

Nuclear Latency (NL) Dataset
Country Coding Sheets

UNITED KINGDOM
COW COUNTRY CODE: 200

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

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Detailed Facility-Specific Information and Sources

1. Capenhurst A-3

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

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 began construction in 1982 and was completed in 1987.¹ The facility operated from 1987 to 1993 producing HEU. Urenco commercially operated the enrichment facility from 1993 forward.

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

No, the facility was not developed covertly.

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

The facility was initially part of the nuclear weapons complex. After commercial production began in 1993, however, the facility was likely included on the list of eligible facilities per the UK's Voluntary Offer Agreement (VOA) with the IAEA.

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

Yes, the facility was under Euratom safeguards after 1993.

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

The facility was developed for military purposes and produced 20% HEU from 1987 to 1993. The facility was used for commercial production after 1993.

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

Yes, operations were transferred to Urenco in 1993.

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

Yes. The facility was constructed and began operations in the mid 1980s. Under the 1970 Almelo treaty the UK agreed to cooperate with Germany and the Netherlands "on the development of the gas centrifuge process for uranium enrichment and on the construction and operation of uranium enrichment facilities." The Capenhurst E-21 plant and following facilities at Capenhurst were built by Urenco.

j. *Sources:*

Friend, Peter. 2008. "Urenco's Views on International Safeguards Inspection." 8th International Conference on Facility Operations—Safeguards Interface. March 30-April 4, 2008. Portland, OR. <http://web.mit.edu/stgs/pdfs/Friend%20->

¹ The construction and operational dates are from Zentner et al. (2005). The IAEA lists 1972 but does not separate among the three enrichment facilities. The IAEA date probably refers to the transitions that occurred at the facility from diffusion to centrifuge. "British Nuclear Weapons" lists 1984-85 as start up.

[%20Urenco's%20Views%20on%20International%20Safeguards%20Inspection.pdf](#). Accessed 07/06/2015.

Forwood, Martin. 2008. “The Legacy of Reprocessing in the United Kingdom.” International Panel on Fissile Materials. Research Report #5. http://fissilematerials.org/library/2008/07/the_legacy_of_reprocessing_in_.html. Accessed 07/06/2015.

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Krass, Allan S., Peter Boskma, Boelie Elzen, and Wim A. Smit. 2008. *Uranium Enrichment and Nuclear Weapons Proliferation*. London, UK: Taylor & Francis Ltd. <http://books.sipri.org/files/books/SIPRI83Krass/SIPRI83Krass08.pdf>. Accessed 07/06/2015. 220.

Nuclear Weapons Archive. “Britain’s Nuclear Weapons: British Nuclear Facilities.” <http://nuclearweaponarchive.org/Uk/UKFacility.html>. Accessed 07/06/2015.

Oak Ridge National Laboratory. 2007. “Profile of World Enrichment Programs.” 7.

Sellafields Press Office. 2012. “Capenhurst Site Integration.” <http://www.sellafieldsites.com/press/capenhurst-site-integration/>. Accessed 07/06/2015.

World Nuclear News. 2010. “NDA May Transfer Capenhurst Site to Urenco.” http://www.world-nuclear-news.org/C-NDA_may_transfer_Capenhurst_site_to_Urenco-2910104.html. Accessed 07/07/2015.

Zentner, M.D., G.L. Coles, and R.J. Talbert. 2005. “Nuclear Proliferation Technology Trends Analysis.” Pacific Northwest National Laboratory. Report 14480. 30.

— 1992. “Urenco Gives Up Laser Project, Citing Commercialization Cost.” *Nuclear Fuel*. October 21.

2. Capenhurst (GD) (E-22)

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

Uranium enrichment, gaseous diffusion.

- 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 began construction in 1950 and was completed in 1952.² The facility ended operations in 1980 and was decommissioned in 1982. By May 1997 it was completely decommissioned.

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

Yes, the facility was part of the nuclear weapons program. The facility remained covert until 1962 when weapons specific enrichment ended.

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

Yes, this facility was under IAEA safeguards following the agreement on 14 August 1978. The Nuclear Safeguards and Electricity (Finance) Act 1978 provides the necessary authority for IAEA inspectors.

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

Yes, the European Atomic Energy Community (Euratom) Treaty required regional safeguards in January 1973 (Title II, Chapter 7).

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

The facility produced HEU from 1952-1962 and continued operation until 1982 producing LEU.

- 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:*

² The IAEA INFCIS lists the facility operation from 1953-1982. The 1953 date corresponds with the first production of LEU and HEU was first produced in 1954. The facility became operational in 1952, as confirmed by IPFM. In 1969 the facility switched production to LEU. Changes in international prices of fresh uranium in the early 1980's made gaseous diffusion enrichment uneconomical.

