

DGR Hearing Undertaking No. 74

Description:

Perform calculations for the consequences of doses to non-human biota from decommissioning waste, for the normal evolution scenario and for the human intrusion and severe shaft failure disruption scenarios. Confirm whether the calculated doses are below the threshold for environmental effects.

OPG Response:

A preliminary assessment of potential postclosure radiological impacts to non-human biota from addition of decommissioning wastes is provided below for Normal Evolution, Human Intrusion and Severe Shaft Seal Failure Scenarios. The model basis is the same as that described in the assessment of postclosure radiological impacts in the response to IR-EIS-12-512 (OPG 2014).

The impacts were assessed against the screening concentrations defined in the Preliminary Safety Report and accepted by the CNSC (OPG 2011, p.481). These are No-Effect Concentrations (NECs) in surface water, soils, sediments and groundwater.

Normal Evolution Scenario with Decommissioning Wastes

The amount of radionuclides that reach the biosphere for the Normal Evolution Scenario Reference Case is very low. The radionuclide concentrations in surface water, sediment, soil and groundwater are much lower than the No-Effect Concentrations for non-human biota. As was the case for the proposed DGR with operational and refurbishment wastes alone (OPG 2011, p.586), there is no exceedance. The main contributing radionuclide is Cl-36.

Human Intrusion Scenario with Decommissioning Wastes

For the Human Intrusion Scenario, the model considers the release of drill core debris to the surface, where it is not properly disposed, but is left at site and mixes into the soil.

The result of the assessment is that the concentration in soil is low for most radionuclides. However C-14, Cl-36 and Nb-94 exceed the screening concentrations by a factor of 10 to 25, considering intrusion only into the panels containing decommissioning wastes. This is similar to that previously calculated for intrusion into panels containing operations & refurbishment wastes, except that Cl-36 has become important with decommissioning wastes.

Note that decommissioning wastes also contain larger amounts of Ni-59 and Ni-63 than operations and refurbishment wastes. OPG did not obtain an approved No-Effect Concentration limit for these radionuclides as they are not significant in operations and refurbishment wastes (the focus of the present licence application), and so a formal assessment against criteria cannot be made at this time.

However, with respect to the exceedances, the likelihood is low because of the repository depth and lack of nearby resources, and also the assumption that the disposal of the drill core debris is inappropriately managed and simply left on the site and mixed into the soil. The extent of contamination is also local to the drill site. An ecological risk assessment has been undertaken for site-specific biota for C-14, Cl-36 and Nb-94, and the doses found to be below the dose criteria.

Severe Shaft Seal Failure Scenario with Decommissioning Wastes

Calculated concentrations of radionuclides in biosphere media are well below the No-Effect Concentrations for all radionuclides except the peak calculated concentration of C-14 in surface

water around the site, which is a factor of 2.3 above the associated No-Effect Concentrations. This is above the factor of 1.4 for the case of operations and refurbishment wastes alone, due to the increased amount of C-14 available in the gas phase with the addition of decommissioning wastes.

In this case, the shaft seal failure is an unlikely scenario, and these consequences would only apply if the seal failure is within about 50,000 years (due to C-14 decay). The highest concentration is in the local stream and concentrations in other water bodies are lower. Based on these points and the conservatism in the screening concentrations, the actual risk to non-human biota is expected to be low.

Note that the above results are preliminary estimates in support of cumulative effects assessment for the proposed DGR. The results indicate that the addition of decommissioning wastes to the DGR inventory is not likely to significantly change the potential impacts on non-human biota. A more detailed assessment, including an ecological risk assessment, would be needed should a decision be made to apply for a licence to expand the repository to hold decommissioning wastes.

References:

OPG. 2011. OPG's Deep Geologic Repository for Low and Intermediate Level Waste - Preliminary Safety Report. OPG report 00216-SR-01320-00001 R000. Toronto, Canada. (CEAA Registry Doc# 300)

OPG. 2014. OPG Letter, A. Webster to S. Swanson, "Deep Geologic Repository Project for Low and Intermediate Level Waste – Submission of Response to Information Request EIS-12-512", CD# 00216-CORR-00531-00219, January 22, 2014. (CEAA Registry Doc# 1788)