



PROJECT AIR FORCE

CHILD POLICY
CIVIL JUSTICE
EDUCATION
ENERGY AND ENVIRONMENT
HEALTH AND HEALTH CARE
INTERNATIONAL AFFAIRS
NATIONAL SECURITY
POPULATION AND AGING
PUBLIC SAFETY
SCIENCE AND TECHNOLOGY
SUBSTANCE ABUSE
TERRORISM AND
HOMELAND SECURITY
TRANSPORTATION AND
INFRASTRUCTURE

This PDF document was made available from www.rand.org as a public service of the RAND Corporation.

[Jump down to document](#) ▼

The RAND Corporation is a nonprofit research organization providing objective analysis and effective solutions that address the challenges facing the public and private sectors around the world.

Support RAND

[Purchase this document](#)

[Browse Books & Publications](#)

[Make a charitable contribution](#)

For More Information

Visit RAND at www.rand.org

Explore [RAND Project AIR FORCE](#)

View [document details](#)

Limited Electronic Distribution Rights

This document and trademark(s) contained herein are protected by law as indicated in a notice appearing later in this work. This electronic representation of RAND intellectual property is provided for non-commercial use only. Permission is required from RAND to reproduce, or reuse in another form, any of our research documents for commercial use.

This product is part of the RAND Corporation documented briefing series. RAND documented briefings are based on research briefed to a client, sponsor, or targeted audience and provide additional information on a specific topic. Although documented briefings have been peer reviewed, they are not expected to be comprehensive and may present preliminary findings.

DOCUMENTED
BRIEFING



Aum Shinrikyo, Al Qaeda, and the Kinshasa Reactor

Implications of Three Case Studies
for Combating Nuclear Terrorism

Sara Daly, John Parachini, William Rosenau

Prepared for the United States Air Force

Approved for public release; distribution unlimited



PROJECT AIR FORCE

The research described in this report was sponsored by the United States Air Force under Contract F49642-01-C-0003. Further information may be obtained from the Strategic Planning Division, Directorate of Plans, Hq USAF.

ISBN 0-8330-3761-7

The RAND Corporation is a nonprofit research organization providing objective analysis and effective solutions that address the challenges facing the public and private sectors around the world. RAND's publications do not necessarily reflect the opinions of its research clients and sponsors.

RAND® is a registered trademark.

© Copyright 2005 RAND Corporation

All rights reserved. No part of this book may be reproduced in any form by any electronic or mechanical means (including photocopying, recording, or information storage and retrieval) without permission in writing from RAND.

Published 2005 by the RAND Corporation
1776 Main Street, P.O. Box 2138, Santa Monica, CA 90407-2138
1200 South Hayes Street, Arlington, VA 22202-5050
201 North Craig Street, Suite 202, Pittsburgh, PA 15213-1516
RAND URL: <http://www.rand.org/>
To order RAND documents or to obtain additional information, contact
Distribution Services: Telephone: (310) 451-7002;
Fax: (310) 451-6915; Email: order@rand.org

PREFACE

Revelations about A.Q. Khan's global nuclear marketing efforts and Osama bin Laden's contact with Pakistani nuclear scientists have raised concerns about the prospects of terrorists acquiring a nuclear or radiological weapons capability. During the Cold War, there were few instances where subnational groups seemed motivated and competent to acquire such capabilities. Over the past 15 years, terrorist capabilities, motivations, and opportunities have changed. Potential terrorist acquisition of a nuclear or radiological weapons capability poses a grave danger to U.S. national security and to the security of the international system of nation-states.

The historical record of terrorists pursuing nuclear and radiological capabilities is small in size, complicated by significant information gaps, and not well understood. The size of the dataset and the considerable unknowns about the cases where groups have sought these capabilities make it difficult to assess the nature of the danger and to anticipate new developments in the nature of the threat. However, given the potential consequences of terrorist theft of a nuclear weapon or indigenous development of a nuclear device—even one employing a crude design that produces only a small nuclear yield—poses a serious danger that the United States and other allied nations must take extraordinary measures to thwart. Developing an effective and comprehensive strategy to prevent terrorist acquisition of nuclear and radiological weapons capabilities must begin with a thorough understanding of the historical record of terrorist efforts and opportunities to acquire these capabilities. The three case studies described herein were undertaken to contribute to an understanding of this phenomenon.

This documented briefing is part of a larger project for the U.S. Air Force entitled "Denying Armageddon: Preventing U.S. Adversaries from Acquiring Nuclear Weapons."

The research reported here was sponsored by Brig Gen James M. Shames, AF/XOF; Brig Gen David E. Clary, AF/XOH; and Maj Gen (Sel) Robert L. Smolen, AF/XON. Work was conducted within the RAND Project AIR FORCE PAF-Wide program with oversight assistance from the Strategy and Doctrine and Aerospace Force Development programs. The analysis and recommendations should be of interest to the U.S. Air Force, the other military services, and to the many interagency actors engaged in trying to prevent the spread of nuclear weapons.

RAND Project AIR FORCE

RAND Project AIR FORCE (PAF), a division of the RAND Corporation, is the U.S. Air Force's federally funded research and development center for studies and analyses. PAF provides the Air Force with independent analyses of policy alternatives affecting the development, employment, combat readiness, and support of current and future aerospace forces. Research is performed in four programs: Aerospace Force Development; Manpower, Personnel, and Training; Resource Management; and Strategy and Doctrine.

Additional information about PAF is available on our web site at <http://www.rand.org/paf>.

CONTENTS

Preface.....	iii
Summary	vii
Acknowledgments	xi
Introduction	2
Case Study 1: Aum Shinrikyo’s Attempt to Acquire a Nuclear Capability	5
Case Study 2: Al Qaeda’s Attempts to Acquire a Nuclear Capability	22
Case Study 3: Smuggled Nuclear Material from the Kinshasa Research Reactor	54
Observations	68
Bibliography.....	71

SUMMARY

Even before the 9/11 attacks on the United States, national security officials had grown increasingly concerned about the potential for terrorists to acquire unconventional weapons or devices. Denying terrorists access to nuclear materials and components has been a particularly urgent priority, given the enormously destructive potential of terrorists armed with a nuclear weapon or an improvised nuclear device. To provide an empirical basis for policymaking, this documented briefing explores attempts by nonstate actors to acquire nuclear materials and to fabricate nuclear systems.

Three cases were selected for analysis. Although other terrorist groups in the past have shown interest in acquiring nuclear materials and devices, the two groups examined in this study, Aum Shinrikyo and al Qaeda, have demonstrated a commitment unmatched by other organizations. In addition, a substantial body of open-source material was available, although some of it was unreliable and contradictory, making absolute judgments impossible. The case of the disappearance of nuclear fuel rods from a reactor in Zaire illustrates what might be termed the “supply side” of the nuclear market and illustrates the pathways that terrorists or criminals might follow to obtain nuclear material. As with the two other cases explored here, open source material was available, although in many instances this information provided only a fragmentary and tentative account.

Beginning in the early 1990s, Aum, a religious cult with an apocalyptic ideology, recruited scientists and engineers to help the group acquire chemical, biological, and nuclear weapons. Aum identified Russia as a potential source of nuclear weapons, and cult members made numerous overtures to senior officials and scientists. But despite these entreaties, Aum was unable to purchase a nuclear weapon. As a result, Aum chose to focus on building rather than buying a nuclear weapon. Group members investigated the mining of uranium ore in Australia and used the Internet to glean sensitive information on nuclear facilities in Russia, the People’s Republic of China, South Korea, and elsewhere.

Fortunately, none of these efforts bore fruit. This study suggests that two factors worked against Aum’s nuclear acquisition program. First, the technical challenges associated with building a nuclear weapon became apparent to the group’s leadership, which chose instead to devote its ample financial and other resources to acquiring chemical weapons, such

as the nerve agent sarin, which Aum used in its 1995 attack on the Tokyo subway system. Second, despite the reportedly lax security in Russian nuclear facilities and Aum's high-level contacts in the government, Russian officials were unwilling to provide the cult with what it wanted (see page 21).

The second case study examines al Qaeda's nuclear activities. Like Aum, al Qaeda had the motivation, financial means, and physical security to pursue an acquisition program. And as with Aum, al Qaeda followed a two-track strategy. First, in the Sudan during the mid-1990s, al Qaeda tried to obtain nuclear materials that could be used to make a bomb. However, the group fell victim to scams involving "Red Mercury" and radiological waste.

In Afghanistan, under the protection of the Taliban, al Qaeda began a more ambitious acquisition effort that included consultations with Pakistani civilian nuclear scientists. Yet documents recovered in Kabul and elsewhere during and after the allied invasion in 2001 suggest that while al Qaeda's interest was high, it made little progress in terms of designing or fabricating a nuclear system. Al Qaeda may have also attempted to purchase weapons (including so-called suitcase nukes) from Russia and elsewhere, but here too the open-source record suggests that al Qaeda was unsuccessful. The study suggests several reasons for al Qaeda's failure: Nuclear material may be more difficult to obtain than al Qaeda anticipated; building a nuclear device is a formidable technical challenge; and Russian nuclear systems may be more secure than has sometimes been alleged (see pages 47–51).

The third case study examines the disappearance of two reactor rods that had been stored at a small research reactor in Kinshasa. The two rods vanished during the late 1970s and were unaccounted for over the next two decades. The rods, which contained small amounts of low-enriched uranium, would have been extremely difficult to use in a nuclear device. But during the late 1990s, an Italian smuggling ring, which had obtained one of the rods, believed that there might be buyers for the illicit material. The ring, which was linked to Italian organized crime, found buyers for one of the rods. The purchasers were in fact Italian undercover law enforcement agents who ensnared the smugglers in what became known as Operation Gamma. However, many questions about the nuclear rods remain unanswered. For example, how did the Italian ring obtain the rod? What happened to the second rod? Why didn't the International Atomic Energy Agency (IAEA) mount a vigorous search for the rods after they first went missing? (See pages 66–67.)

Looking across the three case studies, this documented briefing concludes with a set of observations. First, access to significant resources, including the sanctuary of a state, will not guarantee the success of a nonstate actor's nuclear acquisition effort. Second, even sophisticated terrorists searching for nuclear material have been victims of scams. Third, Russian officials appear to have been less corrupt, and Russian nuclear materials and expertise more secure, than many analysts in the West have alleged. Fourth, despite inspections and safeguards, the IAEA failed to prevent the loss of reactor fuel. Finally, the study suggests that strict controls on nuclear weapons, materials, and expertise will reduce opportunities for terrorists to acquire these resources (see pages 69–70).

ACKNOWLEDGMENTS

The authors would like to acknowledge the many contributions of John Peters and Michael Hynes, who led the overall “Denying Armageddon” study for RAND Project AIR FORCE (PAF). Additionally, they would like to thank Bruce Hoffman of RAND and Gary Richter of Sandia National Laboratory, who served as reviewers for this documented briefing. Their many insights and comments substantially strengthened this publication. Nancy Rizor provided invaluable assistance during the preparation of this manuscript. Finally, the authors would like to acknowledge Alan Vick, acting director of PAF’s Strategy and Doctrine Program, for his continued support. Any errors, of course, remain those of the authors.

***Aum Shinrikyo, al Qaeda, and the
Kinshasa Reactor:
Implications of Three Case Studies for
Combating Nuclear Terrorism***

Sara Daly, John Parachini, William Rosenau

RAND Project AIR FORCE

Briefing Outline

- ***Introduction***
- ***Case study 1:***
 - Aum Shinrikyo's attempt to acquire a nuclear capability
- ***Case study 2:***
 - Al Qaeda's attempts to acquire a nuclear capability
- ***Case study 3:***
 - Smuggled nuclear material from the Kinshasa research reactor
- ***Observations***

RAND Project AIR FORCE

This briefing examines three cases involving the pursuit of nuclear weapons and materiel by subnational groups and the opportunities they may have to follow through in this pursuit. Two of the cases examine groups that had the ability and motivation to pursue nuclear capabilities. The third case examines an instance in which nuclear fuel rods disappeared from a reactor in the Democratic Republic of Congo and smugglers sought to sell them as ingredients for a nuclear weapon. The three case studies together provide some insight into issues relating to the demand for these weapons capabilities and their supply.

