

2025 Report of the
NWMO Adaptive Phased
Management Geoscientific
Review Group (GRG)

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By NWMO Adaptive Phased Management Geoscientific Review Group

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Remarks by GRG Chair

The Adaptive Phased Management Geoscientific Review Group (APM-GRG; abbreviated to GRG) again followed NWMO's geoscientific initiatives to provide advice, and to undertake a thorough review of technical and scientific documents. The GRG was established in 2012 and currently consists of five members. Brief biographies are included at the end of this report for all past and current members.

This year, the GRG travelled to Toronto to attend NWMO's 25th Annual Geoscience seminar held in advance of a multi-day, in-person review meeting. The seminar provided the GRG with the opportunity to interact with research groups and other external vendors supporting NWMO's overall site characterization program. The in-person meeting included an interactive workshop format to stimulate interdisciplinary discussion and debate. One full day of this meeting was attended by representatives from NWMO's Safety Assessment staff and their Safety Assessment Review Group (SARG). The GRG was pleased to discuss cross-functional topics of technical importance and hear the unique perspectives of another review group. The GRG was also pleased to see that presentations at the seminar and discussion topics at the in-person meeting focussed on the current state of knowledge, modelling initiatives, and uncertainty of understanding of the crystalline rock of the Revell batholith, where the future site for Canada's used nuclear fuel Deep Geological Repository (DGR) is to be located.

This report presents findings and conclusions of the activities undertaken by the GRG in 2025. The GRG was again informed of data processing and interpretation work at monthly virtual meetings with high-quality presentations. Discussions focused on GRG feedback from their reviews of draft reports, and plans related to on-going activities. Specifically, the GRG completed its review of the updated 3D site-scale geological model, aspects around long-term geomechanical stability modelling, hydrogeochemical studies bearing partly on porewater residence time, and a hydrogeological Discrete Fracture Network (hydro-DFN) model. The GRG also reviewed two separate plans for development of 3D site-scale stress models, following two different approaches. The GRG was heavily involved in the development and implementation of an integrated groundwater and contaminant transport modelling initiative jointly led by Geoscience and Safety Assessment. Individual GRG members appreciated being engaged in discipline-specific discussions throughout the year thereby leveraging their expertise, which enhanced the efficiency of the review and feedback process.

The Geoscience team continues to produce high quality work, both in the planning of activities and implementation of their work. The approaches adopted by the Geoscience team follow best international geoscientific practice. The GRG is particularly pleased with the completion of a mature site geological model and its associated description, based on all (6) deep boreholes drilled at the site, as well as the efforts made by the Geoscience team to ensure the same 3D geological framework model is honoured in downstream work. The GRG is encouraged by the intensified communication and technical integration between the Geoscience and Safety Assessment teams.

The GRG recognizes that the Geoscience team is advancing towards completion of initial regulatory and licensing phase deliverables. This important step must include clear documentation of remaining



assumptions, uncertainties and limitations within adopted models, with associated reports clearly documenting the current site understanding. The GRG is of the view that remaining knowledge gaps and geoscientific uncertainties for the Revell Site can be overcome by future work programs, including ongoing site characterization, performance assessment and engineering design.

On behalf of all GRG members, I wish to express our appreciation for the professional work by the NWMO team and for the diligent responses to review feedback.

Peter K. Kaiser, Ph.D, P.Eng., F.EIC, F.CAE

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1 Introduction

The Adaptive Phased Management Geoscientific Review Group (APM-GRG; abbreviated to GRG) was established by the NWMO in 2012. It was formed to provide independent reviews, comments and advice on geoscientific preliminary assessments being conducted as part of NWMO's evaluations to identify a single suitable deep geological repository site for Canada's used nuclear fuel in an informed and willing host community. The selection of a single site was announced by the NWMO in November 2024 with Wabigoon Lake Ojibway Nation (WLO) and Ignace area moving forward as the potential host communities for the future site for Canada's deep geological repository for used nuclear fuel (Figure 1). The GRG acknowledges the hard work of the Geoscience team to provide the basis for this milestone decision. The GRG further recognizes that, as a result of this decision, its priorities are now focused on supporting the Geoscience team in ensuring readiness for the Regulatory Decision-Making (RDM) process, including development of Geoscience deliverables in support of downstream technical users primarily in Engineering and Safety Assessment. Secondly, the GRG will provide support in the Detailed Site Characterization (DSC) phase, comprising additional on-going field studies to continue advancing the geoscientific understanding of the Revell Site in the WLO and Ignace area.

