

Nuclear Latency (NL) Dataset
Country Coding Sheets

JAPAN

COW COUNTRY CODE: 740

List of Country's Enrichment and Reprocessing (ENR) Facilities

1. Asahi Uranium Enrichment Laboratory
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Detailed Facility-Specific Information and Sources

1. Asahi Uranium Enrichment Laboratory

- a. ENR type (diffusion, centrifuge, EMIS, chemical and ion exchange, aerodynamic isotope separation, reprocessing).*

Uranium enrichment, chemical exchange.

- b. Facility size (laboratory, pilot, commercial).*

Pilot.

- c. Is the facility under construction or in operation? If under construction, list the construction years. If in operation, list the years of operation.*

Construction of the facility began 1982. The facility operated from 1986-1991 (INFCIS).

- d. Was the facility developed covertly? If so, identify years that facility was covert.*

No.

- e. Was the facility placed under IAEA safeguards? If so, identify the years that the facility was safeguarded.*

Yes, Japan ratified the INFCIRC 255 agreement in 1977.

f. *Was the facility placed under regional safeguards? If so, identify the years that the facility was under regional safeguards.*

No.

g. *Did the facility have a military purpose?*

No.

h. *Was the facility multinational? If so, identify the other countries that were involved.*

The program is largely indigenous. Zentner et al. (2005) identify Japan as one of six countries with a successful indigenous program.

i. *Was the facility built with foreign assistance? If so, list the supplier(s) and what they provided.*

Foreign assistance is unlikely as the ion chemical exchange process was developed by Asahi Chemical Company, a Japanese entity.

j. *Sources:*

Global Security. "Chemical and Ion Exchange Uranium Enrichment."
<http://www.globalsecurity.org/wmd/intro/u-ion.htm>. Accessed 06/25/2015.

International Atomic Energy Agency. "Integrated Nuclear Fuel Cycle Information Systems." <https://infcis.iaea.org>. Accessed 06/08/2015.

Makhijani, Arjun, Lois Chalmers, and Brice Smith. 2004. "Uranium Enrichment: Just Plain Facts to Fuel an Informed Debate on Nuclear Proliferation and Nuclear Power." Institute for Energy and Environmental Research. Nuclear Policy Research Institute.

—. 1999. "Asahi Chemical Concludes Enrichment Research." *Atoms in Japan*. 43(3): 16.

2. JAEA Ningyo – Toge Enrichment Demo. Plant (DOP)¹

a. *ENR type (diffusion, centrifuge, EMIS, chemical and ion exchange, aerodynamic isotope separation, reprocessing).*

Uranium enrichment, centrifuge.

b. *Facility size (laboratory, pilot, commercial).*

¹ The 'Message from the Director' listed in the sources states *two* facilities were located at the site. It is not clear if the additional facility was a centrifuge facility. The remaining sources only describe a single facility.

Pilot.

- c. *Is the facility under construction or in operation? If under construction, list the construction years. If in operation, list the years of operation.*

The groundbreaking ceremony was in November 1985. This is used as the construction start date. The facility operated between 1988² and 2001.³

- d. *Was the facility developed covertly? If so, identify years that facility was covert.*

No.

- e. *Was the facility placed under IAEA safeguards? If so, identify the years that the facility was safeguarded.*

Yes, Japan ratified the INFCIRC 255 agreement in 1977. The facility was under safeguards from 1988-2001.

- f. *Was the facility placed under regional safeguards? If so, identify the years that the facility was under regional safeguards.*

No.

- g. *Did the facility have a military purpose?*

No.

- h. *Was the facility multinational? If so, identify the other countries that were involved.*

No.

- i. *Was the facility built with foreign assistance? If so, list the supplier(s) and what they provided.*

No evidence of foreign assistance found. The Power Reactor and Nuclear Fuel Development Institute (PNC) built the demonstration plant.

- j. *Sources:*

Global Security. "Ningyo-Toge."

<http://www.globalsecurity.org/wmd/world/japan/ningyotoge.htm>. Accessed 06/25/2015.

² JNC lists 1988 as the first demonstration of facility. INFCIS states 1989 as start of operation.

³ The 2001 date is from the INFCIS. The Nuclear Threat Initiative states the closure date as 2004. Makhijani et al. (2004) list the operational end date. ORNL states 2001.

