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**Policy Forum Online
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Al Qaeda's Nuclear Program: Through the Window of Seized Documents

By David Albright

I. Introduction

This essay by David Albright - a physicist, and the President of the Institute for Science and International Security in Washington, D.C. - examines Al-Qaeda's efforts towards acquiring weapons of mass destruction. He argues that al-Qaeda developed "only limited technological capabilities in Afghanistan to produce WMD." However, he writes, "if al Qaeda had remained in Afghanistan, it would have likely acquired nuclear weapons eventually."

The views expressed in this article are those of the author and do not necessarily reflect the official policy or position of the Nautilus Institute. Readers should note that Nautilus seeks a diversity of views and opinions on contentious topics in order to identify common ground.

II. Essay By David Albright

**Al Qaeda's Nuclear Program: Through the Window of Seized Documents
By David Albright**

Following the fall of the Taliban government in late 2001, intelligence agencies and the media scrambled to find documents and other information about al Qaeda and its next potential targets. A priority was uncovering information about al Qaeda's progress on acquiring weapons of mass destruction (WMD), including nuclear weapons.

Al Qaeda views the acquisition of WMD as a religious obligation. However, it could develop only limited technological capabilities in Afghanistan to produce WMD, and few believe al Qaeda obtained nuclear weapons while it was entrenched there. On the other hand, al Qaeda's determination to get nuclear weapons along with its increased ability to obtain outside technical assistance, lead to the conclusion that if al Qaeda had remained in Afghanistan, it would have likely acquired nuclear weapons eventually. Although al Qaeda's WMD efforts are in disarray, it remains determined to get WMD. As a result, preventing al Qaeda and other terrorist groups from getting nuclear weapons or other WMD must be an overarching goal of the United States and the international community.

Searching Afghanistan

General Tommy Franks, commander of American forces in Afghanistan, said last winter that detailed searches had been conducted at over 100 hundred sites in Afghanistan, including about 50 sites suspected of being involved in the production of weapons of mass destruction. Western and Northern Alliance intelligence officers scoured houses, caves, and training camps for documents, booklets, personnel records, videos, equipment, materials, and other evidence of WMD programs. Many members of the media, who arrived in Kabul soon after the fall of the Taliban in mid-November 2001, uncovered many al Qaeda and Taliban records. In Kabul and elsewhere in Afghanistan, they climbed over walls to get into al Qaeda safe houses, gained access to offices, visited nearby training camps, and acquired hard drives from al Qaeda computers. CNN, The Evening Standard, The Times of London, the Associated Press, NBC, the Wall Street Journal, The Washington Post, USA Today, The New York Times, and others reported on the information they found in videos, on computer hard-drives, and in hundreds of thousands of pages of documents and

other written records. This information provides a detailed snapshot of the terrorist group's activities in Afghanistan and abroad. These activities include:

Instruction manuals to train recruits to make and use a wide variety of conventional explosives; Details about the daily lives of al Qaeda personnel; Pictures or schematics of intended targets including nuclear power plants; Training manuals for teaching recruits who speak many different languages to wage guerilla and conventional warfare; Instructions on operating undercover overseas; and Instructor and student notebooks describing techniques of kidnapping and assassination.

Only a relatively small portion of the records found by the media, however, were about nuclear weapons or other WMD. Nor did the intelligence agencies find a significantly larger amount or vastly different types of nuclear documents in the records they collected.

Al Qaeda and the Taliban likely either destroyed or took many important WMD documents. The media uncovered partially burned documents and other evidence that documents had been burned or removed in advance of the forces of the Northern Alliance and its allies. As a result, any assessment based on the recovered records remains partial.

Nuclear Documents

The captured documents reinforce assessments that al Qaeda is highly determined to obtain nuclear weapons and other weapons of mass destruction. Secretary of Defense Donald Rumsfeld said on January 16, 2001 at a Defense Department briefing: "We have found a number of things that show an appetite for WMD." To support his claim, he cited diagrams, materials, attempts to acquire items, and specific cases wherein such weapons were discussed at al Qaeda meetings.