As in previous years, the GRG reviewed geoscientific site characterization work during 2025, and provided critical comments on the approach, methods and criteria used, the interpretation of data and reporting of findings. Throughout the year, the GRG also assessed and advised on the planning and implementation of modelling activities in order to advance an integrated geoscientific understanding of the site. Eleven yearly GRG reports have been issued since December 2013, except in 2015, and these are publicly available on NWMO's website (APM-GRG 2013, 2014, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024). This report provides a detailed summary of the GRG's findings and conclusions for activities completed in 2025.

2 Objectives of regulatory phase readiness and detailed site characterization

Following site selection, the 'Regulatory Decision-Making' process was initiated and 'Detailed Site Characterization' activities will only be carried out at the Revell Site.

The objective for Geoscience in the RDM process is to ensure the timely completion of key technical integration and synthesis reports, and associated supporting reports and modelling products. For the first regulatory phase milestone, comprising the submission of documents to support the Initial Licence application, Geoscience reports and models will be based primarily on information collected during the site selection phase. Acknowledging the importance of cross-functional integration in developing consistent, comprehensive and defensible regulatory products, an additional objective for Geoscience, as part of the RDM process, will be to support Safety Assessment and other technical functional groups to ensure Geoscience data and conceptual understanding are implemented properly in downstream work programs.

The objective for Geoscience in the DSC process, which will occur in parallel to the RDM process, is to continue to collect geoscientific information to narrow remaining uncertainties and advance site understanding for the Revell Site. The information gathered during the DSC process will be integrated and synthesized along with existing information in support of the second regulatory licensing milestone, which is the submission of documents to support the Licence to Construct.



Figure 1: Wabigoon Lake Ojibway Nation (WLO) and Ignace area are moving forward together as the potential host communities for the future site for Canada's deep geological repository for used nuclear fuel.

2.1 Team interplay, confidence in safety and site understanding

The interactions between different disciplines addressed by the Geoscience team and between the Geoscience and Safety Assessment teams have significantly improved over the years. The GRG was most supportive of the integrated and collaborative approach taken for planning and implementing the important work of developing groundwater flow and contaminant transport models. The GRG also appreciates the opportunity to interact with the Safety Assessment Review Group (SARG) to discuss cross-functional topics of technical importance and hearing the perspectives of the members of another review group.

The GRG looks forward to providing advice on more detailed NWMO plans for future years, including ongoing site characterization and engineering design work, created to further demonstrate the suitability of the selected site and increase confidence in the safety aspect.

The GRG is pleased to see progress in the development of site understanding at the Revell Site, with several complementary technical models completed or on-going this year. The updated three-dimensional (3D) geological model, discussed further below, is a most important milestone for the Geoscience team. It is a foundational product that now needs to be honoured in downstream modelling work programs. It will form the core of the next version of the Descriptive Geoscientific Site Model (DGSM) report due to be provided to the GRG in 2026. The GRG continues to stress that, for the purpose of building public confidence in site understanding at the Revell Site, the geoscientific information acquired at the South Bruce Site in the Saugeen Ojibway Nation (SON) and South Bruce area should be made available, so that the public are aware of the quality of the work completed at the site not selected.

3 Geoscience team activities in 2025

Following the selection of the Revell Site in the WLO and Ignace area as the future site for Canada's Deep Geological Repository for used nuclear fuel, the primary focus by the Geoscience team was on continuing to advance understanding of the crystalline rock at the Revell Site

with prioritization of aspects that assist in the preparation for the upcoming regulatory and licensing phase.

While the sedimentary site in the SON and South Bruce area is no longer in the site selection process, a few work packages remained to be completed through 2025 and, while of lower priority, several items were provided to the GRG for review, as described below. In addition, the GRG understands that a summary geoscientific understanding report for the South Bruce Site, previously emphasized by the GRG as being necessary to complete, is planned for 2026.