- Global Security. “Capenhurst.”
<http://www.globalsecurity.org/wmd/world/uk/capenhurst.htm>. Accessed 07/07/2016.
- International Atomic Energy Agency. “Integrated Nuclear Fuel Cycle Information Systems.” <https://infcis.iaea.org>. Accessed 06/08/2015.
- International Panel on Fissile Materials. “United Kingdom.”
http://fissilematerials.org/countries/united_kingdom.html. Accessed 07/07/2015.
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- Nuclear Weapons Archive. “Britain’s Nuclear Weapons: British Nuclear Facilities.”
<http://nuclearweaponarchive.org/Uk/UKFacility.html>. Accessed 07/06/2015.
- Oak Ridge National Laboratory. 2007. “Profile of World Enrichment Programs.” 7.
- Sellafields Press Office. 2012. “Capenhurst Site Integration.”
<http://www.sellafielddesites.com/press/capenhurst-site-integration/>. Accessed 07/06/2015.
- US Nuclear Regulatory Commission. 2002. “Foreign Trip Meeting Summary.” Memo to Martin J. Virgilio from Timothy C. Johnson. <http://www.nrc.gov/materials/fuel-cycle-fac/ml022100265.pdf>. Accessed 07/07/2015.
- World Nuclear News. 2010. “NDA May Transfer Capenhurst Site to Urenco.”
http://www.world-nuclear-news.org/C-NDA_may_transfer_Capenhurst_site_to_Urenco-2910104.html. Accessed 07/07/2015.
- Zentner, M.D., G.L. Coles, and R.J. Talbert. 2005. “Nuclear Proliferation Technology Trends Analysis.” Pacific Northwest National Laboratory. Report 14480. 30.

3. Capenhurst (Urenco)

- 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 construction start date could not be identified. The facility started operating in 1972 and continues to operate.

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

No, the facility was not developed covertly.

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

Yes, this facility was under IAEA safeguards following the agreement of 14 August 1978. The Nuclear Safeguards and Electricity (Finance) Act 1978 provides the necessary authority for IAEA inspectors.

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

Yes, the European Atomic Energy Community (Euratom) Treaty required regional safeguards in January 1973 (Title II, Chapter 7).

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

No.

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

Yes, the facilities are run by Urenco.

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

Yes. Under the 1970 Almelo treaty the UK agreed to cooperate with Germany and the Netherlands “on the development of the gas centrifuge process for uranium enrichment and on the construction and operation of uranium enrichment facilities.” Urenco built the Capenhurst E-21 plant and the following facilities at Capenhurst. The construction of the CG plant however was completed prior to the signing of the Almelo Treaty, and NDA and Sellafield operated it until 2012. While Urenco has operated the facility since 2012, it has not been in commission during that time.

- j. *Sources:*

Global Security. “Capenhurst.”

<http://www.globalsecurity.org/wmd/world/uk/capenhurst.htm>. Accessed 07/07/2016.

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

International Panel on Fissile Materials. “United Kingdom.” http://fissilematerials.org/countries/united_kingdom.html. Accessed 07/07/2015.

Krass, Allan S., Peter Boskma, Boelie Elzen, and Wim A. Smit. 2008. *Uranium Enrichment and Nuclear Weapons Proliferation*. London, UK: Taylor & Francis Ltd. <http://books.sipri.org/files/books/SIPRI83Krass/SIPRI83Krass08.pdf>. Accessed 07/06/2015. 220.

Nuclear Weapons Archive. “Britain’s Nuclear Weapons: British Nuclear Facilities.” <http://nuclearweaponarchive.org/Uk/UKFacility.html>. Accessed 07/06/2015.

Oak Ridge National Laboratory. 2007. “Profile of World Enrichment Programs.” 7.

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World Nuclear News. 2010. “NDA May Transfer Capenhurst Site to Urenco.” http://www.world-nuclear-news.org/C-NDA_may_transfer_Capenhurst_site_to_Urenco-2910104.html. Accessed 07/07/2015.

Zentner, M.D., G.L. Coles, and R.J. Talbert. 2005. “Nuclear Proliferation Technology Trends Analysis.” Pacific Northwest National Laboratory. Report 14480. 30.

4. Capenhurst (E-21)

- 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 started in 1976 and was completed in 1980. The facility operated until 1991.

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

No, the facility was not developed covertly.

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

Yes, this facility was under IAEA safeguards following an agreement on 14 August 1978. The Nuclear Safeguards and Electricity (Finance) Act 1978 provides the necessary authority for IAEA inspectors.

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

Yes, the European Atomic Energy Community (Euratom) Treaty required regional safeguards in January 1973 (Title II, Chapter 7).

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

No.

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

Yes, the facility is run by Urenco.

