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THESIS

FORGING A FRAMEWORK TO IMPROVE THE EMERGENCY MANAGEMENT COMMUNITY'S ABILITY TO RESPOND TO A NUCLEAR OR RADIOLOGICAL WEAPONS ATTACK

by

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March 2007

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Despite dire predictions from the federal government, academia, and private research institutions about the threat posed by nuclear and radiological terrorism, the federal government has yet to develop an overarching organizational framework to collectively plan and prepare for the horrendous consequences of such an attack. In addition, the federal government has yet to develop even a modest program to provide technical planning and preparedness assistance to those local officials charged with coordinating the response to nuclear or radiological terrorism – the local emergency manager. In order to reduce the loss of life, social panic, and the direct and indirect economic loss caused by a nuclear or radiological terror attack, the federal government should pursue the creation of a suite of strategic national and regional organizational innovations designed explicitly to prepare our nation's emergency management community and other first responders for their critical roles during a large-scale radiological response. First amongst these innovations should be the promulgation of a new Homeland Security Presidential Directive establishing a Domestic Nuclear Preparedness Office. Such organizational improvements, coupled with an aggressive field-level technical assistance planning, training, and exercise outreach campaign, will enable the United States to build a sophisticated and coordinated nuclear and radiological terrorism preparedness and response system.

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ABSTRACT

Despite dire predictions from the federal government, academia, and private research institutions about the threat posed by nuclear and radiological terrorism, the federal government has yet to develop an overarching organizational framework to collectively plan and prepare for the horrendous consequences of such an attack. In addition, the federal government has yet to develop even a modest program to provide technical planning and preparedness assistance to those local officials charged with coordinating the response to nuclear or radiological terrorism – the local emergency manager. In order to reduce the loss of life, social panic, and the direct and indirect economic loss caused by a nuclear or radiological terror attack, the federal government should pursue the creation of a suite of strategic national and regional organizational innovations designed explicitly to prepare our nation's emergency management community and other first responders for their critical roles during a large-scale radiological response. First amongst these innovations should be the promulgation of a new Homeland Security Presidential Directive establishing a Domestic Nuclear Preparedness Office. Such organizational improvements, coupled with an aggressive field-level technical assistance planning, training, and exercise outreach campaign, will enable the United States to build a sophisticated and coordinated nuclear and radiological terrorism preparedness and response system.

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LIST OF ACRONYMS AND ABBREVIATIONS

AAR	After Action Report
CFR	Code of Federal Regulations
DHS	United States Department of Homeland Security
DNDO	Domestic Nuclear Detection Office
DNPO	Domestic Nuclear Preparedness Office
DoD	Department of Defense
DOE	United States Department of Energy
EOC	Emergency Operations Center
EOP	Emergency Operations Plan
EPA	United States Environmental Protection Agency
EPZ	Emergency Planning Zone
FEMA	Federal Emergency Management Agency
FRMAC	Federal Radiological Monitoring and Assessment Center
FRPCC	Federal Radiological Preparedness Coordinating Committee
HHS	United States Department of Health and Human Services
HSC	Homeland Security Council
HSPD	Homeland Security Presidential Directive
ICS	Incident Command System
IND	Improvised Nuclear Device
KT	Kiloton
NARAC	National Atmospheric Release and Advisory Center
NIMS	National Incident Management System
NRC	Nuclear Regulatory Commission
NRCC	National Response Coordination Center
NRPO	Nuclear and Radiological Preparedness Officer
PAR	Protective Action Recommendation
RAC	Regional Advisory Council
RAP	Radiological Assistance Program
REP	Radiological Emergency Preparedness Program
RERT	Radiological Emergency Response Team
RDD	Radiological Dispersal Device
RISC	Regional Interagency Steering Committee
RRAC	Regional Radiological Assistance Committee
RRCC	Regional Response Coordination Center
RRT	Regional Response Team
NRT	National Response Team
S&T	Department of Homeland Security Science and Technology Directorate
TOPOFF	Top-Officials Exercise
TTX	Table-Top Exercise
UASI	Urban Area Security Initiative
UC	Unified Command

USDOT	United States Department of Transportation
WMD	Weapon of Mass Destruction

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I. INTRODUCTION

A. BACKGROUND

In the fall of 1999, the Hart-Rudman Commission finished a year-long assessment of the gravest near and long-term threats to American national security. At the very top of this list was nuclear terrorism.[1] Given the profusion of readily obtainable radioactive "loose sources" throughout the world and stockpiles of poorly controlled fissionable nuclear materials located in failing nation-states, it is no wonder that the national security experts convened under Hart-Rudman rated nuclear terrorism as our country's most significant threat.[2] A threat, which should be noted, was acknowledged before the terrorist attacks of September 11, 2001, and before the initiation of the global war on terror.

A nuclear terrorism attack would likely come in one of two forms of ionizing radiation weapons. The first method would be as a rudimentary conventional explosive "salted" with quantities of a radioactive isotope. This type of weapon is referred to as a Radiological Dispersal Device (RDD). An RDD would not be very destructive, but would create panic, terror, and substantial direct and indirect economic loss.[3] The second type of weapon in the nuclear terrorists' arsenal would be an Improvised Nuclear Device (IND). Incredibly more destructive than an RDD, an IND would involve the fissioning of the isotopes of either Uranium-235 or Plutonium-239 leading to critical mass and a nuclear explosion. An IND would be incredibly powerful, depending on the yield, creating blast, heat, and radiation effects that could kill thousands, perhaps even millions.

According to the "National Strategy for Homeland Security" the primary goal of the American government is to prevent a terrorist attack (in this context an IND or RDD

[1] United States Commission on National Security/21st Century, Phase 1 Report: New World Coming: American Security in the 21st Century. September 1999.

[2] Charles D. Ferguson and William C. Potter, The Four Faces of Nuclear Terrorism (Monterey: Center for Nonproliferation Studies, 2004). 270-275.

[3] Center for Strategic and International Studies (CSIS), Asymmetric Warfare and Terrorism: Radiological Weapons as a Means of Attack. September 2000. 172.

attack) from occurring.[4] However, as a society, we must prepare for the contingency that such prevention efforts may fail, and terrorists may indeed detonate one of these weapons in an American city. If such an attack were to occur, one category of responder would be at the very hub of the incident response – the local emergency manager. For it is the job of the emergency manager to coordinate the activities of all first responders, to quickly report needs to the state, and to communicate protective action recommendations quickly and effectively to elected officials, the media, and the public. In the first critical hours following an RDD/IND attack, the local emergency management director will be in charge of managing a spatially vast, technically complex, and temporally urgent response largely on his/her own with little assistance from Federal response authorities.[5]

B. PROBLEM STATEMENT

The Top-Officials (TOPOFF) II Exercise held in Seattle in May 2003, evaluated local, state and federal government response to the detonation, by a terrorist group, of a Radiological Dispersal Device (RDD) in downtown Seattle. According to the official After Action Report, the results of this exercise showed a general lack of knowledge of the technical side of radiological response operations amongst the city of Seattle and King County emergency management staff and other exercise participants including fire departments and hospitals.[6] This paucity of understanding of the technical information concerning the many aspects of large-scale radiological response and recovery is particularly disconcerting given that both the city of Seattle and King County are renowned for having a very sophisticated emergency management program.

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[4] Office of Homeland Security, National Strategy for Homeland Security. July 2000. 2.

[5] The vast majority of Federal and State radiological response resources and incident management teams will not arrive at the incident for at least 6 to 24 hours following an IND/RDD attack. See the power-point presentation entitled "Overview of DOE/NNSA Nuclear/Radiological Response," presented by Department of Energy officials from the Nevada Operations Office during the 2005 National Radiological Emergency Preparedness Annual Conference, Dallas, Texas. April 2000.

[6] As one King County Emergency Operations Center participant stated, "translating technical data on radiation into meaningful 'so-what' terms and coordinating this was difficult. It took us three days to find someone decision-makers could understand." Department of Homeland Security, Top Officials (TOPOFF) Exercise Series: TOPOFF-2 After Action Report. August 2003. 168.

But this apparent lack of knowledge is not restricted to Puget Sound emergency management officials. From conversations with both local and state emergency management officials from all types of communities at conferences, meetings, and local exercises one cannot help but notice the frustration and general sense of discomfort that local emergency managers have when it comes to planning, preparing for, and responding to an RDD/IND event in their jurisdiction.

Although many local and state emergency managers have had some radiological awareness training or even some technical schooling on the topic, much of this training appears to have focused on transportation accidents involving radioactive sources.[7] While important, this type of event impacts a relatively confined area and a limited number of people, whereas the spatial extent and the scope of an RDD/IND response would be orders-of-magnitude larger.

Some of the angst that appears to grip local emergency managers in regards to large-scale radiological response operations may have to do with the lack of education and information on non-transportation related radiological emergencies (i.e., RDD and/or IND events). Part of this research was to test these assumptions. Are local emergency managers truly unknowledgeable in planning and executing a large-scale radiological response? If so, what are the reasons behind this lack of knowledge? Is one reason the lack of understanding of the "big picture" and the various, complicated "steps" in a large-scale response? Is it the lack of understanding of the types of federal radiological response assets, their organization, and capacities? Is it a lack of technical knowledge regarding the physics and terminology of radiation?

Beginning in the late 1970s, the emergency management community began to move away from its traditional role in "civil emergency preparedness" (CEP); the term used to describe the preparation of civilian government and citizens for the effects of nuclear war. As early as 1978, CEP officials were bemoaning the "drifting with regard to

[7] Federal Emergency Management Agency, Compendium of Federal Terrorism Training for State and Local Audiences. April 10, 2002.

CEP, drifting downward from an emphasis to a non-emphasis."[8] With Cold War threats easing and catastrophic natural disasters increasing, by the 1990's natural hazards (floods, hurricanes, earthquakes, wildfires, etc.) had become the sine qua non of the emergency management profession. In the intervening two decades, much of the knowledge of radiological weapons emergencies had been lost or forgotten as a new generation of emergency managers entered the profession.

C. RESEARCH OBJECTIVES

The primary assumption underpinning this research is that the local emergency manager is the primary coordinator of response efforts in the event of an RDD or IND attack by terrorists or a nation-state. Although the federal government has a host of specialized teams and assets that would be brought to bear in the immediate aftermath of such an attack, most of these assets would not arrive for several hours, and in some cases, several days.[9] Therefore, virtually the entire initial response to an RDD/IND attack would be the responsibility of the local emergency manager to coordinate and direct. Because of this, it is imperative that emergency managers (especially in America's largest urban areas) understand the many components and intricacies of large-scale nuclear or radiological response operations.[10]

The second assumption driving this research is that the federal government has the quintessential responsibility for preparing all levels of government for a response to a nuclear or radiological weapons attack. While local and state governments are undoubtedly responsible for preparing their respective jurisdictions for an RDD/IND attack and all other forms of disasters, only the federal government has been given the

[8] General Services Administration (GSA), Civil Emergency Preparedness, National Security and Strategic Deterrence: A Report on the Federal Preparedness Agency Symposium held January 18-20, 1978. July 1978. iii.

[9] DOE, "Overview of DOE/NNSA Nuclear/Radiological Response".

[10] Federal Emergency Management Agency (FEMA) Office of Civil Defense (OCD). Principal Threats Facing Communities and Local Emergency Management Coordinators. 1990.

mandate via legislation and national-level plans to assist communities with nuclear/radiological and all-hazards disaster preparedness and response.[11]

Given these assumptions and the threat of nuclear/radiological terrorism outlined in the next Chapter, this research project sought to:

- Understand the current federal government bureaucratic organizational structure with respect to radiological and nuclear preparedness and planning, and identify any shortcomings in these organizational constructs that are hindering effective radiological preparedness assistance to local emergency management officials. In other words, are there better ways to organize our national government to prepare all levels of government for the consequences of a nuclear or radiological terrorist attack?
- Ascertain the perceived level of knowledge of large-scale radiological response operations that local emergency managers feel they possess. Do local emergency managers know very little on the subject or are they well-versed?
- Assess the degree in which local emergency managers believe they need information on large-scale (RDD/IND) radiological response operations. Are they comfortable in the knowledge they have, or are they desirous for more information?
- Identify the kinds of information on large-scale radiological response operations required by the local emergency manager. In other words, what would they prefer? Would it be: General or detailed publications and guidebooks; briefings on federal radiological response assets, teams, and operations from Federal authorities like the Department of Energy (DOE), the Environmental Protection Agency (EPA) and others; training modules on "big picture" operations; and/or, more narrowly-focused operations (i.e., medical treatment of contaminated patients, congregate care, survey/monitoring, plume modeling, etc.); or, the need for exercises and drills of various levels of size and complexity, etc.

In sum, the primary questions under consideration are:

- Is the federal government adequately organized to thoroughly support the needs of the local emergency management community with respect to nuclear and radiological terrorism preparedness and response? If not, what organizational constructs could the federal government either create or refine that would aid emergency managers in preparing their communities for the consequences of an RDD or IND terrorist attack?

[11] The very creation of the Department of Homeland Security and the Department's oversight role of Homeland Security Presidential Directives (HSPD)-5 and HSPD-8 is testament to the federal government's leadership role in protecting all American citizens from the consequences of WMD attacks.

- Is the federal government providing the appropriate training, education, and outreach materials to prepare local emergency managers for their respective roles in managing the consequences of a radiological/nuclear (RDD/IND) terror attack? If not, what actions should the federal government take to improve RDD/IND response operations knowledge amongst emergency management and homeland security officials, particularly in America's largest cities?

A few additional points regarding the objectives of this research: First, a local concern that was not addressed in this research project was radiological equipment needs. Although there is a need for radiological survey instruments and monitors at the local level used by fire departments, hazardous materials teams, and medical professionals, this a whole other realm of RDD/IND emergency response that would be better addressed by more thorough and focused research. Since the target of this research, the local emergency management director/coordinator (emergency manager), is primarily a coordinative person and not a field-operator, the need for information on pre-disaster preparedness and post-disaster response processes and procedures outweighed the necessity to understand the need for radiological equipment procurement and training.

Second, this research focused solely on the organizational changes and radiological preparedness outreach products that the federal government should pursue to assist the emergency management community. While privately-owned and public critical infrastructure sectors and local and state emergency services, public health, environmental quality, and others have an important role in assisting local emergency management agencies with RDD/IND preparedness issues, in order to narrow the focus of this research, only the federal government's role in these efforts was analyzed.

Finally, for the purposes of this research, the term "outreach" and "information needs" used throughout this document denote the use of publications, guidebooks, compact-disks, web-sites, briefings, and various drills and exercises designed explicitly to improve the ability of emergency management officials to prepare for and respond effectively to a nuclear or radiological weapons attack in their jurisdiction.

D. HOMELAND SECURITY IMPLICATIONS

The ultimate goal of this research project is a practical one: to aid in the process of strengthening the emergency management community's ability to coordinate the response to an RDD or IND attack in their community. In order to accomplish this goal, it must first be determined what the local emergency manager does not know about large-scale radiological response, and equally important, what the local emergency manager thinks he/she needs to know about large-scale radiological response. Once data on these two fundamental questions are gleaned, this information can be used by federal (and state) authorities to design an effective RDD/IND response information-outreach campaign targeted at the local emergency manager.

Under the Nuclear/Radiological Response Annex to the National Response Plan (NRP) the Department of Energy (DOE) is the Coordinating (or Lead) Agency in the federal response to a nuclear terrorism event. Once the response phase has shifted into the recovery phase, the U.S. Environmental Protection Agency (EPA) takes on the Coordinating Agency role. The Department of Homeland Security (DHS) through the Federal Emergency Management Agency's (FEMA) Regional Response Coordination Center (RRCC) has the responsibility for overall coordination of the federal response.[12]

Although the EPA controls some federal radiological response assets (like the Radiological Emergency Response Team), and DHS/FEMA has overall coordination, it is the DOE that owns the preponderance of federal radiological response teams and resources. Assets like the Federal Radiological Monitoring and Assessment Center (FRMAC) in Nevada are composed of several-dozen highly skilled health-physicist personnel expertly trained in various components of radiological response operations. It is the FRMAC that, once established near the incident scene, will be the center of the response and recovery operations following an RDD/IND attack.[13] Other assets from the DOE like the National Atmospheric Release Advisory Center (NARAC)(now the

[12] Department of Homeland Security, The National Response Plan (NRP), Nuclear/Radiological Incident Annex. December 2004.

[13] Department of Energy, Nevada Operations Office, Las Vegas, "Overview of Federal Radiological Monitoring and Assessment Center (FRMAC) Operations," presented by Department of Energy officials from the Nevada Operations Office during the 2005 National Radiological Emergency Preparedness Annual Conference, Dallas, Texas (April 2000).

Interagency Modeling and Atmospheric Assessment Center under DHS), the Aerial Measuring System (AMS), and the eight Radiological Assistance Program (RAP) Teams will fall under the FRMAC once established.

Currently DOE personnel with the FRMAC participate in required periodic nuclear power plant emergency exercises with state and local officials. Because of this, local emergency managers in communities adjacent to commercial nuclear power plants understand FRMAC and DOE response procedures and have a solid understanding of all of the components of a large-scale radiological response. However, local emergency managers not located in the Emergency Planning Zone (EPZ) of a commercial nuclear power plant, which is most communities in the United States, have little or no interaction with the DOE, FRMAC or other elements of the federal radiological response apparatus. (See Chapter VI, Section A-3). Due to this, many local emergency management agencies may be struggling to understand the federal government's role in the rather complex activities inherent in an RDD/IND response.

E. RESEARCH AUDIENCE

Since the DOE and DOE-FRMAC is the primary source of technical expertise and controls the preponderance of assets in the aftermath of a radiological emergency, it will be one of the primary audiences for this research. So too will the FEMA Response Directorate and the soon-to-be re-aligned Preparedness Directorate,[14] as well as the DHS Science and Technology (S&T) Directorate, since these agencies provide pre-event training services and incident response support to state and local governments during a major disaster. But states and other federal agencies involved in training for and/or organizing large-scale radiological response operations should also benefit from this research. These agencies/departments include: the Environmental Protection Agency (EPA), the Nuclear Regulatory Commission (NRC), the U.S. Department of Agriculture (USDA), the U.S. Department of Health and Human Services (HHS), and the Department

[14] The Post-Katrina Emergency Management Reform Act of 2006 (HR 5441) signed by President Bush on October 3, 2006, transfers many of the functions of the DHS Preparedness Directorate over to FEMA. The reorganizations mandated in this legislation are to become effective March 31, 2007. See the Post-Katrina Emergency Management Reform Act of 2006, HR 5441, Title VIII – National Emergency Management.

of Defense (DoD). Finally, it is hoped that the Homeland Security Council (HSC) will benefit from this research, since several of the recommendations herein can only be executed by the most senior policy organizations of the federal government.