4 GRG review activities in 2025

Review activities in 2025 were conducted by the five current GRG members (Figure 2) described in brief biographies at the end of this report.



Figure 2. Current APM-GRG Members from left to right: Peter Kaiser (Chair), Sven Follin, Alexander (Sandy) Cruden, Michael Stephens, Andreas Gautschi.

The review process followed the same approach as in previous years, involving virtual and in-person meetings, formal reviews of technical documents with completion of disposition tables, and direct correspondence between GRG and the NWMO Geoscience team. The GRG is satisfied with the adopted mode of communication, which allows the GRG to effectively operate and follow progress.

4.1 Meetings between the GRG and the NWMO Geoscience team

The GRG attended eight virtual meetings with NWMO in 2025 to discuss specific technical/scientific issues, and to address questions and recommendations emerging from the reviews of technical documents. In addition, a four-day in-person meeting was held in Toronto in June 2025. The schedule and primary focus of all meetings are summarized in Table 1.

Table 1: GRG-NWMO meeting schedule for 2025

Meeting	Topic of Focus
January 23, 2025 (W) (W for web-meeting)	WSP (external vendor under contract to Safety Assessment) provided update on the development of their hydromechanical model for the Revell Site.
February 27, 2025 (W)	Representative from NAGRA provided an overview of their General License Application that has been published on a specially developed digital platform and NWMO presented a regulatory deliverables schedule.
March 20, 2025 (W)	NWMO presented a summary of key remaining geoscientific uncertainties and proposed action plan for uncertainty reduction.
April 24, 2025 (W)	Agenda review for upcoming GRG in-person meeting in Toronto.
June 05-09, 2025 (IP) (IP for in-person meeting)	Overview presentations of several topics: Site characterization preparation for future field activities, hydrogeochemistry sampling strategy, geological predictions for next four boreholes, preliminary Deep Geological Repository (DGR) construction schedule, and RDM phase geoscience deliverables. In-depth discussions of several topics: Geological characterization and integration, hydrogeological and hydrogeochemical integration, short- and long-term stress characterization, review of safety factors, performance objectives and evaluation factors, and key hypotheses for demonstrating site suitability.
June 06, 2025 (IP)	GRG-SARG joint meeting to discuss Safety Assessment and Geoscience team interfaces, with particular focus on the linkage between groundwater flow and contaminant transport modelling.
June 09, 2025 (IP)	Meeting with Senior Management to discuss means to support and strengthen the Geoscience team, including enhancing the collaboration with Safety Assessment, and timely delivery of quality documents required for licensing.
July 24, 2025 (W)	Integrated work plan for geoscience and safety assessment hydrogeological and contaminant transport modelling. Joint meeting with the SARG.
August 21, 2025 (W)	Conceptual geoscientific models and observational constraints for integrated geoscience and safety assessment groundwater flow, and contaminant transport modelling. Joint meeting with the SARG.
October 23, 2025 (W)	Progress on integrated geoscience and safety assessment hydrogeological and contaminant transport modelling. Joint meeting with the SARG.
November 20, 2025 (W)	3D in situ stress modelling for the Revell Site - preliminary results, Advancing understanding of salinity evolution at the Revell Site.
December 18, 2025 (W)	Contaminant transport modelling. Joint meeting with the SARG.

The GRG met with NWMO's Senior Management during the in-person meeting to allow the NWMO to inform the GRG of the overall program goals and approaches, and to discuss areas

that the GRG considered requiring further attention. In this manner, the GRG continued to fulfill its advisory function on forthcoming work tasks. The in-person meeting was also preceded by the NWMO's 25th annual Geoscience Seminar, which all GRG members attended. Two members, Sven Follin and Michael Stephens, contributed to the seminar content, presenting an overview of the site characterization at Forsmark, Sweden. Scheduling for the in-person meeting also allowed for a one-day meeting with the SARG. This provided the opportunity for the GRG to meet the members of the SARG and facilitated discussion of Safety Assessment and Geoscience interfaces, with particular focus on the linkage between groundwater flow and contaminant transport modelling. Several subsequent virtual meetings of the GRG were attended by members of the SARG throughout the latter half of the year (Table 1).