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

Yes. Under the 1970 Almelo treaty the UK agreed to cooperate with Germany and the Netherlands “on the development of the gas centrifuge process for uranium enrichment and on the construction and operation of uranium enrichment facilities.” Urenco built the Capenhurst E-21 plant and the following facilities at Capenhurst. The construction of the CG plant however was completed prior to the signing of the Almelo Treaty, and NDA and Sellafield operated it until 2012. While Urenco has operated the facility since 2012, it has not been in commission during that time.

j. *Sources:*

Global Security. “Capenhurst.”

<http://www.globalsecurity.org/wmd/world/uk/capenhurst.htm>. Accessed 07/07/2016.

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

- International Panel on Fissile Materials. "United Kingdom."
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- Krass, Allan S., Peter Boskma, Boelie Elzen, and Wim A. Smit. 2008. *Uranium Enrichment and Nuclear Weapons Proliferation*. London, UK: Taylor & Francis Ltd. <http://books.sipri.org/files/books/SIPRI83Krass/SIPRI83Krass08.pdf>. Accessed 07/06/2015. 220.
- Makhijani, Arjun, Lois Chalmers, and Brice Smith. 2004. "Uranium Enrichment: Just Plain Facts to Fuel and Informed Debate on Nuclear Proliferation and Nuclear Power." Nuclear Policy Research Institute.
- Nuclear Weapons Archive. "Britain's Nuclear Weapons: British Nuclear Facilities."
<http://nuclearweaponarchive.org/Uk/UKFacility.html>. Accessed 07/06/2015.
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- US Nuclear Regulatory Commission. 2002. "Foreign Trip Meeting Summary." Memo to Martin J. Virgilio from Timothy C. Johnson. <http://www.nrc.gov/materials/fuel-cycle-fac/ml022100265.pdf>. Accessed 07/07/2015.
- World Nuclear News. 2010. "NDA May Transfer Capenhurst Site to Urenco."
http://www.world-nuclear-news.org/C-NDA_may_transfer_Capenhurst_site_to_Urenco-2910104.html. Accessed 07/07/2015.
- Zentner, M.D., G.L. Coles, and R.J. Talbert. 2005. "Nuclear Proliferation Technology Trends Analysis." Pacific Northwest National Laboratory. Report 14480. 30.

5. Capenhurst (E-23)

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

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 date on which construction began is unknown, but the plant was under construction in 1986. Construction reportedly stalled due to lack of adequate rate of return, but latter resumed. Operations began in 1997 and reportedly continued through 2012.

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

No, the facility was not developed covertly.

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

Yes, this facility was under IAEA safeguards following the agreement of 14 August 1978. The Nuclear Safeguards and Electricity (Finance) Act 1978 provides necessary authority for IAEA inspectors.

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

Yes, the European Atomic Energy Community (Euratom) Treaty required regional safeguards in January 1973 (Title II, Chapter 7).

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

No.

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

Yes, the facility is run by Urenco.

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

Yes. The facility began operating in 1997. Under the 1970 Almelo treaty the UK agreed to cooperate with Germany and the Netherlands “On the development of the gas centrifuge process for uranium enrichment and on the construction and operation of uranium enrichment facilities.” Urenco built the Capenhurst E-21 plant and all subsequent facilities at Capenhurst under this treaty.

- j. *Sources:*

Kemp, R. Scott. 2010. “Research Note: Source Terms for Routine UF₆ Emissions.” *Science and Global Security*. 18: 119-125
<http://scienceandglobalsecurity.org/archive/sgs18kemp.pdf>. Accessed 07/07/2015.

Krass, Allan S., Peter Boskma, Boelie Elzen, and Wim A. Smit. 2008. *Uranium Enrichment and Nuclear Weapons Proliferation*. London, UK: Taylor & Francis Ltd. <http://books.sipri.org/files/books/SIPRI83Krass/SIPRI83Krass08.pdf>. Accessed 07/06/2015. 220.

Oak Ridge National Laboratory. 2007. "Profile of World Uranium Enrichment Programs." 7.

Nuclear Weapons Archive. "Britain's Nuclear Weapons: British Nuclear Facilities." <http://nuclearweaponarchive.org/Uk/UKFacility.html>. Accessed 07/06/2015.

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—. 1986. "Domesday Reloaded." *BBC News*. <http://www.bbc.co.uk/history/domesday/dblock/GB-336000-372000/page/2>. Accessed 11/15/2015.

6. Dounreay Reprocessing Facility

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

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.*

The site was built in 1957 and operated from 1958-1996. The facility was decommissioned in 2000.³

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

No, the facility was not developed covertly. In addition to the reprocessing facility the complex also housed a research reactor and fuel processing facilities.