Introduction to the Case Studies

- **Nonstate groups exist today with**
 - Motivations to cause devastating mass destruction
 - Significant financial resources, material, and human resources
 - Permissive sanctuary for operations
- **Opportunities to acquire key nuclear weapons components and capabilities appear abundant**
 - Security of Russian weapon storage facilities imperfect
 - Large global inventory of nuclear material
 - Nontraditional weapon designs and material
- **The case studies illustrate some of the pathways through the nuclear market these groups can pursue in acquiring a weapon and suggest the market forces that might be manipulated to prevent them from getting a nuclear weapon**

RAND Project AIR FORCE

On the demand side of the nuclear market, subnational groups existed whose political or theological belief structure motivated them to pursue massive devastation. Some of these groups had substantial financial and organizational resources, together with the physical assets and human resources attendant. Moreover, some of these groups enjoyed sanctuary—either in a lawless gray zone or as guests of the local rulers—in which they could pursue their plans. Alternatively, in Japan, extensive legal protections for religious organizations allowed Aum Shinrikyo to operate in a very permissive environment without much state interference. On the supply side of the nuclear market, the opportunities for such groups to acquire nuclear material and expertise are potentially numerous. The primary architect of Pakistan’s nuclear program, A.Q. Khan, showed that people from inside a state weapons program can, in certain circumstances, exploit their expertise, access, and control over equipment and material for considerable profit and personal aggrandizement. Similarly, the huge nuclear weapons inventory and production complex of the former Soviet Union (FSU) remains a vast potential source of supply. According to a National Intelligence Council

(NIC) report, "Russian security has been slowly improving over the last several years, but risks remain."¹

Russian inventory of nuclear weapons, particularly tactical weapons, remains larger than any other in the world. In its report, the NIC indicated that it remained "concerned about vulnerabilities to an insider who attempts unauthorized actions" at Russian nuclear weapons storage facilities. Similarly, the NIC noted that "Russian facilities housing weapons-usable nuclear material . . . typically receive low funding, lack trained security personnel, and do not have sufficient equipment for securely storing such material." As a result, security "varies widely among the different types of Ministry of Atomic Energy (Minatom) facilities and other Russian institutes. The NIC report concludes by noting that over the course of the last seven years, "Moscow has recognized the need for security improvements and, with assistance from the United States and other countries, has taken steps to reduce the risk of theft of its nuclear weapons and material."

While Russia possesses the largest amount of nuclear material of virtually all kinds, many other countries have quantities of weapons-usable nuclear material or other nuclear material that varies in terms of its security. The interest of some terrorists in nuclear weapons, the potential opportunities for acquiring nuclear weapons or material, and a number of nontraditional weapon designs, some of which may use previously uncontrolled strategic nuclear materials, all highlight the potential for terrorists acquiring nuclear weapons in an unprecedented fashion.

¹ National Intelligence Council, *Annual Report to Congress on the Safety and Security of Russian Nuclear Facilities and Military Forces*, February 2003. Paper prepared under the auspices of the National Intelligence Officer for Strategic and Nuclear Programs, p. 2.

Briefing Outline

- Introduction
- **Case study 1:**
 - *Aum Shinrikyo's attempt to acquire a nuclear capability*
- **Case study 2:**
 - Al Qaeda's attempts to acquire a nuclear capability
- **Case study 3:**
 - Smuggled nuclear material from the Kinshasa research reactor
- **Observations**

RAND Project AIR FORCE

Aum Shinrikyo has been designated a foreign terrorist group by the U.S. Department of State. The group has an apocalyptic belief structure in which the world is divided into two opposing forces—good and evil. Members of such movements view themselves as unappreciated avatars of a new world order and as a disenfranchised minority currently being persecuted by the powers of evil in the world today. Group leaders like Shoko Asahara firmly believe they will prevail after the apocalypse and are motivated to trigger the apocalypse because their own salvation depends upon fighting the final conflict and eradicating the enemy. The leadership of these movements often relies on a charismatic hold on their members for their authority and encourages the perception of them as messianic. Sometimes the belief system exercises very tight control over the daily lives of their membership, isolating them from normal social interactions. This further encourages their belief that they are unconstrained by normal social and legal norms.

Aum Leader's Beliefs Shaped Group's Worldview

- **Shoko Asahara prophesied about nuclear war**
- **He preached that Aum followers would be the only survivors of a coming Armageddon**
- **Asahara believed that Japan was doomed and that a U.S.-Japanese nuclear war would trigger Armageddon**

RAND Project AIR FORCE

Aum leader Shoko Asahara was obsessed with the prospect of nuclear war. He preached that Aum followers would be the only survivors of a coming Armageddon. There is much evidence that Asahara's obsession with nuclear weapons formed the foundation for all of his actions related to these weapons. He published several "symposia" during his time as leader in which he made statements about surviving a nuclear holocaust. Asahara initially tried to gain power peacefully through nonviolent means by preaching enlightenment through yoga and meditation. He altered these views following Aum's poor showing in the 1990 Japanese general election. Shortly after this political failure, Asahara began viewing Japanese and Western society as the enemy and advocated pursuing violent means to bring about Armageddon.² More broadly, Asahara believed that the arrival of nuclear war would trigger the final struggle between good and evil—involving the entire earth. He believed that Japan was doomed and that a U.S.-Japanese nuclear war would trigger Armageddon. He prophesied that in 1996 the United States would strike Japan with "nuclear warheads loaded with atomic or hydrogen bombs."

² Daniel Metraux, *Aum Shinrikyo and Japanese Youth*, Lanham, Md.: University Press of America, 1999, pp. 30–36.

Aum's internal structure mirrored the Japanese government because the cult planned to take over Japan following Armageddon.³

³ Robert Jay Lifton, *Destroying the World to Save It: Aum Shinrikyo, Apocalyptic Violence, and the New Global Terrorism*, New York: Henry Holt and Co., 1999, pp. 194, 199.

Historical Consciousness, Popular Culture Also Played a Role

- **Asahara's beliefs resonated with followers for two reasons:**
 - Reaction to the Cold War and the threatening existence of nuclear weapons
 - Japanese historical memory of nuclear devastation during WWII
- **Asahara was also influenced by the 1991 Persian Gulf War**
- **He claimed that a conspiracy among Japan, the United States, and the Jews existed to gain world domination**

RAND Project AIR FORCE

Asahara's ideology resonated with followers as a reaction to the Cold War and to the threatening existence of nuclear weapons and because of a widespread tendency among some Japanese to equate nuclear holocaust with Armageddon. He seized on a fear that resonated widely, particularly among the Cold War generation. Japanese historical memory of nuclear devastation during WWII, especially Hiroshima, had a major psychological impact on postwar Japan and its consciousness. Survivor stories and apocalyptic fears penetrated Japanese popular culture after WWII and persisted.⁴ Asahara was reportedly influenced by popular animated films that depicted nuclear wars, especially the 1983 television film "The Day After" about a Soviet-American nuclear confrontation. According to an Aum follower, Asahara showed this film numerous times to members of the organization.⁵ Aum also began to build strong buildings and underground shelters where Aum faithful could retreat in the event of nuclear war. He identified the subway as the only reliable nuclear shelter in Japan. The subway later became the scene of the 1995 sarin gas attack, committed by Aum followers.⁶ In addition, Asahara was influenced by the 1991 Persian Gulf War. He believed that the Gulf War

⁴ Lifton, pp. 211, 255.

⁵ Lifton, p. 199.

⁶ Metraux, p. 37, and Lifton, p. 195.

was a testing ground for weapons that might be used by the United States against Japan in Armageddon. He claimed that a conspiracy between the Japanese government, the United States, and the Jews existed to gain world domination. Asahara also saw the United States and the West as spreading rampant materialism and internationalism, which he saw as the root of Japan's problems.⁷

⁷ Ian Reader, *A Poisonous Cocktail? Aum Shinrikyo's Path to Violence*, Copenhagen: NIAS Books, 1996, pp. 56, 76; Ely Karmon, *The Anti-Semitism of Japan's Aum Shinrikyo: A Dangerous Revival*, Herzliya, Israel: International Policy Institute for Counter-Terrorism, October 15, 1999.

Scientists Attracted to Aum Ideology, Opportunities

- **Aum recruited highly educated followers, including more than 300 scientists**
 - **Scientists had degrees in medicine, biochemistry, biology, and genetic engineering—but none was clearly a nuclear physicist**
- **Many Aum scientists were second-rate**
- **Aum lured scientists with promises of unlimited funds and the opportunity to conduct original research**
- **One Aum scientist said he joined because he had anxiety fueled by fears of nuclear war**

RAND Project AIR FORCE

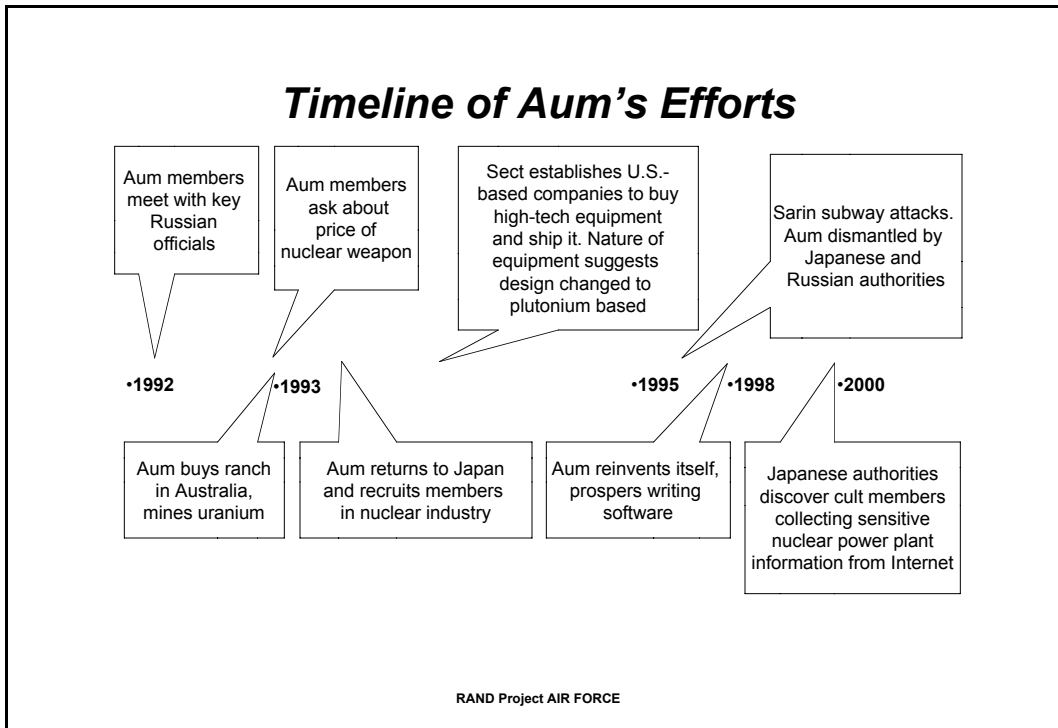
Aum recruited highly educated followers, including more than 300 scientists with degrees in medicine, biochemistry, biology, and genetic engineering. These academic specialties may have driven Aum toward chemical and biological rather than nuclear weapons. According to nuclear weapons builder Carson Mark, a nuclear weapons team would at a minimum require a nuclear scientist, a mechanical engineer, an electrical engineer, and an explosives expert.⁸

Many Aum scientists, however, were second-rate. Even though they graduated from some of Japan's best schools, they typically were not leaders in their fields. Aum gave them a second chance at their careers. Aum lured scientists with promises of unlimited funds and the opportunity to conduct original research. Aum did not wait for scientists to simply show up at meetings; they actively proselytized a number of graduate students in the hard sciences, promising research funds, state-of-the-art laboratories, and other inducements. Aum's offer was quite attractive because these individuals did not have many opportunities to conduct their own research and writing. In the real world, these scientists

⁸ Carson Mark et al., "Can Terrorists Build Nuclear Weapons?" Nuclear Control Institute, Washington, D.C., accessed at www.nci.org/k-m/makeab.htm; U.S. Senate Permanent Subcommittee on Investigations, *Hearings on Global Proliferation of Weapons of Mass Destruction: A Case Study on Aum Shinrikyo*, October 31, 1995; Metraux, p. 60.

were often just cogs in a wheel, but in Aum they could be chiefs of the cult's science and technology agency and research what they wanted at an impressive facility with a great deal of money. One Aum scientist said he joined because he had anxiety fueled by fears of nuclear war. He also said he saw images of a big bomb being dropped on a "megalopolis" and thought it looked familiar. He combined this fear with an attitude of hatred for Tokyo, and, as a result, he wished for such destruction to occur.⁹

⁹ Metraux, pp. 58-59; Mark, p. 128.



As the following pages will show, it appears that the group initially hoped that high-level Russian officials might sell them a nuclear weapon in return for a long-term relationship filled with large bribes and perhaps access to attractive foreign technologies to which the sect was privy.

Aum also sought to build a weapon itself. The group purchased a ranch in Australia where, among other things, it attempted to mine uranium.

When mining proved extremely difficult and key personnel were denied return entry privileges to Australia, the group abandoned this effort, returning to Japan.

After the 1995 attack on the Tokyo subway, the Japanese and Russian governments moved vigorously against the cult, jailing numerous members and closing many of the cult's facilities.

A few years after the subway attack, the group re-emerged as Aleph. There is evidence that some members of the group took keen interest in Japanese nuclear facilities. It is not clear whether they did so as a possible target to cause a pernicious nuclear accident or whether they sought to locate their facilities far from these plants to avoid the potential consequences from earthquakes.

