

# Three Mile Island Nuclear Generating Station/Hanover Hospital After Action Report/ Improvement Plan

Drill Date – June 23, 2016

Radiological Emergency Preparedness (REP) Program



**FEMA**

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# After Action Report/Improvement Plan

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# EXECUTIVE SUMMARY

On June 23, 2016 a Medical Services (MS-1) Drill was evaluated for the 10-mile Plume Exposure Pathway, Emergency Planning Zone (EPZ) around the Three Mile Island Nuclear Generating Station (TMI) by the Department of Homeland Security (DHS), Federal Emergency Management Agency (FEMA) Region III. The most recent prior MS-1 drill for this site was conducted on June 5, 2009.

The purpose of the Three Mile Island Nuclear Generating Station MS-1 drill was to assess the State and local offsite response organization preparedness in responding to a radiological medical emergency. The drill was held in accordance with FEMA's policies and guidance concerning the exercise of State and local Radiological Emergency Response Plans (RERP) and procedures.

FEMA wishes to acknowledge the efforts of the many individuals in the Commonwealth of Pennsylvania, York County Emergency Management Agency, Hanover Hospital and the Grantley EMS/Ambulance who were evaluated during this exercise.

Protecting the public health and safety is the full-time job of some of the exercise participants and an additional assigned responsibility for others. Still others have willingly sought this responsibility as volunteers providing vital emergency services twenty four (24) hours a day to the communities of which they live. Cooperation and teamwork of all the participants was observed during this drill.

This report contains the final evaluation of the MS-1 drill. The Commonwealth of Pennsylvania and local organizations demonstrated knowledge of their emergency response plans and procedures and adequately implemented them. There were no Level 1 or Level 2 Findings or Planning issues as a result of this exercise.

# SECTION 1: EXERCISE OVERVIEW

## 1.1 Exercise Details

**Exercise Name**

Three Mile Island Nuclear Generating Station 2016 Medical Services (MS-1) Drill

**Type of Exercise**

Medical Services (MS-1) Drill

**Exercise Date**

June 23, 2016

**Program**

Department of Homeland Security/FEMA Radiological Emergency Preparedness Program

**Scenario Type**

Radioactive Contaminated/Injured Person

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### **1.3 Participating Organizations**

Agencies and organizations of the following jurisdictions participated in the Three Mile Island Nuclear Generating Station 2016 Medical Services drill:

#### Risk Jurisdictions

York County Emergency Management Agency

#### Healthcare Organizations

Hanover Hospital

Grantley EMS/Ambulance

York Area United Fire/Lifesaving (YAUFL)

#### Private Sector

EXELON

Millersville University

## SECTION 2: EXERCISE DESIGN SUMMARY

### 2.1 Exercise Purpose and Design

On December 7, 1979, the President directed the Federal Emergency Management Agency (FEMA) to assume the lead responsibility for all off-site nuclear planning and response. FEMA's activities were conducted pursuant to 44 Code of Federal Regulations (CFR) Parts 350, 351 and 352. These regulations are a key element in the Radiological Emergency Preparedness (REP) Program that was established following the Three Mile Island Nuclear Generating Station accident in March 1979.

44 CFR 350 establishes the policies and procedures for FEMA's initial and continued approval of State and local governments' radiological emergency planning and preparedness for commercial nuclear power plants. This approval is contingent, in part, on State and local government participation in joint exercises with licensees. FEMA's responsibilities in radiological emergency planning for fixed nuclear facilities include the following:

- A. Taking the lead in offsite emergency planning and in the review and evaluation of Radiological Emergency Response Plans (RERPs) and procedures developed by State and local governments;
- B. Determining whether such plans and procedures can be implemented on the basis of observation and evaluation of exercises of the plans and procedures conducted by State and local governments;
- C. Responding to requests by the U.S. Nuclear Regulatory Commission (NRC) pursuant to the Memorandum of Understanding between the NRC and FEMA dated June 17, 1993 (Federal Register, Vol. 58, No. 176, September 14, 1993; and
- D. Coordinating the activities of the following Federal agencies with responsibilities in the radiological emergency planning process:
  - U.S. Department of Commerce,
  - U.S. Nuclear Regulatory Commission,
  - U.S. Environmental Protection Agency,
  - U.S. Department of Energy,
  - U.S. Department of Health and Human Services,
  - U.S. Department of Transportation,
  - U.S. Department of Agriculture,
  - U.S. Department of the Interior, and
  - U.S. Food and Drug Administration.

Representatives of these agencies serve on the Region III Radiological Assistance Committee (RAC), which is chaired by FEMA. A REP Medical Services drill was conducted June 23, 2016, to assess the capabilities of State and local emergency preparedness organizations in implementing



their RERPs and procedures to protect the public health and safety during a radiological emergency involving Three Mile Island Nuclear Generating Station. The purpose of this exercise report is to present the drill results and findings on the performance of the off-site response organizations (OROs) during a simulated radiological emergency involving a contaminated injured individual.

The findings presented in this report are based on the evaluations of the Federal evaluator team, with final determinations made by the FEMA Region III Radiological Assistance Committee (RAC) Chairperson and approved by FEMA Headquarters. These reports are provided to the NRC and participating States. State and local governments utilize the findings contained in these reports for the purposes of planning, training, and improving emergency response capabilities.

The criteria utilized in the FEMA evaluation process are contained in the following:

- NUREG-0654/FEMA-REP-1, Rev. 1, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants," November 1980;
- Radiological Emergency Preparedness Program Manual, January 2016

Section 1 of this report, entitled "Exercise Overview", presents the "Exercise Planning Team" and the "Participating Organizations".

