



DENVER
THE MILE HIGH CITY



Operations Plan

Denver Securing the Cities Program

Version 1.0
October 2022





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SECTION 1: INTRODUCTION

1.1 OVERVIEW

The Denver STC Operations Plan details the operational framework that the Denver Securing the Cities (STC) Partner Agencies adopted for response to a radiological or nuclear (R/N) threat to the City and County of Denver. In November 2021 the Plan was reviewed and adopted by the Denver STC Executive Committee. This plan is a dynamic document and will continue to be updated yearly to accurately reflect the most current information. The information contained in this document is not intended to supersede partner agency policies.

1.2 SECURING THE CITIES (STC) PROGRAM

The Department of Homeland Security (DHS) STC Cooperative Agreement was created to enhance the nation-wide capability to detect and prevent terrorist attacks and other high consequence events utilizing RN materials that pose a threat to homeland security in high-risk urban areas. The STC Program seeks to reduce the probability of a successful RN terrorist weapon deployment against a major metropolitan area. Capability in this sense is defined as trained and equipped personnel, proficient in the use of RN detection equipment and guided by detection and response protocols. The STC Program supports the “Prevent Terrorism and Enhance Security” Mission Area as specified in the 2014 Quadrennial Homeland Security Review and is a prevention program as defined in Presidential Program Directive 8. The DHS Countering Weapons of Mass Destruction (CWMD) Office is the overarching federal office responsible for the oversight of the STC Program and is responsible for implementing domestic RN detection efforts. Under the STC Program, CWMD leads DHS efforts and coordinates with domestic and international partners to safeguard the United State against CBRNE and health security threats. CWMD’s role is to help ensure federal, state, and local partners have the equipment, training, and knowledge they need to protect their communities and the nation.

1.3 DENVER STC

In 2020, DHS awarded grant funding to expand the STC Program to include the region surrounding the City and County of Denver. The DHS CWMD Office initiated the Denver STC Program with the Denver Office of Emergency Management (OEM), in initial partnership with other principal partners: Denver Fire Department, Denver Police Department, Colorado State Patrol, Denver Health, and the Denver Department of Public Health and Environment. The Program’s initial focus is on principal partner agencies and building capability by 1) identifying participant roles and responsibilities; 2) assessing current capabilities; and 3) identifying gaps in the operational capability within this scope. In subsequent years, the program will continue to build on, expand, and sustain the capabilities created during program implementation as well as focus on expanding the program operations to include other regional agencies.

1.3.1 DENVER STC GOALS

The goals of the Denver STC Program are the intended overarching outcomes for City and County of Denver as they are related to RN threats. The activities carried out by the Denver STC Program Office

and its stakeholder partners will support each of the following goals:

- 1) Enhance the region's capabilities to detect, identify, and interdict radiological and nuclear materials that are out of regulatory control.
- 2) Achieve a unified approach to defense by coordinating, communicating, and building partnerships among Principal Agencies to fully integrate Denver's Operations Plan(s) for RN detection.
- 3) Create a sustainable program that equips partners with the equipment, training, and information necessary to prevent a radiological or nuclear attack in Denver.

1.3.2 DENVER STC OBJECTIVES

To achieve the Denver STC objectives, measurable steps to carry out the mission for program success are as follows:

- **Objective 1:** Governance: Establish and maintain the Denver STC Program governance and administrative infrastructure to facilitate a stakeholder-driven approach that meets the needs of all Principal Partners and fulfills the Denver STC Program mission.
- **Objective 2:** Operations: With concurrence from all Principal Partners, establish and implement a Denver concept of operations that defines coordination and associated mechanisms between all Denver STC Program entities.
- **Objective 3:** Information Exchange: Establish information connectivity through development and integration of the Information Exchange Plan, which outlines the intended methodology, protocols, and procedures for information exchange, in addition to ensuring connectivity among deployed detection systems and for technical reach back and adjudication support.
- **Objective 4:** Equipment: Ensure identified responders have the functioning equipment they need, when then need it, in accordance with agreed upon Denver STC concept of operations.
- **Objective 5: Training:** Develop an Integrated Preparedness Plan to ensure Denver STC Principal Partners and relevant responders are proficient in utilizing equipment, tools, and operational protocols to help prevent a RN event. These objectives may be refined or enhanced as the Denver STC Program progresses and expands further into the region for threat detection and mitigation.

1.4 MISSION AND SCOPE

1.4.1 MISSION

The mission of the Denver STC Program is to establish capability and sustainable infrastructure among its principal partners to detect, analyze, and report on any RN materials out of regulatory control with the affected jurisdictions and thereby reduce the risk of a deployment of RN weapon or attack against the metropolitan area. This mission will include equipping and training the necessary and appropriate number of personnel from all partner agencies and future jurisdictions on the proficient use of Preventative Radiological and Nuclear Detection (PRND) equipment, which will be guided by coordinated and established detection, response, and notification protocols.

The intended audience for this Plan includes governmental and emergency response representatives from the STC Executive Board, the state and federal emergency response representatives, the Department of Homeland Security Office of CWMD and future expansion agencies.

1.4.2 SCOPE

Denver STC has identified an initial six (6) principal jurisdictional partners to be involved in the development of the Denver STC policy, operations, training and exercise, equipment, and information sharing procedures and protocols.

- Denver Office of Emergency Management (OEM)
- Colorado State Patrol (CSP)
- Denver Police Department (DPD)
- Denver Fire Department (DFD)
- Denver Department of Public Health and Environment (DDPHE)
- Denver Health Paramedic Division (DHPD)

Denver OEM has been established as the Lead Agency and Administrator of the Denver STC Program. The Program Management Office will coordinate all planning, training, exercising, and equipment deployment. As the Program’s capabilities develop and expand within the region, other participating partners may be added.

Refer to the following for additional information about the Denver STC Program:

- Denver STC Strategic Plan
- Denver STC Implementation Plan
- Denver STC Equipment Plan
- Denver STC Multi-Year Training and Exercise Plan (MYTEP, phasing into an IPP for FY22)

1.5 AUTHORITIES AND REFERENCES

The [CWMD Act of 2018 \(H.R. 7213/P.L. 115-387\)](#), [Presidential Policy Directive 8 \(PPD-8\)](#), DHS CWMD Strategic Plan of 2019, and the STC Program Management Plan guide the establishment and implementation of the STC Program. DHS designed the STC Program to be part of the interior layer of the Global Nuclear Detection Architecture. Denver is one of eight cities in the FY19/20 cohort, joining the five legacy cities participating in the Program to protect the nation.

The Denver STC Operations Plan does not supersede existing mandates, authorities, plans, polices, or procedures of partner agencies. The following codes, regulations, and authorities provide statutory foundations to the plan:

- **Denver Department of Public Health and Environment (DDPHE):** Under City Charter § 2.12.1, DDPHE is empowered and obligated to “administer and exercise control over all programs and functions pertaining to the physical and mental health of the people.” DDPHE has authority to create programs that address activities affecting human health, including health nuisances as described by chapter 37 of the D.R.M.C.
- **Denver Police Department (DPD):** According to City Charter § 2.6.5(B), DPD must “at all times diligently and faithfully enforce all such laws, ordinances and regulations for the preservation of good order and the public welfare.” Under D.R.M.C. § 37-4, DPD must observe for and report to DDPHE any health nuisance found in the City
- **Denver Fire Department (DFD):** Under City Charter § 2.6.6, the Manager of Safety may direct DFD to provide emergency services to protect the City against non-fire hazards
- **Denver Health and Hospital Authority (DHHA):** Pursuant to City Charter § 24-121, the City may authorize a delegation of DDPHE’s powers and functions to the DHHA.

- **Colorado State Patrol (CSP):** Pursuant to C.R.S. §42-20-108, §42-20-403, §42-20-504, and §42-20-508, CSP may promulgate rules and regulations for the permitting, routing, and safe transportation of hazardous and nuclear materials by motor vehicle within Colorado.
- **Office of Emergency Management (OEM):** Under D.R.M.C. § 16-13, OEM is charged with coordinating the activities of municipal and private agencies that respond to disasters and major emergencies endangering the public welfare. OEM must also provide and sponsor training for City personnel and employees of private logistic support groups.

Law Enforcement Interdiction

Currently no Federal or State code or case law exists specific to the use of preventative RN detection for conducting general law enforcement stops and detentions. Legal authority to conduct field interviews is granted in the Colorado Revised Statutes, which provides:

- [§16-3-103 Stopping of Suspect](#) - A peace officer may stop any person whom they reasonably suspects are committing, has committed or is about to commit a crime and may require them to give their name and address, identification if available, and an explanation of their actions. The stopping shall not constitute an arrest. A peace officer shall not require any person to produce or divulge such person's social security number.
- When a peace officer has stopped a person for questioning pursuant to this section and reasonably suspects that the person is armed and dangerous, the officer may conduct a pat-down search of that person for weapons. In determining whether a person presents such a danger as to require a pat-down search, an officer may consider all of the relevant factors including but not limited to; the person's behavior, prior knowledge that the person is known to carry weapons, the type of crime that is reasonably suspected, number of suspects or other people present, the time of day, the number of officers present, and any other information that supports the officer's conclusion that the person is armed and poses a danger to the officer or others.
- Officers should note that pat-down searches for weapons may be conducted at any time upon the consent given by the person subject to the pat-down search.
- [§16-3-102 \(1\)\(b\) and \(c\)](#) - A peace officer may arrest a person when any crime has been or is being committed in the officer's presence or the officer has probable cause to believe that an offense was committed, and that this person committed the offense.

The action taken based on reasonable suspicion and probable cause, as related to preventative RN detection alarms, is determined on an agency/jurisdictional and possibly per mission/activity basis. When the operator receives a PRND alarm, the action taken by the law enforcement officer, if any, must be based on specific reasonable inferences, drawn from the facts, considering their experience and the totality of the circumstances for establishing reasonable suspicion and/or probable cause for making a stop as well as their agency policy/procedure.

Regulation of Nuclear Material in Colorado

Numerous state and federal codes apply to the transport and possession of radiological/nuclear materials.

The Colorado Department of Public Health and Environment (CDPHE), having delegated authority from the Nuclear Regulatory Commission (NRC), regulates radioactive materials and radiation generating equipment in Colorado per the [Colorado Radiation Control Act \(RCA\)](#), C.R.S. Title 25, Art. 11.

In satisfaction of this statute, the CDPHE operates a Radiation Control Program and enforces a body

of regulations codified in 6 CCR 1007-1 parts 1 through 24. The Radiation Control Program enforces these regulations through registration, licensing, inspections, oversight of training programs and credentialing, and emergency response. Key aspects of the program are licensing the possession and use of radioactive materials (RAM) and radiation generating equipment, and regular, typically annual, registration, re-registration or surveillance of sources, facilities, and operators.

The Denver Department of Public Health and Environment (DDPHE) is the local Health Department for the City and County of Denver a Home Rule subdivision of the state. The DDPHE is created under and takes its authority from the Charter of the City and County of Denver, Article XX. Subtitle A. Part 12 of the Colorado Constitution. Powers and duties of the executive officer and their designees, and regulations of the health department are codified in the Denver Revised Municipal Code, or DRMC, principally in Chapters 4, 24, and 37. Among these powers and duties are the powers and duties to carry-out and enforce the laws of the state, to inspect and regulate public and private properties according to various health protection programs, prohibit the unlawful disposal of waste, and act to protect public health and the environment from immediate threats to air, water and property.

Agents or employees of the CDPHE charged with inspection, investigation and enforcement of the law have police powers to enter onto properties and take control of materials that present an immediate threat to persons, public health, or the environment. And where access to property is denied, or no individual is present to allow entry, agents of the department may obtain orders from a local judicial authority to conduct such actions.

Similar powers of the police are granted by the Charter and the DRMC to the executive officer of the DDPHE and the inspectors, investigators and staff working on their behalf to enforce regulations within the corporate limits of the City and County of Denver.

Hazardous Materials Authorities

All the entities participating as Partner Agencies were organized and exist pursuant to the laws of the State of Colorado. The responsibility for hazardous materials emergencies is federally mandated to the individual states. [C.R.S. §29-22-101](#) and the incorporated federal statutes define RN materials as hazardous and may subsequently designate special authority over any related incidents which presents an immediate or irreparable threat or harm to the environment or the health and safety of any non-response personnel.

Pursuant to C.R.S. Title 29. [Government Local § 29-22-102](#), the State of Colorado requires that local governments designate a local emergency response authority. The Colorado State Patrol (CSP) is the Designated Emergency Response Authority (DERA) on any federal, state, or county highway located outside of municipal city limits CRS. The City and County of Denver has assumed the municipal fire response agency (Denver Fire Department) as the DERA for Hazardous Substance Incidents, pursuant to Sections [29-22-102 \(3\)\(b\)](#) of the Colorado Revised Statutes for all unincorporated area.

Per [C.R.S. §25-11-107](#). Prohibited acts, violations, penalties, rules, cease-and-desist orders:

Except as allowed by rule of the state board:

No person shall acquire, own, possess, or use any radioactive material occurring naturally or produced artificially without having been granted a license from a department; or

Transfer to another or dispose of such material without first having

been granted approval of the department therefor.

Except as allowed by rule of the state board, no person shall knowingly use, manufacture, produce, transport, transfer, receive, send, acquire, own, or possess any source of radiation unless such person is licensed by or registered with the department. The exceptions promulgated by the state board shall include use of domestic television receivers, computer monitors, household microwave ovens, radiant heat devices, cellular telephones, incandescent gas mantles, and vacuum tubes.

Enforcement of [C.R.S. §25-11-107](#) should be coordinated with the Colorado Department of Public Health and Environment and Denver Department of Public Health and Environment.

Additional Federal and State Code and statutes are provided in [Section 7: Laws, Authorities, and Supporting References](#).

1.6 PRINCIPAL PARTNER AGENCIES

The Denver STC Principal Partners were selected by the Denver Office of Emergency Management, in collaboration with the DHS Countering Weapons of Mass Destruction Office, has identified six principal jurisdictional partners as initial stakeholders, based on their authorities, responsibilities, and expertise to carry out the primary goals and objectives of the STC program to detect, respond to, and mitigate against RN materials intended for nefarious use prior to deployment or movement within the City and County of Denver:

- Denver Office of Emergency Management
- Colorado State Patrol
- Denver Police Department
- Denver Fire Department
- City and County of Denver Department of Public Health and Environment
- Denver Health Paramedic Division

Each of the Principal Partners agreed through memoranda of understanding (MOUs) to a coordinated approach with actions and operations in support of the mission of the STC Program and to improve the efficiency of response and capabilities of the region.

1.6.1 DENVER OFFICE OF EMERGENCY MANAGEMENT

The Denver STC Lead Agency, Denver OEM, is responsible for monitoring and coordinating the City's response during large events, emergencies, or disasters which require a coordinated, multi-agency response. OEM is responsible for activating and managing the City's Emergency Operations Center and Joint Information Center. Both the EOC and the JIC provide unified coordination, information dissemination, mutual aid and coordination with State and Federal partners, and establish unified strategic objectives and goals. OEM authority is granted under Municipal Code.

1.6.2 COLORADO STATE PATROL

CSP has law enforcement responsibility for the State's public roadway system and holds law

enforcement jurisdiction throughout the entire State of Colorado. Its authority is established under the Colorado Revised Statutes.

As a Principal Partner of the Denver STC Program, CSP is capable of conducting primary and secondary screening operations to identify and adjudicate a potential RN threat on public roadways and in other locations under their jurisdiction throughout the State of Colorado; establishing scene security and threat isolation in response to HAZMAT and RN incidents; and evidence collection detentions, and arrests in support of criminal investigations outside the City and County of Denver throughout the state, as required.

1.6.3 DENVER POLICE DEPARTMENT

The Denver Police Department (DPD) is the largest municipal police department in the state with over 1,422 fulltime sworn officers and civilians. DPD's mission is to protect the lives and property of the people within the City and County of Denver and maintain order. Additionally, DPD maintains aerial assets capable of assisting in potential RN operations, and several other specialized units to respond to high-risk criminal incidents that involve, but are not limited to CBRNE and WMD, active threats, and other terrorism-related situations.

Denver Police is the primary law enforcement agency of the City and County of Denver, and its authority is established in accordance with Municipal Code. As a Principal Partner of the Denver STC Program, DPD can conduct primary and secondary screening operations to identify and adjudicate a potential RN threat; establishing scene security, threat isolation, and support to DFD in response to HAZMAT and RN incidents; and evidence collection detentions, and arrests in support of criminal investigations.

1.6.4 DENVER FIRE DEPARTMENT

The Denver Fire Department (DFD) is the primary mitigation agency for the City and County of Denver and the largest municipal fire department in the state employing over 1050 paid fire and emergency medical services (EMS) members, servicing almost 3 million residents and commuters, with over 31 million visitors per year.

Denver Fire operates engine companies, truck companies, a decontamination trailer, and heavy rescue, dive, collapse, and hazardous materials teams. Most of the city's fire stations are suppression stations, with dedicated units at Denver International Airport (DEN). Each engine and truck company responds with four personnel. Ambulance service is provided by the city health department.

Through its operational teams, DFD provides fire and basic life support (BLS) first response; specifically, structural fire suppression; specialized rescue; fire prevention and investigation; HAZMAT response; aerial and ground radiological detection surveys; public education outreach; and airport and maritime firefighting and rescue.

Denver Fire services are expanded to include special event planning, extreme weather response, and terrorism preparedness, response, and recovery. DFD can conduct primary and secondary screening operations to identify and adjudicate a potential RN threat.

1.6.5 CITY AND COUNTY OF DENVER DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT

DDPHE is responsible for protecting, improving, and abating impacts to public health in the City and County of Denver and to protect against potential health threats including effects from RN exposure. The authority of DDPHE is granted under City Charter and Municipal Code. DDPHE is an integral partner of other City departments (Police, Fire) in detecting, identifying, assessing, and abating risks to public health and the environment. DDPHE maintains a skilled staff of investigators, scientists, and contract hazmat response specialists. In the event of a RN incident impacting the City and County of Denver, DDPHE will provide co-response personnel to aid and support City first responders with RN detection and identification, and management service. As a Principal Partner in the Denver STC program, DDPHE will train and equip its investigatory and technical response staff from relevant areas of its operations to fill primary and secondary screeners roles. DDPHE will provide SME support such as materials management and abatement in non-criminal cases. DDPHE will also play a lead role in outreach, communication and messaging in the event of health risks and impacts to Denver’s communities.

1.6.6 DENVER HEALTH PARAMEDIC DIVISION

The Denver Health Paramedic Division is the primary Advanced Life Support (ALS) Emergency Medical Service for the Denver area. Its operation staffs dynamically dispersed ambulances across Denver, Englewood, Sheridan, Glendale, and parts of unincorporated Arapahoe County. Ambulances are staffed by highly trained paramedics that receive their training and medical direction from Denver Health Medical Center, the Rocky Mountain Region’s leading Level I trauma center. Its staff is roughly 240 full-time ALS, paramedics and EMT response staff.

The Paramedic Division also provides primary ALS response for DEN, where calls for service are equal to a small city. The Paramedic Division’s special operations include providing care for large gatherings and events. Support for large incident response with the Denver Fire Department and Denver Police Department, and it operates and staffs the City’s Detox transport system to Denver CARES. Finally, the Division provides EMS education to many of the regions EMS agencies. As a Principal Partner in the Denver STC program, the Paramedic Division will train and equip its Paramedics and EMTs to fill the role as primary screeners in all areas of its operation.

1.7 PARTICIPATING PARTNERS

Participating Partners within the Denver STC Program may include local, state, and federal agencies as well as entities that will provide support through resources, subject matter expertise, coordination, and information functions during RN operations that impact the Denver Metropolitan region. Initial program expansion into the region around the City and County of Denver is planned to eventually involve political subdivisions in Adams County, Arapahoe County, Jefferson County, and the Cities of Glendale, Sheridan, and Englewood. Subsequent expansions will begin to incorporate regions identified within the transit corridors to the major metropolitan region in the state, aligned with annual review of the most current regional threats and risks data. As the capabilities of the Urban Area and the region expand and mature, additional partner agencies may be added as needed.

1.7.1 DENVER 911 OPERATIONS

The Denver 911 Emergency Communications Center serves the citizens of Denver twenty-four hours a day, seven days a week. Denver's 911 Communications Center is staffed by public safety professionals who are trained to answer 911 and non-emergency telephone calls, as well as dispatch police, fire, and paramedic resources. Emergency Communications Operators gather critical information from callers and send the information via computer to police, fire and or paramedic dispatchers who are responsible for relaying the information to the first responders. The 911 team works in partnership with Denver Police, Denver Fire and Denver Health Paramedics to ensure the safety and quality of life for residents, businesses and visitors in the City and County of Denver.

As a key supporting player in the Denver STC Program, Denver 911 is capable of relaying mission critical information regarding Primary and Secondary screening alerts to the appropriate personnel via the STC Information Exchange Plan.

1.7.2 COLORADO INFORMATION ANALYSIS CENTER (CIAC)

The CIAC focuses on preventing acts of terrorism, taking an all-crimes/all-threats approach. We are a centralized resource that gathers, analyzes, and disseminates all-threats information to private sector, local, state, tribal, and federal stakeholders throughout Colorado and the United States.

The CIAC serves as the state's fusion center, a multidisciplinary, multi-agency network of professionals from private sector, local, state, tribal and federal partners conducting analysis and sharing information to prevent, protect and respond to crimes and potential or actual acts of terrorism. The CIAC is one component of the national network of fusion centers, which are an integral part of the U.S. Department of Homeland Security's strategic initiative for information sharing.

1.7.3 U.S. DEPARTMENT OF ENERGY NATIONAL NUCLEAR SECURITY ADMINISTRATION RADIOLOGICAL ASSISTANCE PROGRAM (RAP)

The Department of Energy National Nuclear Security Administration (DOE/NNSA) has the capabilities to respond to and resolve RN threats throughout the country. Their response teams conduct: Search/Surge – detection; Render Safe – disabling and disposing of RN devices; and Consequence Management of RN incidents or attacks on people and environments.

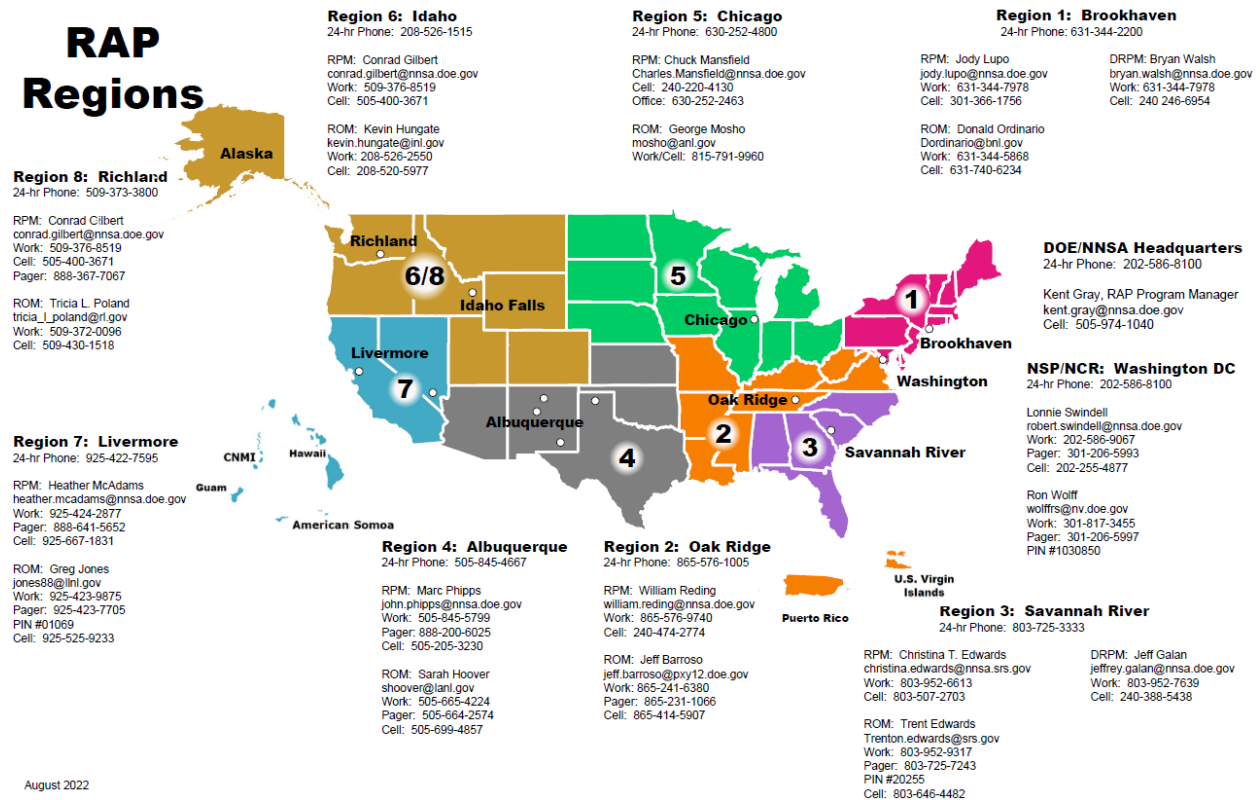
The Radiological Assistance Program (RAP) provides advice and radiological assistance for incidents involving radioactive materials that pose a threat to public health and safety or the environment. RAP can provide field deployable teams of health physics professionals equipped to conduct radiological search, monitoring, and assessment activities. The RAP Team from Idaho National Laboratory currently works with the Denver STC Program to provide support for large events. During RN operations, the RAP Team may provide personnel, resources, SME, and adjudication support to the region. Additionally, DOE and RAP will receive notification and situational updates in the event of RN incidents.

