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Ministry for the Environment
PO Box 10362
Wellington 6143

Submission on the Draft Climate Change (Stationary Energy and Industrial Processes) Regulations 2008

Dear Sir,

Introduction

Newmont Waihi Gold herewith make a submission on the method and assumptions used in calculating the default emissions factors for gold mining.

Under the proposed Draft Climate Change (Stationary Energy and Industrial Processes) Regulations 2008 Newmont Waihi Gold would qualify as a participant in the industrial processes sector as a gold producer.

Producing gold is specifically listed as an activity in the schedules to the Act. Table 5 in Schedule 3 of the Regulations lists the default emission factors for producing gold as 0.44 tCO2-e/t for limestone use and 0.48 tCO2-e/t for dolomite use.

As shown in attachment 1, we believe that there are no significant emissions of green house gas resulting from the use of limestone during the production of gold. (ie milling and smelting process)

and ;

the emissions from limestone use on our waste rock dumps prior to being rehabilitated is over stated by the proposed formula and should be regarded as insignificant.

If we can be of further assistance please contact the undersigned.

Yours faithfully

Glen Grindlay
General Manager Waihi Operations

Newmont Waihi Gold

Attachment 1. Lime and Limestone Use by Newmont Waihi Gold Operations, NZ

In the explanatory bulletin " Emissions Trading Bulletin No. 8 October 2008" issued with the draft regulations, gold mining is specifically listed as an issue to be resolved, as officials understand that limestone can be used in different ways in the gold producing process, and not all of these may have significant, if any, greenhouse gas implications. The calculation method used assumes that all limestone used in gold production causes emissions and submissions are sought about the accuracy of this assumption.

Gold production is not defined in the draft regulations. It is believed that gold production is meant to be gold processing rather than the disposal of waste rock where limestone is used. Both ore processing and mining aspects are covered in this submission.

Gold Production

To produce gold, lime in the form of quicklime or calcium oxide (CaO) is used in the carbon-in-leach process. Lime is used to prevent the release of cyanide gas (HCN^-) as sodium cyanide is used to dissolve the gold and silver contained in the finely ground ore (in a slurry). In the process, water and cyanide react to form hydrogen cyanide gas or the cyanide ion (CN^-). The relative proportion of these to forms depends on the pH of the system. Lime is added to maintain the pH of the slurry above 10 units. The reaction between cyanide and water to produce hydrogen cyanide gas is expressed by $CN + H_2O = HCN + OH^-$. There are various other chemical reactions occurring such as oxidation of cyanide to form ammonia and bicarbonate ($CN^- + 1/2O_2 + H_2O = NH_3 + HCO_3^-$); degradation of cyanide to cyanate ($CN^- + 2OH^- = CNO^- + H_2O + 2e^-$); and the formation of carbon dioxide from cyanate ($CNO^- + H_3O = NH_3 + CO_2$). Addition of lime will form calcium hydroxide ($CaO + H_2O = Ca(OH)_2$), and when with carbon dioxide will form calcium hydrogen bicarbonate in an aqueous state ($Ca(OH)_2 + CO_2 = (Ca(HCO_3)_2)$). This effectively prevents emission of CO_2 to the atmosphere. It is probable that a negative reaction will also occur as any surplus CaO will eventually be taken up.

Based on the above explanation, there is no reason to believe that greenhouse gas emissions will occur in the gold producing process.

Treatment of Waste Rock Dumps

Limestone ($CaCO_3$) is used at some mines to manage the acidity of the mined waste rock. At Waihi, the waste rock is used to build the tailings storage embankment. Limestone addition is an important environmental control for acid water generation.

The chemical reaction is $CaCO_3 + H_2SO_4 = CaSO_4 + H_2O + CO_2$. The emission factor (0.44 tCO_2-e/t,Table 5, Schedule 3 in the draft regulations) is derived from the reaction of these chemical constituents. This assumes that all carbon goes out as gaseous CO_2. However some carbon (approx ½) will stay in solution as HCO_3 (bicarbonate) and CO_3 (carbonate). The chemical equations are complex and have not been fully determined for carbon emission assessment. Thus if waste rock were to be accounted the proposed emission factor (0.44 tCO_2-e/t) will overstate the amount of CO_2 produced.