



**NAVAL
POSTGRADUATE
SCHOOL**

MONTEREY, CALIFORNIA

THESIS

**SECURING NUCLEAR AND RADIOLOGICAL MATERIAL
IN THE HOMELAND**

by

Kevin D. Eack

March 2007

Thesis Advisor:
Second Reader:

David Brannan
Jonathan Schachter

Approved for public release; distribution is unlimited

THIS PAGE INTENTIONALLY LEFT BLANK

REPORT DOCUMENTATION PAGE			<i>Form Approved OMB No. 0704-0188</i>
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instruction, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188) Washington DC 20503.			
1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE March 2007	3. REPORT TYPE AND DATES COVERED Master's Thesis	
4. TITLE AND SUBTITLE Securing Nuclear and Radiological Material in the Homeland			5. FUNDING NUMBERS
6. AUTHOR(S) Kevin D. Eack			
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Naval Postgraduate School Monterey, CA 93943-5000			8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING /MONITORING AGENCY NAME(S) AND ADDRESS(ES) N/A			10. SPONSORING/MONITORING AGENCY REPORT NUMBER
11. SUPPLEMENTARY NOTES The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government.			
12a. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release; distribution is unlimited			12b. DISTRIBUTION CODE A
13. ABSTRACT (maximum 200 words) <p>It is well established among the intelligence community that terrorists view the acquisition of nuclear or radiological materials (NRAM) as a goal in furtherance of their efforts to attack the U.S. within its borders. The use of NRAM in a nuclear weapon of mass destruction (WMD) or a radiological dispersion device (RDD) could potentially kill and injure thousands of American citizens. The economic impact of such a terrorist act on U.S. soil could cause profound economic damage, and would terrify the nation.</p> <p>While international efforts have been underway for many years to better secure military nuclear weapons and materials, this research finds that a comprehensive national security strategy in the U.S. for commercial nuclear materials is needed. While some strides were made in 2005 through measures taken by the U.S. Nuclear Regulatory Commission (NRC) to better secure nuclear generating power facilities, there is no similar comprehensive security strategy for NRAM stored or being transported in the U.S. This poses a potentially serious threat to our homeland security.</p> <p>This research reviews the present statutory and regulatory scheme for NRAM, and outlines a dramatic new approach that will better ensure our homeland security.</p>			
14. SUBJECT TERMS NRAM ; Nuclear; Radiological; Security			15. NUMBER OF PAGES 101
			16. PRICE CODE
17. SECURITY CLASSIFICATION OF REPORT Unclassified	18. SECURITY CLASSIFICATION OF THIS PAGE Unclassified	19. SECURITY CLASSIFICATION OF ABSTRACT Unclassified	20. LIMITATION OF ABSTRACT UL

THIS PAGE INTENTIONALLY LEFT BLANK

Approved for public release: distribution is unlimited

**SECURING NUCLEAR AND RADIOLOGICAL MATERIAL IN THE
HOMELAND**

Kevin D. Eack
Inspector, Illinois State Police
J.D., M.H.R.I.R., University of Illinois, 2004

Submitted in partial fulfillment of the
requirements for the degree of

**MASTER OF ARTS IN SECURITY STUDIES
(HOMELAND SECURITY AND DEFENSE)**

from the

**NAVAL POSTGRADUATE SCHOOL
March 2007**

Author: Kevin D. Eack

Approved by: David Brannan, Ph.D.
Thesis Advisor

Jonathan Schachter Ph.D.
Second Reader

Dr. Douglas Porch
Chairman, Department of National Security Affairs

THIS PAGE INTENTIONALLY LEFT BLANK

ABSTRACT

It is well established among the intelligence community that terrorists view the acquisition of nuclear or radiological materials (NRAM) as a goal in furtherance of their efforts to attack the U.S. within its borders. The use of NRAM in a nuclear weapon of mass destruction (WMD) or a radiological dispersion device (RDD) could potentially kill and injure thousands of American citizens. The economic impact of such a terrorist act on U.S. soil could cause profound economic damage, and would terrify the nation.

While international efforts have been underway for many years to better secure military nuclear weapons and materials, this research finds that a comprehensive national security strategy in the U.S. for commercial nuclear materials is needed. While some strides were made in 2005 through measures taken by the U.S. Nuclear Regulatory Commission (NRC) to better secure nuclear generating power facilities, there is no similar comprehensive security strategy for NRAM stored or being transported in the U.S. This poses a potentially serious threat to our homeland security.

This research reviews the present statutory and regulatory scheme for NRAM, and outlines a dramatic new approach that will better ensure our homeland security.

THIS PAGE INTENTIONALLY LEFT BLANK

TABLE OF CONTENTS

I.	INTRODUCTION.....	1
A.	PROBLEM STATEMENT	1
B.	RESEARCH QUESTION	1
C.	SPECIFIC RESEARCH OBJECTIVE	2
D.	SIGNIFICANCE OF RESEARCH	2
E.	REVIEW OF RELEVANT LITERATURE.....	3
II.	THE THREAT	5
A.	TERRORISTS HAVE THE INTENT TO ATTACK OUR HOMELAND THROUGH THE USE OF NUCLEAR AND RADIOLOGICAL MATERIALS	5
B.	SUCH MATERIAL, IF USED IN WMD OR RDD HAS THE POTENTIAL TO HARM A LARGE POPULATION AND INFLICT SUBSTANTIAL ECONOMIC LOSS	9
III.	THE PRESENT SITUATION	15
A.	HYPOTHETICAL SCENARIO.....	15
B.	WHILE SOME STATES HAVE MORE STRINGENT SECURITY STANDARDS, THE FEDERAL REGULATORY SECURITY STANDARDS FOR NRAM ARE WOEFULLY INADEQUATE	16
1.	Category I Fuel Cycle Facilities.....	18
2.	Category II Fuel Cycle Facilities	19
3.	Category III Fuel Cycle Facilities.....	19
4.	Category III Fuel Enrichment Facilities.....	19
5.	Uranium Conversion Facility.....	19
C.	SECURITY SURROUNDING NRAM SHIPMENTS IS A “PATCHWORK QUILT” OF REGULATORY AGENCIES WITH GAPS AND OVERLAP.....	22
IV.	STATES TAKE HOMELAND SECURITY ACTION	31
A.	THE HISTORY AND THE WAY FORWARD IN NRAM SHIPMENT SECURITY - THE ILLINOIS MODEL	31
B.	THE HEARTLAND IS THE CROSSROADS FOR THE U.S.	35
C.	THE POTENTIAL IMPACT OF YUCCA MOUNTAIN.....	36
V.	THE SOLUTION.....	37
A.	THE NEED FOR A MULTI LEVEL HOMELAND SECURITY EFFORT IN NRAM – A LOOK AT HOW OTHER COUNTRIES HANDLE COMMERCIAL NRAM.....	37
B.	BENCHMARKING – WHAT IS THE VISION?	40
C.	SWOT ANALYSIS	43
D.	STRATEGIC ISSUES	45
E.	THE PRESENT FEDERAL MODEL VERSUS THE ILLINOIS MODEL	46

F.	WHO ARE THE KEY STAKEHOLDERS IN THIS PROPOSAL?.....	46
VI.	POLICY OPTIONS.....	47
A.	MAINTAINING THE STATUS QUO IS AN INVITATION FOR TERRORISTS.....	47
B.	THE 2006 DRAFT PLAN BY DHS IS INCOMPLETE AND DOES NOT GO FAR ENOUGH.....	48
C.	CRITERIA FOR JUDGING SUCCESS.....	51
	APPENDIX A. SUMMARY OF ILLINOIS INSPECTION, ESCORT, SECURITY AND TRACKING.....	53
	APPENDIX B. THREAT TABLE (FROM CENTER FOR PROLIFERATION STUDIES WEAPONS OF MASS DESTRUCTION TERRORISM RESEARCH PROGRAM, 2004).....	55
	LIST OF REFERENCES.....	77
	INITIAL DISTRIBUTION LIST	83

LIST OF FIGURES

Figure 1.	Effects of a Nuclear Device in Downtown Chicago (from Argonne National Laboratory 2006).....	13
Figure 2.	NRAM transport regulations (from Nuclear Regulatory Commission, 2006)	24
Figure 3.	Nuclear Facilities (from Nuclear Regulatory Commission, 2005)	35
Figure 4.	Key Points.....	43
Figure 5.	Comparison of the Present Federal NRAM Security Aspects to the Illinois Model	46

THIS PAGE INTENTIONALLY LEFT BLANK

LIST OF TABLES

Table 1.	Outline of Nuclear Sector (U.S. Department of Homeland Security 2006)	17
Table 2.	Roles in Spent Nuclear Fuel Shipments (from Nuclear Regulatory Commission, 2006).....	26
Table 3.	Primary Roles in Selecting and Approving Highway Routes for Spent Fuel Transportation (from Nuclear Regulatory Commission, 2006).....	27
Table 4.	SWOT Analysis	45
Table 5.	Summary of Federal Requirements by NRAM Category.....	48

THIS PAGE INTENTIONALLY LEFT BLANK

LIST OF SYMBOLS, ACRONYMS, AND/OR ABBREVIATIONS

CHDS	Center for Homeland Defense and Security
DHS	Department of Homeland Security
DNDO	Domestic Nuclear Detection Office
DOE	Department of Energy
DOT	Department of Transportation
DNI	Director of National Intelligence
DNS	Illinois Emergency Management Agency Division of Nuclear Safety
DOD	Department of Defense
FBI	Federal Bureau of Investigation
FEMA	Federal Emergency Management Agency
FOUO	For Official Use Only
GAO	Government Accounting Office
HRCQ	Highway Route Controlled Quantity
HSIN	Homeland Security Information Network
IAEA	International Atomic Energy Agency
IC	Intelligence Community
ICM	Interim Compensatory Measures
ISP	Illinois State Police
JTTF	Joint Terrorism Task Force
LES	Law Enforcement Sensitive
NIPP	National Infrastructure Protection Plan
NNSA	National Nuclear Security Administration
NRAM	Nuclear and Radiological Material
NRC	Nuclear Regulatory Commission
POTUS	President of the United States
RAMQC	Radiological Material in Quantities of Concern
RDD	Radiological Dispersion Device
RSPA	Research and Special Programs Administration
SA	Situational Awareness
SIG	Safeguards Information
SNM	Special Nuclear Material

SSNM	Strategic Special Nuclear Material
STIC	Illinois Statewide Terrorism & Intelligence Center
TNT	Trinitrotoluene
US	United States
USSS	United States Secret Service
WMD	Weapon of Mass Destruction

ACKNOWLEDGMENTS

There are so many I wish to thank for making this experience possible. I would first like to thank Illinois State Police Director Larry Trent and Colonel Chuck Brueggemann for giving me the opportunity to attend this program. Also Illinois Homeland Security Advisor Colonel Jill Morgenthaler and Illinois Terrorism Task Force Chairman Mike Chamness constantly gave me support and, through their personal dedication to homeland security, reminded me why I took on this challenge. Former Illinois Homeland Security Advisor Carl Hawkinson played a major role by convincing me to apply for the program and providing the necessary support to make it become a reality. I would like to thank Dr. Harvey Drucker of Argonne National Laboratory - University of Chicago and the many nuclear science professionals who tolerated my endless questions and gave me support when I needed it most. I wish to thank Chris Van Horn and her great team at the U.S. Department of Energy's Radiological Assistance Program for their technical guidance on nuclear and radiological detection. Director William Burke of the Illinois Emergency Management Agency and his highly qualified science team in the Division of Nuclear Safety were a tremendous help to me, particularly Tim Runyon and Rich Allen. I also wish to thank FBI Special Agent in Charge Weysan Dun at FBI Springfield Division for his support and assistance.

To Bill Pelfrey, Chris Bellavita, Dave Brannan, and the many others at the NPS Center for Homeland Defense and Security, I owe my sincere gratitude for the most valuable education I have ever experienced. Your support and constant drive for excellence was truly an inspiration. I also wish to thank my good friend Jonathan Schachter, former Deputy Director of Chicago Office of Emergency Management, who served as my second reader and gave me his guidance and encouragement.

Most important I wish to thank my wife Cindy, and children, Michael and Michelle. I thank you for your patience, support, and understanding for these eighteen months. I am well aware that my constant travel, coursework, and professional demands made our lives challenging during this period. Through it all, you encouraged me to "stay the course". For that I am truly grateful.

THIS PAGE INTENTIONALLY LEFT BLANK

I. INTRODUCTION

A. PROBLEM STATEMENT

There is a growing concern among many federal authorities for the potential use by terrorists of nuclear and radiological materials (NRAM) in a weapon of mass destruction (WMD) or a radiological dispersion device (RDD), also known as a “dirty bomb”, on U.S. soil.¹ The level of concern in this subject area is evident by virtue of the number of federal homeland security initiatives presently underway by the Federal Bureau of Investigation (FBI), U.S. Department of Energy (DOE), the U.S. Department of Defense (DoD), the U.S. Department of Transportation (DOT), and the newly created Domestic Nuclear Detection Office (DNDO) within the Department of Homeland Security (DHS).² Such initiatives all focus upon detecting the concealed movement of unauthorized NRAM by highway, waterway, and air.

There are basically only two ways NRAM could be used by terrorists within the U.S. The material could be purchased or stolen outside the U.S. and smuggled in, or it could be stolen within the U.S. borders and used for malevolent purposes. The focus of this paper is exclusively upon the theft of commercial NRAM within the U.S. The potential theft of military grade NRAM is not the subject of this research.

B. RESEARCH QUESTION

Should the national policy be changed to better ensure stronger security surrounding commercial NRAM? Also, when such materials are being shipped, what should our national policy be regarding security measures as commercial NRAM move across our nation?

¹ Graham Allison, *Nuclear Terrorism is the Greatest Threat to National Security* (Detroit, MI: Thomson Gale. 2005), 12.

² U.S. Department of Homeland Security, *DHS Press Release Announcing the Opening of the Domestic Nuclear Detection Office* (Washington, D.C.:Department of Homeland Security, 2006), 1.

C. SPECIFIC RESEARCH OBJECTIVE

The objective of this research is to determine whether there is a need for a more stringent national policy on commercial NRAM shipment security. If so, how should that change be accomplished?

D. SIGNIFICANCE OF RESEARCH

Today's terrorist threat is asymmetrical and unpredictable. Unlike conventional enemies, the objective of many international and domestic terrorists is to exact major casualties and economic damage among the civilian population in a manner that terrifies the nation. It is difficult to imagine a more effective tool than nuclear or radiological material detonated in a densely populated area.

It is incumbent upon all those engaged in homeland security efforts to explore ways to detect suspected terrorist activity, to prevent its successful execution, and to protect these deadly and valuable assets from getting into the hands of terrorists. If gaps or deficiencies exist in protecting NRAM and those nuclear facilities in which they are stored or used, they must be identified and remedied as quickly as possible.³ Otherwise, our efforts to secure the homeland may fail, and the U.S. could experience the use of a WMD of nuclear or radiological proportions on U.S. soil. Increased collaboration among federal, state, and local authorities in the security effort will heighten situational awareness around these important assets, enabling us to meet the national preparedness goals.

This research will show the need for a more comprehensive national security policy regarding the storage and shipment of NRAM in the U.S. The research suggests those federal security requirements that presently exist are the responsibility of a number of federal agencies, and have significant gaps. In an effort to address some of these gaps, some states have attempted to close tighten security through state regulation; however,

³ Unless otherwise specified, references to "nuclear facilities" are intended to include all parts of the nuclear sector to include commercial nuclear power plants; research and test reactors; nuclear fuel cycle facilities; radioactive waste management facilities; deactivated nuclear facilities; facilities housing radioactive materials; and radioactive source production and distribution facilities.

the states cannot solve this problem. Research points to the need for a comprehensive national security plan to ensure the safe and secure storage and shipment of NRAM in the U.S. The research findings call for a national solution.

E. REVIEW OF RELEVANT LITERATURE

While more research is needed, the literature reviewed for this analysis took many forms. A federal statute renders some of the materials protected as “SAFEGUARDS”.⁴ This made gaining access to some regulations a bit more challenging but not impossible. The Illinois Emergency Management Agency’s Division of Nuclear Safety (DNS), the DOE, and contacts in the nuclear industry assisted in gaining access to the necessary materials to accomplish a thorough review. Most significantly, the University of Chicago and the Argonne National Laboratory assisted by providing access to research and a cadre of nuclear scientists who are focused upon homeland security issues related to NRAM.

A number of federal statutes and regulations touch portions of the issues presented; these were reviewed and compared. The enforcement agencies for these provisions include the NRC, the DOE, the DOT, and others. From the research, it is clear Congress empowered the NRC, the DOE, and the DOT with overlapping statutory and regulatory authority for the areas of nuclear power generating stations and the transportation of non-military NRAM. After September 11, 2001, Congress also tasked the DHS with ensuring the protection of the nation’s critical infrastructure, including the nuclear sector. Yet there are gaps in these security efforts and at present it appears that the DHS has very little operational control over these efforts. For instance, the more stringent regulations that apply to nuclear power generating facilities do not apply to non-fueled or non-operating facilities, even though nuclear fuel may be stored there. They also do not apply to nuclear storage facilities. Furthermore, while it appears that the

⁴ U.S. Nuclear Regulatory Commission, *Protection of Unclassified Safeguards Information, Criteria and Guidance*, Public Law NUREG-0794 (1981).

NRC has maintained limited authority over the uranium ore processing facility, no specific regulations have been promulgated to clearly require securing it in the proper manner.

Government Accounting Office (GAO) reports, Congressional hearings minutes, and a variety of journals pointed to issues associated with the lack of clear lines of responsibility for security on many types of NRAM shipments. Both law enforcement and science-related journals pointed to issues associated with a lack of security in NRAM shipments. Congressional hearings held on the issue indicated that a problem exists and that operational control by a single agency is needed. The number of federal initiatives presently underway also suggests this issue is the focus of attention.

In some ways, this topic appears to be a Rubik's Cube with many dimensions leading to the same question of whether there is sufficient NRAM security. To fully grasp this subject area, it was necessary to research and strip away various layers of governmental oversight one layer at a time.

Sources considered in this research were categorized as For Official Use Only (FOUO), Law Enforcement Sensitive (LES), and Safeguards Information (SGI). In order to simply gain access to some of the research it was necessary to secure a "Top Secret" "Q" clearance through the assistance of the Federal Bureau of Investigation (FBI) and the DOE.

This research, intended for senior policy makers at the federal level, will focus attention on the security measures surrounding the storage and movement of *commercial* nuclear and radiological materials (NRAM) throughout the U.S. At no time should this research be misconstrued to refer to the weapons, materials, or related activities under the authority of the U.S. Department of Defense (DoD).

II. THE THREAT

A. TERRORISTS HAVE THE INTENT TO ATTACK OUR HOMELAND THROUGH THE USE OF NUCLEAR AND RADIOLOGICAL MATERIALS

Among the areas in homeland security which are of most concern to federal authorities is the potential use of nuclear or radiological materials (NRAM) in a weapon of mass destruction (WMD) or a radiological dispersal device (RDD), also known as a “dirty bomb”, on U.S. soil.⁵ This concern is based upon a number of reliable sources, not the least of which is an ABC interview in which Osama bin Laden, reportedly the leader of al Qaeda, stated that he sees acquiring nuclear weapons as a “religious duty.”⁶ Such concerns have a factual underpinning that goes beyond mere political rhetoric. Research conducted by the Institute of Science and International Security reviewed documents seized in al Qaeda training camps in Afghanistan and elsewhere indicating al Qaeda leadership is highly interested in acquiring and utilizing nuclear and radiological weapons along with other types of WMD and has made several unsuccessful attempts to acquire enriched uranium.⁷

There is other evidence to support this contention. For example, Australia has uncovered terrorist plots against its nuclear facilities.⁸ According to a report by the

⁵ U.S. Department of Homeland Security, *Nuclear Reactors, Materials and Waste for Critical Infrastructure Protection as Input to the National Infrastructure Protection Plan Draft* (Washington, D.C.: U.S. Government, 2006).