1.7.3.1 IDAHO NATIONAL LABS

Colorado is within DOE Region 6 (previously “6/8” - Washington, Oregon, Colorado, Wyoming, Idaho, Utah, and Montana); the Region 6 site office is in Idaho Falls, ID with additional RAP staff and equipment resources in Colorado at the Fort Saint Vrain Generating Station. RAP Region 6 may be contacted via the **Idaho National Laboratory Warning Communications Center, (208) 526-1515** or **DOE Emergency Operations Center 24-hour hotline 202-586- 8100 (ask for the ERO).**

Idaho National Laboratory is a U.S. DOE research facility managed by the Battelle Energy Alliance is the designated as the U.S. Radiological Assistance Plan (RAP) Region 6 operations center. During RN operations or incidents Idaho National Laboratory may support the Denver STC Program by providing SME support. RAP is managed within the National Nuclear Security Administration (NNSA), a semi-autonomous agency within DOE, and is tasked with providing radiation monitoring, decontamination assistance, and medical advice and analysis among other capabilities.

Figure 1. Radiological Assistance Program (RAP) Regions



RAP support capabilities include:

- Rapid Response 24/7/365
- Search for Radiological Material
- Lost/Stolen Source Material
- Determine Technical Search Parameters
- Deploy Specialized Search Equipment
- Advise Law Enforcement
- Alarm Adjudication

- Characterize Radiation Environment
- Initial Assessment
- TRIAGE Capability
- Area Monitoring
- Contamination Control
- Decontamination
- Advise on Public Safety
- Material Recovery
- Activation of other DOE Assets

The Denver STC region falls under the RAP Region 6/8 boundaries, and can be contacted through the Regional Program and Operations Managers

1.7.4 FEDERAL BUREAU OF INVESTIGATION

The FBI is the nation’s lead federal law enforcement agency for investigating and preventing acts of domestic and international terrorism, including making the determination of whether a threat or incident constitutes terrorism. The prevention of a weapon of mass destruction incident is among the FBI’s highest priorities. To that end, on July 26, 2006, the FBI established the Weapons of Mass Destruction Directorate (WMDD) to create a unique combination of law enforcement authorities, intelligence analysis capabilities, and technical subject matter expertise that exists nowhere else in the U.S. government. It is the lead federal agency for investigating attacks involving WMDs—primarily those involving chemical, biological agents, radiological or nuclear weapons (CBRN).

The FBI’s [Critical Incident Response Group](#) (CIRG) provides rapid assistance to incidents in a crisis. Through CIRG, expert assistance is available in cases involving criminal investigative analysis and special weapons and tactics, among other areas. CIRG personnel are on call around the clock, seven days a week, ready to assist FBI field divisions and law enforcement partners in pre-crisis planning and response to critical incidents, major investigations, and special events. Through the Strategic Information Operations Center (SIOC), CIRG also facilitates enterprise-wide situational awareness and maintains a platform for critical interface and the dissemination of strategic information.

The national Domestic Detection Concept of Operations outlines the criteria determining when the FBI WMD Field Office shall be notified of secondary screening operations and suspected RN threats. Once an RN screening determines the existence of an RN threat, FBI will assume the lead for CBRN crisis management operations when a suspected criminal or terror nexus is identified or suspected, deploying render safe support through teams such as the Level 5 Stabilization Team based out of Denver.

The FBI has authority to investigate threats to national security pursuant to presidential executive orders, attorney general authorities, and various statutory sources, including Title II of the Intelligence Reform and Terrorism Prevention Act of 2004, [Public Law 108-458, 118 Stat. 3638](#), outlining FBI intelligence authorities, as does [Executive Order 12333; 50 U.S.C. 401 et seq.](#); [50 U.S.C. 1801 et seq.](#)

1.7.5 NATIONAL GUARD WMD CIVIL SUPPORT TEAM

The Colorado National Guard Civil Support Team (CNG/CST) is an all-hazards emergency response

resource of the State of Colorado. The Governor of the State has the authority to direct the mobilization and deployment of the CNG/CST. The CNG/CST maintains highly trained and well-equipped staff with specific abilities valuable to a response in the event of detection and interdiction, or release of radiological/nuclear material. CNG/CST abilities include:

- Enhanced assessment of a radiologically impacted site
- Advanced isotope identification
- Down-range remote monitoring
- Decontamination of instruments and personnel
- Reach-back communications with federal resources
- Radio-communications channel interoperability
- Training around PRND
- Enhanced steady state PRND support

The mission of the Civilian Support Teams is “to support civil authorities at a domestic Chemical, Biological, Radiological and Nuclear high-yield Explosives (CBRNE) incident site by identifying CBRNE agents/substances, assessing current or projected consequences, advising on response measures, and assisting with appropriate requests for additional follow-on state and federal military forces. Units can also provide immediate response for intentional and unintentional CBRN or hazardous material (HAZMAT) releases and natural or manmade disasters that result in, or could result in, catastrophic loss of life or property.” The closest CST is located at Buckley Air Force Base in Aurora, CO.



SECTION 2: CONCEPT OF OPERATIONS

RN detection, interdiction, response, and mitigation operations combine law enforcement, fire/HAZMAT response, and other first responder resources and procedures with detection technology and government resources to reduce the risk of a RN threats in the City and County of Denver by enhancing regional capabilities to detect, identify, and interdict illicit RN materials. RN detection operations consist of Primary Screening, Secondary Screening, Adjudication, Technical Reachback, and Resolution. The Denver STC Program Office, through OEM, will lead the development of an Operations Plan framework that ensures effective communication among all partners.

2.1 EXECUTION

2.1.1 CWMD/STC INTENT

To achieve an end-state in which regional stakeholders:

- Closely coordinate planning and operations on a regional basis and with CWMD and other Federal agencies.
- Conduct training and exercises to further the nuclear detection mission in the region and gain proficiency in detection operations.
- Develop a robust mobile architecture and equipment set for both land and aerial pathways.
- Lay the foundation of an information exchange methodology so that multiple STCs may exchange data amongst each other, with CWMD, and with other Federal partners.
- Achieve better integration of federal, state, and local capabilities allowing regional support to national operations.

2.1.2 DENVER STC INTENT

As outlined in the Denver STC Strategic Plan, the overarching goal of the Denver STC program is the detection and interdiction of RN materials prior to deployment and movement within the Denver STC program jurisdiction. The Denver STC Program will undertake each of its initiatives and activities in a coordinated fashion with local, state, and federal partners, solidifying existing partnerships at each level.

Goals, Objectives, Activities, and Associated Metrics

Goal	Objective	Activity	Metric
Coordinated Planning	Coordinate planning between the Principal Partners, and other stakeholders to ensure that the regional approach to PRND operations is coherent and unified.	Create Denver STC Program Office.	# agencies/jurisdictions partnering in Denver STC initiative
		Form Executive Steering Committee and Subcommittees.	# partners engaged in planning efforts
		Develop MOU with each principal partner.	



Goal	Objective	Activity	Metric
		Conduct baseline risk and capability assessment and regional plans.	# plans approved
		Leverage lessons learned.	
		Establish end state capability.	Documented goals and capabilities
Information Sharing	Coordinate information exchange between the Principal Partners to ensure regional PRND operations transition between operational phases.	Establish Denver STC information sharing mechanism.	Increased activity reports via implemented protocol
		Integrate with other RN programs.	
		Develop unified Reachback protocol and methodology.	Successful implementation of Reachback protocol
Enhanced Detection	Enhance the Metropolitan Denver's capability to prevent a potential nefarious incident by enhancing the Denver Region's RN detection, response, and interdiction capabilities.	Assess equipment needs and procure for STC region.	# of items purchased and deployed
		Develop equipment and inventory management plan.	# of items tracked and reported on quarterly
		Conduct and document equipment and operations training.	# of training conducted
			# of individuals and agencies trained
		Plan, conduct, and document HSEEP exercises to validate plans.	# of exercises/drills conducted
		Establish in-house trainers to supplement CWMD training.	# of trainers
Risk Management and Threat Mitigation	Manage risk at Special Events and protect critical infrastructure and key resources (CI/KR) within and outside the City and County of Denver geographic boundaries; relying heavily on Principal Partners to	Develop Concept of Operations Plan with stakeholder partners.	Finalized and approved plan
		Develop regional sustainability plan.	# agencies that commit to program sustainment
		Assess regional capabilities annually.	% increase in capabilities year to year

Goal	Objective	Activity	Metric
	detect and interdict RN material	Expansion of Denver STC region and integration with other regions to support national goals.	# agency partners in addition to principal partners

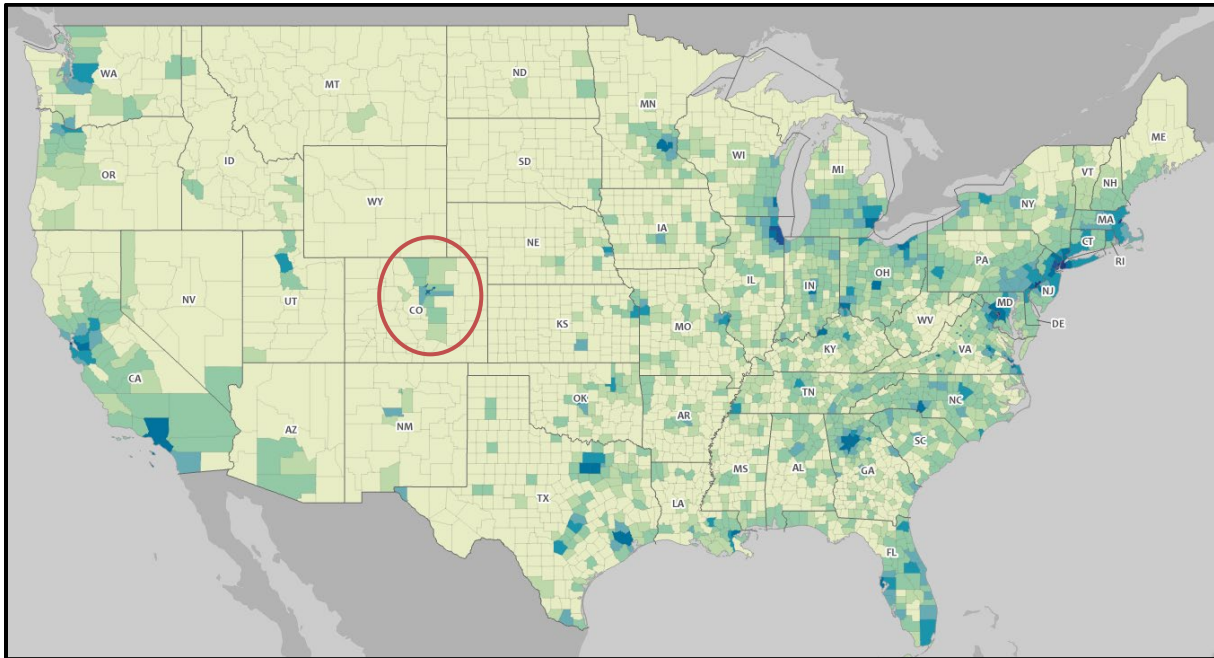
2.1.3 DENVER STC RN DETECTION OPERATIONS

The Denver STC Program seeks to support the National Security Policy by establishing a sustainable capability within the Greater Denver Metropolitan area, and surrounding regions, to detect, analyze, and report nuclear and other RN materials out of regulatory control. Capability in this sense is defined as trained and equipped personnel, proficient in the use of RN detection equipment and guided by detection and response protocols. If STC RN detection equipment and/or personnel are needed, a request can be made through the Denver STC Program Office.

The Denver STC Operations Plan is based on the **detection, identification, and notification** of RN threats in and around the Denver region through Primary and Secondary Screening operations. As part of the Denver STC initial phase of deployment, equipment and training is limited to Principal Partners and limited Participating Partners to create the baseline capability for RN detection discussed in Denver STC Mission, Scope, and Objectives. Limited secondary screening equipment and training is deployed to Participating Partner Agencies in support of the overall mission of the Denver STC.

The initial concept for deployment and operations is based on a phased approach to detection and response for principal and participating agencies. Further expansion of the Denver STC Program to other Participating Partners around the core region will be completed through establishing MOUs, equipment, and training deployment in further development of the Program.

2.1.4 DENVER'S RISK PROFILE



The City and County of Denver is a densely populated urban area that includes numerous critical facilities and services that hold immense real and symbolic significance. The threat of a terrorist RN attack in and around this urban area is very real, also because of the geographic and demographic characteristics of the Denver region that includes being a major hub for both domestic and international passengers, major national highways and freight ways that may make a desirable target for criminals or other terrorist groups.

Terrorist threats evolved over the course of the twenty years since September 11th, when foreign nationals hijacked four airplanes. In recent years the threat included more US homegrown violent extremists inspired by foreign actors, however, in focusing on the threat ‘over there’, the growing threat from domestic violent extremists, born in the USA, was largely ignored. A recent poll conducted by the University of Chicago found that 1 million Americans were part of or “personally knew a member of a militia or extremist group”. This significant threat is homegrown, rooted in US history and operating under a principle of leaderless resistance.

Unmanned aircraft systems (UAS) could also potentially facilitate terrorists’ deployment of chemical, biological, radiological, and nuclear (CBRN) materials. Although UAS have not been successfully employed in a terrorist attack in the US, they factored into a disrupted plot targeting the Pentagon (DHS Strategic Framework for Countering Terrorism and Targeted Violence).

Threat Pathways: The Denver STC Program is currently composed of the principal first response agencies within the City and County of Denver, to include local and state law enforcement agencies. It is understood that the current threat pathways into and out of the Denver Metropolitan Region do not stop at the city’s geographical borders. As the Program expands and builds its capabilities, the Denver STC will expand to include neighboring jurisdictions of the Denver Metropolitan Region, as related to regional risk-assessments and transit corridors, to address threats and equip agencies to mitigate RN threats.

Denver is near major highways, including Interstates 25, 70, 270 and 225. Additional major thoroughfares include U.S. Highway 6 and State Routes 285 and 287. The Burlington Northern Santa Fe and Union Pacific railroads have yards on the northwest side of Denver near downtown. Plans are underway to move the rail yards out of the city. There are also numerous pipelines in and near the city. Fixed-facility exposures include a major chemical distributing company, a chlorine manufacturer, anhydrous ammonia for cooling, and the Air Products specialty gas company.

The metropolitan area surrounding the City and County of Denver represents most of the population and economic activity in the Front Range region. Denver is a key trade point and transportation hub for the country. Our metropolitan region has the following international ports of entry:

- Centennial Airport, Colorado - Englewood, CO
- US Customs and Border Protection Denver, Colorado - Denver, CO
- Eagle County Regional Airport, Colorado - Gypsum, CO
- Rocky Mountain Metropolitan Airport, Colorado - Broomfield, CO

In addition to containing multiple international ports of entry, the Denver metropolitan region supports storage and distribution services for the Mountain States, Southwest States, and all the Western States. Denver is at the center of the Front Range Urban Corridor, situated almost directly on the intersection of Interstates 25 and 70, which are designated for hauling nuclear materials through Denver.

Geography also brings a considerable government presence to Denver, with many federal agencies based or having offices in the Denver area. Denver's west-central geographic location in the Mountain Time Zone also benefits the telecommunications industry by allowing communication with both North American coasts, South America, Europe, and Asia in the same business day. Denver's location on the 105th meridian at over one mile in elevation makes it the largest U.S. city to offer a real-time satellite uplink to six continents in the same business day.

Prior to the Covid-19 Pandemic, the commuter-adjusted population of the combined city and county was estimated to grow by 27%, and Visit Denver estimated that anywhere between 22,000-55,000 tourists visited Denver every day. In terms of total passenger traffic, Denver International Airport was the 5th busiest airport in the U.S and the 15th busiest in the world.

Denver Physical Environment: The greater Denver Metropolitan area also holds a significant and growing amount of radiation source material. Terrorists may seek to acquire these materials by stealing from hospitals, laboratories and research facilities, universities, industrial facilities, or construction sites to build a radiological exposure device (RED) or a radiological dispersal device (RDD). This is because the same isotopes used for life-saving blood transfusions and cancer treatments in hospitals (such as cesium-137, cobalt-60, and iridium-192) may also be used as components of a terror device. Although a RDD is far less destructive than a nuclear device, the public panic, the economic disruption, and mitigation costs resulting from a deployed RDD could also be significant.

Terrorists and other nefarious actors, particularly foreign actors, tend to target individuals who work in sectors that benefit their motives (e.g., military, law enforcement, public health, etc.) and use tactics such as manipulation and blackmail to convince someone on the inside to partake in their plots. This is a significant threat if terrorists can influence someone inside a facility that houses any CBRN materials because of the ease of access and knowledge of security procedures to bypass.

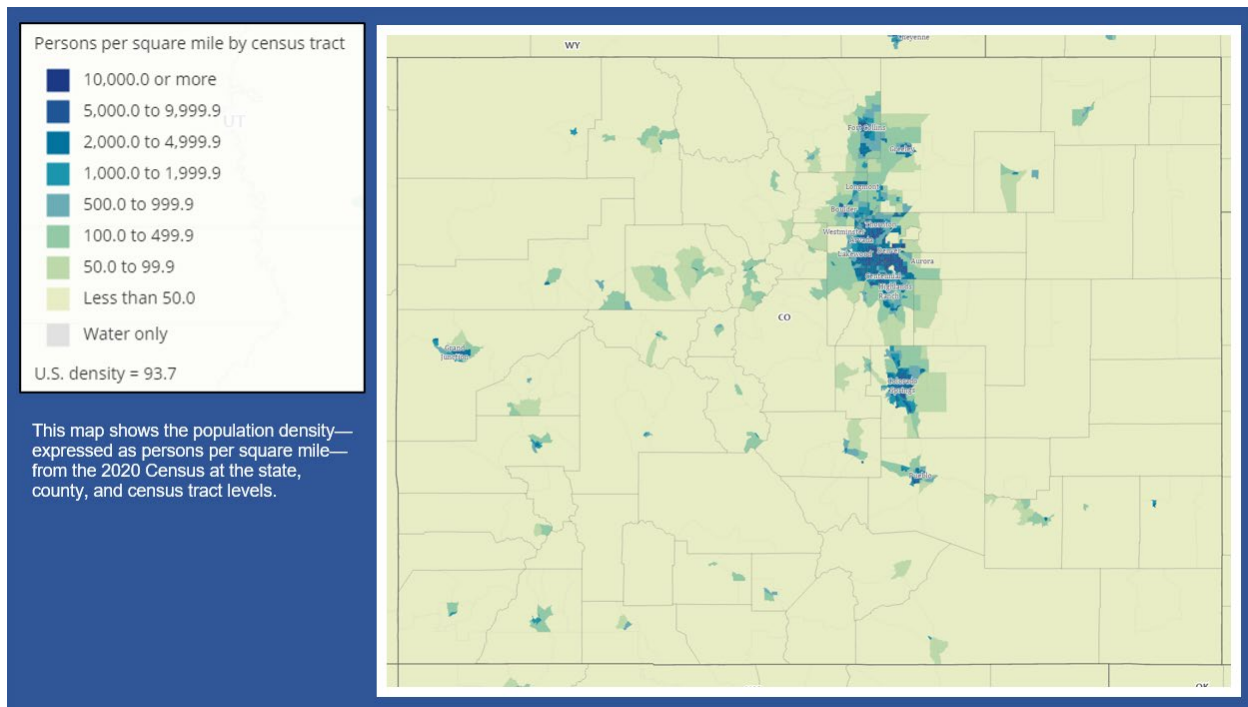
Federal Risk Profile: The Department of Homeland Security Federal Emergency Management Agency (FEMA) defines Denver as a high-risk urban area with a Threat Level 2 rating. At nearly 800 miles from an urban area of comparable size, the resulting geographic isolation compounds the City's risk by limiting accessibility of mutual aid resources. This demands increased local and regional capabilities. The successful deployment of a RN WMD would significantly hinder response efforts, have severe short and long-term health effects, immediately disrupt the economy, and amass profuse recovery and remediation costs.

2.1.5 COLORADO RISK PROFILE

According to the State of Colorado 2019 Preventative Radiological and Nuclear Detection CONOPS and the 2017 Colorado Nuclear and Radiological Risk Assessment, Colorado has a 104,000 square mile footprint, located within the physical center of the contiguous United States, and is at considerable risk to the threat of a radiological or nuclear device being transported through, or utilized within the area. Colorado is of national and international economic, transportation, ecological, and tourist importance:

- The State's transportation infrastructure consists of five major interstate highways and two major railway corridors which traverse the State north to south along the Front Range, and east to west across the central and southern portions of the State. The State has one international airport and 16 regional airports that provide commercial services. There are also 62 general aviation airports.
- Colorado is divided into 64 counties and 276 incorporated municipalities, with a total estimated population of 5,812,069, according to the latest U.S. census survey. County populations range from close to 700 residents in San Juan County to more than 730,000 in El Paso County.

Figure 2. Colorado Population Density Map



- Most of the state’s population, industrial and commercial development, and the seat of State government are located along the Front Range. The Front Range extends from Larimer County in the north to Pueblo County in the south and includes the ten most populated counties in the State.
- More than 39 million global travelers are attracted to the summer and winter outdoor recreational opportunities afforded by the beautiful Rocky Mountains and historic mountain venues.
- With 3,000 miles of Class 1 rail track and intermodal train/truck facilities, Colorado is home to one of the most dynamic transit agencies in North America.

2.1.6 RADIOLOGICAL/NUCLEAR THREAT

U.S. efforts to counter nuclear or radiological threats are considered a top national priority. The Global Nuclear Detection Architecture is a framework for detecting, analyzing, and reporting nuclear and other radioactive materials that are out of regulatory control. Any WMD in the hands of a terrorist is one of the gravest potential risks to the national security of the United States. A successful WMD terrorist nuclear attack could result in hundreds or thousands of casualties and produce far reaching economic and political consequences.

Domestic and foreign terrorist organizations have openly stated their desire to acquire and use nuclear weapons. The diffusion of scientific and technical information, some of which is now available on the internet, has increased the risk that terrorists in possession of sufficient nuclear material may attempt to develop their own nuclear weapon. Within recent years, several Americans have become involved in the global violent extremist movement, either as foot soldiers, front line combatants, operations planners, propagandists, attack operatives for Homeland plots, or senior leaders with extremist groups overseas. These Homegrown American extremists are especially

dangerous and valuable to international terrorist organizations because of their native understanding the US, connections to compatriots in the US, and easy access to Homeland targets.

Racially or ethnically motivated violent extremists (RMVEs) in the West have not progressed beyond aspirational chemical, biological, radiological, or nuclear (CBRN) interest and rudimentary capabilities because of technical hurdles and a preference for more familiar, conventional tactics. CBRN manuals and influential historical texts that promote CBRN agents are available; however, no RMVE has successfully used CBRN material since 2010. (NCTC Searchlight Issue 1, June 2021)

In the Domestic Terrorism Prevention Act of 2019, Congress found white supremacists and other far-right-wing extremists are the most significant domestic terrorism threat facing the United States. Multiple federal, state, and civilian entities identify and track the activities of extremist hate groups within Colorado and the region.

A thorough analysis of operating environments and pathways leading to the region was conducted and factored into deployment plans and the equipment selection for the Denver STC Region.

The following sections provide an overview of specific operations and activities that are conducted as part of the Denver STC Program. See [Section 5.1.3](#) for agency responsibilities pertaining to each of the following activities.

2.2 MODES OF OPERATION

RN detection operations are defined as the process by which specific RN detection resources, personnel, and asset deployments are made to execute the objectives of the preventive RN detection mission. RN detection asset deployment ranges from day-to-day operations to intelligence or incident driven searches. Operations are organized as one of the three phases or postures of deployment: steady state, enhanced steady-state, and RN search operations (RNSO). Detailed asset deployment and locations are outlined in Partner Agencies Standard Operating Procedures or Protocols (SOP) found in [Section 5.1.3](#).

2.2.1 STEADY-STATE OPERATIONS

Steady-state Operations (Routine Day to Day Operations) Steady-state operations represent day-to-day RN detection operations, which are overlaid on existing mission areas as part of a daily routine. Steady-state operations provide a multi-layered approach to RN detection efforts and occur regardless of any credible threat. Steady-state screening is typically low profile and conducted in conjunction with routine law enforcement, fire response, EMS, and other counterterrorism activities to detect RN materials. Steady-state Operations are decentralized operations within the City and County of Denver.

