

**To:** Justin Chase, NBELG, EIA Follow-up & Compliance Coordinator  
**From:** Daniel Guest, Hammond River Holdings Ltd.  
**Date:** December 2<sup>nd</sup>, 2020  
**Subject:** Upham East Gypsum Quarry – Low Purity Gypsum/Anhydrite Opportunity  
**EIA:** #1508

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## Introduction

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Hammond River Holdings (HRH) has identified an opportunity to sell low purity gypsum/anhydrite. New Brunswick, Nova Scotia and Prince Edward Island would be the target market with anticipated annual sales between 10,000 MT and 20,000MT.

## Operations

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Through normal quarrying operations and the presence of anhydrite and or low purity gypsum (<83%), the Upham East deposit inherently lends itself to generating a limited quantity of material that is not of sufficient purity to produce wallboard. However, the low purity gypsum/anhydrite is adequate for use as soil amendment. As a result, pursuing the opportunity to sell low purity gypsum will not require any significant change in day to day quarry operations as low purity gypsum encountered would otherwise be treated as overburden. No additional processing or crushing of the material is required to be done on site.

However, there would be a minor increase in trucking as an additional 10,000 to 20,000 MT of product trucked off site represents 300 to 600 loads annually. This would be in addition to the anticipated 250,000 MT or approximately 7800 loads of gypsum currently planned to leave site annually. This represents an increased number of loads by 3.8% to 7.7%.

Demand is seasonal for both soil amendment and gypsum for wallboard production. Demand for soil amendment is primarily in spring and fall while gypsum demand for wallboard production peaks in spring just following the removal of spring weight restrictions. HRH would focus primarily on supplying the fall demand as it reduces freight cost as well as flattens peaks and valleys in trucking.

Site operations do not exceed the reporting thresholds identified for the National Pollutant Release Inventory (NPRI) for Non-metallic Mineral Mining and Quarrying (North American Industry Classification System ID #212395). As such, the site does not exceed the minimum emission rates for fugitive dust as defined under the Canadian Environmental Protection Act, 1999. The provincial Approval to Operate (I-10936) issued for the site requires that the fugitive dust emissions are monitored at the site and the total particulate matter (TSP) concentrations must not exceed 120 µg/m<sup>3</sup> (see Schedule B of the Air Quality Regulation - Clean Air Act). Monitoring to date has confirmed that fugitive dust emissions at the facility have remained below 120 µg/m<sup>3</sup> for TSP.

## Material Characteristics

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Material produced at the Upham East Gypsum Quarry that is not suitable to produce wallboard is typically a result of impurities being present such as clay, silt and or anhydrite. Chemically, gypsum ( $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ ) is simply the hydrated sulphate mineral form of anhydrite ( $\text{CaSO}_4$ ). Physical characteristics of anhydrite vary slightly from gypsum in that it is harder and denser than gypsum.

The calcium sulphates minerals being quarried at Upham formed as a result of pervasive overprinting of the fine grained calcareous sedimentary host rocks and, in some instances, unconsolidated surficial materials. Initially anhydrite was the dominant calcium sulphate mineral, which subsequently underwent episodic hydration to gypsum. The hydration does not occur uniformly, leaving remnants of the relic anhydrite within the deposit. Anhydrite is the most abundant impurity within the commercial zones being quarried as a source for high purity gypsum. Other impurities include minor amounts of clay and carbonate minerals. Significant amounts of silica or fibrous material are not known to be associated with the host rocks or the secondary sulphate mineral assemblages. Further, given the relatively simple emplacement processes involved in the formation of the Upham East deposit it is not expected that the silica or fibrous material will vary between the gypsum and anhydrite rich zones within the quarry.

## Additional Mitigation Measures

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As discussed in previous sections, the physical and chemical characteristics of gypsum and anhydrite rich zones in the Upham East Deposit are similar. There are also no operational changes required to extract anhydrite. As such, the mitigative measures that are already in place for the extraction of high purity gypsum are also suitable for anhydrite. As a result, HRH does not anticipate the need for any additional safety or environmental mitigation measures.

## Engagement

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As with any project amendments, the sale of anhydrite will be discussed with First Nations through regular updates and meetings as per our engagement strategy. Project updates will also be shared with the Upham community.

## Summary

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HRH considers the extraction of low purity gypsum/anhydrite to represent a minor deviation in operations at the Upham East Quarry. Our review has not uncovered any unique concerns pertaining the physical and/or chemical properties of the anhydrite associated with the deposit and concluded that the existing Environmental Management Plan for the site is suitable to achieve the compliance objectives for the site

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