

## IMPROVING NATIONAL-LEVEL GUIDANCE FOR LOCAL RADIOLOGICAL AND NUCLEAR SECURITY PROGRAMS

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### Abstract

Efficient prevention, detection, and management of radiological and nuclear threats requires the formal inclusion of local jurisdictions within a nation-state's nuclear security framework. This tenet is well-established, with many examples of international and national guidance and programs featuring the important role of local jurisdictions in nuclear and radiological security. National guidance and programs in the United States tend to treat local jurisdictions uniformly and thus miss addressing key issues that challenge local programs. A closer examination of 15 local radiological and nuclear security programs in the United States revealed important variations in their policies, procedures, and regulations that affect how these programs execute their security operations. These variations are not addressed in detail in existing national guidance, but represent opportunities for the creation or modification of national guidance that would add significant value to the local programs they seek to assist. The paper discusses these variations and it also recommends an existing homeland security framework—the 32 core capabilities that the U.S. Department of Homeland Security identifies as central to realizing the U.S. National Preparedness Goal—as a possible organizing construct for future research. The framework provides a generalizable means of structuring further investigation to identify a comprehensive set of local variations with important ramifications. The paper further suggests that systematically applying this framework will help guide opportunities for national and international agencies to better support local radiological and nuclear security operations in a more comprehensive yet customized manner through the creation of new, or modification of existing, national guidance.

### 1. INTRODUCTION

Efficient prevention, detection, and management of radiological and nuclear threats requires the formal inclusion of local jurisdictions within a nation-state's radiological and nuclear security framework. This tenet is well-established, with many examples of international and national guidance and programs featuring the important role of local jurisdictions in nuclear and radiological security, such as:

- Proceedings from the Safety of Radiation Sources and Security of Radioactive Materials (a 1998 conference organized by the IAEA, the European Commission, INTERPOL, and the World Customs Organization) address how local jurisdictions, especially local law enforcement agencies, help safeguard radiation sources both inside and outside of regulatory control [1];
- The U.S. Department of Homeland Security (DHS) offers a variety of technical assistance and funding programs that support local jurisdictions' efforts to prevent, detect, and manage nuclear and radiological threats. For example, the Securing the Cities program offers substantial grants to major metropolitan areas determined to be at risk for the deployment of a radiological or nuclear weapon. These grants help build regional capabilities to detect, analyze, and report nuclear and other radioactive materials [2];
- The Japan Atomic Energy Agency's Nuclear Emergency Assistance and Training Centre provides training on nuclear emergency preparedness and response for national and local-level emergency responders and officials [3].

Current national-level guidance in the United States tends to treat local radiological and nuclear security programs uniformly. Quintessential guidance documents include the National Security Staff Interagency Policy Coordination Subcommittee for Preparedness and Response to Radiological and Nuclear Threats' *Planning*

*Guidance for Response to a Nuclear Detonation* [4], the DHS *Key Planning Factors for Recovery from a Radiological Terrorism Incident* [5], and the Environmental Protection Agency's *PAG Manual: Protective Action Guide and Planning Guidance for Radiological Incidents* [6]. These guidance documents provide detailed descriptions of impacts that local jurisdictions can expect from radiological and nuclear attacks, lay out impact zones useful for planning purposes, and offer detailed guidelines about radiation dosages that should require evacuation, worker-safety actions, and long-term housing relocation. Local radiological and nuclear security programs are familiar with these documents and readily incorporate them into local planning efforts; but these documents, like most national-level guidance documents, do not address many key variations among local programs that impact their operations, or they leave out issues of significant concern to local programs altogether.

