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October 31, 2012

File: 00216-00531 P
CD#: 00216-CORR-00531-00148
Project ID: 10-60004

Dr. Stella Swanson
Chair, Joint Review Panel
Deep Geologic Repository Project

c/o Canadian Nuclear Safety Commission
280 Slater Street
Ottawa, Ontario
K1P 5S9

Dear Dr. Swanson:

Deep Geologic Repository Project for Low and Intermediate Level Waste – Acknowledgement of Package #6 Information Requests

References: 1. JRP letter from Dr. Stella Swanson to Albert Sweetnam, "Information Request Package #6 from the Deep Geologic Repository Joint Review Panel", October 16, 2012, CD# 00216-CORR-00531-00147.

The purpose of this letter is to acknowledge receipt of the Joint Review Panel's request for additional information contained in Reference 1, and to provide some of the information requested.

Attachment 1 provides responses to the following Information Requests (IRs):

- EIS-06-230
- EIS-06-231
- EIS-06-235
- EIS-05-237
- EIS-06-240
- EIS-06-244
- EIS-06-261
- EIS-06-274
- EIS-06-277

OPG will submit responses to the majority of the remaining IRs by November 29, 2012. The remaining responses require detailed analysis and will be provided by December 12, 2012.

If you have questions on the above, please contact Mr. Allan Webster, Senior Manager, Licensing, at (905) 839-1151, ext. 6051.

Sincerely,

<original signed by>

Albert Sweetnam
Executive Vice-President
Nuclear Projects
Ontario Power Generation

Attach.

cc. Dr. J. Archibald – Joint Review Panel c/o CNSC (Ottawa)
Dr. G. Muecke – Joint Review Panel c/o CNSC (Ottawa)
P. Elder – CNSC (Ottawa)
F. King – NWMO (Toronto)

ATTACHMENT 1

Attachment to OPG letter, Albert Sweetnam to Dr. Stella Swanson, "Deep Geologic Repository Project for Low and Intermediate Level Waste – Acknowledgement of Package #6 Information Requests"

October 31, 2012

CD#: 00216-CORR-00531-00148

OPG Responses to a Sub-set of IRs from Joint Review Panel IR Package #6

OPG Responses to a Sub-set of IRs from Joint Review Panel IR Package #6

IR#	EIS Guidelines Section	Information Request and Response
EIS-06-230	• Section 10.1.6, Ambient Radioactivity	***Information Request:*** *Confirm whether the groundwater sampled at Well 231 is, or could, be used as a drinking water source.* ***Context:*** *The maximum tritium concentration at Well 231 is 8 x 10^4 Bq/L. This is less than the screening criterion of 3 x 10^6 Bq/L for non-potable groundwater used by the proponent. However, this tritium concentration is elevated above the drinking water guideline of 7 x 10^3 Bq/L.* *Therefore, clarification that the water at Well 231 will not be used as a drinking water source at any time is required.*
		OPG Response: Well 231 (also known as Water Sampling Hole 231) has not been and will not be used as a drinking water source. Indeed, there are no groundwater wells within the Bruce nuclear site used as a drinking water source. Well 231 was installed at the Western Waste Management Facility (WWMF) in 1990 for the purpose of monitoring radionuclides in groundwater. It is a part of a larger groundwater monitoring network in and around the WWMF, located in approximately the centre of the Bruce nuclear site. At such time as the well is no longer used for monitoring, it will be abandoned in accordance with the requirements of O. Reg. 903, Wells (MOE 1990), which establishes requirements and record keeping for well abandonment. **Reference:** MOE. 1990. O. Reg. 903, Wells.
EIS-06-231	• Section 11.4.6, Radiological Conditions	***Information Request:*** *Clarify whether the first bullet of the regulatory limits on the annual dose to members of the public and to workers (on page 7-92 of the EIS) should read: "nuclear energy workers, not including a pregnant nuclear energy worker."* ***Context:*** *The bullet currently reads: "nuclear energy worker, including a pregnant nuclear energy worker".*
		OPG Response: The first bullet of the regulatory limits on the annual dose to members of the public and to workers (OPG 2011, p. 7-92) is correct as stated. The Canadian Nuclear Safety Commission (CNSC), in Radiation Protection Regulations