⁶ Rahimullah Yusufzai, “Interview with Bin Ladin, World's Most Wanted Terrorist,” ABC News, 1999, <http://www.islamistwatch.org/blogger/localstories/05-06-03/ABCInterview.html> (accessed 4 April 2006).

⁷ D. Albright, “Al Qaeda's Nuclear Program: Through the Window of Seized Documents,” *Policy Forum Online*, November 16 (2002).; D. Albright, K. Buehler and H. Higgins, “Bin Laden and the Bomb,” *Bulletin of the Atomic Scientists* 58, no. 1 (2002).

⁸ Associated Press, “Prosecutor Seeks Guilty Verdict for Terror Suspect Extradited from Australia,” *International Herald Tribune*, Sec. European Region, 9 February 2007, <http://www.iht.com/articles/ap/2007/02/09/europe/EU-GEN-France-Terror-Trial.php>.; Associated Press, “Police Say they Stopped Suspects Near a Reactor,” *Bloomington Pantagraph*, 2006.

Center for Nonproliferation Studies, between 1997 and 2004 there have been a number of incidents that provide evidence of the al Qaeda's interest in various WMD, including nuclear and radiological devices.⁹

In the popular TV show "24" a terrorist recently detonated a suitcase nuclear bomb in Los Angeles, but could this really happen? According to Joe Cirincione, a nuclear expert at the Center for American Progress and author of the book "Bomb Scare" it could happen. Cirincione advises, "There is a better than even chance of something like this happening within the next ten years." According to Cirincione this is, "Our greatest unmet national security threat."¹⁰

The research reveals that the threat goes beyond al Qaeda to other groups as well.¹¹ There is evidence to suggest that some U.S. domestic terrorist groups have expressed an interest in collaborating with al Qaeda in an effort to join forces against the U.S. In a March, 2005, interview the reported leader of the Aryan Nations, August Kreis, advised a CNN news reporter that he hopes the Aryan Nations can join forces with al Qaeda, as they have a "common cause." When asked if he had a message to al Qaeda, Kreis advised, "The message is, the cells are out here and they are already in place. They might not be cells of Islamic people, but they are here and they are ready to fight."¹²

⁹ Lindsey DeFazio, Mathew Osborne and Benjamin Heath, *Chart: Al-Qa'ida's WMD Activities* (Washington, D.C.: Center for Nonproliferation Studies, 2005), http://cns.miis.edu/pubs/other/sjm_cht.htm (accessed 25 September 2006). See Table #1 in Appendix.

¹⁰ Joe Cirincione, *Bomb Scare the History and Future of Nuclear Weapons* (New York, NY: Columbia University Press, 2007).

¹¹ S. Daly, J. V. Parachini and W. Rosenau, "Aum Shinrikyo, Al Qaeda, and the Kinshasa Reactor," *RAND Project Air Force* (2005), http://www.rand.org/pubs/documented_briefings/2005/RAND_DB458.pdf (accessed 2 December 2006).

¹² Henry Schuster, "An Unholy Alliance, Aryan Nation Leader Reaches Out to Al Qaeda," *CNN.Com* 29 March, 2005, <http://www.cnn.com/2005/US/03/29/schuster.column/index.html> (accessed 2 December 2006).

According to reports collected by the DHS Homeland Infrastructure Threat & Risk Analysis Center, there have been a number of suspicious activity incidents around nuclear facilities and NRAM shipments in the U.S. While a percentage of these could certainly be explained away, the likelihood that terrorists are conducting surveillance activity and probing security measures around these assets cannot be discounted.¹³

One such instance occurred in 2003, at an Illinois nuclear fuel processing facility. An unscheduled tractor trailer arrived to load and transport NRAM. Armed security guards became suspicious and searched the truck finding a notebook containing handwritten notes describing security measures at the facility, a ballistic vest, night vision goggles, a gas mask, handcuffs, and a pepper spray canister. Further investigation revealed that the driver and an accomplice were planning a theft of NRAM. The accomplice had been encountered earlier in the evening in Missouri when law enforcement officers there found him blocking traffic with his vehicle and kneeling in the road in traditional Muslim prayer. An investigation further revealed that both of these subjects had anti-government views and that one of the subjects had expressed the desire to kill the President of the United States.¹⁴

If, as Congressional hearings and reports from the DHS and the Federal Bureau of Investigation (FBI) indicate, there is a credible basis for believing that terrorists may have an interest in securing NRAM for use in an attack, then something must be done right away to address this issue.¹⁵ According to the 9/11 Commission, a terrorist group armed with the needed nuclear material, “could fashion a nuclear device that would fit in a van like the one Ramzi Yousef parked in the garage of the World Trade Center in 1993,” and could level Lower Manhattan.¹⁶

¹³ M/Sgt. Steven Shields, *Illinois State Police Field Report F 22-03-149*, 2003; U.S. Department of Homeland Security, Office of Intelligence and Analysis, *Homeland Infrastructure Threat and Analysis Center (HITRAC) Quarterly Report*, 2006.

¹⁴ M/Sgt. Steven Shields, *Illinois State Police Field Report F 22-03-149*, 2003.

¹⁵ G.T. Allison, *Nuclear Terrorism is the Greatest Threat to National Security* (Cambridge, MA: The MIT Press 1996), 12.

¹⁶ T. H. Kean and L. H. Hamilton, *The 9/11 Commission Report: Final Report of the National Commission on Terrorist Attacks upon the United States* (Washington, D.C.: WW Norton & Company, 2004), <http://www.gpoaccess.gov/911/index.html> (accessed 1 February 2006), 380.

Current research clearly shows there are many opportunities for terrorists to obtain NRAM *outside* the U.S. Literally tons of NRAM are vulnerable to theft within the former Soviet Union and in a number of other countries worldwide.¹⁷ According to a November, 2004, report from the U.S. Government Accountability Office (GAO), there are over 120 nuclear facilities around the world with 20 kilograms of highly enriched uranium. Security at many of these facilities consists of only a night watchman or a chain fence.¹⁸

In the popular TV show “24” a terrorist recently detonated a suitcase nuclear bomb in Los Angeles, but could this really happen? According to Joe Cirincione, a nuclear expert at the Center for American Progress and author of the book “Bomb Scare”, “There is a better than even chance of something this happening within the next ten years.” According to Cirincione, this problem is, “Our greatest national security threat.”¹⁹

According to the International Atomic Energy Agency (IAEA), from 1993 to 2004, there were 630 cases of illicit trafficking of nuclear or other radioactive material.²⁰ According to a 2006 report from Harvard University’s Kennedy School of Government, “If terrorists could steal, buy or make a nuclear bomb, there can be little confidence that the government could stop them from smuggling it into the United States. After all, thousands of tons of illegal drugs and hundreds of thousands of illegal immigrants cross the U.S. borders every year, despite massive efforts to stop them.”²¹ As another report

¹⁷ M. Bunn, A. Wier and N. T. Initiative, *Securing the Bomb 2006* (Cambridge: Harvard University; Nuclear Threat Initiative, 2006), <http://www.nti.org/securingthebomb> (accessed 2 September 2006), 3.

¹⁸ M. Bunn and G. Bunn, “Strengthening Nuclear Security Against Post-September 11 Threats of Theft and Sabotage,” *Journal of Nuclear Materials Management* 30, no. 3 (2002): 48.

¹⁹ Joe Cirincione, *Bomb Scare the History and Future of Nuclear Weapons* (NY: Columbia University Press, 2007).

²⁰ Mohamed ElBaradei, “Nuclear Proliferation and the Potential Threat of Nuclear Terrorism,” 8 November 2004, <http://www.iaea.org/NewsCenter/Statements/2004/ebsp2004n013.html> (accessed 20 December 2006).

²¹ Bunn et al., *Securing the Bomb 2006*, 4.

points out, since the essential elements of a nuclear bomb can fit into a briefcase, and the weak radiation these materials emit can be difficult to detect with use of shielding, there are a myriad number of ways this terrorist method could be used against citizens.²²

B. SUCH MATERIAL, IF USED IN WMD OR RDD HAS THE POTENTIAL TO HARM A LARGE POPULATION AND INFLICT SUBSTANTIAL ECONOMIC LOSS

An improvised nuclear device is a crude nuclear bomb made with highly enriched uranium or plutonium. Nonproliferation experts estimate that a successful improvised nuclear device could have yields in the 10 to 20 kiloton range (the equivalent to 10,000 to 20,000 tons of TNT). A 20-kiloton yield would be the equivalent of the bomb that destroyed Nagasaki and could devastate the heart of a medium-size U.S. city and result in thousands of casualties and radiation contamination over a wider area.²³

An RDD or dirty bomb combines conventional explosives such as dynamite with radioactive material using explosive force to disperse the radioactive material over a large area, such as multiple city blocks. The extent of contamination would depend on a number of factors, including the size of the explosive, the amount and type of radioactive material used, and weather conditions. While much less destructive than an improvised nuclear device, the dispersed radioactive material could cause radiation sickness for people nearby and produce serious economic costs and psychological and social disruption associated with the evacuation and subsequent cleanup of the contaminated areas.²⁴ While no terrorists have detonated a dirty bomb in a city, Chechen separatists placed a canister containing cesium-137 in a Moscow park in the mid-1990s. Although

²² M. Bunn, A. Wier and J. P. Holdren, *Controlling Nuclear Warheads and Materials: A Report Card and Action Plan* (Cambridge: Harvard University, Nuclear Threat Initiative; Project on Managing the Atom, 2003), 15-19, http://www.nti.org/e_research/cnwm/overview/report.asp (accessed 1 February 2006).

²³ U.S. Department of Homeland Security, *Nuclear Reactors, Materials and Waste for Critical Infrastructure Protection as Input to the National Infrastructure Protection Plan Draft* (2006), 75.

²⁴ W. C. Conklin, "Proposed Framework for Cleanup and Site Restoration Following a Terrorist Incident Involving Radioactive Material," *Health Physics* 89, no. 5 (November 2005): 575-582; S. V. Musolino and F. T. Harper, "Emergency Response Guidance for the First 48 Hours After the Outdoor Detonation of an Explosive Radiological Dispersal Device," *Health Physics* 90, no. 4 (April 2006): 377-385.

the device was not detonated and no radioactive material was dispersed, the incident demonstrated that terrorists have the capability and willingness to use radiological materials as weapons of terror.²⁵

Dr. Harvey Drucker is a nuclear scientist at Argonne National Laboratory. He has written many papers focusing upon the health risks of NRAM. He has been involved in determining levels of risk as a function of radiological exposure and specific material of concern. He has published a number of papers on the transport of nuclear materials through the food chain and is chair of the Illinois Terrorism Task Force's Science and Technology Committee.

According to Dr. Drucker, RDDs are a threat because nuclear materials are readily available to terrorists. Those used in industry and medicine have been inadvertently released in Latin America and in the U.S. In Latin America, they were responsible for deaths from radiation sickness and in some cases leukemia. Transuranic elements derived from reactor operations and wastes from nuclear processing are available from Russia and other countries. These pose a short term risk of radiation sickness but, more importantly, they pose a long term health risk in the form of cancers from bone to blood.²⁶

Dr. Drucker advised, "The components of a nuclear bomb could be shipped to the U.S. in amounts less than critical mass. With appropriate shielding, they would be easily shippable by air or private truck through U.S. borders, and then assembled into a nuclear device. These materials are available from Russia and its former satellite countries. Their explosive effect would probably be less than that of the Hiroshima or Nagasaki devices, but they would still pose a significant explosive threat and would cause a wide dispersion of radioactive materials; both a significant pathological and psychological risk."²⁷

A report by the Nuclear Threat Initiative and Harvard University suggests that even a crude terrorist bomb would be capable of incinerating the heart of a major city.

²⁵ C. D. Ferguson, T. Kazi and J. Perera, *Commercial Radioactive Sources: Surveying the Security Risks* (Monterey Institute of International Studies, Center for Nonproliferation Studies, 2003), <http://www.unidir.ch/pdf/articles/pdf-art1909.pdf> (accessed 10 November 2006), 18.

²⁶ Dr. Harvey Drucker (Argonne National Laboratory), e-mail messages to author, 16 February 2007.

²⁷ Ibid.

With an explosive power of 10,000 tons of TNT (which is a smaller than the bomb used on Hiroshima, Japan), on a typical work day in downtown Manhattan such a bomb could kill half a million people and cause more than \$1 trillion in direct economic damage.²⁸

Figure 1 below created by the Argonne National Laboratory depicts the potential impact of a 10 kiloton nuclear device in downtown Chicago. It depicts the estimated fatality rate assuming people have no advance warning and without appropriate sheltering or shielding. The fatality rates will vary depending upon a number of factors, including whether it is day or night time during the blast. If, for example, the event were during the Taste of Chicago / July 4th events, the prompt death toll could be over one million. On a “normal” workday, the death toll could be several hundred thousand. If it were a winter night, the estimates are less clear.

Similarly, the fallout dose contours assume an unsheltered population exposed for twenty-four hours. If people could find a well shielded fallout shelter for a day or two before going out in the open, there would be much lower radiation effects. Better yet, if they could be evacuated before the fallout arrives, then there would be no adverse health effects. More realistically, most people in the path of the fallout would probably try to self evacuate, ending up stuck in traffic jams, which would be equivalent to being unshielded. In that case, there could be several hundred thousand more casualties since the fallout plume extends for at least twenty miles downwind.²⁹

The National Infrastructure Protection Plan (NIPP) assesses risk as a function of consequence, vulnerability, and threat. Following that model, the risk of NRAM being used domestically as a weapon against the U.S. is high.³⁰

²⁸ Bunn et al., *Controlling Nuclear Warheads and Materials*, 38.

²⁹ Eugene Frank Moore, (U.S. Department of Energy Radiological Assistance Program, Region V) e-mail messages to author, 3 January 2007.

³⁰ U.S. Department of Homeland Security, *Nuclear Reactors, Materials and Waste for Critical Infrastructure Protection as Input to the National Infrastructure Protection Plan Draft* (2006).

Unfortunately, most first responder agencies are woefully unprepared to respond to a nuclear or radiological incident, making the likelihood of prompt and effective emergency medical care a major concern.³¹

³¹ Kathleen McDonald and W. Sean McLaughlin, “First Responders: Ready or Not?” *Law Enforcement Trainer* 18, no. 3 (May/June 2003): 14.

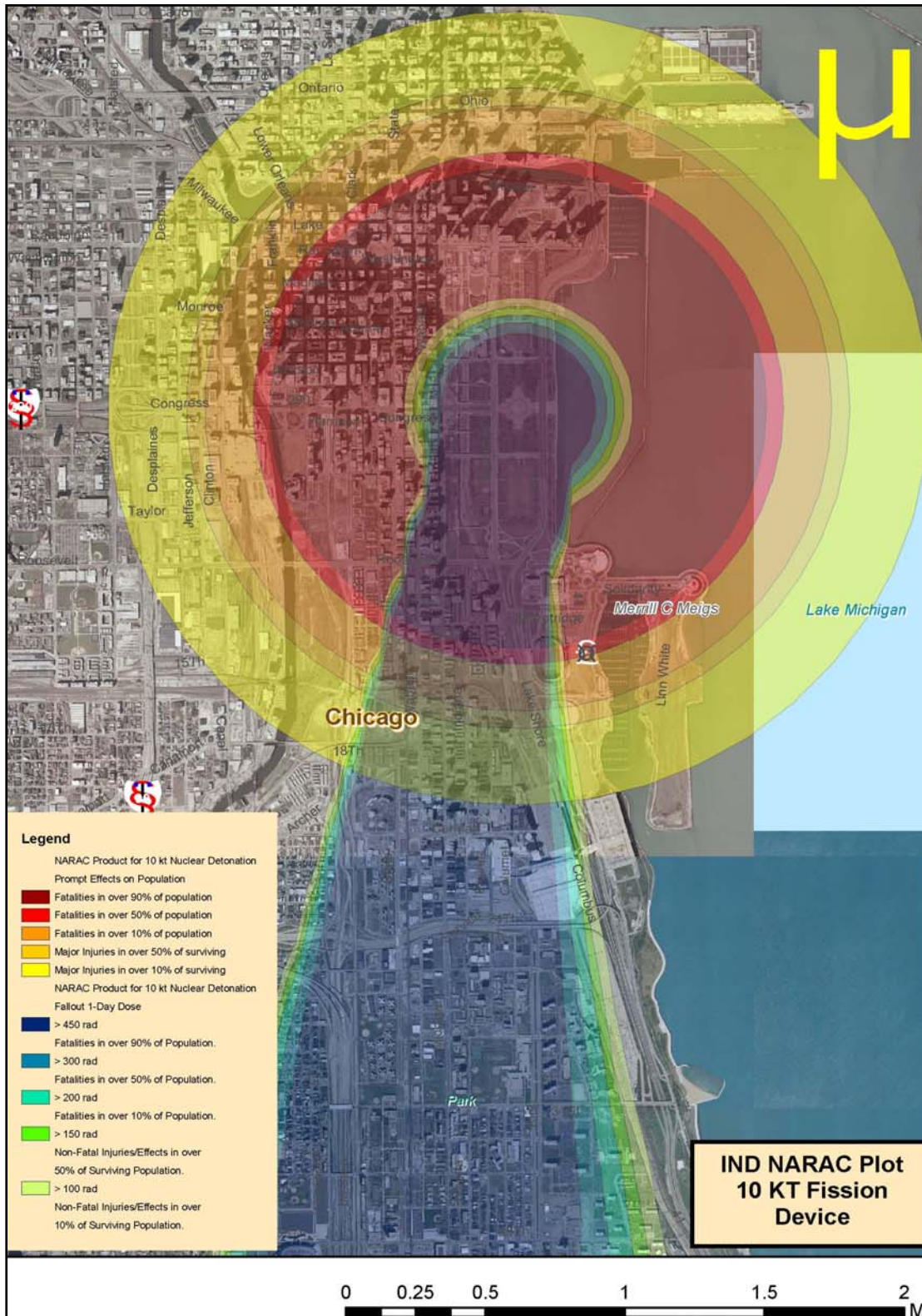


Figure 1. Effects of a Nuclear Device in Downtown Chicago (from Argonne National Laboratory 2006)

THIS PAGE INTENTIONALLY LEFT BLANK

III. THE PRESENT SITUATION

A. HYPOTHETICAL SCENARIO

A shipment of cobalt 60, a potentially deadly radioactive material, is being shipped by a company in Canada to the Port of Los Angeles, where it will be loaded on a ship to be taken to China, a common pathway for this material. The contractor hired to move the material does so with a conventional tractor/trailer. The trip will take several days; and, except for registering with “Transcom,” an electronic tracking service used by the DOE, there is no security on the shipment. The tracking device is affixed to the trailer, not the nuclear cargo itself, which is common among most shippers. While there is a schedule for the shipment, it is completely up to the driver as to when and where he will stop for fuel and breaks, including his rest time required by DOT regulations. Most state and local authorities are completely unaware of such shipments passing through their jurisdictions.

The shipment enters the U.S. at the U.S. / Canadian border in Michigan. As it moves south through Michigan, FBI Joint Terrorism Task Force (JTTF) agents in Illinois learn from the Illinois Statewide Terrorism & Intelligence Center (ST&IC) that a right wing extremist group is apparently “planning something big.” The informant, a source within the organization, has advised agents that the group is planning a “major event” that will “rock America.” While JTTF agents run investigative leads, the ST&IC begins to survey all major gatherings scheduled in the Midwest, contacting its partners within the fusion centers of the surrounding states through an intelligence sharing network covering all the states in the Midwest region, as well as across the U.S. The information is quickly assembled and analyzed. The ST&IC learns that members of this same extremist group appear to be planning something in the St. Louis, Missouri, area during the next week. The ST&IC checks schedules of major sporting events and other activities in St. Louis. There is a major league baseball game planned at Busch Stadium in a week; and, according to U.S. Secret Service (USSS), there is a possibility the President of the United States (POTUS) may attend to throw the opening pitch.