With the data provided in this research, it is hoped that the HSC, DHS, FEMA, DOE, and others will be able to: establish priorities for action; designate lead agencies or subcommittees to pursue and implement the recommendations outlined in this research; scrutinize the progress made in accomplishing mission goals; and, over time, monitor the effectiveness of each of the recommendations that is ultimately implemented.

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II. LITERATURE REVIEW

A. BACKGROUND

Since the attacks on September 11, 2001, there has been a heightened interest in the need for the federal government to assist the local first responder community in preparing for future WMD attacks. In 2003, the Advisory Panel to Assess Domestic Response Capabilities for Terrorism Involving Weapons of Mass Destruction (better known as the Gilmore Commission Report) addressed the "shortcomings in state and local empowerment." The Commission asked the question, "if local responders are in fact our first line of defense, have we [the Federal government] succeeded in effectively empowering and enhancing state and local capabilities?"[15] This research project endeavors to answers this question vis-à-vis federal support to the emergency management community with regards to assistance in preparing for a response to an RDD or IND-induced disaster.

Although there is general agreement that nuclear/radiological terrorism is a significant threat and the human health, economic, and psychological effects of such an attack would be extraordinary, there are no training courses or outreach materials on responding to large-scale radiological emergencies geared specifically towards the local emergency manager. This is important because in the initial hours following an RDD/IND attack, the local emergency manager will be the primary manager/coordinator of the response operation. Furthermore, no studies currently exist that seek to ascertain what local emergency managers know about large-scale radiological response operations, or what they think they need to know or want to know about this most serious and complicated type of emergency.

[15] RAND Corporation, "The Fifth Annual Report to the President and the Congress of the Advisory Panel to Assess Domestic Response Capabilities for Terrorism Involving Weapons of Mass Destruction," Forging America's New Normalcy: Securing our Homeland, Preserving our Liberty. (Arlington, VA: December 15, 2003), 5.

B. THE NUCLEAR AND RADIOLOGICAL TERRORISM THREAT

In recent years much has been written about the growing threat of terrorists' use of ionizing radiation weapons against civilian and/or military targets (i.e., nuclear terrorism). One of the most compelling works on this topic is Charles D. Ferguson and William C. Potter's "The Four Faces of Nuclear Terrorism," in which the authors outline four mechanisms by which terrorists could use existing civilian or military radiological assets around the world against the United States: (1) they could buy or steal a functioning tactical nuclear weapon; (2) they could buy or steal fissile material (U-235 or P-239) and fabricate a nuclear fission weapon (i.e., an Improvised Nuclear Device (IND)); (3) they could attack and breach the reactor containment vessel of a commercial nuclear power plant releasing large amounts of radiation; and, (4) they could acquire industrial and/or medical radioactive isotopes and detonate it with conventional explosives (i.e., a Radiological Dispersal Device (RDD)).[16] Although Ferguson and Potter steer clear of prognostications regarding the likelihood of terrorist's use of an RDD or IND, they seem to be one of the few voices calling for increased RDD/IND response and recovery preparations as the most effective risk-reduction technique instead of the much more frequent call to secure "loose sources."[17]

The possibility of terrorists' use of any of the four means of nuclear terror outlined by Potter and Ferguson is a topic hotly debated by national security and terrorism experts. Giving credence to the argument that terrorists, and specifically Al Queda, are developing IND/RDD weapons can be found in documents uncovered in Afghanistan which include crude drawings of an implosion-type nuclear weapon and bomb designs for RDDs.[18] Much of this information has subsequently become public and several reputable news organizations (i.e., CNN, The Times of London, the Wall Street Journal, etc.) have reported on the contents of these documents seized by American

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[16] Ferguson, The Four Faces of Nuclear Terrorism, 3.

[17] Ibid., 11.

[18] David Albright, "Al Queda's Nuclear Program: Through the Window of Seized Documents," Nautilus Institute Special Forum 47 (Nautilus Institute, November 6, 2002) http://www.nautilus.org/archives/fora/Special-Policy-Forum/47_Albright.html (accessed October 22, 2005).

forces following the defeat of the Taliban in 2002. David Albright outlines a number of examples of these documents, but his statement that "if Al Queda had remained in Afghanistan, it would have likely acquired nuclear weapons eventually" seems a bit too matter-of-fact given the bits of information he was privy to.19 Other terrorism experts like William Rosenau and Greg Treverton are a bit more sanguine about Al Queda's ability to acquire and use radiological or nuclear weapons. In a 2003 interview, Rosenau and Treverton downplay Al Queda's ability and willingness to acquire Weapons of Mass Destruction due primarily to the risk involved in acquiring such weapons especially when existing conventional weapons are so cheap and effective.20 Despite some disagreements, however, a survey conducted of over 80 leading nuclear proliferation experts by Senator Richard Lugar in 2005 found that the near-term risk of a radiological (RDD) attack is significantly higher than the risk of a nuclear (IND) attack.21

C. TYPES OF NUCLEAR AND RADIOLOGICAL WEAPONS AND THEIR EFFECTS

Nuclear weapons have only been used twice on civilian populations: in Hiroshima and Nagasaki, Japan, in August 1945. Well over 120,000 people were killed during and immediately after the attacks. The nuclear bombs dropped on these cities had yields of about twelve-kilotons (KT) and twenty-two KTs, respectively. Modern strategic nuclear weapons possessed by several nations usually have yields between one-hundred KT to one megaton.[22] In addition, most of these same nations possess thousands of shorter-range "tactical" or "battlefield" nuclear weapons. Nuclear weapons with yields under

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19 David Albright, "Al Queda's Nuclear Program: Through the Window of Seized Documents," Nautilus Institute Special Forum 47 (Nautilus Institute, November 6, 2002) http://www.nautilus.org/archives/fora/Special-Policy-Forum/47_Albright.html (accessed October 22, 2005). 1.

20 Jamie Glazov, "Symposium: Diagnosing Al Queda," Frontpagemag.com (August 18, 2003) http://www.frontpagemag.com/Articles/ReadArticle.asp?ID=9416 (accessed November 5, 2005). William Rosenau is a political scientist with RAND, and Greg Treverton served as the Vice Chair of the National Intelligence Council.

21 In the survey, respondents gave the average estimate of risk of an RDD attack over the next 10 year period as being 40 percent; this was twice as high as the average estimate for an IND attack. See Richard G. Lugar, "The Lugar Survey on Proliferation Threats and Responses," (Washington, D.C.: June, 2005). 22.

22 A one megaton nuclear explosion is one-hundred times more powerful than a ten kiloton detonation.

10KT are considered to be tactical or low-yield weapons. Most planning assumptions for terrorist's use of an Improvised Nuclear Device (IND) involve a low-yield weapon.

Research on the effects of a low-yield IND detonated in an urban area is in agreement that most of the injuries would be caused by the explosion, shock wave and fires rather than by radiation. Although modeling the number of deaths and injuries caused by such an attack is difficult, Barnaby provides a well documented estimation that a low-yield tactical IND of one kiloton would likely cause one-hundred percent fatalities within one-mile of the detonation.[23]

Unlike a nuclear weapon, a Radiological Dispersal Device (RDD) or "Dirty Bomb" is simply a conventional explosive that has been wrapped or "salted" with a radioactive source. Although no critical mass is achieved (i.e., no nuclear explosion), an RDD given the right atmospheric conditions could disperse radioactive material over a rather large area. Radioactive materials used in an RDD can be found in countless industrial and medical applications from weld inspection equipment to food bacteria killers, and from oil exploration probes to cancer cell destroying radiotherapy machines.[24] Although there are millions of commercial radiation sources worldwide only a fraction contain enough curies (energy) and possess the portability and dispersability to make effective RDD sources.[25]

While there is general agreement on the scale of destruction for various sized yields caused by an IND, the magnitude of the impacts caused by an RDD are matters of some contention. Some of these post-RDD attack studies like those developed by the Federation of American Scientists (FAS) paint a rather grim picture of "a swath about one mile long covering an area of forty city blocks that would exceed EPA contamination limits…if decontamination were not possible, these areas would have to be abandoned

[23] Frank Barnaby, How to Build a Nuclear Bomb, (New York: Nation Books, 2004). 30.

[24] Center for Strategic and International Studies (CSIS), "Homeland Defense: Asymmetric Warfare and Terrorism, Radiological Weapons as a Means of Attack" (September 2000). 172.

[25] Charles D. Ferguson, et al., Commercial Radioactive Sources: Surveying the Security Risks (March, 2003). http://www.unidir.org/pdf/articles/pdf-art1909.pdf (accessed October 18, 2006). 24.

for decades."[26] However, the U.S. Nuclear Regulatory Commission "took issue with the consequences to public health and the extent of the contamination [caused by an RDD] predicted by the Federation of American Scientist study."[27] The NRC believes that the FAS study exaggerates both the spatial extent of contamination caused by an RDD and the level of contamination.

Regardless of their effectiveness in producing mass casualties or denying area use through contamination, the real threat, as John Ford summarizes it would be the tremendous psychological – and therefore – political impact of an RDD.[28] John Medalia describes how terrorists understand these psychological effects and therefore more highly value RDDs as a terror weapon.[29]

D. THE ROLE OF THE LOCAL EMERGENCY MANAGER IN NUCLEAR/RADIOLOGICAL RESPONSE OPERATIONS

The role of the local emergency manager in an IND or RDD response operation needs to be inferred from general documents on the discipline since little has been published directly on the topic. The exception to this is a brief one-page paper published by the Federal Emergency Management Agency (FEMA) that outlines the various duties of the local emergency manager in coordinating the response to an IND or RDD attack.[30] These duties include:

- Surveying and Monitoring – Ensuring hazmat teams and others are delineating the scope and dose rate of the radioactive plume and coordinating with state and federal survey teams on monitoring locations and dose assessment.

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[26] Testimony of Dr. Henry Kelly, President Federation of American Scientists before the Senate Committee on Foreign Relations, based on a cesium-based RDD with 10-lbs of TNT (March 6, 2002). http://www.fas.org/ssp/docs/kelly_testimony_030602.pdf (accessed October 22, 2005).

[27] Canadian American Strategic Review, "An Assessment of the Threat of Nuclear Terrorism: Dirty Bombs or Radiation Dispersal Devices (Part 3)". http://www.sfu.ca/casr/ft-frost3.htm (accessed September 21, 2005).

[28] James Ford, "Radiological Dispersal Devices, Assessing the Transnational Threat." Strategic Forum Number 136, (National Defense University: March 1998) http://www.ndu.edu/inss/strforum/SF136/forum136.hmtl (accessed November 5, 2005).

[29] John Medalia, "Terrorist Dirty-Bombs: A Brief Primer" (Washington D.C.: Congressional Research Service, 2004).

[30] Excerpted from a handout entitled, "Top-Ten Nuclear/Radiological Disaster Response Activities," Federal Emergency Management Agency, Region 10 (date unknown).

- Plume Predictive Modeling – Getting a hold of an accurate and agreed-upon plume model to make protective action recommendations to local elected officials.
- Protective Action Decisions – Quickly analyzing the situation and data to make a determination on ordering sheltering or evacuation for affected citizens.
- Reception Center and Congregate Care – Establishing and equipping monitoring centers to check vehicles and people for contamination, and providing temporary housing to displaced evacuees.
- Decontamination – Setting-up decontamination stations for both vehicles and people.
- Medical Response – Analyzing the need of the local medical community for assistance and transmitting this need to state authorities for assistance.
- Agricultural Advisories and Food Control Area operations – If impacted by fallout, issuing agricultural advisories to farmers, ranchers, and gardeners, and possibly establish means to quarantine food crops.
- Re-entry and Return decisions – Working closely with state and federal authorities on guidelines and procedures to allow people to temporarily or permanently return to the disaster impacted area.
- Public Information and Warning – Ensuring the public is getting straightforward and timely instructions on what protective actions to take.
- First Responder Safety – Ensuring first responders have appropriate dosimetry to gauge exposure and the means to document and track it.
- Fear Management – Closely aligned with public information; working to ensure that public panic is minimized.

FEMAs Independent Study Course on the Emergency Manager provides a succinct overview of the general duties of the local emergency manager that are germane to all disasters including IND and RDD attacks. According to FEMA the local emergency manager is "responsible for coordinating the various components of the emergency management system – fire and police, emergency medical services, public works, volunteers, and other groups contributing to the community's management of

emergencies."[31] Since all of these first responder components would be critical to an RDD/IND response, the paramount role of the emergency manager in the aftermath of an RDD/IND attack is self-evident.

E. CURRENT RADIOLOGICAL RESPONSE OPERATIONS TRAINING AND INFORMATION

There is a substantial and widely-varying quantity of radiological training courses offered by governments at every level, as well as by universities and private contractors. Since the preponderance of these courses are conducted and/or sponsored by federal agencies, understanding the breadth of courses offered by the federal government provides the best insight into the kinds of RDD/IND response training courses that are being offered, their focus, and their target audiences. These courses provide an insight into the federal government's perspective on what is important information for local first responders and others to have especially post-9/11.

The Federal Emergency Management Agency's "Compendium of Federal Terrorism Training" provides an overview of each of the Weapons of Mass Destruction (WMD) response courses conducted by the Department of Defense, the Department of Energy, the Department of Health and Human Services, the Department of Justice, the Environmental Protection Agency, and various elements within the Department of Homeland Security to include FEMA and the National Nuclear Security Administration.[32] An analysis of the types of WMD courses listed in this compendium dealing specifically with nuclear/radiological response operations shows that the majority of these courses are geared towards transportation accidents involving radiological materials and are not oriented towards large-scale radiological operations involving an IND or RDD. It should be noted, however, that this FEMA "Compendium" was published in 2002, so it likely does not reflect the re-orientation in first responder training that evolved following the September 11, 2001, terrorist attacks.

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[31] Federal Emergency Management Agency, Independent Study Course-1, Emergency Manager: An Orientation to the Position. (Emmitsburg, MD: Emergency Management Institute, 1998), www.training.fema.gov, (accessed September 18, 2005).

[32] Federal Emergency Management Agency, "Compendium of Federal Terrorism Training For State and Local Audiences," (Emergency Management Institute, April 10, 2002).

The best summary of current IND/RDD-oriented training courses can be found in the "ODP WMD Training Program" publication. Similar to the FEMA "Compendium", this document published by the Office for Domestic Preparedness (ODP) within DHS lists and describes fifty-two WMD training courses conducted by sixteen separate institutions.[33] The training courses are logically segregated into three distinct parts based on the "level" of training: awareness level training, performance level training, and planning/management level. For each level a matrix is provided to depict which courses are the most germane to which first responder discipline (i.e., fire service, law enforcement, emergency medical services, etc.). In the "Emergency Management Agency" category a total of thirty-one of the WMD courses are listed as having some applicability to emergency management professionals. However, scrutinizing this list of courses finds that only three or four are specifically geared towards nuclear/radiological operations. The majority of the courses for emergency managers are general WMD courses dealing with incident command issues or other command-and-control type topics.

The few courses that are geared specifically to radiological response operations only explore certain pieces of the operational continuum (i.e., treatment of contaminated individuals, or radiological monitoring). A single course that encapsulates all of the pieces of a large-scale radiological response operation simply does not exist. One of the goals of this research was to ascertain whether local emergency managers believe the development of such a course to be worthwhile.

F. PREVIOUS SURVEYS TO EMERGENCY MANAGERS ON RADIOLOGICAL DISASTER TRAINING

As the preceding section underscores, there are a great number of training courses offered by multiple parties concerning radiological safety, response and recovery

[33] Department of Homeland Security, Office For Domestic Preparedness "ODP WMD Training Program, Enhancing State and Local Capabilities to Respond to Incidents of Terrorism". (Washington D.C.: 2004).

Ten of these are federal government agencies while the remainder are either universities or private firms under contract to ODP (now the Office of Grants and Training) to provide WMD training for local and state officials. For a detailed explanation of the role of Universities in delivering WMD courses see the Department of Homeland Security, Office for Domestic Preparedness, "The National Domestic Preparedness Consortium" at http://www.ojp.usdoj.gov/odp/training_ndpc.htm.

operations. Despite all of these courses, it appears that no one has asked the local emergency management community about their needs concerning training, outreach materials, and technical assistance on radiological response operations especially as it relates to RDD/IND disasters.

The nearest attempt at ascertaining this information was in a survey of emergency managers conducted by the International Association of Emergency Managers (IAEM) in 2004.[34] In its survey of approximately 108 Certified Emergency Managers (CEM), IAEM queried respondents on what they believed to be the most important courses emergency managers should take. Of the top twenty "core courses" listed by the respondents only one, "Weapons of Mass Destruction" had any direct connection to radiological response operations. Most of the other courses deemed critical by emergency managers were general in nature dealing with running an Emergency Operations Center (EOC) or understanding the Incident Command System (ICS).

In March 2004, the State of Washington forwarded a comprehensive questionnaire to the state's emergency managers "to collect information on local emergency management programs in order to develop a snapshot of the broader, statewide system of emergency management in Washington State."[35] Although quite thorough, this survey had a broad focus on the entire gamut of emergency operations and did not explicitly address RDD/IND response training issues. In 2003, Rodriquez, et al conducted a survey of seventy-two local emergency managers and other officials involved in disaster preparedness activities in the State of Oklahoma.[36] However, this survey was limited only to emergency managers' use of weather information and radar technology in supporting their operations.

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[34] Daryl Spiewak, "The Top 10 Core Competancies and Courses as Selected by Practicing Emergency Managers." International Association of Emergency Managers, http://www.iaem.com (accessed September 19, 2005).

[35] Washington State Governor's Emergency Management Council Task Force on Local Programs, "Study of State Emergency Management at the Local Program Level," (Olympia, WA, March 2004).

[36] Havidan Rodriguez, Bill Donner, and Walter Diaz, "A Survey of Emergency Management Organizations in Oklahoma," http://www.udel.edu/DRC/current_projects/A%20Survey%20of%20Emergency%20Management%20Organizations%20in%20Oklahoma.ppt (accessed October 21, 2005).

In sum, no surveys of local emergency managers have been conducted to gauge their knowledge of large-scale radiological response operations (IND/RDD events) and their wishes regarding training courses, briefings, outreach materials, or technical assistance on the topic.