In addition to daily first responder responsibilities, this mission could be performed in coordination with other activities already being employed, including patrol, fire, EMS, or other code enforcement inspections, cargo screening, safety inspections, and other environmental monitoring efforts. These are decentralized operations, single or multi-agency, without any change in jurisdiction.

The Denver STC RN detection steady-state mission is initially law enforcement, fire rescue, and medical response centric, with the long-term program goal to partner with all appropriate government agencies and the private sector to gain additional capacity by saturating the community

with RN detection equipment and to expand detection and response capabilities. During this operational state, the following methods of detector deployment are expected:

- Selected law enforcement officers assigned to calls for service should, as a matter of routine procedure, be equipped with functional PRDs
- All Fire Suppression Units are equipped with functional PRDs
- All Denver Health Ambulances are equipped with functional PRDs
- Other units and personnel equipped and trained by the STC Program should deploy radiation detection during normal operations.

2.2.2 ENHANCED STEADY-STATE OPERATIONS (STEPPED UP/FOCUSED)

When necessary, enhanced Steady-state operations include augmented operations in response to a heightened threat environment or in support of planned security-related activities. Enhanced steady-state operations provide an additional layer of response by introducing or “surging” additional capabilities to increase the probability of locating materials or devices. An enhanced steady-state condition is caused by a deliberative decision by appropriate leadership under advisement to increase RN detection capability for a period over a particular area. These operations may be utilized to support a special event or to respond to general or specific intelligence such as to supplement a Radiological/Nuclear Search Operation (RNSO) outside the established search area.

Additionally, crisis or emergency situations may arise that require additional capabilities, coordination, and support in response to a significant threat/detection event, and/or request from a partner nation or non-Federal entity for assistance. Operations for detection, analysis, and reporting on nuclear and other radioactive materials out of regulatory control will occur concurrently in steady-state, enhanced steady-state, or crisis situations, in multiple locations, dependent on threat information and/or special events.

Enhanced steady state RN detection operations include increased radiological and nuclear detection asset deployment based on a special event or intelligence. An elevation to this state will be at the discretion of the region and may include coordinated operations with state or federal assets that may be surging to the region. Conditions that could lead to this phase of operations include:

- Special events including National Special Security Events (NSSE), activities with Special Event Assessment Rating (SEAR) 1-5, State visits, political campaigns, newsworthy activities, VIP events, and large-scale sporting and entertainment events
- Highly credible and actionable intelligence from the regional intelligence centers including the DPD, Colorado Information Analysis Center, the CIAC, aka, Fusion Center of the state DHSEM., and FBI Denver Field Office, indicates that an attack on the region, utilizing RN materials, is imminent, but not with the detail that would result in an FBI search operation
- A confirmed attack or attempted attack utilizing a radiological or nuclear device has occurred in the United States
- The theft of an International Atomic Energy Agency Category I or II radiological source has occurred within or in proximity to the Denver Region
- As directed or determined by the STC Program Office.

Predetermined screening areas such as roadway chokepoints, may be instituted by jurisdictions within the Denver STC region. Initiation, notification, and screening operations conducted at these

locations will be done in accordance with Denver STC Program protocols.

2.2.3 RN SEARCH OPERATIONS

RNSOs are generally intelligence driven events regarding source materials or potential RN weapons that may be coming into or going out of the area. These large-scale operations are FBI-led and in response to a credible threat (as determined by the Threat Credibility Evaluation [TCE] process) designed to locate and support the interdiction of RN materials or devices in a RN search area. RNSO involves the management, planning, and execution of interagency search efforts and is conducted in direct support of an FBI investigation.

RNSO efforts are conducted by aligning existing federal, state, and local RN detection activities with supplemental search assets into an established RN search area. State and local agencies may be brought into a tactical control situation, led by the FBI. Other State and local units not directly involved in the limited area search will be asked to establish an Enhanced Steady State deployment in the region until the operation is concluded.

During RNSO events, the Denver STC Program Office and partner agencies will coordinate with FBI and provide Denver STC Program resources to support the mission. The Denver STC Program partners will follow all City, County, and State information and intelligence sharing protocols to ensure situational awareness. Information will be shared to all necessary partners through the CIAC. Depending on the specific circumstances during a Search State, operations could be overt or covert. This decision will be made by the lead agency and will be based on specific intelligence information.

2.2.4 CONSEQUENCE MANAGEMENT

Potential or actual threats involving RN materials may require expeditious, integrated, and risk-informed decision-making requiring mission partners, concurrently carrying out their respective authorities and responsibilities to coordinate and communicate to protect against the loss of life, damage to property and/or other serious consequences. The STC screening and detection protocols are not intended to supersede or alter consequence management response protocols.

2.3 ALARM ADJUDICATION PROTOCOL

Primary Screeners may attempt to localize the RN source and determine if a threat exists following procedures included in the Primary Screening protocols in Section 5: Prevention Framework Critical Tasks. Even though no terrorist threat may exist, there could be public safety, health, or regulatory concerns that need to be addressed.

If the Primary Screener cannot adjudicate based on agency specific steps in Section 5, then a secondary screening team will be requested. Secondary screening requests should be made immediately through dispatch to ensure all necessary agencies are notified and the responding unit can be on scene as soon as possible. If the primary screener is not law enforcement (LE), the secondary screening request will dispatch LE (automatic request via nature codes) to ensure adequate powers and authorities arrive on-scene to ensure the detection, identification, and notification protocols are able to be completed, and any subsequent law enforcement actions are able to be implemented.

Secondary screeners will localize and attempt to determine the threat possibility of the source according to procedures included in Section 5. Technical Reachback procedures are addressed in partner agency's SOP are also found in Section 5.

For most RN alarms, adjudication will be on a case-by-case basis. At any time, if a threat is determined or suspected, the on-scene personnel will escalate, via dispatch or agency-appropriate authorities, so the Denver FBI WMD Coordinator is notified through the FBI Denver Field Office 303-630-6097 dial 0.

2.3.1 PRIMARY SCREENING

During the Primary Screening phase, a radiation source is detected causing an alarm on the primary screening detection equipment (ex. PRD, backpack, mobile system).

Primary screening equipment communicates the detection (alarm) to the screening operator with information to support the classification of the alarm as either **verified** or **indeterminate**.

A verified alarm is one that can be repeated, either by the same instrument or when two or more instruments can reproduce the alarm. An indeterminate alarm is an alarm that has not been and cannot be repeated or verified by another instrument.

Utilizing basic tactics, techniques, procedures described in the following sections and annexes to this document, operators will detect, verify, and locate the source of the radiological concern.

Primary Screening personnel will be equipped with Personal Radiation Detectors across all Partner Agencies. Each Denver STC Partner Agency will follow national standards in their respective Primary Screening SOP. Section 8 shows the regional equipment settings for the primary screening equipment as provided by the equipment vendor.

2.3.1.1 INDEX OF SUSPICION

The following are suggestions for how to evaluate whether the source of the rad/nuc alarm should be considered a potential threat or non-threat.

- 1) What is your detector and the conditions telling you?
 - Are radiation readings from your detector within your agency or regulatory limits for the situation?
 - Is source of alarm a hunk of metal, rock or obvious industrial tool?
- 2) Hidden source of alarm?
- 3) Is the package, container, vehicle correctly marked and/or placarded?
 - Is there appropriate paperwork consistent with the detector readings?
 - Is an individual, once separated from bags, purses, packs and/or vehicle, the source of the alarm?
- 4) Does the situation and/or individual seem suspicious?
 - What does your training, experience, and situational awareness tell you?
 - Do you see explosives or anything that looks like an IED or IED component?
- 5) What is indicated by the totality of the circumstances?

- If the situation or circumstance seems suspicious do not hesitate to escalate, through the appropriate channels outlined in the agency-specific SOP, the Denver FBI WMD Coordinator at (303) 629-7171 (ask for the WMD Coordinator).
- If waiting for follow-on response, take appropriate self-protective action by utilizing time, distance and shielding.

2.3.1.2 TOTALITY OF CIRCUMSTANCES

The level of threat must be determined using the totality of circumstances available to the on-scene investigating official, including non-radiological indicators and observable clues. Additional radiological indicators that warrant further investigation include:

- The source identified is not consistent with the list of Common Innocent Radiation Sources.
- The level and distribution of the radioactivity does not correlate with the materials described in the shipping documents.
- Interview responses or shipping documents are inconsistent with additional information provided by the radionuclide identification system.
- The isotope cannot be identified, or the detection equipment, law enforcement data, and other relative information cannot conclusively identify the source of radiation.
- Radiation levels exceed regulatory limits:
 - >500 uR h (>0.5 mR hr.) at the surface of an unmarked package
 - >10,000 uR h (>10 mR hr.) a meter from a placarded vehicle or labeled package
 - >2,000 uR h (>2 mR hr.) in public areas

2.3.2 SECONDARY SCREENING

Secondary Screening is the utilization of isotope identification equipment and/or other techniques to identify and investigate the primary event. Secondary screening equipment may be used to assist field teams in the adjudication of potential threats related to individuals, vehicles, packages, or facilities. Secondary screening operations may be initiated to:

- Detect radiation
- Verify primary screening alarm
- Localize the source
- Measure radiation levels
- Identify the isotope of concern
- Assess the threat status of detected materials

Requests for Secondary Screening will be managed and implemented through agency-standard communication pathways as outlined in the Information Exchange Plan.

The sequence for deploying Secondary Screening Equipment upon the notification of a Primary Screening alert is as follows (See also § 5.3.1.2. Secondary Screening):

- 1) Collect known spectra via a check source at the location where the equipment is stored
- 2) Once on scene, collect background spectra reading
- 3) Collect unknown spectra (the source in question)
- 4) Collect known spectra via a check source once the incident concludes (This is not required to complete the screening and adjudication process but recommended to support equipment standards).

2.3.2.1 TECHNICAL REACHBACK

Reachback is the real-time scientific and technical support provided by on-call subject matter experts (SMEs) to assist on-scene personnel in the evaluation of detection data and resolution of RN alarms. Reachback is necessary as proper source identification and situational assessment may entail many variables and scientific expertise and analysis may not be readily available in the field.

Reachback may be done at the local, state, or federal level depending on the situation. If unable to resolve the alarm locally, or if safety-significant radiation levels are encountered (e.g., greater than 100 mR/hr from an unknown/unidentified object), technical Reachback should be initiated.

During secondary screening operations, Secondary Screeners will first coordinate with local SME agency resources as needed for support, adjudication, and threat analysis. DFD, DDPHE, CDPHE, and other agencies with appropriate SMEs will provide local level Reachback support.

Several agencies are available within the state to provide **Non-Threat related Rad/Nuc detection** technical assistance. The 8th Civil Support Team and DOE Region 6 Radiological Assistance Program can provide result consultation. The CDPHE Radiation Management Unit can provide regulatory and technical support to Colorado agencies regarding licensed use of radioactive material, common sources of non-threat alarms, radioactive material safety and controls, and interpretation of Reachback results for identification of regulatory or public health/exposure concerns. CDPHE provides a 24-hour radiological emergency assistance telephone number for reporting incidents, emergencies, and accidents involving radioactive materials, radiation-producing machines, or vehicles or packages marked "Radioactive" or "Caution Radioactive." This hotline may be utilized for regulatory (non-threat) issues regarding PRND-related Reachback contact.

The CDPHE 24-hour radiation emergency assistance telephone number is

303-877-9757

Individual agencies should follow established communication policies and protocols within their organization when technical Reachback is needed. Colorado Reachback agencies will facilitate engagement of the FBI-Denver if a potential threat is identified, and County/State public health agencies if a potentially unsafe public exposure condition is encountered or suspected.

All partner agencies will use DOE as National Level Reachback (202-586-8100) using one of the follow four methods only:

- Online. Triage website is: <https://triageweb.doerer.us>
- Triage Windows Desktop Client
- Email. Send to TRIAGE.DATA@HQ.DOE.GOV and TRIAGE.DATA@LLNL.GOV
- Android and iOS phone applications.

National-Level Reachback is required when the following triggers are met:

- Neutrons are detected and are not associated with licensed or manifested materials
- A radiation source is suspicious or cannot be identified or authenticated
- Special nuclear material is present, suspected, or cannot be ruled out and there is no legitimate reason for its presence

If an alarm cannot be adjudicated with technical Reachback, additional detection assets, such as

alternate types of primary detection equipment and/or higher resolution identification devices, may need to be deployed to resolve the conditions. Several Federal and State agencies are available with advanced detection equipment to support alarm resolution, such as the FBI- Denver, DOE Region 6 Radiological Assistance Program, and the Civil Support Teams. The technical Reachback organization and/or the FBI should determine the needed assets.

2.3.2.2 NOTIFICATIONS AND REPORTING

Activation Notification:

All Secondary Screening activations will require notify to relevant stakeholders identified in the Information Exchange Plan and the FBI WMD Field Office.

Each agency will follow their communication SOPs for proper notification or escalation of all necessary agencies. The responding unit should follow their STC specific guidelines, so that all STC Partners are notified. [Section 5.1.3](#) contains the notification details for each organization within each partner agency's SOP.

Criminal and terrorist threats involving RN materials require immediate notification to the FBI for coordination of a time sensitive response to potentially prevent harm or substantial loss of life or substantial damage to property. Therefore, Denver STC Partner Agencies will support the federal interagency agreements aligned within the National Domestic Detection CONOPS. When suspicious activity or a criminal nexus is detected at any stage of screening and adjudication, the FBI will be initiated through the existing agency's corresponding dispatch or escalation notification procedures, as summarized in [Section 5.1.3](#).

The **Denver FBI WMD Coordinator** and **Regional Render Safe Team Leader**
can be contacted 24/7 through the FBI Denver switchboard at:

(303)-630-6097

(press 0 at the prompt)

*** If these individuals cannot be reached, contact FBI's Strategic Information and Operations Center at (303) 323-3300 and request to speak with the WMD Duty Supervisor or the Counter IED Duty Officer. ***

Screening Reporting:

When Secondary Screening is engaged, alert and adjudication reports will be filed with the STC Program Office. If a secondary screening engages National Reachback, DOE Triage will automatically report the screening and adjudication data to the appropriate STC GII database. However, when secondary screening can adjudicate and resolve an alarm without engaging DOE Triage, the Secondary Screener will follow agency-specific protocols to ensure the activation data is reported through Survey123.

Survey123 is an application CWMD STC utilizes that allows for the collection of data via the web, computer, and mobile devices. The data is sent securely and directly into the DHS Geographic Information Infrastructure (GII) Portal (GII Portal - dhs.gov). The data can then be analyzed, mapped, and shared to those with a need to know.

The Denver STC PMO will provide support to all Secondary Screeners to obtain a Homeland Security Information Network (HSIN) account to access the GII Portal. Users will only see surveys in which

they have access to. Users can access a survey through:

- A shared URL - <https://survey123.arcgis.com/>
- The GII Portal - <https://gii.dhs.gov/gii/>
- The Survey123 application downloaded to mobile device or desktop

2.3.3 COORDINATING INSTRUCTIONS/PROTOCOLS

2.3.3.1 FEDERAL RESPONSE PROTOCOL: TECHNICAL REACHBACK

The Federal government established a standard protocol to assist State, Local, Tribal and Territorial (SLTT) agencies in adjudicating radiation alarms for the purpose of resolving those alarms. The alarm adjudication process is designed to recognize the source of the alarm and assess its significance at the lowest level possible, consistent with national security objectives. Adjudication includes identifying the type or nature of material or device that caused an alarm and assessing the potential threat that might pose. Resolution includes actions necessary to eliminate the threat. The Federal protocol complements existing SLTT detection response protocols.

U.S. DOE through its Triage program provides on-call 24/7 specialized technical analysis and recommendations for the resolution of radiation detection alarms in the context of global smuggling of RN materials, using a combination of all-source intelligence and technical expertise in radiation detection, radioactive and nuclear materials, nuclear weapons, and nuclear terrorism. This scientific and technical support is provided to assist on- scene personnel in the evaluation of detection data and resolution of RN alarms.

TRIAGE – DOE/NNSA's Triage is a non-deployable, secure, on-line capability that provides remote technical Reachback support for RN alarm adjudication to PRND stakeholders and emergency responders. Triage has on-call scientists available 24 hours a day to analyze site- specific data and confirm radioisotope identification in the event of a radiological incident. The data is transmitted through the Triage website (<https://trriage-data.net>) or provided over the telephone via 202-586-8100 (ask for the Emergency Response Officer).

When engaging National Reachback (DOE Triage) the local FBI field office or FBI SIOC will be automatically notified immediately and concurrently.

A direct notification to the local FBI field office or FBI SIOC is still recommended where and when possible. Screeners should follow agency-specific protocols.

2.3.4 RADIOLOGICAL/NUCLEAR DETECTION ALARM ADJUDICATION AND RESOLUTION

2.3.4.1 ALARM ADJUDICATION

In cases where National-Level Reachback is engaged, final alarm adjudication results in one of two categories: “Nuclear (Radiological) Threat Material Identified” or “Nuclear (Radiological) Threat Material Not Identified”:

- 1) **Nuclear (Radiological) Threat Material Identified: Potential or confirmed threat.** This situation requires immediate action. Agencies that have identified the threat, should immediately contact the FBI.

The Denver FBI WMD Coordinator and Regional Render Safe Team Leader

can be contacted 24/7 through the FBI Denver switchboard at:

(303)-630-6097

(press 0 at the prompt)

*** If these individuals cannot be reached, contact FBI's Strategic Information and Operations Center at (303) 323-3300 and request to speak with the WMD Duty Supervisor or the Counter IED Duty Officer. ***

- 2) **Nuclear (Radiological) Threat Material Not Identified**: Licensed or permitted radioactive materials or Naturally Occurring Radioactive Materials (NORM). In this situation, the item or person may be released at SLTT discretion. In some cases, further action may be required due to regulatory violation, environmental hazard, or other regulatory or public health issues. Personnel at the alarm site will take appropriate action based on the STC Operations Plan.

FBI Threat Credibility Evaluation (TCE)

All mission partner personnel involved in RN detection have a shared responsibility to communicate any terrorism information they possess that is potentially related to an ongoing threat or incident immediately to the FBI, so that information can be appropriately integrated, exploited, analyzed, and disseminated.

The FBI's TCE process evaluates the credibility of a WMD threat, including an RN threat, determines the potential impact of the threat, and coordinates the initial courses of action. The TCE can be initiated by the FBI under the following circumstances:

- Upon the identification of a potential threat that may or may not involve a WMD device or related materials, including RN device or materials.
- During crisis response to determine credibility of an imminent WMD threat, including an RN threat.
- During deliberate planning to mitigate or share information regarding a non-imminent credible WMD threat, including an RN threat.
- When an incident occurs without warning.
- When a radiation alarm in the field is perceived as a potential threat; or
- For a perceived threat discovered at the local or national level.

The primary threat indicators listed in **Section 4: Threat Indicators** will help identify potential threats that are cause for immediate notification to the FBI.

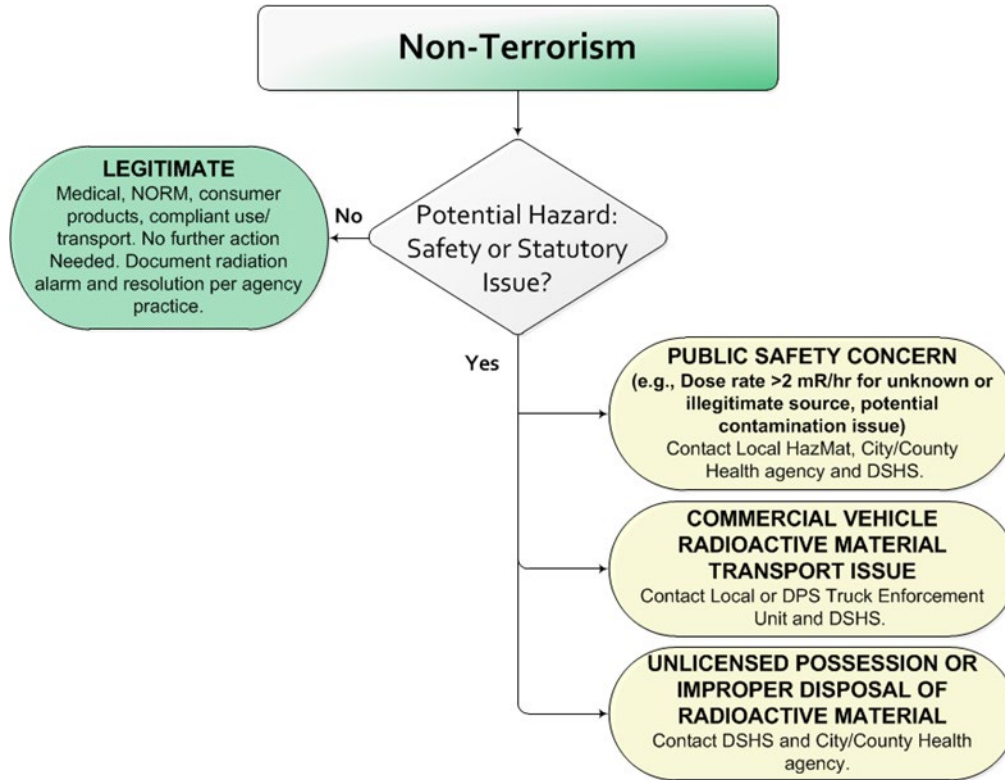
2.3.4.2 ALARM RESOLUTION

Alarm resolution is the process of resolving an alarm using secondary screening and technical Reachback. Even after an alarm has been adjudicated as non-terrorism, follow-up action(s) may be required and can include operational or regulatory response activities to mitigate actual or perceived radiation hazards and risks to workers, the public, or the environment.

In cases where an alarm remains indeterminate after initial adjudication efforts, resolution may involve further actions to complete the adjudication process (e.g., requesting Secondary Screening to

identify the material and determine that it poses no threat), or may involve additional operational response activities depending on the Primary Screening agency’s capabilities.

Figure 3. Non-Terrorism Resolution SOP flowchart



Resolving potential threats is generally performed in coordination with the FBI through a unified command structure. The FBI retains, always, authority over all law enforcement actions dedicated to the response to a credible RN threat. These are subject to FBI Director and/or Attorney General approval requirements set forth in the National Response Framework and the National Domestic Detection CONOPS. The FBI will ensure coordination with appropriate Federal, State, Tribal and local authorities.

2.3.4.3 ALARM DOCUMENTATION & EVIDENCE RETENTION

Radiation Alarm Documentation

Isotope identification spectral files will be downloaded from the RIID by the Secondary Screener and transferred to the incident command agency for retention as evidence and/or for long term storage, and/or as directed by the FBI/WMD coordinator or Nuclear Material Events Database (NMED) Representative (for non-threat regulatory issues).

Each Secondary Screening Agency will submit a [Denver STC Secondary Screening Incident Report](#) for secondary alarm adjudication where DOE Triage was not engaged. A hard copy of the field survey form is included with each RIID case.

Equipment Standards

All PRND equipment should be properly calibrated (when applicable¹⁰) and maintained by appropriately trained personnel. Manufacturer's recommendations as to how frequently this process should be conducted should be the minimum standard followed. Records of this calibration and any repairs should be maintained as documentation for any future court presentations.

Prior to utilizing radiation detection equipment, operators should confirm that the equipment is functioning properly, including having sufficient battery power, by performing the necessary testing procedures as described in training/by manufacturer.

Detection equipment should be placed out of service if:

- Correct date and time (as applicable) are not displayed and cannot be corrected by operator
- Detector is beyond calibration (when applicable²)
- Detector does not pass internal testing
- Damage is apparent or suspected

Function tests with appropriate radiation check source(s) should be conducted on a regular basis, per manufacturer recommendation(s).

Evidence Collection and Retention

Crimes potentially resulting in federal violations and involving radioactive materials are solely the investigative responsibility of the Federal Bureau of Investigation (FBI). Accordingly, recovery of evidence will be directed by the FBI and may require coordination with other Federal, State, or local agencies, depending on the specifics of the response. Activities involving radioactive material not within the jurisdiction of the FBI will be handled by CDPHE or local county official, as determined appropriate per the specific incident.

Each time radiation detection equipment is deployed, it could produce electronic evidence. PRND equipment maintenance and operator training are essential to the quality and potential acceptance of electronic evidence produced during the encounter.

All Agencies involved in any data collection through the adjudication process will store or assist in the storage of any radiological materials/device recovered from the incident as evidence, as directed by the FBI/WMD Coordinator or NMED representative (for non-threat regulatory issues).

Evidence will be retained by the designated local agency or the FBI in accordance with the scope of the incident type and agency authorities.