Meanwhile, the driver of the cobalt 60 shipment has stopped for the night at an Indiana rest stop near the Indiana and Illinois border. He climbs into his sleeper, and with the help of some sleeping pills, falls fast asleep. As many drivers often do, he leaves the truck tractor's diesel engine idling and the air conditioner unit running to keep him cool and to drown out the noise from the traffic. At dawn, the sun shining in his windshield wakes him. He feels foggy from the sleeping pills and steps out of the rig to go wash his face in the rest room. The cobalt 60 cask, which was chained to the flatbed trailer the night before is gone. He dials "911", and reports the shipment stolen. Since the global positioning unit is on the trailer rather than the shipment, there is no way to know where the cask is.

FBI JTTF agents in Illinois learn that an instruction manual on how to build a radiological dispersion device (RDD) also known as a "dirty bomb" was found in one of the safe houses used by this extremist group. With the prospect of a dirty bomb may be used by this group, FBI headquarters is notified.

B. WHILE SOME STATES HAVE MORE STRINGENT SECURITY STANDARDS, THE FEDERAL REGULATORY SECURITY STANDARDS FOR NRAM ARE WOEFULLY INADEQUATE

The hypothetical situation above portrays a dramatic fictional story. While the facts are certainly fictional, the risk and vulnerability that is described is unfortunately quite real.

Few can legitimately question that since the tragic events of September 11, 2001, many great strides have been made in the effort to make our homeland more secure. Security measures have been carefully analyzed and improved regarding the airline industry, cargo shipments in our ports, the rail industry, nuclear power plants, highway and bridge systems, the telecommunications system, the national power grid, natural gas lines, and other critical infrastructure.

Table 1 below is intended to outline the sector that is the subject of this discussion.

<p><u>Nuclear Sector</u></p> <p>NUCLEAR POWER PLANTS</p> <p>A. Light Water Reactor Power Plants</p> <p>B. Other Reactor Power Plants</p> <p>RESEARCH AND TEST REACTORS</p> <p>A. Government Research and Test Reactors</p> <p>B. University Research and Test Reactors</p> <p>C. Private Research and Test Reactors</p> <p>NUCLEAR FUEL CYCLE FACILITIES</p> <p>A. Uranium Mining or In Situ Uranium Leaching</p> <p>B. Uranium Ore Milling or Leachate Processing</p> <p>C. Uranium Conversion Facilities</p> <p>D. Uranium Enrichment Facilities</p> <p>E. Fuel Fabrication Facilities</p> <p> 1. Category I (Special Nuclear Materials) Facilities</p> <p> 2. Category II (Special Nuclear Materials – Moderate Strategic Significance) Facilities</p> <p> 3. Category III (Special Nuclear Materials – Low Strategic Significance) Facilities</p> <p>RADIOACTIVE WASTE MANAGEMENT</p> <p>A. Low-Level Radioactive Waste Processing and Storage Facilities</p> <p>B. Sites Managing Accumulations of Naturally Occurring Radioactive Materials</p> <p>C. Spent Nuclear Fuel Processing and Storage Facilities</p> <p> 1. Spent Nuclear Fuel Wet Storage Facilities</p> <p> 2. Spent Nuclear Fuel Dry Storage Facilities</p> <p>D. Transuranic Waste Processing and Storage Facilities</p> <p>E. High-Level Radioactive Waste Storage and Disposal¹⁴ Facilities</p> <p>NUCLEAR MATERIALS TRANSPORT</p> <p>A. Low Hazard Radioactive Materials Transport</p> <p>B. High Hazard Radioactive Materials Transport</p> <p>DEACTIVATED NUCLEAR FACILITIES</p> <p>A. Deactivated Reactors</p> <p> B. Other Deactivated Nuclear Facilities</p> <p>RADIOACTIVE MATERIAL USERS</p> <p>A. Medical Facilities with Radioactive Materials</p> <p>B. Research Facilities with Radioactive Materials</p> <p>C. Irradiation Facilities</p> <p>D. Industrial Facilities with Nuclear Materials</p> <p>E. Radiopharmaceutical and Medical Isotope Production Facilities</p> <p>F. Radiographers, Well Loggers, and Portable Density Gauge Users¹⁵</p> <p>RADIOACTIVE SOURCE PRODUCTION AND DISTRIBUTION FACILITIES</p> <p>A. Radioactive Source Importers</p> <p>B. Radioactive Source Manufacturers</p> <p>REGULATORY, OVERSIGHT, AND INDUSTRY ORGANIZATIONS</p> <p>A. Federal Nuclear Agencies</p> <p>B. State, Regional, and Local Nuclear Agencies</p> <p>C. Nuclear Industry Organizations</p> <p>OTHER NUCLEAR FACILITIES</p>
--

Table 1. Outline of Nuclear Sector (U.S. Department of Homeland Security 2006)

Unfortunately, with regard to NRAM shipments there has been less focus on homeland security. While many significant reforms were made with regard to nuclear power plants, attention upon security surrounding NRAM storage facilities and shipments has not received as much attention.³²

Perhaps one of the biggest challenges to discussing this topic is the various ways in which NRAM is categorized. Since the terms and categories will become important, the following information will be of assistance.

Source material is natural uranium or thorium or depleted uranium that is not suitable for reactor fuel.

Nuclear material consists of uranium, plutonium or another substance which is or may be used for extraction of nuclear energy (nuclear fuel), or a compound containing such a substance; thorium or another substance suited for conversion into nuclear fuel, or a compound containing such a substance; and spent nuclear fuel which has not been placed in final storage.

Fuel cycle facilities are categorized based upon the type of nuclear material stored or produced at the site. Nuclear material is given different designations depending upon its level of enrichment and the amount of material possessed by the facility. The five categories are as follows:

1. **Category I Fuel Cycle Facilities**

These facilities handle the highest grade of nuclear material, known as **strategic special nuclear material (SSNM)** consisting of uranium 235, uranium 233 or plutonium. This is also often referred to as **fissile** or **military grade material**. Only two such facilities operate within the U.S. today.

³² M. Bunn and G. Bunn, "Strengthening Nuclear Security Against Post-September 11 Threats of Theft and Sabotage," *Journal of Nuclear Material Management* 30, no. 3 (2002): 48.

2. **Category II Fuel Cycle Facilities**

These facilities receive, use or store SSNM of moderate amounts.

3. **Category III Fuel Cycle Facilities**

These facilities are permitted to receive **special nuclear material (SNM)** of low strategic significance or low quantity. There are currently four such facilities in the U.S.

4. **Category III Fuel Enrichment Facilities**

Also known as gaseous diffusion plants, these facilities receive, use, or store natural uranium material and low quantities of SNM and typically manufacture material for the nuclear fuel cycle in the form of enriched uranium hexafluoride (UF – 6). There is only one such facility operating in the U.S.

5. **Uranium Conversion Facility**

Also known as a uranium hexafluoride production facility, this facility receives, uses, and stores material and manufactures material in the nuclear fuel cycle in the form of uranium hexafluoride (UF-6) for commercial fuel enrichment. There is currently only one such facility in the U.S.³³

The uranium mining and milling process is also part of the commercial NRAM sector at the beginning of the fuel cycle process. At the end of the nuclear fuel process are the low level and high level radioactive waste disposal facilities, as well as the spent nuclear fuel storage facilities. Spent nuclear fuel storage facilities come in two types, wet and dry storage. Each of these categories of facilities has their own set of statutes and regulations pertaining to their operations including security.³⁴

Additionally, thirty-four states, known as **agreement states**, have entered into agreements with the NRC to regulate the possession, storage, use, processing, and

³³ Nuclear Regulatory Commission, *Description of Uranium Conversion Process* (Washington, D.C.: U.S. Government, 2006), <http://www.nrc.gov/materials.html> (accessed 16 October 2006).

³⁴ Nuclear Regulatory Commission, *Description of Spent Nuclear Fuel Facilities* (Washington, D.C.: U.S. Government, 2006), <http://www.nrc.gov/waste.html> (accessed 16 October 2006).

transportation of NRAM. **Licenses** are issued under federal regulations or by agreement states under equivalent state authority. Licenses are issued for medical, academic, and industrial uses of nuclear materials. Reactor-produced materials are used extensively throughout the U.S. for a variety of civilian, military, industrial, academic and medical purposes. Both federal and state regulations are intended to ensure that those in possession of such materials use them in a manner consistent with public health and safety.³⁵

As NRAM is created, processed, and enriched, it must be stored and transported. One of the findings of this research is that this area in particular is where a terrorist bent on death and destruction on U.S. soil has his greatest opportunity. It is at this point in the nuclear process where the worst security gaps exist with regard to materials that could be used for terrorist purposes in our homeland. In short, no one has the unified, operational responsibility.

While in the transportation system, NRAM is generally categorized one of four ways based upon their radioactive levels. **Strategic special nuclear material (SSNM)**, also known as “military weapons grade”, consists of uranium-235 (contained in uranium enriched to 20 percent or more in the U-235 isotope), uranium - 233, or plutonium, and, as stated before is not the subject of discussion here. **Special nuclear material (SNM)** consists of uranium-233 or uranium-235, enriched uranium, or plutonium that is less than 20 percent enriched. **Highway route controlled quantities (HRCQ)** is NRAM material below the level of SNM, yet it is relatively high in radioactivity. **Radiological material in quantities of concern (RAMQC)** are materials of lower grade than HRCQ and represent the lower end of the NRAM categories.³⁶

³⁵ DHS, *Nuclear Reactors, Materials and Waste*.

³⁶ *U.S. Code of Federal Regulations*, Title 49 Part 173.435 (2007).

There are also many types of commercial NRAM stored and transported in the U.S. These include General NRAM, Low Level Waste Shipments, Uranium Hexafluoride Shipments, Fresh Fuel Shipments, Transuranic Waste Shipments, Highway Route Controlled Quantity (HRCQ) Shipments, and Weapons Shipments.³⁷

To varying degrees, these four categories of NRAM trigger one or more of the following protective measures under the NRC, the DOT, the DOE or equivalent regulations:

1. Use of NRC certified shipment transportation packaging designed to withstand certain hypothetical accidents. Some packages are also provided a limited amount of security (e.g. spent nuclear fuel package);
2. Advance notifications to the NRC and affected states;
3. Protection of shipment information as classified or sensitive unclassified Safeguards Information (SGI) as appropriate;
4. Communication between the shipper and a control center;
5. Escorts (armed in some cases);
6. Protective measures to protect against movement of a hijacked shipment before response forces arrive.³⁸

It is the consensus of the intelligence community that the potential theft of NRAM is key to the creation of a WMD or an RDD.³⁹ According to some experts, while it may not inflict as many casualties as other explosive devices, an RDD (dirty bomb) would terrify the public and inflict a considerable economic blow upon the commerce of this country.⁴⁰ Since September 11, 2001, regulatory changes have done a great deal to fortify our nation's nuclear power generating facilities. The NRC has required that plants be fortified with numerous additional safeguards and has required that such facilities

³⁷ U.S. Nuclear Regulatory Commission, *Information Digest, 2005-2006 Edition*, 2005-2006 ed., Vol. NUREG 1350, Volume 17 (Washington, D.C.: U.S. Government, 2006), 153.

³⁸ DHS, *Nuclear Reactors, Materials and Waste*, 99.

³⁹ *Ibid.*, 81.

⁴⁰ Allison, *Nuclear Terrorism*, 12; Conklin, "Proposed Framework for Cleanup and Site Restoration," 575-582.

regularly demonstrate their ability to thwart certain designed-based threats;⁴¹ however, security requirements in and around NRAM storage facilities and when NRAM is in transit have not received as much attention.⁴²

C. SECURITY SURROUNDING NRAM SHIPMENTS IS A “PATCHWORK QUILT” OF REGULATORY AGENCIES WITH GAPS AND OVERLAP

In part, the problem is bureaucratic. The regulatory scheme which outlines security measures for commercial grade NRAM storage and shipments was designed before September 11, 2001. The present system is a combination of regulations falling under different regulatory agencies that have not yet fully adjusted to the new homeland security era.

According to the coordinator of the DOE’s Radiological Assistance Program (RAP) for Region 5 in Chicago, the term “patchwork quilt” best describes the present regulatory scheme for NRAM. She is responsible for the DOE’s NRAM security in the DOE region covering the Midwest states.⁴³

Generally, the DOT regulates shippers and carriers that carry hazardous materials including NRAM. The DOT’s focus is on driver certification, vehicle safety, routing, shipping documentation, hazardous material training, and some packaging requirements.⁴⁴ In general, the NRC focuses upon the licensee, and approves the design

⁴¹ U.S. Nuclear Regulatory Commission, *Order Requiring Compliance with Revised Design Basis Threat for Operating Power Reactors*, Public Law EA-03-086, (2003) 1; R. Westrum, “Increasing the Number of Guards at Nuclear Power Plants,” *Risk Analysis* 24, no. 4 (August 2004): 959-961.

⁴² Bunn and Bunn, “Strengthening Nuclear Security,” 48; R. Halstead, J. Ballard and F. Dilger, “State of Nevada Studies of Potential Terrorism and Sabotage against Spent Fuel Shipments,” Waste Management 2001 Conference, Tucson, AZ, 2001.

⁴³ Christine Van Horn (U.S. Department of Energy Radiological Assistance Team Coordinator, Region V) e-mail messages to author, 17 January 2007.

⁴⁴ M/Sgt. David Beasley (Illinois State Police, Commercial Vehicle Enforcement Section), e-mail messages to author, 10 October 2006.

and use of shipping containers termed **packaging**. The NRC is also responsible for regulating the protection of spent nuclear fuel and large quantities of radioactive material in transit from sabotage or theft.⁴⁵

Another key component of this subject area is protecting the information pertaining to NRAM security. The NRC and the DOE jointly regulate security clearances to enable restricted information to be shared with those with a “need to know.” While information pertaining to nuclear facilities, their protective measures, transportation routes, security features, response procedures, certain formula quantities, and similar information regarding certain types and levels of NRAM are considered unclassified, it is considered **Safeguards Information (SGI)**. Disclosure of such information to those not authorized is a federal offense.⁴⁶ Other information pertaining to NRAM as it relates to national security is classified. Through its Protected Critical Infrastructure Information (PCII) Program, the DHS is now also categorizing information as SGI.⁴⁷

While SGI is considered to be sensitive, unclassified information, its handling and protection more closely resembles the handling of classified information. The categories of individuals who are permitted access to SGI are identified in Title 10 CFR Part 73.21.

The DOE regulates the protection of the DOE radioactive waste material shipments. These are typically waste materials from the DOE nuclear facilities across the country. Under the Nuclear Waste Act, as amended, the NRC certifies the packaging for the DOE transports. The NRC regulations require the DOE to comply with certain pre-notifications. All other transportation regulations for those shipments are under the jurisdiction of the DOE.⁴⁸

⁴⁵ F. Dilger and R. Halstead, “The Next Species of Trouble: Spent Nuclear Fuel Transportation in the United States,” *American Behavioral Scientist* 46, no. 6 (February 2003): 796-811; L. Green, “Nuclear Transport - the Regulatory Dimension,” *International Journal of Radioactive Materials Transport* 13, no. 3-4 (2002): 203-206; U.S. Nuclear Regulatory Commission, *Implementing Guidance for Additional Security Measures for Transportation of Radioactive Material Quantities of Concern* (2005).

⁴⁶ *Atomic Energy Act*, Sec. 147.; Nuclear Regulatory Commission, “Nuclear Regulatory Commission Management Directive 12.6,” no. 12.6 (2005), <http://www.nrc.gov/what-we-do/safeguards/phys-protect.html> (accessed 10 October 2006); U.S. Nuclear Regulatory Commission Washington, DC 20555, *Protection of Unclassified Safeguards Information, Criteria and Guidance, NUREG- 0794*, 1981.

⁴⁷ DHS, *Nuclear Reactors, Materials and Waste*, 61.

⁴⁸ Christine Van Horn, (U.S. Department of Energy Radiological Assistance Team Coordinator, Region V) e mail messages to author, 17 January 2007.

In very few instances do any of the federal regulatory agencies collaborate with the state and local agencies through which these materials are shipped.⁴⁹ Figure 2 illustrates how complex the NRAM transport regulations are at the present time.

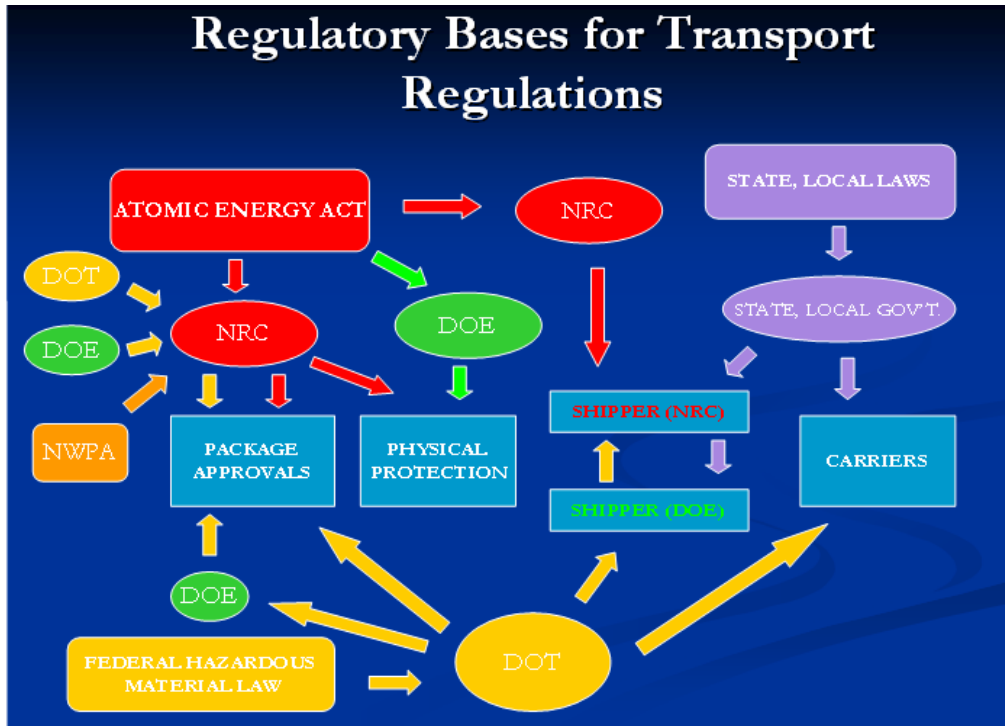


Figure 2. NRAM transport regulations (from Nuclear Regulatory Commission, 2006)

While this regulatory scheme may have been sufficient in the pre-September 11th era, it is woefully inadequate today. Certainly no one questions the commitment and dedication of those within the federal agencies who oversee their respective “lanes of traffic” in securing NRAM commercial storage and transportation, but their primary perspective is with the commercial industry.

None of these agencies have the homeland security mission. That mission is, of course, the province of the DHS. Yet, the DHS has no direct operational control over the security mission for these materials. Further, until an NRAM shipment is stolen,

⁴⁹ Christine Van Horn, (U.S. Department of Energy Radiological Assistance Team Coordinator, Region V).

triggering the involvement of law enforcement through federal, state or local agencies, no one agency is focused upon securing such materials from the hands of terrorists.

Another important category of NRAM shipment is **spent nuclear fuel**. According to the NRC, spent nuclear fuel has the potential to be used in an RDD and has the potential of delivering a lethal radioactive dose to those exposed to it. Using this one category as an example, please note in the illustrations below how regulatory responsibility of this one category of shipment varies under differing circumstances. Unfortunately, in most states these shipments move without the knowledge or collaboration of federal, state, and local law enforcement and often without regard to the presence of major events, high level dignitary visits, or suspected terrorist activity that may be in their path.

One might legitimately ask if these federal agencies “approve” the routes for spent fuel transportation, upon what is that approval based? This is a significant gap in homeland security if those approving the route for such shipments are completely unaware of those activities which threaten public safety. Furthermore, who truly has ownership of the homeland security mission with regard to NRAM? The term “patchwork quilt” described earlier is illustrated in the Tables 2 and 3.