III. METHODOLOGY

A. SAMPLE SELECTION

In order to fulfill one of the primary objectives of this research, specific data and information from local emergency management directors within the United States was collected via an Internet (Web-based) survey. The following is the sample frame for this research which consists of the emergency management directors in the largest 75 cities in the United States based on the FY2005 list of cities participating in the Urban Areas Security Initiative (UASI) program and an additional list of cities developed by DHS based on 2004 population data:[37]

Albany, New York	Albuquerque, New Mexico	Anaheim, California*
Anchorage, Alaska	Arlington, Texas*	Atlanta, Georgia*
Aurora, Colorado	Austin, Texas	Baltimore, Maryland*
Baton Rouge, Louisiana	Boston, Massachusetts*	Buffalo, New York*
Charlotte, North Carolina*	Chicago, Illinois*	Cincinnati, Ohio*
Cleveland, Ohio*	Colorado Springs, Colorado	Columbus, Ohio*
Corpus Christi, Texas	Dallas, Texas*	Denver, Colorado*
Detroit, Michigan*	El Paso, Texas	Fort Worth, Texas*
Fresno, California	Honolulu, Hawaii*	Houston, Texas*
Indianapolis, Indiana*	Jacksonville, Florida*	Jersey City, New Jersey*
Kansas City, Kansas*	Las Vegas, Nevada*	Lexington, Kentucky
Lincoln, Nebraska	Long Beach, California*	Los Angeles, California*
Louisville, Kentucky*	Memphis, Tennessee	Mesa, Arizona
Miami, Florida*	Milwaukee, Wisconsin*	Minneapolis, Minnesota*
Nashville, Tennessee	New Haven, Connecticut	New Orleans, Louisiana*
New York, New York*	Newark, New Jersey*	Oakland, California*
Oklahoma City, Oklahoma*	Omaha, Nebraska*	Orlando, Florida
Philadelphia, Pennsylvania*	Phoenix, Arizona*	Pittsburgh, Pennsylvania*
Portland, Oregon*	Raleigh, North Carolina	Richmond, Virginia
Riverside, California	Sacramento, California*	San Antonio, Texas*
San Diego, California*	San Francisco, California*	San Jose, California*
Santa Ana, California*	Seattle, Washington*	St. Louis, Missouri*
St. Paul, Minnesota	St. Petersburg, Florida	Tampa, Florida*
Toledo, Ohio*	Tuscon, Arizona	Tulsa, Oklahoma
Virginia Beach, Virginia	Washington D.C., NCR*	Wichita, Kansas

* Urban Area Security Initiative (UASI) cities in 2005.

[37] Department of Homeland Security, "Preparedness Directorate Information Bulletin No. 197, National Plan Review," November 23, 2005.

This research was based on responses from the emergency management directors in the largest 75 cities in the United States (2005 UASI cities) under the assumption that these locales would be the most plausible targets of a radiological/nuclear terrorist attack.

Although the intent was for the emergency management directors to complete the survey, allowances were made, particularly in large departments, to have other emergency management managers complete the survey if the director was unable (or unwilling) to do it (See Chapter IV, Table 1, for data on respondents by position).

B. QUESTIONNAIRE DESIGN AND TESTING

The survey instrument for the research was a questionnaire designed specifically for the local emergency management director. The questionnaire's format was modeled after suggestions given by Berdie and Anderson.[38] By using a questionnaire in program evaluation and desires, the researcher remains separated and isolated from the opinions expressed by the respondent. The questionnaire also followed the design guidelines for web-based surveys developed by Dillman which provide the most current recommendations on successfully designing, administering, and managing a web-based survey.[39]

A commercial survey product, Zoomerang, was used to administer the web-based surveys to the target audience. However, before administering the survey via Zoomerang several quality control steps were taken. First, a basic list of questions was developed by this researcher and forwarded to officials at both the DOE National Nuclear Security Administration in Nevada, and the DHS Science and Technology (S&T) Directorate in Washington D.C. for their comments and suggestions. Since both DOE and DHS will be consumers of the information gathered by this questionnaire and thesis project, their respective input was critical to ensuring the questions asked would elicit data they would find useful.

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[38] Douglas Berdie and John Anderson, "Questionnaires: Design and Use," (Metuchen NJ: Scarecrow Press, 1974). 47.

[39] Don Dillman, "Mail and Internet Surveys – The Tailored Design Method," (New York: John Wiley and Sons, 2000).

Following DOE and DHS S&T input, a draft questionnaire was developed. After the questionnaire was designed and readied for survey implementation, an evaluative pre-test was conducted involving three professionals from the Seattle-area emergency management community to test for weaknesses in the survey design. Upon receiving the results of this pre-test, the questionnaire was revised and uploaded to the Zoomerang web-site for final formatting. One day before delivering the Zoomerang questionnaire, a sensitizing email message was sent to all prospective respondents alerting them that the Zoomerang questionnaire would be forthcoming and underscoring the importance of this survey to the country's RDD/IND preparedness efforts.

C. SURVEY IMPLEMENTATION

Upon final revisions, the questionnaire was initially delivered via Zoomerang on April 9, 2006, to the identified respondents – the local emergency management directors of the top-75 communities in the United States (the survey was preceded by an introductory email to all respondents alerting them of the imminent arrival of the survey). Due to a lower than expected response rate (about 17 percent), a second pre-survey email was delivered to all non-respondents, followed a day later by the actual Zoomerang survey which was delivered on April 24, 2006. After this second delivery of the Zoomerang survey the overall response rate increased to 30 percent. In the hopes of improving the response rate further, a third and final email was sent to all non-respondents this time with a web-link taking the respondent directly to the questionnaire. The results of this final solicitation, delivered on May 1, 2006, yielded an overall response rate of 40 percent.

D. DATA ANALYSIS

Analysis of the data gleaned from the completed surveys involved simple statistical methods to include percentage of responses per category, the mean, the median, and the mode. Some basic analysis depicting the variance (level of consensus) was used, but no advanced statistical methods like one/two-way analysis of variance or multiple regression analysis was utilized.

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IV. SURVEY RESULTS

This chapter provides descriptive statistics based on the survey data. The first section presents an overview of the characteristics of the survey respondents including professional titles, years of experience, and the populations of the communities they serve. The next part of the chapter assesses the current state of knowledge of local emergency management directors concerning various elements of large-scale (RDD/IND) radiological response operations. The third section provides an overview of respondents' information needs/desires on various aspects of managing a RDD/IND response operation. The relationship of plans and training to radiological response information needs is then explored in the fourth section of this chapter. Following this, relevant relationships between select variables are analyzed. Finally, a summary of the major findings of this research is provided in Chapter V.

A. CHARACTERISTICS OF SURVEY RESPONDENTS

In order to understand the genesis of the data analyzed in this research and to place it into context, information is first provided on the demographic and professional characteristics of the respondents.

1. Respondents' Professional Position

Of the original target audience of the emergency management directors of the largest-75 communities in the United States, a total of thirty (N=30) completed the questionnaire fully; of those, 70 percent were at the director level and an additional 23 percent were somewhere in the management chain of their respective organizations (see Table 1). Throughout this chapter the terms "emergency management directors" and "emergency managers" are use interchangeably to denote the survey respondents.

Respondents' Position Held Within the Emergency Management Organization						
Responses N=30	4	8	12	16	20	Response Ratio
Director of Emergency Management						**70%**
Deputy Director and/or Management						**23%**
Staff						**7%**

Table 1: Respondents' Position Held Within the Emergency Management Organization

2. Populations of Communities Served by Respondents

Of those responding to the questionnaire over 73 percent were from communities with a population greater than a half-million residents; and 97 percent were from communities with populations exceeding 250,000 (see Table 2). This, of course, is to be expected, since survey instruments were delivered to only the largest 75 communities, by population, in the United States.

To ensure that prospective respondents felt uninhibited to answer the survey questions honestly (without retribution from their elected leaders, staff, or the media) survey recipients were made aware that only total, aggregate information for this research would be compiled, analyzed, and made public. Therefore, information on exactly which of the targeted communities completed the survey instrument and individual community responses to the questions are not presented in this thesis.

Population of the Communities Served by the Respondents						
Responses **N=30**	**4**	**8**	**12**	**16**	**20**	Response Ratio
Greater than 1 Million						**30%**
Between 500,000 to 1 Million						**43%**
Between 250,000 to 500,000						**23%**
Under 250,000						**3%**

Table 2: Population of the Communities Served by the Respondents

3. Respondents' Experience as Emergency Managers

As Table 3 highlights, the respondents had a considerable amount of professional experience with 60 percent having greater than ten years professional emergency management experience while only one-fifth of the respondents had fewer than five years direct experience in the emergency management field.

Respondents' Years of Professional Emergency Management Experience						
Responses **N=30**	**4**	**8**	**12**	**16**	**20**	Response Ratio
Over 20 Years Experience						**23%**
10 to 19 Years of Experience						**37%**
5 to 9 Years of Experience						**23%**
Less than 5 Years Experience						**17%**

Table 3: Respondents' Years of Professional Emergency Management Experience

4. Respondents' Concern of an IND or RDD Attack

Finally, since this research endeavored to ascertain what information emergency management directors need from federal technical experts on IND and RDD response operations, it seemed appropriate to first understand if emergency managers believe the IND/RDD threat is serious enough (to them) to warrant their receptivity to information on the topic from federal officials. As Table 4 illustrates, emergency management directors, as a group, are slightly more concerned that an attack by a terrorist group using an RDD may occur than an attack using an IND. Not only does this confirm that emergency managers are indeed concerned that an RDD/IND attack may occur within their jurisdiction, it also indicates that the respondents possess at least a rudimentary understanding of the differentiation between an IND and an RDD, since they ranked their concern of an IND attack lower than the probability of an RDD attack; this is consistent with most experts' warnings that an IND attack would be, for technical reasons, significantly less probable than an RDD attack.[40]

Local Emergency Managers' Concern that a Nuclear or Radiological Terrorist Attack May Occur in Their Community						
	1 **No Concern**	**2**	**3** **Somewhat Concerned**	**4**	**5** **Extremely Concerned**	Mean n=30
Concerned that a Radiological Dispersal Device (RDD) Attack May Occur						**3.37**
Concerned that an Improvised Nuclear Device (IND) Attack May Occur						**2.37**

Table 4: Local Emergency Managers' Concern that a Nuclear or Radiological Terrorist Attack May Occur in Their Community

[40] Lugar, "The Lugar Survey." 22.

B. KNOWLEDGE ASSESSMENT

One of the objectives of this research was to establish a baseline understanding of the knowledge possessed by emergency managers in America's largest cities concerning the conduct of large-scale radiological response operations following an RDD or IND terrorist attack.

1. General versus Technical Knowledge on RDD and IND Response Operations

If the federal government does decide to develop an information/educational campaign on RDD/IND response operations geared towards emergency managers, it is first necessary to understand which broad category of RDD/IND response operations that emergency management directors feel is most relevant to them. As Table 5 shows, respondents believe that possessing information on the "big picture" elements of an RDD/IND response is more important than "technical" proficiency in various discrete elements of a radiological response. This finding is in keeping with the emergency manager's role as an incident coordinator as opposed to a field-level responder. It also underscores the disconnect between the current training courses offered by the federal government on radiological response operations which are overwhelmingly technical in nature and the desire of emergency managers for more generalist information (the technical orientation of the federal government's radiological response training courses is analyzed in Chapter II, Section E).

Local Emergency Managers' Assessment of the Importance of General and Technical Knowledge of Radiological Response Operations						
	1 Not Important	2	3 Somewhat Important	4	5 Extremely Important	Mean n=30
Emergency Managers Should Possess Strong Technical Knowledge of Rad Response Operations						**3.82**
Emergency Managers Should Possess Strong Knowledge of the "Big Picture" of Rad Response Operations						**4.57**

Table 5: Local Emergency Managers' Assessment of the Importance of General and Technical Knowledge of Radiological Response Operations

2. Knowledge of Radiological Response Operations versus other Hazards

Emergency managers are charged with preparing for and responding to a variety of technological and natural hazard events including hazardous materials spills, hurricanes and windstorms, flooding, wildfires, major urban fires, domestic disturbances, earthquakes, civil unrest, power outages, anthropogenic and natural disease outbreaks, and, potentially, RDD and IND terrorist attacks in their communities. Of all these hazards/disaster events, the respondents rated "nuclear/radiological terrorism" and "earthquakes and tsunamis" as the disasters of which they posses the least amount of knowledge (Table 6). Interestingly, emergency management directors feel more comfortable in dealing with a "bioterrorism and pandemic disease" crisis than in responding to a large-scale radiological event. Perhaps the learning curve on bioterrorism response has been aided recently by the specter of human-to-human avian flu transmission. Regardless, it is striking that emergency managers believe they know more about preparing for and responding to bioterrorism (largely a public health endeavor) than they do about managing a large-scale radiological response which is predominately an emergency management responsibility.

Self-Assessed Knowledge and Expertise as an Emergency Manager in Preparing For and Responding To a Variety of Hazards						
	1 **No Knowledge**	**2**	**3** **Some Knowledge**	**4**	**5** **Expert Knowledge**	Mean N=30
Hazardous Materials Incidents						**4.43**
Hurricanes, Tornadoes, and Windstorms						**4.33**
Coastal and Rivering Flooding						**4.07**
Explosive Bombings						**3.87**
Wildfires						**3.87**
Domestic Disturbances and Riots						**3.83**
Bioterrorism and Pandemic Disease						**3.83**
Nuclear and/or Radiological Terrorism						**3.39**
Earthquakes and Tsunamis						**3.38**

Table 6: Self-Assessed Knowledge and Expertise as an Emergency Manager in Preparing For and Responding To a Variety of Hazards

3. Knowledge of Various Components of a Large-Scale Radiological Response

An RDD or IND response is highly complicated involving many discreet components. Table 7 highlights respondents' self-assessed knowledge of these various elements of an RDD/IND response. In only one of fifteen categories, "developing public information messages" did respondents rate themselves, overall, as possessing expert knowledge. This can likely be attributed to the all-hazards nature of delivering post-emergency messages to the public; a fundamental duty of the emergency manager regardless of the type of disaster.

However, despite the integral part that federal radiological response teams like the FRMAC, NARAC, RAP, and RERT[41] would play in any RDD/IND response, emergency managers' knowledge of the "types and organization of federal radiological response teams" rated second to last in the list of 15 categories presented in Table 7. This is disconcerting given that close coordination between the FRMAC and the other federal response teams and the local Emergency Operations Center (i.e., the emergency management director) would likely be the most critical on-the-ground relationship during what would be a highly complicated and chaotic response following an RDD/IND attack.

Rated last was "issuing agricultural advisories". Since the respondents all served in large cities, it may seem that the issuance of agricultural advisories or the coordination of embargoes on contaminated food crops would not directly affect the urban emergency manager. However, many city and suburban residents have vegetable gardens while some may even pasture horses or other animals. Given this, even the urban emergency manager should be prepared to develop public information messages concerning the ingestion of home-grown produce or animal feed following an RDD or IND attack.

[41] The Federal Radiological Monitoring and Assessment Center (FRMAC) is the Department of Energy's (DOE) primary response team element to assess radiological contamination following an RDD/IND attack. The National Atmospheric Release and Advisory Center (NARAC) is a DOE asset located at Lawrence Livermore Laboratory that develops plume predictive models used by the FRMAC and others in a radiological response. The Radiological Assistance Program (RAP) is the initial (smaller) DOE survey team that would precede the full FRMAC. The Radiological Emergency Response Team (RERT) is a U.S. Environmental Protection Agency asset and would assist the FRMAC in a response.

Emergency Managers' Self-Described Knowledge of Various Elements of Large-Scale (RDD or IND) Radiological Response Operations						
	1 No Knowledge	2	3 Some Knowledge	4	5 Expert Knowledge	Mean n=30
Developing Public Information Messages						**4.10**
First Responder Safety						**3.93**
Decontamination Operations						**3.93**
Protective Action Decision-Making						**3.87**
The Overall "Big-Picture" Steps in a Large-Scale Rad Response						**3.77**
Basic Radiation Terms and Measurements						**3.57**
Health and Biological Effects of Radiation						**3.57**
Radiological Survey and Monitoring Operations						**3.53**
Fear Management						**3.50**
Various Types of Dosimeters and Survey Meters						**3.50**
Medical Treatment of Contaminated Victims						**3.43**
Victim Reception Center Operations						**3.43**
Plume Predictive Modeling						**3.23**
The Types and Organization of Federal Rad Response Teams						**3.10**
Issuing Agricultural Advisories						**2.67**

Table 7: Emergency Managers' Self-Described Knowledge of Various Elements of Large-Scale (RDD or IND) Radiological Response Operations

C. INFORMATION NEEDS

Understanding the information and training needs of local emergency managers on the conduct of large-scale radiological response operations was one focus of this research; the results of which are summarized in this section.

1. Factors Affecting Attendance at Radiological Training Courses

Presently, there are a host of training courses, most of a technical nature, on radiological response operations. While survey respondents attend some of these courses (Table 8), most cited "not enough time to attend" and "too far away" as the predominant factors limiting their more frequent attendance at these courses (Table 9). This suggests that if the federal government wants local emergency managers to attend training courses on radiological response operations, it might prove beneficial to field-deploy shorter-length courses to local communities instead of hosting the traditional week-long training courses at a central site within the United States. This is consistent with the information shown in Table 13.

Local Emergency Managers' Attendance at Federally-sponsored Radiological Response Training Courses						
	1 **Never Attend**	**2**	**3** **Attend Some**	**4**	**5** **Attend Frequently**	Mean n=30
Emergency Management Director's attendance at these courses						**2.87**
Emergency Management staff's attendance at these courses						**3.00**

Table 8: Local Emergency Managers' Attendance at Federally-sponsored Radiological Response Training Courses

Factors Limiting Emergency Managers' Attendance at Radiological Response Training Courses and Workshops						
	1 Not a Factor	2	3 Somewhat of a Factor	4	5 Absolute Factor	Mean n=30
Not Enough Time to Attend						**3.77**
Too Far Away						**3.10**
Too Costly to Attend						**3.06**
Too Technical in Nature						**2.76**
Not Germane to Department/Agency's Mission						**2.42**
Not Technical Enough						**2.16**

Table 9: Factors Limiting Emergency Managers' Attendance at Radiological Response Training Courses and Workshops

2. Information Needs on Radiological Response Operations and Their Relative Importance to the Emergency Manager

The most salient portion of this research attempted to ascertain the type(s) of information on large-scale radiological response operations that local emergency management directors wish to receive from the federal government. Consistent with their role as a crisis coordinator/manager, the primary answer to this question (see Table 10) is "the overall big-picture steps in a large-scale radiological response." In other words, emergency management directors do not necessarily want or need to know the technical details of any one radiological response discipline, but rather believe they need to understand how these discrete disciplines fit together in order to more effectively manage the overall incident.