Aum Investigated Acquiring Nuclear Weapons in Russia

- **Aum's chief mission in Russia was to buy a nuclear weapon**
 - Senior Aum leader Kiyohide's notebook includes notation about purchasing a nuclear weapon for \$15 million
- **Information on Aum's activities in Russia is incomplete**

RAND Project AIR FORCE

Senior Aum leader Hayakawa Kiyohide devoted considerable time and money to exploring Russia's advanced weapons market. He made eight trips to Russia in 1994. He kept a personal notebook—eventually confiscated by the authorities—which included the phrase, “Nuclear warhead. How much?” His shopping list included purchasing a nuclear bomb for \$15 million. A U.S. senator involved in the 1995 hearings indicated that “It is unclear whether the references are reflections of actual discussions or negotiations.” If a nuclear weapon was not available, Kiyohide wanted to build one in Japan.¹⁰

¹⁰ Metraux, pp. 78, 93; Lifton, p. 200; David E. Kaplan and Andrew Marshall, *The Cult at the End of the World*, New York: Crown Publishers, 1996, p. 190.

Senior Russian Contacts Helped Jumpstart Aum's Program

- **Aum had access to Russian leaders**
 - **Asahara led a delegation to Russia in 1992 to meet with senior government officials**
- **These connections allowed Aum access to the black market and to various materials and hardware**
- **Aum wanted to use these contacts to obtain sensitive military technologies**
- **Russian intelligence may have helped Aum to exploit scientific and technical data that Aum possessed**

RAND Project AIR FORCE

Aum had close relations with some senior Russian contacts, contacts the group exploited to develop its military capabilities. Asahara led a delegation to Russia in 1992 to meet with senior Russian government leaders. The delegation met with former Vice President Aleksandr Rutskoy and former Russian Parliament speaker Ruslan Khasbulatov. Head of Russia's Security Council, Oleg Lobov, immediately befriended Asahara and gave him a large, old building in Moscow. Lobov wanted to start a Russia-Japan university in Moscow, but was having trouble raising money for the project until he met Asahara. Lobov reportedly received between \$500,000 and \$1 million from Aum.¹¹ At the outset, most Russian officials denied they helped Aum in any way; however, U.S. Senate investigators found photos in Aum publications that showed Rutskoy, Khasbulatov, Basov, and Lobov with Asahara. Lobov later admitted that he met with Aum members, but said he was duped by their charitable nature and that the Russian intelligence service did not warn him away from Aum. These connections allowed Aum access to the black market and various materials and hardware, including formulae for the production of chemical weapons. Aum hoped to use these contacts to

¹¹ D. W. Brackett, *Holy Terror: Armageddon in Tokyo*, New York: Weatherhill Inc., 1966, p. 92; Reader, p. 92.

obtain sensitive military technologies.¹² Kiyohide's attempts to procure these technologies were rumored to involve large bribes to senior Russian officials, including Lobov. Russian intelligence may have helped Aum acquire military technologies in an attempt to acquire scientific and technical data that Aum had stolen from Japanese research centers.¹³

¹² Brackett, p. 93; Reader, p. 75.

¹³ "Japan: Book Probes Aum Terrorism, Ties with Russia," DPRK Part 2, FBIS, July 30, 2000; Brackett, p. 101.

Aum Also Cultivated Ties with Russian Scientists

Aum targeted Russia's premier nuclear research facility, the Kurchatov Institute, for expertise and technology

- The cult was able to recruit at least two Russian nuclear scientists**

Aum leaders visiting Russia in 1992–1993 approached science officials to obtain laser and nuclear technologies

Asahara held talks with Nikolai Basov, a Nobel Prize winner for physics, in Moscow in 1992

Aum's Moscow branch proposed a meeting in 1993 with Russia's Nuclear Energy Minister, but was turned down

RAND Project AIR FORCE

Aum targeted Russia's premier nuclear research facility, the Kurchatov Institute, for expertise and technology because it reportedly possessed hundreds of kilograms of weapons-usable uranium. Aum allegedly recruited scientists from Moscow University and the Kurchatov Institute, which also reportedly employed Aum followers. At its height, Aum may have had some 35,000 followers in Russia.

According to U.S. congressional investigators, the cult recruited at least two Russian nuclear scientists. Aum leaders approached Russian science officials to obtain laser and nuclear technologies. Asahara held talks with Nikolai Basov, a Nobel Prize winner for physics. The Nuclear Energy Minister declined to meet with Aum's Moscow branch.¹⁴

¹⁴ Matthew Bunn, The Harvard Project on Managing the Atom, Belfer Center for Science and International Affairs, Carnegie Non-Proliferation Project, *The Next Wave: Urgently Needed New Steps to Control Warheads and Fissile Material*, April 2000; Bracket, p. 92; Metraux, p. 93; "Aum Sought Russian Laser, Nuclear Technologies," Tokyo KYODO in English, FBIS, April 10, 1995.

Aum Changed Acquisition Strategies When Russians Failed to Cooperate

- **Despite high-level connections, plentiful financial resources, persistence, and a weak nuclear security regime in Russia, Aum could not obtain nuclear weapons**
- **Unable to get a nuclear explosive device, Aum turned its attention to other approaches . . .**

RAND Project AIR FORCE

Aum's attempts to acquire nuclear capabilities in Russia were limited and embryonic.

Russian officials appear to have exercised caution in handling Aum's inquiries about nuclear matters. This caution may be explained in several ways. First, the Russians may have feared that Aum was working for a foreign intelligence service. Second, even enterprising Russian officials and scientists may have feared the implications of transferring nuclear technology, knowledge, or material to a religious organization based in a foreign state. Third, Aum's contacts may have been good, but not good enough to secure the transfer of such sensitive capabilities.

Aum's Nuclear-Related Activities in Australia

- **Asahara believed Australia would be unaffected by Armageddon**
- **Aum bought a sheep farm at Banjawarn in 1993 to test chemical weapons and mine uranium**
 - **However, the cult found little uranium**
 - **They also explored the possibility of exporting uranium ore from Australia to Japan via ship in 1993**

RAND Project AIR FORCE

Perhaps Aum's most ambitious scheme was its operation in Australia. Asahara believed Australia would be unaffected by Armageddon and is one reason why he wanted to establish a permanent facility there. Aum bought a sheep farm at Banjawarn in 1993 as a place to test chemical weapons and mine uranium. They bought mineral exploration licenses to ensure that no one else could enter the property to prospect for minerals. They also formed two Aum companies—Mahaposya Australia Pty Ltd and Clarity Investments Pty Ltd—as front businesses to cover up their true activities. These companies became the actual holders of the mineral licenses.¹⁵ Asahara brought 25 people to Australia in 1993 to live at Banjawarn Station. The cult brought excess luggage that contained equipment for mining uranium. Two sect members were fined for carrying dangerous goods on an airplane, but were released.¹⁶ However, the cult found little uranium. Aum met with an Australian geologist in early September 1993 and discussed the possibility of exporting uranium ore from Australia to Japan via ship.¹⁷

¹⁵ Bracket, pp. 94–96.

¹⁶ Bracket, pp. 94–96.

¹⁷ Bracket, p. 94.

Aum Pursued Sensitive Nuclear Information via Internet

- **In 2000, Japanese police searches of Aum facilities revealed classified information about nuclear facilities in Russia, Ukraine, PRC, South Korea, and Taiwan**
- **Group broke into classified computer networks to obtain data**
- **Also had detailed information on routes and procedures of nuclear fuel transport in Japan**

RAND Project AIR FORCE

In 2000, the cult hacked into classified computer networks to obtain information about nuclear facilities in Russia, Ukraine, the People's Republic of China, South Korea, and Taiwan. Working from legitimate companies Aum had established, group members were able to obtain information about a Russia-commissioned device for plutonium processing, the Monju fast-breeder reactor in Japan, and the safety system of Ukraine's Chernobyl nuclear power plant.¹⁸ Japanese police also discovered that Aum software developers had been collecting information about Japan's nuclear power program. The cult compiled information about nuclear fuel suppliers and the transportation of nuclear materials through affiliated software companies that had developed computer programs for key corporations and governmental entities in Japan.

Data on companies involved in Japan's nuclear programs and those engaged in nuclear research were included. Police also discovered background files on 75 researchers working with radioactive materials and other nuclear-related studies. Other materials found in the raids

¹⁸ Vasiliy Golovnin, "Russian Scientist Denies Aum Shinrikyo Threat to AES's," *Moscow Izvestiya in Russian*, FBIS, March 3, 2000; Vasiliy Golovnin, "Aum Cult Implicated in Nuclear Information Stealing," *Moscow ITAR-TASS in English*, FBIS, March 29, 2000; "Aum Had Nuke Plant Info," *Mainichi Shimbun*, March 28, 2000.

indicated that Aum members measured radioactivity levels at a cult compound in Japan in 1988.¹⁹ A group spokesman responding to these discoveries claimed that the group had no intention of conducting nuclear terrorism and that it collected the information in order to know how to respond to accidents at nuclear power plants.²⁰

¹⁹ "Cult Siphoned Nuclear Data: Police Say Aum Shinrikyo-Related Software Developers Build Dossiers on Researchers," *Asahi Shimbun*, March 29, 2000.

²⁰ *Ibid.*

Barriers to Aum's Nuclear Ambitions

According to some experts:

- **Aum was stifled in its efforts to obtain and/or manufacture nuclear weapons by a combination of several factors**
 - ***Ideological constraints:*** Asahara had a deadline to meet
 - He predicted Armageddon would begin in 1995, and unless something dramatic occurred, his credibility would be in question
 - Aum was much farther along in its chemical program than in its pursuit of nuclear weapons, so it used sarin gas in 1995 to “start” the Armageddon
 - ***Acquisition difficulties:*** Senior Russian leaders were apparently unwilling to turn over critical nuclear design information, special fissile material, or a fully assembled nuclear bomb
 - Relationship with Aum did not outweigh the importance of protecting Russia's nuclear program
 - Could not obtain necessary materials in United States or Japan
 - Ukraine, Belarus banned Aum in 1993

RAND Project AIR FORCE

The view of some experts is that, despite the group's many advantages, its efforts to obtain and/or manufacture nuclear weapons were stifled by a *combination* of several factors:

Ideological constraints: Asahara had a deadline to meet. He predicted that Armageddon would begin in 1995, and unless something dramatic occurred, his credibility as a “seer” would be in question.²¹ Aum was much farther along in its chemical program than in its pursuit of nuclear weapons, so it used sarin gas in 1995, hoping to precipitate Armageddon.²² Aum placed most of its emphasis on its chemical and biological programs because they were easier.

Nuclear security limitations: The relationship Russian government officials enjoyed with Aum—and the personal benefits they derived from it—did not outweigh the importance of protecting Russia's nuclear program.

²¹ Lifton, p. 93.

²² Lifton, p. 93.

Briefing Outline

- **Introduction**
- **Case study 1:**
 - Aum Shinrikyo's attempt to acquire a nuclear capability
- **Case study 2:**
 - *Al Qaeda's attempts to acquire a nuclear capability*
- **Case study 3:**
 - Smuggled nuclear material from the Kinshasa research reactor
- **Observations**

RAND Project AIR FORCE

Let us now turn to al Qaeda and its efforts.

Alleged al Qaeda Attempts to Acquire Nuclear Capabilities

Incident	Estimated Date of Incident	Date First Reported	Source	Citation
Bin Laden allegedly pays £2m to middleman for Central Asian "suitcase nuke"	Unspecified	16 August 1988	Israeli military intelligence	Marie Colvin, "Holy War With US in his Sights," <i>Times</i> (London), 16 August 1988
Bin Laden allegedly obtains seven enriched uranium rods	Unspecified	November 2001	Italian organized crime office, according to "French expert"	Uthman Tizghart, "Does Bin Ladin Really Possess Weapons of Mass Destruction?" <i>Al-Majallah</i> (London), 25 November 2001
Bin Laden allegedly buys 48 "suitcase nukes" from Russian mafia	Before 11 September 2001	8 September 2002	Unnamed French counterterrorism expert	"Al-Majallah Obtains Serious Information on al Qaeda's Attempt to Acquire Nuclear Arms," <i>Al-Majallah</i> (London), 8 September 2002
Russians thwart attempt by AQ front to buy Soviet-origin uranium	1998	19 September 2001	"Former Russian intelligence official"	Eart Lane and Knut Royce, "Nuclear Aspirations?" <i>Newsday</i> , 19 September 2001

SOURCE: Kimberly McCloud, Gary A. Ackerman, and Jeffrey M Bale, "Chart: Al Qaeda's WMD Activities," Center for Nonproliferation Studies, Monterey Institute of International Studies, http://cns.miiis.edu/pubs/other/sjm_cht.htm.

RAND Project AIR FORCE

During the past five years, many accounts have appeared in the press regarding al Qaeda (AQ) and nuclear weapons and materials. The above chart depicts a small number of these stories to illustrate the range of public reporting on al Qaeda's nuclear activities. However, the reliability of these stories is uncertain, and so they must be approached with caution.