David Ensor of CNN reported on December 4, 2001, that according to U.S. officials, one hand drawn diagram found either in a Taliban or al Qaeda facility showed a design for a "dirty bomb." In regards to nuclear weapons, U.S. officials also saw evidence that al Qaeda was also seeking to acquire or develop a nuclear explosive device.

George Tenet told Congress in late January 2002 that the United States uncovered rudimentary diagrams of nuclear weapons in a suspected al Qaeda house in Kabul. According to a CIA report released publicly on January 30, 2002, these "diagrams, while crude, describe the essential components-uranium and high explosives-common to nuclear weapons."

Superbomb Document

In November 2001, CNN found an Arabic document titled "Superbomb" in the home of Abu Khabbab, the code-name of a senior al Qaeda official. This document, which was assessed by this author in cooperation with CNN, has some sections that are relatively sophisticated and others that are remarkably inaccurate or naive. Over 25 neatly hand-written pages, the author discusses various types of nuclear weapons, the physics of nuclear explosions, properties of nuclear materials needed to make them, and the effects of nuclear weapons. It is not systematic in its coverage and the author sometimes covers some subjects in depth and others superficially or incorrectly. Nor is it a cookbook for making nuclear weapons, as many critical steps to make a nuclear weapon are missing from the document.

Nonetheless, this documents shows that Al Qaeda was interested in developing a deeper understanding of nuclear weapons. Some of the information in the document suggests that the author understood short cuts to making crude nuclear explosives.

The document is missing its cover and first pages, so the author's name or background is unknown. The date of the document is also unknown. The first page begins "...since the latter is less stable and therefore more capable of nuclear fission. For this reason, anyone desiring to obtain a nuclear weapon must set up a plant for enriching uranium."

The author advocates the use of laser enrichment, which he claims is "simple." In reality, however, laser enrichment is incredibly complex to master. This indicates that the author only possessed a rudimentary understanding of the knowledge to enrich uranium or was trying to convince the reader to pursue this enrichment technology for an unstated reason.

The sections on plutonium and uranium are relatively detailed. Compared to the sections discussing nuclear weapons, these sections imply that the author was more comfortable writing about the nuclear fuel cycle than nuclear weapons.

According to Ronald Wolfe, the Arab language specialist who translated this and other documents found by CNN, the author is most likely Egyptian. Moreover, the Superbomb document looks like the type used by professors and lecturers at Arab universities. To further support this, CNN found student notes in houses in Kabul, one containing a date of early 2000, that have crude drawings that appear to be based on the one in the Superbomb document. Thus, an instructor may have used the Superbomb document to give a course to al Qaeda members about nuclear weapons. Some of the notes in the margins suggest that the instructor may have not been the author of the document. In that document and in student notebooks there are similar figures of atomic bomb designs using plutonium or uranium. However, these designs are not credible nuclear weapons designs. If someone obtained separated plutonium and built this design, it would not function as an atomic bomb. Rather, it would be a radiological dispersal device (RDD). These students, who thought they were learning about nuclear weapons, were in actuality learning about making radiological dispersal devices.

The Superbomb document was found in conjunction with a wide variety of other documents regarding the manufacture and use of conventional explosives. An interpretation of this finding is that the students, who were taking an advanced course in building conventional explosives, also received instruction in the ultimate explosive, nuclear weapons.

A student notebook found by The Washington Post in Kabul, supports this view. A November 22, 2001 Washington Post article reports that while most of the notebook contains information written during a general course on using conventional explosives, but the last page contains notes specifically about atomic explosions. Moreover, some of the information that appears in the notebook is similar to what is in the Superbomb document.

Other Records

Other records imply that al Al Qaeda had a more sophisticated understanding of atomic bombs than what is suggested by the Superbomb document. NBC reported that hard drives found by U.S. intelligence agencies had more interesting information about nuclear weapons than those obtained by the media.

A document found by a reporter of the London Times, who was one of the first to search al Qaeda houses in Kabul, shows that the Arab readers were partially discerning about what they obtained. The reporter found a part of a page of a document that simplistically discussed hydrogen bombs and other nuclear weapon topics. The document was typed in English with Arabic notes handwritten on the page. The document contains several mistakes, some of which are outlandish. At one place, the writer of the document compares the chemical structure of plutonium to the fictitious elements Saturium, Jupiternium, and Marrissum. The writer of the Arabic notes drew arrows from these three words, to an Arabic phrase, which translates to: "This is bullshit."

