Elena Geleskul

THE HISTORY OF THE LIBYAN NUCLEAR PROGRAM: THE REASONS FOR FAILURE

In December 2003 a remarkable event occurred – Libya, a former *rogue state*, turned into a loyal partner, supporter, and favorite of the West. On December 19, 2003 it declared its commitment to stop the implementation of WMD and agreed to the inspections of its nuclear facilities, as well as to limit its missile capabilities in accordance with the restrictions imposed by the Missile Technology Control Regime (MTCR). The UN Security Council was informed in due manner.[1]

Already on December 20, 2003 IAEA Director General Mohamed ElBaradei met the Libyan delegation in Vienna. During the meeting the parties discussed the issue of inspections at the Libyan nuclear facilities.[2] And on December 27–29 he came to Libya to talk to Muammar Gaddafi and visit a few nuclear sites, in particular the research center in Tajura. In January 2004 the on-site inspections started – they involved U.S. and British experts.

What was the reason for Libya to develop WMD? Did it help to achieve significant results? Why did Libya abandon its plans?

NUCLEAR WEAPONS – HOW IT ALL STARTED

For the next 30 years after the 1969 coup and the installation of the Gaddafi regime Libya was actively seeking access to nuclear weapons, or at least, nuclear industry.

After proclaiming independence in 1951 the country had no territorial disputes with the neighbors, nor any other substantial differences that could motivate Libya to develop nuclear weapons for the sake of security. On the other hand, this Arab state is located in North Africa, in the Mediterranean and belongs to the Middle East, which has never been stable. In fact, security issue is one of the most acute for all states of the region, especially in the light of the Arab-Israeli confrontation that started at that time.

Muammar Gaddafi repeatedly condemned Israel and its nuclear monopoly in the Middle East. According to the leader of the Libyan revolution, «That means that all foreigners must leave Palestine and return to their countries of origin. Only Palestinian Jews should stay in Palestine, as citizens of a secular state where they would live with Palestinian Arabs and Palestinian Christians. Israel is a colonialist-imperialist phenomenon.»[3] During his visit to Moscow in 1981 Libyan Prime Minister Abdel Salam Jalloud asked Chairman of the Council of Ministers Anatoly Kosygin to provide assistance in targeting, radar support from the ships in the Mediterranean Sea and jamming[4] in case of Libya's military operation against the nuclear center in Dimona.

Another threat for Libya was the United States, since Gaddafi could not establish a constructive dialogue with Washington and accused the U.S.A. of being a symbol of Western imperialism.[5] After all, the United States supported Israel and Egypt.

Thus, there was no direct security threat to Libya. On the other hand, the specifics of relations in the Middle East and the attitude of Arab states to Israel, the United States and Western countries could not but force the Libyan leader to initiate some steps aimed at protecting the country.

However, to a large extent, nuclear weapons were a status factor, which would allow Tripoli to take a lead in the Arab world and in other Third World countries.[6] Such No. 1 position (the first Arab state with nuclear arsenal) could strengthen the authority of Libya and its positions in the region.

Nuclear weapons are a complicated and quite expensive project, which requires a lot of time and money. At first, Libya tried to focus on the development of chemical weapons. The chances for that were rather high, since it was a less costly process (required smaller investments and more modest research) and it could easily be hidden (unlike nuclear facilities). Such cheap type of WMD was more attractive for Gaddafi as well, since it could ensure the balance of power with potential adversaries, taking into account the existing weakness of the Libyan Armed Forces.

In the mid-1980s Libya began the construction of three chemical weapons plants – Rabta, Sebha, Rabta-II near Tarhunah. In the late 1980s it turned out that German *Imhausen-Chemie* was a major subcontractor in building the Rabta plant, while several other German companies were also involved in the program to a lesser extent. One has to note that the development of Libyan CW potential got assistance from other nations – Belgium, the U.K., Hungary, GDR, Denmark, Iraq, Iran, Italy, China, the United States, Thailand, Yugoslavia, and Japan. Many of them curbed the cooperation with Libya under the U.S. pressure, however.