IR#	EIS Guidelines Section	Information Request and Response
		(CNSC 2007, Section 13(1)) establishes effective dose limits. The category "nuclear workers, including pregnant nuclear energy worker" includes all nuclear workers including those who are pregnant up to the time that they become aware that they are pregnant. Every nuclear energy worker who becomes aware she is pregnant is required to immediately inform the licensee in writing (CNSC 2007, Section 11(1)). The category "pregnant nuclear energy worker" establishes effective dose limits for the balance of the pregnancy. **References:** CNSC. 2007. Radiation Protection Regulations SOR/2000-203. OPG. 2011. OPG's Deep Geologic Repository for Low and Intermediate Level Waste - Environmental Impact Statement. Ontario Power Generation report 00216-REP-07701-00001 R000. Toronto, Canada. (CEAA Registry Doc# 298)
EIS-06-235	• Section 16, Follow-Up Program	***Information Request:*** *Provide a conceptual plan for the follow-up and monitoring programs for the decommissioning and abandonment stages of the DGR project. This plan should include a general description of goals, objectives, key monitoring questions, expected spatial extent, and expected frequency of monitoring.* *A conceptual plan should also include a description of how monitoring will be linked with adaptive management.* ***Context:*** *The air, groundwater, and surface water follow-up and monitoring programs are described for the preparation, construction, and operation phases of the project. Follow-up and monitoring will also be required for the decommissioning and abandonment phases.* *A conceptual description of monitoring programs for these phases will assist in the evaluation of the defensibility and completeness of the assessment.*
		OPG Response: A separate Environmental Assessment (EA) is expected to be required for the decommissioning phase of the project and a more detailed follow-up monitoring program would be developed at that time (i.e. in the 2050s or later). The overall objective of the follow-up monitoring program during the decommissioning phase will be consistent with the requirements of subsection 2(1) of the Canadian Environmental Assessment Act (CEAA 2012), to verify the accuracy of the EA and to determine the effectiveness of any measures taken to mitigate any environmental effects predicted in the decommissioning EA. The decommissioning follow-up program will be developed in a similar manner to the DGR EA Follow-up Monitoring Program (NWMO 2011) and will be compliant with relevant regulatory standards and guidance at the time of its

IR#	EIS Guidelines Section	Information Request and Response
		development. It will employ a similar systematic planning process that will comprise: • Definition of the objectives of the follow-up program; • Identification of the information required to meet the defined objectives; • Definition of the spatial boundaries of the follow-up program; • Determination of how data collection will be used to achieve the defined objectives; • Specification of performance or acceptance criteria; and • Development of detailed monitoring design required to obtain the data. The systematic process outlined above will incorporate a pathways model identification that will include air, groundwater, surface water and soil. The spatial extent of the follow-up program is expected to be similar to the follow-up programs for the site preparation and construction, and operations phases of the project, but will be influenced by changes to land use in the local and regional study area. The frequency of sample events planned in the monitoring program is part of the detailed sample plan design stage, and will be based on the statistical analysis of past monitoring data, the benchmark values selected and the specific objectives of the monitoring program. The site surface activities during decommissioning are expected to be similar to those during the site preparation and construction phase (e.g., operation of heavy equipment, demolition, earth moving), with radioactive emissions in the early stages of the decommissioning phase being similar to the latter stage of the operations phase. Therefore, it is expected that the monitoring plans will be similar to those proposed for the site preparation and construction and operations phases of the project, and may include: • Surface water monitoring; • Groundwater monitoring; • Hydraulic head monitoring; • Air emissions/dust/noise monitoring; • Erosion control and re-vegetation monitoring; and • Radiological monitoring. Adaptive management will be incorporated into the EA follow-up plan for the decommissioning phase by including contingency procedures and plans to comply with/conform to regulatory standards or guidelines that are applicable at the time of decommissioning. The Operational Policy Statement Adaptive Management Measures under the Canadian Environmental Assessment Act (CEAA 2009) states: *"The results of follow-up programs may be used for implementing adaptive management measures or for improving the quality of future assessments."* It also states:

IR#	EIS Guidelines Section	Information Request and Response
		"…adaptive management is a planned and systematic process for continuously improving environmental management practices by learning about their outcomes. Adaptive management provides flexibility to identify and implement new mitigation measures or to modify existing ones during the life of a project." Since adaptive management is an iterative process that is based on the results of follow-up monitoring, the follow-up monitoring program development for the decommissioning phase of the project will be guided by the results of the baseline monitoring as well as the results of the follow-up program for each previous phase of the project. Section 4.12 of the Environmental Impact Statement (OPG 2011) describes the abandonment and long-term performance phase of the DGR Project. There are no physical activities occurring on the site during the abandonment phase. The application for a Licence to Abandon would include the results of the decommissioning and environmental monitoring programs. The Licence to Abandon may include conditions, such as local land use controls, and use of surface and subsurface markers, that would apply during the period of institutional control. The need for follow-up monitoring during abandonment will be discussed with the regulator at the time of applying for the Licence to Abandon and will be based on the results of the decommissioning monitoring. If necessary, the follow-up monitoring will be developed using a systematic approach similar to that described above. **References:** CEAA. 2009. Operational Policy Statement Adaptive Management Measures under the Canadian Environmental Assessment Act. Accessed on October 23, 2012 at: http://www.ceaa.gc.ca/default.asp?lang=En&n=50139251-1 CEAA. 2012. Canadian Environmental Assessment Act, 2012. S.C. 2012, c. 19, s. 52. NWMO. 2011. DGR EA Follow-up Monitoring Program. Nuclear Waste Management Organization document NWMO DGR-TR-2011-10 R000. Toronto, Canada. (CEAA Registry Doc# 299) OPG. 2011. OPG's Deep Geologic Repository for Low and Intermediate Level Waste - Environmental Impact Statement, Volume 1. Ontario Power Generation report 00216-REP-07701-00001 R000. Toronto, Canada. (CEAA Registry Doc# 298)
EIS-06-237	• Section 16, Follow-Up Program	***Information Request:*** *Explain the absence of gross alpha measurements in the groundwater and surface water monitoring program.* ***Context:*** *The DGR EA Follow-Up Monitoring Program TSD (page 17) states that only tritium and gross beta levels will be routinely measured in groundwater; and that only tritium, gross beta, and in one case carbon-14 levels will be routinely monitored in surface water.* *The monitoring of gross alpha levels will allow comparison with the gross alpha screening level in the Canadian Drinking Water Guidelines of 0.5 Bq/L.*

IR#	EIS Guidelines Section	Information Request and Response
		OPG Response: OPG's response to Information Request EIS-03-67 (OPG 2012) provides information on the radionuclides monitored in various media at the Bruce nuclear site. Gross alpha is not included in the Radiological Environmental Monitoring Program at the Bruce nuclear site. Radionuclides predicted in the DGR inventory in 2062 are listed in the Preliminary Safety Report (OPG 2011, Table 5-8). Based on the 2062 inventory, the radioactivity in the DGR would be dominated by tritium (H-3), Carbon-14 (C-14), Nickel-63 (Ni-63) and Niobium-94 (Nb-94). Three of these (H-3, C-14 and Ni-63) are pure beta emitters; Nb-94 is a strong gamma emitter and a weak beta emitter. None is a strong alpha emitter. Alpha-emitting radionuclides are present in the waste at much lower levels than the above radionuclides. These alpha-emitters are actinides, which are also less mobile than the above radionuclides. For these reasons, the EA follow-up monitoring program proposed to monitor tritium, gross beta, and in one case C-14, however not gross alpha. Monitoring of these species will provide a good measure of the performance of the DGR facility. **References:** OPG. 2011. OPG's Deep Geologic Repository Project for Low and Intermediate Level Waste – Preliminary Safety Report. Ontario Power Generation report 00216-SR-01320-00001 R000. Toronto, Canada. (CEAA Registry Doc# 300) OPG. 2012. OPG Letter, A. Sweetnam to S. Swanson, "Deep Geologic Repository Project for Low and Intermediate Level Waste - Submission of Responses to Information Request (IR) Package #3", CD# 00216-CORR-00531-00117, July 9, 2012. (CEAA Registry Doc# 608)
EIS-06-240	• Section 10.1.6, Ambient Radioactivity	***Information Request:*** *Provide corrections and clarifications on locations and dates for Table 5.9-2: Tritium Level in Bruce A and B Groundwater Monitoring Wells (Bq/L).* ***Context:*** *Currently under the column "Monitoring Location" the table has a range of dates. In addition, the second row sampling months are also provided. It appears that there is no information on the actual locations.* *The temporal meaning of this table is confusing.*
		OPG Response: As indicated in OPG's supplementary response to Information Request (IR) EIS-03-81 (OPG 2012), there is a