Section 2 of this report, entitled "Exercise Design Summary", and includes the "Purpose and Design", "Exercise Objectives, Capabilities, and Activities", and the "Scenario Summary".

Section 3 of this report, entitled "Analysis of Capabilities", presents detailed "Drill Evaluation and Results" information on the demonstration for each jurisdiction or functional entity evaluated in a jurisdiction-based, issue-only format (Criteria Evaluation Summaries).

Section 4, of this report, entitled "Conclusion", is a description of the Region's overall assessment of the capabilities of the participating organizations. It also presents information on planning issues if any were identified.

#### Emergency Planning Zone Description:

The TMI Nuclear Generating Station (40° 9' 12" N/76° 43' 25" W) is a nuclear power plant operated by Exelon Nuclear. The site consists of two pressurized water-type units. Unit One is an 819-megawatt (MW) reactor, and Unit Two is a 906-MW reactor. Unit 1 received its license in June 1974 and began commercial operation in September 1974. Unit 2 began commercial operation in February 1978; it was damaged in March 1979 and has been shut down and placed in a monitored storage mode.

The minimum exclusion distance specified for the TMI plant is 2,000 feet. Included within the

2,000-foot radius are a portion of Three Mile Island, a portion of Shelly Island, and a portion of the Susquehanna River. Exelon Nuclear owns all the land within the exclusion area.

The TMI plant is located in south-central Pennsylvania in Londonderry Township, Dauphin County. The site is part of an 814-acre tract consisting of several adjacent islands in the Susquehanna River. The power plant is located on Three Mile Island, which is one of the largest islands of the group. The site is at an elevation of 300 feet above mean sea level (msl), relatively flat, and wooded on the periphery and the southern portion. Of the 470 acres that make up the island, the plant occupies approximately 200 acres in the northern portion.

Soils on the island are of the Duncannon-Chavies-Tioga Association, which is comprised of deposits of alluvial sand, silt, and clay. Underlying bedrock is red sandstone and shale.

The normal pool elevation of the Susquehanna River in this area is 277 feet above msl. Hills on both sides of the river in this vicinity rise to elevations of over 500 feet. The plant grade is 300 feet above msl.

An access bridge for plant personnel connects State Route 441 with the north end of the island. A wooden bridge connects the southern portion of the island with State Route 441. Norfolk Southern rail lines are located on both sides of the river; the closest is a one-track line adjacent and parallel to Route 441 on the east shore.

The area within 10 miles of the TMI Nuclear Generating Station is located in south-central Pennsylvania, and includes portions of Cumberland, Dauphin, Lancaster, Lebanon, and York counties. The site is surrounded mostly by farmland within a 10-mile radius. The nearest community is Goldsboro Borough, on the west shore of the Susquehanna River, 1 mile from the plant. The nearest major population center with more than 25,000 people is Harrisburg (Population 53,624), which lies just over 10 miles to the north.

Twenty-three industrial firms are located within a 5-mile radius; they employ approximately 2,400 people. The Harrisburg International Airport is located 2 miles northwest of the TMI plant. An NRC estimate of aircraft risk to TMI Units One and Two indicates an acceptably low risk for either unit, provided fewer than 2,400 operations per year are by aircraft in excess of 200,000 pounds. The NRC requires Exelon to continue periodic monitoring and reporting of airport usage and will reevaluate the adequacy of plant protection if aircraft traffic is reliably projected to exceed 2,400 operations per year. The major railroads operating in the EPZ include Amtrak, Blue Mountain and Ridge, Chessie System, Conrail, and the Maryland and Pennsylvania Railroad.

The climate of the five-county risk EPZ is mild and humid. Weather is variable because the prevailing westerly winds bring both high- and low-pressure systems through the area every few days. Average annual precipitation for the southern portion of the EPZ is about 38 inches and the average annual temperature is 52° F.

On the basis of the 2010 census, the total population of the 10-mile EPZ is 226,160. There are 97 sirens used to provide coverage of the plume exposure pathway EPZ. Each county operates its respective sirens.

## **2.2 Exercise Objectives, Capabilities and Activities**

The Three Mile Island Nuclear Generating Station 2016 Medical Services (MS-1) drill evaluated by the Federal Emergency Management Agency was designed to demonstrate the capabilities of State and local emergency management agencies to technically assess the extent of the radiological impact from a contaminated injured individual, including transport and receipt at a hospital. The demonstration included the ability to:

- A. Demonstrate the ability to respond to a radiation medical emergency following York County Emergency Management Agency, Grantley EMS and Hanover Hospital procedures.
- B. Demonstrate timely and accurate communications between the hospital and offsite response agencies. (Telephones will be used in lieu of radios whenever possible to limit the potential misinterpretation of the exercise as an actual event.)
- C. Demonstrate correct priorities and appropriate techniques in EMS, transportation of patients and pre-hospital and hospital emergency care of radioactively contaminated patients.
- D. Demonstrate inter-agency cooperation between the Ambulance Service / EMS and the Hospital.

## **2.3 Scenario Summary**

The exercise scenario for this Medical Services Drill consisted of simulated notifications of escalating emergency classification levels at the Three Mile Island Nuclear Generating Station from Site Area Emergency (SAE) to General Emergency (GE). Subsequent to a release of radiological material the plant declared a General Emergency.

