Lac-Saint-Jean have recognized ancestral rights on a part of the study area? Does the agreement-in-principle recognize traditional rights?

RQC-201

The general agreement-in-principle signed by the Mamuitun First Nations (which includes the Mashteuiatsh First Nation – Lac Saint-Jean Innu) does not formally recognize the ancestral rights protected under Section 35 of the *Constitution Act, 1982* for these groups. The agreement-in-principle aims to establish the structure, general orientation and principles that will guide the preparation of a possible future treaty. Pursuant to the agreement-in-principle, some ancestral rights, including the title of aboriginal, will be recognized, confirmed and carried over as part of a possible future treaty and the enacted

legislation. The effects and exercise of these rights will be as stipulated in the treaty. Thus, at this time, the ancestral rights of the Lac Saint-Jean Innu in the study area are not yet formally recognized by governments.

- More than half of the local study area is located in the Nitassinan. Document the impacts of the project in the Nitassinan.

RQC-202

The potential effects on the Nitassinan are discussed in the impact statement, and a supplemental study on the rail line is now underway.

2.3.4 Resource Use

- The waste rock buried in the former Lemoine mine reportedly contains small quantities of lead, zinc, gold, silver and perhaps arsenic. Are there risks to the population?

RQC-203

The old Mine Lemoine site was rehabilitated in 1994 and has been monitored by the MRNF. The related information is from the MRNF's website on abandoned mine sites (in French only): http://www.mrnf.gouv.qc.ca/mines/restauration/restauration-sites-miniers-abandonnes.jsp#6

2.3.5 Tourism

- Were the 30 or so hunters (page 34) consulted?

RQC-204

BlackRock Metals has not met with these hunters. However, they will have an opportunity to be heard during upcoming public meetings.

2.5.1 Vegetation

- What are the surface areas of the various types of stands and lands?

RQC-205

See Appendix 5.

2.5.2.1 Mammals

- Provide details on the level of disturbance of the earlier habitats.

RQC-206

See Appendix 5.

2.6.2.2 Unit 2: Lac Chibougamau and Lac Vimont

- Were the fishers in Lac Chibougamau and the eight seasonal residents of Lac Vimont consulted?

RQC-207

These people have not all been consulted. However, they will have an opportunity to be heard during upcoming public meetings.

2.6.3 Summary

- What is the distance between the mine and the closest human activities?

RQC-208

As mentioned in the impact statement (Volume 1, p. 28), there are permanent dwellings and a logging camp (an MRNF lease to operate a commercial resort) on the shores of Lac Vimont, about a dozen kilometres southeast of the future mine installations. Otherwise, the project area is regularly used for blueberry picking, as well as for partridge, waterfowl, bear and moose hunting (traditional activities).

3.1 Uniqueness of the Technology

- The pyrrhotite must be extracted from the magnetite concentrate by flotation by adding an activating agent.

RQC-209

Indeed, both a flotation agent and a frother must be added to the process to extract the sulphides from the magnetite concentrate.

- What agent? What is the impact on the environment? - Surfactants have been widely used most notably at the Troilus mine with no impact on water quality and aquatic life. What is the reference?

RQC-210

The flotation agent is PAX (potassium amyl xanthate), which makes sulphides hydrophobic and allows them to attach to air bubbles from air blown in during the flotation process, and the frother is Flomin F 672 Frother, a polyglycol ether. These agents are used in minute quantities and biodegrade quickly, and thus have no real effect on the environment.

- The sequence of processes described is unmatched in terms of efficiency, economic viability and low environmental impact. What are the other processes?

RQC-211

The most efficient, standardized and recognized process for magnetite recovery is low-intensity magnetic separation. Magnetite is a high-density mineral and it can be recovered by gravimetric processes (spirals or hydro separators) but these methods

are not very efficient for the project grain size liberation, which is 200 mesh.

Fine magnetite can be concentrated by flotation, however it is more costly due to the required use of chemicals agents (collectors, frothers, and pH adjustment agents); its efficiency is lower than magnetic separation.

In summary, magnetic separation is efficient, requires no chemicals and is the most economical way to recover magnetite.

3.2.1 Host Environment and Infrastructure

- Include the power line and the rail line from the concentrator.

