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Re: Dairi Prima Minerals (DPM) Mine EIA Addendum.

I have made a review of the current EIA (2019) Addendum for the Dairi Prima Minerals (DPM) mine in North Sumatra. This follows the analysis I provided on 17 April 2020.

The April analysis was based on information that I could find in publicly available material, much of which was DPM information releases over a period of almost 2 decades. In my April 2020 analysis I summarized that as

> "The sequence of DPM plans as best as I can determine follows:
>
> 2003: Middleton plan (Middleton, 2003) and EIA calls for Anjing Hitam ore body 6 mt at 1 mtpy, 1/3 solids to upper tailings disposal area
>
> 2003-2011: further exploration and designation of "probable" supplementary ore bodies.
>
> 2011: Revised expanded project 25-30 mt @ 1 mtpy requiring larger tailings area."

I see from the new EIA Addendum (dated October 2019), the mining plan is much reduced from the 30 million ton, 30 year plan. The new plan reduces the time and production to about 20% of the previous plan for a mine of 30 million tons. It reduces it to much the same proposal of a high-grade ore extraction proposal set forth by Middleton in 2003.

My April 2020 report discussed how a 30 year mining plan would have required a Tailings Storage Facility (TSF) that filled the lower valley, with many added complications arising from flood problems, as well as the sheer size of the deposit. The latest EIA proposal reduces the TSF to one of a little more than 1 million tons capacity on a small stream near the Sokomokil HKBP church, 3 km downstream from the mine.

In regard to the earthquake safety of the tailings deposit and its retaining dam embankment, the Addendum proposes a 0.5 G maximum earthquake. The method used for deriving this design earthquake appears very similar to the method that I used in my study -- except for one crucial conclusion.

The EIA Addendum recommends a 0.5 G maximum earthquake. My April 2020 report proposed an earthquake that could range from 0.5 to 1.0 G. In other words, the EIR concludes, for TSF design, an earthquake at the lower end of my conclusion would be satisfactory. Whilst I agree that the 0.5g earthquake would be reasonable *if the foundation at the TSF side were stable rock*, the method of deriving the 0.5g design acceleration is not valid *if the underlying foundation is not stable rock*. This would appear not to be

the case. The EIA Addendum itself provides some information on the foundation conditions (Google translate):

> *"In general, TSF lithology locations are composed of Toba Tuff Formation units, with composition in the form of silt sandstone, sandstone clay, sandstone tuff, from several drill holes geotech has done more complete information about the sequence rock layer compilers in the TSF location area, geotech drilling at the TSF location is carried out 11 drill holes, with an average depth of 30 m and at that depth the lithology is still in the form of Toba Tuff deposits."*

The EIA Addendum goes on to explicitly state that the tuff is *unconsolidated*. This does not equate to stable rock. For these less-than-stable foundation conditions, the minimal 0.5 G does not apply. The ground motion would be amplified to a higher value, up to 1.0 G.

Determining what the value would require more important data, including results of borings, which the EIA Addendum apparently did not include. However, even if this data were to show that the tailings facility would be founded on stable rock, there would still be additional amplification of the ground motion within the dam embankment itself, likely to cause some internal movement. Again the estimate of TSF design earthquake of 0.5 G seems unrealistically low. DPM itself (or its consultants) also seem to acknowledge the hazard of the TSF as high (even with the 0.5g estimated ground motion):

> *"In consideration of the consequences of failure (life safety, economic, social and environmental impacts), the hazard classification of the TSF is considered high, based on this classification, the Maximum Earthquake Design (MDE) is calculated to have a bedrock acceleration of a maximum of 0.5g based on an earthquake of 7.7 M near the Sumatra Fault (Table 3.25), or, M 9 earthquake due to subduction which can produce a maximum acceleration of 0.4g in the PT. Seng and Lead mining activities. DPM is also considered in the design, because it also has the same potential to occur considering it is included in the subduction area." (Google Translate from the EIA Addendum, page 194)*

The proposed design also depends on the permanent integrity of a "geomembrane" (plastic) antiseepage barrier and internal drain system. I do not believe that safety can be assured even with the optimistic 0.5 earthquake proposed by the EIR. Earthquake induced failure of these internal elements say 20 years from now would not be detected, and would invalidate the design safety.

In all of this, I have not done any failure analysis of the consequences, but surely those consequences would be catastrophic for the communities and the environment downstream from the mine.

An independent and international-standard review of water quality issues relating to the disposal of potentially-lead-contaminated water into the environment downstream should also be done.

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