Secondary screening exemplifies an issue for which differences among the policies and procedures of local jurisdictions are critical to how operations are conducted, but where national-level guidance does not address local variations. In the United States, local jurisdictions typically exercise broad authority to conduct primary screening (i.e., passive screening), which may include, for example, radiation detectors placed in major transportation hubs or law enforcement officers carrying personal radiation detectors during special events. If primary screening indicates an unidentified source of radiation, then secondary screening may be initiated. A government official will approach the person, vehicle, cargo, or conveyance emitting the signal and attempt to collect additional information. Several years ago, during a meeting of a nationwide working group of local radiological and nuclear security program officials, a noteworthy discussion about secondary screening began. During this discussion, it became clear that rules, regulations, and even culture governing how officials conduct secondary screening—how aggressive or intrusive they may or may not become—vary significantly from one local jurisdiction to another. Local laws, ordinances, and even rulings and advice from local legal counsel (e.g., the City Attorney's Office) will impact how secondary screening is conducted. In some cases, this was a serious challenge for local jurisdictions, potentially affecting their security programs, and it appeared that no nationwide guidance addressed this issue in a meaningful way. It was difficult for local officials to share best practices with and learn from one another on this topic, and they had no national guidance to which they could refer their own local leadership. It became clear that this type of local variation mattered, that there are likely more examples of local variations, that additional assistance in these areas could be valuable to local programs, and that nationwide guidance was not addressing them sufficiently or at all.

The current absence of national guidance capable of tailoring to jurisdictional differences is particularly problematic, as well as challenging to resolve, in the United States given the country comprises 56 states and territories, which divide further into cities or counties. Radiological and nuclear security programs may exist at any of these levels of government (in this paper, references to "local programs" or "local jurisdictions" should be interpreted as representing all programs below the national level).

This paper identifies nine variations in policy, procedures, and regulations among local jurisdictions. The paper suggests drivers that led to the development and the persistence of these variations and suggests that national-level guidance be created or modified to help prevent the unnecessary creation of further variations and to better support local programs in topical areas where variations already exist. It acknowledges that such variations are not necessarily detrimental when developed out of deliberate decision-making, but it also suggests that such deliberate decision-making is usually not the cause of the variations. Although based on observations from a limited number of local jurisdictions, the results highlight the benefits of addressing these variations in national guidance and warrant a more comprehensive examination of potential variations. Toward this end, the paper also proposes and discusses the benefits of one possible framework to leverage for this future research.

## 2. APPROACH

Variations were identified from a pool of 15 local jurisdictions. Involvement of the specific jurisdictions was opportunistic; they were not pre-selected based on particular criteria. Even so, the local jurisdictions forming the case study group covered a broad cross section of the United States, including:

- Local programs from all major regions of the country—East Coast, West Coast, Midwest, and the South;
- Densely populated urban areas and jurisdictions with large rural or undeveloped areas;
- Jurisdictions with nascent and mature programs for radiological and nuclear security.

The identification of significant variations across programs occurred primarily through expert observation and judgment, supplemented by open-source research into formalized policies, procedures, regulations to gain a more detailed understanding of the subject matter. Observations occurred over the course of several years, as analysts worked with local preventive radiological and nuclear detection programs, hazardous materials response teams, emergency management programs, bomb teams, public health and environmental protection programs, and other local officials, to support analysis, planning, and capability assessment for local radiological and nuclear security programs. Analysts worked directly with local radiological and nuclear security program members in the 15 jurisdictions referenced throughout this paper, primarily to conduct impact analyses for radiological dispersal device (RDD) and improvised nuclear device (IND) attacks and to understand their capability levels to prepare for, respond to, and recover from such attacks. In all cases, analysts implemented a standardized process. Formal discussions organized around a consistent set of impacts and capability types were facilitated with local subject matter experts.

Through this work, variations in local policy, procedures, and regulations that impact how local radiological and security programs operated—and how they could, or could not, easily coordinate and learn from other local programs—began to emerge. For particularly consequential variations (i.e., those associated with operational challenges and frustrations), analysts attempted to better understand the underlying drivers of these variations and how local stakeholders were working to mature their capabilities in these challenge areas. Over time, as some variations became more predominant, analysts might prompt a jurisdiction to discuss them. All variations identified in this paper were relevant to multiple local programs in this study.

Analysts began to document these variations, organizing them around a construct created by DHS's Federal Emergency Management Agency (FEMA)—namely, the core capabilities. Since core capabilities already provided the foundation for much of the work described above, they presented a logical organizing framework for variations. Section 3.2 describes this construct, and its potential utility for future research, in greater detail.