Evidence could include:

- Maintenance and/or calibration logs
- Detection equipment
- PRD and portable detector data log files
- RIID spectra files
- Mobile systems files
- Digital photographs
- Technical Reachback forms
- Emails used for Technical Reachback

2.3.4.4 TRANSITION TO LEAD FEDERAL AGENCY

The FBI serves as the lead federal agency for investigating crimes involving WMD, which includes RN materials and devices. The FBI primarily relies upon a designated Special Agent/WMD Coordinator in each field division to be the primary point of contact for WMD matters. Whenever a Secondary Screener initiates Technical Reachback support from DOE Triage, they shall also make notification to the FBI Denver Field Office. In the event the threat is deemed credible, the FBI will initiate subsequent actions through the Strategic Information and Operations Center (SIOC), including timely notifications to the DHS NOC. Upon identification of “threat material” by Technical Reachback, law enforcement officers shall immediately secure the scene and associated personnel and evacuate non-responders away from the radiation source. The local FBI shall be advised, and the investigative lead will transition to the FBI, as per existing operational cooperation and coordination protocols.

2.3.4.5 LOCAL SUPPORT TO NATIONAL SECURITY POLICY

The Denver STC Program seeks to support the National Security Policy as outlined in the National Domestic Detection CONOPS, by establishing a sustainable capability within the City and County of Denver to detect, analyze, and report nuclear and other R/N materials out of regulatory control. Capability in this sense is defined as trained and equipped personnel, proficient in the use of R/N detection equipment and guided by detection and response protocols. If STC R/N detection equipment and/or personnel are needed, a request can be made through the Denver STC Program Office.

2.4 EQUIPMENT & ASSETS

Occasionally, locally available equipment or capabilities will need to be augmented with specialized capabilities, such as remote analysis and alarm tracking, force multipliers for enhanced steady-state operations, integration of federal and multi-agency assets to respond to credible threats, historical PRND and/or intelligence data, or specialized equipment (such as neutron radiation analysis or high purity Germanium [high resolution] gamma spectroscopy) to properly resolve an alarm. The Denver STC will work to identify and integrate resources as the program expands, but will also rely on the capabilities listed in the Colorado PRND CONOPS, available to Colorado PRND partner agencies through several Federal and State programs, such as the Department of Energy’s Radiological Assistance Program (RAP), U.S. Department of Homeland Security’s Mobile Detection Deployment Program (MDDP), Civil Support Team (CST), the Radiological/Nuclear Search Operation (RSNO) capability, and the Visible Intermodal Prevention and Response (VIPR) team. These assets can be accessed remotely or deployed to the scene to provide technical information and/or coordination that supports a law enforcement investigation or PRND response.

Maintenance, calibration, and replacement projections for all STC equipment will be incorporated into procurement and sustainment planning for the program. This is necessary to capture the long-term costs of maintaining the proper functioning of the equipment to successfully execute all facets of the RN detection mission. Equipment standard settings and procedures are in [Section 8: Standard Equipment Settings](#).

2.4.1 HUMAN PORTABLE UNITS

This equipment is small and light enough to be carried easily by a single person, either as a handheld device or in a backpack, and includes dosimeters, personal radiation detectors (PRDs), and radioisotope identification devices (RIIDs).

2.4.1.1 PRD

Personal radiation detectors (PRDs) are vital to interdiction and response missions where both innocent and threat sources must be quickly and easily detected, identified, and located in real time. PRDs offer highly sensitive and versatile radiation measurement that incorporates radiation detection and identification with a flexible technology platform that can be meet the agile demands of law enforcement, first responders, and other agencies.

The RadEye sPRD has a gamma dose rate measuring range up to 250 $\mu\text{Sv/h}$ (25 mR/h or 25 mRem/h). It provides detection while also having the capability to eliminate nuisance alarms from naturally occurring radiation sources, of particular importance in and around the Denver area with a naturally higher level of terrestrial radiation.

2.4.1.2 BACKPACKS

Radiation detection backpacks are portal and mobile units designed for executing covert searches of gamma-emitting (and in some cases neutron-emitting) radioactive materials. The unit's detector and associated electronics are contained in a backpack, allowing the operator to perform inconspicuous searches in public areas. These devices are especially useful in situations where radiation search surveys of large crowds or high-profile events are performed.

2.4.1.3 RADIOISOTOPE IDENTIFICATION DEVICES (RIID)

Radioisotope Identification Devices (RIIDs) are instruments that are designed to determine the identity of radioactive materials by measuring the energy of the emitted gamma rays. Denver STC Secondary Screening personnel are being equipped with RIIDs as part of a national strategy to interdict illicit movement of radioactive material. When radiation sources are detected by primary screening devices, RIIDs are used to determine whether the source of radioactivity constitutes a high-level threat and to convey data to technical and national level Reachback partners. RIIDs will also be deployed for situational assessment during radiological emergencies.

RIID file names should not be changed. Important data is contained in the file names, such as data and time of acquisition and instrument information.

It is a good practice for internally stored files on a RIID to be removed and properly stored before next use. This process will not only minimize confusion during encounter file transfer, but it will also assist with evidence accountability. The deploying agency should consider maintain a backup detector and additional flash cards (as appropriate) in the case the flash card or actual instrument needs to be retained as evidence.

2.4.1.4 SAMSUNG TABLETS

The Denver STC Program Management Office (PMO) will be providing Samsung tablets that will accompany each Radioisotope Identification Device (RIID). These tablets are provided to the PMO by the CWMD STC Program Office, with the platform as designed by the federal sponsor. The intent of these devices is to provide a mechanism for sending spectra information to local and national Reachback while also providing a standardized reporting tool for all STC related field events.

2.4.1.5 MOBILE SYSTEMS

Mobile detection systems contain larger detectors. Typically, mobile detection systems interface with a laptop computer to display alarms and analysis and are capable of both detection and identification. This display often contains additional information about the alarm including left side, right side, intensity above background radiation, dose rate, and in some cases identification of the gamma emitting isotope. Examples of this type system would be vehicle mounted systems that are mounted on a vehicle platform (SUV, truck, van, boat, or helicopter) and can be either single-sided or dual-sided mounts.

2.4.1.6 AERIAL SYSTEMS

These systems are radiation detectors carried by either helicopters or small planes and are used for detection operations in large areas that are not easily covered using other mobile systems. Aerial systems are primarily used for geophysical surveys to develop maps of local baseline radiation levels and/or mapping contaminated regions which may be difficult to access on the ground.

2.4.1.7 MOBILE DETECTION DEPLOYMENT PROGRAM

Mobile Detection Deployment Program is a national CWMD radiological and nuclear detection “surge” asset. MDDP supplements the existing radiological and nuclear detection and reporting capabilities of first responders, particularly in support of national and other special security events. The Denver STC will rely on support from the MDDP equipment loaner program as needed, to support routine or specialized screening demands and activities.

Each Mobile Detection Deployment Unit (MDDU) can provide a wide range of detection equipment systems that can be temporarily integrated into first responder operations. The detection instruments in each MDDU provide emergency personnel with the ability to detect radiological and nuclear material in a wide range of operational profiles. The responsibilities of these experts include: (a) providing the first responders with on-site training; (b) managing equipment distribution; and (c) performing on-site equipment maintenance.

Deployment of a MDDU is authorized through the CWMD Operations Support Directorate (OSD). Requests for a MDDU deployment should be submitted through the MDDU request procedure, directed to CWMD at cwmd_mddu_request@hq.dhs.gov.

2.4.2 DISTRIBUTION

2.4.2.1 ISSUANCE OF EQUIPMENT

The STC PMO will issue detection, adjudication, and notification equipment that supports the operations goals of the program, as outlined, and scheduled in a risk-informed Equipment Distribution and Schedule Plan, as supported through the annual programmatic objectives and milestones. PRDs will be issued to Primary Screeners once they have successfully mastered the PER-243 Course. RIIDs, backpacks and mobile systems will be distributed to the agencies indicated on the Plan once personnel have been properly certified to deploy the equipment. The STC PMO will also maintain a cache of equipment to be used during ESS deployments. This Plan may be modified as new partner agencies are added with the approval of the Executive Committee.

2.4.2.2 BATTERIES

The STC PMO and the Denver STC Program will provide support for charging devices and batteries for equipment (AA and CR123 cell batteries for example), for radiation detection devices used within the STC operational framework.

2.4.2.3 EQUIPMENT HANDLING

Settings (alarm thresholds, function screens, etc.) for STC equipment will not be modified without approval of the STC Denver office and should only be done by trained personnel. All equipment should be properly maintained by the end user. If required, calibration and repair (C/R) will be facilitated and tracked by the Denver STC office. Agencies should strive to return equipment to the designated personnel in a timely manner when notified that C/R is needed. Data logs of capable equipment can be downloaded by the STC Denver office and provided to the local agencies upon request. If needed, replacement equipment should be requested from the STC PMO.

2.4.2.4 OPERATION

Whenever equipment is deployed, it should be verified as working properly. This can be accomplished by “bump” testing the detectors or isotope identifiers against a known source such as a testing card or calibration source and comparing with previous or published results. Verification of sufficient battery strength is important for equipment to perform within specifications. When performing full function testing, such as spectra collection with a RIID, the activity will be documented, and details reported through the asset tracking and management framework established between the Partner Agency and the Denver STC PMO.

2.4.2.5 VENDOR INFORMATION

- Personal Radiation Detectors (sPRD): Thermo Fisher Scientific (Thermo)
- Portable “Backpack” Radiation Detectors: Sensor Technology Equipment (STE)
- Radiation Isotope Identification Detector: Berkeley Nucleonics Corp. (BNC)
- Mobile Detectors (i.e., vehicle, marine or aircraft mounted): Radiation Solutions Inc. (RSI)

2.4.3 DEPLOYMENT

During daily, steady-state operations, radiation detection equipment will be deployed with Partner Agency responders during regular service calls, on a routine basis. This equipment will be deployed in a manner that will not interfere with routine assignments but provide a continual detection capability as a secondary mission.

The initial step before all missions is to ensure that the PRND equipment (PRNDE) is ready to use prior to daily or on-call deployment. Agencies will establish a known location or access point to allow Screeners to perform a source check before deploying with a PRNDE. To conduct the source check, Screeners will position the PRNDE at the manufacturers recommended distance from the source and allow it to display all visible, audible, and vibratory indicators.

2.4.3.1 PROGRAM DISTRIBUTION AND STAGING

The Denver-STC PMO will coordinate with partner agencies to inventory and distribute STC related equipment, as outlined and scheduled in the Equipment Distribution and Deployment Plan. This deployment will align with and incorporate where possible current national framework operations and resources, such as the CWMD Mobile Detection Deployment Program (MDDP). The Denver STC PMO will coordinate with the federal sponsors, participating agencies, and recipient agencies for delivery schedules and provide logistics support for distribution processes.

When not deployed during daily or routine activities, distributed equipment will be stored or staged according to each agency's equipment access protocols and parameters, at the assigned location or within rapid-deployment distance.

Steady State equipment deployment includes:

- Routine patrol and response processes
- Routine event location sweeping (JHAT) activities
- Inclusion of federal assets for routine large-scale events
- Routine event choke point screening

2.4.3.2 PRND ACTIVITIES

PRND operations include three types of activities within the primary modes: mobile detection, stationary detection, and identification.

Mobile Detection

Mobile detection occurs when detection equipment is moving. Radiation detectors may be hand carried on a person or mounted in a vehicle. The threat material may or may not be moving, so mobile detection activities will typically focus on effectively and rapidly monitoring areas for the presence of radioactive materials. Common mobile detection applications include area and venue clearance operations.

Area detection activities are systematic detection operations conducted in a specific region to detect illicit radioactive material. Area operations may vary in size and could be as large as an entire neighborhood or city. An aircraft can be used to quickly cover large areas but does not have the sensitivity of ground-based instrumentation such as foot patrols equipped with Personal Radiation

Detectors (PRDs) or backpack systems.

Venue Clearance operations are performed using similar techniques as area operations, but they are focused on conducting a sweep of the venue for radiological/nuclear threats prior to and (possibly) during an event such as major sporting events.

Stationary Detection

Stationary detection occurs when PRNDE is operated in a fixed location. This activity provides opportunities for detailed coverage of a specific location and relies on the materials of concern passing in proximity of the detector.

The most common use of stationary preventative radiological/nuclear detection is when choke/constraint point operations are conducted at natural or man-made choke/constraint points. These operations are focused on entrances to an area or fixed site. Choke/constraint points force the movement of people and goods to the primary screening location so that time, distance, and shielding are optimized for detection of radiological/nuclear material. Choke/constraint point operations may be conducted on people, vehicles, or goods.

Stationary detection can be performed by portable equipment assigned to a specific location, such as security personnel with PRDs or staged backpacks assigned to a venue access gate.

Identification

Identification occurs after a source has been encountered. Identification can involve using a radioisotope identification device (RIID). Should the RIIDs deployed with Denver STC operators not have sufficient capability to confidently identify the materials; support of remote experts through a technical Reachback program and/or high-resolution detectors will be engaged. The use of high-resolution gamma spectrometers can help resolve ambiguous detection events.

2.4.3.3 TRIGGERS

There are several missions that might be able to use PRNDE to establish environmental contamination or radiation levels that may help support appropriate protective action decisions. The specific reading that may be used as a trigger for action will be highly dependent on many factors such as the radionuclide (or mixture of radionuclides), the type of event, and the time that the measurement is made.

Denver STC PRNDE can provide decision makers with indicators to support initial, time sensitive decisions. The primary PRND tool used within the Denver STC Region is the personal radiation detector. Detection of higher-than-background readings will trigger an alert on the PRD. A radiation alert on one of these devices will subsequently trigger screening and adjudication protocols, including the use of more capable detectors.

Spectroscopic screening and equipment will be deployed when primary screening adjudication is not possible, as outlined in the screening protocols in Section 5.

Denver STC PRND systems may be deployed during special events, such as all National Special Security Events (NSSE) or via the Special Event Assessment Rating (SEAR), as well as events with large attendance or as deemed necessary by the Chief of Police or their designee. These determinations will be made based on the event and associated intelligence. Special Operation's

Units/Personnel are regularly, if not always, deployed at these type of events for additional tasking.

2.5 COMMAND AND COMMUNICATIONS

During steady state and enhanced steady state operations, Denver STC detection operators will engage with command staff to support a coordinated strategic communications effort with the local PMO to enable mission partners to speak with a unified voice, provide consistent messaging, and use communication resources to better accomplish the mission of preventing RN terrorism.

2.5.1 GOVERNANCE STRUCTURE

The Denver STC committees support the implementation of the Denver STC Program and the goals and objectives outlined in the STC Stakeholder Implementation Plan. The committee structure consists of the Executive Committee which provide overarching leadership and consensus, and four subcommittees which support the functional areas of the STC Program.

- The Executive Committee provides high level strategic guidance and consensus for the implementation and sustainment of the STC Program. The committee identifies issues affecting the overall program at a strategic level. The committee prioritizes and delegates solution development to the four functional committees, to address issues in a comprehensive manner.
- The Operations Subcommittee works to institutionalize and standardize realistic and effective operational plans, protocols, and procedures.
- The Equipment Subcommittee's overall goal is to develop an effective and sustainable equipment infrastructure.
- The Training and Exercise Subcommittee's top priority is to maintain proficiency of operators throughout the region with respect to RN detection, through training and exercise coordination to validate and sustain the program CONOPS and SOPs.
- The Information Exchange Subcommittee works to institutionalize and standardize information and data exchange between regional stakeholders and the Federal government.

2.5.2 INFORMATION SHARING

Incidents begin and end locally, and most are wholly managed at the local level. Some incidents require unified response from local agencies, nongovernmental organizations, and the private sector, and some require additional support from neighboring jurisdictions or the state. A small number require federal support.

In accordance with the National Incident Management System, the command organization for any incident or event is as follows:

- Incident Command/Unified Command will be established in the jurisdiction where the incident occurs and will have overall command and control of the incident site and subsequent emergency response operations.

Formal information sharing guidance is captured in the Information Exchange plan, and Denver 911 has been established as the Command-and-Control Virtual Operations Center.

The program will routinely use information that falls under varying local, state, and federal data privacy and protection requirements. Policy and oversight are required to ensure compliance and

protection of data, as included in the notification and reporting protocols and the Information Exchange Plan. The agreements executed with all participating partners establish the protected data policy for sensitive program administration and RN detection reporting.

2.5.2.1 PUBLIC INFORMATION AND MEDIA

RN detection response coordination activities include synchronization of public affairs and public information and should, therefore, include agency public affairs officers from involved agencies throughout an incident response process. Within the City and County of Denver, emergency public information and media information is initially coordinated by the Department of Public Safety's Public Information Officers (PIOs). At such time where the complexity and scope of the event exceeds their capabilities, a request will be made to OEM, with consensus among involved agencies and approval from the Mayor's Office, to activate the Joint Information Center (JIC) and/or the Emergency Operations Center (EOC). The City's existing plans and procedures relevant to public information and media will be followed. Additional information is provided via radio, television, print, and social media as needed.

Recognizing that the public's demand for information can conflict with a law enforcement investigation, regulatory requirements and/or the safety and well-being of individuals, public information officers (PIO) will seek to provide the most full and complete information regarding the incident and response that does not conflict with existing laws or regulations such as the Health Insurance Portability and Accountability Act (HIPAA), an on-going investigation, or the reasonable right to privacy of individuals impacted or involved in the incident or response.

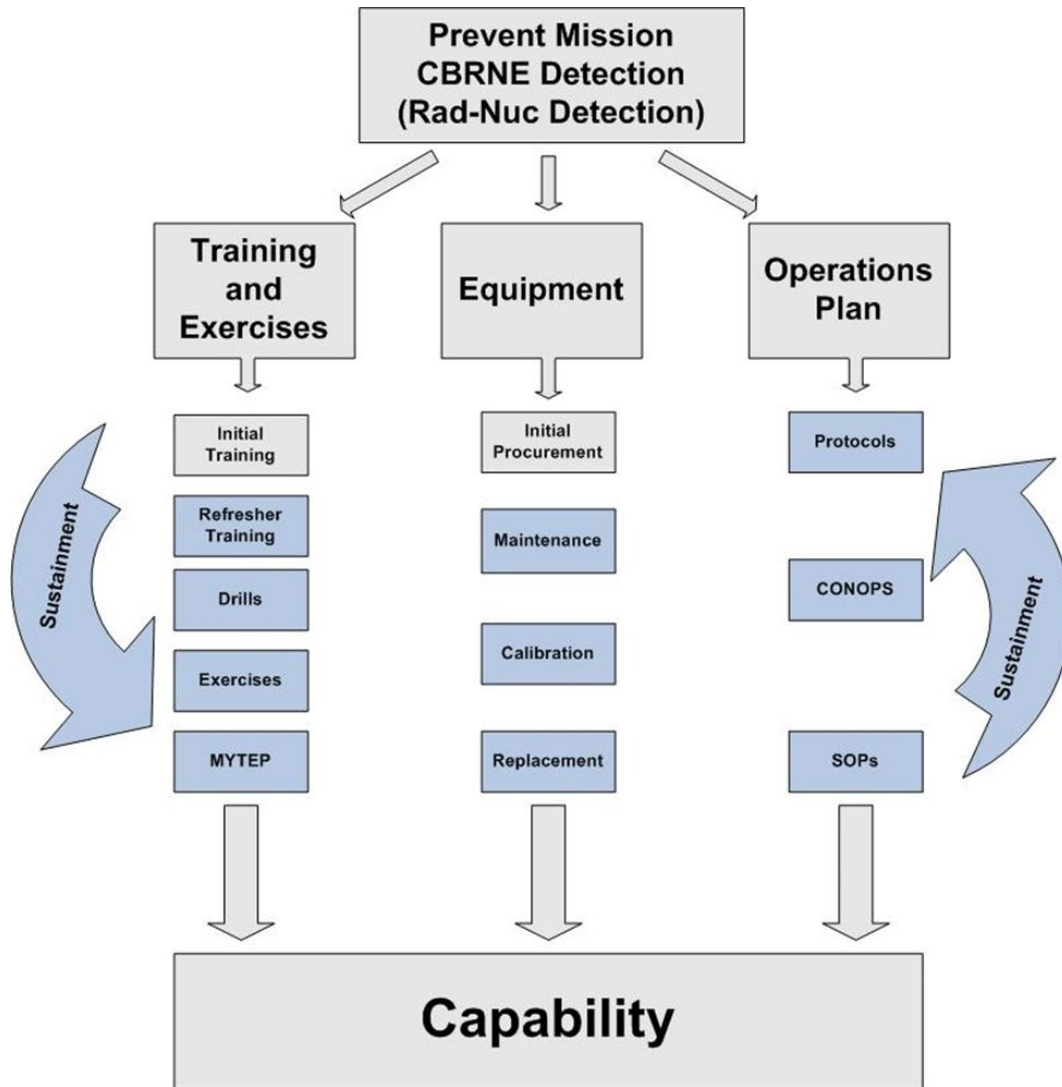
When federal criminal prosecution or civil litigation arise, the U.S. Department of Justice will be consulted on content and approval of the issuance of any media releases, as appropriate, and will determine the extent to which servicing US Attorney Offices will participate in the process.

2.5.3 ADMINISTRATION AND LOGISTICS

2.5.3.1 CONCEPT OF SUSTAINMENT

Maintaining an effective RN detection capability requires active management of several key areas of the program. A coordinated homeland security strategy combines enhanced planning, new equipment purchases, innovative training, and realistic exercises to strengthen the stakeholder agency's prevention and emergency response capabilities.

Figure 4. Denver STC Sustainment Cycle (*MYTEP current for FY22, will be updated to IPP for FY23)



2.5.3.2 PLAN REVIEW AND MAINTENANCE

This Plan was developed by the Denver STC Program in conjunction with the participating Principal Partners. The Plan should be reviewed annually or when major changes occur to assure continuity and accuracy of the information included in the document, including contact information and/or in processes or procedures. Additionally, the Plan should be reviewed immediately after an RN emergency and after exercises are concluded to identify necessary amendments and revisions that would enhance its planned response to better address the Denver STC Program needs.

The Plan Review and Maintenance Section is used to ensure review and update of the Denver STC Operations Plan on the following basis:

- Annually
- During and after Training Events
- During and after every emergency event triggering activation

- Following any annual drill

2.5.3.3 TRAINING AND EXERCISES

An effective training and exercise program is essential for maintaining perishable skills that are required in the performance of the RN detection mission. The Denver STC Training and Exercise Plan (the current MYTEP will be updated to an IPP during year 3 of the program) is the roadmap for stakeholder agencies to accomplish the priorities described in their Homeland Security Strategy. Training and exercises play a crucial role in this strategy, providing a means of attaining, practicing, validating, and improving new capabilities.

These exercises will provide a means to test regional capabilities and vet planning efforts. Denver STC Program drills and exercises will follow DHS guidelines, and will integrate lessons learned through after- action reports.

Further details about the Homeland Security Exercise and Evaluation Program (HSEEP), with sample templates and guidance documents can be found at the following site:

[DHS - HSEEP Document https://www.fema.gov/media-library/assets/documents/32326](https://www.fema.gov/media-library/assets/documents/32326)

The full schedule of training and exercises intended to support the STC Program and increase the overall capabilities throughout the region is found in the Denver STC MYTEP.