NWMO shared draft work plans and initial findings in technical documents as they became available to solicit review comments. Feedback from the GRG for consideration by the NWMO was shared during and after each meeting, and individual GRG members communicated directly by e-mail or during additional focused in-person or virtual meetings. Throughout the year, members were asked to provide, on an individual basis, additional targeted guidance relevant to their specific fields of geoscientific expertise. For example, Peter Kaiser contributed key support during the planning of two separate 3D stress modelling projects now on-going, as well as guidance in planning a second phase of geomechanical stability modelling; Michael Stephens and Sandy Cruden provided in-depth support during completion of the updated 3D geological modelling report; Sven Follin provided technical guidance to support the planning and implementation of the integrated hydrogeological and contaminant transport modelling work program by the Geoscience and Safety Assessment teams, including attending several additional smaller group technical discussions; Andreas Gautschi reviewed early drafts of technical reports discussing porewater ⁴He residence time and ¹⁴C analysis, and provided guidance in support of defining a reference fluid composition for the Revell Site.

These meetings and e-mail exchanges with the Geoscience team served to discuss the GRG's review comments and impressions on progress made. In particular, the in-person meeting provided an excellent opportunity to discuss various broader issues identified by the GRG to help enable the team to successfully complete their tasks in the DGR program at NWMO. One day of the in-person meeting was devoted to small-group focused break-out sessions, followed by group discussion of key outcomes. This format facilitated opportunities for the Geoscience team to discuss specific technical topics with specific GRG members. It also helped to form more comprehensive perspectives guiding data interpretation and the planning of future work.

4.2 Specific studies reviewed by the GRG

Up to and including November 2025, the GRG systematically reviewed approaches, methods and findings reported in fourteen technical documents, including twelve for the Revell Site and two for the South Bruce Site. Key aspects arising from the review work are summarized below.

The GRG again appreciates the diligent use of disposition tables linked to the reviewed documents that facilitates tracking and, if necessary, a response to actions planned by or feedback received from the NWMO. Many disposition tables with written responses by the NWMO and final modified reports were also reviewed by the GRG.

4.2.1 Revell Site in the WLON and Ignace area

The GRG completed reviews of twelve technical documents (Table 2) addressing various activities within and around the Revell Site.

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Table 2: Technical documents reviewed by the GRG from the Revell crystalline rock site

Timing of receipt	Technical document
December 2024	Long-term geomechanical stability analysis of a potential Deep Geological Repository at the Revell Site.
December 2024	Integrated site understanding and 3D geological modelling in the Revell batholith: Model version 2.1.
February 2025	Methodology for determining pore-fluid helium content and preliminary porewater mean residence calculations from boreholes sampled at the Revell Site.
March 2025	Revell Site: Evaluation of the carbonate system chemical and isotope data produced on groundwater collected from boreholes IG_BH01 to IG_BH03.
May 2025	Development of a preliminary 3D stress model for the Revell Site – Work specific quality and work plan.
June 2025	Three-dimensional in situ stress modelling for the Revell Site – Numerical model work plan.
June 2025	Predicting the overburden cover distribution within the Revell batholith and surrounding areas using a machine learning classification approach and remote sensing data.
July 2025	Integrated work plan for Geoscience and Safety Assessment hydrogeological and contaminant transport modelling.
August 2025	Conceptual geoscientific models and observational constraints for integrated Geoscience and Safety Assessment groundwater flow and contaminant transport modelling.
September 2025	Preliminary hydromechanical model for site scale discrete fracture networks in the Revell batholith.
October 2025	Petrographic and mineralogical assessment at the contact of the Revell batholith: Results from outcrop samples RV_GB0001 & RV_GB0002.
October 2025	Test plan for Phase V1 of long-term geomechanical stability analysis of potential Deep Geological Repository in Wabigoon Lake Ojibway Nation (WLON) and Ignace area, Ontario.

The GRG also received three reports informing the GRG of complementary studies related to the Revell Site (Table 3). Formal review of these reports by the GRG was not requested.