Japan Atomic Energy Agency. "Brief History of JNC."
<http://www.jaea.go.jp/jnc/jncweb/01intro/history.html>. Accessed 06/25/2015.

International Atomic Energy Agency. "Integrated Nuclear Fuel Cycle Information Systems." <https://infcis.iaea.org>. Accessed 06/08/2015.

Makhijani, Arjun, Lois Chalmers, and Brice Smith. 2004. "Uranium Enrichment: Just Plain Facts to Fuel an Informed Debate on Nuclear Proliferation and Nuclear Power." Institute for Energy and Environmental Research. Nuclear Policy Research Institute.

Nuclear Threat Initiative. 2012. "Civilian HEU: Japan."
<http://www.nti.org/analysis/articles/civilian-heu-japan/>. Accessed 06/25/2015.

Oak Ridge National Laboratory. 2007. "Profile of World Uranium Enrichment Programs." 14.

3. JAEA Tokai (Enrichment Tests in Naka-gun, Ibaraki prefecture)

- a. ENR type (diffusion, centrifuge, EMIS, chemical and ion exchange, aerodynamic isotope separation, reprocessing).*

Uranium enrichment, laser (MLIS).

- b. Facility size (laboratory, pilot, commercial).*

Laboratory.

- c. Is the facility under construction or in operation? If under construction, list the construction years. If in operation, list the years of operation.*

Construction of the facility began in 1987 and the facility became operational in 1991. The facility ended operation in 2003.

- d. Was the facility developed covertly? If so, identify years that facility was covert.*

No.

- e. Was the facility placed under IAEA safeguards? If so, identify the years that the facility was safeguarded.*

Yes, Japan ratified the INFCIRC 255 agreement in 1977.

- f. Was the facility placed under regional safeguards? If so, identify the years that the facility was under regional safeguards.*

No.

g. *Did the facility have a military purpose?*

No.

h. *Was the facility multinational? If so, identify the other countries that were involved.*

No.

i. *Was the facility built with foreign assistance? If so, list the supplier(s) and what they provided.*

No evidence of foreign assistance found. Much of Japan's enrichment work has been indigenous.

j. *Sources:*

Japan Atomic Energy Agency. "Nuclear Fuel Cycle Engineering Laboratories."
<http://www.jaea.go.jp/english/04/tokai-cycle/01.htm>. Accessed 06/25/2015.

International Atomic Energy Agency. "Integrated Nuclear Fuel Cycle Information Systems." <https://infcis.iaea.org>. Accessed 06/08/2015.

Makhijani, Arjun, Lois Chalmers, and Brice Smith. 2004. "Uranium Enrichment: Just Plain Facts to Fuel an Informed Debate on Nuclear Proliferation and Nuclear Power." Institute for Energy and Environmental Research. Nuclear Policy Research Institute.

Shimpey, Shirayama, Takefumi Mikatsura, Hiroaki Ueda, and Chikara Konagai. 1990. "Laser System For Isotope Separation." SPIE.
http://proceedings.spiedigitallibrary.org/data/Conferences/SPIEP/41278/279_1.pdf. Accessed 06/25/2015.

4. JAEA Tokai Reprocessing Plant (Japan Nuclear Cycle Institute)

a. *ENR type (diffusion, centrifuge, EMIS, chemical and ion exchange, aerodynamic isotope separation, reprocessing).*

Spent fuel reprocessing.

b. *Facility size (laboratory, pilot, commercial).*

Pilot.

c. *Is the facility under construction or in operation? If under construction, list the construction years. If in operation, list the years of operation.*

Construction began in 1971 and was completed in 1975. The facility operated from 1975⁴ to 2006. JAEA Tokai provides the following timeline: September 1975 start of uranium testing; July 1977 first acceptance of spent fuel; 1977 start of test run using spent fuel; 1981 start of first actual run using spent fuel.

d. *Was the facility developed covertly? If so, identify years that facility was covert.*

No.

e. *Was the facility placed under IAEA safeguards? If so, identify the years that the facility was safeguarded.*

Yes, Japan ratified the INFCIRC 255 agreement in 1977.

f. *Was the facility placed under regional safeguards? If so, identify the years that the facility was under regional safeguards.*

No.

g. *Did the facility have a military purpose?*

No.

h. *Was the facility multinational? If so, identify the other countries that were involved.*

No.

i. *Was the facility built with foreign assistance? If so, list the supplier(s) and what they provided.*

Yes, the French helped to build the Tokai Mura reprocessing plant and much of the technology was French in origin.

j. *Sources:*

Gale, Robert W. 1978. "Nuclear Power and Japan's Proliferation Option." *Asian Survey*. 18(11): 1117–33.

