Tracking Libya's Nuclear Activities

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Brief Analysis

Besides dismantling a dangerous program, the IAEA's efforts in Libya may also expose the international network of nuclear cooperation that enabled this infrastructure to develop as far as it has.

The International Atomic Energy Agency (IAEA) team that arrived in Libya on December 27 will face many challenges in its efforts to achieve the goal announced by Director General Mohamed ElBaradei, namely, to "initiate an in-depth process of verification of all of Libya's past and present nuclear activities." Because Libya has a long history of seeking nuclear weapons, its December 19 pledge to forswear nuclear capabilities will require careful review by the international community.

Ambitions and Capabilities

Libya ratified the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) in 1975, concluded a safeguards agreement with the IAEA in 1980, and is party to the African Nuclear Weapons Free Zone (established by the Treaty of Pelindaba). Nevertheless, Western intelligence analysts have long believed that Muammar Qadhafi's regime has continued to pursue nuclear weapons.

Despite its shortage of resources and lack of indigenous technical expertise, Libya has managed to establish a number of research centers and projects in order to increase its understanding of the nuclear fuel cycle. In the 1970s, many Egyptian nuclear scientists continued to work in various academic positions in Libya even as official relations cooled between the two countries. Similarly, Pakistani nuclear scientists reportedly visited Libya during the latter part of the decade, and Libya in turn supplied Pakistan with financing and "yellow cake" (concentrated uranium) for its own nuclear program. At the same time, Libya cooperated with Argentina, Brazil, and Belgium in an effort to develop a nuclear infrastructure. The regime also sent hundreds of graduate students abroad to study nuclear science, primarily in the United States.

In 1982, with the help of the Soviet Union, Libya established the Tajoura Nuclear Research Center (TNRC), which remains its largest known nuclear research facility. TNRC has six buildings occupying a total area of 7,500 square feet. Its activities include fundamental and applied research and training in the field of nuclear science and engineering. In 1984, visitors to TNRC described the center's equipment as "state of the art." At the heart of TNRC's activities is a ten-megawatt thermal IRT pool-type research reactor, used for isotope production and general research. In addition to this reactor, the center houses a neutron generator complex and a "critical facility" (i.e., a laboratory in which experiments necessary for the design of nuclear reactors can be performed in a safe and efficient manner). Other facilities include machine shops and various laboratories for testing, research, isotope production, and nuclear metallurgy. Despite the scope of these facilities, Libya's lack of nuclear expertise has severely hampered its ability to operate TNRC at optimum capacity.

New Revelations

In recent meetings with the IAEA, Libyan authorities revealed that, during the 1980s and 1990s, the regime acquired natural uranium and centrifuge/conversion equipment, built pilot-scale centrifuge facilities, and experimented with uranium enrichment technologies. The size and status of these facilities are unknown, with reports differing on several important aspects. According to the Libyan representative to the IAEA, the facilities have been dismantled; even while operational, the enrichment program was "at an early stage of development and no industrial scale facility had been built, nor any enriched uranium produced." According to media reports, however, the U.S. and British teams that visited more than ten nuclear-related facilities in Libya in recent months "saw centrifuges and parts for centrifuges that appeared to be in working order." One Western official stated, "This was a serious programme, and one that was not bought off the shelf." Libyan scientists could have acquired their centrifuge technology from one of several possible sources. The Soviet Union may have provided it during the period when Moscow had strong ties with Libya. Alternatively, North Korea may have obtained it from the Soviets and passed it on to Libya. The Libyans could also have acquired the technology from Pakistan in exchange for their financial support of Pakistan's nuclear program. According to a senior European diplomat, the Libyan nuclear program shared "certain common elements" with the Iranian program and echoed the pattern of technology leakage from Pakistan to Iran. Iraq may have played a role as well; Libyan scientists participated in Iraq's centrifuge program, and Baghdad may have sent centrifuge components to Libya in order to hide them from UN inspectors.

Verifying Libya's Nuclear Activities

The IAEA team will attempt to lay out a comprehensive program to determine the extent of Libya's nuclear infrastructure and weapons program. Some of the issues that need to be addressed are:

The extent and origins of Libya's centrifuge program and conversion facility. In particular, the IAEA must identify the sources of Libyan centrifuge technology, both to understand how far the regime has advanced and to identify the parties providing such dangerous technologies. This will help the international community halt such proliferation and detect and arrest other centrifuge programs before they become operational.

The status of Libya's research reactor and radiochemistry laboratory. Libyan scientists affiliated with these facilities are known to have studied radiochemistry properties and isotope production methods. Moreover, TNRC's hot cells provide a reprocessing capability that, although limited to laboratory scale, could theoretically produce enough viable material for a nuclear weapon.

The status of any nuclear materials in Libya's possession. One item of concern is the 80-percent highly enriched uranium that the Soviet Union sent to Libya to fuel the research reactor at TRNC. In addition, Libya reportedly acquired over 450 tons of yellow cake from Niger as early as the 1980s. Some or all of this uranium may have been used for conversion and enrichment experiments, which could in turn have generated highly enriched uranium. Alternatively, the yellow cake could have been converted into uranium targets (similar to those constructed by Iran during the 1980s and 1990s) and irradiated in the research reactor, producing plutonium that could then be separated and used in a nuclear weapon. Some of the yellow cake could also have been transferred to other countries, including Pakistan.

Conclusion

The issues raised above, among others, need to be explored in depth. Only long-term diligence by the IAEA and the international community will reveal Libya's true nuclear potential. The agency's current efforts in Libya, along with any subsequent inspections and dismantlement programs, may also yield an even more significant breakthrough: exposure of the international network of nuclear cooperation that has enabled Libya's nuclear infrastructure to develop as far as it has. Such a revelation would be an important victory in the international

campaign to stem the spread of nuclear weapons technology.

In general, the international community must consider new methods for detecting clandestine nuclear weapons programs that may be disguised as peaceful nuclear research. This includes improving intelligence sources and methods, using stronger law-enforcement and export-control procedures, and enhancing verification methodologies.

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