Table 3: Complementary technical documents from the Revell crystalline rock site sent to the GRG solely for information purposes

Timing of receipt	Technical document
February 2025	U-Pb zircon and titanite geochronology by LA-ICPMS in the Revell batholith.
February 2025	U-Pb zircon and titanite geochronology by ID-TIMS for the Revell batholith.
February 2025	Assessment of the whole rock geochemistry of the Revell Site.

4.2.1.1 Base geological studies and modelling work

During the early part of 2025, the GRG reviewed a report providing an updated version of site understanding and 3D geological modelling. This report summarizes the integrated analysis of all available laboratory, borehole (IG_BH01 to IG_BH06), surface, and airborne geological and geophysical data, and presents an updated conceptual understanding and geometric 3D geological model for the Revell site and surrounding area. The GRG provided considerable feedback and guidance later throughout 2025 in supporting the review and finalization of this milestone piece of work. The GRG commends the professionalism and diligence of the Geoscience team in handling the entire process and achieving an excellent final product, which forms the foundation for downstream modelling and integration works.

The Geoscience team at NWMO has previously acknowledged uncertainty regarding the available overburden distribution dataset based on historic regional-scale reconnaissance mapping. During 2025, the GRG reviewed a study predicting overburden cover within the Revell batholith and surrounding area using a machine learning classification approach. The GRG appreciated seeing this updated result, which will provide a more robust input for the groundwater modelling program and for other downstream users.

In October, the GRG reviewed a concise report describing the results of a mineralogical assessment of two grab samples from a metamorphosed volcanic rock unit located adjacent to the Revell batholith on its northeastern boundary. This study confirmed the distinctive character of this rock unit compared with the metamorphosed lamprophyres inside the batholith. The GRG noted that the findings are not surprising but are useful in supporting the site understanding.

The complementary studies provided to the GRG for information purposes alone present summaries of U-Pb geochronological and whole-rock geochemical data. These data were utilized in the updated version of site understanding and 3D geological modelling addressed above.

4.2.1.2 In situ stress modelling

The GRG encouraged the Geoscience team to explore the development of alternative 3D numerical stress models using different approaches in order to assess uncertainty in the distribution of stresses at the Revell Site. To this end, the GRG were pleased to receive two separate work plans in May and June, outlining the proposed approaches, which will iteratively develop a 3D model of the current in situ stress conditions at the site. The modelling will include the evaluation of multiple scenarios for geomechanical and strain boundary conditions (orientation and magnitude of strain) using different approaches for upscaling rock mechanical properties (heterogeneity), which govern the stress distribution. One modelling group is using an empirical Rock Mass Classification-based approach while the other modelling group is using a Discrete Fracture Network (DFN)-based approach. The GRG has acknowledged that these initial 3D stress models, anchored on a single stress profile using DCDA measurements from IG_BH01, are a useful starting point for stress modelling at the site. Along with additional data to be collected in the forthcoming detailed phase of site characterization, such as further DCDA measurements and stress measurements by over-coring, they will provide a basis for future iterations to arrive at suitable 3D stress models.

4.2.1.3 Geomechanical stability modelling

During early 2025, the GRG reviewed initial results addressing a long-term geomechanical stability analysis for the proposed DGR at the Revell Site, acknowledging its preliminary character. The GRG provided detailed critical feedback noting that, while the report is overall well-

structured, many improvements would be required in the second phase of work, both with respect to the modelling approach as well as in precision of reporting. In particular, the GRG highlighted the need to clearly describe the scope of the modelling work, and to remove qualitative and vague language throughout.

Later during October, the GRG reviewed an updated work plan describing the approach for long-term geomechanical stability analysis at the Revell Site. The GRG cautioned that the stress model employed as input to the modelling must reflect the geological framework. While the GRG appreciated that multiple approaches are being proposed for the modelling work, a simple comparison of results is insufficient, and any differences in results based on these approaches must be reconciled. Finally, the GRG stressed that vague and generalized interpretations must be avoided and, overall, the graphical presentation needs to be improved to assist the non-specialist reader in understanding the essence of the report. The GRG looks forward to seeing results of this modelling work and receiving an updated report during 2026 that addresses these concerns.