Evidence of al Qaeda Interest in Nuclear Weapons

- **There is widespread agreement in the U.S. intelligence community that al Qaeda has had a strong interest in, and has attempted to acquire, nuclear weapons**
- **To date, however, no official has stated publicly that al Qaeda has actually acquired nuclear weapons**

RAND Project AIR FORCE

A consensus exists among U.S. government officials that al Qaeda has actively pursued the acquisition of nuclear weapons.²³

As the director of the Defense Intelligence Agency told the Senate Select Committee on Intelligence on 11 February 2003, "Al Qaeda and other terrorist groups are seeking to acquire chemical, biological, radiological, and nuclear [CBRN] capabilities."²⁴ It should be noted, however, that to date there has been no public confirmation by officials that al Qaeda has actually *acquired* nuclear weapons, or indeed any nuclear material necessary to build a weapon.

²³ *United States of America v. Usama Bin Laden*, Indictment 98Cr., United States District Court Southern District of New York, p. 7. See also *United States of America v. Enaam M. Arnaout*, Government's Evidentiary Proffer Supporting the Admissibility of Coconspirator Statement, United States District Court North District of Illinois Eastern Division, No. 02 CR 892, pp. 22–23.

²⁴ Vice Admiral Lowell E. Jacoby, Director, Defense Intelligence Agency, statement for the record, Senate Select Committee on Intelligence, February 11, 2003, p. 3; and George J. Tenet, Director of Central Intelligence, testimony before the Senate Armed Services Committee, March 19, 2002, www.odci.gov/cia/public_affairs/speeches/archives/2002/senate_select_hearing_03192002.html.

Motivation

- **“Acquiring weapons for the defense of Muslims is a religious duty. . . . It would be a sin for Muslims not to try to possess the weapons that would prevent the infidels from inflicting harm on Muslims.”**
(January 1999)
- **“The United States is the biggest terrorist and rogue and it is the duty of every Muslim to struggle for its annihilation.”**
(March 1998)

RAND Project AIR FORCE

Bin Laden has articulated at least two rationales underlying his attempts to acquire nuclear weapons. First, for bin Laden, acquiring nuclear weapons is a solemn religious duty—he intends to use them to defend his co-religionists from the “Jews and Crusaders.”²⁵

Bin Laden also seeks to inflict the maximum amount of physical damage on the United States. Given their potential power, nuclear weapons are an obvious means to this end.²⁶

²⁵ Rahimulla Yusufzai, “Conversation with Terror,” *Time* (Canada), January 11, 1999, p. 14.

²⁶ “Interview with bin Laden Reported,” March 31, 1998, FBIS document no. FTS1998033100479.

Al Qaeda CBRN Threat

- **“We have the weapons [nuclear and chemical] as deterrent.”**
- **“I wish to declare that if America used chemical or nuclear weapons against us, then we may retort with chemical and nuclear weapons.”**

RAND Project AIR FORCE

Bin Laden asserted that the group already has nuclear weapons.²⁷ Most Western analysts view these claims skeptically, but fear they might prove true in the future if the group is not destroyed.

In an interview Ayman al-Zawahiri gave to Hamid Mir for Australian Broadcasting Corporation television, he stated that “we sent our people to Moscow, to Tashkent, to other central Asian states and they negotiated, and we purchased some suitcase bombs.”²⁸ Describing the ease with which these weapons could be procured, al-Zawahiri said that “if you have \$30 million, go to the black market in central Asia, contact any disgruntled Soviet scientist, and a lot of . . . smart briefcase bombs are available.” No U.S. or allied government officials have confirmed or refuted this assertion.

²⁷ Quoted in Hamid Mir, “Osama Claims He Has Nukes: If U.S. Uses N-Arms It Will Get Same Response,” *Dawn* (internet edition), www.dawn.com/2001/11/10/top1.htm.

²⁸ Hamid Mir interview with Ayman al-Zawahiri for Australian Broadcasting Corporation television, as reported in Associated Press, March 21, 2004, <http://apnews.myway.com/article/20040321/D81F0G20.html>.

Divine Motivation



“If I have indeed acquired these weapons, then this is an obligation that I carried out and I thank God for enabling us to do that.”

(Rahimullah Yusufzai interview, January 1999)

SOURCE: Photo courtesy of The Federal Bureau of Investigation, <http://www.fbi.gov/mostwant/terrorists/terubl.htm>

RAND Project AIR FORCE

Bin Laden believes he is divinely entitled to have nuclear weapons. It is perhaps interesting to note that he seems to ascribe some of the same benefits of having nuclear weapons that states do—that owning them will improve their security.

Bin Laden believes that possessing these weapons will deter the United States from using nuclear weapons against him and his followers. As bin Laden announced in a November 2001 interview with a Pakistani journalist, “we have chemical and nuclear weapons as a deterrent and if America used them against us we reserve the right to use them.”²⁹

²⁹ Quoted in Hamid Mir, “Osama Claims He Has Nukes: If U.S. Uses N-Arms It Will Get Same Response,” *Dawn* (internet edition), www.dawn.com/2001/11/10/top1.htm.

Al Qaeda's Formidable Resources to Acquire a Nuclear Weapon

- **Financial—possibly hundreds of millions of US\$**
- **Sanctuary—Sudan, then Afghanistan**
- **Organizational capacity—front companies endowed him with seemingly legitimate logistical and financial means**
- **Demonstrated operational capacities by simultaneously attacking separate targets in different countries**
- **Some technical expertise**

RAND Project AIR FORCE

Al Qaeda had many of the resources and attributes necessary to acquire nuclear weapons.

Early Acquisition Efforts (1)

- **Focus on attaining materials to build a nuclear device**
- **Efforts began in Sudan during 1992–1996 period**

RAND Project AIR FORCE

See *United States of America v. Enaam M. Arnaout*, Government's Evidentiary Proffer Supporting the Admissibility of Coconspirator Statement, United States District Court Northern District of Illinois Eastern Division, No. 02 CR 892, pp. 22–23.

Early Acquisition Efforts (2)

- **Bin Laden made investments in the local economy**
 - **Agriculture, banking, construction**
- **Established dual-use companies for terrorist cover purposes**
- **Provided funds to Sudan’s National Islamic Front (NIF), including the state-owned Military Industrial Corporation (MIC)**
- **In return, NIF provided sanctuary and what has been described as “laboratory assistance”**

RAND Project AIR FORCE

The cash-strapped NIF regime welcomed bin Laden’s financial infusions. For his part, bin Laden gained access to a sanctuary that allowed him to pursue his interest in CBRN weapons. In all likelihood, the MIC was the vehicle through which bin Laden attempted to acquire CBRN.³⁰

³⁰ Anonymous, *Through Our Enemies’ Eyes: Osama bin Laden, Radical Islam, and the Future of America*, Washington, D.C.: Brassey’s Inc., 2002, p. 186. According to another source, the Sudanese provided bin Laden with little more than “laboratory assistance” (Rohan Gunaratna, *Inside Al Qaeda: Global Network of Terror*, New York: Columbia University Press, 2002, p. 48).

Early Acquisition Efforts (3)

- **Bin Laden employed a top aide, Mamdouh Mahmud Salim, as a “point man” on nuclear and other sophisticated weapons**
- **In late 1993, Salim agreed to scheme to obtain enriched uranium**
- **Results unimpressive: offered low-grade reactor fuel that was not usable in classical weapon designs**

RAND Project AIR FORCE

Al Qaeda’s early efforts to develop nuclear weapons were unimpressive. Mamdouh Mahmud Salim, bin Laden’s “point man” on nuclear matters and an early member of al Qaeda, was apparently the victim of a scam involving low-grade reactor fuel.³¹

According to another researcher, “[i]ntelligence sources now believe that criminals sold al Qaeda irradiated canisters purporting to contain uranium stolen from Russian army bases, whereas in fact the contents would have had no military value whatsoever had it been passed to rogue nuclear scientists.”³²

Salim was finally arrested in Munich in September 1998, and extradited to the United States, where he awaits trial.³³

³¹ Stefan Leader, “Osama Bin Laden and the Terrorist Search for WMD,” *Jane’s Intelligence Review*, Vol. 11, No. 6, June 1999.

³² Rohan Gunaratna, *Inside Al Qaeda: Global Network of Terror*, New York: Columbia University Press, 2002, p. 11.

³³ Hugh Davies, “Bin Laden Aide ‘Tried to Buy Atomic Arms,’” *Daily Telegraph* [London], September 28, 1998, www.dailytelegraph.co.uk.

Early Acquisition Efforts (4)

- **Trial of East Africa embassy bombers shed additional light on al Qaeda's early efforts to acquire nuclear material**
- **Jamal Ahmad al-Fadl, star prosecution witness, testified in February 2001 that al Qaeda was willing to spend \$1.5M to acquire uranium in Khartoum**
 - **Did not know whether deal was ever concluded**

RAND Project AIR FORCE

Al-Fadl testified that in 1993 he was sent to meet a man outside the capital who was selling uranium, allegedly from South Africa. He also testified that he did not know whether the deal ever took place, but that bin Laden was "very serious" about buying the material.³⁴

For more on al-Fadl's activities, see *United States of America v. Usama Bin Laden, et al.*, United States District Court, Southern District of New York, 7 February 2001, S(7) 98 Cr. 1023, particularly pp. 357–366.

³⁴ Julian Borger and Ewen MacAskill, "Bin Laden Is Looking for a Nuclear Weapon; How Close Has He Come?" *Guardian* [London], November 7, 2001, www.guardian.co.uk.

Scams

- **Al Qaeda subject of numerous other scams involving radioactive material**
- **“Osama’s buyers weren’t physicists, and the people selling to him were trying to rip him off.”**
 - e.g., “Red Mercury”

RAND Project AIR FORCE

According to press accounts, Osama bin Laden and his associates were tricked into paying for material called “Red Mercury,” which they believed to be weapons-grade nuclear material.³⁵ In the mid-1990s, a number of smugglers claimed to have nuclear material that they referred to as “Red Mercury,” but in most instances the material was fictitious or radiological waste and not weapons-grade nuclear material.

³⁵ Stefan Leader, “Osama bin Laden and the Terrorist Search for WMD,” *Jane’s Intelligence Review*, Vol. 11, No. 6, June 1999.

Afghanistan

- **Al Qaeda's symbiotic relationship with the Taliban enables the use of Afghanistan as a secure base for pursuing unconventional weapons capabilities**
- **State sanctuary allowed al Qaeda to hide its activities from the outside world**

RAND Project AIR FORCE

Enjoying the protection of the Taliban regime, al Qaeda was able to pursue its CBRN acquisition in relative security. At least one author has suggested that the Taliban provided more than security. According to David Albright, the regime may have transferred nuclear material and technology to al Qaeda.³⁶

Other sources allege that the Taliban attempted to recruit a "former Soviet nuclear weapons expert from a Central Asian state," but the plot was disrupted by Russian authorities.³⁷ Searches of al Qaeda facilities after Operation Enduring Freedom have produced little evidence of much progress in the al Qaeda nuclear weapons program.

³⁶ David Albright, Kathryn Buehler, and Holly Higgins, "Bin Laden and the Bomb," *Bulletin of the Atomic Scientists*, Vol. 58, No. 1, January/February 2002, p. 23.

³⁷ Robert Hutchinson, "The Struggle for Control of Radioactive Sources," *Jane's Intelligence Review*, March 2003, p. 33.

Pakistani Scientists May Have Offered Assistance

- **Individuals within Pakistan's nuclear establishment unhappy with country's relatively moderate leadership**
- **Sultan Bashiruddin Mahmood, 38-year veteran of Pakistan's civilian nuclear program, met with Osama bin Laden in Pakistan**
- **Mahmood may have shared classified information with bin Laden, but unlikely that he possessed the specialized knowledge to build nuclear weapons**
 - **Bin Laden may have used Mahmood to recruit other scientists**

RAND Project AIR FORCE

External expertise, particularly from Pakistan, played a part in al Qaeda's attempts to develop a nuclear capability since the late 1990s. A group of "pious scientists"—also described as the "long beards"—long existed within Pakistan's nuclear establishment.³⁸ If bin Laden managed to recruit the long beards to help him, it would have been a very important step because all of the successful nuclear weapons programs to date have been led by teams rather than by single individuals.

Bin Laden informed Mahmood that al Qaeda was intensely interested in nuclear and other unconventional weapons, and he told Mahmood 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 [IMU]."³⁹ Mahmood reportedly told bin Laden that the material is unsuitable for building a nuclear weapon. According to one analyst, the Pakistanis may have given al Qaeda a "road map" for building a nuclear weapon, e.g., identifying key technology and suppliers.⁴⁰ Other Pakistanis

³⁸ Peter Baker, "Pakistani Scientist Who Met Bin Laden Failed Polygraphs, Renewing Suspicions," *Washington Post*, March 3, 2002, p. A01.