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

Yes, IAEA safeguards could have been implemented from 1978 to the present. The facility operated without IAEA safeguards from 1959-1978.

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

Yes, the European Atomic Energy Community (Euratom) Treaty required regional safeguards as of January 1973 (Title II, Chapter 7).

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

The evidence suggests that the facility was not used for military purposes.

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 nuclear assistance found.

j. *Sources:*

Baghdjian, Victoria. 2012. "UK Strong on Decommissioning, But Front End Said to Need Funds." *Nucleonic Weeks*. 53(28).

Dounreay. "Dounreay Site Restoration Limited: Research Reactor Fuel Reprocessing Plant." <http://www.dounreay.com/decommissioning/fuel-cycle-area/research-reactor-fuel-reprocessing-plant>. Accessed 07/07/2015.

Dounreay. "Timeline." <http://www.dounreay.com/particle-cleanup/timeline>. Accessed 07/07/2015.

³ The construction and operational dates are from the Dounreay site website. Zetner et al. (2005) state 1960 for the operational date.

Marshall, Pearl. 2001. "UK Rules Out Reprocessing at Dounreay." *Nuclear Fuel* 26(15): 15.

US Nuclear Regulatory Commission. 2008. "Background, Status, and Issues Related to the Regulation of Advanced Spent Nuclear Fuel Recycle Facilities."
<http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1909/sr1909.pdf>.

7. NDA B205 Magnox Reprocessing

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

Spent fuel reprocessing (Purex).

- 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 construction start year could not be identified. The facility began operation in 1964⁴ with a projected closure date of 2018. The closure date is based on the volume of remaining contracted fuel reprocessing. The facility was originally outlined to close in 2012 but inefficiencies and other problems at the facility decreased production. Productivity peaked in the early 1990s, prior to the Government's 1995 announcement regarding the end of military reprocessing.

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

No, the facility was not developed covertly.

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

Yes, this facility was under IAEA safeguards following the agreement of 14 August 1978. The Nuclear Safeguards and Electricity (Finance) Act 1978 provides the necessary authority for IAEA inspectors, but it is unclear how this facility is covered by the agreement since it undertook military activities. Specific years of coverage were not found.

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

⁴ The operational date is provided by the NFCIS and Forwood.

Maybe. The European Atomic Energy Community (Euratom) Treaty requires regional safeguards on all civilian activities. However, the facility has alternated between military and civilian uses throughout the years.

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

The facility was used for both military and civilian reprocessing. The military facility reprocessed fuel from Sellafield's Calder Hall reactors and the sister reactors at Chapelcross in Scotland. The civilian program used fuel from the UK's other power stations and from Italy's Latina and Japan's Tokai Magnox reactors.

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

The facility was built by the UK but established contracts with numerous countries for reprocessing. The facility had contracts for reprocessing with Germany, Italy Japan and others countries.

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

No, the facility was built with indigenous technology and capability. The plant was built and run by the UKAEA. In 1971 BNFL took over as the site operator.

j. *Sources:*

Bellona. "Magnox Reprocessing Plant." <http://archive.today/hxcTn>. Accessed 07/07/2015.

Cooke, Stephanie. 1986. "BNFL Shuts Magnox Reprocessing Plant." *Nuclear Fuel*. 11(7): 8.

Forwood, Martin. 2008. "The Legacy of Reprocessing in the United Kingdom." International Panel on Fissile Materials. Research Report #5. http://fissilematerials.org/library/2008/07/the_legacy_of_reprocessing_in_.html. Accessed 07/06/2015.

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

Irving, Alan. 2011. "Worker off Sick—So Magnox Has to Shut." *The Whitehaven News*. June 9. <http://www.whitehavennews.co.uk/news/worker-off-sick-so-magnox-has-to-shut-1.845573?referrerPath=home>. Accessed 07/07/2015.

MacKerron, Gordon. 2012. University of Sussex. "Reprocessing in the UK: Why Adopted and Why Soon to Be Abandoned?" http://kakujoho.net/npp/jReproc_GM201205.pdf. Accessed 07/07/2015.

Marshall, Pearl. 2008. "Magnox Decommissioning May Take Longer than Anticipated, NDA Says." *Nucleonics Week*. 49(1): 9.

Phillips, Chris and Andrew Milliken. 2000. "Reprocessing as a Waste Management and Fuel Reprocessing Option: Experience at Sellafield in the UK." WM'00 Conference, February 27-March 2.
<http://www.wmsym.org/archives/2000/pdf/16/16-4.pdf>. Accessed 07/07/2015.

8. NDA B205 Plutonium Operating Corridors

- 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 construction year could not be identified. The facility began operations in 1964 and was closed in 1968.

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

No, the facility was not developed covertly.

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

No, the facility was closed prior to the initiation of IAEA agreements.