Roles in Spent Fuel Transportation

	NRC LICENSEE	DEPARTMENT OF ENERGY			
		West Valley	Yucca Mountain	Foreign Reactor	Naval Reactors
Package Approval	NRC DOT	NRC ¹	NRC ²	DOT NRC ^{1,3}	DOE NRC ¹
Package Preparation	NRC DOT	DOE DOT	DOE DOT	DOE DOT NRC	DOE DOT
Carrier Safety	DOT STATES	DOT STATES	DOT STATES	DOT STATES	DOT STATES

¹ Per NRC/DOE Reimbursable Agreement

² Per Nuclear Waste Policy Act

³ Per NRC/DOT Memorandum of Understanding

Roles in Spent Fuel Transportation (continued)

	NRC LICENSEE	DEPARTMENT OF ENERGY			
		West Valley	Yucca Mountain	Foreign Reactor	Naval Reactors
Physical Protection	NRC	DOE	DOE	NRC DOE	DOE
Emergency Response					
First Response	STATE LOCAL	STATE LOCAL	STATE LOCAL	STATE LOCAL	STATE LOCAL
Lead Federal Agency	NRC	DOE	DOE	DOE NRC	DOE
DOE Response Teams	DOE	DOE	DOE	DOE	DOE

Table 2. Roles in Spent Nuclear Fuel Shipments (from Nuclear Regulatory Commission, 2006)

Primary Roles in Selecting and Approving Highway Routes for Spent Fuel Transportation				
	NRC LICENSEE	DEPARTMENT OF ENERGY		
		West Valley	Yucca Mountain	Foreign Reactor
Route Selection	NRC LICENSEE	DOE	DOE	DOE
Route Selection Criteria	DOT	DOT	DOT	DOT
Safeguards Route Approval	NRC	DOE	DOE	DOE NRC

Table 3. Primary Roles in Selecting and Approving Highway Routes for Spent Fuel Transportation (from Nuclear Regulatory Commission, 2006)

This fragmentation also exists with the various regulatory entities. Under DOT alone there is divergence in responsibilities. Through the Transportation of Hazardous Material Act, the DOT is responsible for ensuring the safety of hazardous materials transportation, including spent nuclear fuel and all radioactive materials. Within the DOT, the Research and Special Programs Administration (RSPA), the Federal Motor Carrier Safety Administration (FMCSA), the Federal Railroad Administration (FRA) and the Federal Aviation Administration (FAA) have varying degrees of responsibility over NRAM shipment security.⁵⁰

Additionally, the U.S. Environmental Protection Agency, the Federal Emergency Management Agency, the Nuclear Waste Technical Review Board, and the Occupational Health and Safety Administration also have partial responsibility for regulating drivers, carriers, and shippers of NRAM.⁵¹

⁵⁰ *Transportation of Hazardous Materials Act*, Title 49 USC 5101-5127 (2004).

⁵¹ J. A. D. Smith and J. B. Reed, *Spent Fuel Transportation: History, Status and State Involvement*, National Conference of State Legislatures, 2004, 80.

Tim Runyon, the Section Manager for the Environmental Monitoring and Transportation Unit at the Illinois Emergency Management Agency's Division of Nuclear Safety (DNS), has been involved in Illinois' NRAM inspection and escort program since 1985. According to Runyon, shortly after September 11, 2001, the NRC and the DOT made efforts to increase security and controls on certain types and quantities of NRAM in transit. As part of what was termed "interim compensatory measures", (ICM) the NRC suggested that states consider security escorts for NRAM shipments at levels RAMCQ and above. States were left to their own discretion to determine how they would respond to this somewhat ambiguous guidance.⁵²

Runyon advises, "The detail of the NRC orders imposed on licensees suggested the existence of a credible threat and that RAMCQ shipments were considered potential targets for individuals interested in obtaining these materials for use in a radiological dispersal device (RDD). However, the lack of clear guidance from our federal partners, regarding the role of state and local law enforcement, has resulted in a wide range of responses from States and other stakeholders." From Runyon's point of view, states with well developed radiological response programs or existing programs that have historically provided truck inspections and security escorts for spent nuclear fuel shipments have added RAMQC or the HRCQ subset to the types of shipments that they inspect and escort. In many cases, fees must be imposed on shippers and carriers to offset the additional expense of these unfunded mandates. However, "there is no consistency from State to State," according to Runyon. This lack of consistency is difficult and confusing for shippers and carriers and reduces the overall effectiveness of states that are involved with such shipments.⁵³

⁵² U.S. Nuclear Regulatory Commission, *Implementing Guidance for Additional Security Measures for Transportation of Radioactive Material Quantities of Concern*; U.S. Nuclear Regulatory Commission, *Order Imposing Additional Security Measures (Effective Immediately)*, Public Law EA-05-007, (2005); Tim Runyon (Illinois Emergency Management Agency, Division of Nuclear Safety) e mail messages to author, 10 December 2006.

⁵³ Tim Runyon, (Illinois Emergency Management Agency, Division of Nuclear Safety), e mail messages to author, 10 December 2006.

“A particular shipment moving across the U.S. may be inspected and escorted in New York, Ohio, Illinois, and California, but not in Pennsylvania, Indiana, Missouri, or Iowa. It’s no great leap in logic to assume that any group interested in the use of these materials for malevolent acts would simply wait in a neighboring state for a shipment to be released from its security escort before launching an attack and commandeering the material,” explained Runyon.⁵⁴

“There is clearly a need for more detailed information and consistent guidance at the federal level. States should also have an avenue for receipt and communication of credible threat information in real time. Most important, the federal agencies including DOT, NRC and DHS should strive for rules or regulations that provide for consistency in the level of security and oversight provided for NRAM shipments as they move across the U.S.”, advised Runyon.⁵⁵

⁵⁴ Tim Runyon, (Illinois Emergency Management Agency, Division of Nuclear Safety) e mail messages to author, 10 December 2006.

⁵⁵ Ibid.

THIS PAGE INTENTIONALLY LEFT BLANK

IV. STATES TAKE HOMELAND SECURITY ACTION

In a minority of states where a number of nuclear power generating or storage facilities are located, the states themselves have instituted security regulations. For some, these regulatory practices have been historical, dating back to when nuclear facilities were first built in their jurisdictions. In others, they were instituted after September 11, 2001.⁵⁶ In no other state are the security measures more developed than in Illinois. Illinois has by far more nuclear facilities than any other state; at present, the state has eleven nuclear power generating plants, with a twelfth planned for construction.⁵⁷ These plants are at six locations around the state. Illinois also has two nuclear fuel storage facilities and the only uranium ore processing facility in the U.S. (located at Metropolis, Illinois). The uranium ore processing facility is only one of five in the world, and 30% of the world's supply of uranium is processed at that facility.⁵⁸

A. THE HISTORY AND THE WAY FORWARD IN NRAM SHIPMENT SECURITY - THE ILLINOIS MODEL

Since 1979, the Illinois State Police (ISP) and the Illinois Emergency Management Agency's Division of Nuclear Safety (DNS) have collaborated on NRAM shipment security. Operating under state regulatory authority, the two agencies have partnered to maintain the safety and security of various types of mid-to high-level NRAM commercial shipments as they move through Illinois.

Additionally, after September 11, 2001, by order of the Illinois Homeland Security Advisor Carl Hawkinson, additional categories and quantities of shipments were included in the security escort program, and all such measures were implemented when the Homeland Security Advisory System warning level is at Level Yellow or above.⁵⁹

⁵⁶ Tim Runyon, (Illinois Emergency Management Agency, Division of Nuclear Safety) e mail messages to author, 10 December 2006.

⁵⁷ U.S. Nuclear Regulatory Commission, *Information Digest, 2005-2006 Edition*, 2005-2006 ed., Vol. NUREG 1350, Volume 17 (Washington, D.C.: U.S. Government, 2006), 153.

⁵⁸ *Ibid.*

⁵⁹ *Ibid.*

Hawkinson, who was the longest serving State Homeland Security Advisor in the nation when he retired at the end of 2005, recounted, “In the first months of 2003, the U.S. was in the run-up to the War in Iraq. DHS was stood up March 1, 2003. In 2003, both pre-DHS and after it was established the nation went to Level Orange. At the time of one or more of these alerts, there was discussion of the threat of dirty bombs. I knew that Illinois was a leading state in nuclear power and through our nuclear safety people, a leader in the shipments of radioactive materials to, from and through our state. This material, if stolen, represented a potential terrorist weapon for dirty bombs...I recommended to the Governor...that Illinois continue this security during “normal” Yellow status. I remained and remain actively concerned with the lack of nationwide security for these shipments. It does little good to secure the shipments in Illinois if they can be hijacked in another state and then used against targets in Illinois or other states...”⁶⁰

As a result of this rich history with the nuclear industry, Illinois is experienced with issues relating to security surrounding the storage and shipment of NRAM. According to a report prepared for the National Conference of State Legislatures, the inspection and escort program developed by Illinois is “unique,” and “the potential increase in NRAM shipments in the future has caused many states to look to Illinois for leadership as they begin to establish similar programs.”⁶¹

Christine Van Horn, Coordinator of the DOE’s Radiological Assistance Program (RAP) Team for Region 5, agrees. According to her, in Illinois the DOE has an excellent relationship with the state’s fusion center, the Statewide Terrorism & Intelligence Center (ST&IC), to obtain intelligence on threats, vulnerability, and special events that may have a bearing on NRAM security. Under the present federal regulatory scheme, a terrorist

⁶⁰ Carl Hawkinson (Former Illinois Homeland Security Advisor and Deputy Chief of Staff for Public Safety, Office of the Governor), e-mail messages to author, 12 January 2007.

⁶¹ Smith and Reed, *Spent Fuel Transportation*, 80.

group need only await the arrival of an NRAM shipment from Illinois into Iowa or Indiana where it is no longer protected, to hijack the load. According to Van Horn, Illinois is a “model” for the nation.⁶²

Another strong partner and advocate for Illinois’ system is the Exelon Corporation, one of the nation’s largest electric and natural gas utility companies. Exelon has the largest fleet of nuclear power generating facilities in the U.S. Headquartered in Warrenville, Illinois, the Exelon leadership team has a strong working relationship with both ISP and DNS.⁶³

The Illinois Emergency Management Agency, Division of Nuclear Safety (DNS), in collaboration with the Illinois State Police, has been engaged in regulating and securing such materials for over twenty-five years under the Illinois Nuclear Safety Act.⁶⁴ As one of the states with an agreement with the NRC, by leveraging the TRANSCOM system, a DOE sponsored, satellite-based shipment tracking system, Illinois monitors shipments routed through Illinois to better estimate their arrival.⁶⁵ Yet, there is often little interaction or collaboration with federal agencies in that process. On a weekly basis, the State of Illinois meets shipments entering from neighboring states, to inspect and escort them. Fully trained and equipped nuclear scientists inspect the cargo to ensure it is safely packaged and secured. Fully trained and equipped Illinois State Police commercial vehicle enforcement officers who are certified in hazardous materials training inspect the driver and vehicle for compliance with federal and state transportation laws. The inspection and escort team then remains with that shipment

⁶² Christine Van Horn (U.S. Department of Energy Radiological Assistance Team Coordinator, Region V), e-mail messages to author, 17 January 2007.

⁶³ Tim Runyon (Illinois Emergency Management Agency, Division of Nuclear Safety), e-mail messages to author, 10 December 2006.

⁶⁴ M/Sgt. David Beasley (Illinois State Police, Commercial Vehicle Enforcement Section), e-mail messages to author, 10 October 2006; *Illinois Compiled Statutes*, Chapter 420, Sec. 10/1-7 (2007), <http://www.state.il.us/iema/legal/statutes/nucpwr/nucfac.htm> (accessed 10 December 2006).

⁶⁵ KS Boes and others, “TRANSCOM: The US Department of Energy (DOE) System for Tracking Shipments,” Conference: SPECTRUM94: International Nuclear and Hazardous Waste Management Conference, Atlanta, GA, 14-18 Aug 1994, <http://www.osti.gov/energycitations/servlets/purl/10160436-iMIFhp/native/> (accessed 2 December 2006).

throughout the state. The routes that are approved take into account major events, present threat intelligence from the state's fusion center, and highway and weather conditions.

Yet those shipments typically arrive and depart the state with no security in the adjacent states, and often with little in the way of electronic monitoring. Worse, in many cases within the neighboring states, stakeholders at the state and local level are completely unaware of the NRAM's presence in their jurisdictions.

Until the fall of 2005, security at the eleven nuclear power generating stations was strong but in need of improvement.⁶⁶ As a result of new Nuclear Regulatory Commission (NRC) standards which took effect in October, 2005, those facilities are now well fortified for all but the most exceptional of terrorist threats⁶⁷ Some facilities, however, are not power generating stations and fall outside the Nuclear Regulatory Commission's (NRC) new stronger security requirements which became effective October 1, 2005. Thus, they have far less security around them than the nuclear power generating stations. This includes nuclear storage facilities, reactors used for medical and scientific research, and the uranium ore processing plant owned by Honeywell Corporation in Metropolis, Illinois (near the Illinois and Kentucky border on the Ohio River).

According to the DNS, the Honeywell facility is the only U.S. source for processed uranium ore needed for nuclear power generating stations and is among only five such facilities in the world. Should a fire occur at this facility, radioactive contaminants could become airborne across much of southeast Illinois and northern Kentucky, as well as the Ohio River, yet it doesn't even appear on the following NRC map.

⁶⁶ Tim Runyon (Illinois Emergency Management Agency, Division of Nuclear Safety), e-mail messages to author, 10 December 2006.

⁶⁷ Ibid.

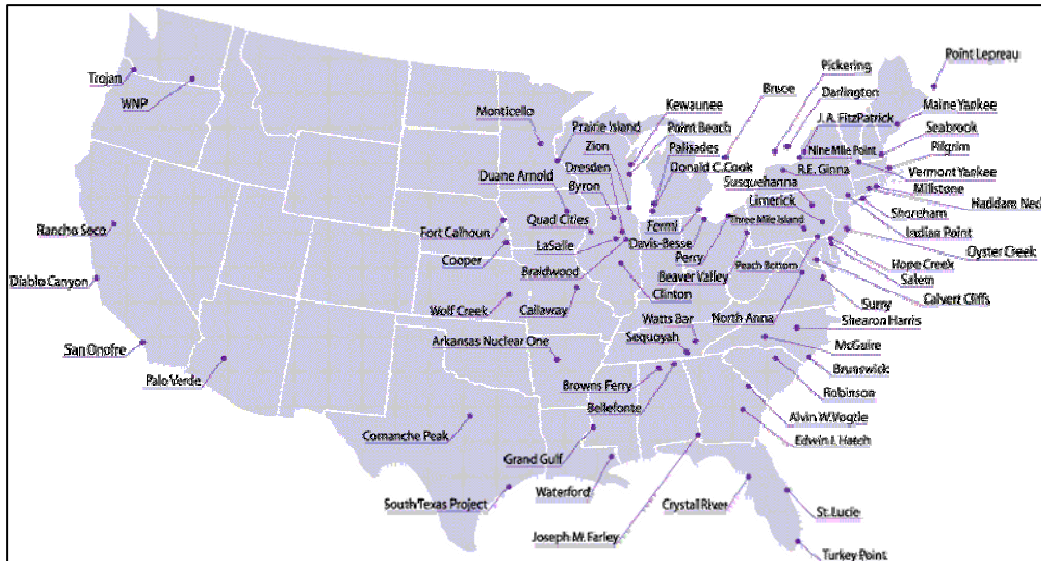


Figure 3. Nuclear Facilities (from Nuclear Regulatory Commission, 2005)

As Figure 3 depicts, nuclear power generating facilities are abundant in the U.S.; however, in no state are there more nuclear facilities than in Illinois. According to the DOE, one in five homes are powered by electricity generated from just over one hundred nuclear facilities in the U.S.⁶⁸ As shown in the figure above, many of these sites are in heavily populated areas.

B. THE HEARTLAND IS THE CROSSROADS FOR THE U.S.

Another reason Illinois has stepped up its NRAM security measures is its location as a major transportation hub for air passenger and freight, rail, and water transportation. Since it is located in the heartland of America, many of our nation's major transportation networks cross through Illinois. Illinois has one of the busiest airports in the U.S. at O'Hare International Airport in Chicago. Illinois also has the largest railroad hub in the country in Chicago.⁶⁹ A short distance south of Chicago is the Centerpoint Inter-modal facility which is the largest inter-modal rail facility in the U.S. and the third largest in the

⁶⁸ U.S. Department of Energy, *Sources of Electric Power* (Washington, D.C. U.S. Government, 2006), <http://www.doe.gov/energysources/electricpower.htm> (accessed 10 February 2006).

⁶⁹ Robert Bensko (Illinois Commerce Commission) interview by author, Springfield, Illinois, 2 February 2007.

world.⁷⁰ By water, Illinois connects the Great Lakes waterway system with the Mississippi, Ohio, and Illinois river systems. Currently nuclear fuel and radioactive materials cross through Illinois on a weekly basis through all these modes of transportation. According to the Illinois Department of Transportation (IDOT), high grade NRAM shipments come through Illinois over two hundred times each year. Mid- to lower-level radioactive shipments pass through the state on a daily basis. These shipments come through at varying radioactive levels, and with varying degrees of safety precautions.

C. THE POTENTIAL IMPACT OF YUCCA MOUNTAIN

An issue that has a significant impact on NRAM security is the storage of spent nuclear fuel. Facilities nationwide are presently holding their spent nuclear fuel or are finding interim storage facilities until Congress determines if Yucca Mountain in Nevada will be used as a national storage facility. The DOE estimates with the opening of the Yucca Mountain storage site, highly radioactive cargo would travel through a total of 45 states at a rate of about 2,200 additional truck shipments per year, or 450 additional rail shipments annually, depending on the mode chosen. Many of those shipments must pass through Illinois.⁷¹

According to the Illinois Department of Transportation (IDOT), approximately 2,000 NRAM shipments move within or through Illinois annually. Over 50 shipments, or slightly over one per week, are escorted with a state police and nuclear science team each year. If Yucca Mountain opens for NRAM storage, that number will likely double.⁷²

⁷⁰ Thomas Korty (Policy and Safety Manager, Illinois Department of Transportation) interview by author, Springfield, Illinois, 7 June 2006.

⁷¹ Environmental Working Group Action Fund, *Will Terrorists Target Nuclear Waste Shipments?* Environmental Working Group Action Fund, http://www.ewg.org/reports/nuclearwaste/faq/faq_terroristthreat_more.php (accessed 10 February 2006).

⁷² Korty interview.

V. THE SOLUTION

There needs to be a single, comprehensive strategy with regard to security of NRAM during storage and shipment. That strategy must have a focus upon homeland security and must be multi-disciplinary in nature. The present “patchwork quilt” of regulatory oversight must be converted to a single, uniform network of federal, state, and local stakeholders with a common mission and operating picture.

Under the proposed solution, the future strategy for NRAM storage and transportation security would work much differently than it does today in many states.

A. THE NEED FOR A MULTI LEVEL HOMELAND SECURITY EFFORT IN NRAM – A LOOK AT HOW OTHER COUNTRIES HANDLE COMMERCIAL NRAM

Unlike many countries that have a national police force, there appears to be tension between federal and state / local authorities in the U.S. in homeland security efforts. Police in the U.S. are also less familiar with addressing international terrorism on their own soil as law enforcement in some other countries.⁷³ The Israeli model of national police is well known and need not be detailed here; but that model is not practical in the U.S. since states and U.S. territories have sovereignty under the U.S. Constitution. Yet, can something be learned from the manner in which other nations protect their commercial NRAM?

The security measures surrounding NRAM are not a topic widely publicized by most governments; therefore, gaining access to specific information about how other countries deal with this issue is quite difficult. While Russia is widely criticized for its lack of tight security surrounding its nuclear military weapons, Russia may have some security practices worth noting with regard to its commercial NRAM.