Washington was extremely discontent with the availability of CW facilities to Tripoli. There is evidence that Libya used mustard gas acquired in Iran against the rebels in Chad in 1987. It was one of a few countries which conducted military operations with the use of CW.

According to some sources, in the mid-1980s Libya manufactured over 100 tons of nerve and blister gases. By 1992 the U.S.-led campaign against the country forced its leadership to curtail the production capacity, to start the dismantlement of the equipment and to change a number of plants into pharmaceutical enterprises. This happened with the CW agent plant in Rabta, which before that had produced mustard gas.

Libya also attempted to carry out research in the area of biological weapons production. Intense studies dealt with pathogens and toxins to be used for military purposes. Hence, Libya was violating the terms of the Biological Weapons Convention. It is assumed that CW plants in Rabta and Tarhuna could also be engaged in research on BW development.

As far as nuclear weapons are concerned, the history of their development in Libya can be divided into three stages:

- 1969–1971 – the first attempts to acquire ready-made nuclear weapons or their components;
- 1971–1992 – development of Libya's civilian programs designated to create the closed nuclear fuel cycle with the potential for further diversion into military uses and production of a plutonium-based nuclear explosive device;
- 1995–2003 – drift towards centrifugal uranium enrichment.

At first, Muammar Gaddafi tried to purchase nuclear weapons. It is noteworthy that Libya turned to Egypt with such offers. The latter was demonstrating interest in nuclear technologies since the early 1950s and tried to acquire nuclear weapons from China and the United States,[7] but these attempts failed. In 1961 the U.S.S.R supplied Egypt with a 2MW reactor,[8] but it was not helpful in nuclear weapons production. However, Gaddafi must have assumed that Egypt was more successful in this area than we think now.

In the early 1970s Libya also addressed China, hoping that Beijing would be an easier negotiation partner than Western countries. For that purpose Prime Minister of Libya Abdel Salam Jalloud went to Beijing in 1971. However, China refused to sell the nukes[9] and was only willing

to provide the assistance of Chinese experts.[10] After all, how could China supply Libya with nuclear weapons, if it had quite a limited arsenal itself?!

When the attempts to buy nuclear weapons failed, Libya decided to develop its own program. This required the construction of a sophisticated nuclear infrastructure, including closed nuclear fuel cycle. This task implied the existence of scientific and technical capabilities, which Libya lacked. The country was ready to pay any price for nuclear technologies – the money was plenty after the oil crisis in the 1970s.

Under the cover of civilian nuclear industry, Libya launched various projects with other countries, in order to obtain nuclear technologies and personnel training. Gaddafi was trying at all azimuths – in 1971–1981 Libya signed a number of agreements with Argentina, Belgium, India, Pakistan, the Soviet Union, and France. Not all of these documents were fully implemented.

One of the first cooperation partners in the area of nuclear energy development was Argentina. In 1974 Buenos Aires agreed to supply equipment and staff for geological surveys and uranium production. Libyan chemists went to Argentina for training.[11]

Despite the anti-Soviet sentiments in the early years of his rule, by the mid-1970s Muammar Gaddafi changed his orientation and turned to the U.S.S.R for help. In 1977 the Libyan delegation visited Moscow and asked the Kremlin to assist in the construction of natural uranium heavy-water-moderated reactor, heavy water production facility, reprocessing plant for irradiated nuclear fuel and plutonium separation and other related facilities. It was a matter of developing the closed nuclear fuel cycle and Libya was ready to pay $10 billion for the services.[12]

This proposal led to serious discussions in the Soviet leadership. The Ministry of Medium Machine-Building was supporting the idea – the price was attractive and there was a desire to support Arabs in their conflict with Israel.[13] The MFA was strongly against such cooperation fearing nuclear proliferation and the emergence of new nuclear weapon states. As a result, it was decided to reject the Libyan offer and to assist the country in a different way. The Soviet Union helped in the establishment of the research center in Tajura and supplied Libya with a light water 10MW reactor that was using highly enriched uranium.[14] It became operational in 1981,[15] and the U.S.S.R insisted on the permanent presence of the Soviet specialists in Tajura, in order to have assurances of peaceful nuclear uses and control the HEU. This was a mutually beneficial enterprise, since Libya anyway needed the assistance of the Soviet experts.[16]

The Soviet Union insisted that Libya ratified the NPT in 1975 (it was signed by King Idris I already in 1969) and signed the safeguards agreements with the IAEA in 1980. So the research center in Tajura and the reactor were now under the IAEA safeguards.