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

No, the facility was closed prior to the Euratom agreements.

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

Potentially. The facility reprocessed spent fuel for plutonium that may have been used for the military stockpile.

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

No, the facility was built entirely by the UK.

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

No.

j. Sources:

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

9. NDA B206 Solvent Regeneration Plant

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.

Construction start year could not be identified. The facility operated from 1952 – 1963.

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

No, the facility was not developed covertly.

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

No, the facility was closed prior to IAEA agreements.

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

No, the UK did not sign agreements with Euratom until 1973.

g. Did the facility have a military purpose?

Given the location (Sellafield), the facility was potentially used for military reprocessing.

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

No evidence of foreign assistance found, and unlikely given sensitive nature of Sellafield.

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

No.

- j. Sources:*

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

Nuclear Decommissioning Authority. "Sellafield Plan." http://www.sellafieldsites.com/publications/sellafieldplan/Sellafield_Plan.pdf. Accessed 07/07/2015.

10. NDA B207 Uranium Purification Plant

- 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 construction dates could not be identified. The facility operated from 1952 – 1973.

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

No, the facility was not developed covertly.

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

No, the facility was closed prior to the IAEA safeguard acceptance.

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

No, the facility was used for military purposes and not subject to the European Atomic Energy Community (Euratom) Treaty.

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

Yes, the facility was designed for national defense.

- 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, and very unlikely given sensitive nature of Sellafield.

- j. *Sources:*

Croff, A.G., R.G. Wymer, L.L. Tavlarides, J.H. Flack, H.G. Larson. 2008. "Background, Status, and Issues Related to the Regulation of Advanced Spent Nuclear Fuel Recycle Facilities. US NRC NUREG-1909.

<http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1909/sr1909.pdf>.

Davis, M.W. "A Review of the Situation of Decommissioning of Nuclear Installations in Europe." *Nuclear Science and Technology*. Report Eur17622.

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

NucNews. 2006. "Nuclear Accidents and Safety: Radioactive Goat Mystery in Connecticut." <http://nucnews.net/nucnews/2006nn/0603nn/060329nn.txt>.

11. NDA B203 Pu Residues Recovery Plant at Sellafield

- 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.*

Construction of the facility began around 1951.⁵ The facility was in operation from 1954 – 1987.⁶

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

No, this facility was designed to reprocess commercial non-LWR fuel using the Purex process.

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

Yes, this facility was under IAEA safeguards following the agreement of 14 August 1978. The Nuclear Safeguards and Electricity (Finance) Act 1978 provides the necessary authority for IAEA inspectors.⁷ It is likely the facility was not under any safeguards from 1956 to 1978.

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

Yes, European Atomic Energy Community (Euratom) Treaty required regional safeguards in January 1973.

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

No, the facility was designed for commercial reprocessing.

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

⁵ The 1951 date is an estimate of the construction start date. The Windscale Pile was not operational until 1951 and the B203 reprocessing plant was designed to reprocess its spent fuel. The NDA “Sellafield Plan” states construction of first generation reprocessing facilities began in the early 1950’s. An earlier construction date is possible after 1947. Webb et al. describe construction efforts in 1947 to include only one reprocessing facility, likely to be B204.

⁶ The 1998 European Parliament report lists the closure date of 1986 but the IAEA NFCIS date is used.
<http://www.europarl.europa.eu/sides/getDoc.do?type=REPORT&mode=XML&reference=A4-1998-0354&language=EN>

⁷ The HSE report states the following concerning UK safeguards and the UK: “In the case of the UK the basic undertaking in the tripartite UK/Euratom/IAEA safeguards agreement (INFCIRC/263) is the UK’s acceptance of the application of IAEA safeguards “on all source or special fissionable material in facilities or parts thereof within the United Kingdom, subject to exclusions for national security reasons only.” (29).

No evidence was found to suggest the facility was built with international assistance.

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

No evidence of foreign nuclear assistance found.

- j. *Sources:*

Campbell, J.B. "Decommissioning of the B203 Plant At BNFL Sellafield." <http://www.wmsym.org/archives/1998/html/sess31/31-03/31-03.htm>. Accessed 07/07/2015.

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

London, Marshall. 1993. "BNFL to Spend by 2005 Over \$500-Million on Sellafield Decommissioning Projects." *Nuclear Fuel*. 18(8): 11.

Madslie, Jorn. 2006. "Investors and Firms Eye Nuclear Future." *BBC News Online*. Wednesday March 26, 2006. <http://news.bbc.co.uk/2/hi/business/4818370.stm>. Accessed 07/07/2015.

Nuclear Decommissioning Authority. "Annual Plan 2005/06." http://www.nda.gov.uk/documents/upload/annual_plan_0506.pdf.