A document found by The New York Times in Afghanistan discusses precautions for using chemical, biological, and nuclear weapons written by Abul Khabad. In the preface, he identified himself as coming from Greece and as a "protector of mujahedeen." It is unknown who this person is, or if it is another spelling or code-name of Abu Khabbab.

The New York Times, in an extensive report on al Qaeda documents on March 18, 2002, cited officials who said that papers were found in Kabul explaining the use of radioactive isotopes in agriculture and medicine in the same rooms as notebooks on conventional explosives, further indicating research into RDDs.

Several documents reportedly described the manufacture of nuclear weapons and their effects. In addition, other documents described defenses against a nuclear attack.

Many documents contained detailed information about making and using conventional explosives, including one called RDX, a high explosive popular with militaries. It has also been used as an ingredient in "shaped charges" used to compress the nuclear core of an implosion-type nuclear

design. However, none of the documents reviewed by this author contained any information about shaped charges. This finding supports the conclusion that al Qaeda's capabilities were limited. However, it also fuels speculation that al Qaeda may have favored a gun-type nuclear design, which is simpler to make and depends on the use of a propellant to fire a slug of highly enriched Uranium (HEU) down a barrel into another piece of HEU.

Foreign Assistance

The documents support the view that al Qaeda's leadership understood its limitations and was taking steps to improve its ability to create an industrial infrastructure to make WMD. Al Qaeda realized that foreign assistance would allow it to overcome its weaknesses and be more efficient and economical in making WMD.

A record obtained by The Wall Street Journal from a computer hard drive appears to be a 1999 al Qaeda progress report on its efforts to make nerve gas.¹ The author of the memo complained that the use of non-specialists had "resulted in a waste of effort and money," urging the recruitment of experts as the "fastest, safest, and cheapest" route. A June 1999 memo said the program should seek cover and talent in educational institutions, which it said were "more beneficial to us and would allow easy access to specialists, which will greatly benefit us in the first stage, God willing."

Al Qaeda's nuclear effort benefited from the help of two Pakistani nuclear scientists, Sultan Bashiruddin Mahmood and Chaudiri Abdul Majeed, who have admitted that they had had long discussions with al Qaeda officials in August 2001 about nuclear, chemical, and biological weapons.² Pakistani intelligence officials told The Washington Post that they believe that the scientists used a charity they had created as a cover to conduct secret talks with bin Laden.

Pakistani officials told The Washington Post, the scientists reportedly admitted meeting with bin Laden, the Egyptian Ayman Zawahiri, and two other al Qaeda officials over two or three days in August at a compound in Kabul. The scientists described bin Laden as intensely interested in nuclear, chemical, and biological weapons.³

Bin Laden indicated to them that he had obtained, or had access to, some type of radiological material that he said had been acquired by the radical Islamic Movement of Uzbekistan.⁴ Mahmood and Majeed reportedly told bin Laden that it would not be possible to manufacture a nuclear weapon from that material.⁵ They claim they provided no material or specific plans to bin Laden, but rather engaged in wide ranging "academic" discussions, Pakistanis officials told The Washington Post.

According to another Pakistani official, however, the scientists spoke extensively about weapons of mass destruction. He described the scientists as "very motivated" and "extremist in their views," but added that they were "discussing things that didn't materialize, but fall under the breaking secrets act."⁶ Pakistani officials familiar with the interrogations told the Washington Post that the scientists provided detailed responses to bin Laden's technical questions about the manufacture of nuclear, biological, and chemical weapons.⁷

Documents describing the projects of these scientists' charity, which were found by CNN in Kabul, include plans to develop uranium mining in Afghanistan. It has been known for a long time that Afghanistan had uranium resources. But the fact that these nuclear scientists were planning to extract uranium is surprising. A nuclear weapons program may need uranium for components, or as a material for testing nuclear designs, or for learning to make highly enriched uranium metal. Such a capability would also make any weapons program more indigenous.