Since 1977 Moscow and Tripoli were discussing the possibility of construction of the Soviet nuclear power plant with two 440MW reactors on the Cirta coast.[17] In February 1982 the parties agreed that *Atomenergoexport*[18] would participate in the construction of an NPP in Libya.[19] The same year the Finnish *Imatran-Voima*, which should have taken part in the construction of the cooling system for the reactor core, refused to be involved in the project.[20] Design and architecture were the responsibility of *Belgonucleaire*, but the Belgian government cancelled the deal and banned its participation in the project.

The agreement that was so attractive to Libya remained on paper. Perestroika in the U.S.S.R and respective changes in the Soviet policy resulted in the decline of nuclear cooperation with Tripoli, while Libyan activities on the world arena did not facilitate further development and strengthening of Soviet-Libyan ties either.

In fact, Western countries (for example, France and Belgium) also rendered assistance to Libya in the development of its nuclear programs. In 1975 during his visit to Tripoli French Prime Minister Jacques Chirac[21] agreed to provide the country with a desalination plant powered by a 600MW nuclear reactor. However, the cooperation plans were not carried out.[22] Besides, Libya intended to purchase 20 calutrons from *Thomson-CSF* in France – the equipment was designated for electromagnetic separation of isotopes and, hence, uranium enrichment. This contract was also sabotaged by the French government.[23]

As far as cooperation with Belgium is concerned, it started in the early 1970s and reached its peak in 1981–1982. Within the framework of their contract with the Libyan Atomic Energy Commission, two companies – *Belgatom* and *Belgonucleaire* – provided technical assistance to the research center in Tajura (the reactor was supplied by the U.S.S.R, as we all remember).

In 1984 the parties signed a $1bn-worth contract on the NPP construction with the Soviet nuclear reactor. *Belgonucleaire* was in charge of design and architecture,[24] as we have mentioned above, but the deal was cancelled under the U.S. pressure.[25]

Due to the deterioration of relations with the West, Libya eventually faced tough confrontation and access to Western nuclear technologies was cut off. So the leadership of this Arab country had to expand its contacts with the developing nations and seek other ways to get necessary materials and technologies.

In 1978 Libya tried to establish relations with India – the latter had a sophisticated nuclear infrastructure and conducted its first tests in 1974. In July 1978 two prime ministers signed the agreement on peaceful nuclear energy uses. India committed itself to assist Libya in achieving independent nuclear power in exchange for low-cost oil supplies to India.[26] According to the agreement, Libyan students and scientists could go to Indian research centers for training and studying.

Meanwhile, Muammar Gaddafi initiated cooperation with Pakistan – and this after all resulted in the deterioration of Libyan-Indian ties. Gaddafi presumed that Pakistani achievements in nuclear weapons development would be divided 50/50. The cooperation between Libya and Pakistan in the late 1970s was an inter-governmental interaction, which ended up when the Zulfikar Ali Bhutto regime was overthrown.

The major difference from any other Libyan nuclear cooperation projects was drastic. Unlike previous attempts, Libya was not acquiring its own weapons – on the contrary, it helped Pakistan to develop nuclear weapons and provided the country with $100–500 million for that purpose.[27]

Beside financial aid, Libya exported over 2,000 tons of uranium concentrate to Pakistan. According to the 2004 IAEA report,[28] in 1978–1981 Libya imported from Niger 2,263 tons of uranium concentrate. But since the safeguards agreement with the IAEA was signed in 1980, the Libyan leadership declared only the amount purchased after 1980. Previous purchases of uranium were not reported to the Agency, so Libya could freely provide assistance to Pakistan in its nuclear weapon program.