Table 1. Training Schedule

Level of Training	Type	Frequency	Objectives
Primary Screener Training <ul style="list-style-type: none"> • PRD – PER-243 	Initial Refresher	Annual	<ul style="list-style-type: none"> • Functional Checks • Functions and Alarms • Search • Operating Skills • Assessing Threats • Adjudicate Alarms
Secondary Screener Training <ul style="list-style-type: none"> • RIID – PER 245 • Backpack – PER-246 • Mobile System • Radiation Detection Kit • On-line ArcGIS Survey 123 Alarm Reporting & Forms 	Initial Refresher	Annual	<ul style="list-style-type: none"> • Functional Checks • Functions and Alarms • Search • Operating Skills • Detecting Radiation • Identifying Isotopes • Adjudicating Alarms • Conducting Reachback • Adjudicate Alarms • Assessing Threats

Table 2. Exercises and Drills Schedule

Exercise Category	Type	Frequency	Objective
Primary Screening <ul style="list-style-type: none"> • Drills and Exercises • Search room/container • Search vehicle • Search personnel • Search package/bag 	Basic	30 days	<ul style="list-style-type: none"> • Functional Check • Functions and Alarms • Search Techniques
Primary Screening <ul style="list-style-type: none"> • Drills and Exercises • Search building • Search parking lot or multiple vehicles • Search multiple people • Choke point -pedestrian • Choke point – vehicle 	Intermediate	90 days	<ul style="list-style-type: none"> • Functional Check • Functions and Alarms • Search Techniques • Small Venue • Choke Point – one or several people/ vehicle(s)
Primary Screening <ul style="list-style-type: none"> • Drills and Exercises • Search compound/facility or section of city • Special event (live) • Choke point - pedestrian • Choke point – vehicle 	Repetitive	180 days	<ul style="list-style-type: none"> • Functional Check • Functions and Alarms • Search Techniques • Search Operations • Large Venue • Choke Point – large numbers of people/ vehicles
Secondary Screening <ul style="list-style-type: none"> • Drills and Exercises • In house drill • No interagency Communications 	Basic	30 days	<ul style="list-style-type: none"> • Functional Check • Functions and Alarms • Search Techniques • Perform ID • Take spectra • Transfer spectra to computer • Complete Reachback form
Secondary Screening <ul style="list-style-type: none"> • Drills and Exercises • Exercise Reachback • Interagency Communications drill • Adjudication 	Intermediate	90 days	<ul style="list-style-type: none"> • Functional Check • Functions and Alarms • Search Techniques • Perform ID • Take spectra • Transfer spectra to computer • Complete Reachback form • Initiate Reachback • Transmit data to Reachback



<p>Secondary Screening</p> <ul style="list-style-type: none">• Drills and Exercises• Exercise Reachback• Interagency COMMs drill• Adjudication• Secondary screening in support of a multi-agency effort	Repetitive	180 days	<ul style="list-style-type: none">• Receive adjudication• Functional Check• Functions and Alarms• Search Techniques• Perform ID• Take spectra• Transfer spectra to computer• Complete Reachback form• Initiate Reachback• Transmit data to Reachback• Receive adjudication• Perform secondary screening as part of FSE• Follow multi-agency protocol and local agency SOPs (NIMS)
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SECTION 3: BACKGROUND

3.1.1 GLOBAL NUCLEAR DETECTION ARCHITECTURE (GNDA)

The Global Nuclear Detection Architecture (GNDA) is a framework for detecting (through technical and non-technical means), analyzing, and reporting on nuclear and other radioactive materials that are out of regulatory control. The GNDA presents the adversary with many obstacles, increasing the cost, difficulty, and risk of attack. The presence of an effective detection architecture also serves to convince the adversary that any attempt to acquire, transport, or utilize nuclear or other radioactive materials in malicious acts will fail. The GNDA structure relies on the critical triad of intelligence and information sharing, law enforcement, and technology:

- Intelligence and Information Sharing – resources and networks detect threats and focus detection capabilities.
- Law Enforcement – front-line personnel are trained, exercised, and equipped to confront and investigate the threat.
- Technology – new nuclear detection technologies are developed, tested, and deployed.

The U.S. Government's (USG) GNDA efforts are intended to enable a defense-in-depth across multiple pathways and layers:

- Exterior layer: Includes foreign countries, non-governmental organizations, and USG international activities. The USG assists in developing and implementing international detection architectures and strategies with foreign GNDA partners. Additionally, the USG works to expand reporting and information sharing agreements and communications channels with foreign governments on nuclear and radiological incidents.
- Trans-border layer: Includes transit to the U.S. and the U.S. border. The USG works on deploying detection assets at domestic land and seaports of entry (POE) and continues to work to enhance scanning between POEs and at air POEs as appropriate.
- Interior layer: Includes the domestic U.S. but excludes the U.S. border. The USG works with state, local, private, and tribal stakeholders to build basic detection architectures and enhanced awareness of the threat. Improved connectivity and situational awareness amongst federal, state, local, private, and tribal stakeholders continue to be a priority.
- Cross-cutting efforts: Includes activities that apply across or to all geographic layers.

This layered, multi-faceted defense provides multiple opportunities to detect, deter, disrupt, and/or interdict an attack.

3.1.2 GNDA STRATEGIC PLAN GOALS

Goal 1: Planning and Assessment – Assess current and future GNDA partners' capabilities to detect nuclear or other radioactive materials out of regulatory control to identify priorities to enhance RN detection and plan to address gaps.

Goal 2: Analysis and Reporting – Enable information sharing, analysis, intelligence fusion, and technical data exchange among GNDA partners to support detection and reporting of nuclear or other radioactive materials out of regulatory control.

Goal 3: Technical Detection – Develop and deploy sustainable technical detection solutions that

address capability needs and gaps.

Goal 4: Operational Support -- Support the development and sustainment of efforts to address awareness, training, and exercises to facilitate implementation of capabilities to detect nuclear or other radioactive materials out of regulatory control.

Goal 5: Communication – Communicate GNDA partner efforts and coordinate public messaging pertaining to nuclear or other radioactive materials out of regulatory control to enhance detection, analysis, and reporting and deter adversaries.

3.1.3 COUNTERING WEAPONS OF MASS DESTRUCTION OBJECTIVES

The Countering Weapons of Mass Destruction Office addresses the radiological/nuclear detection aspect of the Prevent and Protect mission areas through various programs and initiatives. CWMD leads the implementation of the domestic portion of the GNDA.

Objective 1: CWMD will use a common strategy in each STC implementation that will then be tailored for the requirements of that region. This strategy will put in place a comprehensive structure for developing all architectural elements and will encompass all elements of capability development.

Objective 2: Establish information connectivity among deployed detection systems in the interior layer and State, local, tribal, private, and regional data analysis centers, to include connectivity for technical Reachback and adjudication support. Information exchange is critical to reducing the risk of any terrorist attack. Additionally, an Information Exchange Plan will ensure that proper and effective information sharing practices and policies are institutionalized within the region with respect to the STC Program.

Objective 3: Establish administrative infrastructure to support RN detection program. CWMD will play a major role during STC implementation to set up the managing structures allowing the partners to develop a self-managed and sustainable program supported by significant long-term Federal funding and technical assistance.

Objective 4: Establish coordination mechanisms between operational partners for steady-state operations, enhanced steady-state operations, and search deployments. This Operations Plan that has concurrence from all principal STC partners is the key document defining coordination within and outside the region.

SECTION 4: THREAT INDICATORS

4.1 PRIMARY THREAT INDICATORS

Mission partner responders must immediately notify the FBI during encounters with RN materials, or potential devices containing RN materials, where the following threat indicators are present:

- Upon the identification of a potential threat that may or may not involve a WMD device or related materials, including RN device or materials;
- During crisis response to determine credibility of an imminent WMD threat, including an RN threat;
- During deliberate planning to mitigate or share information regarding a non-imminent credible WMD threat, including an RN threat;
- When an incident occurs without warning;
- When a radiation alarm in the field is perceived as a potential threat; or
- For a perceived threat discovered at the local or national level.

Table 3. Isotopic Threat Indicators

Isotopes of Major Concern (Nuclear weapons or Special Nuclear Material (SNM))	
Plutonium-239 (Pu-239)	SNM, used in nuclear weapons, accompanied by neutron emissions, byproduct of nuclear reactor operations. May be identified as WGPu or “weapons grade Pu.”
Plutonium-240 (Pu-240)	SNM, byproduct of nuclear reactor operations. Typically, not seen without Pu-239 also being present. Will be accompanied by neutron radiation. Most RIIDs will identify as “Reactor Grade Pu” or “RGPu”
Uranium-235 (U-235)	SNM, fissile material in nuclear weapons. It is accompanied by neutron emissions, although does not emit neutrons itself. Sources include naval propulsion systems (reactors in ships and submarines). Highly enriched uranium (HEU) is >20% U-235, low enriched uranium (LEU) is <20%; may be identified by RIIDs as “HEU” and “LEU,” respectively.
Uranium-233 (U-233)	SNM, used in nuclear power production and can be used in nuclear weapons. It is accompanied by neutron emissions, although it does not emit neutrons itself.
Neptunium-237 (Np-237)	Considered SNM due to its fissionable properties, a byproduct of plutonium production activities and results from the capture of neutrons by uranium isotopes, usually in a nuclear reactor; used as component in neutron detection instruments.

4.1.1 THE EIGHT SIGNS OF TERRORISM

While RN alarms are rarely related to a terrorist or criminal threat, terrorist or criminal threats involving RN materials require a time sensitive response to potentially prevent substantial loss of life or substantial damage to property. Mission partner authorities who detect or discover RN materials potentially associated with a WMD and terrorist or criminal activity within the United States must immediately contact the FBI to resolve the threat.

Terrorist operations usually begin with extensive planning. You can help prevent and detect terrorism – and other types of crime – by watching out for suspicious activities and reporting them to the proper authorities.

- 3) **Surveillance:** Someone recording or monitoring activities. This may include the use of cameras, note taking, drawing diagrams, annotating on maps, or using binoculars or other vision-enhancing devices.
- 4) **Elicitation:** People or organizations attempting to gain information about military operations, capabilities, or people. Elicitation attempts may be made by mail, email, telephone, or in person. This could also include eavesdropping or friendly conversation.
- 5) **Tests of Security:** Any attempts to measure reaction times to security breaches, attempts to penetrate physical security barriers, or monitor procedures to assess strengths and weaknesses.
- 6) **Funding:** Suspicious transactions involving large cash payments, deposits, or withdrawals are common signs of terrorist funding. Collections for donations, the solicitation for money and criminal activity are also warning signs.
- 7) **Supplies:** Purchasing or stealing explosives, weapons, ammunition, etc. This also includes acquiring military uniforms, decals, flight manuals, passes or badges (or the equipment to manufacture such items) and any other controlled items.
- 8) **Impersonation:** People who don't seem to belong in the workplace, neighborhood, business establishment, or anywhere else. This includes suspicious border crossings, the impersonation of law enforcement, military personnel, or company employees is also a sign.
- 9) **Rehearsal:** Putting people in position and moving them around according to their plan without committing the terrorist act. An element of this activity could also include mapping out routes and determining the timing of traffic lights and flow.
- 10) **Deployment:** People and supplies getting into position to commit the act. This is the person's last chance to alert authorities before the terrorist act occurs.

If at any point in the screening or alarm adjudication process a **terrorism or criminal nexus** is suspected, the responder should elevate the alarm to National-Level Reachback using agency-specific escalation protocols, and **immediately notify the FBI**.

4.2 RADIATION SOURCE TYPES

4.2.1 NON-TERRORISM: COMMON INNOCENT RADIATION SOURCES

The following sources of alarms will be commonly encountered and do not represent a terrorism threat, although regulatory follow-up activities may be required in some cases:

- Industrial Radiography, and examination of the structure of materials by nondestructive methods, utilizing radiation to make radiographic images
- Medical treatments, such as injection of radiopharmaceuticals or implantation of radioactive material into a person for the purpose of medical diagnosis or treatment
- Exempt consumer products containing radioactive material
- Transport or use of radioactive material, including improperly shipped or managed material without intent to harm. Note that safety and regulatory follow-up actions may be required for radioactive material that is improperly shipped or used.
- Naturally Occurring Radioactive Materials (NORM)



4.2.2 INDUSTRIAL AND COMMERCIAL SOURCES

4.2.2.1 COMMON COMMERCIAL NEUTRON SOURCES AND ISOTOPES (EXAMPLE NEUTRON SOURCES: SOIL DENSITY GAUGES & WELL LOGGING SOURCES)

- Americium Beryllium (Am Be) – Alpha, Neutron source
- Californium 252 (Cf -252) – Neutron source
- Polonium Beryllium (Po Be) – Alpha, Neutron source
- Plutonium Beryllium (Pu Be) – Alpha, Neutron source
- Radium Beryllium (Ra Be) – Alpha, Neutron source

4.2.2.2 COMMON SOURCES USED IN INDUSTRY (MAY BE OF CONCERN IF MISUSED)

- Americium (Am-241)
- Antimony (Sb-124)
- Barium (Ba-133)
- Cesium (Cs-137)
- Cobalt (Co-57)
- Cobalt (Co-60)
- Iridium (Ir-192)
- Radium (Ra-226)
- Selenium (Se-75)
- Scandium (Sc-46)
- Thorium (Th-232)

4.2.2.3 MEDICAL ISOTOPES

Someone who has received a nuclear medical treatment within the past two weeks may trigger a radiation alarm. These may be in a person’s bloodstream or pulmonary system or implanted as pellets.

Table 4. Common Medical Isotopes

Cesium-131 (Cs-131)	Fluorine-18 (F-18) ¹	Palladium-123 (Pd-123)
Iodine-125 (I-125)	Gallium-67 (Ga-67)	Radium-223 (Ra-223)
Iridium-192 (Ir-192) ³	Germanium-68 (Ge-68) ²	Rubidium-82 (Rb-82)
Palladium-103 (Pd-103)	Indium-111 (In-111)	Samarium-153 (Sm-153)
Ruthenium-106 (Ru-106)	Iodine-123 (I-123)	Strontium-82 (Sr-82) ⁵
Iodine-125 (I-125)	Strontium-85 (Sr-85)	Palladium-123 (Pd-123)
Iodine-131 (I-131)	Strontium-89 (Sr-89)	Radium-223 (Ra-223)
Iodine-131 (I-131)	Technetium-99m (Tc-99m)	Rubidium-82 (Rb-82)
Krypton-82 (Kr-81m)	Thallium-201 (Ti-201)	Samarium-153 (Sm-153)
Lutetium-177 (Lu-177)	Xenon-133 (Xe-133) ⁶	
Molybdenum-99 (Mo-99) ⁴	Yttrium-90 (Y-90)	
Nitrogen-13 (N-13)	Zinc-65 (Zn-65)	

- 1 Fluorine-18 (F-18) may be identified by RIID as “ionizing radiation” or “annih.”
- 2 Ge-68 is a PET scan calibration source – not normally used in a patient.
- 3 Ir-192 is commonly used as a temporary implant; this source should never be detected within a patient and could be used in a radiological exposure or dispersal device.
- 4 Mo-99 should not be found in the patient unless there has been an error during manufacturing. Mo-99 may be identified when a generator is in transit.
- 5 Sr-82 is used to generate Rb-82 and should not be found in the patient unless there has been an error during manufacturing. Sr-82 may be identified when a generator is in transit.
- 6 Xe-133 is used for lung capacity tests and is out of the patient’s system within minutes of administration.

4.2.3 NATURALLY OCCURRING RADIOACTIVE MATERIALS (NORM) AND COMMON CONSUMER PRODUCTS

4.2.3.1 COMMON NATURALLY OCCURRING RADIOACTIVE ELEMENTS

- Potassium (K-40)
- Radium (Ra-226)
- Thorium (Th-232)
- Uranium (U-238)

4.2.3.2 ITEMS AND PRODUCTS THAT MAY CONTAIN NATURALLY OCCURRING RADIOACTIVE MATERIALS (NORM)

- Agricultural products (e.g., fruits & leafy vegetables; tobacco, marijuana, etc.)
- Aluminum ore (Ra-226, Th-232)
- Ammonium diuranate (U-238, U-235)
- Antique items including: Ceramic-glaze products in orange, red, or yellow, e.g., antique cups & plates, decorative floor tiles, jewelry, pottery, and Vaseline glass (emerald, green glass used in some antique cups, plates, etc.)
- Asphalt equipment (Cs-137, Am Be, by association cross-contamination id source integrity compromised)
- Bananas (large quantities), (K-40, Ra-226, Th-232)
- Batteries (K-40)
- Bentofix (K-40, Ra-226, Th-232)
- Building Materials: Concrete, Granite Marble, Monazite sand Sandstone, Slate
- Camera lenses and any high-quality optical lens may contain Th-232
- Carbon bricks, Carpet, Ceiling fans, Cement statues, Ceramic sanitary ware (toilets), Chinaware, Chopped fiberglass, Comate fireside additive (K-40, Ra-226, Th-232)
- Ceiling tile (Ra-226)
- Dental ceramics
- Feldspar: common raw material used in glassmaking, ceramics; sometimes paint, plastic, rubber
- Fertilizers (K-40, Ra-226, Th-232)
- Irradiated gemstones
- Lantern mantles (natural Thorium contains Th-232)
- Oil and gas piping, equipment (Ra-226)



- Polishing powders
- Propane tanker trucks (from radioactive deposits on tanker's interior walls)
- Radio-Luminescent Products (Radium paint): Watches, clocks, & instrument gauges.
- Smoke detectors (Am-241)
- Television sets
- Thoriated aluminum (an alloy containing Th-232)
- Thoriated tungsten arc-welding electrodes (Often labeled Thoriated welding rods)
- Uranium ore sample
- Products (fertilizer, animal feed) that contain phosphates (U-238)

4.2.4 CONTAMINATED MATERIALS (OTHER THAN NORM)

Commodities, scrap materials and waste that are contaminated with radioisotopes may be encountered.

- Commodities may be contaminated from accidents (e.g., Chernobyl, Fukushima) that have occurred elsewhere. Contamination may occur decades after the accident. (typically, Cs-137).
- Metal products may be contaminated due to foundry accidents where an orphan source (usually Co-60) is melted into the metal.
- Scrap materials may be contaminated by discarded radiation sources or devices.
- Municipal waste is occasionally contaminated by a discarded orphan source, but it is most contaminated with medical radioisotopes from the personal products of patients (e.g., diapers, other paper products).

SECTION 5: PREVENTION FRAMEWORK CRITICAL TASKS

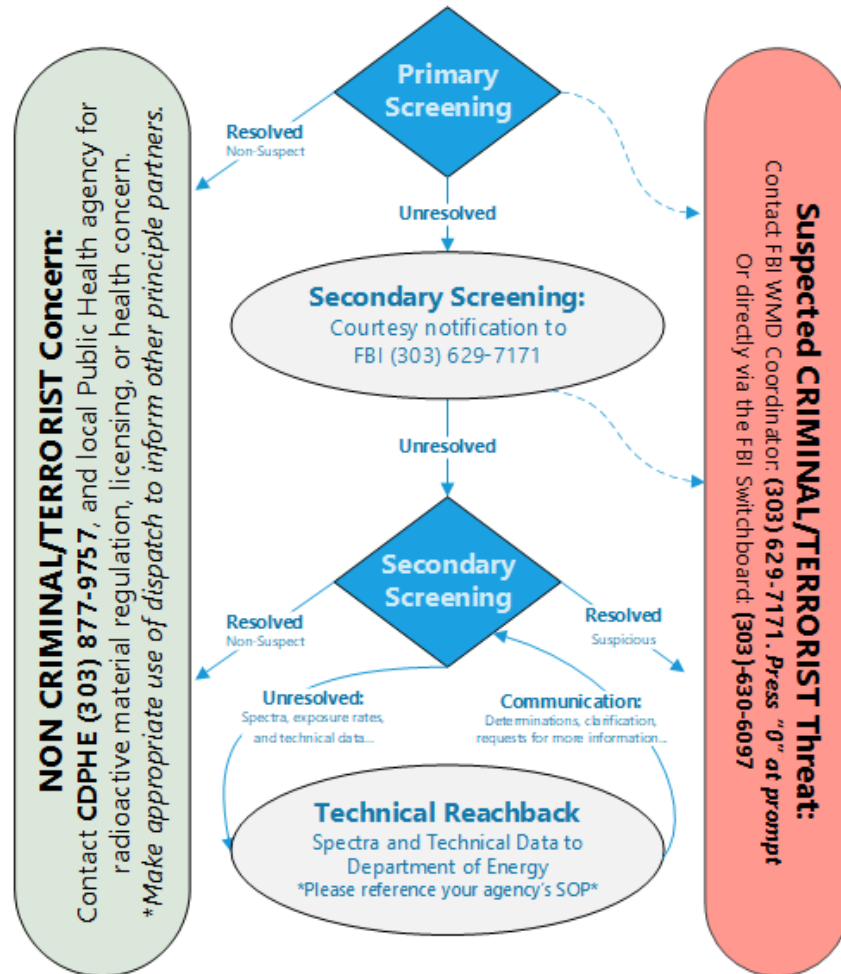
The alarm adjudication process is designed to recognize the source of the alarm and assess its significance at any stage of the screening process. The process uses onsite screening to detect and identify radiation sources. The process also identifies the procedures that should be employed to alert and notify the appropriate resources when certain conditions are met.

Each agency will establish more detailed standard operational procedures according to their organizational guidelines and directives with the intent of using regionally standardized methods. Copies of departmental SOPs are kept on file with the Denver STC Program Management Office to assist in maintaining regional standardization. A standard of screening and adjudication protocol has been included below.

Annual review of these SOPs will assure contact information, procedure alignment, communication bridge and equipment settings remain current.

5.1 RADIOLOGICAL/NUCLEAR MATERIAL DISCOVERY

Figure 5. Radiological Screening and Adjudication Overview Workflow



5.1.1 TOTALITY OF CIRCUMSTANCES/PRIMARY SCREENING

Primary screening equipment typically communicates the detection (alarm) to the primary screening operator or first responder using lights, audio, and/or numeric indicators. Following the detection, the operator or first responder must determine the general location of RN material, based on a totality of circumstances approach.

A totality of circumstances approach recognizes that there is no one single deciding factor for a decision, and that one must consider all the facts and the context to conclude, from the whole of available information, whether there is reason to believe that the detected RN material may be suspicious and potentially associated with a terrorist or criminal threat.

If the RN alarm is associated with a conveyance, package, or individual, the operator/first responder will conduct a passive visual inspection of the alarm location and interview any personnel associated with the alarm. Where possible, screeners will work to establish a two milliroentgens per hour (2mR/hr.) or a blast/fragmentation perimeter if suspected to be associated with a potential device.

5.1.2 GENERAL LAW ENFORCEMENT TACTICS, TECHNIQUES, AND PROCEDURES

PRND Interview Card (side 1)

LE Questions

- 1) Good Morning. The reason we stopped you is that a radiation sensor alarmed as we passed by you. Would you mind stepping over here where I can ask you a few questions?
- 2) Is there any reason that you might be carrying radioactive materials?
- 3) Did you recently have a medical procedure or treatment involving nuclear medicine, (heart stress test, bone scan, thyroid disease,)? (If no, see Side 2, # 9)
- 4) May we take a short measurement to confirm the alarm we received?
- 5) Do you recall what type of medical procedure or treatment you received and how long ago?
- 6) Did your physician provide you with a medical card or letter? (Over)

RND Interview Card (side 2)

LE Actions

- 7) If no medical procedure is identified by the individual, then proceed with:
May we perform a quick scan on you? (and belongings, if appropriate)
- 8) After separating the individual from any items they may be carrying and, if relevant, their vehicle, If no source is detected, then thank the individual for their cooperation.
- 9) If the source is identified as a medical isotope, then proceed with steps 10-12.
- 10) If source is identified as something other than a medical, then request follow-up support.
- 11) If the medical isotope and procedure are confirmed, then proceed with:
Our measurement confirms your explanation and the reason our sensor alarmed, thank you for your cooperation.
[If special event] May I see your individual ticket to the event today? I will record your seat number and mark your ticket with this sticker indicating that you have been through screening in the stadium today. If you are stopped again in the stadium today this lapel pin will identify to security personnel that you have already been through screening today.
- 12) Record a description of the individual and the location and report.

5.1.3 PARTNER AGENCY SOPS

5.1.3.1 STATE LAW ENFORCEMENT - PRIMARY SCREENING CHECKLIST

- **Continue to handle the task at hand** and note level at which your pager is signifying. Evaluating a Radiation Pager alarm should not be prioritized immediately over providing citizen care and services, unless the alarm is in relation to a threat to the member and/ or public safety, i.e. identification of a Radiologic Dispersal Device (RDD).
- If a source is coming from a person investigation is warranted. Use your best judgement on investigation and consider some of these types of questions if you feel it is appropriate:
 - I have detected elevated radiation levels being emitted from you/your car/possessions.
 - Do you know of any reasons for there to be elevated radiation in your car/possessions?"
 - Are you aware of any radioactive material in, on, or around you?"
- CSP Troopers/members will use the totality of the information available to them, including behaviors, interview information, and the nature/location of the possible radiological concern to support a preliminary assessment for the alarm and determine if further investigation is required.
- If other than a medical patient is identified, **DO NO TOUCH THE SOURCE**. Personnel should utilize time, distance, and shielding to protect themselves.
- Discovery of radiation during primary screening that **cannot be adjudicated** will be evaluated by a member of the CSP Hazardous Materials team Secondary Screeners through notification of dispatch.

5.1.3.2 MUNICIPAL LAW ENFORCEMENT - PRIMARY SCREENING CHECKLIST

When a radiation alarm condition is encountered during primary screening activities:

- Immediately note the dose rate alert level and type of radiation displayed on the detector.
- Attempt to verify the alarm and localize the source. An alarm is considered verified if it is repeatable. This can be performed by the same instrument or if two instruments alarm in the same general location.
- Once the source is localized, the Officer may, based on reasonable suspicion and the totality of the circumstances, detain the individual(s) for further investigation.
- If the perceived source is a vehicle or object, isolate the individual(s) from the vehicle object(s) to determine the location of the detected source of radiation.
- Investigate/question to determine if source is non-threat.
- Utilizing standard LE investigative techniques, question individual(s) as to cause of elevated radiation detection. Example types of questions include:
 - “I have detected elevated radiation levels being emitted from you/your car/possessions.
 - Are there any reasons for there to be elevated radiation in your car possessions?
 - Are you aware of any radioactive materials in, on, or around you?”
- Officers will use the totality of the information available to them, including behaviors, interview information, and the nature location of the possible radiological concern to support a preliminary assessment for the alarm and determine if further investigation is required.
- Special Note:
 - Officers who encounter and verify an alarm from a suspicious or unattended item will, in addition and alignment with the procedures set forth in the STC CONOPS, advise dispatch to notify the Bomb Unit and follow DPD OMS 121.04(4) - Suspicious Devices or Suspected Bomb Found on Premises; or if an immediate threat source(s) or conditions are encountered during any part of the alarm resolution process, secure the individual, isolate any belonging(s) or vehicle(s), and advise dispatch to make all appropriate agency notifications. Do not open any packages, bags, or doors until you have consulted with a Bomb Detective.
- Request Secondary Screening isotope identification if:
 - Primary screening procedures do not reveal the source of the confirmed alarm.
 - Radiation levels do not appear to be consistent with manifest shipping documentation or interview comments.
 - Radiation source appears to be a potential threat material condition.
 - Consistent, unexplainable neutrons detected.
 - Other inconsistencies/uncertainties are encountered.
- Readings above 5 mR/hr. may be encountered during the investigation, especially close to the person or object producing the radiation; however, if consistently elevated readings more than a foot away from objects or walls are encountered that cannot be immediately explained (above 2 mR/hr., or “8” on pagers), personnel should take the following protective measures:
 - Move away from the location of the suspected radiation source until a valid rate reading (less than 2 mR/hr. or “8”) is displayed. This will help ensure that personnel are not within a high radiation exposure area.