IR#	EIS Guidelines Section	Information Request and Response
		typographical error in the first column of Table 5.9-2 (AMEC NSS 2011). The table presented in AMEC NSS (2011) lists a series of dates for the Bruce A and Bruce B monitoring well locations. Instead, this column should present the well number and level at which the sample was collected. The correct information for 2009 was provided in OPG's supplementary response to IR-EIS-03-81 (OPG 2012, Table 1, 2009 Semi-Annual Ground Water Data from Bruce A and Bruce B Monitoring Wells). A corrected table, Table 1, for all years is attached. **References:** AMEC NSS. 2011. Radiation and Radioactivity Technical Support Document. AMEC NSS Ltd. report for the Nuclear Waste Management Organization NWMO DGR-TR-2011-06 R000. Toronto, Canada. (CEAA Registry Doc# 299) OPG. 2012. Attachment #3 to OPG Letter, A. Sweetnam to S. Swanson, "Deep Geologic Repository Project for Low and Intermediate Level Waste – Submission of Previously Committed Responses to Information Requests", CD# 00216-CORR-00531-00126, August 9, 2012. (CEAA Registry Doc# 684)
EIS-06-244	• Section 11.4.6, Radiological Conditions	***Information Request:*** *Confirm whether the maximum airborne release rate for C-14 from all LLW and ILW packages should be presented as Bq/s.* ***Context:*** *The release rate of C-14 from LLW and ILW packages is stated as.8 x 10^{12} Bq. A release rate requires a unit of time.*
		OPG Response: In Appendix D, p.D-3, of Radiation and Radioactivity Technical Support Document (AMEC NSS 2011), the maximum airborne release rate of C-14 from all ILW packages is given as 1.8 × 10^{12} Bq, but should be 1.8 × 10^{12} Bq per year, and the maximum airborne C-14 release rate from all LLW and ILW packages should be 1.9 × 10^{12} Bq per year. The time units are given in Table 7-10 of the Preliminary Safety Report (OPG 2011), as referenced for these numbers. **References:** AMEC NSS. 2011. Radiation and Radioactivity Technical Support Document. AMEC NSS Ltd. report for the Nuclear Waste Management Organization NWMO DGR-TR-2011-06 R000. Toronto, Canada. (CEAA Registry Doc# 299) OPG. 2011. OPG's Deep Geologic Repository for Low and Intermediate Level Waste – Preliminary Safety Report. Ontario Power Generation report 00216-SR-01320-00001 R000. Toronto, Canada. (CEAA Registry Doc# 300)
EIS-06-261	• Section 8.1, General	***Information Request:*** *Provide information that justifies the significant decrease in the expected radioactive material content reported for the*

IR#	EIS Guidelines Section	Information Request and Response
	Information and Design Description	*operational LL/ALW resin waste stream in the Reference Low and Intermediate Level Waste Inventory Report Appendix B, Table B.1, page 53 as compared to the August 2008 version of the Reference Low and Intermediate Level Waste Inventory Report (R01) Appendix B, Table B-1, page 48.* ***Context:*** *Reference Low and Intermediate Level Waste Inventory Report Appendix B, Table B-1, page 53, combined 2 waste streams (LL Resins and ALW Resins) that had been separate in the August 2008 version of the Reference Low and Intermediate Level Waste Inventory Report (R01) Appendix B, Table B-1, page 48.* *In the Reference Low and Intermediate Level Waste Inventory Report shows specific activity of the combined waste streams of 2.2E+08 Bq/m^3 where as August 2008 version of the Reference Low and Intermediate Level Waste Inventory Report (R01 of this document showed the specific activity of radioactive material with t½ > 1 yr. of 5.0E+11 Bq/m^3 for the LL resins alone and 2.1E+08 Bq/m^3 for the ALW resin waste stream.* *There is no explanation for the dramatic decrease in specific activity from the combined waste streams.*
		OPG Response: The August 2008 version of the Reference Inventory Report was a preliminary version (OPG 2008). It included separate information on Low Level Resins (LL Resins) and on Active Liquid Waste Resins (ALW Resins). These are both low-level-waste ion exchange resin waste streams. The information on the LL resin waste stream in this report was conservatively based on the Intermediate Level Waste Miscellaneous IX resin category, since specific sampling of LL resin had not been performed at this time. (Compare the LL Resin values in Table B-1 with the Misc IX Resin values in Table B-2, OPG 2008.) For the December 2010 update to the Reference Inventory Report (OPG 2010), these two similar low-level waste resin streams were combined into a single waste stream, and the values for the ALW Resin were adopted as reference as they were more appropriate for this low-level waste. Subsequent measurements since the 2010 report was issued are consistent with this basis. **References:** OPG. 2008. Reference Low and Intermediate Level Waste Inventory for the Deep Geologic Repository (Preliminary). OPG 00216-REP-03902-00003-R01. Toronto, Canada. (available at http://www.nwmo.ca/uploads_managed/MediaFiles/539_ReferenceLowandIntermediateWasteInventoryfortheDGR.pdf) OPG. 2010. Reference Low and Intermediate Level Waste Inventory for the Deep Geologic Repository. Ontario Power Generation report 00216-REP-03902-00003-R003. Toronto, Canada. (CEAA Registry Doc# 300)