During an evacuation of the Three Mile Island Emergency Planning Zone an EMS Personnel arrives at an emergency worker monitoring and decontamination station. The EMT was part of a crew working to extricate an auto accident patient in the Emergency Planning Zone. While extricating the patient the EMT cut her cheek on piece of jagged metal. Medical care was rendered on scene and the EMT passed through decon to be assessed medically now that the mission was accomplished. At the Emergency Worker Decontamination Site she was noted to be contaminated. When contamination was found in the laceration on her cheek the site leader decided to transport her to the MS-1 Hospital rather than attempt debridement. A second ambulance handled the patient so she could seek treatment. The decon station has kept her dosimetry.

Area responders had been informed of the evacuation so when the EMS crew made contact with the patient they immediately asked if she was evacuating the 10 mile EPZ. When she answered

that she was evacuating the EMS Crew immediately took appropriate radiological precautions with her and transported her to the closest MS-1 hospital.

Upon arrival at Hanover Hospital, the medical treatment team and a radiation safety representative met the Emergency Medical Services (EMS) team at the exterior entrance to the Radiological Emergency Area (REA). The hospital's medical team assessed the patient's condition and surveyed the victim for radiological contamination. Initial contamination levels included: 3,500 counts per minute (cpm), on the laceration to the cheek and 2,000 counts per minute (cpm) on the left hand.

## **SECTION 3: ANALYSIS OF CAPABILITIES**

### **3.1 Exercise Evaluation and Results**

Contained in this section are the results and findings of the evaluations of all jurisdictions and locations that participated in the June 23, 2016 Three Mile Island Nuclear Generating Station Medical Services (MS-1) Drill. The drill was conducted to demonstrate the ability of the Offsite Response Organizations to respond to a potentially contaminated injured person associated with the Three Mile Island Nuclear Generating Station.

Each jurisdiction and functional entity was evaluated on the basis of its demonstration of the appropriate Exercise Evaluation Area Criteria contained in the REP Program Manual. Detailed information on the exercise evaluation area criteria and the Extent-of-Play agreement are found in Appendix C.

The drill was conducted and evaluated in accordance with the Radiological Emergency Preparedness Program Manual and NUREG 0654. The Evaluation Criteria included:

- 1.e.1 Equipment and supplies to support operations
- 3.a.1 Implementation of emergency worker exposure control
- 6.d.1 Transportation and treatment of contaminated injured individuals

The drill successfully demonstrated the response capabilities of the participants (except as may be noted in Section 3.2, Summary Results of Drill Evaluation, and Section 3.3, Criteria Evaluation Summaries).

### **3.2 Summary Results of Exercise Evaluation**

The matrix presented in Table 3.1, on the following pages, presents the status of the exercise evaluation area criteria from the REP Program Manual that was scheduled for demonstration during this drill by all participating jurisdictions and functional entities. Drill evaluation area criteria are listed by number and the demonstration status of the criteria is indicated by the use of the following letters:

(D) Demonstrated Strength: An observed action, behavior, procedure, and/or practice that is worthy of special notice and positive recognition.

(L1) Level 1 Finding: An observed or identified inadequacy of organizational performance in an exercise that could cause a determination that offsite emergency preparedness is not adequate to provide reasonable assurance that appropriate protective measures can be taken in the event of a radiological emergency to protect the health and safety of the public living in the vicinity of a Nuclear Power Plant (NPP).

(L2) Level 2 Finding: An observed or identified inadequacy of organizational performance in an exercise that is not considered, by itself, to adversely impact public health and safety.

(P) Plan Issue: An observed or identified inadequacy in the offsite response organizations' (ORO's) emergency plan/implementing procedures, rather than that of the ORO's performance.

(N) Not Demonstrated: A term applied to the status of a REP exercise Evaluation Area Criterion indicating that the ORO, for a justifiable reason, did not demonstrate the Evaluation Area Criterion, as required in the extent-of-play agreement or at the two -year or eight-year interval required in the FEMA REP Program Manual.

(M) Met: A status of a REP exercise Evaluation Area Criterion indicating that the participating ORO demonstrated all demonstration criteria for the Evaluation Area Criterion to the level required in the extent of-of-play agreement with no Findings assessed in the current exercise and no unresolved prior Findings.

Table 3.1 – Summary of Drill/Exercise Evaluation

Date: 2016-06-23 Site: Three Mile Island Nuclear Generating Station			Hanover Hospital	Grantley EMS
(M) Met, (1) Level 1 Finding, (2) Level 2 Finding, (P) Planning Issue				
<b>Emergency Operations Management</b>				
Mobilization	1a1			
Facilities	1b1			
Direction and Control	1c1			
Communications	1d1			
Equipment and Supplies to Support Operations	1e1	M	M	
<b>Protective Action Decision-Making</b>				
Emergency Worker Exposure Control	2a1			
Accident Assessment and Plans for the Emergency Event	2b1			
PAD decision-making process and coordination for the General Public	2b2			
PADs for disabilities & access/functional needs people	2c1			
Radiological Assessment & Decision making for the Ingestion Pathway	2e1			
Radiological Assessment & Decision making for Relocation/Reentry/Return	2d1			
<b>Protective Action Implementation</b>				
Implementation of Emergency Worker Exposure Control	3a1	M	M	
Implementation of KI PAD for Institutionalized Individuals/Public	3b2			
Implementation of PADs for disabilities & access/functional needs people	3c1			
Implementation of PADS for Schools	3c2			
Implementation of Traffic and Access Control	3d1			
Impediments to Evacuation	3d2			
Implementation of Relocation/Reentry/Return Decisions	3f1			
<b>Field Measurements and Analysis</b>				
RESERVED	4a1			
Field Team Management	4a2			
Plume Phase Field Measurement, Handling, & Analyses	4a3			
Post Plume Phase Field Measurements & Sampling	4b1			
<b>Emergency Notification and Public Information</b>				
Activation of the Prompt Alert & Notification System (ANS)	5a1			
RESERVED	5a2			
Activation of the Back-up ANS	5a3			
Activation of the Exception Area ANS	5a4			
Emergency Information & Instructions to the Public/Media	5b1			
<b>Support Operations/Facilities</b>				
Monitoring, Decontamination, & Registration of Evacuees	6a1			
Monitoring/Decontamination of Emergency Workers and Equipment	6b1			
Temporary Care of Evacuees	6c1			
Transportation/Treatment of Contaminated Injured Individuals	6d1	M	M	