Emergency management directors are also desirous of information on protective action decision-making. Again, this is consistent with their responsibilities. Following an RDD/IND attack, it is the local emergency manager director who will need to quickly determine what citizens in which area should shelter-in-place and which ones should evacuate. This determination is the single most important decision to save lives in the immediate aftermath of a nuclear/radiological terror attack,[42] and emergency management directors are obviously aware of this given the high score they attributed to this category.

Third on the list of categories of RDD/IND response operations that emergency management directors wanted to receive more information on is "developing public information messages." This is interesting, because in a previous question, emergency management directors rated "developing public information messages" as that portion of an RDD/IND response that they had the most knowledge of. Regardless, the respondents, by ranking public message development so high on their list of information needs, are highlighting the criticality of giving clear, concise messages to the public following an RDD/IND attack not only to save lives, but also to limit panic and fear (note that information on "fear management", closely related to public messaging, is fourth on the list of information needs).

Finally, it should be noted that of the 15 radiological emergency response steps or categories listed, respondents rated nine categories at 4.0 or greater on a 5.0 point scale. Meaning that emergency managers believe that it is "extremely important" for the federal government to provide information to them on the great majority of radiological response disciplines and procedures.

[42] Department of Homeland Security, National Planning Scenarios. February, 2006. 1-5.

Importance/Priority for Emergency Management Directors and Staff to Receive Information or Training from the Federal Government on Various Elements of Large-Scale (RDD or IND) Radiological Response Operations						
	1 No Importance	2	3 Somewhat Important	4	5 Extremely Important	Mean n=30
The Overall "Big Picture" Steps in a Large-Scale Rad Response						**4.54**
Protective Action Decision-Making						**4.47**
Developing Public Information Messages						**4.43**
Fear Management						**4.33**
First Responder Safety						**4.27**
Victim Reception Center Operations						**4.20**
The Types and Organization of Federal Rad Response Teams						**4.13**
Health and Biological Effects of Radiation						**4.07**
Basic Radiological Terms and Measurements						**4.00**
Decontamination Operations						**3.93**
Plume Predictive Modeling						**3.90**
Medical Treatment of Contaminated Victims						**3.80**
Radiological Survey and Monitoring Operations						**3.80**
Various Types of Dosimeters and Survey Meters						**3.70**
Issuing Agricultural Advisories						**3.63**

Table 10: Importance/Priority for Emergency Management Directors and Staff to Receive Information or Training from the Federal Government on Various Elements of Large-Scale (RDD or IND) Radiological Response Operations

3. Preferences for the Delivery of Radiological Response Information

After analyzing the kinds of information on RDD/IND response operations that emergency management directors in America's largest communities wish to receive, the follow-on question is: in what form or format do they wish to receive this information? Table 11 summarizes the results of this question showing that the strongest preference is for "Brief Guidebooks" followed by "local table-top exercises" and then "Full-day briefings".

The desire for information on RDD/IND response operations to be transmitted via "brief guidebooks" indicates that emergency managers want a concise, readily understandable synopsis of the topic as contrasted to the less-preferred "comprehensive publication". Emergency managers also prefer that information on RDD/IND response operations be drilled utilizing local table-top exercises as opposed to full-week training courses or national conferences which ranked significantly lower.

Local Emergency Management Directors' Preferred Form to Receive Information from the Federal Government on Large-Scale (RDD/IND) Radiological Response Operations						
	1 Not Preferred	2	3 Somewhat Preferred	4	5 Strongly Prefer	Mean n=30
Brief Guidebooks						**4.23**
Local Table-Top Exercises						**4.00**
Full-Day Briefings						**3.86**
Flyers or Pamphlets						**3.63**
Comprehensive Publications						**3.56**
Half-Day Briefings						**3.50**
Full-Week Training Courses Held Locally						**3.36**
Regional Table-Top Exercises						**3.33**
Multi-Day Local Conferences						**3.28**
Multi-Day National Conferences						**2.23**
Full-Week Training Courses Held at a Central U.S. Site						**2.13**

Table 11: Local Emergency Management Directors' Preferred Form to Receive Information from the Federal Government on Large-Scale (RDD/IND) Radiological Response Operations

4. Rating of Federal Government Efforts to Date in Providing Radiological Disaster Preparedness Assistance

To gauge the emergency management communities' level of satisfaction with the federal government's efforts in providing them with information on large-scale radiological response operations, respondents were asked to rate the federal government's success in several categories (see Table 12). In sum, local emergency management officials rated, in every category, the federal government's efforts in this regard as being below an "adequate effort".

Local Emergency Managers' Rating of Federal Government's Efforts in Providing Information on Large-Scale (RDD or IND) Radiological Response Operations

	1 Poor Effort	2	3 Adequate Effort	4	5 Excellent Effort	Mean n=30
Publications						**2.33**
Technical Assistance with Plans						**2.26**
Technical Assistance with Exercises						**2.26**
Periodic Briefings and Presentations						**2.20**
Periodic Meetings with Federal Officials						**2.16**
Overall Rating[43]						***2.36***

Table 12: Local Emergency Managers' Rating of Federal Government's Efforts in Providing Information on Large-Scale (RDD or IND) Radiological Response Operations

[43] This question was asked separately which may explain why the mean of 2.36 is higher than the combined means of the five categories which were being judged.

D. RELATIONSHIP TO PLANS AND TRAINING

One of the objectives of this research was to gauge the status of communities' radiological response plans and the frequency that these communities participate in radiological response exercises/drills and the relationship of these plans and exercises on the perceived needs of emergency management directors for information on large-scale radiological response operations.

1. Status of Local Radiological Response Plans

One of the findings of this research is that almost one-fourth of the communities responding to this survey have neither a stand-alone radiological emergency response plan or a radiological response annex to their Emergency Operations Plan (EOP) (see Table 13). While having a radiological response plan and/or procedures may not be critical for smaller communities, the communities surveyed for this research are the largest metropolitan areas in the United States, and hence, the likeliest targets for an RDD/IND terrorist attack.[44]

Status of Communities' Emergency Operations Plan (EOP)						
Responses **N=30**	**5**	**10**	**15**	**20**	**25**	Response Ratio
Community has an EOP						**100%**
Community has either: A Stand-Alone Rad Response Plan, or a Rad Response Annex to the EOP						**77%**

Table 13: Status of Communities' Emergency Operations Plan (EOP)

[44] The very establishment of the UASI grant program which provides additional homeland security grant funds solely for America's largest communities above and beyond funds provided to states as part of the State Homeland Security Grant Program suggests that Congress views big cities as particularly vulnerable to future terrorist attacks.

2. Status of Participation in Radiological Response Drills or Exercises

Another somewhat distressing finding, highlighted in Table 14, is that over two-thirds of the emergency managers responding to this research have not participated in a radiological response drill or exercise in the past five years. Again, given that over two-thirds of the respondents lead the emergency preparedness and response activities for communities with over half-a-million residents, this datum is disconcerting.

Respondents That Have Participated in a Large-Scale (RDD/IND) Radiological Response Drill or Exercise Within the Last Five Years						
Responses **N=30**	**4**	**8**	**12**	**16**	**20**	Response Ratio
Yes, Have Participated in a Rad Drill or Exercise in Past Five Years						**33%**
No, Have Not Participated in a Rad Drill or Exercise in the Past Five Years						**67%**

Table 14: Respondents That Have Participated in a Large-Scale (RDD/IND) Radiological Response Drill or Exercise Within the Last Five Years

3. Participation in Commercial Nuclear Power Plant Radiological Emergency Preparedness Exercises

Finally, the majority of communities surrounding fixed commercial nuclear facilities participate in periodic drills and exercises under the Radiological Emergency Preparedness (REP) Program.[45] The REP Program requires the development of sophisticated radiological response plans and procedures at the local level to prepare communities surrounding the plant to respond to a radiological emergency. Table 15 shows that 30 percent of the respondents to this survey participate in REP Exercises; 70

[45] Managed formerly by FEMA and now the DHS Preparedness Directorate, communities within 10-miles of a commercial nuclear power plant participate in biannual "plume" exercises that evaluate the utility's as well as local and state government's response to a radioactive release at the facility to include dose assessment, protective action decision making, notification to the public, traffic and access control and several other response measures. Communities located within 50-miles of a commercial nuclear power plant participate in "ingestion" exercises once every six years to test the community's ability to issue agricultural advisories and embargo crops if warranted following a radiological release from the facility. See the Federal Emergency Management Agency and Nuclear Regulatory Commission, Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants, NUREG-0654/FEMA-REP-1, (Washington D.C.: 1980). 10.

percent do not. Since REP communities are required to have a radiological response plan, this means that most of the communities that do not have a radiological response plan as previously highlighted in Table 13 are not REP communities; meaning they are not located near a commercial nuclear facility.

Respondents That Participate in Commercial Nuclear Power Plant Radiological Emergency Preparedness Program (REP) Exercises						
Responses **N=30**	**4**	**8**	**12**	**16**	**20**	Response Ratio
Participate in REP Plume and Ingestion Exercises						**27%**
Participate in REP Ingestion Exercises Only						**7%**
Do Not Participate in REP Exercises						**70%**

Table 15: Respondents That Participate in Commercial Nuclear Power Plant Radiological Emergency Preparedness Program (REP) Exercises

E. RELEVANT RELATIONSHIPS

A number of variables were cross-tabulated to determine if there were any relevant relationships between various demographic variables (i.e., community size, years in the profession, etc.) and a host of selected questions from the research. In sum, none of the demographics were systematically related to the dependent variables (i.e., the research questions). For example, no correlation was witnessed between the size of the community and the need for information on a number of discrete radiological response tasks from Table 7. The only (minor) correlation witnessed was discovered when analyzing respondent's opinions on the federal government's efforts on providing information on large-scale response operations with whether or not a community has a stand-alone radiological response plan or incident annex. In this case, those reporting that they did not have a dedicated radiological response plan were more likely to have an unfavorable opinion regarding federal government outreach efforts.

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V. SUMMARY OF FINDINGS

One of the purposes of this research was to discern what Emergency Managers in America's largest cities know about large-scale radiological response operations, and more importantly, what kinds of information could the federal government provide them on the subject to better prepare them and their respective cities for a response to a future RDD/IND terrorist attack. The following are some of the major findings of this research:

Finding 1: Emergency management directors are slightly more concerned that an RDD attack may occur in their city, and are somewhat less concerned that they may face the aftermath of an IND attack.

Finding 2: Emergency management directors feel strongly that they should possess keen knowledge of the overall "big-picture" components or steps of a large-scale (RDD/IND) radiological response operation.

Finding 3: Compared with other types of hazard incidents, emergency management directors, by their own admission, know little about the conduct of large-scale radiological response operations.

Finding 4: Emergency management directors understand little of the organizational structure and mission of the various federal radiological response teams. They also know little about issuing agricultural advisories or developing plume predictive models following an RDD/IND attack.

Finding 5: Emergency management directors do not attend current radiological response training courses because they do not have enough time to attend, and because they are located too far away to make attendance practical.

Finding 6: Emergency management directors' most pressing desire is for the federal government to provide them with information on the overall "big-picture" elements of responding to an RDD/IND attack. Other high priority requests for information include: the process and procedures for making rapid protective action decisions, how to develop and disseminate public information messages, and fear management techniques.

Finding 7: Emergency management directors would like to receive information on large-scale radiological response operations via: brief guidebook publications, locally-held table-top exercises, and full-day briefings from federal officials. Conferences, conducted either locally or at the national level, are the least preferred method for receiving information.

Finding 8: Emergency management directors believe that the federal government's efforts to date to inform them about large-scale radiological response operations have been less than adequate.

Finding 9: Almost one-fourth of the emergency managers responding to this survey stated that their community has neither a stand-alone radiological emergency response plan nor a radiological response annex to their Emergency Operations Plan.

Finding 10: Over two-thirds of the emergency managers responding to this research have not participated in a radiological response drill or exercise in the past five years.

VI. RECOMMENDATIONS FOR FEDERAL ACTION

This Chapter presents two distinct sets of recommendations for federal action, one strategic the other tactical, derived from the data compiled by this research. First, in Section A, recommendations are offered on the creation and revitalization of several federal government bureaucratic organizations designed to provide a strategic national-level framework for improving the country's RDD/IND preparedness. The second set of recommendations in Section B of this chapter explores a range of tactical, field-level planning, training, and exercise outreach products that the federal government should produce to help improve the emergency management community's RDD/IND response capabilities. Both sets of recommendations, if implemented, will improve RDD/IND preparedness at all levels of government and will enable local emergency managers to respond more effectively to the consequences of an RDD or IND weapons attack, if and when such an attack occurs, thereby saving lives, reducing fear, and limiting the direct and indirect economic loss caused by such an attack.

A. CONSTRUCT A NATIONAL ORGANIZATIONAL FRAMEWORK FOR RDD/IND PREPAREDNESS

The Department of Homeland Security's *National Planning Scenarios* report details the extraordinary physical devastation, loss of life, and economic loss caused by the detonation of an RDD or an IND in an American city.[46] Despite these dire scenarios and the threat of radiological and nuclear terrorism highlighted earlier in this research, the federal government has yet to develop an overarching framework or create a single, unified body or organization to collectively plan and prepare for the consequences of an RDD or IND attack. Although difficult to prove empirically, one of the reasons that emergency managers rated the federal government's efforts in providing information on RDD/IND preparedness so low (see Chapter IV, Table 12) is that there simply is not a federal office, agency, or organization dedicated to managing or coordinating the country's RDD/IND preparedness efforts. This section intends to remedy this problem

[46] Department of Homeland Security, National Planning Scenarios. February 2006. 1-1 to 1-41 and 11-1 to 11-9.

by proposing the creation of several offices and organizational constructs within the federal government to lead, manage, and coordinate a sophisticated national-level effort to prepare emergency managers and other homeland security officials at every level of government for the consequences of nuclear or radiological terrorism.

1. Create a New Homeland Security Presidential Directive Establishing the Domestic Nuclear Preparedness Office

a. Limitations of the Federal Radiological Preparedness Coordinating Committee

Currently, the Federal Radiological Preparedness Coordinating Committee (FRPCC) is the sole national-level coordinative body dealing with radiological emergency preparedness issues. The Committee, which meets quarterly in Washington D.C., is comprised of subject-matter experts from seventeen federal agencies with roles to play in responding to radiological emergencies at licensed commercial nuclear power plants.47 The function of the FRPCC is "to assist FEMA in providing policy direction for the program of technical assistance to state and local governments in their radiological emergency planning and preparedness activities…this assistance activity is extended to licensees.48

While the FRPCC has recently veered into the realm of RDD/IND issues with its document describing protective actions following an RDD/IND event,49 there is no doubt that the legislation forming the FRPCC found in 44 CFR Parts 351-353 intends the body to focus on both on- and off-site emergency planning issues for commercial nuclear power plant licensees and not on broader radiological emergencies like the consequences of nuclear war or terrorism. In fact, as established by regulations, the

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47 The term 'licensee' means "the utility which has applied for or has received a license from the NRC to operate a commercial nuclear power plant." See, U.S. Government Printing Office, Code of Federal Regulations (CFR), Title 44, Part 352.1. (Washington D.C.: 2005). 604.

48 44 CFR, Part 352.22. 607.

49 U.S. Department of Homeland Security, Preparedness Directorate, Federal Register Notice, Volume 71, Number 1, Protective Action Guides for Radiological Dispersal Device (RDD) and Improvised Nuclear Device (IND) Incidents, January 3, 2006. From the Federal Register Online via GPO Access. (http://a257.g.akamaitech.net/7/257/2422/01jan20061800/edocket.access.gpo.gov/2006/05-24521.htm) (accessed September 27, 2006). 193.

nuclear power industry is required to fund the salaries of many of the representatives to the FRPCC to include the entire staff of the Nuclear Regulatory Commission (NRC) as well as the Radiological Emergency Preparedness (REP) program staff within FEMA.50

While the goal of the FRPCC is to assist communities in preparing for possible atmospheric radiation releases caused by a nuclear power plant accident, it is important to note that most American cities (and likely targets of an RDD or IND attack) are not located within the 10-mile Emergency Planning Zone (EPZ) of a commercial nuclear power plant, and, therefore, are not subject to, and do not benefit from, the radiological emergency preparedness policy guidance developed by the FRPCC.51

Thus, while the FRPCC has the expertise to serve as the central, national, policy and planning body for domestic nuclear and radiological terrorism preparedness and response, several factors inhibited its ability to function in this capacity. First, there are legislative restraints. The FRPCC was created by Congress expressly and solely to coordinate nuclear power plant radiological emergencies not emergencies caused by nuclear terrorism. Second, as required by law, many of the FRPCC participants are funded by the nuclear power industry via their respective agencies creating the rational expectation by the nuclear power industry that the FRPCC exists to support the industry and not other governmental priorities. Finally, FRPCC members meet only once a quarter and do not serve full-time on the committee, but rather have "day jobs". Therefore, because of these legislative restraints, partial funding by the nuclear power industry, a lack of dedicated staff, and an infrequent meeting schedule, the FRPCC is ill-suited to serve as the central policy and planning organization to guide America's RDD/IND preparedness effort.

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50 44 CFR, Part 353.4 requires that "FEMA services will be billed at 6-month intervals for all accumulated costs on a site-specific basis. Each bill will identify the costs related to services for each nuclear power plant site."

51 The Emergency Planning Zone (EPZ) is a 10-mile area surrounding a nuclear plant in which communities are mandated to develop radiological emergency plans and procedures as well as participate in a variety of evaluated radiological emergency response exercises. See NUREG-0654/FEMA-REP-1.

b. HSPD-14 and the Domestic Nuclear Detection Office as a Model

In 2005, President Bush signed Homeland Security Presidential Directive (HSPD)-14 establishing the Domestic Nuclear Detection Office (DNDO). The mission of the DNDO is to combat the threat of smuggled radiological materials into the United States by combining the radiological detection efforts of DHS, DOE, DoD and other federal agencies. Specifically, the Office focuses on radiological and nuclear detection measures to include information sharing and intelligence on possible threats, research and development of radiological detection equipment, and the training of security specialists and other end users in the use of this equipment.52

Before the DNDO was established, the mission of radiological detection and countermeasures was under the purview of the Office of Science and Technology (S&T) within DHS. In Fiscal Year (FY) 2005, the entire budget for the Office of Science and Technology was $173 million. However, once HSPD-14 was signed and issued in April, 2005, and the DNDO was officially established, the budget for radiological detection services alone, now under the DNDO, increased to $315 million in FY2006 and swelled to over $535 million in FY2007.53 There are two lessons to be drawn from this: (1) Because an Executive Order was issued (in the form of HSPD-14), several disparate federal agencies were required to come together under the aegis of the DNDO to begin work on the mission and objectives clearly articulated in the HSPD; and, (2) The very fact of having a formal HSPD signed by the President appears to have provided Congress with a clear focal point to allocate an increasing amount of funds towards radiological detection that did not exist to the degree it did before HSPD-14 was issued.