IR#	EIS Guidelines Section	Information Request and Response
EIS-06-274	• Section 8.1, General Information and Design Description	***Information Request:*** *Explain how the concept of retrievability applies to the proposed DGR. Describe how retrievability could be achieved and during which phases of the project it would be considered.* ***Context:*** *Page 4-56 of the EIS states that "Materials placed in the DGR are considered waste and the need for retrieval is not anticipated; however, retrieval can be achieved."*
		OPG Response: A discussion of retrievability can also be found in the Preliminary Safety Report (OPG 2011, Section 6.6) and is repeated below: *"The materials that are placed in the DGR are considered waste and the need for retrieval is not anticipated. However, in the unlikely event that any waste package(s) would need to be retrieved from a room following emplacement, retrieval can be achieved.* *A specific plan for retrieving the package(s) would be developed. First, the position of the waste package(s) to be retrieved will be identified using the waste tracking system and the number and type of packages that will have to be moved to access the identified waste package will be determined. Alternative locations, which may be temporary or permanent, for the packages will be identified. They could be relocated to another room, which is partially filled or empty. This new location could be suitable as a permanent location for these packages.* *The retrieval concept would be carried out by one of two methods depending on the status of the room.* 1. *For an open room, packages would be removed using the reverse of the initial emplacement procedure. In most instances this would involve using the same equipment (forklifts, rail carts, etc.) that had been used to originally emplace the waste packages.* 2. *For a waste-filled room that is isolated by an end wall, the ventilation fan system for that room would need to be re-established and run for adequate time to purge the room of any noxious or other gases and to ventilate the room. The packages would be recovered in the same manner as for an open room. If a gantry crane is required for retrieval, then this equipment would be re-installed after the end wall has been opened.* *Although it would be possible to remove waste packages from a room without excessive difficulty, it is expected that the retrieval procedure would be relatively slow to complete to ensure worker safety at all times. If any waste packages were required to be moved to surface, they would be handled in the reverse way to which they were moved underground."*

IR#	EIS Guidelines Section	Information Request and Response
		Additional information is provided in OPG's response to Information Request EIS-04-122 (OPG 2012): "*The wastes are considered to be always retrievable, however, it is recognized that the ease of retrievability of waste containers will diminish with time. For example, once the closure walls have been constructed in access tunnels to isolate a set of filled emplacement rooms, these walls would require removal, or a bypass tunnel constructed around the wall, prior to retrieving any emplaced waste in the isolated rooms. If waste containers would require retrieval at long time periods after the start of emplacement, then over-packing might be required as part of this retrieval process for some containers."* The above information applies to the Operations Phase of the DGR. The regulatory process to obtain a Decommissioning Licence from the Canadian Nuclear Safety Commission, which would be required to seal the repository shafts and dismantle DGR surface facilities, would only be obtained if there was confidence in the long-term safety of the DGR facility, hence the need for retrieval would not be envisioned. **References:** OPG. 2011. OPG's Deep Geologic Repository for Low and Intermediate Level Waste – Preliminary Safety Report. Ontario Power Generation report 00216-SR-01320-00001 R000. Toronto, Canada. (CEAA Registry Doc# 300) OPG. 2012. OPG Letter, A. Sweetnam to S. Swanson, "Deep Geologic Repository for Low and Intermediate Level Waste – Submission of Responses to a Sub-set of Package #4 Information Requests", CD# 00216-CORR-00531-00134, August 27, 2012. (CEAA Registry Doc# 704)
EIS-06-277	• Section 7.2, Alternatives to the Project	***Information Request:*** *Provide the following information regarding OPG's rationale for considering only LLW in the Engineering Feasibility and Safety and "Licensibility" analyses (in the Independent Assessment Study (IAS)) for the alternatives to the DGR project:* *a) An explanation of how inclusion of ILW would affect the engineering feasibility analysis of the options.* *b) An explanation of how inclusion of ILW would affect the safety and "licensibility" analysis of the options.* ***Context:*** *In the IAS, OPG's evaluation of alternatives to the DGR project does not consider ILW in the Engineering Feasibility and Safety and "Licensibility" analyses. Only LLW is considered.*
		OPG Response: The Independent Assessment Study (IAS) (GOLDER 2004) evaluated three options for the long-term management of OPG's low-level waste (LLW) and intermediate-level waste (ILW) and compared these to the status quo. The technical