### 3.3 Criteria Evaluation Summaries

#### 3.3.1 Risk Jurisdictions

In summary, the status of DHS/FEMA criteria for the State jurisdiction is as follows:

##### 3.3.1.1 York County, Hanover Hospital

- a. MET: 1.e.1; 3.a.1; 6.d.1
- b. LEVEL 1 FINDINGS: NONE
- c. LEVEL 2 FINDINGS: NONE
- d. PLAN ISSUES: NONE
- e. PRIOR ISSUES – RESOLVED: NONE
- f. PRIOR ISSUES – UNRESOLVED: NONE

##### **Narrative Summary for Criterion 1.e.1 - Equipment and Supplies to Support Emergency Operations**

*Equipment, maps, displays, monitoring instruments, dosimetry, potassium iodide (KI), and other supplies are sufficient to support emergency operations. (NUREG-0654/FEMA-REP-1, H.7, 10; I.7, 8, 9; J.10.a, b, e; J.11, 12; K.3.a; K.5.b)*

Hanover Hospital successfully demonstrated that they have the necessary equipment and supplies required to support treatment and decontamination of radiological contaminated patients during the Hanover Hospital Medical Services (MS-1) Drill for Three Mile Island Nuclear Generating Station conducted on June 23, 2016.

Hanover Hospital uses the first patient room on the left entering the EMS entrance to the Emergency Department as the dedicated Radiation Emergency Area (REA). The hospital does have a separate shower room with a water containment system and hot and cold running water that could be used as a decontamination area if necessary. The equipment, signage, tape and traffic control material is kept in large bins that are stored within the Emergency Department.

The Radiation Kits contain Personal Protective Equipment (PPE) such as Tyvek suites, long sleeve gowns, shoe covers with tape strips, surgical gloves, head covers, and masks with eye shields. The facility has two radiological Portal Monitors affixed to the facility that are used to monitor every-day activities and will be included in future planning efforts.

Other equipment that is used to support the operation are head covers, shoe covers, latex and nitrile gloves, all in varied sizes. Additional medical and decontamination supplies include surgical masks, safety goggles, disposable stethoscopes, irrigation syringes, 4x4 gauze pads, sample bags with tubes, basins, saline, radiation caution tape, duct tape, tarps,

stanchion units, Herculite, towels, blankets, trash receptacles, radiation spill kits, donning and doffing posters, decontamination procedure posters, and a large array of administrative materials such as pens, pencils, monitoring and recording forms, and dosimetry issue forms

There were two (2) survey instruments, Ludlum, Model 14Cs with an expiration date of March 18, 2017 and August 21, 2016, equipped with 44-9 pancake probes. The Nuclear Medicine Department technician demonstrated the use of the check source to check the operability of the instruments. One of the units required a battery replacement for it to be operational. She also demonstrated the charging and zeroing of the DRDs using a CDV-750. The Permanent Record Dosimeters (PRDs) (Landauer, LUXEL models) were issued when the hospital received an update of the Estimated Time of Arrival and patient update. A Direct Reading Dosimeter (DRD) (Arrow Tech, model 730s) was hung in the center of the room (leak rate tested within spec) and read by a nurse, as directed by procedures. Since the Hospital is located beyond the 10-mile Emergency Planning Zone (EPZ), the use of Potassium Iodide tablets was neither required nor demonstrated.

Paper sheeting was used to cover the floor of the emergency receiving area and the entrance leading to this area. The area was set-up to keep decontamination strictly controlled with adequate coverings for all medical equipment. The facility took about 15 minutes to set up. The Radiation Emergency Area (REA) had appropriate excerpts of procedures posted on the walls of the facility. The REA had an EKG machine and portable X-ray machine available, and was supported by the nuclear medicine staff and respiratory therapy staff and their specialized equipment.

All activities were based on the plans and procedures and completed as they would have been in an actual emergency, except as noted in the Extent of Play agreement.

#### **Narrative Summary for Criterion 3.a.1 - Implementation of Emergency Worker Exposure Control**

*The OROs issue appropriate dosimetry, KI and procedures, and manage radiological exposure to emergency workers in accordance with the plans and procedures. Emergency workers periodically and at the end of each mission read their dosimeters and record the readings on the appropriate exposure record or chart. OROs maintain appropriate record-keeping of the administration of KI to emergency workers. (NUREG-0654/FEMA-REP-1, J.10.e; K.3.a, b; K.4*

Hanover Hospital successfully demonstrated the implementation of emergency worker exposure control during the Hanover Hospital Medical Services (MS-1) Drill for Three Mile Island Nuclear Generating Station on June 22, 2016.

