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NUCLEAR ENERGY AGENCY
RADIOACTIVE WASTE MANAGEMENT COMMITTEE

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**SELECTED INTERNATIONAL BIBLIOGRAPHY ON REVERSIBILITY AND RETRIEVABILITY TO
SUPPORT THE CURRENT NEA PROJECT**

The present list of references was assembled in support of the work of the NEA Project on Reversibility and Retrievability during the period May 2007 - September 2010 (<http://www.nea.fr/rwm/rr/>).

It is not intended to update this list any further. Most of the cited references are downloadable from the web as of September 2010. The reader should be aware however, that electronic availability may change with the progress of time.

The list is provided to others who may want to undertake their own analysis. Although not exhaustive, the list will constitute for them a useful start.

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About this document

Reversibility and retrievability are not new concepts. In 1969, the United States National Academy of Sciences, in its report to Congress *Technology: Processes of Assessment and Choice*, observed that: “Other things being equal, those technological projects or developments should be favored that leave maximum room for maneuver in the future. The reversibility of an action should thus be counted as a major benefit; its irreversibility, a major cost.” One of the *Proposed Goals for Radioactive Waste Management*, in the NUREG-0300 document dated 1978 and prepared by a task group for presentation to the United States Nuclear Regulatory Commission, reads as follows: “If wastes are disposed on earth, their retrievability - assuming a technology as advanced as present - should not be precluded.”

Interest in reversibility and retrievability has been increasing in a number of national contexts. In fact, as can be seen in the detailed list of references in the annex, there have been discussions of the subjects in almost every national repository programme. The example may be given of the conclusions of the environmental assessment panel’s 1998 report on the original Canadian repository concept. The panel stated that there was not yet sufficient societal acceptance of the concept to proceed. Among the reasons given for this lack of acceptance was a desire on the part of many stakeholders for the concept to better accommodate monitoring, retrieval, recycling and the emergence of new technology. The eventual outcome of this panel report was the establishment of the Nuclear Waste Management Organization whose extensive consultations led to the formulation of the Adaptive Phased Management approach, in which reversibility of decision making and retrievability of spent fuel play important roles. Similarly, review, assessment and consultation have led in some other countries (notably France and the UK) to a greater programme focus on retrievability and reversibility.

The first major international publication on reversibility and retrievability was a result of a seminar on the subject held in Sweden in 1999. The proceedings of this seminar were documented in IAEA TECDOC-1187 (2000). The papers presented covered a wide range of topics related to the subject, and this report may still be considered the most comprehensive and detailed international reference on reversibility and retrievability. At approximately the same time, the European Commission sponsored a study called the *Concerted Action on the Retrievability of Long Lived Radioactive Waste in Deep Underground Repositories*; several of the contributors to this study presented papers at the Swedish conference. Subsequently, and based to a considerable extent on the work that had been represented in these two reports, the NEA published its summary report on the topic, *Reversibility and Retrievability in Geologic Disposal of Radioactive Waste – Reflections at the International Level* (NEA-3140, 2001), where the concept of reversibility was first established as a concept distinct from that of retrievability.

Subsequently, in addition to the various developments in individual national programmes, there have been two publications from international agencies that bear importantly on the topic. The first of these was a report entitled *Stepwise Approach to Decision Making for Long-term Radioactive Waste Management - Experience, Issues and Guiding Principles* (NEA-4429, 2004), which deals with topics related to adaptive, staged or stepwise decision making. The second was *Disposal of Radioactive Waste: Technological Implications for Retrievability* (IAEA NW-T-1.19, 2009), which focuses on technical issues related to retrievability.

The list of references in the Annex includes the above references as well as several others, including working papers supplied by their authors. This material was gathered in support of the work of the NEA Project on Reversibility and Retrievability during the period September 2007- September 2010 (<http://www.nea.fr/rwm/rr/>). It is not intended to update this list any further. Most of the cited references are downloadable from the web as of September 2010. The reader should be aware however, that electronic availability may change with the progress of time.

The list is provided to others who may want to undertake their own analysis. Although not exhaustive, the list will constitute for them a useful start.

ANNEX:
SELECTED REFERENCES ON REVERSIBILITY AND RETRIEVABILITY TO SUPPORT THE
CURRENT NEA PROJECT
(last update: September 23, 2010)

1.0 International documents

1.1 NEA

- 1.1.1.** Document title: Reversibility and Retrievability in Geologic Disposal of Radioactive Waste – Reflections at the International Level, NEA Report 3140, 20 November 2001

Web address for download:

<http://www.nea.fr/html/rwm/reports/2001/nea3140.pdf>

<http://www.nea.fr/html/rwm/reports/2001/nea3448.pdf> (French)

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- 1.1.2.** Document title: The French R&D Programme on Deep Geological Disposal of Radioactive Waste - An International Peer Review of the "Dossier 2001 Argile", NEA Report 4432, 31 July 2003

Web address for download:

<http://www.nea.fr/html/rwm/reports/2003/nea4432-andraeng.pdf>

<http://www.nea.fr/html/rwm/reports/2003/nea4588-andrafr.pdf> (French)

- 1.1.3.** Document title: Stepwise Approach to Decision Making for Long-term Radioactive Waste Management - Experience, Issues and Guiding Principles, NEA Report 4429, 13 September 2004

Web address for download:

<http://www.nea.fr/html/rwm/reports/2004/nea4429-stepwise.pdf>

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- 1.1.4.** Document title: Safety of Geological Disposal of High-level and Long-lived Radioactive Waste in France - An International Peer Review of the "Dossier 2005 Argile" Concerning Disposal in the Callovo-Oxfordian Formation, NEA Report 6178, 17 July 2006

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<http://www.nea.fr/html/rwm/reports/2006/nea6178-argile.pdf>

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- 1.1.5.** Document title: The Roles of Storage in the Management of Long-lived Radioactive Waste – Practices and Potentialities in OECD Countries, NEA Report 6043, 1 December 2006

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<http://www.nea.fr/html/rwm/reports/2006/nea6043-storage.pdf>

- 1.1.6.** Document title: "International Experiences in Safety Cases for Geological Repositories (INTESC)", NEA Report 6251, November 2009

Web address for download:

<http://www.nea.fr/rwm/reports/2009/nea6251-INTESC-eng.pdf>

- 1.1.7.** Document title: "More than Just Concrete Realities: The Symbolic Dimension of Radioactive Waste Management", NEA Report 6869, April 2010

Web address for download:

<http://www.nea.fr/rwm/reports/2010/nea6869-symbolic.pdf>

1.2 IAEA

- 1.2.1.** Document title: Issues in radioactive waste disposal – Second report of the Working Group on Principles and Criteria for Radioactive Waste Disposal, IAEA-TECDOC-909, October 1996

Web address for download:

http://www-pub.iaea.org/MTCD/publications/PDF/te_909_web.pdf

- 1.2.2.** Document title: Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management, IAEA-INFCIRC-546, December 1997

Web address for download:

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- 1.2.3.** Document title: IAEA 3rd Scientific Forum, Radioactive Waste Management – Turning Options into Solutions, 19-20 September 2000

Web address for download:

<http://www.iaea.org/Publications/Booklets/ScientificForum3/scientificforum3.pdf>

- 1.2.4.** Document title: Retrievability of high level waste and spent nuclear fuel - Proceedings of an international seminar organized by the Swedish National Council for Nuclear Waste in co-operation with the International Atomic Energy Agency, Saltsjöbaden, Sweden, 24–27 October 1999, IAEA-TECDOC-1187, December 2000

Web address for download:

http://www-pub.iaea.org/MTCD/publications/PDF/te_1187_prn.pdf

- 1.2.5.** Document title: Monitoring of geological repositories for high level radioactive waste, IAEA-TECDOC-1208, April 2001

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- 1.2.6.** Document title: The Long Term Storage of Radioactive Waste: Safety and Sustainability – A Position Paper of International Experts, June 2003

Web address for download:

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- 1.2.7.** Document title: Retrieval and Conditioning of Solid Radioactive Waste from Old Facilities, IAEA TRS-456, February 2007

Web address for download:

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1.3 EC

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Web address for download: N/A

- 1.3.2.** Document title: Results of the Concerted Action on the Retrievalability of Long Lived Radioactive Waste in Deep Underground Repositories, J.B. Grupa, J.P. Hoorelbeke, J. Ziegenhagen, J-L. Santiago, P. Zuidema, I. Crossland, J. Vrijen, J. Vira, G. Volckaert, T. Papp, WM'01 Conference, February 25-March 1, 2001, Tucson, AZ

Web address for download:

<http://www.wmsym.org/archives/2001/36/36-1.pdf>

http://cordis.europa.eu/search/index.cfm?fuseaction=lib.simplifiedocument&DOC_ID=46986132&CFID=3304784&CFTOKEN=45334928 (description of EUR 19145)

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- 1.3.4.** Document title: Review of Current Disposal Concepts concerning Measures for Retrievalability, B.R.W.Haverkate, Petten, NRG, 30 May 2005

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http://www.esdred.info/medias/Retrievalability_compilation.pdf

- 1.3.5.** Document title: ESDRED Final Summary Report and Global Evaluation of the Project, Mod6-WP4-D6, Brussels, January 2009

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http://www.esdred.info/medias/Mod6-WP4-D6_FinalSummaryReport_Final30Jan09.pdf

- 1.3.6.** Document title: Project Presentation – Monitoring Developments for safe Repository operation and staged closure: MoDeRn, Euratom contract 232598, Brussels, September 2009

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http://www.modern-fp7.eu/fileadmin/modern/docs/Deliverables/MoDeRn_project_presentation-D5.2.1.pdf

1.4 Other

- 1.4.1.** Document title: Ethical Aspects of Technical Safety, C.F. Gethmann, Human Factors and Ergonomics in Manufacturing vol 13, pp. 243-252, June 2003