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52 Federation of American Scientists, Homeland Security Presidential Directive-14: Fact Sheet. April 15, 2005. http://www.fas.org.irp/offdocs/nspd/nspd-42fs.html. (accessed October 21, 2006).

53 At the time of this research, the $535 million represented the White House budget for the DNDO and had yet to be approved by Congress. See, Government Executive.com. "Lawmakers May Cut Nuclear Detection Office Funding". August 3, 2006. http://www.govexec.com/dailyfed/0806/080306gsn1.htm. (accessed October 21, 2006).

c. Role of the Domestic Nuclear Preparedness Office (DNPO)

Using HSPD-14 and the establishment of the DNDO as a model, and recognizing the restraints on the FRPCC to fully address nuclear/radiological preparedness issues, the Homeland Security Council (HSC) should pursue the development of a new HSPD creating the establishment of a Domestic Nuclear Preparedness Office (DNPO) to be housed within DHS.

Like the DNDO, the DNPO would be staffed full-time by representatives from several federal agencies and have a Senate-confirmed Senior Executive Service Director. Its mission would be to coordinate efforts to address the gaps in local, state, and federal preparedness with respect to responding and recovering from a large-scale nuclear or radiological disaster in the United States resulting from an act of terrorism or an Act of War by a nation-state. The promulgation of an HSPD focused solely on improving the country's radiological preparedness and the creation of the new DNPO would enable the federal government to:

- Provide federal agencies and departments, state and local communities, the Department of Defense, and critical infrastructure sectors with a single point of contact for all matters relating to nuclear and radiological preparedness policy, planning, training, exercise, and response procedures;
- Create a unity of effort by bringing together in one office representatives from DHS S&T, FEMA, EPA, DOE, DoD, HHS, and other federal agencies involved in some aspect of radiological preparedness and response assistance to local and state governments in order to foster improved federal interagency coordination and collaboration;[54]
- Leverage radiological preparedness funds by providing Congress with a single accountable office for the receipt, oversight, and disbursement of these funds;

[54] Presently, several Federal agencies are undertaking various initiatives to prepare local communities to respond to an RDD/IND attack. These include: the DHS Office of Grants and Training (OGT) Homeland Defense and Equipment Reuse (HDER) Program; the DHS OGT and USDOT Joint-Federal Radiological Emergency Training (JFRET) Initiative; and the DHS S&T Radiological Community Preparedness Resource (RadCPR) program, and the HHS Office of Public Health and Emergency Preparedness outreach efforts. In addition, DHS, FEMA, and DOE each separately offer numerous radiological training courses at their respective education centers. Finally, many Federal agencies participate in joint RDD/IND local planning efforts to include Army (active) National Guard WMD Civil Support Teams (CST), and EPA and Coast Guard Regional Response Teams (RRT).

- Allow the FRPCC to continue its mandated focus on commercial nuclear power plant emergencies, but utilize its knowledge and expertise as a conduit to build a much broader full-spectrum nuclear and radiological preparedness national institution;
- Serve as a horizontal link to the DNDO to ensure that emergency management and homeland security officials are receiving information on appropriate radiological detection equipment;
- Provide direction for the development of RDD/IND planning, training, and exercise technical assistance and outreach products as called for in Section B of this chapter;
- Provide potential cost-savings by providing a single office to oversee the numerous contractors that provide radiological preparedness support services to a variety of federal agencies/departments; and,
- Oversee a robust regional approach to radiological preparedness by providing guidance and direction to re-invigorated Regional Radiological Assistance Committees via FEMA's Nuclear/Radiological Terrorism Preparedness Section (see Section A-2 below).

Once established, the first goal of this joint-Agency DNPO should be to draw upon the expertise of all the agency representatives of the DNPO, state and local radiological disaster experts, nuclear energy sector representatives, and others to produce a *National Strategy for Nuclear and Radiological Disaster Preparedness*. When complete, this Strategy would establish the overarching framework for the activities of the DNPO and provide Congress and the American people with a template by which to judge the outcomes produced by the DNPO over time.

In sum, the DNPO would ensure the implementation of the provisions of the new HSPD on domestic radiological preparedness by providing the senior-level foundation of a joint, national-level, radiological and nuclear terrorism preparedness system for the country's emergency management, homeland security, and first-responder communities.

2. Establish a Nuclear/Radiological Terrorism Preparedness Section within FEMA Headquarters

As explained in the previous section, like the FRPCC, the FEMA Radiological Emergency Preparedness (REP) Program staff are, by statute, charged with overseeing and implementing radiological preparedness programs for communities surrounding

commercial nuclear power plants.[55] Because of this nuclear power plant focus, and due to a hectic REP planning, training, and exercise regimen, REP staff at both the FEMA headquarters level and at the FEMA Regional office level perform virtually no RDD/IND preparedness functions.[56] This lack of any formal organization or staff within FEMA headquarters dedicated to planning and preparing for the consequences of radiological or nuclear terrorism is disconcerting given that two of the fifteen National Planning Scenarios that were created by DHS to drive local, state, and federal readiness programs are IND and RDD scenarios.[57]

This noticeable lack of alignment by FEMA with its own parent agency's preparedness goals would not be so conspicuous if FEMA did not already have distinct work units dedicated, in some form, to each of the specific hazards as outlined in the National Planning Scenarios. For instance, FEMA has a National Earthquake Program with dedicated headquarters and field level staff (Scenario 9)[58]; a large floodplain management program with over 240 headquarters and regional staff (Scenario 10)[59]; the National Disaster Medical System dedicated to preparing for infectious disease outbreaks (Scenarios 2, 3, and 4);[60] and, up until 2005, FEMA had a hazardous materials program, again, with dedicated headquarters and field-level staff that work closely with the Agency's Chemical Stockpile Emergency Preparedness Program (Scenarios 6, 7, and

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[55] 44 CFR, Part 350.

[56] In an email survey conducted by the author on October 17, 2006, the nine FEMA REP Program Managers (RRAC Chairs) were asked to respond either "no" or "yes" to the following question: "As a group is your REP staff or RRAC involved in any non-nuclear power-plant (ie, RDD/IND) radiological response planning, training, or exercises?" Of the five responses received, three answered "no"; one answered "no", but then explained how some members of their RRAC also participate in Regional Interagency Steering Committee (RISC) meetings where IND/RDD issues are discussed; and one answered "no", but then wrote "EPA only". This confirms the author's own experience as the former REP Program Manager and RRAC Chair in FEMA Region 10.

[57] DHS, National Planning Scenarios. See Chapters 1 and 11 on IND and RDD scenarios, respectively.

[58] The FEMA National Earthquake Program is currently comprised of 18 headquarters and regional staff. Chris Jonientz-Trisler (Earthquake Program Coordinator, FEMA Region 10) e-mail exchange with author, October 28, 2006.

[59] Approximately 240 Full-Time Employees work in the FEMA Floodplain Management and National Flood Insurance Program. Carl Cook (Mitigation Division Director, FEMA Region 10), personal interview with the author, November 20, 2006.

[60] The National Disaster Medical System was transferred from HHS into DHS in 2003 and into FEMA in 2004; about 100 Full-Time Employees are assigned to work NDMS. See, "What is the NDMS" at http://www.fema.gov/media/backgrounders/ndms_bg.shtm. (accessed October 22, 2006).

8).[61] While virtually every hazard outlined in the National Planning Scenarios has (or had) an organization within FEMA dedicated to preparing the nation for its respective post-disaster consequences, there are two hazards/scenarios that remain organizationally unaddressed: radiological and nuclear terrorism.

To address this hazards/scenario gap, FEMA should create a Nuclear/Radiological Preparedness Section to be located within the Preparedness Division at FEMA headquarters. The mission of this Section would be to:

- Serve as the conduit between the newly created Domestic Nuclear Preparedness Office (DNPO), and the Preparedness, Response, and Recovery Divisions of FEMA;
- Prepare FEMA and other federal agency Emergency Support Functions (ESFs) staff to fulfill their IND/RDD response coordination role as outlined in the National Response Plan (NRP) Nuclear/Radiological Incident Annex by developing Regional Response Coordination Center (RRCC) and National Response Coordination Center (NRCC) training and exercise modules on managing the consequences of an RDD/IND attack;
- Provide direction and guidance to the re-invigorated Regional Radiological Assistance Committees (RRACs) and the newly created Nuclear and Radiological Preparedness Officers (NRPOs) in each of the FEMA regions as outlined in the following section;
- Work closely with the FEMA Emergency Management Institute in the development of RDD/IND response training courses for emergency management and homeland security officials;
- Coordinate with other federal agencies and departments, directly and through the FRPCC, that are providing some kind of radiological preparedness technical assistance to state and local communities to include: the DHS S&T Directorate, DOE, EPA, HHS, and DoD; and,
- Based on the priorities set by the DNPO, leverage the experience with community radiological disaster preparedness achieved over the past 25 years by the FEMA REP Program by utilizing REP policies, planning, and exercise guidance documents to form a suite of new publications and outreach materials on RDD and IND disaster preparedness and response.

[61] Under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA), Public Law 96-510, the EPA and FEMA entered into an interagency agreement each year where EPA would fund a hazardous material specialist position at each FEMA Regional office to perform a variety of hazardous materials coordination functions with local, state, and Federal governments. Beginning in Fiscal Year 2007, EPA decided to no longer fund these positions. See the FEMA, "FEMA/EPA Interagency Agreement Scope of Work for Fiscal Year 2005".

Furthermore, this may be an optimal time to establish this Section due to the recent passage of the Post-Katrina Reform Act of 2006 which mandates the move of the homeland security grants program office, training, and exercise functions now located within the DHS Preparedness Directorate into its counterpart preparedness program offices within FEMA.[62] This consolidation of the preponderance of DHS's homeland security preparedness apparatus under one roof within FEMA could, if coupled with the creation of a Nuclear/Radiological Preparedness Section at FEMA, produce synergies that could greatly enhance local, state, and federal radiological preparedness and response coordination.

For example, because the nation's multi-billion dollar all-hazards preparedness grants will be the responsibility of FEMA to manage beginning in March 2007, FEMA officials will soon be in much closer contact with state and UASI emergency management and homeland security officials. These relationships will enable FEMA grants staff to readily gauge state and local nuclear/radiological disaster preparedness assistance needs. At the regional level, these needs could be easily transmitted to the RRAC Chairs and Nuclear and Radiological Preparedness Officers and then on to the Nuclear/Radiological Preparedness Section at FEMA headquarters where the appropriate technical assistance actions could be decided upon and taken. Similar coordination improvements could also be realized between the new Nuclear/Radiological Preparedness Section and exercise program and training office officials which are also now consolidated within FEMA.

In short, the creation of a modest-sized 7 to 12 member Nuclear/Radiological Preparedness Section at FEMA Headquarters staffed by appropriately trained and experienced health physicist and emergency management professionals could serve as an institutional bridge of sorts between the vision and goals set by the DNPO and the Agency's enhanced regional role in assisting communities with RDD/IND preparedness efforts as discussed in the next section.

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[62] The Office of Grants and Training (OGT) within the Preparedness Directorate is to be transferred to FEMA effective March 31, 2007. See P.L. 109-295 (HR 5441), the Post-Katrina Emergency Management Reform Act of 2006, new section 505 of the Homeland Security Act of 2002.

3. Focus the Regional Radiological Assistance Committees on RDD/IND Preparedness Issues

a. The Need for a Regional Approach

Since the primary customers of the recommendations posited in Section B of this Chapter are local emergency management officials in communities scattered around the United States, providing radiological response planning, training, and exercise technical assistance to this audience will be difficult if managed solely from Washington D.C. via the DNPO or the FEMA Nuclear/Radiological Terrorism Preparedness Section. To be effective, it is imperative that some kind of regional, field-level approach be undertaken that fully integrates local, state, and federal nuclear/radiological disaster preparedness efforts.

The concept of using a regional approach to improve our country's terrorism preparedness level has recently been given renewed interest by DHS. In fact, "Expanded Regional Collaboration" is one of the seven national priorities for our country's homeland security strategy.[63] While the regionalism expounded in the State and Urban Area Homeland Security Strategy is focused on multi-city and county intra-state regional approaches, the recently adopted Post-Katrina Reform Act of 2006 focuses on inter-state regional approaches by requiring FEMA to establish Regional Advisory Councils (RACs) within each FEMA region to:

> Advise the Regional Administrator (of FEMA Regional Offices) on emergency management issues specific to that region; and, advise the Regional Administrator of any weaknesses or deficiencies in preparedness, protection, response, recovery, and mitigation for any state, local, and tribal government within the region of which the Regional Advisory Council is aware.[64]

Fortunately, the concept of regional collaboration is not new to the federal radiological response community in the United States. Through the Regional Radiological Assistance Committees (RRACs) established a generation ago, the federal

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[63] Department of Homeland Security, State and Urban Area Homeland Security Strategy, Guidance on Aligning Strategies with the National Preparedness Goal. (Washington D.C. 2005). 8.

[64] Post-Katrina Reform Act, P.L. 109-295, new Homeland Security Act, Section 507(e)-(f).

government already has a multi-disciplined, multi-agency body to coordinate radiological emergency preparedness efforts. The problem is, as currently exists, the RRACs in each FEMA region, like the FRPCC, are focused on preparing for radiological emergencies in communities surrounding nuclear power plants, and not terrorism-induced nuclear or radiological disasters in our largest cities.

b. The RRAC mission

In the aftermath of the Three-Mile Island nuclear power plant emergency in 1979, Congress created the Radiological Emergency Preparedness (REP) Program to be overseen by Regional Radiological Assistance Committees (RRACs) in nine of the ten FEMA regional offices with commercial nuclear power plants in their respective regions. The purpose of the RRACs was (and is) to "assist state and local government officials in the development of their radiological emergency response plans, and (to) review plans and observe exercises to evaluate the adequacy of these plans and related preparedness."[65]

Each RRAC is currently chaired by a FEMA representative in each of the FEMA regional offices and is comprised of regional representatives from DOE, EPA, HHS, NRC, USDA, and USDOT. In brief, the RRAC provides a ready-made, regional forum of federal radiological response subject matter expertise. However, as previously noted, the RRACs expertise is focused almost exclusively on nuclear power plant emergencies, and the Committees do little if any joint-planning for RDD or IND terrorism-induced radiological emergencies. This is not the fault of the respective RRACs. Like the FRPCC, the regulations governing the RRACs make clear that Congress's intent on establishing these bodies was to focus on commercial nuclear power plant emergencies. This restriction, coupled with the fact that all FEMA Radiological Emergency Preparedness (REP) Program staff, to include the RRAC Chairs, are funded through fees collected by FEMA from the nuclear power industry, make the use of the

[65] 44 CFR, Part 350.6.

RRACs as a vehicle for assisting local communities' efforts to prepare for nuclear/radiological terrorist events, problematic, at best.[66] So, the questions posited are two-fold:

1) How can the RRACs, a pre-existing, regionally-based, cadre of federal radiological preparedness and response technical experts, be utilized to assist cities and states with RDD and IND response planning without contravening federal regulations?; and,

2) If the above question can be satisfactorily addressed, what are the strengths, weaknesses, opportunities, and challenges posed by utilizing the RRACs to assist local communities, and how should the RRACs be integrated into the larger local/state regional homeland security framework?

c. Expanding the RRAC Charter

The Federal Emergency Management Agency (FEMA) working with the FRPCC should utilize the radiological emergency expertise of the RRACs by expanding the RRAC charter to focus these committees on nuclear and radiological terrorism preparedness issues in addition to their traditional nuclear power plant focus. Accomplishing this objective, however, will require two major concurrent actions:

1) *Legislative modifications* – FEMA should modify the regulations governing the RRAC found in 44 CFR, Parts 350-353, to give the RRAC the latitude to address RDD and IND issues. Specifically, language should be added that explicitly allows the RRACs to focus on the full spectrum of nuclear and radiological emergencies to include fixed nuclear facilities and radiological emergencies resulting from acts of terrorism and acts of war.

2) *Funding and Staffing Solutions* – Changing the legislation to give the RRACs the authority to work on nuclear/radiological terrorism issues solves the legal dilemma, but not the financial one. The fact that the nuclear power industry pays the salary, benefits, and travel expenses of the FEMA RRAC Chairs is a significant impediment to freeing the RRAC to pursue RDD/IND preparedness issues. To solve this dilemma FEMA should dedicate annual discretionary operating funds for the following:

   - *Create a Nuclear and Radiological Preparedness Officer (NRPO) Position at each FEMA Region* – First, the FRPCC should advocate, and FEMA should create, a Nuclear and

[66] 44 CFR, Parts 353.4 and 353.5.

Radiological Preparedness Officer (NRPO) position within each FEMA Region. The position description for this new position should include daily management and coordination of the RRAC to include meeting agenda development, RDD/IND workshop/training development, regional radiological exercise development and coordination, the dissemination and interpretation of federal radiological response policies and standards, and coordination with the Regional Interagency Steering Committees (RISC) on all matters relating to RDD/IND preparedness. This position would not supplant the RRAC Chair, but would ideally serve as his/her assistant or operations officer, only with a focus on nuclear/radiological terrorism preparedness instead of fixed nuclear facilities.

- *Provide the RRAC Chairs and NRPOs with Discretionary Funds* – Secondly, FEMA should provide each RRAC Chair and NRPO with a substantial travel and miscellaneous budget each year to fund training courses, workshops and exercises, as well as to fund the travel of local and state officials to these activities (e.g., paying the expenses of non-REP UASI communities to travel to REP communities to participate in exercises; see Section A-5 below on the "Sister Cities" Initiative). Bringing together emergency management and other officials from all levels of government across a multi-state geographical region can be costly. An adequate discretionary budget would enable the respective RRAC Chairs to promote the development and integration of state, local, and federal radiological response planning and training at the regional level.

