This Update is a regular advertising feature provided by OceanaGold Waihi Operation

8 September, 2016

EARTHQUAKES and the Tailings Impoundment

Last week's earthquake off the East Coast was felt in Waihi by many people and was recorded by our vibration monitors.

Six of our recording devices logged the event, with a peak vibration of 8.9mm/s, well above the limits set for Correnso, and far longer at 90 seconds.

Whenever an event like this happens we naturally ask ourselves "what if the 'big one' happened here?" We want to know what the risk is. The word 'risk' is used very differently by members of the public and engineers. When a parent says 'That's risky' and stops a child climbing too high in a tree, the word 'risk' is used as a synonym for 'dangerous'. Engineers use the word 'risk' in a much more objective way as they analyse all the variables, as we explain below.

HOW DO I KNOW IF IT'S BLAST VIBRATION OR AN EARTHQUAKE?

Blasts occur during the regularly advertised time periods during the day, with the larger production blast happening between 1.00pm and 2.00pm. We do not blast at night, on Sundays or Public Holidays. Blast vibrations are quite short. Any vibration outside the normal blasting times and which lasts longer than 10 – 12 seconds will not be caused by a blast.

What do we mean by 'risk'?

Risk assessment procedures consider the hazards, how likely they are to occur, and identify actions required to lessen the risk. As an example, there is the likelihood of a very large earthquake happening off the coast of Chile every 50 to 100 years. It is predicted that such an earthquake would create tsunami waves travelling across the Pacific Ocean, hitting New Zealand's east coast and inundating coastal land. Do we decide to evacuate all inhabited areas on the east coast of New Zealand because of this risk? No, but we do make preparations such as installing tsunami warning sirens, having Civil Defence practices, or knowing the best route to take to higher ground. In this case the likelihood is low, and we minimise the high consequence by taking appropriate action.

What if an earthquake happens here?

The risk of an earthquake breaching the Waihi tailings impoundments is considered to be extremely low. In designing the project, the risks have been identified and, where possible, have been minimised or 'engineered out'.

- The embankments forming the tailings impoundments are of 'downstream construction' which is the safest form of construction. The slopes are gentler than necessary due to the availability of large quantities of rock from the Martha Mine open pit.
- The foundations are solid, based on bedrock which is present at shallow depth.
- The tailings themselves consolidate with time, and even if the tailings did liquefy this has no impact on the stability of the embankments retaining the tailings.

How do you design and build for 'risk'?

Structures such as our two tailings impoundments come under the provisions of the Building Act. Design criteria are based on national and international guidelines. Earthquake design levels for large impoundments are related to the potential consequences of failure.

Earthquake design loads are primarily affected by three factors.

- **earthquake magnitude**
- **distance and depth of earthquake from the site**
- **frequency of occurrence (return period) of different magnitude earthquakes.**

Just as a '100 year storm' describes the size of a storm, not how often it happens, an earthquake with a 'return period' of 10,000 years would be significantly larger than one with a return period of 500 years. It is not how often it happens, but how big it is.

Our tailings impoundments are designed to withstand earthquake loads with a return period of 10,000 years. In 2007 the Institute of Geological and Nuclear Sciences (GNS) provided updated estimates of 10,000-year ground motions for design of the tailings impoundments at Waihi.

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In comparison, normal buildings, including residential houses, are designed for earthquake ground motions with an average return period of 500 years. Structures that may contain large numbers of people including schools are designed for 1,000 years, and structures with special post-disaster functions (e.g., hospitals, fire and police stations) and vital infrastructure (e.g., state highway bridges) are designed for 2,500 years.

Correnso **Community Meeting**

The next Correnso Community Meeting will be held on Thursday 15 September at the Education Centre, corner of Moresby Avenue and Savage Road at 3.00pm. Written copies of the minutes and audio recordings on disc will be available approximately two weeks after the meeting.

The OceanaGold Waihi Operation community engagement line is attended 24 hours a day, seven days a week. Contact the Company Liaison Officer, Donna Fisher.

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