### 3. RESULTS AND DISCUSSION

In the United States, a close examination of local radiological and nuclear security programs revealed important variations in local policies, procedures, and regulations that affect how these local jurisdictions execute their security operations. These local variations seem to develop in one of two ways:

- Local conditions drive deliberate decision-making regarding a specific local policy, procedure, or regulation;
- A lack of national-level guidance on specific topics leaves local programs no choice but to create select policies, procedures, or regulations entirely on their own.

In some cases, variations across local programs have existed for many years. Commonly-cited national guidance documents still do not acknowledge these variations at all or do not address them at a level of detail sufficient to be valuable to local programs. When varied policies and procedures prevail over consistent ones, they pose challenges to the sharing of best practices and continuous improvement across local programs. This reveals an opportunity for enhanced national-level guidance to provide additional value to local programs in two significant ways:

- Addressing topics of interest to local programs that currently are largely left out of national-level guidance, thereby preventing the development of further unnecessary variations in policy, procedure, or regulation across local jurisdictions;
- Acknowledging and addressing existing variations in local policy, procedures, and regulation, to assist jurisdictions evolve their maturity and capability levels.

It would be useful to more systematically and deliberately research these local variations, develop a more comprehensive accounting of such variations, and then modify national guidance accordingly to support local jurisdictions in their efforts to increase their security postures. DHS has established a number of national guidance documents that might be leveraged to provide a framework for continued research into these local variations. The National Preparedness Goal [7], in particular, introduced the concept of core capabilities in 2011, updated in 2015.

The core capability taxonomy, consisting of 32 discrete elements across the mission areas of prevention, protection, mitigation, response, and recovery for all-hazards, is a likely candidate to facilitate this research process.

Two key outcomes have already emerged from this study. First, a preliminary set of local variations has been developed, none of which are yet comprehensively addressed in any standard national guidance documents, despite the potential value these issues pose to local radiological and nuclear security programs. Second, the core capabilities structure has emerged as a useful framework for further research into this issue.

### 3.1. Local Variations

This section provides a discussion of nine local variations identified through this study. For each variation, a brief description is provided along with specific recommendations for how national-level guidance may be created or enhanced to provide additional value to local jurisdictions, based on direct communications with members of those local programs. In its current form, this list can already serve as a research and action agenda for national and international agencies and organizations that develop radiological and nuclear security guidance, to enhance their current offerings and add more value to local programs.

**Secondary Screening:** As described in the Introduction section of this paper, primary screening is typically considered passive screening, through fixed detectors at sites or portable detectors either set up temporarily or carried by personnel. If primary screening indicates an unidentified source of radiation, then secondary screening may be initiated—typically, a government official will approach the person, vehicle, cargo, or conveyance emitting the signal and attempt to collect additional information. It has become clear through our research, however, that rules, regulations, and even culture governing how officials conduct secondary screening varies significantly from one jurisdiction to another. Local laws, ordinances, and even rulings and advice from local legal counsel (e.g. City Attorney’s Office) will impact how secondary screening is conducted. Sometimes it is required that a sworn law enforcement official is included in all instances of secondary screening; sometimes it is only required to include a sworn law enforcement official if the subject of the secondary screening is uncooperative; other times, operators are given no clear rules at all and specific procedures are up to their discretion. National-level guidance has an opportunity to contribute value to local programs if it comprehensively addresses the various approaches to secondary screening, outlines the implications—both positive and negative—for each approach, and provides case studies of jurisdictions employing various approaches along with their best practices and lessons learned. This way, not only can jurisdictions still developing policies and procedures have additional guidance to assist their efforts, but those who already have policies and procedures in place will have a guide to other jurisdictions with similar conditions from whom they may share experiences and thus continuously improve.