4.2.1.4 Hydrogeochemical studies

During early 2025, the GRG reviewed a report describing a methodology for determining pore-fluid ^3He and ^4He content from preserved rock core samples, and modelling the results to provide a conservative, or minimum, age estimate for the mean porewater residence. The GRG recognizes that such work will be a key indicator of the hydrogeochemical stability of the Revell Site and will contribute important calibration constraints on groundwater and contaminant transport models. In reviewing the draft report, the GRG stressed the need to clearly define the adopted technical terms and to ensure the terminology is appropriate and consistent with the use in other chapters, especially for non-specialist readers. The revised report addressing GRG feedback is still in preparation.

Later, during March, the GRG reviewed an early version of a report evaluating ^{14}C and stable water isotope data from groundwater samples collected from boreholes IG_BH01 to IG_BH03. The GRG noted that the report is of high scientific quality, with a logical and easy to follow reporting structure. The GRG suggested that the report would benefit from including a separate data integration chapter discussing and comparing groundwater residence times and stable water isotope results indicating the climatic conditions during recharge, rather than including such information in a summary and conclusions chapter. The revised report addressing GRG feedback is still in preparation.

4.2.1.5 Hydrogeological and contaminant transport modelling

Following the in-person meeting in June 2025, the GRG has spent considerable time reviewing various aspects of a work plan for groundwater and contaminant transport modelling developed after a tight collaboration between the Geoscience and Safety Assessment teams. For several years, the GRG has highlighted the importance of communication and technical integration between the expertise in these two teams and, consequently, the GRG very much welcomes this development. Following reviews by both groups (GRG and SARG), a final document summarizing the integrated work plan was completed during early August. A critical part of this plan concerns the hydrogeological calibration of relevant structures at the site. Parallel approaches were proposed, involving development of a hydromechanical model at the Revell Site (hydro-DFN) and, secondly, parameterizing structures on the basis of the conceptual understanding of the hydrogeological system at and around the site developed by the Geoscience team.

The GRG subsequently reviewed a technical memo describing the hydrogeological conceptual model, including a focus on sub-horizontal structures, and both hydrogeological and hydro-

geochemical observational constraints that will be used to support the integrated modelling work. The GRG has been encouraging the Geoscience team for some time to develop a suite of conceptual models that can be used to guide the downstream numerical modelling work and illustrate key geosphere characteristics as well as expected flow and transport processes. As a consequence, receipt of this product was very much appreciated. The GRG pointed out that more data will need to be collected during the next phase of site characterization to help reduce uncertainty in understanding the role of diffusion and sorption close to and immediately surrounding groundwater-conducting features. The GRG also emphasized the need for a better understanding of potential flow and transport behaviours such as channelling.

Later, during September, the GRG reviewed a preliminary hydromechanical model (hydro-DFN) for the Revell Site. This study was initiated in 2024 by Safety Assessment and reviewed earlier during 2025 by the Geoscience team. The GRG commented that while the model report is technically well structured, it should be much improved by clarifying the assumptions and limitations used in the modelling workflow. The GRG noted a lack of alignment with the current geological and hydrogeological conceptual understanding of the site, including an over-reliance on a shear-dilation hypothesis as the primary mechanism controlling elevated transmissivity, and an under-appreciation of the role of sub-horizontal structures in controlling flow dynamics. The GRG suggests that improvements will need to be made to the hydro-DFN model before it can be implemented for use in downstream work, such as groundwater flow and contaminant transport models.

Following a web-meeting in October and with the aim to develop confidence in results coming from this modelling work, the GRG advised the NWMO that the approach taken must be technically defensible and not unnecessarily complex. The GRG is of the opinion that the hydro-DFN approach is insufficiently mature to be used with confidence at this stage. Instead, the GRG considered that the modelling work should be based on the current conceptual understanding of the hydrogeological system at the Revell Site, as developed by the Geoscience team. The GRG also identified in their feedback critical aspects needing attention, for example hydraulic interference tests, acquisition of more hydrogeochemical data across fractures, and matrix diffusion and sorption during radionuclide transport. For the assessment of the sorption capacity of the Revell rocks, mineralogical information concerning the rock matrix adjacent to the groundwater-conducting features will be required.