In summation, these scientists are believed to have provided al Qaeda a blueprint for making nuclear weapons. They are suspected of providing classified information about producing nuclear weapons to al Qaeda or the Taliban or of facilitating access to others in the Pakistani nuclear program who had that knowledge. These two scientists, who had years of experience in Pakistan's nuclear program, could have provided important tips or direct assistance on managing and running a complex nuclear project. This type of assistance would have been critical to al Qaeda, which had limited experience in technical projects or their management.

What was Not Found

The documents and other information did not provide any evidence that al Qaeda had acquired nuclear weapons. Prior to the September 11th attacks, many media reports stated that al Qaeda had acquired operational nuclear weapons from countries of the former Soviet Union. No evidence, however, has emerged that al Qaeda obtained any nuclear weapons, despite bin Laden's statement to a Pakistani journalist published in Dawn on November 9, 2001 in which he claimed to have both nuclear and chemical weapons. He said that the weapons would be used as a deterrent against an U.S. attack.

In addition, no evidence showed that al Qaeda had acquired nuclear explosive materials, although this result is less certain. U.S. experts took "environmental samples" at about 100 sites in Afghanistan that were analyzed for traces of nuclear material, chemical weapons, and biological agents. Environmental sampling did not reveal the presence of plutonium or highly enriched uranium at any of these sites. Secretary of Defense Donald Rumsfeld stated on January 15, 2001, at a roundtable with radio media, that in one case U.S. experts detected a high radiation reading, but the radioactive material was depleted uranium contained in armor-piercing munitions.⁸

Bin Laden is known to have sought highly enriched uranium and plutonium. At least two attempts are known to have been scams. Al Qaeda may, however, have obtained natural or low enriched uranium or other radiological material in these deals. The information revealed by these investigations, leads to the question of whether al Qaeda was completely thwarted in its quest for nuclear material or whether it just got smarter and more secretive in its efforts to get the material. Nuclear material used in nuclear weapons (or in many radiological dispersal devices) is relatively easy to hide or transport. Given that most of the al Qaeda leadership escaped U.S. capture, it would be foolhardy to assume that al Qaeda would have left behind any valuable, transportable radioactive material.

Reflecting that uncertainty, The Washington Post reported March 3, 2002 that some U.S. intelligence officials believe that al Qaeda could already control a stolen Soviet-era tactical nuclear weapon or enough weapon-grade material to fashion a crude atomic bomb.

The search of Afghanistan did not reveal a cadre of al Qaeda's nuclear scientists and technicians, even though bin Laden and other al Qaeda leaders are known to have taken a personal interest in acquiring nuclear weapons and other WMD. But information about the personnel that staffed such a program is scarce. A few names, such as Abu Khababb, surfaced in media reports, but these appear to be code names of individuals. The fate or current location of any technical or scientific al Qaeda personnel remains unknown.

Taking Stock

Whatever al Qaeda had accomplished towards a nuclear weapon capability, its effort in Afghanistan was "nipped in the bud" with the fall of the Taliban government. The international community is fortunate that the war in Afghanistan set back al Qaeda's effort to obtain nuclear weapons.

Al Qaeda was putting together a serious program to make nuclear weapons. But it is hard to judge how far the nuclear research went.

Although al Qaeda was unlikely to develop the capability to make separated plutonium or highly enriched uranium, it may have tried to do so or accelerated its efforts to acquire separated plutonium or highly enriched uranium overseas. In either case, al Qaeda would have had to build the necessary infrastructure to make a nuclear explosive from plutonium or highly enriched uranium.

The available information implies that al Qaeda had only achieved a limited technical capability to make nuclear weapons, assuming it acquired plutonium or highly enriched uranium illicitly. Its effort would likely have needed to concentrate on the simpler gun-type design of a crude nuclear explosive, which also means it would have had to obtain at least about 50 kilograms of HEU.

Plutonium does not work in a gun-type design.

The documents strongly suggest that al Qaeda was intensifying its long-term goal to acquire nuclear weapons and would have likely succeeded, if it had remained powerful in Afghanistan for several

more years. The documents show that al Qaeda was creating a quasi-state nuclear weapons program with the tacit or direct approval of the Taliban government. Moreover, this effort was largely invisible to the rest of the world prior to September 11th. Although intelligence agencies were intensely scrutinizing al Qaeda's activities, they had little success in penetrating al Qaeda's secret WMD programs.