International Atomic Energy Agency. "Integrated Nuclear Fuel Cycle Information Systems." <https://infcis.iaea.org>. Accessed 06/08/2015.

Japan Atomic Energy Agency. "Brief History of JNC." <http://www.jaea.go.jp/jnc/jncweb/01intro/history.html>. Accessed 06/25/2015.

⁴ The INFCIS uses 1977 as the start date, while Johnson and Ehinger (2010) cite 1978 as the operational start date. Kroenig (2009) provides 1974 as the end of construction assistance.

- Johnson, S.J., and M. Ehinger. 2010. "Designing and Operating for Safeguards: Lessons Learned From Rokkasho Reprocessing Plant (RRP)." Pacific Northwest National Laboratory Report 19626.
http://www.pnl.gov/main/publications/external/technical_reports/pnnl-19626.pdf. Accessed 06/25/2015.
- Kroenig, Matthew. 2009. "Exporting the Bomb: Why States Provide Sensitive Nuclear Assistance." *American Political Science Review*. 103(1): 113-133.
- Kroenig, Matthew. "Importing the Bomb: Sensitive Nuclear Assistance and Nuclear Proliferation." The Belfer Center.
http://belfercenter.ksg.harvard.edu/files/uploads/Kroenig_Importing_the_Bomb.pdf. Accessed 06/25/2015. 29.
- Lester, Richard K. 1982. "US-Japanese Nuclear Relations: Structural Change and Political Strain." *Asian Survey*. 22(5): 417-33.
- Makhijani, Arjun, Lois Chalmers, and Brice Smith. 2004. "Uranium Enrichment: Just Plain Facts to Fuel an Informed Debate on Nuclear Proliferation and Nuclear Power." Institute for Energy and Environmental Research. Nuclear Policy Research Institute.
- McGoldrick, Fred. 2011. "Limiting Transfers of Enrichment and Reprocessing Technology: Issues, Constraints, Options." The Belfer Center.
<http://belfercenter.ksg.harvard.edu/files/MTA-NSG-report-color.pdf>. Accessed 06/25/2015. 10.
- Sharon, Stephanie and Warren H. Donnelly. 1990. "Japan." In *International Nuclear Trade and Nonproliferation*. William C. Potter, Ed. Lexington, MA: Lexington Books. 217.
- World Nuclear Association. "Nuclear Power in Japan."
<http://www.world-nuclear.org/info/inf79.html>. Accessed 06/25/2015.

5. Ningyo – Toge Uranium Pilot Plant

- a. *ENR type (diffusion, centrifuge, EMIS, chemical and ion exchange, aerodynamic isotope separation, reprocessing).*

Uranium enrichment, centrifuge.

- b. *Facility size (laboratory, pilot, commercial).*

Pilot.

- c. *Is the facility under construction or in operation? If under construction, list the construction years. If in operation, list the years of operation.*

Construction of the facility began in 1978. The facility operated from 1979 to 1999.⁵

- d. *Was the facility developed covertly? If so, identify years that facility was covert.*

No.

- e. *Was the facility placed under IAEA safeguards? If so, identify the years that the facility was safeguarded.*

Yes, Japan ratified the INFCIRC 255 agreement in 1977. The facility was under safeguards from 1979 forward.

- f. *Was the facility placed under regional safeguards? If so, identify the years that the facility was under regional safeguards.*

No.

- g. *Did the facility have a military purpose?*

No.

- h. *Was the facility multinational? If so, identify the other countries that were involved.*

No.

- i. *Was the facility built with foreign assistance? If so, list the supplier(s) and what they provided.*

No evidence of foreign assistance found. The Director of the JAEA says this facility was “developed and put into practical use by our country from scratch.”

- j. *Sources:*

Goto, Kazuko. 2012. Federation of American Scientists. “Japan’s Role as Leader for Nuclear Nonproliferation.” http://www.fas.org/docs/2012IssueBrief_Japan.pdf. Accessed 06/25/2015.

International Atomic Energy Agency. “Integrated Nuclear Fuel Cycle Information Systems.” <https://infcis.iaea.org>. Accessed 06/08/2015.