Vladimir Sergevnin served in the Russian military and in the Russian police. He began his law enforcement career in 1977 as a Second Lieutenant in Ministry of Internal

⁷³ Dennis Bridges, “It’s a Police Problem: The Terrorist Threat’s Impact on State and Local Law Enforcement,” *Police Chief* 69, no. 2 (February 2002): 35.

Affairs of the USSR, which he described as the equivalent of the Royal Canadian Mounted Police in Russia. The unit in which he worked had both federal and state authority. He had many assignments including the Special Forces unit during the 1980 Olympic Games, border security, 12th International Youth Festival, President Boris Yeltsin's security detail, and others. He retired at the rank of Colonel in 2002. He presently works with the Illinois Law Enforcement Training and Standards Board Executive Institute as the research manager and editor of their research publications.⁷⁴

According to Mr. Sergevnin, Russian police are integrally involved in security measures surrounding commercial NRAM shipments. Most of these shipments are the responsibility of the state police in Russia, under the guidance of the Ministry of Nuclear and Atomic Energy (Minatom) and the Ministry of the Interior (MVD). There are 89 states in Russia, and police are responsible for securing the shipment along the highways as it moves from state to state. Police are in uniform and are typically armed with both handguns and AK-47 rifles. Such escorts will typically carry a red flag denoting a security escort and may have a traffic police placard on them.

Mr. Sergevnin explained that the plans for movement of NRAM are overseen by the Minatom, which oversees the safety arrangements; Federal Security Service (FSB), which provides intelligence security; and the MVD, which arranges police security along the highways, railways, river ways and sea. Such shipments are tracked and monitored electronically, as well as escorted. The security teams are in constant contact with authorities to maintain situational awareness of the shipments. While local police may stop and inquire as to the nature of the shipment and may demand to see identification and shipment papers, local police are not permitted to inspect the shipment itself due to safety concerns.⁷⁵

If other countries such as Russia can deploy procedures that better secure commercial NRAM during transportation across its many states, why can't the U.S.? Through efforts by Congress to help better secure NRAM in *other* countries under the

⁷⁴ Col. Vladimir Sergevnin (Ret.) (Illinois Law Enforcement Training and Standards Board) interview by author, Springfield, Illinois, 2 August 2006.

⁷⁵ Ibid.

1991 Nunn-Lugar Act, we are seeking to help ensure that the U.S. is more secure.⁷⁶ For example, in one recent effort the Russian government in conjunction with the U.S. National Nuclear Security Administration (NNSA) removed highly dangerous NRAM from a troubled area of Chechnya under armed security, to be stored in a secure facility. There was reportedly enough material to make up to five RDD's or dirty bombs.⁷⁷

The International Atomic Energy Agency (IAEA) argues that national standards in each country are inadequate, as they are dependent upon that individual country's economics, political make-up, international standing, and other factors. They argue that to attack the problem one nation at a time through international agreements is ineffective and depends upon the stability of that government to meet its commitments in the long term. Accordingly, the argument is made that a single international standard should be developed that all countries would agree to follow. While the IAEA works toward establishing a minimum safety standard, in the view of some this goal is unlikely to be achieved due to the wide disparity in economic capabilities and political interest in the issue.⁷⁸ Nonetheless, the IAEA continues to strive toward model security policies for all nations involved in the nuclear fuel cycle.⁷⁹

Clearly, it is easy to understand the challenges with improving security measures of NRAM in other countries, but what about the NRAM *within* the U.S.? Is the U.S. really doing all it should within its own borders?

One might assume that improving NRAM security within the U.S. should be a much easier task than doing so in a foreign country. As the agency charged with the responsibility to oversee the nation's critical infrastructure and national assets, the DHS

⁷⁶ Allison, *Avoiding Nuclear Anarchy*.

⁷⁷ U.S. Senate Committee on Homeland Security and Governmental Affairs, *Testimony of David Huizenga, Assistant Deputy Administrator, National Nuclear Security Administration, before the U.S. Senate Committee on Homeland Security and Governmental Affairs*, 2006, http://www.nnsa.doe.gov/docs/congressional/2006/2006-03-28_David_Huizenga_testimony.pdf (accessed 10 September 2006).

⁷⁸ Jenkins, "Standards for Physical Protection of Nuclear Material," 98.

⁷⁹ International Atomic Energy Agency, *Mission of the International Atomic Energy Agency* (Vienna, Austria 2006), <http://www.pub.iaea.org/MTCD/Meetings/Announcements.asp?ConfID=147> (accessed 17 September 2006).

should be given the clear lead role to pull together a more comprehensive system to secure NRAM both while it is being stored and while it is being transported. Also, collaboration between the various layers of the federal, state, and local government must be strengthened so all the agencies have a common operating picture. This includes expanding the use of technology to track and monitor NRAM. Finally, state and local governments must be brought into the overall strategy as they are in Illinois. This will ensure that all key stakeholders have situational awareness (SA) and are quickly sharing intelligence on changes in the levels of threat and vulnerability with regard to the security of NRAM.

B. BENCHMARKING – WHAT IS THE VISION?

Since true benchmarking is setting forth the vision of where we hope to go the following illustration is appropriate.

Hypothetical Scenario

A shipment of a large quantity of cobalt 60, a potentially deadly radioactive material, is being shipped by a company in Canada to the Port of Los Angeles, where it will be loaded on a ship to be taken to China, a common pathway for this material. The contractor hired to move the material does so with a conventional tractor/trailer. The trip will take several days, and states through which the shipment will move all receive written notice through a new DHS unit that coordinates security for such materials. At every point along the way, state and/or local law enforcement maintain a presence either by escorting the shipment, appearing at bridge overpasses, or by patrol visibility along the interstate route. At no time is the shipment out of the line of sight of one or more law enforcement officers. Where practical, air assets are used by law enforcement to maintain constant surveillance of the shipment and the road ahead. This is not taxing on any specific agency, and only takes a few minutes for any one officer. Fire departments in the areas through which the shipment is passing have their hazmat teams on a ready status. It is excellent training for them and provides them the opportunity to hone their skills in handling a nuclear / radiological incident.

Radiological assistance teams, equipped and trained within each state through DHS training grants, are on alert and ready to respond if needed. They are state assets, stationed in each region of the state through which these shipments are commonly transported. These teams also participate in multi-jurisdictional training exercises in their regions throughout the year to increase preparedness for responding to a nuclear / radiological incident.

Costs associated with equipment and manpower incurred by the states are defrayed in part due to a homeland security fee assessed upon the commercial shipper of the NRAM, enabling states to receive reimbursement for the expenses incurred for this heightened security. Should an incident occur requiring an actual response, the commercial shipper must bear the cost of response and clean up.

In terms of communications, electronic tracking devices are placed on the commercial vehicle as well as the NRAM package itself, which has two devices, one of which is covert. The latest technology provides a tracking signal monitored by the DHS National Operation Center, as well as the individual states through which the shipment is moving. In addition, federal regulation requires the commercial vehicle driver to have an encrypted 800 mhz radio that is interoperable across states and check in periodically with state and local law enforcement involved in the security detail. This same communication system enables local stakeholders from all disciplines to coordinate their preparedness and response.

As soon as each state receives notice of the shipment and route of travel, the state intelligence fusion center logs the route and provides a security analysis to the state's homeland security coordinator. The coordinator reviews the following factors.

- *Major events planned in the area of the route*
- *FBI JTTF and local terrorism investigations presently underway which may impact the proposed route of the shipment*
- *Threat intelligence to include criminal activity, domestic or international terrorism activity which may impact the proposed route*
- *Weather and road conditions that may have some bearing on the proposed route*

Once the intelligence report has been reviewed by the state's homeland security advisor and any adjustments to the route have been made, it is approved by the state's homeland security advisor to enter the state. Fusion centers in the states through which the shipment is expected to travel communicate through the Homeland Security Information Network (HSIN) to ensure situational awareness is maintained. If at any time it is determined that a potential threat to public safety exists with regard to the shipment, the state coordinator may direct that the shipment 1) not enter the state; or 2) take a different route through the state; or 3) be secured within the state until it is safe for it to continue on its way.

As the shipment passes through each area of the state, public health officials are aware and ensure regional hospitals have the necessary trained and qualified staff readily available, should an incident occur requiring a medical response. In addition, state emergency management professionals ensure that response resources including those with decontamination capability are at the ready.

The above scenario may at first sound unrealistic. In fact, in several states like Illinois it is easily possible. Given its present level of capabilities, Illinois could implement just such a plan, provided the proper federal framework is in place to support it. In some other states which have chosen to implement state regulations, it is quite achievable.⁸⁰

How would such a strategy be achievable? In many cases, those states and local communities in which NRAM is stored or through which NRAM is transported are well aware of the potential threat to homeland security. For many states through which NRAM is already moving in high numbers, officials are already attempting to address this problem at a local level. What is needed is a national framework with which state and local stakeholders may link a state and local strategy. In some states like Illinois, the NRAM presence is so prominent that the states have constructed a framework on their own out of a sense of urgency for public safety.

⁸⁰ Runyon e-mail.

Figure 4 below depicts the key points of this proposal.

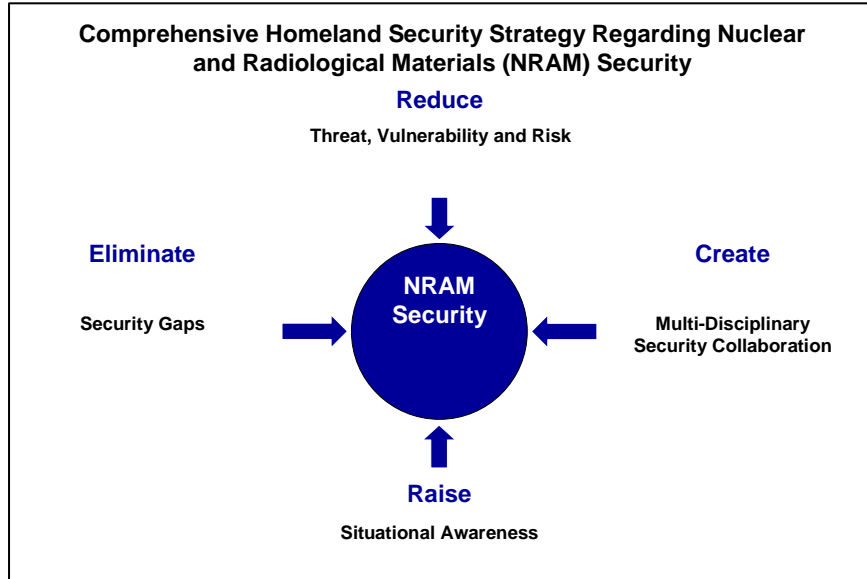


Figure 4. Key Points

Through the development of federal, state, local, and private stakeholder collaboration, security threats and vulnerabilities can be more effectively analyzed. By closing security gaps for NRAM shipments and raising the collective situational awareness of the key homeland security stakeholders, public safety is greatly enhanced.

C. SWOT ANALYSIS

Internal Strengths		
Strength	Description	Options for Preserving or Enhancing
<ul style="list-style-type: none"> Model framework is already in existence at the federal level and within some states 	<ul style="list-style-type: none"> With proper leadership and guidance at the federal level, state and major cities could fall in under a new national policy rather easily 	<ul style="list-style-type: none"> Equip and train state and local partners Under proper guidance and direction partners at state and local level could share a common mission

		<ul style="list-style-type: none"> • Build on present momentum of post 9/11 era to form collaboration
Internal Weaknesses		
Weakness	Description	Options for Minimizing or Overcoming
<ul style="list-style-type: none"> • Which federal agency will take “ownership” of the mission? • Will there be adequate funding to fulfill the mission? • Gaining the buy in and support of the other federal agencies • Gaining the trust and rapport with state and local partners to carry out the mission effectively 	Self Explanatory	<ul style="list-style-type: none"> • Logical choice is for DHS to take the lead for this mission, and provide funding and guidance to the NRC, DOT, and other stakeholders • Other federal agencies will suffer budgetary cutbacks if they do not partner and collaborate with DHS on the mission
External Opportunities		
Opportunity	Description	Options for Taking Advantage
<ul style="list-style-type: none"> • Form a “One Team / One Fight” Approach to Homeland Security • Consistent with the overall effort to develop national capabilities • Consistent with the NIMS and ICS Strategy • Enables Congress to focus a strategy across the nation down to the local level for maximum capability 	<ul style="list-style-type: none"> • At present the mission is fragmented and in most states non-existent • Self Explanatory • Self Explanatory • Self Explanatory 	<ul style="list-style-type: none"> • Selling point to Congress, state and local partners and the public

External Challenges		
Challenge		
<ul style="list-style-type: none"> • Budget / Funding • Additional Personnel • State and local politics as well as media perceptions may pose challenges 	<ul style="list-style-type: none"> • Congress may be reluctant to establish and maintain funding 	<ul style="list-style-type: none"> • Educate Congress, state legislatures, and the public on the threat and vulnerability implications

Table 4. SWOT Analysis

As the SWOT analysis shows, there are many facets to consider with the proposed solution. Statutory and regulatory changes at the federal level will be the first hurdle. Obtaining adequate funding to stand up and maintain this initiative may be the most challenging. Obtaining buy in from the private sector industries that will be affected by the proposal so they will support the necessary changes will be essential, otherwise Congressional resistance may result from lobbying efforts by private industry if buy in to the proposal is not fully established.

D. STRATEGIC ISSUES

1. What would a national NRAM security strategy look like, and how would it be implemented across the states and U.S. territories?
2. How will members of Congress be convinced this is critical to the national homeland security strategy?
3. How are states and U.S. territories educated on the issue sufficiently to gain their buy in and support without also educating those who may be planning a terrorist act?
4. What classification will the intelligence have when it is pushed out to state and local entities in this mission?
5. What level of funding will be needed to make this a reality?
6. While some states can readily adopt this framework, others which have no pre-existing system at the state level may have difficulty. How can that be addressed?

E. THE PRESENT FEDERAL MODEL VERSUS THE ILLINOIS MODEL

Figure 5 illustrates the multiple benefits to adopting the Illinois model. In all categories there is value added to homeland security and public safety.

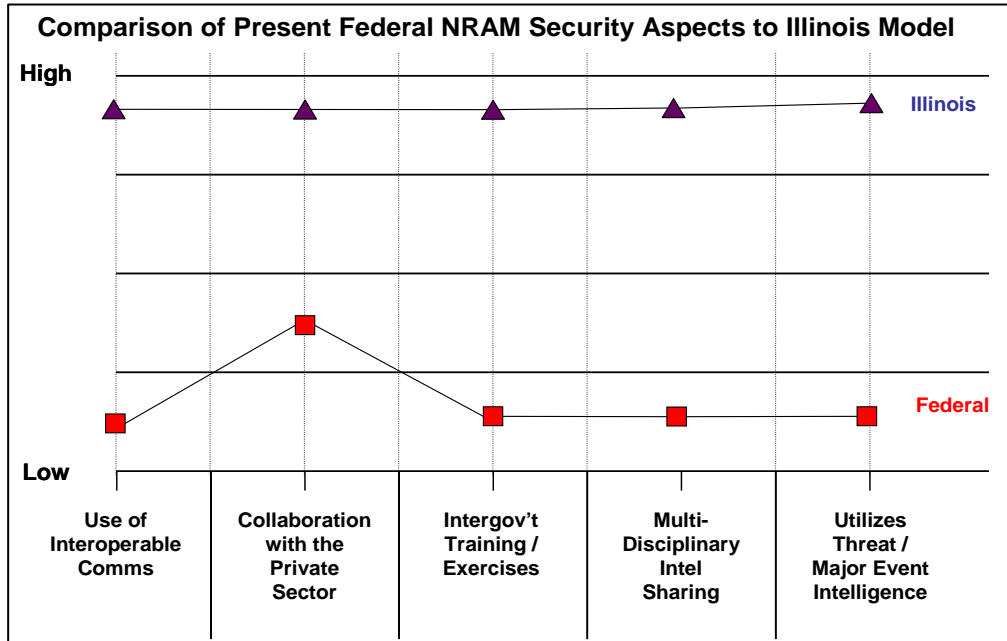


Figure 5. Comparison of the Present Federal NRAM Security Aspects to the Illinois Model

F. WHO ARE THE KEY STAKEHOLDERS IN THIS PROPOSAL?

Key stakeholders in this proposal include the following:

1. Congressional and legislative leadership within those states who will be most effected under this plan, most notably those states through which the highest number of NRAM shipments pass on an annual basis.
2. Public safety leadership in those high traffic states for NRAM.
3. Leadership of the DHS, the NRC, the DOE, the DOT and other federal agencies whose legislative and regulatory mandates touch this vital area.
4. Leadership of the major industries who are the largest producers, processors, and shippers of NRAM.
5. Public interest groups who are focused upon nuclear / radiological safety.

VI. POLICY OPTIONS

A. MAINTAINING THE STATUS QUO IS AN INVITATION FOR TERRORISTS

Obviously, one policy option is to maintain the status quo. This option presents a myriad of concerns. On the economic side of the equation, the detonation of a dirty bomb in a highly populated, major city would be very costly in terms of injury and death, property damage, and interruption of commerce. Experts agree the effected area would be rendered contaminated and uninhabitable from the effects of radiation for a significant period of time.⁸¹

But, as serious as the economic effects would be, the political and public reaction would likely be even more significant. Once such an incident has occurred on U.S. soil, the landscape will have changed in America just as it did after September 11th, 2001. No longer would international or U.S. citizens be as eager to visit major cities. It is well recognized that the terror caused by such an incident and the fear of future ones would linger for years.⁸² This could turn a vibrant, popular city such as Chicago or New York into a much different environment where only those who had to travel into the city for essential business would do so. Once a major city in the U.S. is hit in this manner, nothing would ever be the same.

All of this makes the cost of inaction substantial. While at this point the costs of implementing various options may be high, they pale in comparison to the costs of inaction should terrorists choose to strike with an improvised nuclear bomb or RDD. Given the gravity of the threat in this situation, the tipping point for decision making should be readily apparent. The potential implications of an improvised nuclear bomb being detonated in a major city are profound.

⁸¹ Dr. Harvey Drucker, (Argonne National Laboratory) e mail messages to author, 16 February 2006; DHS, *Nuclear Reactors, Materials and Waste*; Conklin, "Proposed Framework for Cleanup and Site Restoration," 575-582.

⁸² Dodd, "International Efforts in Countering Radiological Terrorism," 556-565 (accessed 17 February 2006); Kathleen McDonald and W. Sean McLaughlin, First Responders: Ready or Not?, *Law Enforcement Trainer* (May/June 2003): 14; S.V. Musolino and F.T. Harper, "Emergency Response Guidance for the First 48 Hours after the Outdoor Detonation of an Explosive Radiological Dispersal Device, *Health Physics* (April 2006): 377-385.

B. THE 2006 DRAFT PLAN BY DHS IS INCOMPLETE AND DOES NOT GO FAR ENOUGH

The proposed comprehensive strategy in this thesis has two key elements. First, there must be a single, clearly stated national security policy for commercial NRAM with one agency, preferably the DHS, as the lead. Second, that plan must be multi-disciplinary in nature, involving the relevant federal, state, local, and private sector stakeholders who all share a common operating picture. This vertical and horizontal collaboration will ensure our nation’s NRAM assets are substantially more secure than they are today.

As Table 5 below illustrates, presently the federal approach to NRAM security seems to rely largely upon federal stakeholders. There is an absence of any significant multi-disciplinary collaboration both horizontally and vertically. The 2002 National Strategy for Homeland Security clearly describes the need for cooperation between federal, state and local governments. This cooperation must be established both horizontally and vertically.