4.2.2 South Bruce Site in the SON and South Bruce area

Acknowledging that the South Bruce Site in the SON and South Bruce area was not selected for continuation in the APM program at the end of 2024, the GRG understood that only a few items would be delivered in 2025. Two documents requiring review by the GRG were delivered (Table 4).

Table 4: Technical documents reviewed by the GRG from the South Bruce sedimentary rock site

Timing of receipt	Technical document
December 2024	Long-term geomechanical stability analysis of a potential deep geological repository at the South Bruce Site.
October 2025	WP10 data report: Rock Mass Classification for SB_BH01 and SB_BH02.

The GRG also received one additional report from the Geoscience team with the aim to hold them informed of complementary studies around the South Bruce Site (Table 5). Formal review of this report by the GRG was not requested.

Table 5: Complementary technical documents from the South Bruce sedimentary rock site sent to the GRG solely for information purposes

Timing of receipt	Technical document
February 2025	Quantitative 3D seismic interpretation of Silurian reef structures

During early 2025, the GRG reviewed initial results of a long-term geomechanical stability analysis for a proposed DGR at the South Bruce Site. As with the initial modelling and reporting work completed for the Revell Site, the GRG acknowledged that this work was preliminary in nature. Because the site selection decision occurred just prior to receiving these reports for review, the GRG did not prioritize review of this document and instead focused on the Revell Site version (see above).

Later during October, the GRG reviewed a summary of the Rock Mass Rating (RMR)-index based on data from both the SB_BH01 and SB_BH02 deep boreholes. The GRG noted that the report was satisfactory but required some clarifications in the text and in figures to demonstrate that the approach followed the same RMR-index classification approach applied for the Revell Site reviewed by the GRG for different sets of borehole data during 2022 and 2024. Several other editorial comments were identified to improve the final version of the report.

5 Concluding remarks

This report summarizes the most important findings and conclusions of the GRG in connection with their work during 2025. For more than a decade, the GRG has been impressed by the professional work undertaken by the Geoscience team. A high standard has been maintained during 2025 after selection of the Revell Site in the WLON and Ignace area for Canada's deep geological repository for used nuclear fuel.

Following earlier recommendations by the GRG, members were pleased to see a tighter collaboration between the Geoscience and Safety Assessment teams that has started to materialize in formal recommendations for an ongoing groundwater and contaminant transport modelling project. The GRG wishes to emphasize that such integrated project work will require continued careful planning as well as frequent communication and feedback between the modelling teams.

The GRG appreciated receiving several work plans for modelling at the Revell Site, thereby permitting the GRG to help steer the strategy for this work prior to reviewing results. Following advice from the GRG to NWMO on the approach and methods to be used, many high-quality reports documenting results and interpretation were also obtained and reviewed by the GRG, predominantly in the context of preparation for the first regulatory phase milestone. The GRG looks forward to guiding forthcoming integration, modelling and documentation activities, as well as ongoing site characterization efforts for the Revell Site in the WLON and Ignace area to further advance the geoscientific understanding of the site.

6 References

Previous annual reports by the GRG available from www.nwmo.ca.

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7 Brief biographies of the APM-GRG members

The APM-GRG was composed of five to six internationally recognized experts from Canada, Australia, Sweden and Switzerland. The five current members combine extensive multidisciplinary international experience in areas relevant to the siting of deep geological repositories in both crystalline rock and sedimentary rock formations. The tenure in the GRG is noted in brackets after each GRG member's name.

Dr. Peter Kaiser (2012-present)

Dr. Peter Kaiser, Chairman of the APM-GRG, is Professor Emeritus of Mining Engineering at Laurentian University, former Chair for Rock Engineering and Ground Control, Director of the Rio Tinto Centre for Underground Mine Construction, Founding Director of the Centre for Excellence in Mining Innovation, and geomechanics consultant. His interests lie in geomechanics, underground excavation stability, mine design, mechanized excavation, and the applications of emerging technologies that increase mining safety and productivity. Dr. Kaiser is a Fellow of the Canadian Academy of Engineers and a Fellow of the Engineering Institute of Canada.