Gaddafi's unscrupulous cooperation with both India and Pakistan, despite their confrontation, indicates that he did not care about the source of aid in nuclear weapons development – ends were much more important than means. Therefore, Libya was signing one contract after another with the countries from different political and ideological blocs.

Thus, the second stage in the development of nuclear industry and closed nuclear fuel cycle was not successful for Libya either. Expected results were not achieved, numerous agreements were not implemented. The Soviet-made research center could not be used for the production of nuclear weapons – the capacity of the plant (10MW) was not enough, though the reactor used highly enriched uranium. After all, the reactor was under the IAEA safeguards, so it was difficult to divert it anyway. Western countries turned their backs to Libya, since it was accused of sponsoring international terrorism.

But technology was not sufficient – Libya required human resources capable of working in the nuclear industry. Libyan students could be found all over the place – they were studying nuclear physics in Argentina, India, the United States, the U.S.S.R, and Western Europe. For instance, in 1980, 25 Libyan students had nuclear technology course at the Technical Research Center in Finland.[29]

Moreover, before the U.S. State Department decision of 1983 banning the citizens of Libya and other Third World countries closely connected with Libya to study at the nuclear faculties in the U.S. universities, this country was a popular destination for Libyan students and researchers.[30]

The situation changed after a series of terrorist attacks (including the European territory), of which the Libyan government was accused. After the explosion of U.S. *PAN AM* airplane in Lockerby in 1988 and French *UTA* planed in Niger, the UN Security Council introduced sanctions against Libya in 1992.

Resolution 748 spoke about embargo on air transportation, supplies of arms and weapons, restrictions on the activities of diplomatic and consular missions, constraints for the movement of those Libyan citizens who were suspected of being terrorists or sponsors of terrorism.[31] These measures were further expanded in Resolution 883 (1993), which froze some Libyan assets abroad, tightened air embargo and prohibited supplies of some equipment used at the oil pipeline terminals and refineries.[32] This was a serious blow for the Libyan key source of earnings – oil industry.

The sanctions resulted in the interruption of nuclear cooperation and hampered even normal economic links with Libya. However, this was not an obstacle for the ambitious Libyan leader, who decided to intensify nuclear activities in 1995.[33] Due to the UN sanctions, such activities could occur only at the black markets of nuclear technologies, i.e. Gaddafi turned to the notorious A.Q. Khan network.

NUCLEAR WEAPONS AND THE KHAN NETWORK

According to the IAEA report, Muammar Gaddafi and the Libyan officials first met A.Q. Kan in January 1984. The Pakistani dealer told his interlocutors about the nuclear-material production technology. Libya got an offer to buy the centrifugal uranium enrichment technology, but technical knowledge of the Libyans was insufficient to realize this plan.[34] Relations deepened in 1989–1991 and Tripoli obtained information about *L-1* centrifuges developed by the Pakistani physicist and some of its components were scheduled for transfer.[35] However, Libya was dissatisfied with the deal – it condemned A.Q. Khan for supplying old components of the centrifuges which could not be used to implement the nuclear program.[36] Moreover, Libya did not receive any assembled centrifuge, partly due to the UN Security Council sanctions (much of the purchased equipment was left in storage in Dubai in the United Arab Emirates).

A new contract on centrifuge supplies with A.Q. Khan was signed in 1995 and two years later Libya finally received 20 ready-made centrifuges and the components to assemble another 200.[37] In 2000 it got two test centrifuges which supposedly had been used to develop the Pakistani A-bomb.

The first successful test of *L-1* was finished by October 2000. In late 2000 Libya launched the stage-by-stage installation of cascades with 9, 19 and 64 centrifuges. By April 2002, when Libya had to move this equipment for security reasons to some other locations, the cascades were at different phases of completion, but none of them was finished mainly for technical reasons.[38]

In September 2000 Libya was also supplied with two *L-2* centrifuges and placed an order for another 5,000 of them and appropriate supplementary equipment. The order was then increased to 10,000 centrifuges. Starting from December 2002 the massive delivery of *L-2* components to Libya began.