- Secure the area
- Establish control perimeter at the 2 mR/hr. boundary (or where the pager reading transitions to less than “8”).
- Advise dispatch to contact Secondary Screening Team and continue to investigate if safe to do so.
- If the 2 mR/hr. boundary is greater than ten feet from the source, or the PRD is overloaded or indicating “9” ten feet or more away from the source, request radiation safety support (e.g., electronic dosimeters PRD’s and equipment capable of measuring at least 1 R/hr. may be needed for investigation and public safety if the source is not immediately identifiable and secured.)

5.1.3.3 MUNICIPAL FIRE AUTHORITY - PRIMARY SCREENING CHECKLIST

When a radiation alarm condition is encountered during primary screening activities:

- Immediately note the dose rate alert level and type of radiation displayed on the detector.
 - Attempt to verify the alarm and localize the source. An alarm is considered confirmed if it is repeatable. The same instrument can perform this.
 - Once the source is localized, the primary screener, based on reasonable suspicion and the totality of the circumstances, will contact Denver Fire Dispatch to ask for Denver Police to detain the individual(s) for further investigation.
 - If the perceived source is a vehicle or object, isolate the individuals(s) from the vehicle object(s) to determine the location of the detected radiation source.
 - Denver Fire will request Denver Police in the event the need to investigate or question to determine if the source is a non-threat.
- Readings above 5 mR/hr. may be encountered during the investigation, especially close to the person or object producing the radiation; however, if consistently elevated readings more than a foot away from objects or walls are encountered, that cannot be immediately explained (above 2 mR/hr., or “8” on pagers), personnel should take the following protective measures:
 - Move away from the location of the suspected radiation source until a valid rate reading (less than 2 mR/hr. or “8”) is displayed. This will help ensure that personnel are not within a high radiation exposure area.
 - Secure the area
 - Establish control perimeter at the 2 mR/hr. boundary (or where the pager is reading transitions to less than “8”).
 - Advise Denver Fire dispatch to contact the Secondary Screening Team and continue to investigate if safe to do so. If not safe, seek protective shielding until the Secondary Screening team arrives.
 - If the 2 mR/hr. boundary is greater than ten feet from the source, or the PRD is overloaded or indicating 9-inches, ten feet or more away from the source, request radiation safety support (e.g., electronic dosimeters PRD’s and equipment capable of measuring at least 1 R/hr. may be needed for investigation and public safety if the source is not immediately identifiable and secured.)
- **DFD Primary Screeners will request Secondary Screening isotope identification if:**
 - Primary screening procedures do not reveal the source of the confirmed alarm.
 - Radiation levels do not appear to be consistent with shipping paper documentation or

interview comments.

- Radiation source appears to be a potential threat to material condition.
- Consistent, unexplainable neutrons detected.
- Other inconsistencies and uncertainties are encountered.

5.1.3.4 LOCAL HEALTH AND ENVIRONMENTAL SAFETY AUTHORITY - PRIMARY SCREENING CHECKLIST

- Verify the alarm.
- For all verified alarms, and with the help of law enforcement partners separate all persons from their vehicles and/or objects they are carrying or transporting, for further inspection.
 - Assess behavior of person(s) related to the alarm (medial/acting suspicious).
- Determine the general location of the source of the alarm.
- Note the details of the alarm.
 - The equipment type, indications, dose rate or alarm level if available, and recording of distance to and from source.
- Record the radiation measurement associated with the alarm (e.g., dose rate, count rate, O-9 reading) and the estimated distance from the unknown causing the alarm (using the inverse square law).
- Do not violate local agency SOPs for personal safety to measure or locate.
- Immediately notify the local FBI Field Office if a criminal or terrorist threat is identified.
- If the alarm cannot be adjudicated using primary screening techniques and equipment, Secondary Screening must be conducted.

5.1.3.5 HEALTH AND MEDICAL AUTHORITY - PRIMARY SCREENING CHECKLIST

- Continue to handle the task at hand. Evaluating a Radiation Pager alarm should not be prioritized over providing patient care, unless the alarm is in relation to a threat to provider and/ or public safety, i.e., identification of a Radiologic Dispersal Device (RDD).
- Utilization of the Radiation Pager and its associated decisions is included in Primary Screening Decision Tree shown below.
- If a source, other than a medical patient, is identified, DO NO TOUCH THE SOURCE. Personnel should utilize time, distance, and shielding to protect themselves.
- Discovery of radiation during primary screening that cannot be adjudicated will be evaluated by the Denver Fire Department and the Denver Police Department as a hazardous materials incident. Notify dispatch of the need for a DFD HazMat response.

5.1.4 SECONDARY SCREENING

Secondary Screening involves the use of radionuclide (isotope) identification detection equipment and other investigative techniques to identify and investigate the primary alarm or detection event.

5.1.4.1 STATE LAW ENFORCEMENT - SECONDARY SCREENING CHECKLIST:

- Make telephonic contact with Primary Screener to confirm and receive any additional information that may be needed to guide response, isolation distances, or other concerns.



- Notify FBI.

The **Denver FBI WMD Coordinator** and **Regional Render Safe Team Leader**
can be contacted 24/7 through the FBI Denver switchboard at:

(303)-630-6097

(press 0 at the prompt)

*** If these individuals cannot be reached, contact FBI's Strategic Information and Operations Center at (303) 323-3300 and request to speak with the WMD Duty Supervisor or the Counter IED Duty Officer. ***

- Conduct Secondary Screening, e.g., perform isotope identification spectrum collection and additional surveys following equipment procedures. Review all information obtained by the Primary Screening operator.
- If there are multiple hot spots on the incident, spectra are required.
 - The following measurements should be obtained (shorter spectra acquisition times may be used as the situation safety conditions warrant):
 - 5-minute spectrum of the unknown isotope source
 - 5-minute spectrum of a known isotope (check source)
 - 5-minute background spectrum
 - Two gamma dose rate measurements at two different distances – near and far, such as 1' and 2' or 30" and 60".
 - Neutron count rate
- Request Reachback if:
 - Unexplained Special Nuclear Material is identified.
 - Secondary screening procedures do not reveal the source of the confirmed alarm.
 - Radiation levels do not appear to be consistent with manifest shipping documentation or interview comments.
 - Radiation source appears to be a potential threat material condition.
 - Consistent, unexplainable neutrons detected – all neutron detections should be treated as potential threats until determined to be non-threatening and legitimate.
 - Other inconsistencies and uncertainties are encountered.
- All alarms that are not related to elevated background should be reported in the Department of Homeland Security reporting form
- If the radiation pager reads a sustained “8”:
 - Back out of the environment. Consider evacuating any citizens from the environment. Containment of the area should be at the point where the sustained radiation level changes from “8” to “7”.
 - Contact dispatch for a HazMat response and notify supervision.
- If the radiation pager reads a sustained number below “8”:
 - Continue to handle the task at hand
 - If safely able, pinpoint the location of the source by determining where the reading is the highest. Remember the inverse square law, ALARA, and time, distance, and shielding.
 - Take note of any suspicious activity or circumstances.
- If the radiation pager alarms but the level rapidly decreases or goes away, the source is likely moving:

- Do any identification possible. Was it a vehicle? Can you get a license plate? Was it a vehicle displaying DOT HazMat placards? Are you able to make contact?

5.1.4.2 MUNICIPAL LAW ENFORCEMENT - SECONDARY SCREENING CHECKLIST:

- Make telephonic contact with Primary Screener to confirm and receive any additional information that may be needed to provide guidance for response, isolation distances, or other concerns.
- Notify FBI.

The **Denver FBI WMD Coordinator** and **Regional Render Safe Team Leader** can be contacted 24/7 through the FBI Denver switchboard at:

(303)-630-6097

(press 0 at the prompt)

*** If these individuals cannot be reached, contact FBI's Strategic Information and Operations Center at (303) 323-3300 and request to speak with the WMD Duty Supervisor or the Counter IED Duty Officer. ***

- Conduct Secondary Screening, e.g., perform isotope identification spectrum collection and additional surveys, in accordance with equipment procedures. Review all information obtained by the Primary Screening operator.
- If there are multiple hot spots, capture spectra for each if practical.
- The following measurements should be obtained (shorter spectra acquisition times may be used as the situation safety conditions warrant):
 - 5-minute spectrum of the unknown isotope source
 - 5-minute spectrum of a known isotope (check source)
 - 5-minute background spectrum
 - Two gamma dose rate measurements at two different distances – near and far, such as 1' and 2' or 30" and 60".
 - Neutron count rate
- Request Reachback if:
 - Unexplained Special Nuclear Material is identified
 - Secondary screening procedures do not reveal the source of the confirmed alarm.
 - Radiation levels do not appear to be consistent with manifest shipping documentation or interview comments.
 - Radiation source appears to be a potential threat material condition.
 - Consistent, unexplainable neutrons detected – all neutron detections should be treated as potential threats until determined to be non-threatening and legitimate.
 - Other inconsistencies/uncertainties are encountered.
- Document alarm resolution.

5.1.4.3 MUNICIPAL FIRE AUTHORITY - SECONDARY SCREENING CHECKLIST:

- Make telephonic contact with Primary Screener to confirm and receive any additional information that may be needed to guide response, isolation distances, or other concerns.
- Notify FBI.



The **Denver FBI WMD Coordinator** and **Regional Render Safe Team Leader**
can be contacted 24/7 through the FBI Denver switchboard at:

(303)-630-6097

(press 0 at the prompt)

*** If these individuals cannot be reached, contact FBI's Strategic Information and Operations Center at (303) 323-3300 and request to speak with the WMD Duty Supervisor or the Counter IED Duty Officer. ***

- Conduct Secondary Screening, e.g., perform isotope identification spectrum collection and additional surveys following equipment procedures. Review all information obtained by the Primary Screening operator.
- If there are multiple hot spots on the incident, spectra are required.
- The following measurements should be obtained (shorter spectra acquisition times may be used as the situation safety conditions warrant):
 - 5-minute spectrum of the unknown isotope source
 - 5-minute spectrum of a known isotope (check source)
 - 5-minute background spectrum
 - Two gamma dose rate measurements at two different distances – near and far, such as 1' and 2' or 30" and 60".
 - Neutron count rate
- Request Reachback if:
 - Unexplained Special Nuclear Material is identified.
 - Secondary screening procedures do not reveal the source of the confirmed alarm.
 - Radiation levels do not appear to be consistent with manifest shipping documentation or interview comments.
 - Radiation source appears to be a potential threat material condition.
 - Consistent, unexplainable neutrons detected – all neutron detections should be treated as potential threats until determined to be non-threatening and legitimate.
 - Other inconsistencies and uncertainties are encountered.

5.1.4.4 LOCAL HEALTH AND ENVIRONMENTAL SAFETY AUTHORITY - SECONDARY SCREENING CHECKLIST:

- Make telephonic contact with Primary Screener to confirm and receive any additional information that may be needed to guide response, isolation distances, or other concerns.
- Notify FBI.

The **Denver FBI WMD Coordinator** and **Regional Render Safe Team Leader**
can be contacted 24/7 through the FBI Denver switchboard at:

(303)-630-6097

(press 0 at the prompt)

*** If these individuals cannot be reached, contact FBI's Strategic Information and Operations Center at (303) 323-3300 and request to speak with the WMD Duty Supervisor or the Counter IED Duty Officer. ***

- Using approved operational procedures, identify the radiation source(s) by collecting spectra with a Radiation Isotope Identification Device (RIID).

- In lieu of local procedures collect three (3) spectra for Reachback. Ideally, each spectrum should be a sample five (5) minutes in length. Of these spectra, obtaining a five (5) minute sample is most critical for the “unknown source”, causing the radiation alarm.
 - Background spectrum (not close to unknown source)
 - Calibration/known spectrum (check source)
 - Priority Collection - Unknown source spectrum (object causing alarm)
- Record all identification results on the RIID display screen, a radiation measurement taken at the same location where the identification was performed, and any error messages shown on the RIID display.
- Remember that taking a clean background spectrum can generate results on the RIID display such as “counts too low”, “no source”.
- Be aware of the 2 mR/h perimeter. Limit your time closer to a source than this perimeter. Unless it is required to set-up detection equipment, collect spectra, obtain quick exposure rate readings, or record other evidence, do not proceed beyond this 2 mR/hr. line.
- Do not disturb or approach the object to obtain readings. Do not change the environment around the object. Wait for assistance.
- If the RIID does not provide definitive identification results or identification results do not correspond with packaging, documentation, labels, etc., this would indicate a need for National-Level Reachback (NRB).
- Initiate National-Level Reachback if any of the conditions for NRB are present:
 - Neutron radiation is detected and is not associated with a legitimate shipment (e.g., properly licensed, or manifested radioactive material).
 - Special nuclear material (SNM) is present, suspected, or cannot be ruled out and is not part of a legitimate shipment or on-site usage.
 - A radiation source is suspicious, cannot be identified or authenticated, and is not part of a legitimate shipment or on-site usage.
- All verified alarms should be documented.
- For radiation detection events where it is determined that no criminal activity is involved, and the conveyance is determined safe for release, local public health and safety officials may release the conveyance and should follow local reporting procedures.
- Procedures for handling RN materials deemed not in compliance with transportation or licensing regulations may be reported to the appropriate Department of Transportation (DOT) and Nuclear Regulatory Commission (NRC) authorities, as well as the State Radiation Control Program.

5.2 STANDARD INFORMATION COLLECTION, ANALYSIS, AND REPORTING

5.2.1 SPECTRAL DATA SUBMISSION

Spectroscopists prefer five-minute sample times [1) known, 2) background, and 3) unknown] for all spectra transmitted to National-Level Reachback for technical adjudication. This is the national standard, and all agency SOPs should conform to this protocol. There may be exceptional cases when operational circumstances preclude full five-minute spectra sample times. See [Section 5.3](#) (National Alarm Adjudication Protocol) for detailed information on this topic.

5.2.2 ESSENTIAL ELEMENTS OF INFORMATION (EEI)

In the course of their normal duties, mission partner personnel may be the first to encounter RN material that may be associated with a potential device. Aside from acting according to their level of training and communicating a potential threat exists, they may be expected to passively collect further data regarding the totality of circumstances and provide information to follow-on resources. Personnel will be expected to follow internal agency protocols to protect themselves from the situation and other hazards, up to and including establishing distance or perimeter when or where appropriate, and contacting the appropriate resources, when identifying, collecting, and communicating information.

If the RN material is confirmed or suspected of being associated with a potential explosive device, **DO NOT TOUCH OR DISTURB THE POTENTIAL DEVICE!** Notify the FBI immediately and, without actively collecting the information, be prepared to describe the following to a Public Safety Bomb Technician (PSBT) or an FBI field office SABT:

- The object itself (approximate dimensions and type of container it is in).
 - Obvious features/emissions (e.g., lights, sounds, smells, antennas, wires)
 - External markings (e.g., holes, writing, stickers, clock)
 - Has anyone gotten sick near it?
- The environment the object is located in.
 - How long it has been there, if known.
 - Other hazards nearby (e.g., chemical, gas station, utilities)
- Has anyone changed the surroundings? (DO NOT disturb the scene; however if changes were made, please make note of them)
 - Were the lights/power on/off?
 - Was the object moved? (By whom? How? When?)
 - Has anyone had a radio nearby the object? (What? When? Type/Wattage? How close? Transmitting or receiving?)
 - Did anyone touch the object?

It is important to note that when a device is suspected, **NO ONE TOUCH OR DISTURB THE SCENE OR POTENTIAL DEVICE**, unless specifically trained to obtain information from a hazardous device.

The EEIs should only be collected if it is possible to do so without interacting with the scene or the device itself. The list of EEIs are questions that will be asked, but answers are not required.

5.3 STANDARD SCREENING AND ADJUDICATION PROCESS

Establishing agency-specific standard operating procedures (SOPs), Orders, and policies are critical elements in overall PRND program development and implementation. It is recognized that there is no “one size fits all” approach to the development of SOPs and policies; different types of content, formats and level of detail are needed as a function of agency mission space, equipment, operating environment, and administrative requirements. Regardless of the format or level of detail, there are key elements that should be considered in agency procedures, policies and practices when deploying

Rad/Nuc detection equipment to conduct preventive primary and/or secondary screening, such as:

- **ALARM SETTINGS:** If the primary screening equipment has user selectable alarm thresholds, what is basis for settings? Are there different alarm settings for routine use versus special event, versus incident follow-up?
- **AUTHORITY:** What is the agency's Authority to stop/question or search relative to presence of increased radiation and/or alarm condition? Steady state versus special event venues? Who is the jurisdictional Designated Emergency Response Authority (DERA) if there is a radiological/nuclear incident?
- **SAFETY:** What are public control boundaries? When should operator hold and call back for safety support and/or additional monitoring resources? Are there environmental factors that need to be considered for safe and reliable equipment deployment (e.g., high humidity/rain, lightening, severe heat, or freezing conditions)?
- **RESOURCES:** What is the primary screening agency's steady state resource(s) for secondary screening & technical Reachback/assistance? Is an interagency agreement or MOU needed for steady state secondary screening support, etc.?
- **NOTIFICATIONS:** What are the initial and follow-up notification requirements, internal & external?
- **DOCUMENTATION:** How will the alarm be documented? Will there be a different documentation practice for prompt, non-threat/regulatory compliant adjudications (such as medical intakes, NORM, and compliant industrial sources) versus when secondary screening and/or technical Reachback is needed to adjudicate an alarm?
- **TRAINING:** What are the minimum training operators will have prior to utilizing equipment for primary and/or secondary screening? What are the refresher training requirements?
- **MAINTENANCE:** Who will be responsible for maintaining equipment? How will equipment be performance checked?

The alarm adjudication process is designed to recognize the source of the alarm and assess its significance at the earliest stage possible. While the standard process uses onsite screening to detect and identify radiation sources, it may also require specific powers and authorities granted to law enforcement agencies, or certain types of investigatory roles. The process outlined below is intended to provide guidance around screening and adjudication handling but may need to be adapted to the agencies or screeners' specific powers and authorities. Where necessary, the list below should also identify the procedures that should be employed to alert and notify the appropriate resources when certain conditions are met.

5.3.1 RADIOLOGICAL/NUCLEAR MATERIAL DISCOVERY

5.3.1.1 TOTALITY OF CIRCUMSTANCES/PRIMARY SCREENING

Primary screening equipment typically communicates the detection (alarm) to the primary screening operator or first responder using lights, audio, and/or numeric indicators. Following the detection, the operator or first responder must determine the general location of RN material. Based on a totality of circumstances approach, if the RN alarm is associated with a conveyance, package, or individual, the operator/first responder will conduct a passive visual inspection of the alarm location and interview any personnel associated with the alarm. If possible, establish a two milliroentgens per hour (2mR/hr.) or a blast/fragmentation perimeter if suspected to be associated with a potential device.

Primary Screening Checklist (Initial Alarm, No Immediately Suspected Device):

- Verify the alarm.
- Determine the general location of the source of the alarm.
- Note the details of the alarm.
 - The equipment type, indications, dose rate or alarm level if available, and recording of distance to and from source.
- Record the radiation measurement associated with the alarm (e.g. dose rate, count rate, 1-9 reading) and the estimated distance from the unknown causing the alarm.
- Do not violate local agency SOPs for personal safety to measure or locate.
- Adjudicate the alarm during primary screening, if possible.
 - If any of the triggers for National-Level Reachback (NRB) are present, NRB should be initiated immediately.
 - Immediately notify the FBI if a criminal or terrorist threat is identified.
- If the alarm cannot be adjudicated, Secondary Screening must be conducted.
 - If any of the triggers for National-Level Reachback are present, NRB should be initiated immediately.

Primary Screening Checklist (Totality of Circumstances):

- Location of the alarm (mass public gathering, empty parking lot, cargo container on ship)
- For all verified alarms, separate all persons from their vehicles and/or objects they are carrying or transporting, for further inspection.
 - Assess behavior of person(s) related to the alarm (medical/acting suspicious).
- Visually inspect/interview all objects/personnel associated with the alarm.
 - Unattended versus suspicious (wires, lights, etc.) package association
- Identify any manifest/shipping discrepancies.
- Follow local agency SOPs for suspicious packages if any boxes, containers, packages are in the vicinity of the object causing the alarm. Do not disturb or approach the box to obtain readings. Wait for assistance.

Primary Screening Checklist (Suspected Device):

First and foremost, should the RN material be associated with a potential device (IND or RDD), **DO NOT TOUCH OR DISTURB THE POTENTIAL DEVICE!** Then, be prepared to describe the following to the FBI field office personnel:

- The object itself (approximate dimensions and type of container it is in).
 - Obvious features/emissions (lights, sounds, smells, antennas, wires, etc.).
 - External markings (holes, writing, stickers, clock, etc.).
 - Has anyone gotten sick nearby it?
- The environment the object is located in.
 - How long it has been there, if known.
 - Other hazards nearby (chemical, gas station, utilities, etc.)
- Has anyone changed the surroundings? (If, no, then don't do any of the following! If yes, then note only and do not continue!)

- Lights/power on/off?
- Was the object moved? (By whom? How? When?)
- Has anyone had a radio nearby the object? (What? When? Type/Wattage? How close? Transmitting or receiving?)
- Did anyone touch the object?
- If possible, establish a perimeter per local SOP, or consider blast/fragmentation distances if associated with a suspicious package.
- Consider public evacuation of the immediate area if circumstances indicate.

5.3.1.2 SECONDARY SCREENING

Secondary Screening involves the use of radionuclide (isotope) identification detection equipment and other investigative techniques to identify and investigate the primary alarm or detection event.

Secondary Screening Checklist:

Immediately notify the FBI that secondary screeners are being deployed and if NRB has been initiated, *or* if at any point in the Secondary Screening process the alarm becomes associated with a suspicious activity or terrorist threat.

- Using approved operational procedures, identify the radiation source(s) by collecting spectra with a Radiation Isotope Identification Device (RIID).
- In lieu of local procedures collect three (3) spectra for Reachback. Ideally, each spectrum should be a sample five (5) minutes in length. Of these spectra, obtaining a five (5) minute sample is most critical for the “unknown source”, causing the radiation alarm.
 1. Background spectrum (not close to unknown source)
 2. Calibration/known spectrum (check source)
 3. Priority Collection - Unknown source spectrum (object causing alarm)
- Record all the identification results on the RIID display screen, a radiation measurement taken at the same location where the identification was performed, and any error messages shown on the RIID display.
- Remember that taking a clean background spectrum can generate results on the RIID display such as “counts too low”, “no source”.
- Do not violate the 2 mR/h perimeter established by your agency to collect the spectra.
- Follow local agency SOPs for suspicious packages if any boxes, containers, packages are in the vicinity of the object causing the alarm. Do not disturb or approach the object to obtain readings. Do not change the environment around the object. Wait for assistance.
- If the RIID does not provide definitive identification results or identification results do not correspond with packaging, documentation, labels, etc., this would indicate a need for National-Level Reachback.
- Initiate National-Level Reachback if any of the conditions for NRB are present:
 - Neutron radiation is detected and is not associated with a legitimate shipment (e.g., properly licensed, or manifested radioactive material).
 - Special nuclear material (SNM) is present, suspected, or cannot be ruled out and is not part of a legitimate shipment.
 - A radiation source is suspicious, cannot be identified or authenticated, and is not part of a legitimate shipment.



- All verified alarms should be documented per local Standard Operating Procedures (SOPs).
- For radiation detection events where it is determined that no criminal activity is involved and the conveyance is determined safe for release, domestic first responder officials may release the conveyance and should follow local reporting procedures.

Procedures for handling RN materials deemed not in compliance with transportation or licensing regulations may be reported to the appropriate Department of Transportation (DOT) and Nuclear Regulatory Commission (NRC) authorities.

SECTION 6: SPECIALIZED SECONDARY SCREENING PROFILES

Secondary Screeners for the Denver STC program are chosen from among the agencies' specialized response teams. While all Secondary Screeners will complete the PRNDOR coursework provided by CTOS, some Secondary Screeners will have additional RN or specialized hazmat training around safety and instrumentation use.