Dr. Sandy (Alexander) Cruden (2012-present)

Dr. Sandy (Alexander) Cruden is Professor of Tectonics and Geodynamics in the School of Earth, Atmosphere and Environment at Monash University (Australia). Dr. Cruden has more than 30 years of geoscience experience related to structural geology, analysis, and characterization in both crystalline and sedimentary rock settings. Dr. Cruden completed a fault reactivation analysis and structural characterization of southwestern Ontario as part of site characterization activities for Ontario Power Generation's proposed Low- and Intermediate-Level Waste Deep Geologic Repository at the Bruce site.

Dr. Sven Follin (2019-present)

Dr. Sven Follin is a retired geoscience consultant who has been actively involved in the Swedish site evaluation process for hosting a deep geological repository, including geoscientific feasibility studies and the detailed site characterization of the Forsmark site, which was selected by SKB (the Swedish Nuclear Fuel and Waste Management Company) as the site for the deep geological repository for spent nuclear fuel in Sweden. Focus has been on hydrogeological aspects using the Discrete Fracture Network (DFN) approach. He was also involved in SKB's subsequent safety assessment. In addition to working with site descriptive hydraulic DFN modelling for SKB, Dr. Follin has been actively involved in the hydraulic investigations and the structural-hydraulic DFN modelling of excavated damage zones (EDZ) around deposition tunnels at the Olkiluoto site, which was selected by Posiva (the Finnish Nuclear Fuel and Waste Management Company) as the site for the deep geological repository for spent nuclear fuel in Finland.

Dr. Andreas Gautschi (2012-present)

Dr. Andreas Gautschi was Chief Geoscientific Advisor at the Swiss National Cooperative for the Disposal of Radioactive Waste (Nagra). Since his retirement he works as an international geoscientific consultant. Dr. Gautschi has more than 30 years of geoscience experience related to the planning, co-ordination, and implementation of site evaluation programs for deep geological repositories in both crystalline and sedimentary rocks, in close collaboration with Nagra's safety assessment group. He was a member of Posiva's **IN**ternational **A**dvisory **G**roup for the **O**nkalo (INAGO) deep geological repository during the first phase of site characterization on the Olkiluoto island, Finland. For many years he had lectureships at Tübingen University and ETH Zurich on Deep Geological Disposal of Radioactive Waste.

Dr. Richard Smith (2012-2017)

Dr. Richard Smith is a Professor in the Department of Earth Sciences at Laurentian University, where he is the Industrial Research Chair of Exploration Geophysics. He has expertise in the application of geophysical methods generally and airborne methods specifically to investigate the geosphere at depth. Dr. Smith brings over 20 years of experience working in the exploration business. In 2015, he was asked by the Geological Society of London and the UK Department of Energy and Climate Change to be a member of the National Geological Screening Independent Review Panel.

Dr. Michael Stephens (2012-present)

Dr. Michael Stephens is a retired Senior State Geologist with the Geological Survey of Sweden in Uppsala. Dr. Stephens has been actively involved in the Swedish site evaluation process, including country-wide reconnaissance studies conducted in Sweden to identify potentially suitable regions for hosting a deep geological repository, geoscientific feasibility studies, and the detailed site characterization of the Forsmark site, which was selected by SKB as the site for the deep geological repository in Sweden. Focus has been on base geological aspects.

Mr. Anders Ström (2017-2024)

Mr. Anders Ström is Senior Program Manager of final disposal solutions for spent fuel at SKB (the Swedish Nuclear Fuel and Waste Management Company). Mr. Ström has been actively involved in SKB's siting program since the 1990s, among other things, in charge of the development of requirements on the crystalline rock for the spent fuel repository and criteria for site evaluation. During the site characterization project, he was Chief Project Manager for the multidisciplinary site descriptive modelling conducted for the two candidate sites at Forsmark and Laxemar-Simpevarp (Oskarshamn). He is now international coordinator of SKB and in charge of the close co-operation between SKB and Posiva, in Finland, for implementing robust disposal solutions according to the KBS-3 concept.