RQC-212

Hydro-Québec is responsible for the power line (see RQC-234), while the rail line is currently being addressed as part of a supplement to the impact statement (in preparation; see RQC-188).

3.2.2 Selection Criteria

- The cost of hauling the ore to the crusher and the concentrator becomes difficult to justify in financial and environmental terms if the distance is more than two kilometres from the pit. What is the reference?

RQC-213

Each addition kilometre of transportation adds roughly 28 cents/tonne to transportation costs. As BlackRock Metals will mine a total of 152,165,000 tonnes of ore from the pit, each additional kilometre to reach the crusher will add ($0.28 x 152,165,000 tonnes) or $42,606,200 to the total production cost.

3.6.2.5 Conclusions and Recommendations Regarding the Environmental Condition of the Property

- The data obtained is considered insufficient for conclusions to be drawn on the environmental condition of the site. A Phase 2 environmental audit of the site is necessary. When does the proponent plan to conduct this Phase 2 environmental audit?

RQC-214

The site environmental assessment (Phase I) was done for the planned site of the rail transfer point. Given that a rail line will be built next to the concentrator, this facility is no longer necessary and a Phase II assessment is no longer required.

3.7.4 Description of the Selected Access Road Route

- Will this road be built even if the rail line is built?

RQC-215

The access road leading to the mine will be an existing road built for logging purposes.

4.1 Overview of the Ore and the Mine

- Extraction of titanium later by treatment of the coarse tailings. By what process? What is the anticipated impact on the environment?

RQC-216

See RQC-189.

- Confirm the shipping port, Quebec or Saguenay?

RQC-217

The shipping port will be in Saguenay (see RQC-183).

- Confirm the work at the port and the consequences of this work for the environmental assessment.

RQC-218

See RQC-183.

4.3 Concentrate Transport to the Rail Transfer Point

- Rail line for concentrate transport: description, route and impact?

RQC-219

See RQC-188.

4.4.3 Fine Tailings and Polishing Ponds

- Construction of the polishing pond 18 months before the start of operations? Review the timetable based on the progress of the environmental assessment.

RQC-220

Once the necessary authorizations are received, we still plan to start construction of the polishing pond roughly 18 months prior to the start of operations.

See also RQC-223.

4.7.2 Transmission Line, Substation and Power Grid

- Has the environmental assessment of the line begun? What is the timetable established by Hydro-Québec for this line?

RQC-221

See RQC-186.

4.7.4 Communication System

- Telecom tower: the proponent should contact Industry Canada to determine whether a permit is required.

RQC-222

BlackRock Metals already received all authorizations required for construction of the telecommunications tower, including those from Transport Canada and NAV CANADA, within the scope of the exploration phase of the project.

4.10 Project Schedule

- Revise the timetable to take into consideration the time actually required to complete the environmental assessments.

RQC-223

The project schedule has been revised and the project timetable is now as follows:

- **end of front-end engineering design: August 2012;**
- **end of detailed engineering: December 2012;**
- **construction permit (EA): March 2013;**
- **start of civil construction: May 2013;**
- **end of civil construction: December 2013;**
- **start of rail line construction: May 2014 ;**
- **end of rail line construction: September 2014.**

5.5.3 Contour Maps – Contaminant Concentrations

- What is the impact of the change in the concentrate shipping method (rail line)?

RQC-224

BlackRock will prepare a supplemental report that will present the potential impact on air quality along the proposed rail line. This supplemental report will be submitted to the Federal Committee as soon as it is ready.

- How will the sampling stations be monitored and by whom?

RQC-225

The various sampling stations used for monitoring purposes (air quality, water quality, noise environment, etc.) will be set up in accordance with the protocols and timetables prescribed by law. The BlackRock Metals environmental team will ensure that these monitoring activities are carried out properly.

- What is the probability of mining the southeast deposit? What is the projected time horizon?

RQC-226

BlackRock Metals is currently reviewing the possibility of mining the Armitage deposit. A thorough assessment of the feasibility of this project must be carried out to ensure that it is both economically and technically viable.

At this stage, no time horizon can be set with certainty, and new authorizations will be sought should the project turn out to be viable. Thus, this is a related but distinct project that is still included in the assessment of the project's cumulative effects.