**Escorts When Transporting Radiation Sources:** The U.S. Nuclear Regulatory Commission and the U.S. Department of Transportation are largely responsible for the control of radioactive material transport with shipping rules outlined in Title 49 of the Code of Federal Regulations, parts 100 to 177. States decide on when and how to provide escorts for many types of radioactive materials traveling on their highways, however, and the policies vary. For example, the State of Indiana requires drivers to obtain state High Level Radioactive Waste (HLRW) and Hazardous Route Controlled Quantity (HRCQ) permits to transport radioactive material, but drivers do not require escorts or inspections during transportation (although state police may conduct inspections of vehicles transporting radioactive material, Indiana Code 10-14-8-11). Meanwhile, in the neighbouring State of Illinois, drivers must also obtain state registrations and permits prior to transporting radioactive materials AND the State of Illinois requires escorts and inspections for all shipments of HRCQ radioactive material and transuranic waste [9]. These varying procedures among states challenge the sharing of best practices, especially when states do not know which other states share similar rules and regulations. While it is likely that given the United States federal system of government, leaving decisions about intra-state operations such as the use of escorts for the transportation of radiation sources up to each individual state was deliberate, national-level guidance could benefit local radiological and nuclear security programs by creating a central repository of these types of regulations so that local jurisdictions could readily identify who does and does not share their own procedures, facilitating the sharing of best practices and continuous improvement.

**Mega-Shelters:** When thousands of people are in need of government-provided shelter after a disaster, a very likely scenario in the case of an improvised nuclear device attack, one option in the United States is to open

a single, very large, congregate shelter, or *mega-shelter*. A mega-shelter can be defined by the following criteria: it is activated by local, state, or federal government; it is managed through multi-agency coordination; it is a large, non-conventional sheltering facility such as an arena, convention centre, or stadium; and it provides shelterees with longer-term needs beyond immediate evacuation [9]. The value of mega-shelters was questioned by some after the experiences of those impacted by Hurricane Katrina in 2005. Significantly updated guidance from American Red Cross and International Association of Venue Managers on the establishment and management of mega-shelters has been developed, along with many state plans for running mega-shelters. In just the past few years, Louisiana, North Carolina, and Dallas, Texas, have all used mega-shelters with varying reported degrees of success. Still, some jurisdictions remain unaware of the major improvements that have been made to mega-shelter planning in recent years, or have not considered the concept of mega-shelters in their plans, which is particularly problematic when faced with the need to shelter tens of thousands of people after a nuclear attack. In addition, many publically available mega-shelter plans are geared toward disasters covered under the Stafford Act, with FEMA as the federal agency responsible for coordinating federal assistance to states. Procedures may be different after a radiological or nuclear attack. National-level guidance has an opportunity to fill at least two clear gaps related to mega-shelters: first, it can comprehensively address the specialized needs related to a radiological or nuclear attack not currently included in mega-shelter guidance, and second, it can work to socialize this guidance to local radiological and nuclear security programs on a large-scale so local officials have more guidance about how to potentially shelter tens of thousands of their residents.

**Contaminated Waste / Debris Planning:** While most local programs involved in this study could confirm the establishment and maintenance of a waste or debris management plan, the plans were often geared toward natural disasters, focusing on debris from a hurricane, tornado, or flooding event. Few if any could cite planning specific to debris contaminated by radiation after a radiological or nuclear attack (contamination due to routine medical procedures is an exception). Informal plans to deal with contaminated waste discussed during this study varied from closing off a contaminated site and leaving the waste undisturbed, using a contractor to haul away the waste to a designated site, or acknowledging that if a jurisdiction suffered a radiological or nuclear attack, there is likely not sufficient storage available anywhere to hold the vast amount of contaminated waste that would be produced. Upon rapid survey of 11 debris management plans available publically, plans either make no mention of radiologically contaminated debris or they include brief, high-level references with no real operational plan or guidelines. National-level guidance has an opportunity to fill at least two clear gaps related to those described in the mega-shelter section above. First, specific guidance regarding how to manage radiologically contaminated waste could be of value to local programs, and second, authors should aggressively socialize the availability of this guidance so that local programs know the resource exists.