6.1 SPECIALIZED HAZARDOUS MATERIALS AUTHORITIES

6.1.1 COLORADO DESIGNATED EMERGENCY RESPONSE AUTHORITY: COLORADO STATE PATROL

The Colorado State Patrol's Hazardous Materials Section (CSP Hazmat) was formed in the late 1980's and is the designated emergency response authority (DERA) for hazardous materials incidents on any public roadway outside of city limits. (C.R.S. §[29-22-102](#)) The CSP Hazmat sections mission is: To protect life, property, and the environment by providing emergency response, mitigation, and support for hazmat incidents and through enforcement and education of hazmat transportation regulations.

The CSP Hazmat section when fully staffed is comprised of 1 CSP Captain, 3 CSP Sergeants, 24 CSP Troopers, a reimbursement specialist, a Nuclear Materials Transportation Specialist, and an administrative assistant. The Troopers and Sergeants are all State certified hazmat technicians and receive hundreds of hours of additional specialized training including radiation incident response, chemical incident response, and enforcement training. The team responds to 250 plus incidents per year as a group across the State

The Troopers and Sergeants are situated across the State in several strategic locations and on call 24/7/365. This makes them uniquely qualified to respond as secondary screeners throughout the State.

6.1.2 CITY AND COUNTY OF DENVER DESIGNATED EMERGENCY RESPONSE AUTHORITY: DENVER FIRE DEPARTMENT

Denver Fire has been designated as the lead agency within the City for all HAZMAT incidents including R/N, as granted to municipal fire response authorities under [8 CCR 1507-22](#). Under this response framework, the DFD Hazardous Materials Response (HAMER) Team will provide secondary screening support where needed using the advanced spectroscopic tools that will be supported by additional hazmat-specific training capabilities. DFD Hazmat personnel receive 120 hours of training for the technician level. All other Denver firefighters are trained to the hazmat operations level.

The fire and police departments work well together utilizing an integrated Incident Command System (ICS). They also work with the FBI and other federal agencies where needed and appropriate. Hazmat team members assist the fire department Fire Prevention Bureau on inspections of hazardous materials in fixed facilities.

The hazardous materials unit, HAMER 1 (Hazardous Materials Emergency Response), is located at

Fire Station 9 and is staffed by crews of Engine 9 and Tower 9. The team is supported by the members of Station 10's Rescue 2 and Station 11's Rescue 1. The DECON Unit (Decontamination Unit) is located at Fire Station 6 and staffed by the members of Engine 6. There are five members assigned to these apparatuses with a minimum staff of 4 members. All members assigned to these units are certified as Hazardous Materials Technicians.

The Denver Fire Department distribution and use of secondary screening tools is based on the member's assignment to the Hazardous Materials Team, completion of the CTOS Secondary Screener Course, and Department required Hazardous Materials Training. Denver Firefighters assigned to the Hazardous Materials Team receive an 80-Hour Hazardous Materials Technician Course, which includes radiation science, identification, technical and gross decontamination, and radiation incident mitigation. The team members also participate in the 24-Hour, Transportation Emergency Preparedness Program (TEPP) - Modular Emergency Response Radiological Transport (MERTT) course. Lastly, team members also receive the 8-Hour Radiation IQ Course from federal resources.

6.2 OTHER AGENCY SPECIALIZED UNITS & TEAMS

6.2.1 DENVER POLICE DEPARTMENT SPECIAL OPERATIONS

The Denver Police Secondary Screeners have been identified from among Special Operations Personnel and Units – Metro/SWAT, Traffic HAZMAT, SORT, and the Bomb Unit. All personnel respond to various high-risk threats.

Bomb Detectives are certified Public Safety Bomb Technicians and complete some, if not all, of the following:

- FBI's Hazardous Device School (280 hours)
- FEMA's hazardous materials technician course (32 hours)
- Select personnel are on the FBI Nuclear Stabilization Response Team (training is SECRET and is certified by the DOD)
 - Weekly sustainment training is conducted for personnel who fill these roles
- Select personnel are Site Safety Supervisors
- Select personnel are HAZWOPER trained via the following:
 - Hazwoper 40-Hour Initial
 - Hazwoper 24-Hour
 - Hazwoper Training for First Responder Awareness
 - Hazwoper 8-Hour Refresher

Traffic Hazmat personnel undergo the following R/N related training:

- Hazmat Tech taught by the Denver Fire Department
- Hazmat Operations taught by the Denver Fire Department

The Response to RAD/NUC WMD Incidents Program conducted by CTOS provides additional related training and competencies for Operations Level Responders assigned radiological material specific tasks and provides additional response capability to safely respond to incidents involving a radiological exposure device (RED), a radiological dispersal device (RDD), or an improvised nuclear device (IND). All Traffic HazMat personnel attend both the Hazmat Tech and Hazmat Operations training.

6.2.2 DENVER DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT

DDPHE serves as a Local Reachback resource, providing technical and scientific support for alarm adjudication. The Inspectors and Scientists at DDPHE, who are selected as Secondary Screeners, are trained through CTOS PRNDOR coursework, but some Screeners will also have specific additional safety and instrumentation use and application training.

The DDPHE Secondary Screening Team is comprised of environmental scientists and technicians housed in the Environmental Quality Division. All team members have an educational background, bachelor's, and master's degrees, in the natural sciences ranging from geology to biology. Through their education and training, including months of laboratory work and fieldwork, instrument use and acting based on instrument response and associated environmental conditions is second nature. The team is equally at ease exercising exacting technical procedures and gathering, communicating, and presenting information according to scientific principles (including knowledge and use of exponential and logarithmic scales and units, the statistical validity of data, etc.).

The more senior members of the team have one or more decades managing technical programs for medium and large organizations, including national and multinational engineering firms, and various government agencies.

The DDPHE Secondary Screening Team rounds out its skill set with subsets of staff who bring additional focused training, knowledge, and experience. Three team members have hours of training and experience specifically in radiation safety, use and function of radiation detection instruments, and the management of radioactive materials. This team is often called upon to address management and safety of radium mill tailings and TENORM in the City.

A second subset of the team is trained in emergency response to hazardous materials incidences, certified and recertified to OSHA and EPA standards, and trained in related regulatory programs, including USDOT hazardous material transportation regulations, and response to highway accidents.

The DDPHE maintains a duty officer program whereby both a Department Emergency Response and Preparedness staff member and an EQ Division staff member are always on-call and reachable 24/7/365 via dedicated mobile phones, text, and e-mail accounts. As part of this readiness program, at least one member of the Secondary Screening Team is prepared to mobilize to a site within 90 minutes or less of initial call-out at any time of day or night.

As investigatory staff of the local health department, all Secondary Screening Team members are agents of the state and carry the authority of state and federal environmental regulators when necessary, especially at the very start of a response and investigation of an incident. Within the City of Denver, we also possess police authority to enter upon private property where there is an immediate risk to public health and the environment.

DDPHE maintains its own inventory of hazmat response equipment, supplies, and PPE-including various radiation detection instruments- traditional Geiger-Mueller (GM) survey meters, and NaI/photomultiplier and ZnS scintillation meters and activity counters. All Secondary Screener team members are respirator fit tested and are medically cleared and prepared to operate on-site in Level C respiratory protection.

SECTION 7: LAWS, AUTHORITIES, AND SUPPORTING REFERENCES

7.1 COLORADO LEGAL FRAMEWORKS

7.1.1 COLORADO REVISED STATUTES (CRS) AND RESPONSE & ENFORCEMENT POLICIES

Below are titles and excerpts of CO Revised Statutes and response/enforcement policies that are relevant to the PRND mission space. Current CO Revised Statutes may be found at:

www.lexisnexis.com

- [COLO. REV. STAT. tit. 16 §§3-102](#) (2013) Arrest by peace officer. (1)(b) and (c) – A peace officer may arrest a person when any crime has been or is being committed in the officer’s presence or the officer has probable cause to believe that an offense was committed, and that this person committed the offense.
- [COLO. REV. STAT. tit. 16 §§3-103](#) (2013) Stopping of Suspect. (1) A peace officer may stop any person who he reasonably suspects are committing, has committed, or is about to commit a crime and may require him to give his name and address, identification if available, and an explanation of his actions.
- [Colorado Criminal Code, COLO. REV. STAT. tit. 18 §§9-120](#). Terrorist training activities - penalties - exemptions. (1) Any person who teaches, demonstrates, practices with, or is instructed in the use, application, or making of firearms, explosive or incendiary devices, or techniques capable of causing injury or death and who knows that the same will be used in the furtherance of a civil disorder commits a class 5 felony.
- [Colorado Criminal Code, COLO. REV. STAT. tit. 18 §§11-203](#) (2013) (Membership in anarchistic and seditious associations).
- [COLO. REV. STAT. tit. 24 §§1-128.6](#) (amended by H.B. 12-1283) (Department of Public Safety, Division of Homeland Security and Emergency Management - creation).
- [COLO. REV. STAT. tit. 25 §§11-103\(2\)](#) (amended 2010) (Radiation Control Agency) – Colorado Department of Public Health and Environment, Hazardous Materials and Waste Management Division deemed the Radiation Control Agency.
- [COLO. REV. STAT. tit. 25 §§11-107](#) (amended 2010) (Prohibited acts, violations, penalties, rules, cease-and-desist orders).
- [COLO. REV. STAT. tit. 42 §§20-403, 504, and 508](#) (the Chief of the Colorado State Patrol has the authority to promulgate rules and regulations for the permitting, routing, and safe transportation of hazardous and nuclear materials by motor vehicle within the State of Colorado).
- [COLO. REV. STAT. tit. 42 §§4-235](#) (Minimum standards for commercial vehicles rules).

[Code of Colorado Regulations 8 C.C.R. §§1507-25](#) (2014) (Department of Public Safety Division of State Patrol Rules and Regulations Concerning the Permitting, Routing Transportation of Hazardous and Nuclear Materials and the Intrastate Transportation of Agricultural Products in the State of Colorado) Provides Colorado State Patrol the authority to inspect motor vehicles, books, and records.

- Colorado Department of Public Safety and Environment, Hazardous Materials and Waste Management Division, Radiation Program, Enforcement Response Policy (5-31-2011)

[enforcement options appropriate for addressing violations of radiation management laws and regulations in Colorado].

7.2 FEDERAL REGULATIONS

7.2.1 UNITED STATES CODE

7.2.1.1 18 U.S.C. §831 PROHIBITED TRANSACTIONS INVOLVING NUCLEAR MATERIALS

Federal agencies work under this statute. The purpose of the statute is to provide Federal law enforcement agencies with the necessary means and the maximum authority permissible under the Constitution to combat the threat of nuclear contamination and proliferation that may result from the illegal possession and use of radioactive materials. The penalty for violation of this code ranges from a fine to life in prison dependent upon the intentional or reckless nature of the offending party.

7.2.1.2 18 U.S.C §832 PARTICIPATION IN NUCLEAR AND WEAPONS OF MASS DESTRUCTION THREATS TO THE UNITED STATES

- 1) Whoever, within the United States or subject to the jurisdiction of the United States, willfully participates in or knowingly provides material support or resources (as defined in section 2339A) to a nuclear weapons program or other weapons of mass destruction program of a foreign terrorist power, or attempts or conspires to do so, shall be imprisoned for not more than 20 years.
- 2) There is extraterritorial Federal jurisdiction over an offense under this section.
- 3) Whoever without lawful authority develops, possesses, or attempts or conspires to develop or possess a radiological weapon, or threatens to use or uses a radiological weapon against any person within the United States, or a national of the United States while such national is outside of the United States or against any property that is owned, leased, funded, or used by the United States, whether that property is within or outside of the United States, shall be imprisoned for any term of years or for life.

7.2.1.3 THE FEDERAL BUREAU OF INVESTIGATION (FBI)

The FBI has jurisdiction in matters of counterterrorism, including the threat, use or attempted use of WMD on navigational waterways. The FBI will coordinate prevention, detection, interdiction efforts of WMD with logical and appropriate Federal, State, and Local jurisdictions, as well as Other Government Agencies (OGA) and Non-Government Agencies (NGA). Using a collaborative approach, notification will be made to appropriate entities, as necessary, during WMD-related investigations. A mutual approach involving all available resources and assets will be utilized to mitigate the WMD threat.

The definition of Federal Crimes of Terrorism, [18 U.S.C. §2332](#), lists several violations in which the FBI has primary responsibility, including:

- [18 U.S.C. §1363](#) – damage to buildings or property within the special maritime and territorial jurisdiction of the United States.
- [18 U.S.C. §81](#) – arson within the special maritime and territorial jurisdiction; and
- [18 U.S.C. §2332a](#) –Use of weapons of mass destruction:

- It is illegal for a person who, without lawful authority, uses, threatens, or attempts or conspires to use, a weapon of mass destruction against any person or property within the United States, and
- The perpetrator travels in or causes another to travel in interstate commerce in furtherance of the offense or
- The offense, or the results of the offense, affect interstate, or, in the case of a threat, attempt, or conspiracy, would have affected interstate commerce
- [18 U.S.C. §2332f](#) – bombings of places of public use, government facilities, public transportation systems and infrastructure facilities including waterways.
- [18 U.S.C. §2332h](#) – Radiological dispersal devices.

It is illegal for any person to knowingly produce, construct, otherwise acquire, transfer directly or indirectly, receive, possess, import, export, or use, or possess and threaten to use any weapon that is designed or intended to release radiation or radioactivity at a level dangerous to human life; or any device or other object that is capable of and designed or intended to endanger human life through the release of radiation or radioactivity.

7.2.2 49 CODE OF FEDERAL REGULATIONS

7.2.2.1 49 C.F.R. §171 – GENERAL INFORMATION, REGULATIONS, AND DEFINITIONS

Any substance or material defined in [Title 49 of the Code of Federal Regulations \(49 CFR\), Section 171.8](#) that can cause an unreasonable risk to human health or safety or the environment when transported by vehicle, used incorrectly, or not properly stored or contained, is a hazardous material. Hazardous materials can be a liquid, a solid, or a gas. Examples of hazardous materials are explosives, flammables, corrosives, radioactive materials, and poisons. Transportation of such materials is highly regulated to ensure the safety of the motoring public.

When transported in vehicles, activities associated with hazardous materials transportation (packaging, identifying, loading, and warning the public of the hazard) are regulated by the Colorado State Patrol and the U. S. Department of Transportation (USDOT).

7.2.2.2 49 C.F.R. §173 SUBPART I - GENERAL REQUIREMENTS FOR SHIPMENT AND PACKAGING, (RADIOACTIVE) MATERIALS

[49 C.F.R. §173 Subpart I – Class 7](#) Transportation, Shippers – General requirements for shipment and packaging, radioactive materials. Provides package activity limits, packaging and labeling requirements, radiation level limitations, and contamination controls and limits. The Radiological/Nuclear Law Enforcement and Public Health Investigation Handbook serves several purposes:

- Introduces RN, LE and PH investigations so personnel have a better understanding of each other’s information requirements and investigative procedures,
- Identifies potential barriers LE and PH personnel will encounter during their respective RN incident investigations and provide potential solutions that can be adapted to meet the needs of the various jurisdictions and agencies throughout the United States (US).
- Enhances the appreciation and understanding by all parties of each discipline’s expertise.

SECTION 8: STANDARD EQUIPMENT SETTINGS

The U.S. Department of Homeland Security (DHS) established the System Assessment and Validation for Emergency Responders (SAVER) Program which presents a description of the Personal Radiation Detectors (PRDs) selected for the Denver STC Program Partner Agencies.

These devices are generally held in the palm of your hand and capable of detecting gamma radiation. The gamma sensors used consist of small scintillators (CsI, NaI, Etc.). These devices measure exposure rates (uR/h) and count rates (cps).

The American National Standard for performance criteria for PRDs is [ANSI N42.32 \(2016\)](#).

Setting the unit default range to display a 0-9 will display the following ranges:

Table 5. Thermo PRD Dose Range Equivalencies

Level	Range
0	0...12 µR/h
1	12...27 µR/h
2	27...62 µR/h
3	62...142 µR/h
4	142...329 µR/h
5	329...760 µR/h
6	761 µR/h ...1.75 mR/h
7	1.75...4.05 mR/h
8	4.05...9.4 mR/h
9	9.4...25 mR/h

Table 6. Backpack Technical Specifications and Settings

SENSOR TECHNOLOGY ENGINEERING RADPACK MAX BACKPACK	
Radiation Type	Gamma Neutron
Gamma Detector Type	Cesium Iodide Scintillator
Gamma Detector Size	6 x 51 cm ³
Gamma Sensitivity	102 cps per UR/H at Cs-137 (662keV)
Neutron Detector Type	Helium-3 Proportional Counter
Neutron Detector Size	7 x 726 cm ³ (39.3 psi)
Neutron Sensitivity	680 cps/nv
Integration time	<1 Second
Size	46 cm x 36 cm x 18 cm
Weight	8.6 kg
Battery	CR123
Battery Life	40 Hours
Temperature Range	-15° to 50° C

Communication	Optional Bluetooth
---------------	--------------------

Table 7. RIID Technical Specifications and Settings

BERKLEY NUCLEONICS SAM III 950 RIID	
Energy Resolution (Gamma)	Nal(Tl) 2x2, 3x3 inch: < 7%@662 Kev, LaBr3 2x2 inch: < 3% @662Kev, CeBr3 2x2 inch: < 4% @662Kev
Energy Range (Gamma)	20 keV – 3 MeV
Alarm Types	Gamma dose rate, gamma count, neutron count, CPS secondary Health alarm -Danger Indication
MCA channel	10bit, 1024 channel
Dose rate range	0 – 10 mR/h (Nal), 10 mR/h - 10R/h (GM)
Stabilization	Automatic real-time stabilization using K-40
Nuclide Identification	According to ANSI N42.34, isotope/category/confidence report
USB	Micro USB 2.0, IP65
Camera	CMOS 13.0 MP
GPS	Built-in GPS in Smartphone
Battery Type/Life	AA Alkaline battery/ >8 Hours continuous use
Reachback Capability	Single click Reachback
Additional Features	Photo, video, and audio recording capabilities
Dimensions	192 mm x 356 mm x 214 mm
Device Weight	9.5 lbs.
Operating Temps	-4° F to 122° F

Table 8. Mobile Unit Technical Specifications and Settings

RADIATION SOLUTIONS INC. MOBILE UNIT RS-700	
Uses	Land vehicles, helicopters, UAVs or at a fixed location
Operating temp	-40° to + 122° F
Battery	External Li-FePo
Battery Life	10+ hours
Energy Range	12KeV-3MeV
Gamma Detector Type	Nal(Tl) optional LaBr or Csl

SECTION 9: GLOSSARY OF TERMS

9.1.1 DEFINITIONS

Table 9. Glossary of Terms and Definitions

Term	Definition
Alarm Adjudication	<p>Alarm adjudication is the process of identifying with reasonable certainty the RN material or technical reason as to why an alarm occurred. If at any point in the alarm adjudication process terrorism or criminal use is suspected, the responder should elevate the alarm to National-Level Reachback and immediately notify the FBI.</p> <p>While RN alarms are rarely related to a terrorist or criminal threat, terrorist or criminal threats involving RN materials require a time sensitive response to potentially prevent substantial loss of life or substantial damage to property. Mission partner authorities who detect or discover RN materials potentially associated with a WMD and terrorist or criminal activity within the United States must immediately contact the FBI to resolve the threat.</p> <p>In cases where National-Level Reachback is engaged, final alarm adjudication results in one of two categories: “Nuclear (Radiological) Threat Material Identified” or “Nuclear (Radiological) Threat Material Not Identified.” The terms pertain only to the technical radiological assessment of the material itself that produced the alarm and are not an assessment of the totality of circumstances.</p>
Alarm Resolution	<p>Alarm resolution is the process of taking the necessary actions to communicate the situation following the identification of the material based on the totality of circumstances or taking measures to address an alarm for which the cause has not been determined. In cases where the cause of an alarm remains indeterminate after initial adjudication efforts, resolution may involve further actions to complete the adjudication process (i.e., request additional response personnel and equipment to obtain an identification of the material causing the alarm).</p>
Credible Threat	<p>A threat that has been evaluated for technical feasibility, operational practicality, and adversarial intent and has been determined to be actionable.</p>
Criminal Activities	<p>For this Operations Plan, criminal activities related to nuclear and other radioactive materials, meaning subversive activities, such as breaches of proliferation controls (as they are subversive to international will) and/or state/federal laws that regulate nuclear and other radioactive materials.</p> <p>NOTE—These may also include the following:</p> <ul style="list-style-type: none"> • Other actual or potential malevolent acts intended to cause harm to people or the environment • Illegal gain, such as profits from the sale of the nuclear or other radioactive material • Avoiding prescribed costs of disposal, or relevant taxes • Violation of transport regulations

Term	Definition
Detection	Includes traditional technical means (sensors) to sense alpha, beta, gamma, or neutron emission from radioactive materials; technical means that use non-intrusive inspection (NII); other technical means, such as ultrasound or weight measurement; and non-technical approaches, to include conventional intelligence and law enforcement activities, intelligence cues, surveillance, or operational encounters by law enforcement. A detection event could entail either an instrument alarm or an information alert.
DOE/NNSA Triage	The DOE/NNSA's Triage is an integrated system to provide secure online nuclear and radiological expertise to first responders within 60 minutes of receipt of data. The DOE/NNSA Triage provides essential, time-sensitive information on the nature of the threat, allowing responders to develop and implement appropriate courses of action. The information also helps ensure the scope of the response is sufficient to protect health and safety of responders and the public.
Hot Zone	The control zone immediately surrounding a hazardous materials incident, which extends far enough to prevent adverse effects from hazardous materials releases to personnel outside the zone. (NFPA 472) The national standard for defining a Hot Zone is 10 mR/hr. (National Council on Radiation Protection and Measurement Report #165)
Improvised Nuclear Device	A device incorporating fissile materials designed or constructed outside of an official agency that has, or appears to have, or is claimed to have capability to produce a nuclear explosion. It also may be a nuclear weapon that is no longer in the custody of competent authority or custodian, or has been modified from its designated firing sequence, or may have been assembled from illegally obtained nuclear weapons components or special nuclear materials.
Incident Commander (IC)	the individual responsible for all incident activities, including the development of strategies and tactics and the ordering and release of resources. The IC has overall authority and responsibility for conducting incident operations and is responsible for management of all incident operations at the incident site. (NIMS 2007)
Interdiction	This is a law enforcement action designed stop and prevent the transportation of illegal goods.
National Level Reachback / National Reachback (NRB)	National-Level Reachback is the process by which skilled technical experts in RN detection concepts, spectroscopy, technologies, and nuclear weapons, analyze site-specific data and confirm radioisotope identification in the event of a RN threat or incident to enable responders to develop and implement response options, including if appropriate, the FBI's TCE Process. National-Level Reachback includes the full resources of DOE/NNSA Triage or Customs and Border Protection (CBP)/ Laboratories and Scientific Services Directorate - Teleforensic Center (LSSD-TC).
Personal Radiation Detector	A small "pager" style radiation detector worn by an individual. A PRD can detect the presence of gamma radiation at very low levels, as well as (some models, e.g., Radeye) recording the total accumulated dose received by the user. A PRD is often the first indication that radiological/nuclear material is present.