6.1 Introduction

- Why were the potential effects of worker exposure to noise not considered?

RQC-227

BlackRock Metals addressed the issue of workers' exposure to noise in the impact statement. On page 239 (Section 11.5.6), BlackRock Metals specifically undertakes to set up a medical monitoring program for those exposed to excessive noise. The potential effects on workers are described later on, on page 279 (Section 12.3.5). Finally, general and specific mitigation measures for workers are included in the impact statement.

6.2 Study Area

- Were the residents closest to the site consulted?

RQC-228

Yes, the closest residents to the site are the Wapachee family. They were consulted and even took part in the field surveys (tallyman).

6.5.3 Rail Transfer Point Noise

- The information available is preliminary, and the noise impact can be reassessed if needed. Who will determine if this is necessary? When and how?

RQC-229

As a result of project optimization, the rail transfer point will no longer be built, and loading will take place right next to the processing plant. Note that noise resulting from rail transport will be addressed in the supplement to the impact statement that will be prepared as part of the impact assessment for the new rail line.

It should also be noted that BlackRock Metals has already undertaken to conduct noise monitoring studies in Section 14.2.5 of the impact statement (Volume 2, p. 320). The noise environment will be assessed once a year in the

first three years of operation and then every four years or whenever new equipment or activities are added to the project.

6.5.4 Transportation Noise

- Assess the effect of the change in transport by rail.

RQC-230

As the rail line is located right next to the processing plant and there is no longer ongoing truck transport to the transfer point, it is estimated that transport-related noise will decrease significantly. The daily train that will travel on the new rail line will cross the Wapachee family trapping grounds. The anticipated noise will therefore be localized and of short duration, which will result in a low potential impact. Moreover, the Rabbit camp will be moved to a more remote location (see RQC-176).

See also RQC-188 for the cumulative effects assessment.

6.6.2 Noise Impact Mitigation

- Why was no analysis of the effects on workers or wildlife conducted?

RQC-231

See RQC-227 for mitigation of effects on workers and RQC-239 for effects on wildlife.

10.2 Geology and Hydrogeology

- Legend for Figure 10.3 not visible.

RQC-232

This figure would have to be printed in plan format for the legend to be clearly visible, which was deemed unnecessary for purposes of the impact statement. However, in the PDF version of the document, the legend can be enlarged sufficiently to make it legible.

12. Impact Assessment and Mitigation Measures

- A flow chart or diagram explaining the assessment process would facilitate understanding.

RQC-233

The impact assessment methodology is explained in Section 12.2 of the impact statement (Volume 2, p. 250). The impact is assessed in light of two indicators, namely intensity and scope, and then the resistance of the impacted component to project development is applied. The duration of an anticipated effect is another criterion used to determine impact. The residual impact is obtained once the application of mitigation measures has been taken into account.

In addition to a thorough description in the text, various figures and tables are presented to clearly illustrate the methodology. It is worth emphasizing that impact assessment was done using proven methods, as mentioned at the start of Section 12 of the impact statement (methods used by the Federal Environmental Assessment Review Office, the *Ministère de l'Environnement du Québec* and Hydro-Québec).

12.1 Environmental Components

- Consider the impacts of the rail line and power line.

RQC-234

See RQC-188 for the impact of the rail line.

In terms of the impact of the power line, Hydro-Québec is responsible for the related environmental assessment. Its cumulative effects are nevertheless described in RQC-86.

- Forests affected: Specify the forest types and areas affected.

RQC-235

See Appendix 5.

- 13 lakes affected: can this number be reduced? Provide a list and maps of the affected lakes.

RQC-236

The infrastructure footprint was optimized and an assessment of tailings and waste rock storage alternatives was also done (see Appendix 2).

For lakes affected by the project, of which there are 12, please see RQC-7. It should be recalled that the impact statement indicates that lakes and ponds B-1, B-6, B-3 and B-12 are unable to sustain life in winter (freeze solid), and that lakes B-8, B-9 and B-11 are bog lakes (ponds).

12.1.1 Ground

- Impact of 600 ha. Add 105 ha for the power line and the impact of the rail line.

RQC-237

See RQC-188 for the impact of the rail line that will be built as part of the BlackRock Metals project. In terms of the impact of the power line, Hydro-Québec is responsible for the related environmental assessment. The cumulative effects of these two infrastructure components were taken into account (see RQC-86).