Nuclear Decommissioning Authority. "Sellafield Plan." http://www.sellafieldsites.com/publications/sellafieldplan/Sellafield_Plan.pdf. Accessed 07/07/2015.

Webb, G.A.M., R.W. Anderson and M.J.S. Gaffney. 2006. "Classification of Events with an Off-Site Radiological Impact at the Sellafield Site Between 1950 and 2000, using the International Nuclear Event Scale." *Journal of Radiological Protection*. 26: 33-49.

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

12. B204 Reprocessing Plant at Sellafield

- 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.*

This was the UK's first reprocessing plant. Construction of the facility probably began in 1947.⁸ The facility operated from 1952-1964 and 1969-1972 (as a pre-treatment plant for B205).⁹ The facility had only limited capability and following a serious 'blow-back' accident in 1973 it was permanently closed. There was also an accident in 1971 that released radiation in to the facility.

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

Yes, the facility was built covertly. Details of the facility became publicly available in 1964.

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

This was a military plant and ceased operation prior to the UK's VOA with the IAEA.

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

The Euratom Treaty requires regional safeguards on all civilian plants as of January 1973. However, this was not a civilian plant and it ceased operation prior to 1973.

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

Yes, the facility was built for the UK defense program.

- 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. This was the first reprocessing plant in the UK and it was run by the military.

- j. *Sources:*

⁸ Webb, Anderson and Gaffney (2006) state that construction at Sellafield's reprocessing plant began in 1947. However, they are not definitive about which reprocessing plant this refers to.

⁹ The operational dates are from NFCIS and are supported by Forwood. The facility operated from 1969 to 1972 as a pre-handling plant for B205.

Bellona. "Reprocessing Plant B204." <http://archive.today/4IxGH#selection-621.118-631.93>. Accessed 07/07/2015.

Bellona. Untitled report. <http://bellona.org/content/uploads/sites/3/Sellaengweb.pdf>. Accessed 12/28/2015.

Croff, A.G., R.G. Wymer, L.L. Tavlarides, J.H. Flack, H.G. Larson. 2008. "Background, Status, and Issues Related to the Regulation of Advanced Spent Nuclear Fuel Recycle Facilities. US NRC NUREG-1909. <http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1909/sr1909.pdf>.

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

Nuclear Decommissioning Authority. "Sellafield Plan." http://www.sellafielddesites.com/publications/sellafieldplan/Sellafield_Plan.pdf. Accessed 07/07/2015.

Webb, G.A.M., R.W. Anderson and M.J.S. Gaffney. 2006. "Classification of Events with an Off-Site Radiological Impact at the Sellafield Site Between 1950 and 2000, using the International Nuclear Event Scale." *Journal of Radiological Protection*. 26: 33-49.

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

13. NDA B205 – Magnox Reprocessing Pilot Plant

- 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 of the facility began around 1956.¹⁰ The facility was in operation from 1957-1968.¹¹

¹⁰ The 1956 date is based on when the first Magnox reactors went online at Sellafield.

¹¹ The IAEA INFIC lists the start date as 1956. The date provided comes from a report by the European Parliament on closed nuclear facilities.

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

No, this was a commercial facility.

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

No, the facility was closed prior to IAEA agreements.

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

No, the facility was closed prior to Euratom agreements.

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

No, the facility was civilian.¹²

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

The facility was built by UK but numerous countries established contracts at the facility for reprocessing.

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

No, the plant was built and run by the UKAEA. In 1971 BNFL took over as the site operator.

j. *Sources:*

Bellona. "Magnox Reprocessing Plant." <http://archive.today/hxcTn>. Accessed 07/07/2015.

Chichester, Giles. 1998. "Report on the Decommissioning of Nuclear Power Stations and Other Nuclear Installations."
<http://www.europarl.europa.eu/sides/getDoc.do?type=REPORT&mode=XML&reference=A4-1998-0354&language=EN>. Accessed 07/07/2015.

Forwood, Martin. 2008. "The Legacy of Reprocessing in the United Kingdom."
International Panel on Fissile Materials. Research Report #5.
http://fissilematerials.org/library/2008/07/the_legacy_of_reprocessing_in_.html.
Accessed 07/06/2015.

¹² While most sources describe this as a civilian facility, Bellona claim some military fuel was reprocessed here.

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

MacKerron, Gordon. 2012. University of Sussex. “Reprocessing in the UK: Why Adopted and Why Soon to Be Abandoned?” http://kakujo.net/npp/jReproc_GM201205.pdf. Accessed 07/07/2015.

Phillips, Chris and Andrew Milliken. 2000. “Reprocessing as a Waste Management and Fuel Reprocessing Option: Experience at Sellafield in the UK.” WM’00 Conference, February 27-March 2. <http://www.wmsym.org/archives/2000/pdf/16/16-4.pdf>. Accessed 07/07/2015.