IR#	EIS Guidelines Section	Information Request and Response
		options considered were: 1. Enhanced Processing and Storage 2. Surface Concrete Vaults 3. Deep Rock Vaults (later renamed 'Deep Geologic Repository'). In the conduct of the IAS it was recognized that the Surface Concrete Vault option was not suitable for long-lived ILW, as international practice normally has long-term management of long-lived radioactive waste in deep geologic repositories. The reason for this is to minimize the likelihood of inadvertent intrusion in the long term when the wastes still remain hazardous. Since the three options were not equally applicable for all waste streams, the comparative technical and cost assessment was based on LLW only. The engineering feasibility of the options is summarized in Section 2.7 of the IAS (GOLDER 2004, Table 4a). If ILW had been considered it would have affected the engineering feasibility in the following ways: • The Surface Concrete Vault option would not have been feasible for long-lived ILW. • The cost estimates for the Enhanced Processing and Storage option, and the Deep Rock Vault option would have increased. The safety and licensibility of the options is summarized in Section 3.4 of the IAS (GOLDER 2004, Table 5). If ILW had been considered it would have affected the overview of the safety and licensibility assessment in the following ways: • The Percent of Dose Constraint - Reference Scenario - would not have changed for the Enhanced Processing and Storage option and the Deep Rock Vault option (GOLDER 2004, Section 3.3.4). • The Percent of Dose Constraint - Intrusion Scenario (for deep rock vault option) - would have increased. • The Surface Concrete Vault option would not have been considered licensable for long-lived ILW. The IAS was one input to the Municipality of Kincardine/OPG Steering Committee that was established following the signing of the Memorandum of Understanding in April 2002 between the Municipality of Kincardine and OPG. Members of this Steering Committee also visited international operating facilities similar to the options under consideration, and met with local officials as part of these visits. With all the inputs available, the Municipality of Kincardine passed a resolution (KINCARDINE 2004) indicating a clear preference for the Deep Rock Vault option, namely: *"...that Council endorses the opinion of the [Kincardine] Nuclear Waste Steering Committee and select the 'Deep Rock Vault' option as the preferred course of study in regards to the management of low and intermediate level radioactive waste."* The selection of a deep geologic repository for OPG's LLW and ILW would not have changed if ILW had been considered in the engineering feasibility, and safety and licensibility assessments in the IAS.

IR#	EIS Guidelines Section	Information Request and Response
		References: GOLDER. 2004. Independent Assessment of Long-Term Management Options for Low and Intermediate level Waste at OPG's Western Waste Management Facility. Golder Associates Ltd. report 03-115-012. KINCARDINE. 2004. Municipality of Kincardine Council Resolution #2004-232.

Table 1 (associated with IR-EIS-06-240): Tritium Level in Bruce A and B Groundwater Monitoring Wells (Bq/L)
[Correction to Table 5.9-2 (AMEC NSS 2011)]