12.3.4 Impact on the Natural Environment - Air Quality

- Review the impact with the rail transport scenario?

RQC-238

See RQC-188.

12.3.5 Impact on the Natural Environment - Noise

- Document the noise impact on wildlife.

RQC-239

Wildlife

During the construction (and closure) phase, land clearing activities will disturb some land mammal species. In addition, construction of the mine infrastructure will produce noise that will make several species tend to leave the area. This disturbance (increased noise levels) will result from the use of machinery, vehicle traffic and the presence of humans during the construction period. Consequently, the use of machinery in the work area and surroundings may disturb small wildlife species, particularly micromammals. Thus, it is likely that several species will move away from these sources of disturbance towards habitats more favourable to their survival.

While the value of this environmental component is high, the impact intensity is small as the impact results in very limited changes in the quality, use and integrity of wildlife and its habitat. Wildlife will be disturbed locally, i.e., in and around the mine site. As the impact will be felt throughout the construction phase and beyond, its duration is moderate. The likelihood of occurrence is high, as it is very likely that wildlife will be disturbed near the construction sites. Overall, the significance of the residual impact on wildlife during the construction phase is deemed low.

During the operation phase, the intensity of the impact will remain low as wildlife integrity is not affected and similar habitats are available nearby. Wildlife activities will be disturbed locally, i.e., in and around the mine site. The impact on wildlife will be of long duration, throughout the mine production period and beyond. The likelihood is high since disturbance resulting from mining activities is unavoidable. Thus, the significance of the residual impact on wildlife during the operation phase is deemed low.

Birds

The construction of mine facilities, use of machinery and vehicle traffic will disturb birds due to constant comings and goings and noise caused by drilling, blasting, truck and machinery traffic, and the use of tools and various pieces of equipment. It is possible that some bird species will temporarily avoid the areas around the work sites.

Birds are more sensitive to noise during the nesting season (brooding and raising of juveniles), some birds going as far as to abandon their nest if a disturbance is too intense. Thus, nesting species are more likely to be affected by the work. Use of residual habitats within the mine site or in the surrounding areas could decline considerably. However, given their high mobility, birds will be able to migrate easily to other habitats located nearby.

Disturbances affecting birds during nesting or migration will be felt locally, in and around the construction sites and along the roads. The impact will be of moderate duration (about four to seven months of construction), spanning the entire construction phase. Finally, the likelihood of this impact is high since all construction sites inevitably result in disturbance to birds. Overall, the significance of this impact is deemed to be low.

During the useful life of the mine during the operation phase (about 15 years), the noise and traffic related to production activities, including mining, storage and handling of various materials, land transportation and the presence of workers may disturb some bird species that are more sensitive to human activity, at least during the first few years of operations, after which the most sensitive birds will have left the area surrounding the mine site to settle into quieter locations.

Waterfowl species and other aquatic birds that use lakes and shoreline areas to nest, raise their brood or rest during migration will be able to use the various process ponds safely as these ponds will comply with applicable standard.

Given the limited number of species and individuals that will be affected during the operation phase of the mine and the fact that the bird community in the study area is not characterised by any regionally-unique feature, the intensity of the impact remains low as it only leads to very limited changes to the integrity of bird communities. The scope of the impact on birds during the operation phase will be local as it will only affect bird densities around the mine facilities. This impact will be felt for a long time, as long as the mine is in operation. The likelihood of this impact is high as it is unavoidable that birds will be disturbed during the operation of the mine. Consequently, the significance of the impact on birds during the operation phase of the project is deemed low.

The closure phase of the mine will have a positive impact as the peacefulness of the area will be restored (end of activities).

Reptiles

The anticipated impact (negative and positive) will be similar to the anticipated impact on wildlife.

Fish

No particular impact is expected on lakes not directly affected by the project.

12.6 Compensation Measures

- What is MRNF's opinion for Rivière Armitage?

The MRNF did not make any comment on this topic. BlackRock Metals points out that an overall compensation plan is being developed in collaboration with the DFO and the MRNF (see RQC-95).

- Lake A-2 is not visible on the maps.