Term	Definition
Primary Screening	<p>The initial point of radiation detection related to individuals, vehicles, packages, or facilities. Alarms are categorized as verified or indeterminate. An alarm is considered verified if it is repeatable. An alarm is considered repeatable if it can be reproduced by the same instrument or if two different instruments provide an alarm in the same general location.</p> <p>During the Primary Screening phase, a radiation source(s) is(are) detected causing an alarm on the primary screening detection equipment (e.g., personnel radiation detector, backpack, mobile system). Utilizing tactics and techniques learned in training, operators will detect, verify, and locate the source of the elevated radiological emissions. Operators will use the totality of the information available to them, including behaviors, interview information, and the nature/location of the possible radiological concern to support a preliminary assessment of the alarm and determine if further investigation is required.</p>
Reachback	<p>Reachback is the real-time scientific and technical support provided by on-call subject matter experts (SMEs) to assist on-scene personnel in the evaluation of detection data and resolution of RN alarms. Reachback is necessary as proper source identification and situational assessment may entail many variables and scientific expertise and analysis may not be readily available in the field.</p> <p>Reachback can occur locally to engage local partner technical support in the adjudication process. However National-Level Reachback is required when the following triggers are met:</p> <ul style="list-style-type: none"> • Neutrons are detected and are not associated with licensed or manifested materials • A radiation source is suspicious or cannot be identified or authenticated • Special nuclear material is present, suspected, or cannot be ruled out and there is no legitimate reason for its presence
Secondary Screening	<p>Secondary Screening involves the use of isotope identification equipment and/or other techniques to identify and investigate the primary event. The investigating official will validate the nature of the radiological concern using dose measurement, visual cues, and initial isotopic identification to support an assessment of the alarm. Secondary screening equipment may be used to assist field teams in the adjudication of potential threats related to individuals, vehicles, packages, or facilities. Secondary screening operations may be initiated to:</p> <ul style="list-style-type: none"> • Detect radiation • Verify primary screening alarm • Localize the source • Measure radiation levels • Identify the isotope of concern • Assess the threat status of detected materials
µR/h	<p>Microroentgen/hour: A microroentgen/hour is the derived unit of ionizing radiation dose</p>

9.1.2 ACRONYMS

Table 10. Acronyms and Definitions

Acronym	Definition
ALS	Advanced Life Support
ANSI	American National Standards Institute
ATSA	Aviation and Transportation Security Act
BDO	Behavior Detection Officers
BLS	Basic Life Support
CARES	Community Addictions Rehabilitation and Evaluation Services
CBP	Customs and Border Protection
CBRNE	Chemical, Biological, Radiological, Nuclear high-yield Explosive
CCD	City and County of Denver
CDPHE	Colorado Department of Public Health and Environment
CFR	Code of Federal Regulations
CIAC	Colorado Information Analysis Center
CM	Consequence Management
CNG/CST	Colorado National Guard Civil Support Team
CONOPS	Concept of Operations
CRS	Colorado Revised Statutes
CSP	Colorado State Patrol
CST	Civil Support Team
CTOS	Counter Terrorism Operations Support
CWMD	Countering Weapons of Mass Destruction
DDPHE	Denver Department of Public Health and Environment
DERA	Designated Emergency Response Authority
DFD	Denver Fire Department
DHHA	Denver Health and Hospital Authority
DHPD	Denver Health Paramedic Division
DHS	Department of Homeland Security
DHSEM	Colorado Division of Homeland Security and Emergency Management
DoD	Department of Defense
DOE	Department of Energy
DPD	Denver Police Department
DTRA	Defense Threat Reduction Agency
ECBC	Edgewood Chemical Biological Command
EM	Emergency Management/Manager
EMS	Emergency Medical Services
EMT	Emergency Medical Technician



Acronym	Definition
EOC	Emergency Operations Center
EOD	Explosive Ordnance Disposal
ERO	Emergency Response Officer
FAIN	Federal Award Identification Number
FAMS	Federal Air Marshal Service
FAR	Federal Acquisition Regulation
FBI	Federal Bureau of Investigation
FC	Federal Coordinator
FEMA	Federal Emergency Management Agency
FOC	Full Operational Capability
FOIA	Freedom of Information Act
FSE	Full-Scale Exercise
GAO	Government Accountability Office
GNDA	Global Nuclear Detection Architecture
HAZMAT	Hazardous Materials
HERT	Hazardous Evidence Response Team
HPAC	Hazard Prediction and Assessment Capability
HRUA	High Risk Urban Area
HSAS	Homeland Security Advisory System
HSEEP	Homeland Security Exercise and Evaluation Program
HSIN	Homeland Security Information Network
HSPD	Homeland Security Presidential Directive
IC	Incident Commander
ICS	Incident Command System
IED	Improvised Explosive Device
IFSP	Integrated Federal Support Plan
IND	Improvised Nuclear Device
IOC	Initial Operational Capability
IPP	Integrated Preparedness Plan
JHERT	Joint Hazardous Explosives Response Team
JITT	Just in Time Training
JOC	Joint Operations Center
JTTF	Joint Terrorism Task Force
LE	Law Enforcement
MDDP	Mobile Detection Deployment Program
MDDU	Mobile Detection Deployment Unit
MOU	Memorandum of Understanding
MYTEP	Multi-Year Training and Exercise Plan



Acronym	Definition
NFE	Non-Federal Entity
NGA	Non-Government Agencies
NIMS	National Incident Management System
NMED	Nuclear Material Events Database
NNSA	National Nuclear Security Administration
NOC	National Operations Center
NORM	Naturally Occurring Radioactive Material
NRB	National [Level] Reachback
NRF	National Response Framework
NSSE	National Special Security Event
OEM	Office of Emergency Management
OEPR	Office of Emergency Preparedness and Response
OGA	Other Government Agency
OLE	Office of Law Enforcement
OSD	Operations Support Directorate
PII	Personally Identifiable Information
PMO	Program Management Office
POAM	Plan of Action and Milestones
POE	Ports of Entry
POETE	Planning, Organization, Equipment, Training, and Exercises
PPE	Personal Protective Equipment
PRD	Personal Radiation Detector
PRND	Preventative Radiological Nuclear Detection
PRNDOR	Preventative Radiological Nuclear Detection 4-Module Training Course
PRNDOS	Preventative Radiological Nuclear Detection On-Site Training of 4-Module Training Course
PTE	Pass-Through Entity
R	Roentgen
R/h	Roentgen per hour
R/N, RN	Radiological/Nuclear
RAP	Radiological Assistance Program
RDD	Radiological Dispersal Device
RED	Radiological Exposure Device
RFI	Requests for Information
RIID	Radioisotope Identification Device
RND(O)	Radiological & Nuclear Detection (Operations)
RNSO	Radiological/Nuclear Search Operations
RS	Reachback Spectroscopy
RTD	Regional Transportation District



Acronym	Definition
SABT	Special Agent Bomb Technicians
SAM	System for Award Management
SDO	Staff Duty Officer
SEAR	Special Event Assessment Rating
SLTT	State, Local, Tribal and Territorial
SME	Subject Matter Expert
SNM	Special Nuclear Material
SOP	Standard Operating Procedure
SPR	Stakeholder Preparedness Review
STAB	FBI Stabilization Team
STC	Securing the Cities
STTL	State, Territorial, Tribal and local
SWAT	Special Weapons and Tactics Team
TCE	Threat Credibility Evaluation
TEDE	Total Effective Dose Equivalent
TENORM	Technologically Enhanced Naturally Occurring Radioactive Material
TEP	Training and Exercise Plan
THIRA	Threat and Hazard Identification and Risk Assessment
TLO	Terrorism Liaison Officers
TSA	Transportation Security Administration
TSI	Transportation Security Inspectors
TSSE	Transportation Security Specialists – Explosives
TTP	Tactics, Techniques and Procedures
TTX	Tabletop Exercise
USC	United States Code
USDOT	United States Department of Transportation
USG	United States Government
VIPR	Visible Intermodal Prevention and Response
WMD	Weapons of Mass Destruction

SECTION 10: DIRECTORY

Table 11. WMD Resources Directory

Agency	Contact	Number
Colorado Department of Homeland Security and Emergency Management	State of Colorado Emergency Operations Line	303-279-8855
Colorado Department of Public Health and Environment	CDPHE Radioactive Materials Incident Reporting call line (Duty Officer)	303-877-9757
Colorado Information Analysis Center	CIAC Asst. Dir. Devon Rhoads	303-963-6971
	CIAC Asst. Dir. Kristina Bomba	720-883-1374
		877-509-2422
Colorado National Guard	Civil Support Team, WMD Staff Duty Officer	720-272-4997
Colorado State Patrol	Denver Regional Communications Center	303-239-4501
Denver Dept of Public Health	On call	303-495-8376
Denver Fire Department	Non-Emergency Fire Department dispatcher	720-913-2400
Denver Health and Hospital Authority	Paramedic Dispatch Line	720-913-2200
Denver OEM	Duty Officer	720-865-5500
Department of Energy, U.S.	Technical Reachback/Triage/RN Assets	202-586-8100
	National Response Center - RAP Team	800-424-8802
Federal Bureau of Investigation	WMD Coordinator	303-629-7171
	WMD Dave Autrey	303-472-0877
	Radio Direct	303-630-6097
	WMD Duty SSA via SIOC	202-323-3300
	STAB Coordinator Scott Kapfer	808-265-0665

SECTION 11: RADIATION SAFETY GUIDANCE FOR SCREENING OPERATIONS

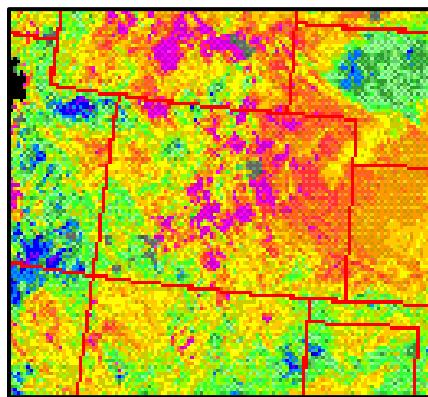
11.1 RADIATION ENVIRONMENT AND DOSE CONTROL GUIDANCE

11.1.1 BACKGROUND RADIATION AND ANTICIPATED INNOCENT RADIATION ALARMS

Background radiation is emitted from both natural and human-made radioisotopes. Naturally occurring radiation comes from the atmosphere because of radiation from outer space, as well as from the primordial radioactive materials within the earth's surface. Additionally, human-made radiation enters our environment from consumer products, industrial uses, and medical procedures.

Colorado's ambient radiation levels vary greatly around the state due to the impacts of elevation on cosmic radiation and the amount of uranium and thorium in ground surface materials. For example, the total dose to residents of the Colorado Plateau due to cosmic and terrestrial radiation can range from 74 to 140 mrem/year¹. This equates to about 8 to 16 microR per hour (8-16 μ R/hr.) as detected by a personal radiation detector (PRD). Such background levels can fluctuate greatly (by roughly a factor of 2 to 5, or more) when detection activities are performed near ground berms, large parking structures, passing through tunnels or bridges/underpasses, or near/within buildings/large structures constructed of indigenous materials (granite, rock, sandstone, adobe, even concrete). These fluctuations may cause detection alarms on PRDs and elevated readings/background interference during radioisotope identification and contamination survey activities.

Figure 6. Colorado: Terrestrial Gamma-Ray Exposure at 1 meter Above Ground



Radiation alarms may occur in the vicinity of legitimate consumer products containing NORM and individuals that have recently undergone nuclear medicine exposures. Items such as vintage Fiesta Ware ceramics, antique and contemporary Vaseline glass, smoke detectors, radium dials, and NORM-containing rocks typically range from <math><1\text{ mR/hr.}</math> to

¹ Radiation and Risk, Radiation Information Network, Idaho State University.
<http://www.physics.isu.edu/radinf/risk.htm>

immediately following a diagnostic technique or therapy.

11.1.2 DOSE AND DOSE RATE GUIDANCE

The Denver STC Partner Agencies use very sensitive equipment that detects radiation well below levels that represent a safety concern. Most preventive radiological encounters will not involve radiation levels significant enough to cause an imminent health hazard. Radiological incidents could involve safety-significant radiation levels. Whether as a preventive or a response measure, it is always important to take all reasonable steps to minimize responder exposure, and to monitor and document all exposures that occur. All available protective measures should and will be used to maintain the exposure doses to radiation detection equipment operators and first responders as low as reasonably achievable (ALARA), through the proper use of time, distance and shielding principles to control total dose exposures.

Operational and public exclusion zones may need to be established in response to a radiological incident, depending on the magnitude and extent of the impact. **Table 14** shows the default control zones and turn-back levels for use by Denver STC Partner Agency responders unless otherwise determined by the Incident Commander.

Table 12. RN Incident default control zones and turn-back levels

Control Type	Control Level	Additional detail/comment
Cold Zone Aka Exclusion Zone	<2 mR/hr. at 1 m above ground Detectable contamination <2x background, not to exceed: 60,000 dpm/cm ² beta/gamma at 3 cm above ground 6,000 dpm/cm ² alpha at 1-2 cm above ground	Outer boundary for small incidents. No legal restrictions outside this area. Command centers, staging areas, etc., that need to be set up close to the incident can be within this boundary.
Warm Zone	If Feasible: <2 mR/hr. at 1 m above ground <60,000 dpm/cm ² beta/gamma at 3 cm above ground <6,000 dpm/cm ² alpha at 1-2 cm above ground	A zone within the Cold Zone. Comprises the area in which monitoring, and decontamination of personnel and equipment and Hot Zone support takes place. Personnel and equipment enter and exit the Hot Zone through the Warm Zone. The Warm Zone may become an area of elevated radiation levels (i.e., above normal background) due to the activities that occur there (e.g., decontamination).

Control Type	Control Level	Additional detail/comment
Hot Zone ²	10 mR/hr. 60,000 dpm/cm ² beta/gamma at 3 cm above ground 6,000 dpm/cm ² alpha at 1-2 cm above ground	The zone immediately surrounding a HazMat incident at a distance to minimize prompt and long-term risk to individuals outside the zone. Demarcated by the “hot line”. For a radiological dispersal device scenario it can be set at 500 m from the explosion for an unknown source activity or at 250 m if the activity is known to be less than 10,000 Ci. After meter readings are available, set outer border at 10 mR/hr. if possible.
Hot Spot	1 R/hr.	A localized area of especially high activity inside the Hot Zone, generally above 1 R/hr. Responders going into a hot spot should be especially aware of ALARA and plan all tasks to minimize unnecessary exposures.
Dangerous Radiation Zone	10 R/hr.	Zone within the Hot Zone. Per NCRP 165, actions taken within the dangerous radiation zone should be restricted to time-sensitive, mission-critical activities such as lifesaving.
“Turn Back” level	200 R/hr. ³	At this dose rate, the likelihood of successful rescue of victims is outweighed by dose effects to responders. Represents the level at which rescue operations may not be justified. Enter such areas only after it has been determined that the likelihood of success outweighs potential harm to rescuers. Survival of non-ambulatory victims who have been in the area for more than 60 minutes is questionable.

Protective action guides apply to both dose rate and total dose levels during radiation alarm encounters and HazMat incident response to aid in maintaining responder and public exposures ALARA. The Incident Commander is responsible for defining the total dose and dose rate control levels for a specific incident, and authorizing responders to exceed a control level for a given type of action when reasonable alternatives do not exist. **Table 15** provides more detailed guidance regarding default Denver STC Partner Agency responder total dose and dose rate/turn-back levels, types of activities conducted within the different dose/dose rate ranges, technical basis for the default levels, and related radiation risk.

Dose rate turn-back levels may be applied in the early phase of an encounter or response when the radiological hazard has not yet been well characterized. When possible, considering their other missions, first responders should measure and report exposure rates, particularly during initial area entries. Once the radiation conditions are better characterized, activities can be planned, and responder doses can be estimated utilizing a combination of real-time total dose monitoring and stay

² National Council on Radiation Protection and Measurement. (2011), Responding to a Radiological or Nuclear Terrorism Incident: A Guide for Decision Makers. Report No. 165

³ Responder Protective Equipment and Equipment Settings, Key Planning Factors: Response to an IND. September 2015.



time estimates.

Table 13. Dose Rate Activity Guide

Dose-Rate Guide	Total Dose ⁴	Activity	Conditions	Relative Risk
2 mR/hr.	Up to 5 rem (5,000 mrem)	Preventative RND evaluations Emergency support efforts not required to be in the Hot Zone	none	
10 R/hr. ⁵ (10,000 mR/hr.)	Up to 5 rem (5,000 mrem) ⁶	1. General response operations at a radiological emergency 2. Longer term recovery operations 3. Monitoring and sampling	All reasonably achievable actions have been taken to minimize dose. Areas exceeding 1 R/hr. (1,000 mR/hr.) should be marked if possible	Negligible increase in long-term fatal cancer risk (<<0.5%)
200 R/hr. (200,000 mR/hr.)	Up to 10 rem (10,000 mrem)	1. Protecting major property/valuable property for public welfare 2. Implement urgent protective actions	All appropriate actions and controls have been implemented; however, exceeding 5 rem (0.05 Sv) is unavoidable. Responders have been fully informed of the risks of exposures they may experience. Dose >5 rem (0.05 Sv) is on a voluntary basis. Appropriate respiratory protection and other personal protection is provided and used. Monitoring available to project or measure dose.	<0.8% increased lifetime risk of fatal cancer for a 10-rem exposure

⁴ The projected sum of the effective dose equivalent from external radiation exposure and committed effective dose equivalent from internal radiation exposure .

Note: 10,000 mrem = 10 rem = 100 mSv = 0.1 Sv; 1 R ~ 1 rem

⁵ NCRP Report 165 defines areas exceeding 10 R/hr.. as the Dangerous Radiation Zone (DRZ) and recommends Actions taken within this zone should be restricted to time-sensitive, mission-critical activities such as lifesaving.

⁶ Applies to doses after the end of the emergency phase

Dose-Rate Guide	Total Dose ⁴	Activity	Conditions	Relative Risk
200 R/hr. (200,000 mR/hr.)	Up to 25 rem (25,000 mrem)	1. Lifesaving or prevention of serious injury 2. Protection of a large population, or actions to avert a large collective dose (to all personnel) 3. Prevent the development of catastrophic conditions	All appropriate actions and controls have been implemented; however, exceeding 5 rem (0.05 Sv) is unavoidable. Responders have been fully informed of the risks of exposures they may experience. Dose >5 rem (0.05 Sv) is on a voluntary basis. Appropriate respiratory protection and other personal protection is provided and used. Monitoring available to project or measure dose.	Increased lifetime risk of fatal cancer by ~2% for a 25-rem exposure
>200 R/hr. ⁷	Up to 50 rem (50,000 mrem) [When lower doses are not practicable]	Lifesaving operation or avoiding extensive exposure of large populations (e.g., catastrophic event/conditions)	Emergency responders might receive an equivalent dose that approaches or exceeds 50 rem (0.5 Sv) to a large portion of the body in a short time. ⁸ If lifesaving emergency responder doses approach or exceed 50 rem (0.5 Sv), emergency responders must be made fully aware of both the acute and the chronic (cancer) risks of such exposure.	No immediate health effects expected. Increased lifetime risk of fatal cancer by ~4% for a 50-rem exposure

A stay timetable (**Table 16**) can be used in entry planning to quickly project the approximate dose that could be received from working for a given amount of time in each radiation field. To use the stay-time table, select the expected exposure rate in the left-hand column (round up if a range of exposure levels are possible). Read across to the amount of time spent in that field, then look to the

⁷ Although planned activities in areas above 200 R/hr. can be done safely, it should be considered that victims who are in this area for more than a **few hours** may not survive their exposure

⁸ The principle of justification and optimization continue to apply during emergency operations and every effort shall be made to keep doses below the occupational exposure limit. Where this cannot be accomplished doses of up to 50 rem or more may be reached or exceeded. For such operations emergency workers must be 1) experienced volunteers, 2) trained for radiation protection, and 3) must understand the risks (NCRP 138). The 50,000 mrem dose guideline is a level where minor effects from short-term radiation exposure are possible. Note that this guideline applies to a once-in-a-lifetime event. (CRCPD). NCRP recommends, when the cumulative absorbed dose to an emergency responder reaches 50 rad, a decision be made on whether to withdraw the emergency responder from the hot zone. (NCRP-165)

top of that column to see the total dose expected.

Emergency workers, whose duties during a radiological incident may entail exceeding the occupational dose limits, do so as volunteers who have been provided information on the health risks of such exposures to permit informed decision making. It is recommended that, to the extent practical, informed consent of such emergency workers be obtained in advance of a radiological emergency (e.g., not when an incident occurs), that responsibilities and related risks be communicated in employment-related documentation, training, and qualification.

Table 14. Stay Timetable

	Stay Time to Receive this Dose (external dose only)							
	Regulatory dose limit for non-rad worker	Regulatory dose limit for radiation worker	Property-saving guidance level	Life-Saving Actions	Upper Guidance Level for life-saving actions (Volunteer)	Onset of acute radiation sickness	Lethal dose to 50% without medical treatment	Lethal dose to 50% with medical treatment
Total Dose	100 mR	5 R	10 R	25 R	50 R	100 R	400 R	800 R
Dose Rate								
1 mR/hr.	4 days	28 weeks	>60 weeks	>60 weeks	>60 weeks	>60 weeks	>60 weeks	>60 weeks
2 mR/hr.	2 days	14 weeks	30 weeks	>60 weeks	>60 weeks	>60 weeks	>60 weeks	>60 weeks
5 mR/hr.	20 hr.	6 weeks	12 weeks	30 weeks	>60 weeks	>60 weeks	>60 weeks	>60 weeks
10 mR/hr.	10 hr.	3 weeks	6 weeks	14 weeks	30 weeks	>60 weeks	>60 weeks	>60 weeks
20 mR/hr.	5 hr.	1.5 week	2 weeks	7 weeks	14 weeks	30 weeks	>60 weeks	>60 weeks
50 mR/hr.	2 hr.	4 days	1 week	3 weeks	6 weeks	12 weeks	47 weeks	>60 weeks
100 mR/hr.	1 hr.	2 days	4 days	1.5 week	3 weeks	6 weeks	24 weeks	47 weeks
200 mR/hr.	30 min	1 day	2 days	125 hr.	1.5 week	3 weeks	12 weeks	24 weeks
500 mR/hr.	12 min	10 hr.	20 hr.	2 days	4 days	1 week	4.5 weeks	9.5 weeks
1 R/hr.	6 min	5 hr.	10 hr.	1 day	2 days	4 days	2 weeks	4.5 weeks
2 R/hr.	3 min	2.5 hr.	5 hr.	12 hr.	1 day	2 days	8 days	2 weeks
5 R/hr.	72 sec	1 hr.	2 hr.	5 hr.	10 hr.	20 hr.	6 days	6.5 days
10 R/hr.	36 sec	30 min	1 hr.	2.5 hr.	5 hr.	10 hr.	1.5 days	6 days
20 R/hr.	18 sec	15 min	30 min	1.2 hr.	2.5 hr.	5 hr.	20 hr.	1.5 days
50 R/hr.	7 sec	6 min	12 min	30 min	1 hr.	2 hr.	8 hr.	16 hr.
100 R/hr.	3 sec	3 min	6 min	15 min	30 min	1 hr.	4 hr.	8 hr.
200 R/hr.	2 sec	90 sec	3 min	7 min	15 min	30 min	2 hr.	4 hr.
300 R/hr.	1 sec	60 sec	2 min	5 min	10 min	20 min	1.3 hr.	2.7 hr.
500 R/hr.	<1 sec	36 sec	1 min	3 min	6 min	12 min	48 min	1.6 hr.
1000 R/hr.	<1 sec	18 sec	36 sec	90 sec	3 min	6 min	24 min	48 min

<1 hr
<1 shift
>1 shift
 Shift=12 hours, day=24 hours, week=24/7

Table 17 provides some initial stand-off distances for different types of radiological events that may be used in the absence of immediate on-scene information/guidance. Stand-off distances would be adjusted as additional information became available regarding incident/material specifics, Bomb Squad recommendations, etc.

Table 15. Stand-off Distances for Different Types of Radiological Incidents

Stand-off Distances for Different Types of Radiological Incidents	
Radiological Incident	Establish Restricted Area of:
Transportation Accident Intact package with a WHITE-I, YELLOW-II, or YELLOW-III label	Immediate area around the package (1 – 3 m)
Transportation Accident Damaged package with a WHITE-I, YELLOW-II, or YELLOW-III label	30 m radius or reading of 2 mR/hr.
Radioactive material within licensed container Undamaged common radioactive source (consumer item) such as a smoke detector	Immediate area around the source (1 – 2 m)
Radiation Exposure Device Other unshielded or unknown source (may be damaged)	30 m radius or reading of 2 mR/hr.
Small Spill (small amount of RAM (microcuries) and small area (a few square meters))	Spill area plus 30 m around or reading of 2 mR/hr.
Major Spill (large amount of RAM (millicuries) and large area (a 100 square meters))	Spill area plus 300 m around, or reading of 2 mR/hr.
Radiological Dispersal Device Fire, explosion, or fumes	250 m radius, reading of 2 mR/hr. or explosive standoff, whichever is greater

Figure 7. Class 7, Radioactive Material Placard





Table 18 provides radiation measurements references to help interpret multi-agency equipment readings (e.g., the CST utilize SI units for all radiation measurements).

Table 16. Radiation Measurements Reference

Radiation Units of Measure and Conversions			
	SI Units*	Common Units	Conversion
Radioactivity	becquerel (Bq)	curie (Ci)	1 Bq = 1 disintegration per second 1 megaBq = 0.027 millicuries 1 Ci = 3.7x10 ¹⁰ Bq
Absorbed Dose	gray (Gy)	rad	1 Gy = 100 rad 1 rad = 0.01 Gy
Dose Equivalent	sievert (Sv)	rem	1 Sv = 100 rem 1 rem = 0.01 Sv
Exposure	coulomb/kilogram (C/kg)	roentgen (R)	1 R = 0.000258 C/kg 1 C/kg = 3,880 R

* SI Units: International System of Units

* Unit conversion tool located at <https://www.remm.nlm.gov/radmeasurement.htm>

Prefixes Often Used with Radiation SI Units:

- nano (n) 10⁻⁹
- micro (u) 10⁻⁶
- milli (m) 10⁻³
- centi (c) 10⁻²
- kilo (k) 10³
- mega (M) 10⁶
- giga (G) 10⁹
- tera (T) 10¹²



SECTION 12: RECORD OF CHANGE

Date	Description of Change	Who approved change?



DENVER
THE MILE HIGH CITY