**Situational Assessment and Monitoring Support:** Most local jurisdictions have access to, and capability to run, radiological or nuclear modelling to support situational awareness and monitoring after a radiological or nuclear event. Still, especially in the case of an attack, all programs in our study voiced that they would welcome additional assistance for more granular and ongoing monitoring. There are many resources available to support this need, but two are particularly predominant. A Weapons of Mass Destruction (WMD) Civil Support Team (CST) is a group of highly trained National Guard members focused on chemical, biological, radiological, nuclear, or explosive (CBRNE) threats. They support local authorities with the identification of CBRNE agents, assessments of the scene and its current and future consequences, and other response activities [10]. There are 57 CSTs located throughout the country, covering all states and territories. Some local programs have very close relationships with their CST representatives, coordinating and planning together regularly, while others are less familiar with this resource. The Federal Radiological Monitoring and Assessment Center (FRMAC) is a federal asset maintained by the Department of Energy and comprised of specialists from all levels of government. It exists to support local governments with verified radiation measurements, interpretations of radiation distribution based on authoritative protective action guidelines, and understandings of overall radiological conditions [11]. Similar to CSTs, some local programs are very familiar with, and know how to access the support of, FRMAC, while others are much less aware of this resource. National-level guidance could benefit local programs by making the existence of, value of, and procedures to work with, these two resources much more clear, predominant, and specific.

**Pet Decontamination:** As the need to care for pets and pets' needs during disasters becomes a more predominant topic in the United States, the issue of pet decontamination after a radiological or nuclear event is also emerging. Plans and operations for pet decontamination vary widely across different jurisdictions. Some

provide public information about how pet owners can decontaminate their pets, some plans have defined procedures for handling decontamination of pets, and others suggest that pets are unlikely to be permitted into decontamination areas, especially when people are waiting to be decontaminated. While some national-level guidance does provide specific information regarding the care for livestock, there is an opportunity to build out guidance for pet safety after a radiological or nuclear attack and specifically, decontamination procedures.

**Other Variations:** Many jurisdictions, especially larger states or urban areas, participate in preparedness measures such as training or exercises, to help prepare for radiological or nuclear attacks. There is varied thinking at the local level about whether *deterrence messaging*--disseminating public information about preparedness measures local governments are taking for radiological and nuclear attacks, in order to deter attacks—is valuable. All programs in our study were supportive of providing public information to their residents about the preparedness measures they take. Some believe in the impact such public messaging has on deterrence while others are sceptical; this variation in thought certainly has an impact on the design method behind the messaging. National-level guidance has an opportunity to treat this topic directly; it appears that local programs would benefit not only from guidance of how to design deterrence messaging, but also from data that suggests deterrence messaging is in fact effective. The *role of volunteer groups*, such as Community Emergency Response Teams (CERT), Volunteer Organizations Active in Disasters (VOAD)-sponsored groups, and faith-based groups, are incorporated into radiological and nuclear security management in varying ways across local programs. While all of these groups may be very active in natural disasters, some jurisdictions hesitate to include them in disasters that involve radiation and possible contamination, while others assert that there are numerous roles for such volunteer groups far away from hazardous areas, such as assisting the dissemination of information or working at shelters outside of the impact zone. There already exists significant national-level guidance regarding the management and role of many of these volunteer groups; an opportunity for enhancement of this guidance is to specifically address these groups' potential roles in radiological and nuclear incidents. Finally, a newer topic that is emerging more frequently is the use of *drones and counter-drone technology* in the prevention and protection against, as well as response to, a nuclear or radiological attack. Different local jurisdictions are at very varying levels of maturity with regard to this knowledge and capability, and either way, little national level guidance exists to support related planning.

### 3.2. Core Capability Framework

Our initial research underscores how nationwide variability across local jurisdictions in the United States affects the effectiveness of existing national guidance and programs. We recommend applying a framework to comprehensively identify additional areas of variation. As described in the Introduction section of this paper, the National Preparedness Goal introduced the core capability structure. This was a useful framework for preliminary documentation and organization of the data on variations in local programs as it emerged, and is likely to prove useful to support broader research efforts for the following reasons:

- It covers the full range of incident management activities that relates to radiological or nuclear attacks;
- Many stakeholders involved in any type of homeland security efforts, including radiological and nuclear security, are familiar with this taxonomy;
- Existing initiatives in the United States such as the Threat and Hazard Identification and Risk Assessment and the Stakeholder Preparedness Review [12] have proven that it is reasonable to structure detailed discussions with public safety officials about local incident management issues around the core capability framework, and identify concrete, actionable outputs for each.

