

July 4, 2016

Loic Didillon  
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Dear Mr. Didillon,

This document contains the preliminary comments of Geofor about the EIS technical review dated June 3, 2016. The NRCAN's comments can be grouped according to some main topics. We think that it is actually more appropriate to provide an answer to these main general points. A detailed answer to the NRCAN's concerns or questions will be integrated in the NRCAN document. The main concerns of NRCAN discussed in the next sections are:

- The presence of a shallow aquifer
- The water balance
- The modelling

### **Shallow Aquifer**

The presence of a shallow aquifer has not been observed in any hydrogeological holes except into the well HW-RC-14-WE01OB. This aquifer was interpreted as a perched aquifer of small extend. If a water bearing zone is met during the wells drilling, the driller will observed an increase of the flow in the return of the drilling fluid which was used at a lowest possible rate. The following ascertainment based on direct observation of the Howse or surrounding areas support the absence of a superficial aquifer:

- During drilling of a large number of exploration holes, no shallow aquifer was observed by the geologists and the drillers. Golder did not point out the presence of a surficial aquifer in their report.
- The observation of old pits in the Timmins area shows that the part over the deep phreatic level visible in the bottom of the pit is dry the vast majority of the time. Any runoff is visible on the sub vertical faces of the pits (see appended photos).
- Geofor did not observe superficial aquifer during previous well drilling s in the Timmins area. During the mining of Kivivic 4 north and south no dewatering was needed as predicted by the pre-mining drilling. No infiltration along the walls of the pits are visible.
- Mining is in progress in the Kivivic area which is at about 30 km north of Howse deposit. The Kivivic 2 pit was dry until the intersection of the deep water level as observed in the pre-mining piezometers and no groundwater dewatering was necessary.

- Hydrogeological wells were drilled into the Goodwood deposit few kilometers north of Kivivic area. All wells drilled to more than 100 m deep were dry. Only one showed a water bearing zone at 120 m below the surface. Few years after their drilling measurements the shallow and deep piezometers indicate the wells are still dry.

Based on the observations carried out in Howse area and his experience in the large mining area, Geofor does not believe in the presence of a surficial aquifer in the Howse area. Based on this assumption, Geofor does not recommend drilling of more wells or conducting more testing on existing wells. In our opinion, the presence of wetlands around the Howse deposit, is the effect of accumulation of surface water in low-lying lands. Since we do not have observed the presence of a surficial aquifer, it cannot be integrated in the model.

Although we do not believe that the wetlands are fed by superficial aquifer, we can suppose that the dewatering of the deep aquifer may have an impact on the wetlands. This hypothesis is stated in the EIS document in the sections concerning the impacts. To prove this impact in the field by pumping, testing would require the drilling of wells of large diameter and very long term pumping at high flow rate combined with the installation of a piezometric network. The results of these pumping test should not mimic the dewatering of the pit which will use a large number of wells distributed in the Howse area and create the large hydraulic gradient expected.

### **Water Balance**

The only reference about the water balance is from Fracflow Consultant inc. (2006). This company conducted a hydrogeological study for the Labmag project close to the Howse deposit but in a different geological context. The Labmag deposit is of taconite type consisting of lightly dipping undisturbed parallel layers. A DSO deposit results from the alteration of a taconite formation. SNC-Lavalin also performed hydrogeological study including modelling but the results are still confidential. Due to the scarceness of references, it was recently decided to establish a water balance using the hydrological data acquired by Groupe Hémisphères Inc. during the surface water flow monitoring of specific water course of the Howse area. SNC-Lavalin is currently carrying out the analysis of the data.

The recharge of the deep aquifer occurs preferentially through high elevation zones as stated in the report and obviously also through local permeable zones. As can be observed in figure 5 of the hydrogeological report of annex B of EIS, the thrust faults and geological formation are dipping almost vertically. The groundwater flow through the quartzite or its contact with the Sokoman. Locally we can suppose that the water infiltrate into permeable sector of the overburden and subsequently into the bedrock through local fault parallel to the main thrust fault and geological formation.

The partial discharge of groundwater through a southwest set of thrust faults in the Burnetta Creek area is a valuable hypothesis although not supported by references which are rare in the area. The hypothesis is based on the following:

- The large increase of the specific runoff at a downstream station of the Burnetta Creek in relation with an upstream one;
- The confirmation of the possibility of southwest set of thrust faults by an experienced geologist. Henry Simpson is a credible geologist who has worked for over 30 years as chief exploration geologist for DSO project conducted by Iron Ore Company, New Millenium Limited and Silver Yard (TSMC's subcontractor). For him, the creeks of the Timmins area often follow the surficial location of thrust faults because they are erodible lineaments. The sudden change of direction of the Burnetta Creek toward southwest parallel to an unusual orientation of the geological formations west of Irony Mountain support the hypothesis of a southwest fault zone.
- The low water temperature of Burnetta Lake in summer can also be a clue to the possible groundwater discharge. The temperature of groundwater in the Howse area is around 2 degrees Celsius. For the same period, temperature of Pinette Lake's water was over 12 degrees Celsius compare to 6 degree Celsius for Burnetta Lake.
- The groundwater flow seems to focus toward the Triangle lake area

#### **Comments on Modelling**

The modelling will evolve with the acquisition of knowledge of the geology and hydrogeology of the deposit and its surrounding. The actual modelling which simulate a complex geological environment, provides a good frame that will be improved with time. The actual model provides the basic information necessary for the dewatering of the pit and the definition of possible impacts of the project on the environment based on the actual information on the site and neighboring mining area. Important efforts have be spent in order to obtain information on the geology and hydrogeology of the deposit and its surrounding that have experienced a high degree of metamorphism during the Hudsonian orogeny. The numerous boreholes allowed obtaining a model of the complex geology of the ore body.

Regards

<Original signed by>

Gilles Fortin, ing. M.Sc.  
President

## **APPENDIX**

**TYPICAL PIT IN THE SCHEFFERVILLE AREA**

**(GAGNON A AND B)**