RQC-240

Lac A-2 is immediately west of Lac Laugon. It can be seen on Figure 4-1 (Volume 1, p. 100) and Figure 8-18 (Volume 2, p. 117). It is also identified on the map in Appendix 1, just east of the north part of the pit.

14.2.3.1 Wildlife and Birds

- How will the quality of replacement winter habitats be monitored?

RQC-241

In addition to information provided by the tallyman, a survey of moose winter habitats will be conducted in the areas where the project facilities will be built. Should winter habitats be disturbed by infrastructure development, appropriate compensation measures will be implemented with the prior approval of the MRNF.

14.2.3.2 Wetlands

- Have the tallymen been consulted to identify the wetlands affected?

RQC-242

The tallyman always accompanied the people who did the field surveys for the impact assessment submitted in November 2011. He also provided information to complement the basic information compiled by the consultant who conducted the surveys.

7 Questions and comments from the community of Mashteuiatsh

1. Mapping

- The project covers 600 hectares but does not include rail transportation.

RQC-243

A supplement to the impact assessment statement addressing the rail transport related to the project is currently being prepared. Appendix 11 shows the rail line route selected.

- There is no general map of trapping grounds and of the Nitassinan; features are not easily identifiable on the various maps, except Figure 2.1 (p. 26, volume 1), on which the area of overlap between the Nitassinan, trap line No. 24, the Chibougamau municipality, and the JBNQA Category III area is visible.

RQC-244

Figure 2.1 of the impact statement (Volume 1, p. 26) shows the essential features of the study area where most of the project-related impacts are expected. The trap line boundaries are somewhat vague and differ from one community to the next (see RQC-187).

- Check the location of the various sites, including one tailings facility which would be located in trap line No. 24.

RQC-245

In the optimized version of the project, there will not be any tailings facilities in the Nitassinan (trap line No. 24).

2. Traditional activities are only addressed superficially

- The use of trap line No. 24 is not described in detail (p. 250, volume 2). What does the tallyman say? When did he stop his activities in that area? The environmental assessment states that he has not been active in the area for some time – for how long? Is this a good reason not to address the impact of the project on his trap line? When will he start using the area again?

RQC-246

The impact on the seasonal hunting camps was addressed in the impact statement. Mitigation measures were determined for air quality, as this is the only environmental component for which there might be a long-term environmental impact in the area south of the project. Any water that will come in contact with project components is within the James Bay watershed. The residual impact on the Nitassinan is deemed low.

- An analysis of the potential impact, that is the impact that would be felt if traditional activities were to take place over the next 15 years, would be necessary.

RQC-247

There would not be any change to impact on the trap line, as the mine life is assigned a similar duration in the environmental impact assessment.

- Other areas that will see an increase in road and rail line traffic should be assessed in terms of the effects of this increased traffic. There is nothing in the impact statement on the increase use of Route 167 and, most importantly, the rail line. What are going to be the impacts on the Innu Aitun practice, on wildlife, what are the risks of accidents, spills, etc.?

RQC-248

The impact statement indicates (Volume 2, p. 328) that between Route 167 and the work site (i.e., Road 210), "From a human perspective, the main issues surrounding the project are traditional activities and the harmonious, safe sharing of the road corridor between Route 167 and the mine site. Many mitigation measures are therefore planned in this regard." It is estimated that during the operation phase, Route 167 will be used in the morning and at night by a bus, which constitutes an impact deemed to be negligible.

Insertion measures are also planned to offset the impact on traditional users of the land in the area.

With respect to the use of the rail line, the supplement currently being prepared will address the anticipated impact of its construction and operation, and cumulative effects of these activities are addressed in RQC-86 above.

Finally, impact on wildlife is addressed in this report, in RQC-74, RQC-239 and RQC-241, in particular.

- Traditional use by the Innu is not described as presenting a strong or even medium resistance (p. 254, volume 2). However, on p. 257, resorts around Lac Vimont are mentioned.

RQC-249

On page 255 of Volume 2 of the impact statement, it is clearly stated that traditional activities (hunting, fishing and gathering) present a high resistance because of their cultural significance for aboriginal communities.

3. Ecology

- The description of the physical environment (Volume 1, pp. 39-65) is fragmented (climate, geology, geomorphology), with no maps. Ecosystems are not mentioned. The analysis of landscapes is very limited.