The A.Q. Khan network was only an intermediary in the production and delivery of components and equipment in different countries. The process of supplies of nuclear technologies and equipment to Libya involved the individuals and corporations from 13 states – Germany, Spain, Italy, Lichtenstein, Malaysia, the United Arab Emirates, Pakistan, South Korea, Singapore, Turkey, Switzerland, South Africa, and Japan.[39] Libya paid to the network over $100 million.[40]

After the U.S. and U.K. inspections and the IAEA inspections in late 2003 – early 2004, it turned out that many components were not even unpacked and were stored at hidden warehouses. Scientific and technical difficulties were the major reason for Libya's failure to develop nuclear weapons and nuclear industry as such, even though the country possessed all necessary financial and technical capabilities.

CONCLUSION

In the 1970–1980s Libya passed a long way in establishing contacts with other nations in order to obtain nuclear technologies. Muammar Gaddafi managed to achieve a lot – numerous agreements were signed, but only some of them were carried out. Regardless of Libyan desire to develop nuclear weapons, the country had serious chances to develop a mighty nuclear industry. But it failed and there were several reasons for that.

First of all, the WMD programs required the assistance of foreign experts and technologies from abroad.[41] Thanks to substantial investments, the Libyan leader succeeded in attracting them and in providing education and training for Libyan researchers. However, this was not enough.

Secondly, a complicated power system in Libya, the lack of clear division of powers among the major bodies and unlimited ruling authority of Muammar Gaddafi impeded the process of interaction with other countries. According a famous European nonproliferation expert Harald Mueller, the key reason for failure was not the lack of financial or scientific components, but the ineptitude of the Libyan authorities.[42]

Thirdly, the aggressive statements by Gaddafi with respect to Israel, the United States and the West also aggravated the situation. As a result, many agreements on cooperation in peaceful nuclear energy uses were not carried out.

Libya's refusal to continue the WMD programs is a sample of nonproliferation solutions achieved through diplomatic efforts of the international community. Libya and its leader Muammar Gaddafi could become a good example for today's Iran and North Korea, but only the time will show if it happens one day.

Notes

[1] Letter by the Permanent Representative of Libya to the United Nations to the President of the UN Security Council, December 19, 2003.

[2] «IAEA Director General to visit Libya,» IAEA Press Releases 2003/14, http://www.iaea.org/NewsCenter/pPressReleases/2003/prn200314.html (last updated on September 29, 2008).

[3] «An interview with Gaddafi. Libya's leader predicts the treaty will hurt U.S.,» *Time*, April 9, 1979, http://www.time.com/time/magazine/article/0,9171,920211,00.html (last updated on January 20, 2008).

[4] Oleg Grinevsky, *Scenario for the Third World War. How Israel nearly became its originator* (Moscow: OLMA-PRESS Obrazovanie, 2002), p. 103.

[5] Harald Müller, *A European Non-Proliferation Policy. Prospects and Problems* (Oxford: Clarendon press, 1987), p. 274.

[6] Joseph Cirincione, Jon B. Wolfsthal, Miriam Rajkumar, *Deadly Arsenals. Tracking weapons of mass destruction* (Washington: Carnegie Endowment for International Peace, 2002), p. 305.

[7] *Nuclear black markets: Pakistan, A.Q. Kahn and the rise of proliferation networks. A net assessment* (London: The International Institute for Strategic Studies, 2007), p. 59.

[8] Shai Feldman, *Nuclear Weapons and Arms Control in the Middle East* (London: CSIA studies in international security, 1997), pp. 58–59; Nuclear weapons program of Egypt, http://www.globalsecurity.org/wmd/world/egypt/nuke.htm (last updated on October 27, 2008).

[9] Leonard S. Spector, Jacqueline R. Smith, *Nuclear ambitions: the spread of nuclear weapons 1989–1990* (Oxford: Westview Press, 1990), p. 175.

[10] Ibid.

[11] Harald Müller, *A European Non-Proliferation Policy...*, p. 260; Libyan Nuclear Weapons, http://www.globalsecurity.org/wmd/world/libya/nuclear.htm (last visited on September 8, 2008).