While these recommendations would strengthen FEMA's leadership of the RRAC, ensuring involvement from the other federal agencies represented on the RRAC would be greatly aided by the adoption of two previously mentioned recommendations. First, the promulgation of an HSPD on nuclear and radiological disaster preparedness would provide an obvious impetus to all the federal agencies currently serving on each of the RRACs to commit the necessary energy and resources to this new RDD/IND preparedness mission. Secondly, the publication of a *Nuclear and Radiological Disaster Preparedness Strategy for the United States* (see Section A-1 of this chapter) that emphasized the need for the federal government to regionalize much of its RDD/IND preparedness efforts would also help ensure the commitment to the RRAC by member agencies.

d. Integrating the RRACs into the Larger Regional Framework

While strengthening and re-focusing each of the RRACs to assist local emergency management and homeland security agencies with RDD/IND preparedness efforts would be a worthy goal in and of itself, to be truly complementary and value-added, the RRACs should be folded into a broader, interagency, regional framework. Two options currently exist in this regard:

- *RRAC subcommittee of RISC* – At the federal (FEMA) regional level, the Regional Interagency Steering Committees (RISCs) are the primary federal-to-state coordinative disaster preparedness bodies. Specifically, the RISCs are responsible for multi-agency coordination under the National Response Plan (NRP) and are "comprised of representatives from each state in the region, and, where appropriate regional-level representatives from Emergency Support Function (ESF) primary and support agencies. RISCs meet at least quarterly and provide an operational-level forum for regional planning, interagency information-sharing and coordination."[67] One concept to better integrate the RRACs into a larger regional framework would be to make the RRACs a formal subcommittee of the RISCs. Such an arrangement already informally exists in a few FEMA regions. For instance, in FEMA Region IV in Atlanta, members of the region's RRAC regularly attend RISC meetings (although do not represent a formal subcommittee).[68] Although such a structure may aid in information sharing, given the lack of local community representation on the RISC, using this body to advance the work of the RRACs may not be the optimal solution.
- *RRAC into RAC* – Perhaps the better forum to truly regionalize and operationalize the RRACs would be to make them a permanent subcommittee of the soon-to-be-formed Regional Advisory Councils (RACs). As previously stated, The Post-Katrina Reform Act calls for the establishment of "a joint local, tribal, state and federal RAC (within each FEMA region) to discuss issues pertinent to all phases of emergency management and homeland security."[69] Since FEMA Chairs both the RRACs and the new RACs, there appears to be a natural synergy between the two committees. While it remains to be seen how these RACs will

[67] Department of Homeland Security, The National Response Plan (Washington D.C.: December 2004). 58.

[68] Conrad Burnside (RRAC Chair, FEMA Region 4), email exchange with author, October 17, 2006.

[69] Post-Katrina Reform Act, P.L. 109-295, new Homeland Security Act, Section 507(e)-(f).

ultimately be structured, the legislation creating them suggests that they might be an ideal forum through which the respective RRACs could gauge local desires regarding RDD and IND terrorism preparedness and response issues. The RRACs therefore should serve as subcommittee to the respective RACs as soon as these bodies are formed.

e. Strength, Weaknesses, Opportunities, and Challenges Analysis

Figure 1 provides a Strength, Weaknesses, Opportunities, and Challenges (SWOC) Analysis for the proposed reinvigoration of the Regional Radiological Assistance Committees (RRACs) to focus on RDD/IND preparedness assistance to local communities. The SWOC analysis is "a popular strategic planning tool (that) helps identify an organization's key success factors" by analyzing opportunities and building upon strengths while recognizing the challenges and weaknesses inherent in the desired goal.[70] While there are certainly weaknesses and threats to focusing the RRACs on RDD/IND preparedness issues, as Figure 1 shows, these shortcomings are outweighed by the strengths and opportunities created by this recommendation.

[70] John M. Bryson, Strategic Planning for Public and Nonprofit Organizations: A Guide to Strengthening and Sustaining Organizational Achievement, 3rd ed. (San Francisco: Jossey-Bass, 2004). 126.

SWOC Analysis: Refocusing the RRACs on RDD and IND Preparedness

Strengths

RRAC members are subject matter experts in their respective areas of discipline and could provide a wealth of information to local and state officials.

RRAC members frequently participate in off-site nuclear power plant exercises which involve response components very similar to an RDD/IND response.

RRAC members review and comment on the radiological response plans and procedures of nuclear power plant off-site communities; plans which are very similar to RDD/IND response plans.

RRAC members have numerous contacts within their respective radiological response disciplines which could be used to leverage additional support to local emergency managers.

The RRAC Chairs are kept abreast of the latest Federal radiological policy discussions and decisions through interaction with the FRPCC.

Weaknesses

Currently there is a lack of a dedicated funding source to conduct RRAC meetings or travel to local communities to provide technical assistance.

"Buy-in" from the Federal agencies comprising the RRAC asked to expand their RRAC duties to address nuclear/radiological terrorism is not pre-ordained.

Modifying Federal legislation to enable the RRAC to address nuclear/radiological terrorism issues is a lengthy process involving many layers of approval.

Opportunities

Local emergency managers have expressed a need for Federal technical assistance with radiological response planning, training, and exercises.

Federal agencies/departments which have a significant role in an RDD/IND response will have a regular forum to interact with their state and local counterparts and other officials with responsibilities in the aftermath of an RDD/IND attack.

Integration of the RRACs into the soon-to-be created local, state, and Federal Regional Advisory Councils (RACs) within each FEMA Regional office would meet the DHS strategic priority of "expanded regional collaboration."

Challenges

The creation of a new Nuclear and Radiological Preparedness Officer position within each FEMA Region will require the development of a business case and need to be vetted through several channels before funding of these positions could be approved.

Other DHS entities and other Federal agencies with a role to play in preparing communities for a radiological emergency may oppose FEMA leadership of the radiological/nuclear terrorism preparedness mission via the RRAC. (However, this should be tempered since most of these agencies are represented on the RRAC).

Figure 1. SWOC Analysis: Refocusing the RRACs on RDD and IND Preparedness

f. Benchmarking the Regional Response Teams

Utilizing a federal regional preparedness forum like the RRACs to coordinate local, state, and federal emergency response planning is not a new concept. The United States Coast Guard and United States Environmental Protection Agency (EPA) Regional Response Teams (RRTs) have been effectively integrating local, state, federal, and private partners together to plan and prepare for oil spills and hazardous materials releases for two decades.

Under the National Contingency Plan (NCP), the Coast Guard and EPA have established 13 RRTs in the United States each representing a particular geographic region. With input from state officials, local cities and counties, private sector interests, and federal agencies, each RRT develops a Regional Contingency Plan to ensure all potential responders within an established geographic area are integrated and clearly understand their respective roles in a hazardous materials disaster response. The RRTs, which meet quarterly, provide a transparent forum for federal, state, local and private entities to collectively plan, train, and exercise their hazardous materials disaster responsibilities.[71]

Using the RRTs as a model, the RRACs should expand their meeting participant base beyond the current federal agency focus to encompass a broad array of state and local health, emergency management, and first responder officials. This expansion of the RRAC meeting base could be facilitated by the inclusion of the RRAC as a subcommittee of the soon-to-be-established RACs as previously recommended. Once assembled, this larger RRAC could itself form various subcommittees, like the RRTs, that focus on particular training, planning, or exercise shortcomings endemic to that respective region.

[71] U.S. Environmental Protection Agency, Emergency Response Program, Regional Response Teams, http://www./epa.gov/superfund/programs/er/nrs/nrsrrt.htm. (accessed November 10, 2006).

4. Develop a Model Unified Command Incident Management Structure for an RDD/IND Response

a. RDD/IND Response Complexities

A large-scale radiological emergency response involving an RDD or IND detonation will be highly complicated. The potential for mass-casualties and mass-panic notwithstanding, an RDD/IND response will involve thousands of responders from all levels of government that will have to work together in a level of interaction far beyond a conventional natural disaster response. This is so because not only will the "normal" federal search and rescue, incident management teams, and Emergency Support Functions (ESFs) be involved in the response, but hundreds and even thousands of additional technicians will be employed by the DOE FRMAC and DoD to assess atmospheric contamination levels and monitor people and the built-environment. Integrating the FRMAC into an Incident of National Significance/Stafford Act Joint Field Office (JFO)-type response and discerning which responsibilities belong to the FRMAC and which to the JFO is a significant concern during an RDD/IND response; a concern that will reverberate across all levels of government since FRMAC personnel will be working side-by-side with both local and state first responders for an extended period of time.72

Given this close interaction between federal, state, and local responders during an RDD or IND incident, and the scale of an RDD or IND response, it becomes apparent that both radiological response plans and, moreover, incident command structures to manage a large-scale radiological response must be inextricably linked at every level of government. One way to forge this linkage would be to develop a consistent, standardized, integrated, and mutually agreed-upon Unified Command (UC) incident management structure for an RDD/IND event before the event occurs.

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72 One of the primary AAR comments from the EPA and State of Georgia "Southern Crossing" RDD exercise in August 2006 concerned the difficulty of integrating the FRMAC into both the Operations and Planning Section of the ICS structure. See, United States Environmental Protection Agency Region 4, Southern Crossing Issues from the Incident Command Perspective. (Atlanta: September 2006).

b. Fulfilling a Documented Need

Under the National Incident Management System (NIMS) and the Incident Command System (ICS), a Unified Command (UC) is defined as:

> A structure that brings together the "Incident Commanders" of all major organizations involved in the incident in order to coordinate an effective response while at the same time carrying out their own jurisdictional responsibilities. The UC links the organizations responding to the incident and provides a forum for these entities to make consensus decisions. Under the UC, the various jurisdictions and/or agencies and non-government responders may blend together throughout the operation to create an integrated response team.73

The benefits of this integrated response team philosophy ensconced within the organizational construct of the Unified Command structure has been noted for some time. In fact the need to utilize a UC structure to manage the consequences of an RDD or IND attack has been noted during a number of major recent exercises. For example, the After Action Report (AAR) from the first TOPOFF Exercise in 2000 which was an RDD scenario for the National Capitol Region stated that "the federal government should adopt the widely used NIMS ICS/UC (Unified Command) system as the standard response management system at incident sites including WMD incidents."[74] Likewise the AAR following the Pennsylvania Emergency Management Agency's "Vigilant Lion" RDD Exercise back in 1999 stated that "the concept of Unified Command must be further refined in an operational sense…to permit the smooth integration of efforts and command responsibility as called for by the dynamics of the incident."[75] Finally, although not an RDD-related issue, the 9/11 Commission considered the disaster response to the Pentagon attack a success do, in part, to an unified incident command system that was agreed-upon and in-place prior to the attacks.[76]

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[73] New Hampshire Homeland Security and Emergency Management. NIMS Frequently Asked Questions. http://www.nh.gov/safety/divisions/bem/Planning/planning_muni_nims_faq.html#FAQ20 (accessed October 1, 2006).

[74] National Response Team. TOPOFF 2000 After Action Final Report (Washington D.C.: 2001). 5.

[75] Pennsylvania Emergency Management Agency. Vigilant Lion After Action Report, September 30, 1999. http://wearcam.org/decon/hospital_decon_facility_drill.htm (accessed September 28, 2006). 39.

[76] National Commission on Terrorist Attacks Upon the United States. The 9/11 Commission Report. (Washington D.C.: 2004). 314.

Aside from several exercise AAR recommendations, two recently released federal agency documents clearly articulate the importance of utilizing a UC structure to manage the consequences of a RDD/IND attack. The first, a recently published Federal Register Notice announcing the draft guidance on protective action guides for RDDs and INDs makes clear that DHS expects that a UC structure is to be used during an RDD or IND response. It states:

> As federal response assets arrive on scene, they will be incorporated into the on-scene incident command established by State and local officials and then become part of the unified command structure. In general, the primary agencies expected to be represented in the Unified Command for an RDD or IND response incident are the agencies with primary response authority and include DHS, FBI, DOE, EPA, and other Federal, State, and local government agencies, as appropriate. Other Federal agencies (e.g., NRC, OSHA, U.S. Army Corps of Engineers, and DoD) will be requested to support the response in accordance with the NRP and NIMS.[77]

The second, a U.S. National Response Team (NRT) report seeking ways to reconcile various federal government emergency response plans like the Terrorism Concept of Operations Plan and the Federal Radiological Emergency Response Plan explicitly recommends that "the Unified Command (UC) should be adopted by the federal government as its 'on-scene' management structure, and a standard management structure at the regional and national levels established for all incidents."[78]

However, despite these numerous exercise AAR recommendations, NRT report recommendations, and DHS expectations regarding the need for the use of a UC incident management structure to manage the consequences of an RDD/IND disaster, neither DHS, FEMA, DOE, EPA or any other federal agency has produced a model or template RDD/IND UC structure. One of the goals of this research, therefore, is to provide such a model.

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[77] U.S. Department of Homeland Security, Preparedness Directorate, Federal Register Notice, Volume 71, Number 1, Protective Action Guides for Radiological Dispersal Device (RDD) and Improvised Nuclear Device (IND) Incidents, January 3, 2006. From the Federal Register Online via GPO Access. (http://a257.g.akamaitech.net/7/257/2422/01jan20061800/edocket.access.gpo.gov/2006/05-24521.htm) (accessed September 27, 2006). 193.

[78] National Response Team, Reconciling Federal Emergency Response Plans – NRT Homeland Security Recommendations. (Washington D.C.: January, 2003). v and 13.

Aside from meeting the aforementioned recommendations and expectations, the development of a model RDD/IND UC structure would have several tangible benefits:

- First, since over two-thirds of the local emergency management agencies surveyed in this research have not participated in a large scale radiological response exercise within the past five years, a model UC structure for an RDD/IND event could, in some way, substitute for the lack of RDD/IND exercise participation by assisting these communities in at least understanding the command and control architecture of an RDD/IND response;
- Second, since one-third of emergency management agencies do not have a stand-alone radiological response plan or annex to their EOP, a model UC structure produced by the federal government would help these communities understand their respective role in the multi-agency response picture, especially vis-à-vis the National Response Plan, thereby providing them with an important component and tool to craft their own plans;
- Third, since understanding the "big-picture" of a large-scale radiological response and understanding the roles and relationships of federal radiological response teams were two of the most highly-rated categories of information sought by local emergency managers, a published model of a UC structure for an RDD/IND event would go a long way to meeting local emergency management director's need to grasp the big-picture of an RDD/IND response;
- Finally, the development of a UC template for a possible real-world event like an RDD/IND attack would help those communities struggling to understand the relevancy of the Incident Command System portion of the National Incident Management System gain an appreciation of its real-world utility.

c. Development and Implementation

In order to start the process of developing a model RDD/IND disaster response UC structure, the author convened a meeting of DOE and EPA officials on August 30, 2006, to discuss the feasibility of creating such a structure to be utilized during the RDD-scenario TOPOFF-4 exercise to be held in Portland, Oregon, in October

2007.[79] This meeting was followed-up with a larger federal workgroup meeting on November 29, 2006.[80] The results of this meeting produced the model RDD/IND UC structure depicted in Figure 2.

For purposes of the model depicted in Figure 2, it is assumed that the initial Incident Command for an RDD/IND event would likely be led by local senior first responder officials who immediately arrive on the scene. Other non-local representatives like the FBI WMD Coordinator, DOE Radiological Assistance Program (RAP) Team Leader, and State Health officers may arrive within a few hours of the incident, but would likely serve in an advisory role and not as part of the Incident Command (IC) leadership team.

However, once a large number of local, state, and federal resources begin arriving on-scene about 12-24 hours after the incident, under this model, the IC will morph into a Unified *Area Command* comprised of two primary Unified Commands: Law Enforcement and Security and Health/Medical and Environmental. Establishing separate Unified Commands seemed a rational approach since forming separate Branches or Units under one single UC might present span-of-control problems given the hundreds of individuals that will likely just be working environmental health issues as part of the FRMAC.

Forming one of the core elements of the tactical or field level response under the Unified Area Command is the Health/Medical and Environmental Unified Command. All of the local, state, and federal radiological response teams and assets

[79] This meeting was conducted at the DOE Region 8 Radiological Assistance Program (RAP) team offices in Richland, Washington, and was attended by the author representing FEMA Region 10, the DOE Region 8 RAP Team leader and co-leader and three other DOE-Hanford officials, and two On-Scene Coordinators (OSC) from the EPA Region 10 office. The TOPOFF-4 exercise to be conducted in October, 2007, is the next in the series of DHS TOPOFF exercises which will occur in three venues: Guam, Phoenix, and Portland, Oregon. The scenario for the Portland venue will involve an RDD detonation in the city of Portland. Because of this, it seemed like an appropriate opportunity to attempt to develop a Unified Incident Command structure for the exercise that might also serve as a model for any RDD (or IND) incident that may occur within the United States.

[80] Participants at this November 29, 2006, follow-on meeting at the Portland Federal Building included the author (representing FEMA) and representatives from the EPA, DOE, HHS, and the U.S. Coast Guard.

would either be completely located under this UC or would have representatives assigned to this UC.[81] The major functions of this UC in the response phase would be:

[81] These teams and assets would include from DOE RAP Teams, the entire Federal Radiological Monitoring and Assessment Center (FRMAC), the Radiological Emergency Assistance Center/Training Site (REACTS), the Consequence Management Response Team, EPA On-Scene Coordinators, Radiation Emergency Response Teams (RERT), the Nuclear Incident Response Team (NIRT), US Coast Guard Strike Teams, the HHS Toxic Substances Disease Registry (ATSDR), Disaster Medical Assistance Teams (DMAT), Disaster Mortuary Teams (DMORT), National Medical Response Teams (NMRT), National Guard Civil Support Teams (CSTs), a number of DoD WMD response teams, plus state and local public health and hazardous materials teams.

