

Nuclear Latency (NL) Dataset
Country Coding Sheets

LIBYA

COW COUNTRY CODE: 620

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

1. Al Hashan Enrichment Facility
2. Plutonium Separation Facility at Tajura Nuclear Research Center
3. Tajoura Enrichment Facility

Detailed Facility-Specific Information and Sources

1. Al Hashan Enrichment Facility

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

Enrichment, centrifuge.

- 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.*

The operational start date coincides with the successful centrifuge test in 2000. Three additional cascades were installed around 2002. Note, however, that Libya was unable to enrich uranium at this plant. According to Libya's declaration to the IAEA, it dismantled centrifuge equipment at al Hashan in April 2002 and moved it to another site (al Fallah) where everything reportedly remained in storage (see: <https://fas.org/nuke/guide/libya/iaea0204.pdf>).

It is unclear whether UF₆ was ever introduced at this site. The IAEA discovered LEU and HEU contamination on the floor of the building, but these materials could have originated in Pakistan. Libya denies that it introduced UF₆ at this site.

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

Libya's enrichment activity was covert from 1995 until December 2003 when Libya publicly announced its program.

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

The Agency did not safeguard this plant while it operated. However, IAEA inspectors visited numerous weapon-related facilities in Libya in 2003. Most of Libya's materials and technology were transported to Oak Ridge National Laboratory for secure storage. Libya signed the Additional Protocol with the IAEA in March 2004.

- 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 enrichment program was part of the secret military project. The centrifuge technology was covertly developed.

- 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. In the late 1990's and early 2000's Libya acquired 20 L-1 (P-1) centrifuges as well as component parts for L-1 and L-2 (P-2) centrifuges and two completed L-2 centrifuges from the AQ Khan network. It is known that at least one of the pre-assembled rotors was used in the installation of a centrifuge at the al Hashan site. These centrifuges and parts were mostly manufactured in Malaysia, in a factory under the direction of AQ Khan affiliates. It is believed the network also supplied UF₆, nuclear weapons designs, precision machine tools, materials, and training. It is also thought that the AQ Khan network may have provided centrifuge rotor assemblies as early as 1991.

- j. *Sources:*

Beatty, Bret and Evan Harms. 2010. "The Pursuit of Nuclear Proliferation Activities in Libya: A Case Study." http://www.ne.ncsu.edu/faculty/yim/documents/NE591-S2010/Report/Libya_rep.pdf.

International Atomic Energy Agency. "Implementation of the NPT Safeguards Agreement in the Socialist People's Libyan Arab Jamahiriya." Report by the Director General of the International Atomic Energy Agency. <http://www.fas.org/nuke/guide/libya/iaea0804.pdf>. Accessed 06/29/2015

Langewiesche, William. 2007. *The Atomic Bazaar: The Rise of the Nuclear Poor*. New York City, NY: Farrar, Straus and Giroux.

Laughter, M.D. 2009. "Profile of World Enrichment Programs—2009." Oak Ridge National Laboratory.

Montgomery, Alexander H. 2005. "Ringing in Proliferation: How to Dismantle an Atomic Bomb Network." *International Security*. 30(2): 153-87.

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

2. Plutonium Separation Facility at Tajura Nuclear Research Center

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

Reprocessing.

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

Laboratory (probably a basic hot cell, as it only separated gram amounts of plutonium).

- 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 operated for the purposes of plutonium extraction from 1984 to potentially 2003 (Chipman 2008). We were unable to identify the precise date on which construction began.

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

Yes, the IAEA was unaware of the experiments until investigations took place in 2004. While the facility was not developed covertly, the production of plutonium was done in secret. The radiochemical lab and the associated hot cells were designed for medical radioisotope production. The facility was also used for undeclared plutonium separation experiments.

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

Parts of the TNRC were under IAEA safeguards. It does not appear, however, that the buildings housing the reprocessing plant were safeguarded. Full knowledge of the facility and its operation were not known until late 2003 or early 2004 after the discovery of the AQ Khan Network. Libya signed the Additional Protocol with the IAEA in March 2004.