	Commercial Spent Nuclear Fuel	DOE Spent Nuclear Fuel	Highway Route Controlled Quantities	NRC Quantities of Concern (QC)	Transuranic Waste (Destined for DOE Waste Isolation Pilot Plant of Offsite Treatment)	Uranium Hexifluoride (UF6)	Low Level Radioactive Waste	Medical Radiopharmaceuticals
Pre-Notifications	Yes*	Yes*	Yes*	Yes*	Yes*	No	No	No
Inspections	No	No	No	No	Yes	No	No	No
Security Escort	Yes	Yes	No	No	No	No	No	No
Background Checks of Drivers	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Tracking	Yes	Yes	Yes	Yes	Yes	No	No	No

Table 5. Summary of Federal Requirements by NRAM Category

*Except for a few states, such notifications often do not trigger any additional precautions or state action that would enhance homeland security. Actions vary among states.

In June, 2006, the DHS issued a draft plan for comment called, “Nuclear Reactors, Materials and Waste for Critical Infrastructure Protection As Input to the National Infrastructure Protection Plan.”⁸³ This draft plan is a great start in the steps necessary to move NRAM security regulations into the new homeland security era. At first blush, the proposed plan appears to identify the key issues and acknowledges the criticality of all aspects of the nuclear and radiological systems and processes. Further, the plan also seems to recognize the need for better collaboration.

Among the stated goals for the draft plan are collaboration and communication with “all stakeholders”; the prevention of NRAM from being used “for malevolent” purposes; and coordinating federal, state, and local agencies to develop tactics to “deter, detect, and prevent terrorist attacks.”⁸⁴ The plan readily acknowledges that all types of nuclear facilities including those which store, process, or produce NRAM are a part of the nation’s critical infrastructure and key resources (CI/KR). The draft plan lists the following as being an integral part of the nation’s CI/KR.

1. Nuclear Power Plants
2. Research and Test Reactors
3. Nuclear Fuel Cycle Facilities
4. Radioactive Waste Management
5. Nuclear Materials Transport
6. Deactivated Nuclear Facilities
7. Radioactive Material Users
8. Radioactive Source Production and Distribution Facilities
9. Regulatory, Oversight and Industry Organizations
10. Other Nuclear Facilities⁸⁵

The draft plan points out that the NRC is taking steps to tighten up security surrounding **risk significant** NRAM. The draft points out the “Energy Policy Act of

⁸³ DHS, *Nuclear Reactors, Materials and Waste*.

⁸⁴ *Ibid.*, 6.

⁸⁵ *Ibid.*, 16.

2005” has now expanded fingerprinting and background checks for those seeking licenses or certifications to possess NRAM which will be a tremendous help. Further, the NRC is revising its regulations to better track NRAM in quantities of concern.⁸⁶

However, the draft plan seems to focus upon four principal stakeholders. They are the DHS, the DOT, the NRC and the FBI. This federal centric approach is precisely the core of the problem. Further, it seems to overlook one of the key players in NRAM security, the DOE. The DOE Radiological Assistance Program (RAP) is the equivalent to a nuclear tactical team providing a nationwide response.⁸⁷ Second, the plan also seems to assume that state and local agencies are not presently engaged in, equipped, or trained for the NRAM security mission. As was outlined earlier, many states through which NRAM is shipped on a regular basis have built strong capabilities in the interests of public safety.

Additionally, citing Homeland Security Presidential Directive (HSPD) 7, the draft plan asserts that the DHS is responsible for the protection of the nuclear reactors, materials and waste sector through its Chemical and Nuclear Preparedness and Protection Division (CNPPD). However, the draft plan then readily acknowledges the numerous lanes of responsibility held by various agencies including the NRC which has the authority to regulate reactors, materials and waste pursuant to the Atomic Energy Act (AEA) of 1954, as amended.⁸⁸

To address the problem of NRAM security, the proposed policy option is to establish a national standard covering all NRAM shipments that carry material of a level lethal enough to pose a threat if used by terrorists in a nuclear or radiological improvised explosive device (IED). While most high grade NRAM shipments sponsored by the DoD or the DOE receive stringent security, in most states a majority of mid-level NRAM shipments go largely unprotected and unmonitored, despite the fact that such material is

⁸⁶ DHS, *Nuclear Reactors, Materials and Waste*, 63; See also *United States Code*, Title 10 CFR Part 110.

⁸⁷ Van Horn e-mails.

⁸⁸ DHS, *Nuclear Reactors, Materials and Waste*, 20.

highly hazardous.⁸⁹ Under this proposal, federal regulations would require that NRAM shipments over a certain level have electronic monitoring and armed escort. Security monitoring and armed escorts for mid-range NRAM shipments are only occurring in a handful of states. Illinois is among the most stringent.

In 1983 Illinois established the Spent Nuclear Fuel and High Level Waste Inspection and Escort Program. So far, only eight delays in shipments have occurred due to carrier violations. No transportation related accidents have occurred. The pace of this escort program is steadily increasing. While in the late 1990's there were less than a dozen such escorts per year. Today these escorts occur on a weekly basis. If the proposed site at Yucca Mountain in Nevada is opened for operation, this number could double.⁹⁰

According to the DHS DNDO, Illinois is among only five states that provide this level of security for the mid-range NRAM shipments, and at present Illinois is a "model" for the nation.⁹¹ But how effective is it to escort these shipments from the Indiana border to the Iowa border when neither of those states have such security measures? The answer is obvious. A patient terrorist need only wait to for the shipment to reach Iowa City, then hijack the load to deploy a dirty bomb in downtown Chicago.

Further research is needed to explore other options, which may exist. However, given the potential threat to NRAM in the U.S. it is difficult to imagine that any option would not include some aspects of this proposal.

C. CRITERIA FOR JUDGING SUCCESS

One criterion with which to judge the success of security with NRAM storage and shipments is through exercises. Another would be security assessments similar to those presently conducted by DHS at nuclear power generating facilities, involving federal,

⁸⁹ Runyon e-mails.

⁹⁰ Ibid.

⁹¹ Ibid.

state, and local first responders to gauge the *effectiveness* of security. Is it stronger? Are communications between agencies interoperable and effective? What are the response times? Are there gaps? Are training or equipment deficiencies apparent?

In the absence of actual terrorist threats, security effectiveness could be measured through table top, functional, or full scale exercises. Of course, it is understood that a balance must be reached between security and impeding commerce for the private sector. Another possible measure could be impact the newly imposed policy has on the amount of suspicious activity reports that are submitted related to NRAM. A significant shift in reporting could be a strong indicator that situational awareness has been improved.

To be sure, this undertaking to stand up a national framework that involves federal, state, local and private stakeholder collaboration will be challenging. Most worthwhile efforts are. However, given the implications of NRAM being used against citizens within the U.S. such a course of action is worthy of serious consideration.

APPENDIX A. SUMMARY OF ILLINOIS INSPECTION, ESCORT, SECURITY AND TRACKING

Requirements by Material Category

Commercial Spent Nuclear Fuel

Pre-notification – 7 day advance notification to governor’s designee required by NRC 10 CFR 71.97

Inspection – Commercial Vehicle Safety Act (CVSA) Level VI inspection at point of origin or point of entry⁹²

Security Escort – Required by NRC 10 CFR 73.37 and NRC’s interim compensatory measures (ICM) issued by NRC 12-01 require escorts for entire route.

Background Checks – Required by 49 CFR for CDL with Hazmat endorsement and by NRC Additional Security Measures (ASM) issued by NRC 11-04.

Tracking – NRC Additional Security Measures and orders to licensees, requires telemetry or active monitoring by a communications center.

Department of Energy (DOE) Spent Nuclear Fuel

Pre-notification – 7 day advance notification. DOE orders are intended to parallel, at a minimum, the NRC 10 CFR 71.97.

Inspection – CVSA Level VI inspection at point of origin or point of entry.

Security Escort – Required by NRC 10 CFR 73.37, and DOE orders.

Background Checks – Required by 49 CFR for Commercial Drivers License with Hazmat endorsement and by NRC Additional Security Measures.

Tracking – DOE’s TRANSCOM satellite tracking system.

Highway Route Controlled Quantities (HRCQ)

⁹² *Illinois Nuclear Safety Act*, Illinois Compiled Statutes Chap. 420-Sec. 10/1 (2006).

Pre-notification – 7 day advance notification required by NRC orders and Additional Security Measures.

Inspection – CVSA Level VI point of origin or point of entry (Illinois).

Security escort – Recommended but optional according to NRC. Required in Illinois when the Homeland Security Advisory System (HSAS) is at Level Yellow or Above.

Background Checks – Required by 49 CFR for CDL with Hazmat endorsement and by NRC orders.

Tracking – NRC orders require telemetry or active monitoring by a communications center.

NRC Quantities of Concern (QC)

Pre-notification – 7 day advance notification required by NRC orders.

Inspection – Periodic enroute inspections by Illinois State Police or by joint DNS / ISP teams.

Security escort - None

**APPENDIX B. THREAT TABLE (FROM CENTER FOR
PROLIFERATION STUDIES WEAPONS OF MASS DESTRUCTION
TERRORISM RESEARCH PROGRAM, 2004)**

Estimated Date of Incident	WMD	Incident	Date First Reported	Source(s)	Citations
Unspecified	Nuclear	A leaked intelligence report states that Bin Ladin allegedly paid over two million British Pounds to a middle-man in Kazakhstan for a "suitcase" bomb.	8/16/1998	Israeli military intelligence sources	Marie Colvin, "Holy War with US in his Sights," <i>Times</i> (London), 16 August 1998
Unspecified	Nuclear	Bin Ladin is supposedly engaged in a comprehensive plan to acquire nuclear weapons, and reportedly has given a group of Chechens \$30 million in cash and two tons of opium in exchange for approximately 20 nuclear warheads.	11/ 1998	"secret reports" that have reached the US National Security Council from "several sources," including the Russian FSB	Riyad 'Alam al-Din, "Report Links Bin Ladin, Nuclear Weapons," <i>Al-Watan al-Arabi</i> , 13 November 1998; Emil Torabi, "Bin Laden's Nuclear Weapons," <i>Muslim Magazine</i> (Winter 1998)
Unspecified	Biological	Associates of Bin Ladin are reported to have bought anthrax and plague from arms dealers in Kazakhstan.	6/4/2000	Unspecified "intelligence sources"	Paul Daley, "Report Says UBL-linked Terrorist Groups Possess 'Deadly' Anthrax, Plague Viruses," <i>Melbourne Age</i> , 4 June 2000
Unspecified	Nuclear/ Radiological	Bin Ladin allegedly sends envoys to several Eastern European countries to purchase enriched uranium. These efforts reportedly were both unsuccessful and very costly for the organization.	12/24/2000	"Arab security sources"	"Arab Security Sources Speak of a New Scenario for Afghanistan: Secret Roaming Nuclear Weapons for Drugs," <i>Al-Sharq al-Awsat</i> , 24 December 2000

Estimated Date of Incident	WMD	Incident	Date First Reported	Source(s)	Citations
Unspecified	Nuclear / Radiological	Bin Ladin allegedly obtains seven enriched uranium rods, which were supposedly US-made, from mafia connections.	11/2001	Italian anti-organized crime office, according to a "French expert"	Uthman Tizghart, "Does Bin Ladin Really Possess Weapons of Mass Destruction? Tale of Russian Mafia Bosfs Simion Mogilevich Who Supplied Bin Ladin With the Nuclear 'Dirty Bomb.'" <i>Al-Majallah (London)</i> , 25 November 2001
Unspecified	Nuclear / Biological / Chemical	Two Pakistani scientists allegedly share nuclear, biological, and chemical weapons information with Bin Ladin, and thereby learn of radiological material given to him by the Islamic Movement of Uzbekistan. They tell Bin Ladin that there is insufficient material for use as a weapon.	11/12/2001	Pakistani scientists Sultan Bashir ul Din Mehmood and Abdul Majid; Pakistani government contests their level of nuclear knowledge	"Toby Harnden, "Rogue Scientists Gave bin Laden Nuclear Secrets," <i>Daily Telegraph (London)</i> , 13 December 2001; Peter Baker, "Pakistani Scientist Who Met Bin Laden Failed Polygraphs, Renewing Suspicions," <i>Washington Post</i> , 3 March 2002; Susan B. Glasser and Kamran Khan, "Pakistan Continues Probe of Nuclear Scientists," <i>Washington Post</i> , 14 November 2001
Unspecified	Biological	The Kabul office of Pakistani scientist Mehmood is reportedly found to contain documents indicating an interest in anthrax, including calculations concerning the aerial dispersal of anthrax via balloon, and an Associated Press photo showed something at the anthrax vaccine laboratory described as "anthrax spore concentrate".	11/28/2001	<i>The Economist</i>	"Sketches of anthrax bomb found in Pakistani scientist's office," <i>Rediff.com</i> , 28 November 2001

Estimated Date of Incident	WMD	Incident	Date First Reported	Source(s)	Citations
Unspecified	Chemical / Biological	The 11th volume of al-Qa`ida's 5,000-page <i>Encyclopedia of Jihad</i> is devoted to how to construct CBW.	6/23/2002	al-Qa`ida text: <i>Encyclopedia of Jihad</i>	"Osama Bin Laden's bid to acquire weapons of mass destruction represents the greatest threat that Western Civilization has faced," <i>Mail on Sunday</i> (London), 23 June 2002
Unspecified	Chemical	CNN correspondent Mike Boettcher reports that coalition intelligence agencies have detected several recent purchases of cyanide by al-Qa`ida operatives.	7/31/2002	"coalition intelligence agencies"	"Wolf Blitzer Reports," CNN, 31 July 2002
Unspecified	Radiological	British intelligence discovered documents in western Afghanistan which suggest that al-Qa`ida members built a dirty bomb in Afghanistan. British officials also claim that the Taliban provided medical isotopes to al-Qa`ida members to help construct the bomb. U.S. officials cannot substantiate this claim.	1/30/2003	British Government	Ed Johnson, "Report: Al-Qaida Made Bomb in Afghanistan," Associated Press, 30 January 2003.
Unspecified	Chemical/Biological	With the capture of Khalid Shaykh Muhammad, investigators uncovered detailed information about production plans for chemical and biological weapons. According to captured documents, certain members of al-Qa`ida had plans and the requisite material to manufacture cyanide and two biological toxins, and were close to producing anthrax bacteria.	1/30/2003	British Government	Barton Gellman, "al-Qaida Near Biological, Chemical Arms Production," <i>Washington Post</i> , 23 March 2003.

Estimated Date of Incident	WMD	Incident	Date First Reported	Source(s)	Citations
Unspecified	Biological	Al-Qa'ida operatives allegedly planned to poison U.S. troops stationed in Afghanistan and Kuwait. Afghan terrorists allegedly delivered an "unspecified poison" to Afghan nationals who were hired as cooks for U.S. forces in Afghanistan. The incident has been tied to the January 2003 arrest of 11 al-Qa'ida suspects in Britain who were reportedly in possession of the biological toxin ricin. Some sources also indicate that the group Ansar al-Islam was involved in this plot to use ricin against U.S. troops.	2/1/2003	U.S. Government	James Gordon, "Feds Find Poison Plot vs. Gulf Troops," Daily News, 10 February 2003; Mike Toner, "Humble Bean Produces a Deadly Toxin," Cox News Service, 20 March 2003.
Unspecified	Biological/ Nuclear	A publication posted by members of al-Qa'ida on the internet included an article by 'Abd al-'Aziz al-Muqrin (Abu Hajir), a leading al-Qa'ida fugitive in Saudi Arabia, which called for supporters to use nuclear and biological weapons in attacks against the Saudi government.	1/18/2004	al-Qa'ida manifesto entitled "The Base of the Vanguard" posted on the internet	"Counter-Insurgency in the Middle East," Middle East Newline Morning Report, 19 January 2004, Vol.6, No. 23.
Unspecified	Chemical	U.S. Government officials announced that a group of al-Qa'ida members along with Zarqawi established a weapons lab in Kirma, Iraq. The lab was to be used to produce ricin and cyanide.	3/2/2004	U.S. Government	"Program Transcript-Terrorist Attacks in Iraq," NBC Nightly News, 2 March 2004.

Estimated Date of Incident	WMD	Incident	Date First Reported	Source(s)	Citations
Unspecified	Nuclear	In a secret interview with Pakistani journalist Hamid Mir, Ayman al-Zawahiri allegedly claimed that al-Qa'ida possessed nuclear weapons purchased in Central Asia. Zawahiri reportedly told Mir that al-Qa'ida sent representatives to "Moscow, Tashkent, [and] countries in Central Asia" in order to purchase "portable nuclear material."	3/3/2004	Hamid Mir	Max Delany, "Under Attack al-Qaeda Makes Nuclear Claim," The Moscow News, 3 March 2004.
Unspecified	Nuclear/ Biological/ Chemical	According to the 9/11 Commission, al-Qa'ida operatives in Afghanistan prior to the 9/11 attacks were considering ways of using WMD, including mustard and cyanide, against Jews in Iran, "forcing Russian scientists to fire a nuclear-armed missile at the U.S.," and using air conditioning systems in buildings to pump poisonous gas.	6/16/2004	U.S. Government; 9/11 Commission	"Al-Qaeda Operatives Discussed WMD Attacks While Training Prior to 9/11, Report Says," Global Security Newswire, 16 June 2004.
Unspecified	Radiological	An al-Qa'ida insider has alleged that Usama Bin Ladin was pressured by network affiliates to purchase radiological material through contacts in Chechnya. The insider has been named as Abu Walid al-Misri. Misri is reportedly planning to publish a book detailing his relationship with Usama Bin Ladin and al-Qa'ida leadership.	12/19/2004	al-Qa'ida "insider"	Nick Fielding, "Bin Laden's Dirty Bomb Quest Exposed," London Times Online, 19 December 2004.