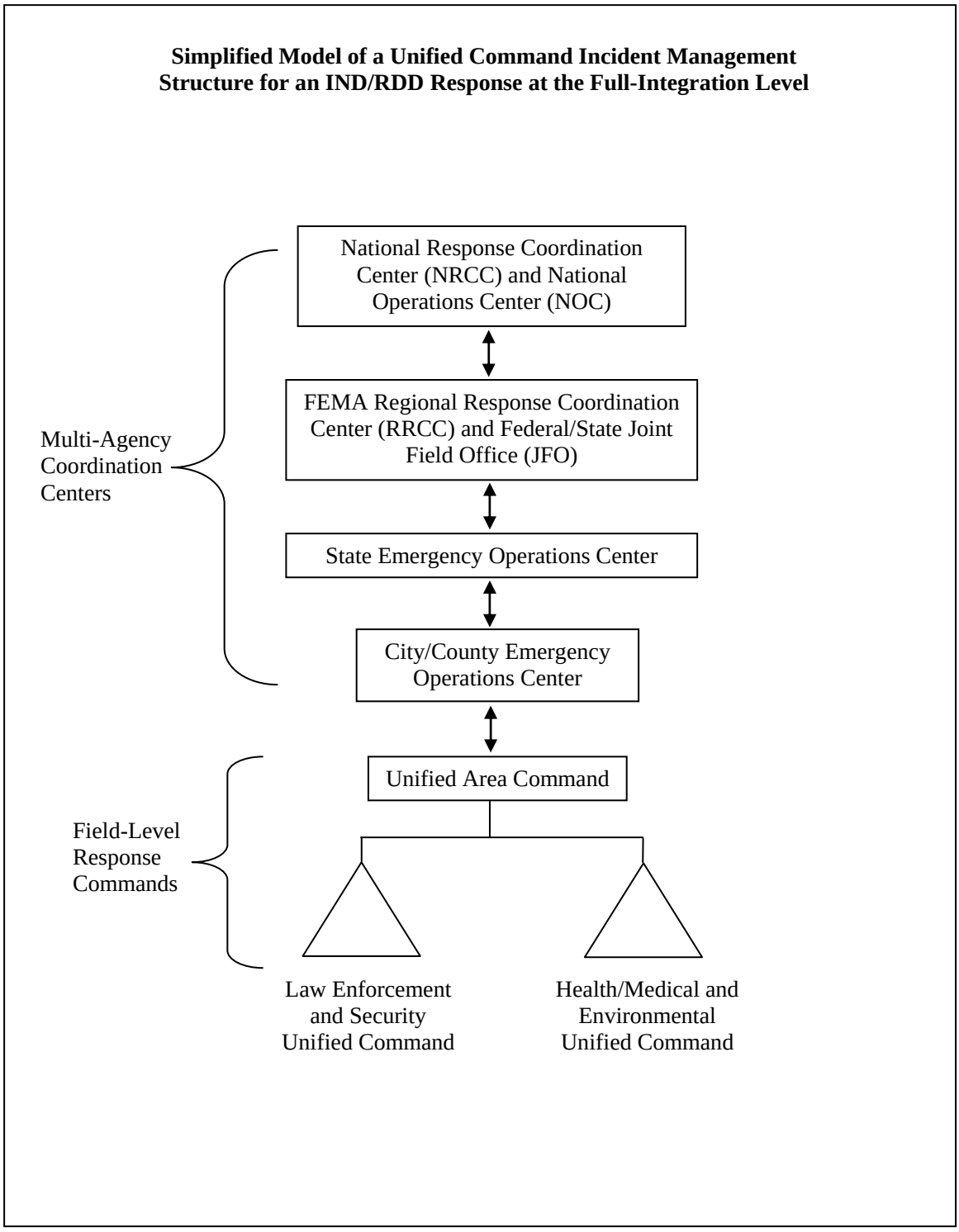

Figure 2. Simplified Model of a Unified Command Incident Management Structure for an IND/RDD Response at the Full-Integration Level

- Medical triage
- Medical treatment of contaminated patients
- Medical surge assistance
- Dose assessment
- Development of Protective Action Recommendations
- Implementing Protective Action Recommendations
- Field data coordination and interpretation
- Mass decontamination of people
- Mass decontamination of vehicles
- Isotope identification
- Delineating the extent of contamination
- Coordinating with the IMAAC on plume predictive models

The other core response element would be the Law Enforcement and Security Unified Command. This command would be comprised of all the law enforcement personnel whose mission in an RDD/IND response would be to provide security for the impacted area, coordinate and man traffic and access control points, assist the public with evacuation away from the impacted area, and assist with the crime scene investigation.

Both the Health/Medical and Environmental Unified Command and the Law Enforcement and Security Unified Command would report to the Area Unified Command. The mission of this Unified Area Command would be to: Coordinate the development and ensure the implementation of Protective Action Recommendations (i.e., sheltering or evacuation of citizens); Ensure the health and safety of first responders; Receive and process requests for resource support and assistance from the two Unified Commands and forward these requests on to the local and state EOC; and, Serve as a bridge between the technical, field-level, federal responders and their counterparts

serving in the Joint Field Office (JFO) in matters relating to situation reports and response planning and procedures germane to specific Emergency Support Functions (ESFs).

Of course, there are innumerable complexities regarding the interaction between the two Unified Commands, the Area Unified Command and the various Multi-Agency Coordination Centers like the EOCs, the JFO, and the FBI-led Joint Operations Center (JOC). Likewise the interaction within the Unified Commands to include the organization of the command group sections (e.g., operations, planning, logistics, and administration/finance) and the coordination between these sections is replete with complexities that, given the policy-oriented nature of this section, will not be elucidated upon in this research.

While this model UC template has yet to be fully vetted by all TOPOFF-4 exercise participants, it does provide a starting-point for the DNPO and all levels of government to build upon. It is recommended that, if utilized during TOPOFF-4, this model UC structure should be thoroughly scrutinized in the exercise AAR. If found to have merit by whatever metrics it is being evaluated against, the model should then be included in the "National Plan of Record" for an RDD and IND response currently being developed by the National Preparedness Task Force (NPTF).

5. Develop a Radiological Preparedness "Sister Cities" Initiative

Since its inception over 25 years ago, communities surrounding commercial nuclear power plants have consistently drilled every facet of large-scale radiological emergency response operations under the auspices of the Radiological Emergency Preparedness (REP) program. Under the REP Program, communities within the 10-mile Emergency Planning Zone (EPZ) of a commercial nuclear power plant are required to conduct a full-scale "Plume" response exercise biannually, as well as frequent hospital Medical Drills, Emergency Worker and Assistance Center monitoring and decontamination drills, radiological isotope detection Laboratory Drills, and agricultural "Ingestion" Exercises. They also must produce and periodically review comprehensive

radiological emergency response plans and procedures.[82] These regular exercises coupled with mandated radiological emergency response planning and a sophisticated training regimen make REP communities uniquely qualified to assist non-REP communities with their nuclear/radiological preparedness programs.

While there are 65 nuclear power plants in the United States, the vast majority of America's largest cities are not located within the 10-mile Emergency Planning Zone (EPZ) of one of these plants, and therefore, do not participate in, nor benefit, from the REP program. In fact as highlighted in Chapter IV, Table 5, a full 77% of the respondents representing America's largest cities, do not participate in REP Exercises. To address this gap, FEMA should create a radiological preparedness "Sister Cities" initiative that would link a non-REP UASI community with a nearby community that participates in the REP program.[83] The goals of this "Sister Cities" Initiative would be:

- To provide opportunities for local emergency management officials and other first responders from major cities and UASI areas to observe, evaluate, or participate in periodic REP drills and exercises;
- To provide opportunities for emergency management and other first responders from 10-mile EPZ REP communities to travel to non-REP major cities and UASI areas to assist these communities in radiological response planning, training, and exercise design and implementation;
- To create a stimulating environment where REP and non-REP UASI communities can exchange ideas and best practices with one another regarding all components of large-scale radiological response operations; and,
- Through these relationships develop radiological response mutual aid agreements between REP and non-REP UASI "sister-city" communities. Such agreements would formalize the process for providing a host of support resources from the non-REP UASI community to the REP community during a nuclear power plant emergency, and, conversely, from a REP community to a non-REP UASI community in the aftermath of an RDD/IND attack in the UASI community.

[82] NUREG-0654/FEMA-REP-1. 71.

[83] "Sister Cities" is a term developed by Sister Cities International, a nonprofit organization that links together U.S. cities with international cities to promote cultural understanding and foster economic development opportunities at http://www.sister-cities.org/sci/aboutsci/mission.

To bring this initiative to fruition, FEMA should provide the Nuclear and Radiological Preparedness Officers (NRPOs) and RRAC Chairs in each FEMA Region with a dedicated funding stream to pay for the travel of REP and non-REP UASI emergency management and other officials to each other's respective communities. The creation of a radiological preparedness "Sister Cities" program would enable emergency management officials in America's largest cities to refine or even jump-start their nuclear/radiological terrorism preparedness and response planning efforts by providing them with insight into decades of lessons learned by REP program communities in radiological response planning, training, and exercising.

6. Bringing it all Together: Forging a National Framework for Nuclear and Radiological Disaster Preparedness

The preceding recommendations in this section each represent a piece of a larger mosaic – the creation of a national government strategic organizational structure to prepare our nation for the consequences of a nuclear or radiological weapons attack. Figure 3 graphically depicts this proposed national framework for nuclear and radiological disaster preparedness beginning with the formation of the multi-agency Domestic Nuclear Preparedness Office (DNPO) within DHS and extending down through the new FEMA Headquarters Nuclear/Radiological Terrorism Preparedness Section, on to the FEMA Regional Nuclear and Radiological Preparedness Officers and RRAC Chairs, and ultimately to the primary customer: state and local emergency management, homeland security, and first responder officials.

At every level of this national radiological preparedness framework, key linkages with current federal government preparedness and response organizations such as the Office of Grants and Training within DHS/FEMA, the Emergency Management Institute, the National Response and Regional Response Coordination Centers, and the soon-to-be-formed Regional Advisory Councils will be forged and strengthened. The creation of these federal radiological preparedness organizational structures will also help to achieve the DHS National Priorities of "Expanded Regional Collaboration", "Strengthened Information Sharing and Collaboration", and "Strengthened CBRNE Detection,

Response, and Decontamination capabilities."[84] While this national framework for nuclear and radiological preparedness will not stop an RDD or IND attack from occurring, it will help to minimize its impacts through the creation of an integrated local-state-federal RDD/IND disaster preparedness and response system.

[84] Department of Homeland Security. State and Urban Area Homeland Security Strategy, Guidance on Aligning Strategies with the National Preparedness Goal (Washington D.C.: July 22, 2005).

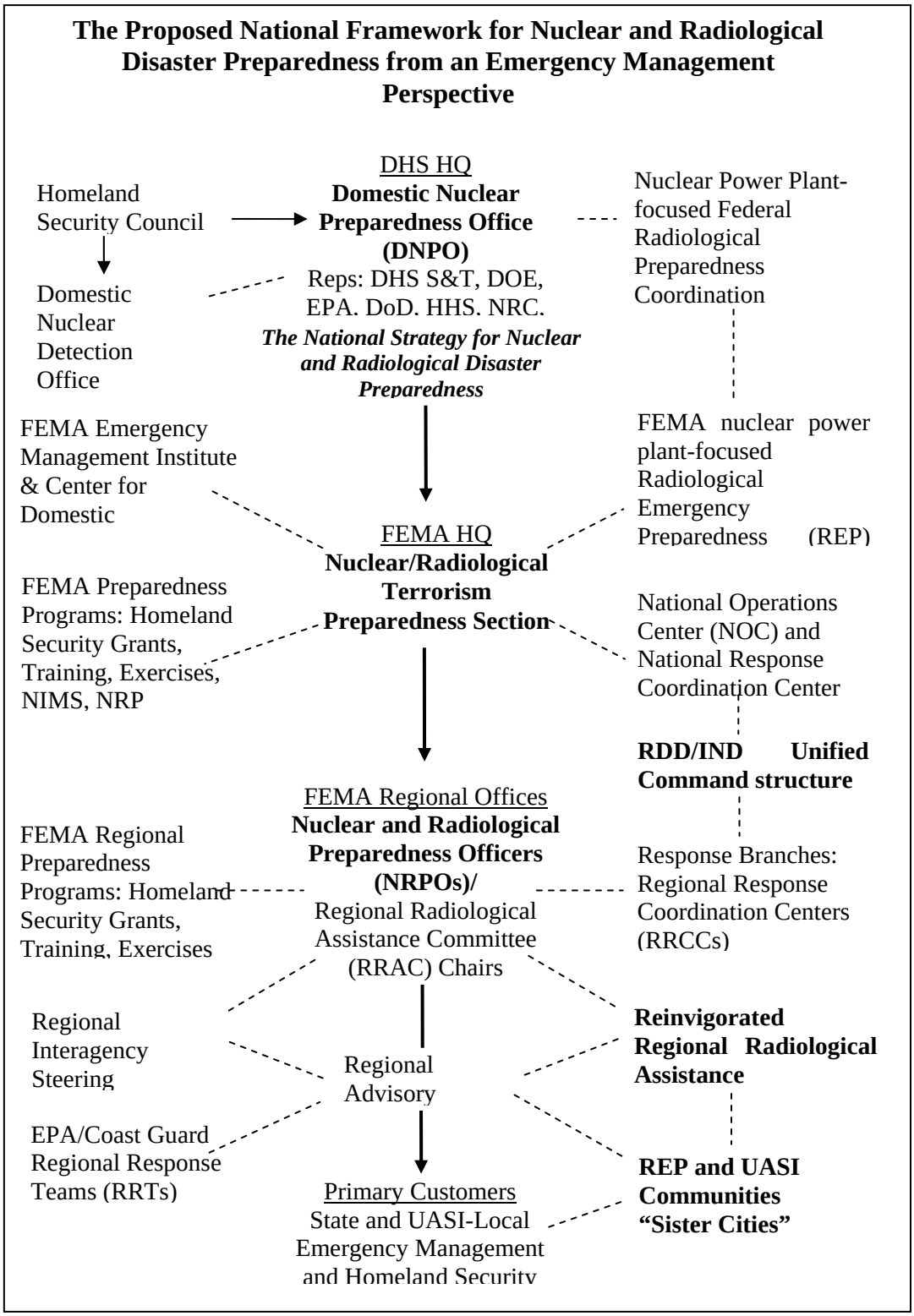

Figure 3: The Proposed National Framework for Nuclear and Radiological Disaster Preparedness from an Emergency Management Perspective

Note: **Bold font** represents the newly proposed organizations outlined in Chapter VI, Section A.

B. DEVELOP OUTREACH PRODUCTS ON RDD/IND RESPONSE OPERATIONS GEARED TOWARDS THE LOCAL EMERGENCY MANAGEMENT OFFICIAL

Based on the results of the survey to emergency management directors on RDD/IND preparedness and response information needs presented in Chapter IV, this section provides specific recommendations on RDD/IND planning, training, and exercise outreach products or activities that should be produced or undertaken by the federal government. Ideally, the new DNPO as highlighted in Section A of this chapter would coordinate the development of these tactical outreach products and activities. Short of the creation of the DNPO, it is recommended that either the FRPCC review these recommendations, and if found to have merit, create subcommittees or "task" committee member agencies to accomplish these assignments, or individual agencies like DOE or FEMA should take on the development of these recommendations on their own. Since precise ownership of the following recommendations is difficult to proscribe, the term "federal government" is used throughout this section to denote general responsibility.

1. Publish a Guidebook for Emergency Managers on Responding to an RDD/IND Attack

When asked to identify the form that RDD/IND preparedness and response information should be presented, emergency managers rated "brief guidebooks" as their first choice. Given this, and the overwhelming desire by emergency managers to receive information on the "big-picture" components of a post-RDD/IND attack response, the federal government should work to produce a concise guidebook on *Responding to a Nuclear or Radiological Terror Attack* geared specifically towards the emergency manager.

To again meet the desires of emergency managers, the guidebook should be non-technical in nature and touch-upon each of the discrete components of an RDD/IND response (see Chapter IV, Tables 7 and 10, respectively). Based on the findings of this research, particular attention should be paid to the following:

- Protective action decision-making – Highlight the conditions under which sheltering-in-place and the evacuation of citizens is most appropriate.

- Plume predictive modeling – Provide an overview of the procedures for requesting plume models from the Interagency Modeling and Atmospheric Assessment Center (IMAAC) within DHS, and information on how these models are to be interpreted.
- Public information messages – Provide some best-practice examples of public alert messages used by communities for radiological emergencies (see Section B-5 of this chapter on risk communication guidance).
- Types and functions of the various federal civilian and DoD radiological response teams – Provide a comprehensive listing of all federal radiological response teams and assets to include the number of personnel, equipment, and time on scene once notified.
- Unified Command – Provide examples of a nuclear/radiological disaster incident command structure that integrates local, state, and federal field responders and management staff (see Section A-4 of this chapter).

2. Provide RDD/IND Emergency Operations Planning Assistance

Almost a quarter of the communities that participated in this research have neither a radiological response incident annex as part of their Emergency Operations Plans (EOP) or a stand-alone radiological response plan. Of the remaining communities that do have a radiological response plan, there is currently no way to address their efficacy. Therefore, the following radiological emergency response planning assistance should be pursued:

a. Develop Radiological Disaster Emergency Planning Guidance

The federal government should develop planning guidance for local communities on radiological emergency response operations. Such a planning guidance document already exists for REP communities, and could easily be modified from its present fixed-nuclear facility orientation to an RDD/IND terrorist point of reference. Such a model planning document would meet the intent of the recently released "Nationwide Plan Review, Phase 2 Report" which charges the federal government to "provide the leadership, doctrine, policies, guidance, standards and resources to build a shared national homeland security planning system."[85]

[85] Department of Homeland Security, Nationwide Plan Review, Phase 2 Report. June 16, 2006. xi.

b. Conduct Radiological Response Plan Reviews

The federal government in cooperation with state emergency management offices and state health and/or environmental offices should conduct a comprehensive review of the emergency radiological response plans of each Urban Area Security Initiative (UASI) regions in the United States. Although DHS just completed a Nationwide Plan Review of the EOPs of all fifty states and the UASI cities, that Review focused primarily on evacuation planning and other functional annexes to state and local EOPs, but did not involve reviews of incident annexes like radiological response plans.[86] This review of UASI radiological response plans should be conducted by joint-teams comprised of experts in the various fields of radiological emergency response. Aside from DOE FRMAC officials, Radiological Emergency Preparedness (REP) program staff at the local, state, and federal level as well as REP contractors should also be part of these teams. Many of these staff and contractors have extensive experience in preparing and reviewing radiological response plans for communities surrounding fixed nuclear power facilities and could provide tremendous insight in the review of UASI radiological response plans.

c. Provide Planning Technical Assistance

Communities that are found to have deficient radiological emergency response plans as part of the aforementioned plan review should be afforded the opportunity to receive technical planning assistance from the federal government. The federal government should make available the services of a cadre of radiological planning experts to provide technical assistance, at no-charge, to local communities that are building their own radiological response incident annexes and plans. Recently the DHS Science and Technology (S&T) Directorate has begun a pilot initiative called Radiological Community Preparedness Resource (RadCPR) that appears to meet this need. The purpose of the RadCPR initiative is to work with select communities over an intensive six to eight-month period to help them build radiological response plans and

[86] Department of Homeland Security, Nationwide Plan Review, Phase 2 Report. June 16, 2006. xi.

playbooks and identify equipment needs.[87] This initiative is being piloted in Portland, Oregon, in early 2007. The program should be evaluated and if successful, it should be institutionalized and expanded to other UASI communities.