³⁹ Baker; Robert Hutchinson, "The Struggle for Control of Radioactive Sources," *Jane's Intelligence Review*, March 2003, p. 33.

⁴⁰ David Albright and Holly Higgins, "A Bomb for the Ummah," *Bulletin of the Atomic Scientists*, Vol. 59, No. 2, March/April 2003, pp. 49–55.

may have been involved as well. According to a press account, Suleiman Assad and Mohammed Mukhtar, two nuclear scientists suspected by the Americans of involvement with al Qaeda or the Taliban, fled to Burma during late 2001 or early 2002 to avoid questioning.⁴¹

⁴¹ Rahul Bedi, "Nuclear Scientists in Myanmar," *Jane's Intelligence Review*, Vol. 14, No. 3, March 2002, p. 2.

“Superbomb”

- **Search of sites suspected of involvement in CBRN revealed instruction manuals and other documents**
- **Documents reinforce assessment that al Qaeda determined to acquire nuclear weapons, but also sought radiation dispersion devices (RDDs)**
- **Some documents likely destroyed or removed by al Qaeda**
- **No evidence of weapons or nuclear material**

RAND Project AIR FORCE

During the course of Operation Enduring Freedom, allied military forces uncovered a number of documents relating to nuclear weapons. Among them was a weapons design that experts who examined it characterized as unworkable, and other documents suggesting the group was also interested in a radiological dispersion device. CNN obtained several papers from a suspected al Qaeda location in Kabul.⁴²

⁴² Mike Boettcher and Ingrid Arnesen, “Al Qaeda Documents Outline Serious Weapon Program,” CNN.com, January 25, 2002, www.cnn.com/2002/US/01/24/inv.al.qaeda.documents.

Al Qaeda Documents

- **“Superbomb” document may have been used to inform al Qaeda members about nuclear weapons**
- **The atomic bomb designs contained in document “are not credible nuclear weapons designs. If someone obtained separated plutonium and built this design, it would not function as an atomic bomb.”**

(David Albright, 6 November 2002)

– **More likely to have functioned as RDD**

RAND Project AIR FORCE

The “Superbomb” document was discovered in Kabul and turned over to David Albright of the Institute for Science and International Security (ISIS) for analysis.⁴³ To date, Albright has provided the most authoritative open-source analysis of al Qaeda’s nuclear activities in Afghanistan. In his judgment, there was no evidence that the group had gone beyond theory: “To create a nuclear weapon, Albright said a designer must learn a whole set of manufacturing steps not mentioned in al Qaeda’s manual and develop confidence in the weapon’s design.”⁴⁴

Other documents suggested a more sophisticated knowledge of nuclear weapons, although they contained mistakes, e.g., references to “Saturium.”⁴⁵

⁴³ “Al Qaeda Documents, Manuals Found in Kabul,” www3.cnn.com/2001/WORLD/asiapcf/central/11/16/ret.al.qaeda.documents.

⁴⁴ Ibid.

⁴⁵ David Albright, “Al Qaeda’s Nuclear Program: Through the Window of Seized Documents,” *Nautilus Institute Special Forum*, Vol. 47, November 6, 2002.

Al Qaeda Documents Raise Many Questions

- **Documents contained nothing on shaped charges**
 - Supports conclusion that al Qaeda’s capabilities were limited
 - May have been more interested in an RDD as an easier step up the learning curve
- **Fuels speculation by some observers that al Qaeda was focusing on simpler gun-assembled design**
 - Would require at least 50 kgs of highly enriched uranium
 - But from where?
 - Doubts about whether al Qaeda possessed other critical technologies necessary to execute such a design

RAND Project AIR FORCE

Overall, the seized documents suggest a rather limited capability.⁴⁶ In the words of one U.S. official, “If they [al Qaeda] had been handed the plans for a nuclear bomb, the worst they could have done is use them as kindling to start a fire.”⁴⁷ This conclusion is echoed in the more measured words of Geoff Hoon, the UK defence secretary, who announced in November 2001 that “[w]e are not convinced at this stage that he is capable of producing a nuclear bomb.”⁴⁸

After reviewing the available evidence, the nuclear weapons designer on the RAND Corporation’s research team noted that al Qaeda apparently did not have the other essential technologies necessary to execute a gun-assembled device.

⁴⁶ Ibid.

⁴⁷ Quoted in David E. Sanger, “Nuclear Experts in Pakistan May Have Links to Al Qaeda,” *New York Times*, December 9, 2001.

⁴⁸ Interview with Defence Secretary Geoff Hoon, interview with John Deane, Chief Political Correspondent, PA News, London Press Association, November 11, 2001, FBIS document no. EUP20011111000048, “UK’s Hoon: Bin Ladin ‘Has Material That Could Contribute’ to Nuclear Weapons.”

Alleged Attempts to Purchase Weapons

- **Frustrated by scams when attempting to acquire materials, and (perhaps) lacking technical expertise, al Qaeda may have attempted to buy, rather than build, nuclear weapons**
- **Search for a “turnkey” weapon as early as 1998**

RAND Project AIR FORCE

Bin Laden’s nuclear program may have taken a major shift. He may have concluded that it was simply too difficult to build a nuclear device. Instead, he may have attempted to buy full-up nuclear warheads.⁴⁹

At the same time, according to press accounts, individuals associated with bin Laden continued to seek out low-level radioactive material, most likely for use in a radiological dispersal device or “dirty bomb.” In October 2001, for example, the British press reported that a bin Laden operative in Pakistan offered a Bulgarian businessman \$200,000 to set up a front company to purchase radioactive waste from a nuclear power station in Bulgaria.⁵⁰

⁴⁹ Anonymous, *Through Our Enemies’ Eyes: Osama bin Laden, Radical Islam, and the Future of America*, Washington, D.C.: Brassey’s Inc., 2002, pp. 189–190.

⁵⁰ Adam Nathan and David Leppard, “Al Qaeda’s Men Held Secret Meeting to Build Dirty Bomb—Bin Laden’s Nuclear Plot—War on Terrorism,” *Sunday Times* [London], October 14, 2001, cited in Rensselaer Lee, “Nuclear Smuggling: Patterns and Responses,” *Parameters*, Vol. XXIII, No. 1, Spring 2003, p. 110 (fn. 12).

Alleged Diversion of “Suitcase Nukes”

- **Since 1999, there have been numerous and unsubstantiated claims that Russian “suitcase nukes” have wound up in al Qaeda’s hands**
- **Pakistani press claims (November 2001) that two “briefcase” nuclear weapons, each containing “at least 2kgs of fissionable plutonium and uranium” have reached U.S. shores**
- **Details are vague enough not to address key questions—do the weapons have PALs on them?**

RAND Project AIR FORCE

Since 1999, press reports from the Middle East and South Asia have alleged that al Qaeda has obtained Russian atomic demolition munitions (ADMs) or “suitcase nukes.” According to one Israeli source, eight to ten ADMs, built for the KGB’s First Directorate during the 1970s, are now in al Qaeda’s hands.⁵¹

Some press reports have gone even farther, alleging in 2001 that al Qaeda’s “briefcase” weapons have reached American shores.⁵² Some critical details are missing from these press accounts. A key question is whether the weapons are fitted with permissive action links (PALs) that would have to be overcome in order to detonate the weapons. According to one study, Russian “portable nuclear weapons are equipped with some protection devices (e.g., PALs), making their unauthorized use difficult, though not completely impossible.”⁵³ Other reviews of the Russian

⁵¹ “DEBKA: Secret Services Think Key to Bin Ladin’s Nuclear Capability Lies in Spain,” *Jerusalem DEBKA-Net-Weekly*, October 12, 2001, FBIS document no. GMP 20010102000065.

⁵² “Al Qaeda Network May Have Transported Nuclear, Biological, and Chemical Weapons to the United States,” *The Frontier Post* (Peshawar), November 20, 2001, FBIS document no. SAP 20011120000087.

⁵³ “‘Suitcase Nukes’: A Reassessment,” Research Story of the Week, Monterey Institute of International Studies, Center for Nonproliferation Studies, September 23, 2002, www.cns.miis.edu/pubs/week/020923.htm.

suitcase nuclear bomb controversy have been similarly skeptical of the claims that these weapons have been lost or stolen and consequently acquired by al Qaeda.⁵⁴

⁵⁴ David Smigielski, "A Review of the Suitcase Nuclear Bomb Controversy," *Policy Update*, RANSAC, September 2003.

Al-Watan Al-'Arabi Alleges al Qaeda Has Nuclear Weapons

- **November 1998, pro-Saudi Lebanese magazine reports that through the Chechens and Russian mafia, bin Laden obtained nuclear warheads**
 - **US\$30M from bin Laden, “grant” of US\$70M in heroin from Taliban**
 - **Warheads from Ukraine, Kazakhstan, Russia**
 - **Al Qaeda reputed to have “more than 20” warheads stored at “secret base” in Afghanistan**
- **Such stories nearly impossible to verify**

RAND Project AIR FORCE

The publication alleged that al Qaeda’s efforts to acquire fissionable material were in fact a smokescreen for its campaign to buy a nuclear weapon from Chechen rebels. According to *Al-Watan Al-'Arabi*, “it seems that this network’s [al Qaeda’s] continued attempts to shop for enriched uranium was mere camouflage to draw the attention of the intelligence community away from what the Chechen-Russian mafia was doing. This mafia spread its agents and middlemen throughout the republics known for having a nuclear arsenal. These agents and middlemen were not looking for uranium or plutonium; they were on the lookout for ready-made weapons.”⁵⁵

A related set of allegations was made in an October 1998 article in an Arabic language newspaper published in London. According to *al-Hayah*, bin Laden purchased tactical nuclear weapons from “the Islamic Republics in Central Asia.”⁵⁶

Given the vagueness surrounding sources, the official secrecy that normally attends nuclear weapons inventories, and doubts about the

⁵⁵ “Report Links Bin-Laden, Nuclear Weapons,” *Al-Watan Al-'Arabi*, November 13, 1998, FBIS document no. FTS19981113001081.

⁵⁶ “Sources Claim Bin-Laden Has Acquired Nukes from FSU,” *Al-Hayah* [London], October 6, 1998, FBIS document no. FTS19981006000679.

editorial policies of the publications concerned, such claims are nearly impossible to verify.

Weapons Purchased from FSU?

- **Repeated allegations in the press that al Qaeda has purchased nuclear weapons**
 - **But no evidence that any exchange ever took place**
- **Russian President Vladimir Putin and other senior government officials vehemently deny al Qaeda obtained weapons from former Soviet Union**

RAND Project AIR FORCE

Statements by General Lebed and others, to the effect that Russia has lost small nuclear weapons, give these and other accounts a surface plausibility. However, there is no firm evidence that these transactions were ever completed.⁵⁷ Indeed, the Russian government denies that al-Qaeda obtained nuclear weapons from Russian, Central Asian, Ukrainian, or any other sources in the former Soviet Union.⁵⁸ In an interview, President Putin said he was “absolutely confident” that terrorists in Afghanistan do not have Soviet or Russian weapons of mass destruction.⁵⁹

⁵⁷ Jack Boureston, “Assessing Al Qaeda’s WMD Capabilities,” *Strategic Insight*, Center for Contemporary Conflict, Naval Postgraduate School, September 2, 2002, www.ccc.nps.navy.mil/rsepResources/si/sept02/wmd.asp.

⁵⁸ “Russian Defence Ministry Does Not Have the Data That Osama Bin Laden Possesses Mass Destruction Weapons,” *Pravda* (online edition), November 13, 2001, <http://english.pravda.ru/world/2001/11/13/20824.html>; “Ministry of Defense Confident Nuclear Warheads Safe,” September 4, 2002, Interfax story summarized in “Russia: Nuclear Weapons Security Developments,” Nuclear Threat Initiative, <http://nti.org/db/nisprofs/russia/weapons/security/secdevs.htm>.

⁵⁹ National Intelligence Council, *Annual Report to Congress on the Safety and Security of Russian Nuclear Facilities and Military Forces*, February 2002, www.ciagov/nic/pubs/other_icarussiansecurity.htm.

Al Qaeda: Has It Failed?

- **Al Qaeda seemingly poised for success**
 - **Motivation**
 - **Resources**
 - **Sanctuary and infrastructure (Sudan and Afghanistan)**
 - **Reportedly lax security in former FSU**
 - **Nuclear black market**
 - **Access to renegade nuclear scientists**
- **Question is: What has intervened to preclude success?**

RAND Project AIR FORCE

As a terrorist organization, al Qaeda had much going for it. Its leaders were eager to acquire nuclear weapons; it had substantial financial and other resources; it had state sanctuary (in some respects, the Taliban were actually a front for al Qaeda); security was reportedly lax in Russia and the former Soviet Union, making theft somewhat less difficult; and, finally, the organization had access to some nuclear scientists, primarily Pakistanis.

So, what frustrated al Qaeda's efforts?

Why Did al Qaeda Fail to Build Weapons?