[12] Roland Timerbaev, *Stories of the Past: Memories of the Negotiations on Nonproliferation and Disarmament and Many Other Issues* (Moscow: ROSSPEN, 2007), p. 28.

[13] Ibid., p. 29.

[14] Ibid., p. 28.

[15] The nuclear research center in Tajura was renamed into the Center for Research of Renewable Energy Sources and Water Desalination.

[16] Roland Timerbaev, *Stories of the Past...*, p. 28.

[17] Cirta is a gulf in the Mediterranean near the Libyan coast in North Africa, where Benghazi, Marsa Brega and Es Sider ports are located.

[18] *Atomenergoexport* is one of the oldest Soviet nuclear enterprises which mostly focuses on managing large-scale hi-tech projects, such as construction of NPPs and nuclear centers all over the world. See: http://www.atomenergoexport.ru

[19] Harald Müller, *A European Non-Proliferation Policy...*, p. 263.

[20] Ibid.

[21] Jacques Chirac was the French Prime Minister in 1974–1976.

[22] Libyan Nuclear Weapons...

[23] Nuclear chronology, 1968–1979, Libya, NTI Nuclear database, http://www.nti.org/e_research/profiles/Libya/4132.html (last visited on October 20, 2008).

[24] Leonard S. Spector, Jacqueline R. Smith, *Nuclear ambitions...*, p 177; Libyan Nuclear Weapons....

[25] Harald Müller, *A European Non-Proliferation Policy...*, p. 261.

[26] Wyn Q. Bowen, «Libya and nuclear proliferation,» *Adelphi Paper* 380 (L.: The International Institute for Strategic Studies, 2006), p. 28.

[27] Ibid, pp. 30–31; *Nuclear black markets...*, p. 59. According to other sources, Libya paid Pakistan over $1.5 billion. See Harald Müller, *A European Non-Proliferation Policy...*, p. 261.

[28] Implementation of the NPT safeguards agreement of the Socialist People's Libyan Arab Jamahiriya. Report by the Director General, GOV/2004/33, May 28, 2004, http://www.globalsecurity.org/wmd/library/news/libya/2004/040528-iaea.pdf (last visited on October 31, 2008).

[29] Harald Müller, *A European Non-Proliferation Policy...*, p. 264.

[30] Ibid.

[31] Resolution 748 (1992) of March 31, 1992 adopted at the UN Security Council, 3063rd meeting, http://www.un.org/russian/documen/scresol/res1992/res748.htm (last visited on October 20, 2008).

[32] Resolution 883 (1993) of November 1, 1993 adopted by the UN Security Council, 3312nd meeting, http://www.un.org/russian/documen/scresol/res1993/res883.htm (last visited on October 20, 2008).

[33] *Nuclear black markets...*, p. 76.

[34] Implementation of the NPT safeguards agreement of the Socialist People's Libyan Arab Jamahiriya. Report by the Director General, GOV/2008/39, September 12, 2008, http://www.iaea.org/Publications/Documents/Board/2008/gov2008–39.pdf (last visited on October 29, 2008).

[35] *L-1* and *L-2* centrifuges are based on the early European models and have such modifications as *G-1*, *G-2*, *P-1*, and *P-2*.

[36] Adrian Levy, Catherine Scott-Clark, *Deception: Pakistan, the United States and the global nuclear weapons conspiracy* (London: Atlantic Books, 2007), p. 363.

[37] Implementation of the NPT safeguards agreement of the Socialist People's Libyan Arab Jamahiriya. Report by the Director General, GOV/2004/12, February20, 2004, http://www.iaea.org/Publications/Documents/Board/2004/gov2004–11.pdf (last visited on October 20, 2008).

[38] Ibid.

[39] Ibid.

[40] «Libya paid $100 million to the Khan network», http://www.iranatom.ru/news/aeoi/year04/march/sto.htm (last visited on November 29, 2008).

[41] Joseph Cirincione, Jon B. Wolfsthal, Miriam Rajkumar, *Deadly Arsenals...*, pp. 305–306.

[42] Harald Müller, *A European Non-Proliferation Policy...*, p. 269.