The Taliban needed al Qaeda's financial and military support and allowed its operatives to function relatively independent of Taliban control. A senior Pakistani official said in an interview that the annual budget of the Taliban was \$70 million per year while the budget of al Qaeda was \$200 million per year. Moreover, al Qaeda personnel were far more skilled at running organizations than the relatively ineffectual Taliban government personnel.

Al Qaeda's relationship with the Taliban regime, which some have labeled "parasitic," was immensely beneficial to Al Qaeda. It needed Taliban support to hide any WMD programs from outsiders. Senior al Qaeda officials appear to have realized that foreign assistance was critical to the success of its endeavors to obtain WMD. As a result, they would have also realized the importance of the cover provided by the Taliban regime in its efforts to obtain sensitive foreign supplies and the help of foreign experts. Such outside assistance would have been far harder to obtain without the Taliban regime legitimizing or fronting al Qaeda's activities.

A critical lesson of the documents found in Afghanistan is that groups like al Qaeda see great value in the use of nuclear weapons. Al Qaeda, its spin-offs, and like-minded terrorist groups can be expected to struggle to enhance their chances of acquiring and using nuclear explosives, regardless of the costs to themselves.

The Risk Remains

Al Qaeda's nuclear weapons program was seriously disrupted by the loss of its base of operations in Afghanistan. We are left to ponder many troubling questions. Will al Qaeda reconstitute a nuclear weapons effort somewhere else? Will this program be more focused? What did al Qaeda learn from the Pakistani nuclear scientists?

Any effort by al Qaeda or splinter groups to reconstitute a nuclear weapons effort will take time. That time permits actions to prevent a nuclear terrorist attack. Al Qaeda will likely need another base and more assistance to master making a nuclear explosive.

Although a nuclear weapon in the hands of al Qaeda remains the greatest danger, many analysts believe that al Qaeda will try to strike at a nuclear facility or attack with a RDD using stolen radioactive materials. Documents found in Afghanistan and other information suggest that al Qaeda was considering attacks on nuclear power plants in Europe or the United States. Concern about RDDs intensified in May and June 2002 following revelations that senior al Qaeda official Abu Zubaydah told his captors that al Qaeda was interested in producing a RDD and knew how to do it. Adding to worries, was the arrest of the al Qaeda operative Jose Padilla in Chicago in May 2002. He was reportedly on a scouting mission for an al Qaeda operation to attack the United States with a RDD.

Profound Consequences of a Nuclear Explosion

Although the overall chance of al Qaeda detonating a nuclear explosive appears on reflection to be low, the consequences would be profound. A single nuclear explosion in a major metropolitan area would be catastrophic. Even a relatively low-yield nuclear explosion could cause tens, or hundreds of thousands of casualties. A severe earthquake can provide some indication of the level of damage to be expected from the blast of nuclear explosion, but it cannot capture the immense number of burns and radiation injuries that would follow a nuclear detonation.

Recovery from a nuclear explosion would be long and difficult. Financial impacts would be severe. Emotional consequences for both those most immediately and indirectly affected would be profound. No one would feel safe.

The desire for revenge may lead the United States, or perhaps its allies, to respond with nuclear weapons, eliminating the perpetrators if they could be immediately identified, but likely causing

untold suffering to civilian populations. U.S. use of nuclear weapons could fundamentally alter world order and institutions.

Preventing al Qaeda or other terrorist groups from acquiring nuclear weapons must remain a fundamental goal of the international community. Many of the necessary steps have been identified and are being implemented. Several actions, however, remain undone.

Steps to Prevent a Nuclear Attack

The existing strategy of the international community to aggressively pursue global terrorists remains the most effective way to prevent nuclear terrorism. Although often stated, the best defense is a good offense. Governments must be prepared to target such groups through covert and overt military means in order to deny them the ability to conduct nuclear weapons research and development.