Estimated Date of Incident	WMD	Incident	Date First Reported	Source(s)	Citations
Unspecified	Nuclear	Pakistani businessman Saifullah Paracha allegedly told al-Qa'ida operatives that he knew where to obtain nuclear weapons that could be used against U.S. troops. Paracha denied the allegations but admitted to meeting Usama Bin Ladin in 1999 to discuss business deals. Paracha owns an import company in New York.	2/11/2005	U.S. Government	"Pakistani Told al-Qaeda Operatives to Acquire Nuclear Weapons, U.S. Investigators Say," Nuclear Threat Initiative, 11 February 2005; Frank Davies, "U.S. Alleges Pakistani Businessman Urged al-Qaeda to Acquire Nuclear Weapons," Miami Herald, 11 February 2005.
1993-1994	Nuclear/ Radiological	Jamal al-Fadhli claims that, on behalf of Bin Ladin, he investigated purchasing uranium for nuclear weapons.	2/2001	al-Qa`ida operative Jamal al-Fadhli, a witness at US trial	Kimberly McCloud and Matthew Osborne, "WMD Terrorism and Usama bin Ladin," CNS Report, 20 November 2001, http://cns.miis.edu/pubs/reports/binladen.htm
1996-1998	Chemical	Bin Ladin allegedly purchases CW over a two-year period prior to 1998 from European states and the former Soviet Union. This information is allegedly provided under custody by the Jihad leader (arrested on August 20, 1998 in Baku, Azerbaijan) during the April 1999 "Trial of the Returnees from Albania" in Egypt.	4/1999	Ahmad Salama Mabruk (in his trial in Egypt)	Muhammad Salah, "Bin Ladin Front Reportedly Bought CBW From E. Europe," <i>Al-Hayah</i> , 20 April 1999; idem, "US Said Interrogating Jihadist Over CBW," <i>Al-Hayah</i> , 21 April 1999
1997 - 1998	Chemical / Biological	Islamic extremists, including al-Qa`ida members, are allegedly trained in secret camps near Baghdad in how to use CW and BW by instructors from the secret Iraqi military intelligence Unit 999.	7/14/2002	"Abu Muhammad", a former colonel in Saddam Husayn's Fidayin militia	Gwynne Roberts, "Militia defector claims Baghdad trained Al-Qaeda fighters in chemical warfare," <i>Sunday Times</i> (London), 14 July 2002

Estimated Date of Incident	WMD	Incident	Date First Reported	Source(s)	Citations
10/1997	Chemical / Biological	A meeting is held in Sudan between Bin Ladin, Ayman al-Zawahiri, and Hasan al-Turabi, leader of Sudan's National Islamic Front regime, about the construction of a CBW factory.	10/1997	Unspecified report received by a Western or Arab security agency	Jihad Salim, "Report on Bin Ladin, Zawahiri, 'Afghans'," <i>Al-Watan al-Arabi</i> , 16 February 2001
1998	Nuclear	On 8 February 2004, the Egyptian newspaper Al-Hayat reported that al-Qa'ida had purchased tactical nuclear weapons from the Ukraine in 1998 and was "storing them for possible use". Al-Qa'ida allegedly purchased the bombs in Kandahar after a visit from Ukrainian scientists. The Ukrainian government denied that the transaction had taken place, stating that all nuclear weapons stored in the Ukraine had been transferred to Russia as of 1996.	8-Feb-04	Al-Hayat newspaper (Egypt)	"Al-Qaida Said to Possess Nuclear Arms," Associated Press, 9 February 2004; "Al-Qaida May Have Nuclear Weapons," Al Jazeera.net, 8 February 2004; "Al-Qaida Does Not Have Our Nuclear Bombs Insists Ukraine," The Scotsman, 11 February 2004; Sokov, Nikolai, "Suitcase Nukes: Permanently Lost Luggage," CNS, 13 February 2004; Jane Macartney, "Al-Qaeda Unlikely to Have Attained Nuclear Know-How," Reuters, 6 February 2004.
1998	Nuclear / Radiological	Russian intelligence allegedly blocks a deal in which a Pakistani firm controlled by Bin Ladin attempted to purchase Soviet-origin uranium.	9/19/2001	A "former Russian intelligence official"	Earl Lane and Knut Royce, "Nuclear Aspirations? Sources: Bin Laden Tried to Obtain Enriched Uranium," <i>Newsday</i> , 19 September 2001

Estimated Date of Incident	WMD	Incident	Date First Reported	Source(s)	Citations
1998	Chemical / Biological	A reporter purchases two computers from a looter in Kabul, Afghanistan, that had been found in an abandoned al-Qa`ida office. The U.S. government confirms the existence of the computers. One of the computers allegedly contains a file describing "plans to launch a chemical and biological weapons program." Bin Ladin's deputy al-Zawahiri reportedly created computer documents describing his CW and BW program, codenamed "Curdled Milk," which included work on a pesticide/nerve agent that used a chemical to increase absorption and was tested on rabbits and dogs. He was assisted by Midhat al-Mursi / Abu Khabbab, a chemical engineer.	12/2001	al-Qa`ida computers	Alan Culluson and Andrew Higgins, "Computer in Kabul holds chilling memos," <i>Wall Street Journal</i> , 31 December 2001; "Report: Al Qaeda Computer Had Plans for Bio-Weapons," Reuters, 21 December 2001
5/1998	Chemical / Biological	Bin Ladin's group reportedly purchases three CBW factories in the former Yugoslavia and hires a number of Ukrainian chemists and biologists to train its members.	7/1998	"Arab sources" [?]	Guido Olimpio, "Islamic Group Said Preparing Chemical Warfare on the West," <i>Corriere della Sera</i> , 8 July 1998; Yossef Bodansky, <i>Bin Laden: The Man Who Declared War on America</i> (Roseville, CA: Prima, 2001), p. 326.

Estimated Date of Incident	WMD	Incident	Date First Reported	Source(s)	Citations
8/1998	Chemical	The United States charges that al-Qa`ida is producing chemical weapons at the al-Shifa pharmaceutical factory in Khartoum, Sudan. As a result, the United States bombs the factory on 20 August, 1998.	8/1998	US Government	Michael Barletta, "Chemical Weapons in the Sudan: Allegations and Evidence," <i>The Nonproliferation Review</i> (Fall 1998), pp. 115-36
8/1998	Chemical	John Gannon, chairman of the National Intelligence Council, reveals that the CIA discovered that Bin Ladin had attempted to acquire unspecified CW for use against U.S. troops stationed in the Persian Gulf.	8/1998	US Central Intelligence Agency	Barry Schweid, "US Suggests Iraq Got Weapons from Sudan," <i>Record</i> (New Jersey), 27 August 1998
9/1998	Nuclear/ Radiological	A Bin Ladin aide, Mamduh Mahmud Salim, is arrested in Munich, Germany, on charges of trying to obtain nuclear materials (allegedly for al-Qa`ida), including highly enriched uranium.	9/26/1998	German Government	Benjamin Weiser, "US Says Bin Ladin Aide Tried to Get Nuclear Weapons," <i>New York Times</i> , 26 September 1998
9/1998	Chemical	Wadi al-Hajj, a Lebanese national, is arrested in Arlington, Texas, for perjury. The FBI contends that he had lied about his affiliation with Bin Ladin in 1997 and 1998 court testimonies. A grand jury investigates al-Hajj's possible activities in procuring CW for Bin Ladin.	12/20/1998	US Government	CNN, 20 December 1998
12/1998	Chemical / Nuclear	In an interview with <i>Time</i> magazine, Bin Ladin asserts that acquiring weapons of any type, including chemical and nuclear, is a Muslim "religious duty."	12/1998	Usama bin Ladin	<i>Time</i> , 24 December 1998, transcript of interview with Bin Ladin

Estimated Date of Incident	WMD	Incident	Date First Reported	Source(s)	Citations
1999	Chemical	Local Afghan sources say that Bin Ladin is using a plant in Charassiab, a district 30 kilometers south of Kabul, to produce CW.	12/1999	(Afghan) Northern Alliance	"Afghan Alliance -- UBL Trying to Make Chemical Weapons," <i>Parwan Payam-e Mojahed</i> , 23 December 1999
4/1999	Biological	Bin Ladin and his followers allegedly obtain BW substances through the mail from countries of the former Soviet Union (the Ebola virus and salmonella bacterium), from East Asia (anthrax-causing bacteria), and from the Czech Republic (botulinum toxin).	8/1/1999	Various defendants in the Egyptian "Trial of the Returnees from Albania"	Al J. Venter, "Elements Loyal to Bin Laden Acquire Biological Agents 'Through the Mail'," <i>Jane's Intelligence Review</i> (August 1999); Khalid Sharaf al-Din, "Bin Ladin Men Reportedly Possess Biological Weapons," <i>Al-Sharq al-Awsat</i> , 6 March 1999
6/1999	Chemical / Biological	Usama bin Ladin reportedly constructed "crude" CBW laboratories in Khost and Jalalabad, Afghanistan, and acquired ingredients for CW and BW from former Soviet states.	6/1999	Unspecified intelligence sources	John McWethy, "Bin Laden Set to Strike Again?," ABC News, 16 June 1999
7/1999	Chemical / Biological	An Islamist lawyer states that Bin Ladin's organization has CBW, and will likely use such weapons against the United States.	7/1999	Muntasir al-Zayyat, lawyer defending Islamists in Egypt	"Islamist Lawyer on Bin Ladin, Groups," <i>Al-Sharq al-Awsat</i> , 12 July 1999
2/2000	Chemical	An apparent plot by nine Moroccans to poison the water supply of the U.S. Embassy in Rome using a cyanide compound is foiled by Italian police.	2/2002	Various media reports	Eric Croddy et. al., "Chemical Terrorist Plot in Rome?" <i>CNS Research Story</i> , 11 March 2002
2/2/2000	Chemical / Biological	CIA Director George Tenet tells the Senate that Bin Ladin has shown a strong interest in CW and that his operatives have "trained to conduct attacks with toxic chemicals or biological toxins."	8/19/2002	CIA Director George Tenet	Pamela Hess, "Al Qaida may have chemical weapons," United Press International, 19 August 2002

Estimated Date of Incident	WMD	Incident	Date First Reported	Source(s)	Citations
Late 2000	Nuclear	The intelligence agency of an unnamed European country reportedly intercepts a shipment of approximately twenty nuclear warheads--originating from Kazakhstan, Russia, Turkmenistan, and the Ukraine--intended for Bin Ladin and the Taliban regime of Afghanistan.	12/24/2000	"Arab security sources"	"Arab Security Sources Speak of a New Scenario for Afghanistan: Secret Roaming Networks that Exchange Nuclear Weapons for Drugs," <i>Al-Sharq al-Awsat</i> , 24 December 2000
2001	Biological	Various reports describe Muhammad Atta, the leader of the September 11 hijackers, meeting in Prague with an Iraqi intelligence agent, who allegedly gave him a vial of anthrax. This claim, originally made by foreign intelligence sources, was later contested by the Czech government.	10/20/2001	Israeli or Egyptian intelligence officials; denied by Czech intelligence chief Frantisek Bublan	Compare "FBI Overlooks Iraq's Connections to Anthrax Attacks," <i>Newsmax</i> ; Kriendler & Kreindler 9/11 lawsuit; "Prague Discounts an Iraqi Meeting," <i>New York Times</i> , 21 October 2001; "Czechs retract Iraq terror link," UPI, 20 October 2001
2001	Biological	Ahmad Rassam, arrested in a plot to bomb LAX, testifies that Bin Laden is personally interested in using low-flying aircraft to dispense BW agents.	10/28/2001	al-Qa`ida operative Ahmad Rassam, in US custody	"Bin Laden's Biological Threat," BBC, 28 October 2001
2001	Biological	Documents found in Afghanistan ostensibly reveal that al-Qa`ida was doing research on using botulinum toxin to kill 2,000 people.	1/1/2002	al-Qa`ida documents	"Al Qaeda tested germ weapons," Reuters, 1 January 2002
2001	Chemical	Ahmad Rassam (an al-Qa`ida terrorist who pleaded guilty to plotting to bomb LAX) claims in court in 2001 that he had witnessed the gassing of a dog with cyanide.	8/19/2002	al-Qa`ida operative Ahmad Rassam, in US custody	Pamela Hess, "Al Qaida May Have Chemical Weapons," United Press International, 19 August 2002

Estimated Date of Incident	WMD	Incident	Date First Reported	Source(s)	Citations
2001	Biological	In December 2001, Yazid Sufaat was arrested in Malaysia for terrorist activities as a member of Jamaah Islamiyah. According to subsequent interrogations of two captured terrorists, Khalid Shaykh Muhammad of al-Qa'ida and Hambali of Jamaah Islamiyah, Sufaat was part of a plan to obtain and weaponize biological warfare agents. Jamaah Islamiyah maintains close ties to al-Qa'ida.	1-Dec-01	Malaysian authorities	Maria Ressa, "Reports: Al Qaeda [sic] Operative Sought Anthrax," CNN, 10 October 2003; Judith Miller, "U.S. Has New Concerns About Anthrax Readiness," New York Times, 28 December 2003; "Yazid Sufaat," The Open Source Threat Network Database, 26 January 2004.
2/2001	Chemical	The United States allegedly aborts a planned air strike against Afghanistan for fear of a retaliatory chemical attack by al-Qa'ida, after receiving warnings from an Arab embassy in Islamabad, Pakistan.	2/2001	"Arab sources"	Sa'id al-Qaysi, "US Said Aborted Planned Attack on Bin Ladin for Fear of 'Chemical Strike'," <i>Al-Watan al-Arabi</i> , 16 February 2001
2/2001	Chemical	Bin Ladin's elite 055 Brigade is supposedly reorganized under the leadership of Midhat al-Mursi, aka Abu Khabab, an Egyptian and an expert in sarin gas production.	2/2001	"Sources in Afghanistan"	Sa'id al-Qaysi, "US Said Aborted Planned Attack on Bin Ladin for Fear of 'Chemical Strike'," <i>Al-Watan al-Arabi</i> , 16 February 2001
4/2001	Nuclear / Radiological	Ivan Ivanov claims he met Bin Ladin just over the Pakistani border in China, and discussed setting up an environmental company to buy nuclear waste. Ivanov was then approached by a Pakistani chemical engineer interested in buying nuclear fuel rods from the Bulgarian Kozlodui reactor.	10/14/2001	Bulgarian businessman Ivan Ivanov and ex-Bulgarian Defense Minister Velizar Shalamanov	Adam Nathan and David Leppard, "al-Qa'ida's men held secret meetings to build 'dirty bomb'," <i>Sunday Times</i> (London), 14 October 2001

Estimated Date of Incident	WMD	Incident	Date First Reported	Source(s)	Citations
Since summer 2001	Chemical / Biological / Nuclear	Iraqi military instructors allegedly trained al-Qa`ida fighters in northern Iraq in the use of CBW agents, and possibly also in the handling of nuclear devices. Between 150 and 250 al-Qa`ida trainees purportedly passed through the training facilities.	8/20/2002	DEBKA [an online newsletter relying heavily on hawkish Israeli intelligence sources]	"Abu Nidal's Nemesis," DEBKA file [Jerusalem], 20 August 2002
Before 9/11/2001	Nuclear	Bin Ladin allegedly buys 48 "suitcase nukes" from the Russian mafia.	9/8/2002	An unnamed French anti-terrorism expert	"Al-Majallah Obtains Serious Information on al-Qa`ida's Attempt to Acquire Nuclear Arms," <i>Al-Majallah</i> [London-based Saudi weekly], 8 September 2002
Before 11/2001	Chemical	CNN releases videotapes, allegedly made by al-Qa`ida, showing dogs being killed by unidentified toxic chemicals (experts believe either a crude nerve agent or hydrogen cyanide gas is used).	8/19/2002	al-Qa`ida videotapes	"Insight," CNN, 19 August 2002
11/2001	Chemical / Nuclear	In an interview, Bin Ladin claims "We have chemical and nuclear weapons as a deterrent and if America used them against us we reserve the right to use them."	11/2001	Usama bin Ladin	Hamid Mir, "Osama Claims He Has Nukes: If US Uses N-Arms it Will Get Same Response," <i>Dawn</i> (Pakistan), 10 November 2001
11/2001	Chemical / Nuclear	In an interview with a Pakistani newspaper reporter, Usama bin Ladin states that "we have chemical and nuclear weapons as a deterrent, and if America used them against us we reserve the right to use them."	11/10/2001	Usama bin Ladin [there are some doubts regarding the authenticity of this interview]	Hamid Mir, "Osama claims he has nukes: If US uses N-arms it will get same response," <i>Dawn</i> [Pakistan], 10 November 2001

Estimated Date of Incident	WMD	Incident	Date First Reported	Source(s)	Citations
11/2001	Nuclear	al-Qa`ida reportedly acquires a Russian-made suitcase nuclear weapon from Central Asian sources. The device is reported to weigh 8 kg and to possess at least 2 kg of fissionable uranium and plutonium. The report said the device, with a serial number of 9999 and a manufacturing date of October 1998, could be set off by a mobile phone signal.	11/14/2001	"Reports from Pakistan"	"N-weapons May be in US Already," <i>Daily Telegraph</i> (Sydney, Australia), 14 November 2001
11/2001	Nuclear	A <i>Times</i> (London) reporter discovers a blueprint for a "Nagasaki bomb" in files found in an abandoned al-Qa`ida house in Kabul, Afghanistan.	11/19/2001	al-Qa`ida files	"Nuke Plans Found; Brit Paper Discovers Details of Weapons in Kabul Safe House," <i>Toronto Sun</i> , 15 November 2001; Hugh Dougherty, "Afghan Nuclear Weapons Papers 'May Be Internet Spoofs'," Press Association, 19 November 2001
11/2001	Nuclear	A so-called "Superbomb" manual, which discusses the advanced physics of nuclear weapons and dirty bombs, is found in Kabul in November 2001.	6/23/2002	Author of <i>Mail on Sunday</i> article	"Osama Bin Laden's bid to acquire weapons of mass destruction represents the greatest threat that Western Civilization has faced," <i>Mail on Sunday</i> (London), 23 June 2002
Late 2001	Biological	U.S. operatives in Afghanistan allegedly discover evidence indicating that one or more Russian scientists were helping al-Qa`ida weaponize anthrax.	12/9/2001	A "well-placed" US intelligence source	Jeffrey Bartholet, "Terrorist Sleeper Cells," <i>Newsweek</i> , 9 December 2001

Estimated Date of Incident	WMD	Incident	Date First Reported	Source(s)	Citations
Late 2001	Biological	Reports claim that al-Zawahiri's home in Kabul tested positive (perhaps falsely) for traces of anthrax, as did five of nineteen al-Qa`ida labs in Afghanistan.	12/10/2001	US Government	"Al-Qaeda: Anthrax Found in al-Qaeda home," Global Security Newswire, 10 December 2001; Judith Miller, "Labs Suggest Qaeda Planned to Build Arms, Officials Say," <i>New York Times</i> , 14 September 2002
Late 2001	Biological	John Walker Lindh allegedly told interrogators that battlefield rumors suggested that a biological attack was expected to be a "second wave" al-Qa`ida attack.	10/3/2002	"American Taliban" John Walker Lindh, citing "battlefield rumors"	"US biological attack imminent -- Taliban," <i>iafrica.com</i> , 12 December 2001; "Walker Lindh: Al Qaeda Planned More Attacks," CNN, 3 October 2002
post-2001	Chemical/ Biological	French Interior Minister Dominique de Villepin claimed that al-Qa`ida affiliates have produced chemical and biological weapons in Georgia's Pankisi Gorge. De Villepin told members of a bio-terrorism conference in Lyons, France, that after the fall of the Taliban, al-Qa`ida cells moved to the Pankisi Gorge in order to continue efforts to produce anthrax bacteria, ricin, and botulinum toxin.	3-Jan-05	French Government	"Al-Qaeda Made Biological Weapons in Georgia--French Minister," <i>Moscow News</i> , 3 January 2005.
2002	Chemical	One of the facilities of Ansar al-Islam, a radical Islamist group operating in northern Iraq with ties to al-Qa`ida and Iran, produces a form of cyanide cream (not a WMD) that kills on contact.	8/25/2002	Unnamed U.S. interrogators	William Safire, "Tying Saddam to Terrorist Organizations," <i>New York Times</i> , 25 August 2002

Estimated Date of Incident	WMD	Incident	Date First Reported	Source(s)	Citations
first half of 2002	Biological	Ansar al-Islam is reported to have been experimenting with ricin, a deadly toxin, including on at least one human being. This report is denied by Ansar spokesman Muhammad Hasan Muhammad.	8/20/2002	US Government	“US knew of bioterror tests in Iraq,” BBC News, 20 August 2002; “US Monitors Kurdish Extremists,” Fox News, 21 August 2002; Isma'il Zayir, “Ansar al-Islam Group Accuses [Jalal] Talabani of Spreading Rumors About Its Cooperation with al-Qa`ida,” <i>Al-Hayah</i> , 22 August 2002
1/2002	Nuclear	Diagrams of U.S. nuclear power plants are found in abandoned al-Qa`ida camps and facilities in Afghanistan.	1/31/02	al-Qa`ida document cache	Bill Gertz, “Nuclear Plants Targeted,” <i>Washington Times</i> , 31 January 2002; John J. Lumpkin, “Diagrams Show Interest in Nuke Plants,” Associated Press, 30 January 2002
2/2002	Nuclear	No evidence was discovered in Afghanistan that al-Qa`ida possesses nuclear weapons, raising the question whether al-Qa`ida might have been tricked into buying metal containers with phony nuclear symbols filled with worthless material.	2/26/2002	US analysts	Thom Shanker, “US Analysts Find No Sign bin Laden Had Nuclear Arms,” <i>New York Times</i> , 26 February 2002
Before 3/2002	Biological	US forces discover a BW laboratory under construction near Kandahar that was abandoned by al-Qa`ida. It was allegedly being built to produce anthrax, but no biological agents or traces thereof were found in the facility.	3/22/2002	US Government	Dominic Evans, “US Troops Found Afghan Biological Lab,” Reuters, 22 March 2002; Michael R. Gordon, “US Says it Found Qaeda Lab Being Built to Produce Anthrax,” <i>New York Times</i> , 23 March 2002