The Hanover Hospital is located outside the 10-mile Emergency Planning Zone. The Hospital provides medical services for the workers and evacuees from the Emergency Worker Decontamination Station, Reception Centers and Congregate Care Centers, as well as the plant. The Nuclear Medicine Department at the Hospital is responsible for providing



personnel dosimetry to the emergency workers at the Hospital and for the radiological monitoring of injured and/or contaminated patients.

At 0820, the hospital Emergency Room was notified by the York County, that TMI had declared a Site Area Emergency and that the EMS responded to a car accident with a victim (simulated) with possible radiation contamination. The hospital had specialized equipment and set up the reception area prior to the arrival of the transporting EMS Company. There were two (2) survey instruments, Ludlum, Model 14Cs with an expiration date of March 18, 2017 and August 21, 2016, equipped with 44-9 pancake probes. The Nuclear Medicine Department technician demonstrated the use of the check source to check the operability of the instruments. One of the units required a battery replacement. She also demonstrated the charging and zeroing of the DRDs using a CDV-750. The Permanent Record Dosimeters (PRDs) (Landauer, LUXEL models) were issued when the hospital received an update of the Estimated Time of Arrival (15 minutes) and a patient update. A Direct Reading Dosimeter (DRD) (Arrow Tech, model 730s) was hung in the center of the room (leak rate tested within spec) and read as directed by a nurse, as directed by procedures. Since the Hospital is located beyond the 10-mile Emergency Planning Zone (EPZ), the use of Potassium Iodide tablets was neither required nor demonstrated.

Tyvek suits, gloves, face shields and bootie covers were issued to manage radiological exposure and protect the emergency worker and the patient. The Direct Reading Dosimetry was read every 15 minutes for the nurse to document on the form. A PRD was issued to each staff member that entered the Radiation Emergency Area (REA). Proper doffing of the PPE and monitoring was performed on one staff member upon completion of the event.

This facility was adequate for the treatment of an injured and contaminated patient. All activities were based on the plans and procedures and completed as they would have been in an actual emergency, except as noted in the Extent of Play agreement.

#### **Narrative Summary for Criterion 6.d.1 - Transportation and Treatment of Contaminated Injured Individuals**

*The facility/ORO has the appropriate space, adequate resources, and trained personnel to provide transport, monitoring, decontamination, and medical services to contaminated injured individuals. (NUREG-0654/FEMA-REP-1, F.2; H.10; K.5.a, b; L.1, 4)*

Hanover Hospital successfully demonstrated having the appropriate space, adequate resources, and trained personnel to provide transport, monitoring, decontamination, and medical services to contaminated injured individuals during the Hanover Hospital Medical Services (MS-1) Drill for Three Mile Island (TMI) Nuclear Generating Station on June 23, 2016.

At 0820, the Hanover Hospital Emergency Room (ER) was notified that TMI had declared a Site Area Emergency. The Emergency Room Charge Nurse confirmed the call and then notified the Emergency Room Doctor on duty, who in turn notified the Hospital Administrator. The Administrator ordered the switch board to notify the Hospital Emergency Incident Command and response members about an emergency at the TMI

Power Station. The Emergency Room staff was sufficient to handle an emergency situation. However, all committee members were placed on the stand-by. At 0832 the ER was notified that the Emergency Classification Level (ECL) had been elevated to a General Emergency Declaration.

The Nuclear Medicine Department was requested to send the technicians to the Emergency Room. At about 0834 the Operator announced "Code Purple" over the public address system, (Drill). The hospital staff began the set-up of the area in the Emergency Room and the Radiation Emergency Area (REA). The Security Department was set up outside to secure the area and directed the EMA unit to the entry of the Hospital. The entrance area was covered with tarps. The ambulance arrived at 0921. The Hospital Emergency Room Doctor and nurses, and the Nuclear Medicine technician met at the ambulance and received a briefing from the EMS staff. The Hospital staff was dressed in Tyvek suits, shoe covers, head covers, face shields, and gloves. They each had a permanent record dosimeter (PRD). The ambulance delivered the patient wrapped in blankets, lying on a backboard and on a wheeled stretcher. The patient's vital signs and data was provided on a form. The ER doctor assessed the patient's medical condition, as not life threatening. The patient was then moved to the ER treatment area

The Hospital staff transferred the patient onto a second wheeled stretcher, and into the ER entrance. The fixed portal monitor sounded (simulated) and the patient was pushed back and re-monitored. After the fixed portal monitor sounded (simulated) again the Hospital Staff monitored the patient in the doorway.

Contamination readings of 3500 cpm were noted on the patient's left cheek and 2000 cpm on the left hand. Two (2) cleansings of the contaminated wounds, readings showed less than 100 cpm. The first changing of gloves was demonstrated and subsequent changing of gloves was simulated. The swabs and gloves were discarded into a contamination waste barrel.

After successful decontamination of the patient, the Doctor determined that the patient could be transferred to a clean stretcher and sent to the Emergency Room for X-rays and further medical care. The transfer was done using appropriate contamination control precautions with paper sheeting on the floor. The disrobing procedure was demonstrated by one of the nurses. She was surveyed to determine if she was clean before being released. The paramedic described through an interview process, how the area would be surveyed and the procedure to be used if contamination was discovered. All contaminated materials would be bagged. The utility would be responsible for the disposal of the contaminated materials. The Emergency Room staff and the Nuclear Medicine technician were well trained and demonstrated a good knowledge of contamination control procedures.