- **Lack of appropriate expertise**
- **Lack of access to materials?**
 - **These materials may be more secure than is commonly understood**
- **Building a nuclear weapon remains a formidable challenge for a sovereignless, subnational entity**
 - **Program management formidable**
 - **Only a handful of states have succeeded**

RAND Project AIR FORCE

A number of important questions remain. Given its resources, motivation, and the supposedly lax security conditions at Russian and FSU nuclear facilities, why, to the best of our knowledge, was al Qaeda unsuccessful in obtaining the appropriate nuclear materials? Did the organization lack the right set of skills? Were the technical challenges too formidable?

Or were nuclear materials in fact more secure and guards less corrupt than we had thought?

Did the nature of the nuclear black market play a role? As one analyst has observed, “[m]ost arrested smugglers are amateurs, uncertain both of the potential market and the nature of the substances they are smuggling.”⁶⁰

Finally, was it possible that al Qaeda—which was pursuing chemical, biological, radiological, and nuclear capabilities simultaneously—fragmented an effort that would have produced better results had it been more focused? In the words of one British government official, al Qaeda

⁶⁰ Robert Hutchinson, “The Struggle for Control of Radioactive Sources,” *Jane’s Intelligence Review*, March 2003, p. 34.

“had too many projects running simultaneously—that’s a downside to having a fluid, flexible organization.”⁶¹

⁶¹ Authors’ interview with UK Ministry of Defence official, Washington, D.C., December 5, 2002.

Why Did al Qaeda Fail in Efforts to Purchase Nuclear Weapons?

- **Russia warhead security is imperfect, but more difficult than often thought**
- **Relative to other means of terrorism (9/11 hijackings and 1998 embassy bombings), acquiring nuclear weapons seems prohibitively expensive**
- **Market for nuclear weapons does not exist**
 - **Supply and demand curves never cross**
 - **Maybe state monopoly on weapons remains sound**

RAND Project AIR FORCE

Similarly, why was al Qaeda apparently unable to buy nuclear weapons? Weapons may in fact be more secure than Western analysts have thought. As one scholar has claimed, “[g]overnments that have nuclear capability tend to be, for obvious reasons, extremely protective of these weapons systems. . . . Inherent tendencies, particularly among smaller nuclear powers toward centralized control, further reduce the likelihood of theft.”⁶²

Alternatively, the prices demanded may simply have been too high for al Qaeda to accept. More broadly, al Qaeda may have found it difficult to navigate in the unfamiliar world of nuclear materials and weapons, as demonstrated by the fact that the organization appears to have been the victim of numerous scams. One explanation might be that states realize the huge significance of transferring nuclear weapons and maintain their monopoly at all costs. Over time, of course, al Qaeda could become a much more knowledgeable nuclear consumer, and nuclear weapons states may become more desperate.

⁶² Thomas J. Badey, “Nuclear Terrorism: Actor-Based Threat Assessment,” *Intelligence and National Security*, Vol. 16, No. 2, Summer 2001, p. 40.

Other Hypotheses Suggest Themselves

- **Still climbing the “learning curve”**
- **Difficulty of designing devices**
- **Could not attract the right personnel**
- **Had trouble dealing in the nuclear black market**
- **Chose to emphasize chemical and biological programs over the nuclear effort in the near term**

RAND Project AIR FORCE

The first hypothesis is that al Qaeda is still climbing the learning curve—developing the expertise, skills, and experience necessary to execute a nuclear weapon design. Proponents of this view might point out that the United States needed the better part of five years to master the science involved and field a usable weapon, even with the vast resources of the entire country and the priority the Manhattan Project enjoyed as a result of World War II. According to this hypothesis, given that al Qaeda only launched its quest for nuclear weapons in the early 1990s, commands nowhere near the resources of a state, and lacks secure operating facilities since Operation Enduring Freedom, it is not surprising that it has not yet built a weapon.

A second hypothesis might be that al Qaeda failed to attract the right experts. Not all nuclear physicists are equipped to design and build nuclear weapons, according to this line of thinking. Indeed, the known successful nuclear weapons programs have always employed teams of experts. If, as reports cited earlier suggest, al Qaeda only had contact with a few Pakistani and other experts—perhaps for a very limited amount of time—it would not be surprising that the group could not build a nuclear weapon.

A third hypothesis is that the nuclear weapons and materials market is a difficult and dangerous place to negotiate. The market is contaminated

with police and intelligence sting operations, and charlatans and fraudulent persons claiming to have nuclear weapons and materials for sale. It is difficult for sincere buyers and sellers to identify each other and conclude a transaction. Given that al Qaeda did not have very knowledgeable representatives searching the marketplace for real sellers and that the organization had apparently very limited ideas about what nuclear components and materials should look like, it should not be surprising that Mahmud Salim and other al Qaeda members were duped, according to this hypothesis.

Al Qaeda's Prospects for the Future

- **Since his time in Sudan, bin Laden has demonstrated a strong desire to acquire nuclear weapons**
- **To date, however, there is no evidence that he has been successful**
 - **Or to suggest he has given up the search**
- **Likelihood of acquisition low, but potential consequences high**
- **International developments could have a major impact on al Qaeda's efforts**
 - **e.g., collapse of Pakistan, arrest of key al Qaeda personnel**

RAND Project AIR FORCE

There is no solid evidence that al Qaeda, or indeed any terrorist group, has acquired nuclear weapons, although the desire clearly is there. In the words of Brigadier General Yossi Cooperwasser, the former chief of research for Israeli military intelligence, “[we] don’t have any evidence to support concerns over lost, stolen or misappropriated nuclear devices.”⁶³

However, while the likelihood might be low, the consequences of the terrorist use of nuclear weapons are likely to be high. In June 2002, an al Qaeda spokesman declared the organization’s intention to kill four million Americans, albeit with chemical or biological rather than nuclear weapons.⁶⁴ International developments could have a large impact on al Qaeda’s efforts to obtain nuclear weapons. Growing political instability in Pakistan, or the country’s outright collapse, could lead to the transfer of nuclear weapons to terrorists. At the same time, the arrest of key al Qaeda

⁶³ Julian Borger and Ewen MacAskill, “Bin Laden Is Looking for a Nuclear Weapon: How Close Has He Come?” *Guardian* [London], November 7, 2001, www.guardian.co.uk/Print/0,3858,4293701,00.html.

⁶⁴ “‘Why We Fight America’: Al Qaeda’s Spokesman Explains September 11 and Declares Intentions to Kill 4 Million Americans with Weapons of Mass Destruction,” Middle East Media Research Institute, Special Dispatch Series, No. 388, June 12, 2002, <http://memri.org/bin/opener.cgi?Page=archives&ID=SP38802>.

lieutenants (e.g., Khalid Shaikh Mohammed) could create significant new hurdles for the group.

Briefing Outline

- **Introduction**
- **Case study 1:**
 - Aum Shinrikyo's attempt to acquire a nuclear capability
- **Case study 2:**
 - Al Qaeda's attempts to acquire a nuclear capability
- **Case study 3:**
 - *Smuggled nuclear material from the Kinshasa research reactor*
- **Observations**

RAND Project AIR FORCE

This case study illustrates the nuclear market from the supply side.

Many countries of the third world were recipients of research reactors in the 1950s under the Eisenhower administration's "Atoms for Peace" program. Following the U.S. policy of containment of the USSR, it was thought that making reactors available to these countries on favorable terms would draw them into the U.S. sphere of influence. The USSR at this time was also actively marketing its research reactors in a similar attempt to draw countries into its orbit. Both the United States and the USSR kept key reactor technologies, such as reprocessing and enrichment, separate and distinct from the reactor itself, making the recipient country dependent upon the United States or USSR for refueling and new reactor rods. In exchange, the United States agreed to be the final disposal custodian of highly radioactive spent reactor fuel rods. It is unclear what deals were made by the USSR in this regard. The competition between the United States and the USSR in providing research reactors to the third world in many ways led to creation of the International Atomic Energy Agency (IAEA) under the auspices of the United Nations to monitor and inspect these facilities, and to prevent the proliferation of nuclear weapons.

U.S. and USSR power reactors (reactors used for generating electricity) use rods that are enriched with U-235 to the 3-to-5 percent level. Most U.S.-

designed research reactors use rods that are enriched to approximately 20 percent. Some USSR research reactors use rods enriched to as much as 90 percent. None of these rods is made of 100 percent uranium metal. For example, the enriched uranium may be dispersed uniformly in a matrix of zirconium hydride. There are a host of competing nuclear processes that make it very difficult to weaponize uranium that is enriched to less than 20 percent. To weaponize the uranium from these rods, the uranium metal would have to be extracted from the zirconium hydride matrix.

Origins of Reactor Technology in the Congo

In the early 1950s, Monsignor Luc Gillon, a Belgian priest turned nuclear physicist, lobbies for the Congo to get a nuclear reactor.

By 1958, under the Atoms for Peace Program, construction begins outside Kinshasa on a 50 kW TRIGA Mark I design research reactor from General Atomic.

In 1959, the reactor reaches criticality.

In 1960, the Congo becomes independent of Belgium.

For the following ten years, the Congo is beset by revolution and power struggle.

In 1970, Mobutu Sese Seko becomes the self-appointed president.

Mobutu exploits the reactor in Kinshasa and uses it as a source of national pride and of his personal power and respect in the world.

In 1970, Mobutu stops operation of the reactor in favor of the construction of a newer design.



SOURCE: U.S. Central Intelligence Agency, *World Factbook*, 2003, <http://www.cia.gov/cia/publications/factbook/geos/cg.html>.

RAND Project AIR FORCE

In the early 1950s, the Congo was a Belgian colony. During this time an avid nuclear enthusiast, Monsignor Luc Gillon, a Belgian priest and missionary, lobbied the Belgian government for a reactor to be built in the Congo near the University in Kinshasa. He believed that helping the United States obtain uranium ore for the Manhattan Project might qualify the Belgian Congo for a reactor under the U.S. Atoms for Peace Program. In 1958, construction of a 50 kW TRIGA (Teaching, Research, Isotope generation by General Atomic) research reactor, jointly sponsored by the United States and Belgium, began on a site outside Kinshasa, the capital city.⁶⁵ The reactor was a U.S. design by General Atomic and the construction was carried out by a Belgian company. In 1959, the reactor went critical and was hailed as a great symbol of future progress for the Congo in particular and for Africa in general.⁶⁶

In 1960, Belgium granted independence to the Congo. There followed a decade of brutal political and military conflict. By the end of the 1960s, Mobutu Sese Seko emerged as the strong man in the conflict. He rewrote the constitution and in 1970 appointed himself president. During this era,

⁶⁵ For more details, see IAEA Research Reactor Details at <http://www.iaea.org>.

⁶⁶ Douglas Pasternak and Eleni E. Dimmler, "A Home-Grown Nuclear Threat," *U.S. News & World Report*, September 23, 2002, p. 40.

Mobutu exploited the reactor, using it as a symbol of national pride, giving his government access to international forums, and enhancing his own personal power and international prestige. The first reactor was retired in 1970, and a newer and bigger design, the TRIGA II reactor, began operation in 1972.

Reactor Developments and Operations in the Congo, Now Known as Zaire

- **At the urging of now President Mobutu, construction by a Belgium company begins on a 1,000 kW TRIGA Mark II reactor on the site of the retired TRIGA Mark I**
- **The TRIGA Mark II uses 91 rod locations in the active reactor core with some unused rods kept in storage**
- **The 91 rods can be a mixture of fuel rods, control rods, or irradiation channels**
- **In 1971, 20 percent* enriched fuel rods are shipped from the United States to Zaire in support of the program**
- **In all, there are about 25 kilograms of uranium metal in the entire reactor**
- **In 1972, the reactor reaches criticality**
- **In the mid to late 1970s, two of the reactor rods in storage disappear**

*Some former U.S. government officials indicate the fuel rods may have been somewhat less enriched, at the 19.7–19.8 percent level.

RAND Project AIR FORCE

Construction began in 1970 on a TRIGA II design reactor. This was the latest design research reactor from General Atomic and was rated at 1,000 kW.⁶⁷ This reactor, now Africa's oldest, is located on the same site as the TRIGA Mark I at the edge of the University of Kinshasa campus on an "erosion prone" hill.⁶⁸

The TRIGA Mark II has 91 rod locations in the core. These 91 locations can have a mixture of fuel rods, control rods, or irradiation channels for isotope production or other research. In 1971, the construction at the site was ready to mount or store the rods and rod shipments began. Each rod has a rather small amount of uranium metal, with the entire core containing about 25 kilograms. In 1972, the reactor reached criticality and started operations. In the mid to late 1970s, two of the reactor rods in storage disappeared.⁶⁹

⁶⁷ For more details, see IAEA Research Reactor Details at www.iaea.org.

⁶⁸ Tim Sullivan, "Splitting Congo's Atoms: A Decaying Nation Proudly Nurses Along an Old Nuclear Reactor," Associated Press, July 27, 2001.