3. Conduct Regional RDD/IND Briefings and Table-Top Exercises

Based on the desires of emergency management directors for full-day briefings and their disappointment in not interacting more frequently with federal officials (Chapter IV, Tables 11 and 12, respectively), the federal government should develop a one-day briefing on RDD/IND response operations specifically for emergency managers in America's largest urban areas. Ideally, the radiological response guidebook and/or planning guidance recommended above would be developed first, thus enabling these one-day briefings to be based on the information found in these documents.

In addition, since two-thirds of emergency managers have not participated in a radiological response exercise in the past five years, and since most emergency managers would welcome a Table-Top Exercise (TTX) as a means of receiving information on RDD/IND response operations (Chapter IV, Table 11), FEMA and DOE should co-develop a brief TTX on large-scale radiological response operations geared towards the local emergency manager. Again, this TTX should be of limited duration (perhaps no longer than one-day) and focus on the decisions and actions that emergency managers would need to take in the first critical hours and days following an RDD/IND attack. To be efficient, these TTXs could occur the day after the aforementioned full-day briefing on RDD/IND response operations. This would allow emergency managers to hear the "school-book solution" prior to delving into the table-top discussion the following day.

4. Develop an RDD/IND Response Training Course for the Emergency Management Official

As shown in Chapter IV, Table 10, the number one priority for emergency managers is to receive information on the "big-picture" of RDD/IND response operations. However, as discussed in Chapter I, Section D, the training courses currently

[87] Brooke Buddemeier, "Radiological Community Preparedness Resource (RadCPR)." Power-point presentation, Department of Homeland Security Science and Technology Directorate. September 1, 2006.

offered by the federal government for emergency managers are predominately general WMD courses dealing with incident command issues or other command-and-control type topics. The few courses that are geared specifically to radiological response operations only address a few discreet components like the treatment of contaminated individuals or radiological monitoring. A single course that addresses all of the elements of a large-scale radiological response operation that an emergency manager would have to coordinate simply does not exist.

Therefore, to close this gap between the current state of radiological training courses for emergency managers and the type of training courses that emergency managers actually want, FEMA in cooperation with DOE, EPA, HHS and others should develop a comprehensive course on large-scale radiological response operations targeted at emergency management officials. This course would provide an overview of all the components of an RDD/IND response that an emergency management official would either have to directly lead or tangentially coordinate to include: developing Protective Action Recommendations (PARs); crafting public information messages; ensuring first responder safety; establishing victim reception centers; integrating with the numerous federal radiological response teams; understanding the health and biological effects of radiation; understanding basic radiation terms and measurements; managing decontamination operations; requesting and analyzing plume predictive models; providing resources for the medical treatment of contaminated victims; overseeing radiological survey and monitoring operations; understanding the various types of dosimetry and survey equipment; and developing agricultural advisories.

To appeal more readily to emergency managers, this course should be offered by federal training institutions familiar to the emergency management community like the Emergency Management Institute (EMI) in Emmitsburg, Maryland, or the Center for Domestic Preparedness (CDP) in Anniston, Alabama.

5. Develop a Nuclear and Radiological Disaster Risk Communications Guidance Document

a. The Challenge of Fear

One of the most difficult challenges that emergency management officials will face in the aftermath of an RDD or IND attack is controlling public fear. Unlike a natural disaster or even a terrorist attack with conventional explosives, an RDD or IND attack would add the insidious threat of ionizing radiation. Even long after the event those that think that they might have been exposed to radiation will experience terrible anxiety and feelings of a lack of control.[88]

People fear ionization radiation because it cannot be seen or felt. In a recent public poll 41% of Americans believe it is unsafe to be exposed to even tiny amounts of radiation like one might receive during a dental x-ray; and 39% believe that radiation cannot be detected or easily monitored.[89] In short, "because it is such an unknown, radiation stimulates worst-case fantasies" in the minds of many citizens.[90] These statistics do not bode well for an emergency management community whose goal will be to calm public fears following an RDD or IND attack.[91]

Despite these challenges, research from many prior large-scale disasters indicate that "in times of disaster, panic may be 'iatrogenic'; that is the actions of emergency managers may determine the extent and duration of panic, the extent that it exists."[92] If the goal then is to reduce public fear and panic in the immediate aftermath of

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[88] Department of Homeland Security, Working Group on Radiological Dispersion Device (RDD) Preparedness, Medical Preparedness and Response Sub-Group. May 1, 2003. 33.

[89] Bisconti Research, National USA Public Opinion Survey conducted in 2001 and quoted by Robert Long in a power-point presentation entitled, "Public Acceptance of Nuclear Power: What Can We Do to Get It?" delivered to the Nuclear Energy Institute conference in 2006.

[90] DHS, Working Group on RDD. 33.

[91] Fortunately, emergency managers recognize this challenge. In this research when asked to prioritize the delivery of information that the federal government should provide them on RDD/IND response operations, "Fear Management" was rated 4 out of the 15 presented elements (See, Chapter IV, Table 10).

[92] Thomas A. Glass and Monica Schoch-Spana, "Bioterrorism and the People: How to Vaccinate a City against Panic." Clinical Infectious Disease. (Washington D.C.: Infectious Disease Society of America, 2002). 218.

an RDD/IND attack, and emergency managers can make a difference in controlling this fear and panic, what should the federal government do to assist emergency managers with this fear-management mission?

b. Fulfilling an Established Need

Within the past few years there have been a number of reports on radiological and nuclear preparedness that have called on the federal government to create some form of a public communications strategy for the consequences of an RDD or IND attack. For instance, in their 2006 Report entitled *The U.S. and Nuclear Terrorism,* Physicians for Social Responsibility called on DHS to "establish a plan for communicating evacuation and sheltering decisions to the public and educate the public in advance about these (radiological disaster) issues."[93] The Medical Preparedness and Response Sub-Group of the DHS Working Group on RDD Preparedness dedicated several chapters of their 2003 report to ideas for managing the psychological consequences after an RDD/IND event.[94] In 2003, the National Academy of Sciences completed a comprehensive study on various strategies to ameliorate the psychological consequences of terrorism including recommendations for the development of risk communication strategies.[95] Finally, the recently released report by the DHS S&T Directorate on radiological emergency preparedness recommends that "a communications strategy should be built by DHS that provides resources to a variety of government agencies to help them develop a coherent approach and needed tools for communicating with the public and the media" about RDD events.[96]

Despite these recommendations and the fact that emergency managers are highly desirous of information on how to craft public messages following a RDD/IND

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[93] Ira Helfand, Andy Kanter, Michael McCally, Kimberly Robert, Jaya Tiwari, The U.S. and Nuclear Terrorism. (Washington D.C.: Physicians for Social Responsibility, August 2006). 27.

[94] DHS, Working Group on RDD. 33-50.

[95] Adrienne S. Butler, Allison M. Panzer, and Lewis R. Goldfrank, Preparing for the Psychological Consequences of Terrorism: A Public Health Strategy (Washington D.C.: The National Academies Press, 2003). 118.

[96] Department of Homeland Security, Radiological Community Preparedness: Identifying Needs and Resources. (Los Alamos National Laboratory, 2006). 12.

attack,[97] the federal government has only produced rudimentary RDD/IND risk communication information predominately geared towards the general public and mostly found on government agency web sites.[98] Comparatively little information on RDD/IND risk communications has been developed that is focused specifically on the emergency management community or other public officials.[99] One reason for this lack of sophisticated RDD/IND risk communication and fear management strategies and guidance for public officials, despite report-after-report urging its development, could be attributed to the lack of a dedicated office or unit within the federal government to lead and coordinate this effort (one of the fundamental arguments of the first section of this chapter calling for the establishment of a Domestic Nuclear Preparedness Office (DNPO).

However, given the obvious need, as a first-step, the newly created DNPO should pursue the development of a *Nuclear and Radiological Disaster Risk Communications Guidance* document for emergency management, homeland security, and public health officials to assist them in developing both pre- and post-event approaches and tools for communicating with the public and the media following a radiological or nuclear weapons attack.

During a large-scale radiological emergency, communications with the media and public must occur immediately. Messages also need to be consistent, since both the public and the media will be especially conscious of any inconsistencies in the information they receive from public authorities. Therefore it is imperative for the emergency manager to have a suite of pre-crafted message templates that can be quickly modified and broadcasted. Radiological Emergency Preparedness (REP) program

[97] In this research when asked to rank the level of importance of receiving information on 15 different components of a large-scale radiological response, emergency managers from America's largest cities rated "developing public information messages" as their third highest priority (See Chapter IV, Table 10).

[98] Many federal government agencies host radiological emergency response instructions including FEMA at http://www.fema.gov/areyouready/radiological_dispersion_device.shtm, and DHS at http://www.ready.gov/america/radiation.html.

[99] Some information on the topic does exist on the DHS Lessons Learned Information Sharing site, but most is geared towards first responders and incident scene panic reduction not on the larger issues surrounding public fear management. See https://www.llis.dhs.gov/member/secure/DynamicPage.cfm?pageTitle=rdd%20v3.0.

communities which surround commercial nuclear plants have developed a host of pre-scripted messages for the public and the media in the event of a radiological emergency in their respective communities. This information developed by a number of communities and refined over the past decades could serve as a tremendous resource for this Risk Communications Guidance publication. Some of the model or template information that could be included in this document includes: evacuation and route movement instructions; shelter-in-place instructions; information on the health effects of radiation; mass-sheltering locations and actions; monitoring and decontamination locations and procedures; self-administered basic decontamination procedures; agricultural advisories for farmers and gardeners; instructions for schools and other special populations; media briefing materials and tips for effectively utilizing the media at various stages of the response; psychological first aid techniques; and re-entry and return information.

Providing emergency managers with concrete examples of various public messages and media advisories to be used both before and after an RDD/IND event will enable emergency management professionals to craft nuclear/radiological risk communication plans and procedures tailored to the needs of their respective communities. These risk communications plans will aid emergency managers in providing consistent and timely information to the public in the immediate aftermath of an IND or RDD attack thereby engendering public trust, reducing fear, and increasing compliance with protective action instructions. This, in turn, will create an environment conducive to faster individual and community psychological recovery once the crisis has passed.100

[100] Butler et al, Preparing for the Psychological Consequences of Terrorism, 122.

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VII. RECOMMENDATIONS FOR FURTHER RESEARCH

This research could be expanded upon in a variety of ways. First, this research focused narrowly on the nuclear and radiological preparedness and response needs of emergency managers in America's largest cities. While big city emergency managers would shoulder the brunt of coordinating a response to an RDD/IND attack, emergency managers in surrounding suburban and outlying jurisdictions would also play a crucial role in and RDD/IND response through mutual-aid support and/or by directly coordinating actions within their own communities should they be affected by the radioactive plume or be impacted by evacuees and contaminated victims fleeing the urban core. Future researchers may want to examine the knowledge and expectations of emergency managers in suburban UASI areas regarding RDD/IND response operations.

Another potential area of future research might involve conducting actual tests of emergency manager's knowledge of large-scale radiological response operations instead of asking these professionals to self-report on their knowledge as this research did. Having quantifiable data on what emergency managers know (or do not know) regarding large-scale radiological response operations may better aid in the development of radiological preparedness publications and training courses.

This research also focused exclusively on organizational structures and educational outreach actions that the federal government should undertake to help prepare local emergency management officials for their roles in managing the consequences of nuclear and radiological terrorism. Of course, various state agencies and departments play a significant role in preparing both themselves and local communities for radiological disasters. Future studies might want to explore ways that state emergency management offices could improve their radiological preparedness services to other state agencies and local cities and counties.

Another intriguing area of study which this research only rudimentarily addressed is radiological "fear management". Future researchers may want to conduct a more in-depth analysis of pre-event psychological anxiety and post-event trauma as it relates to

radiological disasters, and how this information could assist emergency management, homeland security, and public health officials develop tangible strategies to minimize these negative psychological affects.

Furthermore, studies on the readiness of other critical disciplines to respond effectively to an RDD/IND attack could also be pursued. For example, are medical doctors and nurses at trauma centers and hospitals in America's largest cities adequately equipped or trained to monitor, decontaminate and treat hundreds or thousands of people in the aftermath an RDD/IND attack? What about local public affairs offices? Are they ready to quickly stand-up joint information centers to begin coordinating post-attack messages to the public in concert with their state and federal agency counterparts? What sort of information and training do public affairs officers need to effectively integrate and carry-out their post-radiological terrorism responsibilities? Finally, what about the various critical infrastructure sectors' abilities to respond to a nuclear or radiological disaster? Electric utility crews, water and wastewater management officials, telephone line repair personnel, and many other private or semi-private critical infrastructure workers would be essential to maintaining the crucial services that underpin civil society following an RDD/IND attack. How will these workers respond to an RDD/IND attack? What sort of training do these workers receive from their respective employers on radiological protective actions? Can they be relied upon to perform their essential duties following a nuclear/radiological terrorist attack? If not, what can the emergency management community do to assist critical infrastructure sectors prepare for the consequences of a nuclear or radiological disaster?

VIII. CONCLUSION

Several years ago a panel of national security experts convened as part of the Hart-Rudman Commission rated nuclear terrorism as the single biggest threat to America's physical and future economic security. To combat this threat the federal government established the Domestic Nuclear Detection Office (DNDO) via the promulgation of a Homeland Security Presidential Directive (HSPD) to oversee an impressive joint, inter-agency effort to detect illicit nuclear materials and keep them from entering the United States. However, the federal government has made no provision to establish a similar joint-oversight office to coordinate the consequences of a nuclear or radiological attack should the detection efforts of the DNDO fail. In short, while the *prevention* side of nuclear terrorism, through the DNDO, has a clear mandate, a joint-agency organizational super-structure, and dedicated funding, the *preparedness* side of nuclear terrorism remains devoid of direction, is organizationally fragmented, and financially unacknowledged.

To address this preparedness gap the federal government should pursue a host of strategic organizational remedies chief amongst which is the promulgation of a new Homeland Security Presidential Directive (HSPD) that establishes a Domestic Nuclear Preparedness Office (DNPO) within DHS. Like the DNDO, the DNPO would be a joint, multi-agency office that would bring together all the disparate agencies of the federal government that are currently working on some aspect of radiological and nuclear preparedness. The DNPO would provide leadership, direction, and, moreover, dedicated staff to oversee the creation of a sophisticated nuclear and radiological preparedness planning, training, and exercise regimen for the emergency management, homeland security, and first responder communities of the country. Other organizational solutions to this nuclear preparedness gap should include the creation of a Nuclear/Radiological Preparedness Section within FEMA, the revitalization of the currently existing nuclear power plant-focused Regional Radiological Assistance Committees (RRACs), and the creation of a model Unified Command incident management structure to be used by local, state, and federal responders during an RDD/IND disaster response.

At the tactical level, the federal government, through the DNPO, must work to increase the proficiency level of those charged with managing the response to an RDD/IND attack – principally the local emergency management directors in America's largest cities. With the end of the Cold War and the termination of the federal government's post nuclear-attack Civil Defense programs in the 1980s, much of the knowledge of nuclear/radiological response operations has been lost as a new generation of emergency managers, reared on natural disasters, has taken charge. With the specter of an RDD or IND terrorist attack or rogue-nation nuclear weapons strike increasingly plausible, it is time for the federal government to once again invest the resources to make emergency managers proficient in radiological response operations. This should not be a tough sell. As this research has highlighted, emergency managers concede that their knowledge of large-scale radiological response operations is lacking, and they recognize the importance of increasing their skills in this arena.

To accomplish the goal of raising the proficiency level of emergency managers in regards to managing a large-scale radiological response, the newly established DNPO should pursue the development of a suite of RDD/IND preparedness and response outreach products geared specifically towards the emergency manager to include: the development of a concise guidebook; the creation of a series of joint briefings or workshops; the development of a one-day Table-Top Exercise (TTX); the publication of radiological response planning guidance; the establishment of a cadre of experts to provide technical radiological planning assistance; and the development of a comprehensive training course on the many components of large-scale radiological response operations.

In conclusion, the United States is engaged in a global war on terrorism, but despite dire warnings from federal agencies, private think-tanks, and independent commissions about the threat of nuclear and radiological terrorist attacks occurring on American soil, the American federal government has yet to develop a comprehensive, national approach to preparing our cities and states for the consequences of such an attack. Hopefully, the strategic organizational approaches and tactical, field-level outreach recommendations presented in this research can provide the impetus towards

building an integrated, national, nuclear and radiological disaster emergency preparedness system for our country; a system that will not stop a nuclear or radiological weapons attack from occurring, but will help to ameliorate the tremendous loss of life, social panic, and direct and indirect economic impacts caused by such an attack.

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APPENDIX – "OTHER" RESPONSES

Open-ended question from the survey: What assistance do you foresee requiring from the federal government following an RDD/IND event in your community? (N=24)

1. "Primary assistance needed is support of EMPG funding to provide adequately trained emergency management personnel at the local level."
2. "Expert first responders, decon, recovery, financial assistance."
3. "Providing instruction and information to 1st responders on a regular ongoing basis and the same for myself (EM Director)."
4. "Flyover to determine extent of plume, technical assistance in decontamination, medical care, and related issues."
5. "We are lucky in we have a RAP Team on-site, plus lots of expertise. Some technicians have attended NTS training, but most policy folks don't have the time."
6. "Assistance in the form of response and recovery, clean-up, and apprehension of the perpetrator."
7. "Assistance with direction and control and technical assistance."
8. "Technical support."
9. "Monitoring; helping identify 'how clean is clean'; helping with fear management; placing a relative value on the contamination/exposure; financial assistance for victims; funding for clean-up efforts."
10. "Assessment and recommendations on evacuation, long-term ecological impact and long-term public health impact. Operational assistance for quarantine and clean-up of medical support for hospitals."
11. "Realistic planning scenarios/exercises that we can prepare for in our area."
12. "It would depend on the scope of the event. There would likely be a great need for Fed resources, particularly if the event involved our AFB. Resources would be the greatest need."

13. “I don’t fear an RDD/IND problem. Our problem will be an explosive in the downtown area.”
14. “Clean-up, decon, relocation, economic revitalization, etc.”
15. “As per NIMS/SENS models.”
16. “Representation in the EOC and direct communications with local government.”
17. “Tech assistance, response teams, human services, public assistance, medical support, transportation support.”
18. “Monitoring and survey, mass casualty / NDMS, security assistance, sheltering, recovery assistance.”
19. “Significant.”
20. “A Rad/Nuc incident would involve dozens of local, state, and federal agencies. Need help in coordinating all of that into a coherent response. My biggest fear is a massive technical “cluster” among the government “experts” resulting in slow and difficult policy and strategic decision-making processes.”
21. “Recovery.”
22. “Money and man-power.”
23. “Appropriate NRP assistance from local and mainland federal agencies.”
24. “Federal teams will be needed to assist; we will be overwhelmed.”

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