All activities associated with this criterion were based on the plans and procedures and completed, as they would have been in an actual emergency except as noted in the Extent of Play agreement.

### **3.3.1.2 York County, Grantley EMS**

- a. MET: 1.e.1; 3.a.1; 6.d.1
- b. LEVEL 1 FINDINGS: NONE
- c. LEVEL 2 FINDINGS: NONE
- d. PLAN ISSUES: NONE
- e. PRIOR ISSUES – RESOLVED: NONE
- f. PRIOR ISSUES – UNRESOLVED: NONE

**Narrative Summary for Criterion 1.e.1 - Equipment and Supplies to Support Emergency Operations**

*Equipment, maps, displays, dosimetry, potassium iodide (KI), and other supplies are sufficient to support emergency operations. (NUREG-0654, H.7, 10; J.10.a, b, e; J.11; K.3.a)*

Grantley Emergency Medical Services (GEMS) successfully demonstrated Equipment and Supplies to Support Operations during the Three Mile Island-Hanover Hospital Medical Services (MS-1) Drill evaluated on June 23, 2016. Hanover Hospital is located at 300 Highland Ave Hanover, PA 17331 and is located outside the 10 Mile Emergency Planning Zone (EPZ). All activities conducted during the drill occurred outside of the 10 mile EPZ.

GEMS was equipped with a basic life support ambulance which included a collapsible gurney, medical supplies and instruments. Communications were conducted via an 800 MHz dash mounted radio and separate hand held 800 MHz Walkie Talkies. The crew also had cell phones at their disposal.

The Emergency Medical Technicians (EMTs) were equipped with Exposure Control Kits that included gowns, gloves, protective eye-wear, surgical masks, and paper booties to wear over their shoes/boots. The ambulance also had a sufficient quantity of additional gloves and PPE. The EMTs were not provided radio-protective drugs or direct reading dosimeters because they were operating outside the EPZ. Permanent Record Dosimeters and a Dosimetry/KI Report Form would have been provided by the County had they been necessary.

All activities were based on the plans and procedures and completed as they would have been in an actual emergency except as noted in the extent of play agreement.

**Narrative Summary for Criterion 3.a.1 - Implementation of Emergency Worker Exposure Control**

*The OROs issue appropriate dosimetry and procedures, and manage radiological exposure to emergency workers in accordance with the plans and procedures. Emergency workers periodically and at the end of each mission read their dosimeters and record the readings on the appropriate exposure record or chart. (NUREG-0654, K.3.a, b)*

Grantley Emergency Medical Services (GEMS) successfully demonstrated Implementation of Emergency Worker Exposure Control during the Three Mile Island-Hanover Hospital Medical Services (MS-1) Drill evaluated on June 23, 2016. Hanover Hospital is located at 300 Highland Ave Hanover, PA 17331 and is located outside the 10 Mile Emergency Planning Zone (EPZ).

As per Pennsylvania Emergency Management Agency plans and procedures, the EMTs were considered Class "C" Emergency Workers and therefore did not require Potassium Iodide (KI) or direct reading dosimeters. Had dosimetry been required the EMS Staff would have been provided a radiological briefing by the county radiological officer prior to being dispatched and a Dosimeter/KI Report form would have been completed.

Emergency Medical Technicians (EMTs) exercised cross contamination control by wearing Personal Protective Equipment (PPE) consistent with protection against Blood-Borne Pathogens as noted in the Extent of Play Agreement. Equipment and vehicles were protected by wrapping the patient in three layers of sheets and blankets before being loaded into the ambulance. The EMS Crew segregated all equipment used to treat the patient onto a towel in the ambulance where it was monitored by a member of the hospital response team after the patient had been moved into the Emergency Room. It was explained that those items would be bagged for proper disposal or cleaning.

All activities were based on the plans and procedures and completed as they would have been in an actual emergency except as noted in the extent of play agreement.

#### **Narrative Summary for Criterion 6.d.1 - Transportation and Treatment of Contaminated Injured Individuals**

*The facility/ORO has the appropriate space, adequate resources, and trained personnel to provide transport, monitoring, decontamination, and medical services to contaminated injured individuals. (NUREG-0654, F.2; H.10; K.5.a, b; L.1, 4)*

Grantley Emergency Medical Services (GEMS) successfully demonstrated Transportation and Treatment of Contaminated Injured Individuals during the Three Mile Island-Hanover Hospital Medical Services (MS-1) Drill evaluated on June 23, 2016.

Hanover Hospital is located at 300 Highland Ave Hanover, PA 17331 and is located outside the 10 Mile Emergency Planning Zone (EPZ).

The drill was initiated with a controller call to the Hanover Hospital Emergency Department notifying them that of a "Site Area Emergency" Emergency Classification Level (ECL) at TMI at 0810 hours. The GEMS ambulance with a crew of two was staged at the Emergency Worker Monitoring and Decontamination Station located at the York Area United Fire and Rescue (YAUFR) station at 50 Commons Drive York PA 17402.

The ambulance crew was briefed at 0819 hours by the Exercise Controller. The crew was informed that the patient was an EMS worker who had injured her cheek while extricating

a victim from a car crash that occurred within the EPZ. During the briefing the crew was advised of radiation readings of 3,500 counts per minute on the injured cheek and 2,000 counts per minute on the victim's left hand. The contamination was discovered by personnel at the YAUFR Monitoring and Decontamination Station after the EMS Worker had arrived at their facility. The EMS Crew was provided with the patient's Monitoring/Decontamination Report Form that had been completed by the YAUFR Decontamination Team.