RQC-250

Despite the "fragmented" description, all the required information on the physical environment is in the impact statement. In terms of ecosystems, additional surveys complete the characterisation of the area (see Appendix 5). Finally, landscape analysis was carried out in accordance with best practice and did not draw any questions from the Federal Committee or the provincial review panel (COMEX).

- Wetlands (Appendix 3.2). A lake would be used as a tailings facility. Does option 1 selected for tailings facilities not pose any ecological risk?

RQC-251

Although the project has been optimized, construction of various installations, such as the tailings facilities, will still result in the loss of some ponds and wetlands. As most of these water bodies have been identified and surveyed, their ecological value and the organisms they contain are known. Specific mitigation measures are planned to minimize ecological risks, such as the capture of fish (if any) prior to draining. In addition, as required by law, a government-approved compensation plan will have to be implemented to compensate for the lost lakes and wetlands.

- Wetlands, which are abundant, are paradoxically presented as having a high water and metal retention potential (p. 244, volume 2), but on p. 270, it is stated that they are "sensitive" and should ideally be avoided.

RQC-252

The new program to characterise wetlands in the study area (see Appendix 5) describes their ecological functions as well as the new areas affected by the project. BlackRock Metals has paid particular attention to the selection of sites for its facilities in order to avoid the most sensitive wetlands to the extent possible.

It should be recalled that by law, a compensation plan must be developed to compensate for the loss of wetlands. At this point, BlackRock Metals is looking at implementing a wetlands compensation plan at the abandoned mine site on Merrill Island (Campbell site) in Lac Doré, near Chibougamau. Compensation opportunities will be identified in collaboration with MRNF experts.

- Threatened species (Volume 1, pp. 209-237): Was their presence at the mine and waste storage sites specifically studied? Why only look at information from databases such as those from the CDPNQ instead of collecting the required information on site, which could then be added to those databases?

RQC-253

New wildlife and plant surveys were conducted to complement the basic data (see Appendix 5).

4. Air and noise pollution

- Air pollution (Volume 1, pp. 157-188): the conclusion section (5.6) needs to be clarified: "*...atmospheric dispersion modelling results show that overall, expected maximum concentrations for all contaminants considered (...) will comply with applicable Quebec criteria.*"

RQC-254

Air pollution aspects are addressed in greater depth and detail in this report (see RQC-51 to RQC-73). Furthermore, a new atmospheric dispersion study will be done and filed with the Federal Committee as soon as possible. It should also be recalled that monitoring will ensure the project will comply with applicable criteria and that, if need be, corrective measures will be implemented to ensure compliance.

- Noise pollution (Volume 1, p. 205): was only assessed with respect to man, but what would be the impact if a trapper were to use the area?

RQC-255

The zone of influence for the noise from mining activities and rail line operations will have the same effects on a man or a trapper.

- Do these two types of potential pollution have an impact on wildlife?

RQC-256

As far as noise pollution is concerned, the expected impacts on wildlife are low (see RQC-239). As for air pollution, it will essentially be restricted to the vicinity

of the mine infrastructure, and specific measures are already planned, such as a low idle feature on train engines (see RQC-71).

In addition, mitigation measures such as covered transfer piles, closed conveyors, management of fine tailings covered by water, and adequate spraying of roads will be implemented to suppress dust to the extent possible.

5. Importance of rail line traffic

- According to the impact statement, 72 cars with a maximum load of 102 tonnes would be used to transport 7,200 tonnes of concentrate daily (p. 110). We would like to know what that represents in terms of increase in rail traffic, which will run through Innu trapping grounds, but also the community of Mashteuiatsh. Are the effects of this increase documented?

RQC-257

During the operation phase of the project, there will only be one train per day, or about 365 convoys per year. The impact will be addressed in the supplemental study on the new rail line.

6. Schedule

- Start of work (Vol. 1, p. 157) following issuance of the MDDEP certificate of authorization: March 2012 (construction camp); May 2012 (dams). This is a very optimistic schedule.

RQC-258

The new schedule is presented in RQC-223.

7. Monitoring Committee

- Bill 14 states that a monitoring committee must be set up. Does BlackRock intend to form such a committee?