⁵ The operational start date and 1999 date is from the INFCIS while Global Security states 2000. The Nuclear Threat Initiative lists 2004 as the end of operation. ORNL lists 1990 as the shutdown year.

- Japan Atomic Energy Agency. "Message from the Director."
<http://www.jaea.go.jp/english/04/ningyo/english/message.html>. Accessed 06/25/2015.
- Laughter, M.D. 2009. "Profile of World Uranium Enrichment Programs—2009." Oak Ridge National Laboratory
- Makhijani, Arjun, Lois Chalmers, and Brice Smith. 2004. "Uranium Enrichment: Just Plain Facts to Fuel an Informed Debate on Nuclear Proliferation and Nuclear Power." Institute for Energy and Environmental Research. Nuclear Policy Research Institute.
- Naoaki, Usui. 1997. "Troubled PNC to be Scrapped; Some Duties Shifted to New Group." *Nucleonics Week*. 38(32): 10.
- Nuclear Threat Initiative. 2012. "Civilian HEU: Japan."
<http://www.nti.org/analysis/articles/civilian-heu-japan/>. Accessed 06/25/2015.
- Oak Ridge National Laboratory. 2007. "Profile of World Uranium Enrichment Programs." 14.

6. Reprocessing Test Facility (JRTF)

- a. *ENR type (diffusion, centrifuge, EMIS, chemical and ion exchange, aerodynamic isotope separation, reprocessing).*

Spent fuel reprocessing.

- b. *Facility size (laboratory, pilot, commercial).*

Laboratory.

- c. *Is the facility under construction or in operation? If under construction, list the construction years. If in operation, list the years of operation.*

Constructing started in 1968 and the facility operated from 1968 to 1970.⁶

- d. *Was the facility developed covertly? If so, identify years that facility was covert.*

No.

- e. *Was the facility placed under IAEA safeguards? If so, identify the years that the facility was safeguarded.*

⁶ The INFCIS lists the facility operating from 1968 to 1970. Saito et al. (2001) provide the 1969 date. Construction date from JAEA.

Yes, the fuel used in the reactor would have been under the providing country's safeguards arrangement. The facility did close prior to Japan's ratification of INFCIRC 255. The decommissioning would have been under safeguards.

f. Was the facility placed under regional safeguards? If so, identify the years that the facility was under regional safeguards.

No.

g. Did the facility have a military purpose?

No.

h. Was the facility multinational? If so, identify the other countries that were involved.

No.

i. Was the facility built with foreign assistance? If so, list the supplier(s) and what they provided

No. This was apparently the first reprocessing facility in Japan to be constructed "by applying only Japanese technology to establish basic technology on wet reprocessing."

j. Sources:

International Atomic Energy Agency. "Integrated Nuclear Fuel Cycle Information Systems." <https://infcis.iaea.org>. Accessed 06/08/2015.

Japan Atomic Energy Agency. "JAREI Reprocessing Test Facility." https://www.jaea.go.jp/english/04/ntokai/decommissioning/01/decommissioning_02_02.html. Accessed 11/16/2015.

Kanayama, Fumihiko. 2011. "Dismantling Method of Fuel Cycle Facilities Obtained by Dismantling the JRTF." International Atomic Energy Agency. http://inis.iaea.org/search/search.aspx?orig_q=RN:44029971. Accessed 06/25/2015.

Keiichiro, Saito et al. 2001. "Dismantling Experience in the JAERI's Reprocessing Test Facility Decommissioning." <http://www.wmsym.org/archives/2001/38/38-4.pdf>. Accessed 06/25/2015.

Makhijani, Arjun, Lois Chalmers, and Brice Smith. 2004. "Uranium Enrichment: Just Plain Facts to Fuel an Informed Debate on Nuclear Proliferation and Nuclear Power." Institute for Energy and Environmental Research. Nuclear Policy Research Institute.

Saito, Keiichiro, Kazutoshi Miyajima, Uchikoshi Tadaaki, Oasada, Kaoru, and Kikuji Kubota. 2001. "Dismantling Experience in the JAERI's Reprocessing Facility Decommissioning." <http://www.wmsym.org/archives/2001/38/38-4.pdf>. Accessed 06/25/2015.

7. Rokkasho Reprocessing Plant I

- a. *ENR type (diffusion, centrifuge, EMIS, chemical and ion exchange, aerodynamic isotope separation, reprocessing).*

Spent fuel reprocessing.