Monitoring Location Well Number - Level	2001		2002		2003		2004		2005		2006		2007		2008		2009	
	June	Nov	May[a]	Nov[b]	Aug	Nov	June	Dec	June	Dec	June	Dec	June	Dec	June	Dec	June	Dec
Bruce A																		
1-1	94.4	101.6	130	43.6	550	481	415	249.3	235	157.7	214.9	201.1	246.1	138.3	240.4	165.8	153.9	82.9
1-2	258.5	277.4	401	100.1	660	614	596	320	409	252.8	430	375.5	483	267.4	487	334.2	351.4	200
2-1	<3.7	<3.7	<23.5	<3.7	13.3	4.8	<4.3	<5.9	<4.4	<4.9	<5.1	<5.0	<5.2	<4.6	1.4	1.4	Ld	Ld
2-2	<3.7	<3.7	<23.5	<3.7	383.7	268.8	83.2	34.6	21.3	11.9	12.5	89.1	8.3	6.2	24.5	6.4	Ld	Ld
2-3	474	762.2	692	364.3	1,707	1817	1271	807	977	667	840	1499	783	527	763	544	462	499
3-1	<3.7	<3.7	<23.5	<3.7	<3.7	<3.7	<4.3	<5.9	<4.4	<4.9	<5.1	<5.0	<5.2	<4.6	0	0	Ld	Ld
3-2	<3.7	<3.7	<23.5	<3.7	8.6	11.2	4.7	<5.9	<4.4	<4.9	<5.1	<5.0	<5.2	<4.6	1.4	1.2	Ld	Ld
3-3	516.8	645.5	704	318	1,252	1,092	985	526	7.53	522	778	585	682	429.0	570	536	493	506
4-1	<3.7	<3.7	<23.5	<3.7	<3.7	<3.7	<4.3	<5.9	<4.3	<4.9	14.8	<5.0	<5.2	<4.6	3	1.1	Ld	Ld
4-2	1,466.4	1,303.3	1,590	594.6	450	433	250.3	231.2	190.7	167.7	188.9	176.2	350	114.9	221.5	171.6	176.6	131.6
5-1	<3.7	<3.7	<23.5	<3.7	<3.7	<3.7	5.2	<5.9	<4.4	3.8	<5.1	5.7	<5.2	<4.6	0.4	2.6	Ld	Ld
5-2	<3.7	<3.7	<23.5	<3.7	<3.7	<3.7	<4.3	<5.9	<4.4	<4.9	<5.1	<5.0	<5.2	<4.6	0	0	Ld	Ld
Bruce B																		
1-1	16.3	18.2	-	19.8	27.8	21	23.4	22.9	22.6	23.9	19.7	19.5	18.9	23.9	21.8	0	17.6	21.1
1-2	233.2	149	-	213.7	252.2	409	308.4	310.8	215.8	312.8	191	213.2	214.5	285.7	321.9	324.9	265.6	226.6
1-3	463.7	215.3	-	185	890	1,686	2,784	739	429	226.1	373.4	286.6	695	209.2	1116	389	436	270.6
2-1	156.4	143.8	-	147.6	177.6	164.7	163.1	160.6	109	140.9	221.2	167.9	219.8	226.1	202.3	257.2	142	272.8
2-2	155.4	161.1	-	191.2	262	278.8	277.8	323	301.4	279	390.8	407.0	444	400	597	650	763	754
3-1	<3.7	<3.7	-	4.9	<3.7	<3.7	4.6	<5.9	<4.4	<4.9	<5.1	<5.0	<5.2	<4.6	3.5	4.4	Ld	Ld
3-2	50.6	46.7	-	55.4	45.5	42.5	39.9	50.4	48.6	81.8	52.3	33.9	87.0	201.9	106.8	72.2	48.2	59.7
3-3	400.9	381.1	-	440.6	385.6	387.7	372.6	598	467	369.7	547	397.7	437	451	474	537	724	659
4-1	72.4	69.1	-	73.1	56.6	63.4	66.5	63.8	55.6	53.4	52	48.8	50.3	43.1	48.6	49.8	47.5	47
4-2	551.4	500.4	-	318.3	419	802	508	366	364	616	513	583	506	589	504	669	685	421
4-3	1,204.3	1341	-	899.3	1,089	1,552	1,600	1,406	1,649	1,593	1,895	2,042	2,153	1,979	2,769	3,012	3,082	3,161
5-1	258.5	252.6	-	288.9	265.7	287.6	288	267	240.9	257.8	253.1	233	249.4	234.6	262.7	263.3	88.9	245.3
5-2	354	361.6	-	388	392.6	450	468	445	370.9	390.3	467	462	505	470	604	610	621	619
5-3	469.3	454.5	-	431.5	619	742	534	460	599	449	656	613	1,024	650	1,250	945	766	599

Notes:
a Modifications to the security fencing around Bruce B made access to the groundwater wells impractical during the first half of 2002
b Samples were collected on November 13 for wells in Bruce A and November 19 for wells in Bruce B
- No measurement taken
Ld Lower than detection limit
Source: [10; 11; 12; 13; 14; 15; 16; 17; 18]