The current core capability framework is depicted in Table 1. Each column represents a different mission area covering the full range of incident management activities; the three core capabilities at the top of the table—Planning, Public Information and Warning, and Operational Coordination—are considered common to all mission areas and thus relevant across the entire cycle of incident management.

Table 1. The 32 Core Capabilities, as established by the DHS National Preparedness Goal, 2nd edition, 2015

Prevention		Protection	Mitigation	Response	Recovery	
Planning						
Public Information and Warning						
Operational Coordination						
Intelligence and Information Sharing		Access Control and Identify Verification; Cybersecurity; Physical Protective Measures; Risk Management for Protection Programs and Activities; Supply Chain Integrity and Security	Community Resilience; Long-term Vulnerability Reduction; Risk and Disaster Resilience Assessment; Threats and Hazards Identification	Infrastructure Systems		
Interdiction and Disruption				Forensics and Attribution	Critical Transportation; Environmental Response / Health and Safety; Fatality Management Services; Fire Management and Suppression; Logistics and Supply Chain Management; Mass Care Services; Mass Search and Rescue Operations; On-scene Security, Protection, and Law Enforcement; Operational Communications; Public Health, Healthcare, and Emergency Medical Services; Situational Assessment	Economic Recovery; Health and Social Services; Housing; Natural and Cultural Resources
Screening, Search, and Detection						

Table 2 lists the variations identified above, each mapped to a core capability. Because the core capabilities are meant to be comprehensive of the entire incident management cycle of activities, future research could be conducted by working through each core capability, reviewing publically available documentation, and communicating directly with local stakeholders to identify how local radiological and nuclear security programs do or do not deal with each core capability, from where they receive input or guidance for their activities related to each core capability, and what challenges they face in the design or execution of these activities. Research should be updated at regular intervals as emerging threats and emerging technologies are very relevant to this field, evidenced by the recent increase in attention to drones and especially counter-drone technology.

Table 2. Identified Variations Across Local Programs

No.	Issue	Core Capability
1	Secondary Screening	Screening, Search, and Detection
2	Escorts When Transporting Radiation Sources	Supply Chain Integrity and Security
3	Mega-Shelters	Mass Care Services
4	Contaminated Waste/Debris planning	Environmental Response / Health and Safety
5	Situational Assessment and Monitoring Support (CST, FRMAC)	Situational Assessment
6	Pet Decontamination	Public Health, Healthcare, and Emergency Medical Services
7	Deterrence Messaging	Public Information and Warning
8	Role of Volunteer Groups	Community Resilience
9	Drone and Counter-drone Technology	Interdiction and Disruption;

	On-scene Security, Protection, and Law Enforcement
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#### 4. CONCLUSIONS

Although based on observations made in the United States, our findings likely apply to other nation-states as well. While the specific variations across local jurisdictions may differ in other nation-states, certainly variations do exist that impact the operations of local radiological and nuclear security programs worldwide. And it is possible that some of these variations are consistent internationally. Moreover, we assert that the core capability framework provides a generalizable means of structuring facilitated discussions and further research to identify variations with important ramifications in any nation-state. Ultimately, we believe that systematically applying this framework will help guide opportunities for national and international agencies to better support radiological and nuclear security operations in a more comprehensive yet customized manner. In sum, we recommend the following next steps:

- (a) Conduct expanded, deliberate, and systematic research into variations among local jurisdictions' nuclear and radiological security operations using the core capability framework;
- (b) Expand research outside of the United States;
- (c) Update national guidance and programs and/or create additional guidance, accordingly.

All nation-states should be sure to make as much of their guidance publically available as possible to facilitate the sharing of best practices and continuous improvement of local radiological and nuclear security programs world-wide.

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