The United States and allied governments are sharing intelligence about terrorist activities. They understand the importance of developing a strategy and method to detect attempts to acquire nuclear weapons or the wherewithal to make them. A well-accepted priority is placing agents in terrorist groups and providing financial and other incentives for members to defect.

Many have pointed out the critical need to better protect nuclear material worldwide, particularly in states or regions in conflict or experiencing instability. Significantly more resources are needed to develop adequate accounting and protection of nuclear explosive material and other radiological materials.

Similarly, it is accepted that technical and procedural capabilities to search for nuclear weapons or nuclear materials require improvement. Such improvements are occurring, although far more needs to be done worldwide.

Often overlooked is the need to continue to tighten export controls worldwide, particularly in places like the former Soviet Union and Pakistan. The production of nuclear weapons requires material, know-how, and manufacturing equipment. Countries need to improve export controls and be more vigilant to make it harder for terrorist groups to acquire needed items. In addition, more attention to the monitoring of certain exports may uncover terrorist group efforts to make nuclear weapons. Toward that end, countries should share more information about their nuclear dual-use exports. Information about making nuclear weapons was actively sought by al Qaeda. This sobering fact means that governments need to continue trying to strengthen their own controls on sensitive know-how. In addition to national systems, there is a need for an international set of guidelines about what types of nuclear weapons information should remain classified. Nations have a responsibility to have more open and transparent nuclear programs and policies. Nonetheless, not all nuclear information should be released. The oldest information about nuclear weapons design may be the most useful to terrorist groups. In addition, declassification guidelines are not always consistent from state-to-state, allowing classified information to be assembled piecemeal from several countries.

Many governments need to pay significantly more attention to the activities of their scientists who work in classified nuclear programs and can "leak" important know-how, equipment, materials, or components. No country can prevent all defections or leakage of sensitive items, but terrorist groups will likely depend on outside help to make nuclear weapons. Acquiring the services of a highly-trained expert may be necessary, or at least could significantly decrease the time it would take, for a terrorist group to produce a crude nuclear weapon. Governments, therefore, need to develop responsible programs to ensure the reliability of the people in their nuclear programs.

The safeguards system of the International Atomic Energy Agency (IAEA) has a role to play in preventing terrorists acquiring nuclear weapons. One step is to continue improving the IAEA's ability to detect undeclared nuclear activities in states. The IAEA needs to pay more attention in states that have little declared nuclear activity, such as Afghanistan, but where terrorist groups may establish a nuclear weapons program in secret. There were many indicators that al Qaeda and the Taliban regime were interested in nuclear activities prior to September 11th. The IAEA should use its expertise to flag undeclared activities in these types of states.

More resources are needed to improve the understanding of the capabilities of terrorist groups to make nuclear weapons. Some believe that a terrorist group could never build a nuclear weapon, even if it possesses large quantities of HEU. Others believe that a small group could easily build a nuclear explosive from HEU. Experience says that the truth lies somewhere in the middle. Knowing what terrorists can do is instrumental in developing an accurate and comprehensive plan of action to combat and prevent nuclear terrorism. One step is re-evaluating the type of nuclear explosives a terrorist may seek. The design may differ significantly from that sought by a nation. More needs to be learned about al Qaeda and other terrorist groups, particularly about who they recruit, and their potential approaches to building nuclear weapons. This information is critical to determining how terrorists may assemble the necessary materials, equipment, infrastructure, and expertise to obtain or build a nuclear explosive

Conclusion

The documents found in Afghanistan show that al Qaeda members are neither supermen nor morons. Their efforts in making nuclear weapons were far less sophisticated than known state programs, but their determination to get nuclear weapons is astounding and their apparent willingness to use them is terrifying. Because many of these terrorist groups will never give up in their quest for nuclear weapons and other WMD, the world cannot let down its guard either.

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3. "2 Nuclear Scientists Briefed," *op. cit*
4. *The Washington Post* reported on June 11, 2002 that the U.S. government had concluded that al Qaeda controls enough radioactive cesium, strontium, or cobalt to mount a radiological attack on the United States.
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6. "2 Nuclear Scientists Briefed," *op. cit*.
7. Kaman Khan, "Pakistan Releases Nuclear Scientists for Ramadan's End," *The Washington Post*, December 16, 2001.
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