At 0830 hours the ambulance crew was advised that the ECL had been elevated to a General Emergency (GE) ECL.

The ambulance crew wore Level C protection and utilized double gloves while working with the patient. The ambulance crew prepared the transport gurney by placing two additional sheets on a backboard and having the patient lie down on top of the sheets. After a preliminary assessment to include vital signs and external or internal injuries, the sheets were wrapped so that all exposed clothing and skin was covered. The patient was then secured using safety straps and loaded into the ambulance.

At approximately 0838 hours the ambulance crew relayed information to the Hanover Hospital Emergency Department via their 800 MHz radio advising them of the condition of the patient and of the reported contamination issues. Reports of the patient's condition were also communicated while in transit to the hospital.

The ambulance crew departed the YAUFR facility at 0840 hours and proceeded to Hanover Hospital, arriving at 0930 hours.

At the hospital the patient was removed from the ambulance by the ambulance crew and wheeled to the ED entrance which was prepared in accordance with the hospital's SOP to receive contaminated patients. The ambulance crew briefed the hospital staff on the condition of the patient after which the ambulance crew and hospital staff executed a clean transfer of the patient from the ambulance gurney to a hospital gurney using "hot/cold zone" protocols.

After the ambulance crew had transferred the patient to the custody of the ED staff they were monitored by a member of the hospital staff for any cross-contamination from the patient. The staff member also performed a detailed monitoring of the vehicle and its interior. After the ambulance and crew were determined to be free of any contamination they were released and placed back into service at 0950 hours. In accordance with PEMA and County policy, and the negotiated extent of play, emergency workers located outside the EPZ and responding to incidents outside the EPZ are considered "Category C" and are not issued dosimetry or potassium iodide (KI).

All activities were based on the plans and procedures and completed as they would have been in an actual emergency except as noted in the extent of play agreement.

## SECTION 4: CONCLUSION

The Commonwealth of Pennsylvania and local jurisdictions, except where noted in this report demonstrated knowledge of their Radiological Emergency Response Plans (RERP) and procedures were adequately implemented during the Three Mile Island Nuclear Generating Station, Medical Services Drill evaluated on June 23, 2016.

Two (2) Federal Emergency Management Agency (FEMA) evaluators provided analyses of six evaluation criteria. These analyses resulted in a determination of no Findings, no new Plan Issues, and no unresolved Plan Issues.

The Grantley EMS successfully demonstrated that necessary equipment and supplies were available to support the treatment of an injured/contaminated victim. EMS personnel prioritized life-saving medical practices over contamination concerns, implemented protective measures through the use of Personal Protective Equipment (PPE), regular glove changes, and control of cross contamination. Appropriate patient assessments were demonstrated as well as regular and ongoing communications with Hanover Hospital.

Hanover Hospital successfully demonstrated the mobilization of staff, staffing assignments, issue of dosimetry and monitoring equipment, and effective use of Personal Protective Equipment (PPE) during the exercise. The hospital staff effectively responded to communications from the Grantley EMS, initiated the set-up and management of a Radiation Emergency Area (REA), and accepted and successfully treated an injured/contaminated victim while administering life-threatening medical attention over contamination concerns. In addition, the medical facility provided security control of the facility including the drop off bay for the patient and overall protective measures for contamination control and prevention of cross contamination.

Based on the results of the exercise and a review of the offsite radiological emergency response plans and procedures submitted, FEMA Region III has determined they are adequate (meet the planning and preparedness standards of NUREG-0654/FEMA-REP-1, Revision 1, November 1980, as referenced in 44 CFR 350.5) and there is reasonable assurance they can be implemented, as demonstrated during this exercise.

An After Action Implementation Plan (IP) will not be developed as part of this report.

# APPENDIX A: EXERCISE EVALUATORS AND TEAM LEADERS

The following is the list of Evaluators and Team Leader for the Three Mile Island Nuclear Generating Station 2016 Medical Services (MS-1) Exercise evaluated on June 23, 2016. The following constitutes the managing staff for the Exercise Evaluation:

- Thomas Scardino, DHS/ FEMA, Regional Assistance Committee (RAC) Chairman
- William M McDougall, DHS/ FEMA, Lead Technological Hazards Program Specialist
- Thomas Murray, DHS/ FEMA, Technical Hazards Program Specialist, Evaluator

DATE: 6/23/2016, SITE: Three Mile Island Nuclear Generating Station

LOCATION	EVALUATOR	AGENCY
York County, Hanover Hospital	Thomas Murray	FEMA RIII
York County, Grantley EMS	William McDougall	FEMA RIII

## APPENDIX B: ACRONYMS AND ABBREVIATIONS

Acronym	Meaning
DHS	Department of Homeland Security
EMS	Emergency Medical Services
EMT	Emergency Medical Technician
EOP	Extent Of Play
EPZ	Emergency Planning Zone
FEMA	Federal Emergency Management Agency
GE	General Emergency
IP	Improvement Plan
MSL	Mean Sea Level
MS-1	Medical Services
NPP	Nuclear Power Plant
NRC	Nuclear Regulatory Commission
ORO	Offsite Response Organization
PEMA	Pennsylvania Emergency Management Agency
RAC	Regional Assistance Committee
PPE	Personal Protection Equipment
SAE	Site Area Emergency
TMI	Three Mile Island Nuclear Generating Station
REA	Radiation Emergency Area
REP	Radiological Emergency Preparedness
RERP	Radiological Emergency Response Plans



## APPENDIX C: EXERCISE PLAN

The enclosed Exercise Plan was created as an overall tool for facilitation and implementation of the Three Mile Island Nuclear Generating Station Medical Services drill and to integrate the concepts and policies of the Homeland Security Exercise Evaluation Program with the Radiological Emergency Preparedness Program Exercise Methodology.