⁶⁹ Author's interview with State Department official, January 17, 2003. See also "DRC: US Reportedly Plans to Buy Uranium to Prevent It from Falling into Terrorist Hands," *Kinshasa Digitalcong*, October 1, 2002, FBIS document no. AFP20021002000011.

TRIGA II Reactor Fuel Rods

- **The fuel elements for the TRIGA II reactors are cylindrical stainless steel rods about 28 inches long with a 1.5 inch diameter**
- **The enriched uranium fuel in each element is about 15 inches long***
- **The uranium fuel is composed of 20 percent** enriched uranium dispersed in a matrix of zirconium hydride**
- **In each rod there are about 280 grams of uranium metal**
- **There is a zirconium rod down the middle of the uranium fuel**
- **There are graphite caps at each end of the rod that serve as end reflectors for the neutrons**
- **The fuel element weighs less than about 25 lb**

*I. Mele, M. Ravnik, and A. Trov, "TRIGA Mark II Benchmark Experiment, Part I: Steady State Operation," and "TRIGA Mark II Benchmark Experiment: Pulsed Operation," *Nuclear Technology*, Vol. 105, 1994, pp. 37–51 and 52–58.

**Some former U.S. government officials indicate the fuel rods may have been somewhat less enriched, at the 19.7–19.8 percent level.

RAND Project AIR FORCE

The Kinshasa Case Goes Cold for Twenty Years—Until a Market Emerges

- **The missing rods themselves are of no use to the person who stole them**
 - He will want to sell them
- **The rods are not a commodity in which other TRIGA II reactor owners would be interested**
 - All rods are indexed and labeled—no black market
 - The attempted exchange of an illicit rod would raise immediate alarms in the legitimate reactor community
 - There is no illegitimate reactor community
- **The only buyer would have to be someone with an alternative use for the rods**
- **The person who stole the rods might have been trying to find an alternative buyer for 20 years**
 - It may be that the buyers were not there yet
 - The market for the sale of the rods did not yet exist

RAND Project AIR FORCE

The fuel rods themselves are of no intrinsic value to the person who stole them. He would have to sell them to achieve any financial gain. Moreover, the market structure for reactor rods is highly regulated. Consequently, the rods will not be a commodity of interest to other TRIGA II reactor owners. All rods are indexed and labeled, making the creation of a black market very difficult. The attempted exchange of an illicit rod would raise immediate alarms in the legitimate reactor community (and there is no illegitimate reactor community).

Therefore, the only buyer for the rods would have to have an alternative use for them. The person who stole the rods may have been looking for a buyer with alternative applications for 20 years. The market for the rods probably did not exist—until some 20 years later. An IAEA official speculated that the reason only one rod eventually turned up in an illicit transaction was because the other was probably lost “somewhere in the Congolese undergrowth.”⁷⁰ Like many other aspects of this case, the explanation for the eventual location of the other fuel rod is unclear.

⁷⁰ Michela Wrong, “More Wreck Than Reactor,” *Financial Times*, August 21, 1999, p. 8.

What Is Really for Sale?

- **The rod itself is of little value**
 - No black market among TRIGA II reactor owners
- **Only the uranium fuel has intrinsic value**
 - The other rod materials are of little value
- **The uranium metal needs to be extracted from the zirconium hydride matrix**
 - Messy industrial chemistry but eminently doable
- **Each rod has only a few hundred grams of uranium metal at 20 percent U-235 enrichment***
 - The spot price for these enrichment units makes the industrial chemistry for extraction uneconomical
 - For a nuclear weapon, many orders of magnitude more material would be needed at this enrichment level
- **The key to creating a market, particularly an illicit market, lies in both true value and perceived value**

*Some U.S. government officials indicate the fuel rods may have been somewhat less enriched, at the 19.7–19.8 percent level. I. Mele, M. Ravnik, and A. Trov, "TRIGA Mark II Benchmark Experiment, Part I: Steady State Operation," and "TRIGA Mark II Benchmark Experiment: Pulsed Operation," *Nuclear Technology*, Vol. 105, 1994, pp. 37–51 and 52–58.

RAND Project AIR FORCE

Fast-Forward to the 1990s

July 1996: Carlo Monteiro, a Portuguese businessman, and others arrested for allegedly planning to manufacture and sell nuclear bombs made from uranium stolen from Zaire

- Testing the marketplace

May 1997: Mobutu regime toppled by Laurent Kabila and his followers; Mobutu flees to France

- Stolen assets already on way out of the country
- Many assets lost
- Serious marketing activities begin

RAND Project AIR FORCE

Allegations of Italian criminal smuggling rings attempting to sell nuclear material from Zaire (later named the Democratic Republic of Congo, or DRC) started even before the fall of the Mobutu regime. It could be that these attempts were designed to test the market for the rods.

In July 1996, a Portuguese businessman, Carlo Monteiro, offered to make available a bar of uranium-235 from Zaire worth seven billion Italian lira. The offer was made to a “figurehead” for the Italian criminal group Santapaola.⁷¹ Regional authorities decided not to detain the smugglers in hopes of not compromising other investigative leads. Eventually, two Portuguese citizens involved in the plot admitted to criminal activity. An Italian involved in the plot claimed to be working for the Russian Secret Service, and alleged that they asked him to obtain “Red Mercury” that had been stolen from the Soviet Union in 1989.⁷²

By 1997, Mobutu had been overthrown by Laurent Kabila and his followers; Mobutu fled to France. Mobutu had been systematically moving assets out of the country for several years before his ultimate

⁷¹ Alfio Sciacca, “Smugglers Discovered: They Wanted to Manufacture Small Nuclear Bombs,” *Corriere Della Sera*, July 2, 1996, FBIS document no. FTS19960702000198.

⁷² Sciacca.

downfall. Although there is no definitive evidence, the rods missing since the 1970s may have been moved out of country during this time.⁷³ An illicit nuclear materials market begins to emerge during this period.

⁷³ The whereabouts of the fuel rods from their disappearance in the 1970s until their re-appearance in 1998 is a matter of speculation. One possible explanation, consistent with the Mobutu regime's behavior, is that Mobutu took the rods at some point as a potentially valuable asset. Other explanations, including clerical and accounting errors, are also possible.

Operation Gamma—Undercover Sting

- **Early 1998: Smugglers sought Middle Eastern buyers**
- **Smugglers alleged they had nuclear missiles and eventually revealed they had nuclear material**
- **Haggling caused price to drop from 40 to 22 billion lira (\$12.6 million)**
- **February 1, 1998: Undercover agents posing as traders for Middle Eastern buyers met with smugglers**
- **February 27, 1998: Smugglers arrested**
- **2001: 13 individuals sentenced to jail terms for “trafficking in strategic material”**
- **Most were members of Italy’s most powerful organized crime families**
- **The continuing saga—August 1999: Four men arrested in Belgium for alleged attempted sale of 5 kg of uranium. Arrests were made after a sting operation was launched initiated by a report of a group selling uranium smuggled from DRC**
- **By 2002, the DRC was denying that the rods were missing**

RAND Project AIR FORCE

Local Italian authorities initiated the investigations based on information that the smugglers were trying to sell missiles. The radioactive material was not the original item that attracted the authorities’ attention. The smuggling ring that sought Middle Eastern buyers for the fuel rod unknowingly negotiated with undercover agents from the Guardia di Finanza’s Central Investigating Service (SCICO).⁷⁴ Through haggling, the price dropped from 40 to 22 million lira (about \$12.6M); the deal was structured so that the sellers would receive payment of the 22 billion lira through a Swiss bank account.

U.S. intelligence and law enforcement authorities interacted extensively with Italian authorities after news of Operation Gamma broke in the media. Much of the reporting on the nuclear material, its origin, and the danger associated with it was inaccurate.⁷⁵ There was much confusion in the press over how many rods were involved and whether or not the uranium was highly enriched. Only a single fuel rod was recovered by

⁷⁴ “Uranium Bar Seized in N-Trafficking Gang Bust Made in US,” *RAI Uno*, March 20, 1996, FBIS document no. FTS19980320001196.

⁷⁵ Interview with U.S. State Department official, January 17, 2003.

Italian authorities.⁷⁶ As to enrichment, the only relevant question is whether the uranium could be used in a nuclear weapon. The answer is yes—all research reactor uranium is at a sufficient level of enrichment to be used in a weapon. A *U.S. News & World Report* article from 2002 indicates that 13 people were eventually sentenced.⁷⁷ Most of these individuals were members of Italy’s most powerful organized crime families. By 2002, the DRC was denying that the rods were missing.⁷⁸

⁷⁶ “Agent Infiltrated into Uranium Trafficking Gang Interviewed,” *RAI Tre*, March 20, 1998, FBIS document no. FTS19980320001615; see also Maria Novella de Luca, “How I Captured Uranium Pirates,” *La Repubblica* (Internet version), March 21, 1998.

⁷⁷ Douglas Pasternak and Eleni E. Dimmler, “A Home-Grown Nuclear Threat,” *U.S. News & World Report*, September 23, 2002, p. 40.

⁷⁸ “Uranium Bars Smuggled from Zaire Might Still Be in Country,” *Rome ANSA* (Internet version) November 8, 2001, FBIS document no. EUP20011108000487.

Unresolved Aspects in the Case of the Missing Rods

- **Where were the rods stored for 20 years until they were obtained by Italian smuggling rings?**
 - Mobutu cronies may have stored rods in-country as part of the booty
 - Eventually sent to Europe as part of asset looting
- **How did the Italian smuggling ring obtain the fuel rod?**
 - Mafia not likely to have originated the theft
 - Mafia acting as agent for DRC perpetrator
- **Why did the rods surface in the illicit nuclear market in the mid-1990s?**
 - Buyers with alternative uses did not exist until the 1990s
- **Where is the other fuel rod?**
 - IAEA mandate provided insufficient powers to ensure perfect safekeeping
 - Source of future scams
- **Could there have been a shipping error?**
 - Eight rods shipped instead of ten
 - Zaire never received all the rods
 - DRC recently claims to have all the rods
- **Why did the IAEA not pursue a vigorous recovery of the rods?**
 - Limited mandate
 - Subject to the desires of its governing board

RAND Project AIR FORCE

There are several unresolved issues that both set the stage for future developments and cast doubt on the ability of international control regimes to prevent the illicit transfers of nuclear materials.

The actual chain of custody for the rods is unknown. We can only speculate about the rods' whereabouts for the 20 years they were missing. Mobutu cronies may have held them in-country for a few years and, realizing the only market for them was overseas, moved them to Europe along with other booty. Part of answering this question is determining how the Italian mafia got the rods in the middle 1990s. The mafia might have been acting as an agent for what was left of the Mobutu regime with little idea how to cash out the value of the rods in the international black market for nuclear components and materials. This raises the issue of why the rods did not surface earlier than the 1990s. One possible explanation is that they emerged when the deposed regime liquidated more of its assets. Maybe there were just not any buyers with alternative uses for the rods until the 1990s. The appearance of groups willing to cause mass killings through indiscriminate attacks in the 1990s may have created the demand side of the market.⁷⁹

⁷⁹ Anonymous, *Through Our Enemies' Eyes: Osama Bin Laden, Radical Islam, and the Future of America*, Washington, D.C.: Brassey's Inc., 2002.

Another nagging detail is the final disposition of the other missing rod. Recently, an IAEA official responded to this question by saying that he thought it was probably “lost in the jungle.”⁸⁰ Moreover, this missing rod could serve as the catalyst for future scams and may wind up in the hands of actors who could use it. Perhaps there was an error in shipping or all the rods never made it to the loading dock in Kinshasa. Recently, the DRC has claimed that the rods are all present and accounted for.⁸¹ Finally, why did the IAEA not vigorously pursue the recovery of the rods? Under IAEA rules, the IAEA keeps the results of its inspections confidential between the inspected state and the IAEA board of governors.⁸² According to press reports, IAEA officials raised concerns about the missing fuel rods in 1998.⁸³ However, there is no precise explanation about when and how the two rods got lost.

⁸⁰ Michela Wrong, “More Wreck Than Reactor,” *Financial Times*, August 21, 1999, p. 8.

⁸¹ “Uranium Bars Smuggled from Zaire Might Still Be in Country,” *Rome ANSA* (Internet version) November 8, 2001, FBIS document no. EUP20011108000487.

⁸² Author’s interview with U.S. State Department official, Washington, D.C., January 17, 2003.

⁸³ “Nuclear Fuel Rod at African Research Facility Missing,” *Deutsche Presse-Agentur*, July 10, 2002.

