NWMO Response and Action Plan for the

2012 Report of the Independent Technical Review Group

February 2013

NWMO Response to the 2012 Report of the Independent Technical Review Group

The Board of Directors of the Nuclear Waste Management Organization (NWMO) established the Independent Technical Review Group (ITRG) to provide an independent review and assessment of the NWMO's Adaptive Phased Management (APM) Technical Program.

In September 2012, the ITRG held its annual meeting at the NWMO offices in Toronto and in November 2012, the ITRG presented its findings to the NWMO Board and Advisory Council. An NWMO response and action plan for the ITRG 2012 recommendations is outlined below.

ITRG 2012 Recommendations and NWMO Response & Action Plan

No.	ITRG 2012 Report Recommendation	NWMO Response & Action Plan
1	**Section 3.1 b)** The ITRG emphasised the role of safety assessment as a process of integrating the required strands of scientific and technological information. The ITRG is satisfied that NWMO intends to adopt such an approach and ***recommends*** that the timing of objectives that rely upon multi-disciplinary inputs should be reviewed carefully in the light of its comments.	**Recommendation: Accepted** NWMO planned activities in 2013 related to: i) continued development/optimization of the Mark I and Mark II APM engineered repository barrier designs; and ii) regulatory review of the 4th (crystalline) and NWMO preparation of the 5th (sedimentary) APM repository case studies that illustrate the Mark I design will satisfy this recommendation. Interim results will be presented in September 2013 to establish progress. Due Date: September 2013
2	**Section 3.2 b)** If correct, the ITRG ***recommends*** that the NWMO will need to balance the risks of going ahead with the level of substantiation available for the Mark II design as the basis for a regulatory submission against such benefits as will be afforded by this design.	**Recommendation: Accepted** A technical assessment of the Mark II design and risks associated with substantiation as part of a future DGR safety case and regulatory submission will be developed prior to interim decision on acceptance of design or components. Due Date: July 2013

3	**Section 3.2 b)** Whereas the ITRG would agree that conditions in the emplacement area of a repository in low-permeability sedimentary rock might be reasonably well simulated in such a facility, it is doubtful that this would be the case for a crystalline rock repository. The ITRG ***recommends*** that NWMO consider whether, in the light of published information, the proposed Mark II design and testing are suitable for a repository in crystalline rock.	**Recommendation: Accepted** The Mark II design will be assessed for operational practicality in both a wet and a dry crystalline environment based on experience gained through implementation of full scale experimental demonstration programs both in Canada and internationally. **Due Date:** July 2013
4	**Section 3.2 b)** The ITRG also ***recommends*** that the safety-related requirements of the bentonite buffer should be reviewed for the case of a repository in sedimentary rock to ensure that those requirements, which are thought to be driving the current buffer design and protection measures, are indeed relevant to that case. If not, a simpler and more cost-effective design might be developed and further complex issues, such as the interaction between highly saline groundwater and bentonite, might not require detailed investigation.	**Recommendation: Accepted** A re-assessment of the functional requirements for buffer in a low permeability sedimentary setting will be conducted. If changes are required a plan will be developed for additional bentonite characterisation, modelling and proof testing. . **Due Date:** September 2013
5	**Section 3.2 b)** The ITRG also questioned what requirements had been established by NWMO for retrievability and ***recommends*** that the NWMO document how the proposed Mark II design matches up to these.	**Recommendation: Accepted** The features of the Mark II design and program for proof testing will include a process for demonstrating container retrieval from a backfilled repository emplacement room. **Due Date:** July 2013
6	**Section 3.2 c)** The ITRG commends the recently conducted Geoscience Work Program Evaluation which clearly shows the status of NWMO's work program in this area and enables any gaps to be identified, as well as, confirming the adequacy of information in a number of the technical areas. The ITRG ***recommends*** that this type of evaluation should be considered for other parts of the Technical Programme.	**Recommendation: Advisement** The APM technical work programs are considered to focus on technical issues of most importance to establishing a credible APM repository safety case and quality license submission. The performance and regulatory review of the integrated 4th and 5th case studies (item 1) provides objective assessment of technical program sufficiency. **Due Date:** September 2013

7	**Section 3.2 c)** NWMO has responded appropriately to filling an identified gap in knowledge concerning the vapour phase corrosion of copper in partially saturated conditions, such as might persist in a low-permeability host rock formations. This knowledge gap has been identified in other waste management programmes where copper container material may be used and the NMWO is already aware of the possibility of international co-operation in this area. The ITRG ***recommends*** that NWMO should also consider whether a more focussed work programme is required on the interaction of container corrosion products and bentonite buffer, where again international cooperation may be possible.	**Recommendation: Advisement** It is believed that the current APM work program activities related to this topic are sufficient for the purpose of APM DGR safety case development. **Due Date:** Complete
8	**Section 3.4 c)** ITRG ***recommends*** that consideration should be given to submitting a single illustrative safety assessment for a repository in sedimentary rock. If both container corrosion barrier materials, steel and copper, are still under consideration at the time of submission, the safety assessment could treat these as alternatives. This would facilitate an understanding of the consequences of making a choice between the two corrosion barrier materials at a later stage.	**Recommendation: Accepted** NWMO has updated its plans and will submit to CNSC a single pre-project report on the design and postclosure safety assessment of a deep geological repository for used fuel in sedimentary rock. **Due Date:** December 2013
9	The current proposals for a Mark II design, in particular the use of an over pack fabricated from pre-formed bentonite blocks and the stacking arrangements for over-packed used fuel containers, are somewhat different to the designs under consideration in other countries. However, as already noted in Section 3.2, there is a considerable body of information from international RD&D activities in this area, particularly from large-scale demonstration experiments. The ITRG ***recommends*** that NWMO takes full account of this information at an early stage of developing its Mark II design.	**Recommendation: Accepted** The current repository engineering program will continue to include international experience and practice related to the development and operational practicality of the optimized Mark II repository components or processes. Key aspects of the Mark II engineered design will be benchmarked against international practice and Canadian Underground Research Laboratory experience. Additional assessment will be linked to the results of the integrated 4^{th} and 5^{th} illustrative repository case studies scheduled for completion in 2013. **Due Date:** Ongoing