Estimated Date of Incident	WMD	Incident	Date First Reported	Source(s)	Citations
4/2002	Radiological	Abu Zubayda claims al-Qa`ida has the interest and know-how to produce a radiological weapon, and the group may already have one in the United States.	4/22/02	al-Qa`ida leader Abu Zubayda	Jamie McIntyre, "Zubaydah: al Qaeda Had 'Dirty Bomb' Know-How," CNN, 22 April 2002; "Al-Qaeda Claims 'Dirty Bomb' Know-How," BBC, 23 April 2002
5/2002	Radiological	U.S. citizen Abdullah al-Muhajir (formerly José Pedilla), is arrested in Chicago and alleged to be involved with al-Qa`ida in planning to perpetrate a radiological bomb attack in the United States.	6/11/2002	US Government	Dan Eggen and Susan Schmidt, "Dirty Bomb' Plot Uncovered, US Says: Suspected Al Qaeda Operative Held as 'Enemy Combatant'," <i>Washington Post</i> , 11 June 2002
5/2002	Chemical	Among the items seized during the arrest of Sami Uthman, a Lebanese national who moved to the US and became an Imam at a Islamist mosque in Seattle, are papers by London-based al-Qa`ida recruiter Shaykh Abu Hamza al-Masri, firearms, military manuals, and "instructions on poisoning water sources."	7/13/2002	confidential "investigative document"	Patrick J. McDonnell and Josh Meyer, "Links to Terrorism Probed in Northwest," <i>Los Angeles Times</i> , 13 July 2002
6/3/2002	Radiological	al-Qa`ida allegedly attempts to acquire 11 lbs of radioactive thallium from measuring devices on decommissioned Russian submarines, but Russia's Federal Security Service claims to have blocked the attempt.	6/3/2002	Russia's Federal Security Service	"Insider Notes," United Press International, 3 June 2002
7/18/2002	Biological	Stephen Younger, director of the Defense Threat Reduction Agency, claims that al-Qa`ida's interest in BWs is focused mainly on anthrax.	7/18/2002	Stephen Younger	"Weapons Worries," CBS News, 18 July 2002

Estimated Date of Incident	WMD	Incident	Date First Reported	Source(s)	Citations
9/1/2002	Nuclear	On 23 January 2005, German police announced the arrest of an Iraqi al-Qa'ida member who had allegedly attempted to purchase uranium in Luxembourg. In September 2002, Ibrahim Muhammad K. attempted to purchase 48 grams (1.5) ounces of uranium from an unnamed group in Luxembourg. Prosecutors claim that the amount of uranium was insufficient for the construction of a nuclear device.	25-Jan-04	German government	Craig Whitlock, "Germnay Arrests Two Al Qaeda Suspects," <i>Washington Post</i> , 24 January 2005; "Germany; Al Qaeda Suspects Held," <i>Facts on File World News Digest</i> , 27 January 2005; "Iraqi Al-Qaeda Suspect held in Germany Sent by Bin Laden," <i>Agence France Presse</i> , 29 January 2005.
9/13/2002	Chemical / Biological	Pentagon officials admit that lab equipment found near Kandahar, Afghanistan, supports the assessment that al-Qa`ida might have acquired what it needed for "a very limited production of biological and chemical agents."	9/14/2002	US Government	Judith Miller, "Lab Suggests Qaeda Planned to Build Arms, Officials Say," <i>New York Times</i> , 14 September 2002
10/2002 or 11/2002	Chemical	The Islamist group Asbat al-Ansar, a Lebanon-based Sunni organization affiliated with al-Qa`ida that is currently operating in northern Iraq, reportedly obtained the nerve agent VX from the Iraqi regime.	12/12/2002	US Government	Barton Gellman, "US Suspects Al Qaeda Got Nerve Agent From Iraqis," <i>Washington Post</i> , 12 December 2002
11/9/2002	Chemical	British security officials arrest three men reportedly plotting a cyanide attack on the London subway.	11/18/2002	Unnamed sources	Hala Jaber and Nicholas Rufford, "MI5 foils poison-gas attack on the Tube," <i>Sunday Times</i> (London), 17 November 2002

Estimated Date of Incident	WMD	Incident	Date First Reported	Source(s)	Citations
Early 2003	Radiological	After the 2003 Casablanca bombings, a police roundup of Salafia Jihadia exposed a plot by 'Abd al-'Aziz ibn Laysh to attack a French nuclear power plant at Cap de la Hague. Additional evidence indicates that members of al-Qa`ida trained Salafia Jihadia for this mission.	7-Jun-03	Moroccan authorities	Martin Arostegui, "Terrorism in Morocco Deeper Than Imagined," United Press International, 7 June, 2003; "Frenchman on Trial in Morocco Over Suicide Bombings," Agence France Presse, 25 August, 2003.
1/5/2003	Biological	Six Algerians were arrested in London and charged with plotting to produce ricin. Authorities discovered traces of ricin and equipment used to process castor beans in the apartment. According to news sources, the group was plotting to attack a British military base by poisoning the food. Later reports indicate that the substance tested in the apartment was not ricin.	1/9/2003	British Government	Jeffrey Bale, Anjali Bhattacharjee, Eric Croddy, and Richard Pilch, MD, "Ricin Found in London: An al-Qa'ida Connection," Center for Nonproliferation Studies, 23 January 2002, available at http://cns.miis.edu/iiop/cnsdata?Action=1&Concept=0&Mime=1&collect

Estimated Date of Incident	WMD	Incident	Date First Reported	Source(s)	Citations
3/1/2003	Radiological	On 20 March 2003, the FBI announced that they were searching for Adnan al- Shukrijuma in connection with the Jose Padilla case. Padilla was arrested May 2002 for plotting to obtain materials in Canada for a dirty bomb. Shukrijuma was identified from documents obtained in connection with the 2002 arrest of Ramzi bin al-Shib, a key 9/11 architect.	3/1/2003	FBI	Bill Gertz, "Al Qaeda Pursued a Dirty Bomb," Washington Times, 17 October 2003; pg. A1; Entity Record: "Adnan El Shukrijumah," Sentenial TMS Records: Tracking the Threat, 25 November 2003. Available online at: http://www.trackingthetreat.com/db/ENT1706.htm . Accessed 20 May 2004; Katherine Wexler, "Father Denies Son Linked to Terror," St. Petersburg Times, 22 March 2003; Scott Wheeler, "Evidence Points to Dirty-Bomb Plot," Insight Magazine, 29 October 2003.
2004	Radiological	Reports indicate that an al-Qa'ida affiliate named Midhat Mursi may have been constructing a "dirty bomb" in early 2004. Mursi is reportedly in contact with Ayman al-Zawahiri and was suspected of managing al-Qa'ida chemical labs in Afghanistan. Mursi allegedly uses the name "Abu Khabab".	1/1/2004	U.S. Government	Muhammad Wajdi Qandyl, "Searching for Weapons of Mass Destruction and Al-Qa'ida," Al-Akhbar (Cairo), 18 January 2004.
1/23/2004	Chemical	U.S. forces found 3kg of cyanide at the Baghdad house of Ahmad Fadhl Nazzal al-Khalayila, an aide to Zarqawi. The cyanide was to be placed in construction bricks and used against coalition troops. Troops also uncovered a document thought to be written by Zarqawi asking al-Qa'ida for aid.	2/7/2004	U.S. Government	John Lumpkin, "U.S. Forces in Iraq Find Some Cyanide," Associated Press, 7 February 2004; Douglas Jehl, "U.S. Aids Report Evidence Tying Al Qaeda To Attacks," New York Times, 10 February 2004.

Estimated Date of Incident	WMD	Incident	Date First Reported	Source(s)	Citations
3/1/2004	Chemical	British authorities announced they had thwarted a possible chemical attack tenuously linked to al-Qa'ida. The plot, which was in an early planning stage, involved the use of conventional explosions enhanced with osmium tetroxide in London's shopping centers, railway stations, and the Underground.	4/5/2004	British authorities	"Deadly Chemical Planned for Use in Potential British Bomb Plot," Agence France Presse, 26 April 2004; "Osmium Tetroxide: A New Chemical Terrorism Weapon," CNS Research Story of the Week, 13 April 2004; available at: http://cns.miis.edu/pubs/week/040413.htm .
4/20/2004	Chemical	The Jordanian Intelligence Service seized six trucks wired with explosives containing 20 tons of an unknown chemical. The trucks were reportedly part of a plot by Zargawi and a number of al-Qa'ida members to destroy Jordan's Intelligence Department, Prime Minister's Office, and the U.S. Embassy.	4/21/2004	Jordanian Government	"Qaeda-linked Chemical Attack in Jordan Could Have Killed 80,000," Agence France Presse, 26 April 2004; "Confessions of Group Planning Jordan Chemical Attack," BBC Monitoring, 26 April 2004; Interview with Mahmud Al-Kharabsha, Member of the Jordanian Parliament.

Estimated Date of Incident	WMD	Incident	Date First Reported	Source(s)	Citations
6/1/2004	Chemical/ Radiological	Eight men were arrested in Britain and charged with conspiracy to murder after they were discovered with information on chemicals, explosives, and radiological materials. Also in their possession were plans of the New York Stock Exchange, the Citigroup Building in New York, the International Monetary Fund in Washington, and the Prudential Building in New Jersey. The arrests occurred two weeks after a series of 13 arrests of men allegedly affiliated with the al-Qa'ida network. The men were identified as Dhiren Barot, Omar Abdur Rehman, Zia ul Haq, Abdul Aziz Jalil, Nadeem Tarmohammed, Moammed Naveed Bhatti, Quaisar Shaffi, and Junade Feroze.	Aug-04	British Government	Ben English, "Britain Charges Eight Over US Terror Campaign," The Advertiser, 18 August 2004.

LIST OF REFERENCES

- Albright, D. "Al Qaeda's Nuclear Program: Through the Window of Seized Documents." *Policy Forum Online* (November 2002).
- Albright, D., K. Buehler, and H. Higgins. "Bin Laden and the Bomb." *Bulletin of the Atomic Scientists* 58, no. 1 (2002): 6-17.
- Allison, G. T. *Avoiding Nuclear Anarchy: Containing the Threat of Loose Russian Nuclear Weapons and Fissile Material*. Cambridge, MA: The MIT Press, 1996.
- . *Nuclear Terrorism is the Greatest Threat to National Security*. Detroit, MI: Thomson Gale, 2005.
- Associated Press. "Prosecutor Seeks Guilty Verdict for Terror Suspect Extradicted from Australia." *International Herald Tribune*, 9 February 2007, sec European Region. <http://www.ihf.com/articles/ap/2007/02/09/europe/EU-GEN-France-Terror-Trial.php> (accessed 14 February 2007).
- . "Police Say They Stopped Suspects Near a Reactor." *Bloomington Pantagraph*, 17 March 2006.
- Boes, KS, DS Joy, RB Pope, TM Thomas, and PB Lester. "TRANSCOM: The US Department of Energy (DOE) system for tracking shipments." Conference: SPECTRUM94: International Nuclear and Hazardous Waste Management Conference, Atlanta, GA, 14-18 August 1994.
- Bridges, Dennis. "It's a Police Problem: The Terrorist Threat's Impact on State and Local Law Enforcement." *Police Chief* 69, no. 2 (February 2002): 35-38.
- Bunn, M., and G. Bunn. "Strengthening Nuclear Security Against Post-September 11 Threats of Theft and Sabotage." *Journal of Nuclear Materials Management* 30, no. 3 (2002): 48-60.
- Bunn, M., and A. Wier. *Securing the Bomb: An Agenda for Action*. Cambridge, MA. and Washington, D.C.: Project on Managing the Atom, Belfer Center for Science and International Affairs, John F. Kennedy School of Government, Harvard University, 2006.
- Bunn, M., A. Wier, and J. P. Holdren. *Controlling Nuclear Warheads and Materials: A Report Card and Action Plan*. Boston, MA: Harvard University Nuclear Threat Initiative; Project on Managing the Atom, 2003.
- Bunn, M., A. Wier, and N. T. Initiative. *Securing the Bomb 2006*. Boston MA: Harvard University; Nuclear Threat Initiative, 2006.

- Cirincione, Joe. *Bomb Scare the History and Future of Nuclear Weapons*. New York, NY: Columbia University Press, 2007.
- Conklin, W. C. "Proposed Framework for Cleanup and Site Restoration Following a Terrorist Incident Involving Radioactive Material." *Health Physics* 89, no. 5 (November 2005): 575-582.
- Daly, S., J. V. Parachini, and W. Rosenau. "Aum Shinrikyo, al Qaeda, and the Kinshasa Reactor." *RAND Project Air Force*, 2005.
- DeFazio, Lindsey, Mathew Osborne, and Benjamin and Heath. *Chart: Al-qa'ida's WMD Activities*. Washington, D.C.: Center for Nonproliferation Studies, 2005.
http://cns.miis.edu/pubs/other/sjm_cht.htm (accessed 25 September 2006).
- Dilger, F., and R. Halstead. "The Next Species of Trouble: Spent Nuclear Fuel Transportation in the United States." *American Behavioral Scientist* 46, no. 6 (February 2003): 796-811.
- Dodd, B. "International Efforts in Countering Radiological Terrorism." *Health Physics* 89, no. 5 (November 2005): 556-565.
- ElBaradei, Mohamed. Nuclear Proliferation and the Potential Threat of Nuclear Terrorism. Paper presented at Asia-Pacific Nuclear Safeguards and Security Conference, Sydney, Australia, 8 November 2004.
<http://www.iaea.org/NewsCenter/Statements/2004/ebsp2004n013.html> (accessed 20 December 2006).
- Environmental Working Group Action Fund. *Will Terrorists Target Nuclear Waste Shipments?* Environmental Working Group Action Fund, 2002.
http://www.ewg.org/reports/nuclearwaste/faq/faq_terroristthreat_more.php (accessed 10 February 2006).
- Ferguson, C. D., T. Kazi, and J. Perera. *Commercial Radioactive Sources: Surveying the Security Risks*. Monterey, CA: Monterey Institute of International Studies, Center for Nonproliferation Studies, 2003.
- Green, L. "Nuclear Transport - the Regulatory Dimension." *International Journal of Radioactive Materials Transport* 13, no 3-4 (2002): 203-206.
- Halstead, R., J. Ballard, and F. Dilger. "State of Nevada Studies of Potential Terrorism and Sabotage against Spent Fuel Shipments." Waste Management 2001 Conference, Tucson, AZ, 2001.

- Huizenga, David. *Testimony of David Huizenga, Assistant Deputy Administrator, National Nuclear Security Administration, before the U.S. Senate Committee on Homeland Security and Governmental Affairs*. Washington, D.C.: U.S. Government, 2006. http://www.nnsa.doe.gov/docs/congressional/2006/2006-03-28_David_Huizenga_testimony.pdf (accessed 10 September 2006).
- Illinois Compiled Statutes. *Illinois Nuclear Safety Act*. Chapter 420, Section 10/1. Springfield, Illinois: Illinois General Assembly, 2006.
- International Atomic Energy Agency. *Mission of the International Atomic Energy Agency*. Vienna, Austria: International Atomic Energy Agency, 2002. <http://www-pub.iaea.org/MTCD/Meetings/Announcements.asp?ConfID=147> (accessed 17 September 2006).
- Jenkins, B. D. "Standards for Physical Protection of Nuclear Material." *The Nonproliferation Review* (Spring/Summer 1998): 98-110.
- Kean, T. H., and L. H. Hamilton. *The 9/11 Commission Report: Final Report of the National Commission on Terrorist Attacks Upon the United States*. Washington, D.C.: WW Norton & Company, 2004.
- McDonald, Kathleen, and W. Sean McLaughlin. "First responders: Ready or Not?" *Law Enforcement Trainer* 18, no. 3 (May/June 2003): 14-27.
- Musolino, S. V., and F. T. Harper. "Emergency Response Guidance for the First 48 Hours after the Outdoor Detonation of an Explosive Radiological Dispersal Device." *Health Physics* 90, no. 4 (April 2006): 377-385.
- Nuclear Regulatory Commission. *Description of Spent Nuclear Fuel Facilities*. Washington, D.C.: U.S. Government, 2006. <http://www.nrc.gov/waste.html> (accessed 16 October 2006).
- . *Description of Uranium Conversion Process*. Washington, D.C.: U.S. Government, 2006. <http://www.nrc.gov/materials.html>. (accessed 16 October 2006).
- . *Nuclear Regulatory Commission Management Directive 12.6*. Washington, D.C.: U.S. Government, 2005.
- Schuster, Henry. "An Unholy Alliance: Aryan Nation Leader Reaches Out to Al Qaeda." *CNN.com*, 29 March 2005. <http://www.cnn.com/2005/US/03/29/schuster.column/index.html> (accessed 2 December 2006).
- Shields, M/Sgt Steven. *Illinois State Police Field Report F-22-03-149*. Illinois: Illinois State Police, 2003.

- Smith, J. A. D., and J. B. Reed. *Spent Fuel Transportation: History, Status and State Involvement*. Washington, D.C.: National Conference of State Legislatures, 2004.
- U.S. Code of Federal Regulations. *Atomic Energy Act*. Title 18 Section 147, Washington, D.C.: U.S. Government, 2006.
- . *Transportation of Hazardous Materials Act*. Title 49 Part 5101-5127, Washington, D.C.: U.S. Government, 2006.
- . Title 10 Part 110, Washington, D.C.: U.S. Government, 2006.
- . Title 10 Part 173.435, Washington, D.C.: U.S. Government, 2006.
- . Title 10 Part 73, Washington, D.C.: U.S. Government, 2006.
- U.S. Department of Energy. *Sources of Electric Power*. Washington, D.C.: U.S. Government, 2006. <http://www.doe.gov/energysources/electricpower.htm> (accessed 10 February 2006).
- U.S. Department of Homeland Security. *DHS Press Release Announcing the Opening of the Domestic Nuclear Detection Office*. Washington, D.C.: U.S. Government, 2006. <http://www.dhs.gov/dhspublic/interapp/editorial/editorial0766.xml> (accessed 2 March 2006).
- . *Nuclear Reactors, Materials and Waste for Critical Infrastructure Protection as Input to the National Infrastructure Protection Plan Draft*. Washington, D.C.: U.S. Government, 8 June 2006.
- , Office of Intelligence and Analysis, Homeland Infrastructure Threat and Analysis Center (HITRAC). *Quarterly Infrastructure Suspicious Activity Analysis - Nuclear Sector*, Washington, D.C.: U.S. Government, 2006.
- U.S. Nuclear Regulatory Commission. *Information Digest, 2005-2006 edition*. 2005-2006 ed. Vol. NUREG 1350, Volume 17. Washington, D.C.: U.S. Government, 2006.
- . *Implementing Guidance for Additional Security Measures for Transportation of Radioactive Material Quantities of Concern*. U.S. Nuclear Regulatory Commission, Washington, D.C.: U.S. Government, 2005.
- . *Order Imposing Additional Security Measures (Effective Immediately)*. Order ed. Vol. EA-05-007. U.S. Nuclear Regulatory Commission, Washington, D.C.: U.S. Government, 1981.
- . *Order Requiring Compliance with Revised Design Basis Threat for Operating Power Reactors*. Order ed. Vol. EA-03-086. U.S. Nuclear Regulatory Commission, Washington, D.C.: U.S. Government, 2003.

----. *Protection of Unclassified Safeguards Information, Criteria and Guidance*. Nuclear Regulatory Commission. Vol. NUREG-0794. Division of Safeguards, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, D.C.: U.S. Government, 1981.

Westrum, R. "Increasing the Number of Guards at Nuclear Power Plants." *Risk Analysis* 24, no. 4 (August 2004): 959-961.

Yusufzai, Rahimullah. "Interview with Bin Ladin: World's Most Wanted Terrorist." *ABC News*, 1999. <http://www.islamistwatch.org/blogger/localstories/05-06-03/ABCInterview.html> (accessed 4 April 2006).

THIS PAGE INTENTIONALLY LEFT BLANK

INITIAL DISTRIBUTION LIST

1. Defense Technical Information Center
Ft. Belvoir, VA
2. Dudley Knox Library
Naval Postgraduate School
Monterey, CA
3. Jonathan Schachter
Bloomington, IL
4. Dave Brannan, Ph.D.
Naval Postgraduate School
Monterey, CA