- b. *Facility size (laboratory, pilot, commercial).*

Commercial.

- c. *Is the facility under construction or in operation? If under construction, list the construction years. If in operation, list the years of operation.*

The decision to construct the commercial facility was made in 1980. The Federation of Electric Power Companies applied to Rokkasho-mura village for permission to begin construction of the complex. The IAEA consulted on construction design starting in 1987. Construction started in 1993 with one phase of completion in 2004 with active trials being in December 2005.⁷ The facility received continued approval for construction as of June 2012. The IAEA codes the facility as being operational from 2007.

- d. *Was the facility developed covertly? If so, identify years that facility was covert.*

No.

- e. *Was the facility placed under IAEA safeguards? If so, identify the years that the facility was safeguarded.*

Yes, the facility is under safeguards from the time commissioning to the present.

- f. *Was the facility placed under regional safeguards? If so, identify the years that the facility was under regional safeguards.*

No.

- g. *Did the facility have a military purpose?*

No.

⁷ Shimbum (2012) provides the active trial date. The IAEA lists 2007 as the operational date.

h. *Was the facility multinational? If so, identify the other countries that were involved.*

No.

i. *Was the facility build with foreign assistance? If so, list the supplier(s) and what they provided.*

Yes. This facility was built with assistance from Areva. It is thought that Japan may have contributed more to the construction than it did on the Tokai reprocessing plant. Much of the technology for this plant however was imported from France.

j. *Sources:*

International Atomic Energy Agency. "Integrated Nuclear Fuel Cycle Information Systems." <https://infcis.iaea.org>. Accessed 06/08/2015.

Johnson, S.J., and M. Ehinger. 2010. "Designing and Operating for Safeguards: Lessons Learned From Rokkasho Reprocessing Plant (RRP)." Pacific Northwest National Laboratory Report 19626.
http://www.pnl.gov/main/publications/external/technical_reports/pnnl-19626.pdf. Accessed 06/25/2015.

Kroenig, Matthew. 2009. "Exporting the Bomb: Why States Provide Sensitive Nuclear Assistance." *American Political Science Review*. 103(1): 113-133.

McGoldrick, Fred. 2011. "Limiting Transfers of Enrichment and Reprocessing Technology: Issues, Constraints, Options." The Belfer Center.
<http://belfercenter.ksg.harvard.edu/files/MTA-NSG-report-color.pdf>. Accessed 06/25/2015. 10.

McMillan, M.J. and J.M. Silver. 1993. "Nuclear Developments in the Asia and Pacific Region." IAEA.
http://www.iaea.org/inis/collection/NCLCollectionStore/_Public/24/067/24067579.pdf. Accessed 11/16/2015.

Rokkasho Reprocessing Plant. "Frequently Asked Questions."
<http://www.kakujoho.net/e/RokFAQ.pdf>. Accessed 06/25/2015.

Sharon, Stephanie and Warren H. Donnelly. 1990. "Japan." In *International Nuclear Trade and Nonproliferation*. William C. Potter, Ed. Lexington, MA: Lexington Books. 217.

Shimbun, Asahi. 2012. "Outgoing NISA OK's Construction of Nuke Reprocessing Plant." The Asahi Shimbun, Asia and Japan Watch.

World Nuclear Association. "Nuclear Power in Japan."

<http://www.world-nuclear.org/info/inf79.html>. Accessed 06/25/2015.

World Nuclear News. 2009. "Rokkasho Reprocessing Plant Delayed Again."
http://www.world-nuclear-news.org/WR-Rokkasho_reprocessing_plant_delayed_again-0809094.html. Accessed 06/25/2015.

Zentner, M.D., G.L. Coles, and R.J. Talbert. 2005. "Nuclear Proliferation Technology Trends Analysis." Pacific Northwest National Laboratory. Report 14480, 102.

8. Rokkasho Uranium Enrichment Plant

- a. *ENR type (diffusion, centrifuge, EMIS, chemical and ion exchange, aerodynamic isotope separation, reprocessing).*

Uranium enrichment, centrifuge.

- b. *Facility size (laboratory, pilot, commercial).*

Commercial.

- c. *Is the facility under construction or in operation? If under construction, list the construction years. If in operation, list the years of operation.*

The facility was licensed for business in 1988, which is used as the construction start date. The facility has been in operation since 1992. The enrichment plant suspended operations from 2010-2011 for plant updates and resumed production in 2011. We code the interruption in production as a closing and restart.