RQC-259

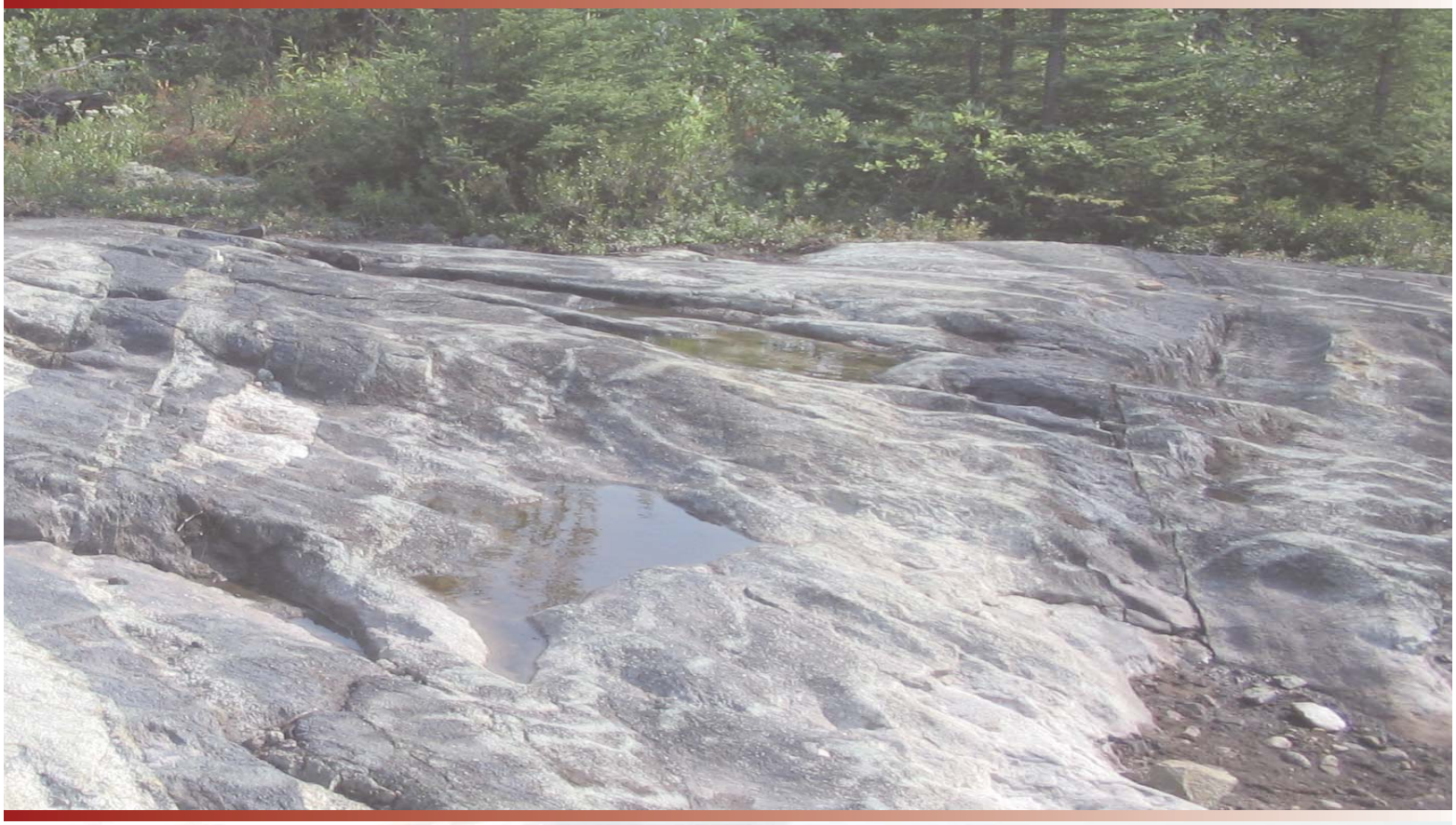
Indeed, BlackRock Metals undertakes to form a monitoring committee for its project.

8. Site visit

- Do you not think that it would be useful to arrange a site visit and to show how this type of mine operates?

RQC-260

BlackRock is not at liberty to arrange such an industrial-type visit, which usually requires special authorizations and safety training.



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