Web address for download:

http://www.eurosafe-forum.org/files/0511_gethmann_eurosafe02_gb.pdf

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- 1.4.3.** Document title: Decision Making for Complex Socio-Technical Systems: Robustness from Lessons Learned in Long-Term Radioactive Waste Governance, T. Flüeler, Springer, Dordrecht 2006

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Web address for download:

http://www.internet-observatory.be/energy/ampere_commission/E5.pdf

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<http://www.kbs-frb.be/pressitem.aspx?id=259836&LangType=2060>

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- 2.2.1.** Document title: *Report of the Nuclear Fuel Waste Management and Disposal Concept Environmental Assessment Panel*, Canadian Environmental Assessment Agency, March 1998

Web address for download:

<http://www.ceaa-acee.gc.ca/default.asp?lang=En&n=0B83BD43-1&xml=0B83BD43-93AA-4652-9929-3DD8DA4DE486&offset=1&toc=hide> (on-line only; not downloadable)

- 2.2.2.** Document title: Geological Safekeeping and Retrievability, a PowerPoint presentation by C. Allan, AECL, to the International Conference on Safety of Radioactive Waste Management, Cordoba, 13-17/03/2000 (see IAEA STI/PUB/1094)

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<http://www-pub.iaea.org/MTCD/publications/PubDetails.asp?pubId=6045> (description of conference proceedings)

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- 2.2.5.** Document title: NWMO Background Paper 1-1, Sustainable Development and Nuclear Waste, David Runnalls, International Institute for Sustainable Development, October 2003

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- 2.2.7.** Document title: NWMO Background Paper 6-18, Adaptive Phased Management: Technical Description, Nuclear Waste Management Organization, October 2005

Web address for download:

<http://www.nwmo.ca/6.18>

- 2.2.8.** Document title: NWMO Dialogue Report 11-ABO-1, Building Relationship - The NWMO Aboriginal Dialogue 2003 - 2005, Nuclear Waste Management Organization, 18 October 2005

Web address for download:

http://www.nwmo.ca/uploads_managed/MediaFiles/971_11-abo-1buildingrelationship-t.pdf

- 2.2.9.** Document title: Choosing a Way Forward: The Future Management of Canada's Used Nuclear Fuel, Final Study report, November 2005

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- 2.3.1.** Document title: Retrieval of Spent Nuclear Fuel Canisters, Posiva Working Report 99-21, by T. Saanio and H. Raiko, 1999

Web address for download: N/A

- 2.3.2.** Document title: Government Decision on the safety of disposal of spent nuclear fuel, 25 March 1999

Web address for download:

<http://www.stuk.fi/saannosto/19990478e.html>

- 2.3.3.** Document title: Finland proceeds towards direct disposal of spent fuel, Juhani Vira, presented at Workshop on Long-Term Nuclear Waste Management, Loughborough University, 6-7 November 2006

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[http://www.lboro.ac.uk/departments/cm/research/LTNWM/Finland%20Proceeds%20Towards%20Direct%20Disposal%20of%20Spent%20Fuel%20-%20Juhani%20Vira%20\(Posiva\).pdf](http://www.lboro.ac.uk/departments/cm/research/LTNWM/Finland%20Proceeds%20Towards%20Direct%20Disposal%20of%20Spent%20Fuel%20-%20Juhani%20Vira%20(Posiva).pdf)

- 2.3.4.** Document title: Retrieval

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- 2.4.1.** Document title: The reversibility of radioactive waste disposal in deep geological formations: The role of underground research laboratories and programme of studies, Andra, March 1998

Web address for download: N/A

- 2.4.2.** Document title: Réflexions sur la réversibilité des stockages, Commission nationale d'évaluation relative aux recherches sur la gestion des déchets radioactifs, June 1998

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- 2.4.4.** Document title: Colloque ‘La Réversibilité et ses Limites’, Vendredi 30 mars 2001, Comité Local d’Information et de Suivi du laboratoire de recherché souterrain de Bure (CLIS), 126 pages.

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- 2.4.7.** Document title: “ Les Français et les déchets nucléaires” by P. d’Iribarne, Ministère de l’Économie, des Finances et de l’Industrie, May 2005

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<http://www.andra.fr/international/pages/en/menu21/waste-management/research-and-development/dossier-2005-1636.html>

- 2.4.9.** Document title: LOI no 2006-739 du 28 juin 2006 de programme relative à la gestion durable des matières et déchets radioactifs

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<http://halshs.archives-ouvertes.fr/halshs-00090195/fr/> (index reference only)

- 2.4.11.** Document title: Réversibilité et sciences sociales: Actes de la Journée d’études du 2 octobre 2008 (Andra)

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<http://www.andra.fr/pages/fr/feedback-on-the-interdisciplinary-symposium-on-reversibility-1635.html>

2.4.13. Document title: Les formes d'argumentation autour de la notion de réversibilité dans la gestion des déchets radioactifs, 15 December 2009 (EHESS and Andra)

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