14. NDA Reprocessing Plant MTR

- 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.*

Construction of the facility began in the 1950’s.¹³ The facility operated from 1958-1998.

- 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.*

No, the facility was military in nature and not subject to safeguards.

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

No, the European Atomic Energy Community (Euratom) Treaty does not apply to military facilities.

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

¹³ The NDA “Sellafield Plan” states construction of first generation reprocessing facilities began in the early 1950’s.

Yes, the facility had a military purpose.

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:

Croff, A.G., R.G. Wymer, L.L. Tavlarides, J.H. Flack, H.G. Larson. 2008. "Background, Status, and Issues Related to the Regulation of Advanced Spent Nuclear Fuel Recycle Facilities. US NRC NUREG-1909.
<http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1909/sr1909.pdf>.

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

Nuclear Decommissioning Authority. "Sellafield Plan."
http://www.sellafieldsites.com/publications/sellafieldplan/Sellafield_Plan.pdf.
Accessed 07/07/2015.

15. NDA Thorp

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.

Construction of the facility began in 1985. It became operational in 1994.¹⁴
Reprocessing operations are expected to end in 2018, though industry experts doubt that date due to continued inability to hit reprocessing targets.

¹⁴ Sellafield Plan and Forwood (2008, 3) provide these dates. Other sources including a presentation by Dr. Gordon MacKerron state the facility was completed in 1992 and commissioned in 1991.

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

No, the facility is commercial and well known.

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

Yes, the facility is under partial IAEA safeguards.

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

Yes, the European Atomic Energy Community (Euroatom) Treaty requires regional safeguards.

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

No, the facility can be used for reprocessing of British fuel for nuclear purposes. It is unclear if any military reprocessing has occurred at this facility, however.

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 facility was indigenously developed despite its reliance on foreign funding. A number of international customers helped with the construction costs with Japanese utilities being especially important.

j. *Sources:*

Forwood, Martin. 2008. "The Legacy of Reprocessing in the United Kingdom."

International Panel on Fissile Materials. Research Report #5.

http://fissilematerials.org/library/2008/07/the_legacy_of_reprocessing_in_.html.

Accessed 07/06/2015.

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

Jones, Peter and David Pearce. 1981. "The Economics of Nuclear Fuel Reprocessing: A Case Study of the THORP Plant." *Energy Economics*. 3(4): 202-218.

MacKerron, Gordon. 2012. University of Sussex. "Reprocessing in the UK: Why Adopted and Why Soon to Be Abandoned?" http://kakujo.net/npp/jReproc_GM201205.pdf. Accessed 07/07/2015.

Nuclear Decommissioning Authority. "Sellafield Plan." http://www.sellafielddesites.com/publications/sellafieldplan/Sellafield_Plan.pdf. Accessed 07/07/2015.

Phillips, C. "Uranium—Plutonium Partitioning by Pulsed Column in the First Cycle of the Thermal Oxide Reprocessing Plant." <http://www.wmsym.org/archives/1992/V2/12.pdf>. Accessed 07/07/2015.

Phillips, Chris and Andrew Milliken. 2000. "Reprocessing as a Waste Management and Fuel Reprocessing Option: Experience at Sellafield in the UK." WM'00 Conference, February 27-March 2. <http://www.wmsym.org/archives/2000/pdf/16/16-4.pdf>. Accessed 07/07/2015.

"UK Confirms Plans To Close Thorp Reprocessing Plant." *Waste Management*. 6 July 2012. <http://www.nucnet.org/all-the-news/2012/06/07/uk-confirms-plans-to-close-thorp-reprocessing-plant>. Accessed 07/07/2015.

United Nations Conference on Disarmament. "Weapons-Material Production and Select Civil Facilities in Target Countries." http://www.princeton.edu/sgs/publications/sgs/pdf/5_1occasional.pdf.

16. MOX Demonstration Facility

- 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 start year could not be identified. The facility operated from 1993 to 2000.

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

No, the facility was not developed covertly.

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

Yes, this facility was under IAEA safeguards.

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

Yes, the European Atomic Energy Community (Euratom) Treaty requires regional safeguards.

- 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 nuclear assistance found.

- j. *Sources:*

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

17. NDA Reprocessing Plant (Mox)

- 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.*

Construction start year could not be identified. The facility operated from 1980 to 1998. It is currently on stand-by.

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

No, the facility was not developed covertly.

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

Yes, this facility was under IAEA safeguards.

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

Yes, the European Atomic Energy Community (Euratom) Treaty requires regional safeguards.

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 nuclear assistance found.

j. *Sources:*

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

18. NDA Thorp Miniature Pilot Plant (TMPP)

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

Spent fuel reprocessing plant.

