White Points Quarry Joint Panel Review
Public Hearings June 16 to June 30, 2007
Undertaking #29
Fisheries and Oceans Canada

Undertaking # 29: To provide, following collaboration with Environment Canada, an assessment of the ecological risks associated the ammonia residuals resulting from blasting and episodic and controlled releases from the project's settling ponds.

Response:

Background

(Note that the following background information was taken from Environment Canada and Health Canada's Priority Substances List Assessment Report (1999))

Ammonia exists in two forms, NH_3 (un-ionized ammonia) and NH_{4+} (ionized ammonia or ammonium) and together they are called total ammonia. It is the NH_3 form that is particularly harmful to aquatic organisms. The formation of NH_3 is favoured at higher pHs but is also affected by temperature. This means that while the concentration of total ammonia may remain constant in a water body, the proportion of un-ionized ammonia fluctuates with temperature and pH (Environment Canada 1999).

The majority of information relating to the effects of ammonia in the marine environment stems from research and analysis related to nutrient enrichment from municipal waste water, agricultural inputs and finfish aquaculture. However, the potential impacts from ammonia releases from blast residues may be extrapolated from these studies.

The effects from ammonia inputs in the marine environment can include coastal eutrophication, toxic algae blooms and direct toxicity for fish and invertebrates.

Nitrogen is generally the nutrient limiting primary production in the open ocean. Increased ammonia input can lead to anoxic conditions, however in highly mixed environment this is unlikely. Eutrophication of Canada's east and west coasts is not occurring at present. There are some indications that coastal areas around Vancouver and Halifax are impacted as a result of sewage effluents, but these are not eutrophication issues.

Evidence from the northern hemisphere indicates that over-enrichment of coastal waters can cause an increase in algae which produce toxic chemicals (Burkholder et al., 1992). Marine algae have been found responsible for at least four different illnesses in human consumers of molluscs as well as massive mortality of fish, birds and marine mammals (Paerl, 1997). The occurrence of these "harmful algal blooms" has resulted in the closure of shellfisheries, resulting in large economic impacts on coastal communities. The exact

cause of these blooms is not clear, although they tend to follow periods of intense rainfall, runoff and intense periods of sunlight (Smayda, 1997).

Available acute and chronic ammonia toxicity data for saltwater organisms are more limited than those for freshwater organisms. The U.S. EPA (1989) published a review on the saltwater toxicity of ammonia. Of those assessed, Winter flounder (*Pseudopleuronectes americanus)* was found to be the most sensitive to ammonia with an LC_{50} level of 0.49 mg/L of NH_3.

Potential for Impacts from Whites Point Quarry and Marine Terminal

Without predictions of the amount of basting residue (which can be highly variable due to environment conditions and practices of the blasting contractor), the potential environmental effects of emission of ammonium-nitrate and fuel oil in the marine environment is difficult (Environment Canada has requested additional information that has not been provided by the proponent – see below). Even if these quantities were known, further detailed analysis would be required for dispersion predictions to estimate the concentrations at the outfall of the settling ponds or other point sources.

Other factors may also influence these predictions such as the effectiveness of the settling ponds to remove ammonia prior to the release of settling pond water into the coastal environment. Fractured bedrock may also provide a role if factures provided a direct pathway between unexploded ANFO and the marine environment.

Without this further information, DFO and Environment Canada are unable to predict the ecological risk. However, if the proponent is able to reduce the levels of blast residue to their lowest practical levels, any residual material would be unlikely to have any ecological impact, given the mitigation measures proposed and the high rates of flushing in the Bay of Fundy. As noted to the proponent, if the application of the recommendations outlined in the paper by Gordon Revey were incorporated into the blasting plan, there will be little in the way of residual impacts accruing from this aspect of the proposal.

Environment Canada's Requested Information

Blasting Residues

Based on the Guidelines, it is the responsibility of the Proponent to describe Project activities, such as blasting, and to assess any potential adverse effects on water quality (e.g., subsections 7.8 and 10.1.2.3). In the Environment Canada review of the EIS, information was requested that would allow a better understanding of how residues from blasting activities could enter surface waters (e.g., nitrates, fuel oil) and adversely affect water quality upon which fish and migratory birds are dependent. The following specific information requests remain outstanding:

- Identify the amount of residue expected from blasting, the anticipated nitrate levels in surface water runoff, and the potential to affect the pH of water or trophic status in the sediment retention ponds.

- Identify potential blasting residues that could be present in any discharges and how they will be managed taking into account opportunities to reduce residues at source (i.e., pollution prevention).

Recommendation 8: In satisfying Guidelines direction on assessing effects on water quality, the Proponent should submit the requested information on blasting residues, potential interactions with the aquatic environment, and the proposed management measures so that potential adverse effects can be better understood and appropriate mitigation and follow-up monitoring measures identified.

Additional Resources

Natural Resources Canada

Natural Resources Canada (NRCan) may also be able to provide assistance on methods of reducing ammonia. NRCan's Mining and Mineral Sciences Laboratories (MMSL) have provided mining companies advice in better managing ammonia. Through the Ammonia Control Consortium, it was found that better management of ammonia would enable companies to meet regulations without implementing any new technologies.

The MMSL are federal government research laboratories within the Mineral Technology Branch of Natural Resources Canada. MMSL provides quality research and sound scientific advice to the mining and minerals industries, and to provincial/territorial and federal government departments involved in promoting or regulating these industries.