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 portion of the Tajura facility used for plutonium was designed only for military purposes. The amount of potential plutonium for extraction was small 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.*

The TNRC was established in 1982 with assistance from the USSR, though it is unclear exactly how much the Soviets assisted in the reprocessing work at Tajoura. It is unlikely Libya would have been able to completely indigenously construct and operate the facility, and the center itself is described as “Soviet supplied” in a US intelligence report. It is also described as a “turnkey facility” though it is unclear if this refers to the entire center or more specifically to the reprocessing facilities at Tajoura. The same report also makes note of Libyan requests for assistance from other countries including Belgium, West Germany, India, Finland, and Brazil. Apparently some assistance was provided from Belgium and Finland, though it is not certain this assistance would have related to enrichment or reprocessing activities.

j. *Sources:*

Global Security. “Libyan Nuclear Weapons.”

<http://www.globalsecurity.org/wmd/world/libya/nuclear.htm>. Accessed 06/29/2015.

Huband, Mark. 2004. “Libya Had Diverse Nuclear Weapons Programme.”

<http://www.thefreelibrary.com/ARABS-UN+-+Feb.+20+-+Libya+Had+Diverse+Nuclear+Weapons+Programme.-a0113702831>. Accessed 06/29/2015.

International Atomic Energy Agency. “Implementation of the NPT Safeguards Agreement in the Socialist People’s Libyan Arab Jamahiriya.” Report by the Director General of the International Atomic Energy Agency.

<http://www.fas.org/nuke/guide/libya/iaea0804.pdf>. Accessed 06/29/2015

Nuclear Threat Initiative. 2011. “Libya Nuclear Chronology.”

http://www.nti.org/media/pdfs/libya_nuclear.pdf?_id=1316466791. Accessed 06/29/2015.

US CIA. 1985. "The Libyan Nuclear Program: A Technical Perspective." Directorate of Intelligence.

<http://nsarchive.gwu.edu/nukevault/ebb423/docs/10.%20libya%201985.pdf>. Accessed 11/10/15.

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

3. Tajoura Enrichment Facility

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

Enrichment, centrifuge.

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

Laboratory.

- c. *Is the facility under construction or in operation? List the construction and operation years.*

Construction began in late 1977, though the building interiors were not finished until late 1981. Enrichment experiments were conducted between 1982 and 1992, with little success. It is unclear whether UF₆ was ever introduced into the centrifuges. Libya later ramped up its enrichment program, but did so outside of Tajoura to avoid detection by the IAEA.

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

Yes, the facility was developed covertly from 1984 to the 2003. The international community strongly suspected that Libya was pursuing nuclear enrichment.

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

Parts of the TNRC were under IAEA safeguards. It does not appear, however, that the buildings housing the enrichment program were safeguarded.

- 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 part of Libya's nuclear weapons 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.*

The initial centrifuge experiments involved a German flight engineer who had smuggled centrifuge technology to Libya.

j. *Sources:*

Beatty, Bret and Evan Harms. 2010. "The Pursuit of Nuclear Proliferation Activities in Libya: A Case Study." http://www.ne.ncsu.edu/faculty/yim/documents/NE591-S2010/Report/Libya_rep.pdf.

Bowen, Wyn. 2006, *Libya and Nuclear Proliferation: Stepping Back from the Brink*. Adelphi Paper, Vol. 46, No. 380.

Chipman, John. 2008. "Chapter 5: The Maghreb." In *Nuclear Programs in the Middle East: in the Shadow of Iran*. Washington, D.C.: International Institute for Strategic Studies. <http://www.iiss.org/publications/strategic-dossiers/nuclear-programmes-in-the-middle-east-in-the-shadow-of-iran/read-the-dossier/>. Accessed 06/29/2015.

CIA. 1985. *The Libyan Program: A Technical Perspective*. <http://nsarchive.gwu.edu/nukevault/ebb423/docs/10.%20libya%201985.pdf>

Fitzpatrick, Mark. 2011. "Nuclear Capabilities in the Middle East," Background paper, EU Nonproliferation Consortium. <http://www.nonproliferation.eu/web/documents/backgroundpapers/fitzpatrick.pdf>.

International Atomic Energy Agency. "Implementation of the NPT Safeguards Agreement in the Socialist People's Libyan Arab Jamahiriya." Report by the Director General of the International Atomic Energy Agency. <http://www.fas.org/nuke/guide/libya/iaea0804.pdf>. Accessed 06/29/2015

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