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.*

This facility has been decommissioned. We were unable to determine when construction began or the dates of operation.

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

No, the facility was not developed covertly.

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

Yes, the facility was under IAEA safeguards.

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

Yes, the facility was under Euratom safeguards.

g. Did the facility have a military purpose?

No, the facility was part of the civilian program.

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

No, the facility was built indigenously.

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 facility was housed in 'legacy buildings' close to other sensitive areas of the Sellafield site.

j. Sources:

Albright, David. 2007. "Shipments of Weapons-Usable Plutonium in the Commercial Nuclear Industry." Institute for Science and International Security.
http://isis-online.org/uploads/isis-reports/documents/plutonium_shipments.pdf.
Accessed 07/07/2015.

Croff, A.G., R.G. Wymer, L.L. Tavlarides, J.H. Flack, H.G. Larson. 2008. "Background, Status, and Issues Related to the Regulation of Advanced Spent Nuclear Fuel Recycle Facilities. US NRC NUREG-1909.
<http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1909/sr1909.pdf>.

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

Masood, Ehsan. 1998. "UK's Dounreay Reprocessing Plant to Shut." <http://www.nature.com/nature/journal/v393/n6685/full/393503a0.html>. Accessed 07/07/2015.

N-Base. "Briefing 199." http://www.n-base.org.uk/public/briefing/06_07/brief499.htm. Accessed 07/07/2015.

Nuclear Weapon Archive. "British Nuclear Facilities." <http://nuclearweaponarchive.org/Uk/UKFacility.html>. Accessed 07/07/2015.

Sellafield Ltd. "The Plan." <http://www.sellafieldsites.com/solution/risk-hazard-reduction/first-generation-reprocessing-plants/the-plan/>. Accessed 07/07/2015.

19. Urenco MLIS Laser Enrichment Facility

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

Uranium enrichment, laser.

- 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 year could not be identified. The facility operated from 1983-1994.

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

No, the facility was not developed covertly.

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

Yes, IAEA safeguards would have been applicable in 1983.

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

Yes, Euratom safeguards have been applicable since 1983.

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

The facility did not have a military purpose.

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

Yes, the facility was owned and operated by Urenco.

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

Yes, Urenco built and operated the facility. The German partner, Uranit GmbH, actually announced the closure for the facility, which was operated by Urenco.

j. Sources:

Hibbs, Mark. 1988. "Late Funding Effort May Save German Enrichment Project." *Nuclear Fuel*. 13(21): 3.

Hibbs, Mark. 1992. "Urenco Gives up Laser Project, Citing Commercialization Cost." *Nuclear Fuel*. 17(21): 3.

Zentner, M.D., G.L. Coles, and R.J. Talbert. 2005. "Nuclear Proliferation Technology Trends Analysis." Pacific Northwest National Laboratory. Report 14480. 30.

20. NDA Sellafield North Group Facilities

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

Reprocessing. This was a plant to recover highly enriched uranium from spent nuclear fuel.

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.

Construction year could not be identified. The facility operated from 1953 to 1985.

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

Little information about this facility is available beyond the IAEA's INFCIS. We are unsure whether the plant was developed covertly.

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

Little information about this facility is available beyond the IAEA's INFCIS. We are unsure whether the plant was under safeguards.

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

Little information about this facility is available beyond the IAEA's INFCIS. We are unsure whether the plant was under safeguards.

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

Little information about this facility is available beyond the IAEA's INFCIS. We are unsure whether the plant had a military purpose, although it seems likely that it did.

- 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.*

There is no evidence one way or the other.

- j. Sources:*

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

Additional Notes:

- There is potentially an additional pilot enrichment facility. There was a Urenco report outlining pilot plant construction in the Netherlands and the UK. Future research needs to establish if this facility is different from any of the facilities listed. The time profile of the facility in the Urenco Report does not match any current enrichment facilities listed.

Additional Facility (Does not enter dataset):

AWE Aldermaston Uranium Enrichment Facility

- a. ENR type (Enrichment or reprocessing? If enrichment, what type?).*

Enrichment.

- 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 start year could not be identified. Operational start year could not be identified and while it operated in 2013, it is not possible to verify if it operated in prior years. The facility will not be included until further evidence is found that it operated during the dataset time period.

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

Yes, the facility remained covert until 2013. The AWE Aldermaston is well known as a weapons assembly complex. The nuclear enrichment was not discovered until the lab closed.

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

No, the facility was initially part of the weapons complex. After commercial production began in 1993 the facility is considered as being under IAEA 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?*

Yes, the facility was developed for military purposes and testing of advanced enrichment technology.

- 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 was found of foreign assistance and the high degree of secrecy further reduces the likelihood of foreign assistance.

- j. *Sources:*

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