- d. *Was the facility developed covertly? If so, identify years that facility was covert.*

No.

- e. *Was the facility placed under IAEA safeguards? If so, identify the years that the facility was safeguarded.*

Yes, the facility is under safeguards starting in 1992.

- f. *Was the facility placed under regional safeguards? If so, identify the years that the facility was under regional safeguards.*

No.

- g. *Did the facility have a military purpose?*

No.

h. Was the facility multinational? If so, identify the other countries that were involved.

No.

i. Was the facility built with foreign assistance? If so, list the supplier(s) and what they provided.

No, the World Nuclear Association states that the Rokkasho RE2A Centrifuge Plant was developed indigenously.

j. Sources:

Citizens' Nuclear Information Center. 2002. "Rokkasho Uranium Enrichment Plant Trial: An Unprecedented Verdict." *Nuke Info*. May/June (89).
<http://cnic.jp/english/newsletter/pdf/nit89.pdf>. Accessed 06/25/2015.

International Atomic Energy Agency. "Integrated Nuclear Fuel Cycle Information Systems." <https://infcis.iaea.org>. Accessed 06/08/2015.

Makhijani, Arjun, Lois Chalmers, and Brice Smith. 2004. "Uranium Enrichment: Just Plain Facts to Fuel an Informed Debate on Nuclear Proliferation and Nuclear Power." Institute for Energy and Environmental Research. Nuclear Policy Research Institute.

World Information Service on Energy (WISE) Project on Uranium. "JNFL Rokkasho-mura Uranium Enrichment Plant."
<http://www.wise-uranium.org/epasi.html#JNFLENR>. Accessed 06/25/2015.

World Nuclear Association. "Nuclear Power in Japan."
<http://www.world-nuclear.org/info/inf79.html>. Accessed 06/25/2015.

9. Tokai Test Facility

a. ENR type (ENR type (diffusion, centrifuge, EMIS, chemical and ion exchange, aerodynamic isotope separation, reprocessing)).

Uranium enrichment, laser (ALVIS).

b. Facility size (laboratory, pilot, commercial).

Laboratory.

c. Is the facility under construction or in operation? If under construction, list the construction years. If in operation, list the years of operation.

Construction of the laser enrichment experiments has not been identified. The

Tokai test facility began construction of other forms of reprocessing in 1971. The facility operated from 1987 to 2003.⁸

d. *Was the facility developed covertly? If so, identify years that facility was covert.*

No.

e. *Was the facility placed under IAEA safeguards? If so, identify the years that the facility was safeguarded.*

Yes, the facility was under safeguards from 1987 to 2003.

f. *Was the facility placed under regional safeguards? If so, identify the years that the facility was under regional safeguards.*

No.

g. *Did the facility have a military purpose?*

No.

h. *Was the facility multinational? If so, identify the other countries that were involved.*

No.

i. *Was the facility built with foreign assistance? If so, list the supplier(s) and what they provided.*

No

j. *Sources:*

Japan Atomic Energy Agency. "Brief History of JNC."

<http://www.jaea.go.jp/jnc/jncweb/01intro/history.html>. Accessed 06/25/2015.

Japan Atomic Energy Agency. "Nuclear Fuel Cycle Engineering Laboratories." _

<http://www.jaea.go.jp/english/04/tokai-cycle/01.htm>. Accessed 06/25/2015.

International Atomic Energy Agency. "Integrated Nuclear Fuel Cycle Information Systems." <https://infcis.iaea.org>. Accessed 06/08/2015.

Makhijani, Arjun, Lois Chalmers, and Brice Smith. 2004. "Uranium Enrichment: Just Plain Facts to Fuel an Informed Debate on Nuclear Proliferation and Nuclear

⁸ The 2003 date is from the IAEA while Makhijani et al. state 2005 as the *planned* operational end date. The Makhijani report states 2004 as closure date.

Power.” Institute for Energy and Environmental Research. Nuclear Policy Research Institute.

Shimpey, Shirayama, Takefumi Mikatsura, Hiroaki Ueda, and Chikara Konagai. 1990.

“Laser System For Isotope Separation.” SPIE.

http://proceedings.spiedigitallibrary.org/data/Conferences/SPIEP/41278/279_1.pdf. Accessed 06/25/2015.