Briefing Outline

- **Introduction**
- **Case study 1:**
 - Aum Shinrikyo's attempt to acquire a nuclear capability
- **Case study 2:**
 - Al Qaeda's attempts to acquire a nuclear capability
- **Case study 3:**
 - Smuggled nuclear material from the Kinshasa research reactor
- ***Observations***

RAND Project AIR FORCE

Observations Based on Three Case Studies

- **State sanctuary enabled terrorists to enjoy the international protections states enjoy without any responsibilities for acceptable behavior**
 - Sanctuary by itself proved insufficient as a basis for creating successful weapons programs
- **Trusted lieutenants tasked to acquire nuclear materials were still defrauded**
- **Russian officials proved incorruptible**
 - At least at the \$15M level
- **Despite inspections and safeguards, IAEA could not prevent the loss of reactor fuel**
- **Effective controls on nuclear weapons, material, and expertise greatly reduce the opportunities for terrorists**

RAND Project AIR FORCE

The research team draws five key observations from the cases recounted in this briefing. First, sanctuary is invaluable to terrorist groups, but it did not provide circumstances that allowed either Aum or al Qaeda to build a successful nuclear weapons program. While Aum was not protected by the Japanese government like the Taliban protected al Qaeda, it did benefit from the extensive legal protections religious organizations are afforded in Japan. Second, Aum and al Qaeda appear not to have had the right sort of agents to represent them in the nuclear materials marketplace. Their agents apparently were selected for their loyalty and trustworthiness, but seemed to lack the skills and market knowledge to avoid being duped.

Third, the Russian officials approached by Aum proved incorruptible, despite the tremendous potential for personal enrichment that a standing relationship with cult leadership would likely have provided. Whatever their motives—official sense of responsibility, loyalty, or fear—Russian officials' refusal to make a deal suggests that the price for nuclear weapons will be very high indeed.

Fourth, the IAEA mandate provided insufficient powers to ensure perfect safekeeping of the fuel rods. Undoubtedly, local circumstances, including unscrupulous officials and, ultimately, civil war, made accountability

difficult, but at the end of the day the controls provided by international accountability systems proved to be limited.

BIBLIOGRAPHY

By Article

- "Agent Infiltrated into Uranium Trafficking Gang Interviewed," *RAI Tre*, March 20, 1998, FBIS document no. FTS19980320001615.
- "Al Qaeda Documents, Manuals Found in Kabul," accessed at www3.cnn.com/2001/WORLD/asiapcf/central/11/16/ret.al.qaeda.documents.
- "Al Qaeda Network May Have Transported Nuclear, Biological, and Chemical Weapons to the United States," *The Frontier Post* (Peshawar), November 20, 2001, FBIS document no. SAP 20011120000087.
- "Aum Had Nuke Plant Info," *Mainichi Shimbun*, March 28, 2000.
- "Aum Sought Russian Laser, Nuclear Technologies," *Tokyo KYODO* (in English), FBIS, April 10, 1995.
- "Cult Siphoned Nuclear Data: Police Say Aum Shinrikyo-Related Software Developers Build Dossiers on Researchers," *Asahi Shimbun*, March 29, 2000.
- "DEBKA: Secret Services Think Key to Bin Ladin's Nuclear Capability Lies in Spain," *Jerusalem DEBKA-Net-Weekly*, October 12, 2001, FBIS document no. GMP20010102000065.
- "DRC: US Reportedly Plans to Buy Uranium to Prevent It from Falling into Terrorist Hands," *Kinshasa Digitalcong*, October 1, 2002, FBIS document no. AFP20021002000011.
- "Interview with bin Laden Reported," March 31, 1998, FBIS document no. FTS1998033100479.
- "Japan: Book Probes Aum Terrorism, Ties with Russia," DPRK Part 2, FBIS, July 30, 2000.
- "Ministry of Defense Confident Nuclear Warheads Safe," September 4, 2002, Interfax story summarized in "Russia: Nuclear Weapons Security Developments," Nuclear Threat Initiative, accessed at <http://nti.org/db/nisprofs/russia/weapons/security/secdevs.htm>.
- "Nuclear Fuel Rod at African Research Facility Missing," *Deutsche Presse-Agentur*, July 10, 2002.

- "Report Links Bin-Ladin, Nuclear Weapons," *Al-Watan Al-'Arabi*, November 13, 1998, FBIS document no. FTS19981113001081.
- "Russian Defence Ministry Does Not Have the Data That Osama Bin Laden Possesses Mass Destruction Weapons," *Pravda* (online edition), November 13, 2001, accessed at <http://english.pravda.ru/world/2001/11/13/20824.html>.
- "Sources Claim Bin-Laden Has Acquired Nukes from FSU," *Al-Hayah* [London], October 6, 1998, FBIS document no. FTS19981006000679.
- "'Suitcase Nukes': A Reassessment," Research Story of the Week, Monterey Institute of International Studies, Center for Nonproliferation Studies, September 23, 2002, www.cns.miis.edu/pubs/week/020923.htm.
- "Uranium Bar Seized in N-Trafficking Gang Bust Made in US," *RAI Uno*, March 20, 1996, FBIS document no. FTS19980320001196.
- "Uranium Bars Smuggled from Zaire Might Still Be in Country," *Rome ANSA* (Internet version), November 8, 2001, FBIS document no. EUP20011108000487.
- "'Why We Fight America': Al Qaeda's Spokesman Explains September 11 and Declares Intentions to Kill 4 Million Americans with Weapons of Mass Destruction," Middle East Media Research Institute, Special Dispatch Series, No. 388, June 12, 2002, accessed at <http://memri.org/bin/opener.cgi?Page=archives&ID=SP38802>.

By Author

- Albright, David, "Al Qaeda's Nuclear Program: Through the Window of Seized Documents," *Nautilus Institute Special Forum*, Vol. 47, November 6, 2002.
- Albright, David, Kathryn Buehler, and Holly Higgins, "Bin Laden and the Bomb," *Bulletin of the Atomic Scientists*, Vol. 58, No. 1, January/February 2002.
- Albright, David, and Holly Higgins, "A Bomb for the Ummah," *Bulletin of the Atomic Scientists*, Vol. 59, No. 2, March/April 2003.
- Anonymous, *Through Our Enemies' Eyes: Osama bin Laden, Radical Islam, and the Future of America*, Washington, D.C.: Brassey's Inc., 2002.
- Badey, Thomas J., "Nuclear Terrorism: Actor-Based Threat Assessment," *Intelligence and National Security*, Vol. 16, No. 2, Summer 2001.

- Baker, Peter, "Pakistani Scientist Who Met Bin Laden Failed Polygraphs, Renewing Suspicions," *Washington Post*, March 3, 2002.
- Bedi, Rahul, "Nuclear Scientists in Myanmar," *Jane's Intelligence Review*, Vol. 14, No. 3, March 2002.
- Boettcher, Mike, and Ingrid Arnesen, "Al Qaeda Documents Outline Serious Weapon Program," CNN.com, January 25, 2002, accessed at www.cnn.com/2002/US/01/24/inv.al.qaeda.documents.
- Borger, Julian, and Ewen MacAskill, "Bin Laden Is Looking for a Nuclear Weapon: How Close Has He Come?" *Guardian* [London], November 7, 2001, accessed at www.guardian.co.uk/Print/0,3858,4293701,00.html.
- Boureston, Jack, "Assessing Al Qaeda's WMD Capabilities," *Strategic Insight*, Center for Contemporary Conflict, Naval Postgraduate School, September 2, 2002, accessed at www.ccc.nps.navy.mil/rsepResources/si/sept02/wmd.asp.
- Brackett, D. W., *Holy Terror: Armageddon in Tokyo*, New York: Weatherhill Inc., 1996.
- Bunn, Matthew, The Harvard Project on Managing the Atom, Belfer Center for Science and International Affairs, Carnegie Non-Proliferation Project, *The Next Wave: Urgently Needed New Steps to Control Warheads and Fissile Material*, April 2000.
- Davies, Hugh, "Bin Laden Aide 'Tried to Buy Atomic Arms,'" *Daily Telegraph* [London], September 28, 1998, accessed at www.dailytelegraph.co.uk.
- de Luca, Maria Novella, "How I Captured Uranium Pirates," *La Repubblica* (Internet version), March 21, 1998.
- Golovnin, Vasiliy, "Aum Cult Implicated in Nuclear Information Stealing," *Moscow ITAR-TASS in English*, FBIS, March 29, 2000.
- Golovnin, Vasiliy, "Russian Scientist Denies Aum Shinrikyo Threat to AES's," *Moscow Izvestiya in Russian*, FBIS, March 3, 2000.
- Gunaratna, Rohan, *Inside Al Qaeda: Global Network of Terror*, New York: Columbia University Press, 2002.
- Hoon, Geoff, Defence Secretary, interview with John Deane, Chief Political Correspondent, PA News, London Press Association, November 11, 2001, FBIS document no. EUP20011111000048, "UK's Hoon: Bin Ladin 'Has Material That Could Contribute' to Nuclear Weapons."

- Hutchinson, Robert, "The Struggle for Control of Radioactive Sources," *Jane's Intelligence Review*, March 2003.
- Jacoby, Vice Admiral Lowell E., Director, Defense Intelligence Agency, statement for the record, Senate Select Committee on Intelligence, February 11, 2003.
- Kaplan, David E., and Andrew Marshall, *The Cult at the End of the World*, New York: Crown Publishers, 1996.
- Karmon, Ely, *The Anti-Semitism of Japan's Aum Shinrikyo: A Dangerous Revival*, ICT, October 15, 1999.
- Leader, Stefan, "Osama Bin Laden and the Terrorist Search for WMD," *Jane's Intelligence Review*, Vol. 11, No. 6, June 1999.
- Lifton, Robert Jay, *Destroying the World to Save It: Aum Shinrikyo, Apocalyptic Violence, and the New Global Terrorism*, New York: Henry Holt and Co., 1999.
- Mark, Carson, et al., "Can Terrorists Build Nuclear Weapons?" Nuclear Control Institute, Washington, D.C., accessed at www.nci.org/k-m/makeab.htm.
- Mele, I., M. Ravnik, and A. Trov, "TRIGA Mark II Benchmark Experiment, Part I: Steady State Operation," and "TRIGA Mark II Benchmark Experiment: Pulsed Operation," *Nuclear Technology*, Vol. 105, 1994, pp. 37–51 and 52–58.
- Metraux, Daniel, *Aum Shinrikyo and Japanese Youth*, Lanham, Md.: University Press of America, 1999.
- Mir, Hamid, "Osama Claims He Has Nukes: If U.S. Uses N-Arms It Will Get Same Response," *Dawn* (Internet edition), accessed at www.dawn.com/2001/11/10/top1.htm. Mir, Hamid, interview with Ayman al-Zawahiri for Australian Broadcasting Corporation television, as reported in Associated Press, March 21, 2004, <http://apnews.myway.com/article/20040321/D81F0G20.html>.
- Nathan, Adam, and David Leppard, "Al Qaeda's Men Held Secret Meeting to Build Dirty Bomb—Bin Laden's Nuclear Plot—War on Terrorism," *Sunday Times* [London], October 14, 2001, cited in Rensselaer Lee, Nuclear Smuggling: Patterns and Responses," *Parameters*, Vol. XXXIII, No. 1, Spring 2003.

- National Intelligence Council, *Annual Report to Congress on the Safety and Security of Russian Nuclear Facilities and Military Forces*, February 2002, www.ciagov/nic/pubs/other_icarussiansecurity.htm.
- Pasternak, Douglas, and Eleni E. Dimmler, "A Home-Grown Nuclear Threat," *U.S. News & World Report*, September 23, 2002.
- Reader, Ian, *A Poisonous Cocktail? Aum Shinrikyo's Path to Violence*, Copenhagen: NIAS Books, 1996.
- Sanger, David E., "Nuclear Experts in Pakistan May Have Links to Al Qaeda," *New York Times*, December 9, 2001.
- Sciacca, Alfio, "Smugglers Discovered: They Wanted to Manufacture Small Nuclear Bombs," *Corriere Della Sera*, July 2, 1996, FBIS document no. FTS19960702000198.
- Smigielski, David, "A Review of the Suitcase Nuclear Bomb Controversy," *Policy Update*, RANSAC, September 2003.
- Sullivan, Tim, "Splitting Congo's Atoms: A Decaying Nation Proudly Nurses Along an Old Nuclear Reactor," Associated Press, July 27, 2001.
- Tenet, George J., Director of Central Intelligence, testimony before the Senate Armed Services Committee, March 19, 2002, accessed at www.odci.gov/cia/public_affairs/speeches/archives/2002/senate_select_hearing_03192002.html.
- U.S. Senate Permanent Subcommittee on Investigations, *Hearings on Global Proliferation of Weapons of Mass Destruction: A Case Study on Aum Shinrikyo*, October 31, 1995.
- United States of America v. Usama Bin Laden*, Indictment 98Cr., United States District Court Southern District of New York.
- United States of America v. Enaam M. Arnaout*, Government's Evidentiary Proffer Supporting the Admissibility of Coconspirator Statement, United States District Court North District of Illinois Eastern Division, No. 02 CR 892.
- Wrong, Michela, "More Wreck Than Reactor," *Financial Times*, August 21, 1999, p. 8.
- Yusufzai, Rahimulla, "Conversation with Terror," *Time* [Canada], January 11, 1999.