The Exercise Plan was originally drafted by the Pennsylvania Emergency Management Agency (PEMA) and published by the Federal Emergency Management Agency as an independent document and is annexed here. The Limerick Generating Station Extent of Play was negotiated and agreed upon by FEMA Region III, and PEMA. The Exercise Plan is included as an Appendix of the Exercise Plan.



# **HANOVER HOSPITAL**

## **Medical Services Exercise (MS-1)**

**June 23, 2016**

### **EXERCISE SUMMARY**

The purpose of this exercise is to demonstrate the capabilities of the emergency response organizations in York County in handling contaminated/injured persons and to satisfy both the hospital's requirement for an emergency/drill and the "Medical Services Guidance Memorandum MS-1".

### **PARTICIPANTS**

Hanover Hospital  
Grantley EMS  
York County Emergency Management Agency

### **CONTROLLERS**

Pennsylvania Emergency Management Agency  
York County Emergency Management Agency  
EXELON

### **EVALUATORS**

Pennsylvania Emergency Management Agency  
York County Emergency Management Agency  
EXELON

### **OBSERVERS**

York County Emergency Management Agency  
Pennsylvania Emergency Management Agency  
EXELON

## SCHEDULE OF EVENTS

### Hanover Hospital

- 07:50 AM Exercise begins.
- 08:00 AM Hospital is notified that the emergency at Three Mile Island (TMI) has escalated to a **Site Area Emergency**.
- 08:10 AM The hospital is notified that the emergency at TMI has escalated to a **General Emergency**.
- 08:15 AM Hospital is notified that there is a victim injured and potentially contaminated.
- 09:30 AM The victim arrives at the hospital.
- 10:30 AM After the patient is stabilized and decontaminated; clean-up of the area begins (explained). Exercise ends.
- 10:45 AM Critique (Hotwash) at hospital immediately following the exercise.

### Grantley EMS

- 07:50 AM Exercise begins.
- 08:00 AM Ambulance is notified that the emergency at Three Mile Island (TMI) has escalated to a **Site Area Emergency**.
- 08:10 AM Ambulance is notified that the emergency TMI has escalated to a **General Emergency**.
- 08:15 AM An ambulance is requested to report to the accident site to pick up an injured and potentially contaminated individual.  
*(Simulated - Staging will be at YAU – 50 Commons Drive York, PA 17406)*  
*(Controller Note: Ambulance to notify the hospital of potentially contaminated injured patient by 08:45. See Controller Prompts)*
- 08:40 AM Ambulance leaves for hospital.
- 9:30 AM Ambulance arrives at the hospital.
- 10:00 AM Exercise ends for ambulance crew.
- 10:45 AM Critique (Hotwash) at hospital immediately following the exercise.
- NOTE:** Ambulance will respond without siren and lights.

### SCENARIO

- 08:00 AM Ambulance and the hospital are notified that an emergency at TMI has escalated to a **Site Area Emergency**.
- 08:10 AM Ambulance and hospital are notified that the TMI incident has escalated to **General Emergency**.
- 08:15 AM Ambulance is requested to report to the monitoring decontamination center accident scene to pick up an injured and potentially contaminated victim. (*Simulated - Staging will be at YAU – 50 Commons Drive York, PA 17406*)
- 08:15 AM The hospital is notified that an injured, potentially contaminated victim will be brought in for treatment. (*Controller Note: Ambulance to notify the hospital of potentially contaminated injured patient by 08:35. See Controller Prompts*)
- 08:40AM The ambulance leaves for the hospital.
- 9:30 AM The ambulance arrives at the hospital. Hospital Staff initiates control of ambulance and patient.
- 9:35 AM Hospital staff takes control of the contaminated/injured person. Ambulance and crew are monitored before being released.
- 10:00 AM Exercise ends for ambulance crew
- 10:30 AM After the patient is stabilized and decontaminated; clean-up of the area begins (explained)
- 10:45 AM Exercise ends followed by a critique (Hotwash) at the hospital.

### OBJECTIVES

- A. Demonstrate the ability to respond to a radiation medical emergency following York County Emergency Management Agency, Citizen's Hose Company and Hanover Hospital procedures.
- B. Demonstrate timely and accurate communications between the hospital and offsite response agencies. (Telephones will be used in lieu of radios whenever possible to limit the potential misinterpretation of the exercise as an actual event.)

- C. Demonstrate correct priorities and appropriate techniques in EMS, transportation of patients and pre-hospital and hospital emergency care of radioactively contaminated patients.
- D. Demonstrate inter-agency cooperation between the Ambulance Service / EMS and the Hospital.

### CONTROLLER PROMPTS

- 08:00 AM The **county controller** notifies the ambulance and the hospital that the plant has declared a **Site Area Emergency**. Instruct staff to prepare for possible contaminated/injured victim.
- 08:10 AM The **county controller** notifies the ambulance and the hospital that the plant has declared a **General Emergency**.
- 08:15 AM The **county controller** notifies the ambulance to pick up a contaminated/injured victim. (*Simulated - Staging will be at YAUR – 50 Commons Drive York, PA 17406*)
- 08:15 AM The **county controller** provides EMS with Monitoring and Decontamination Facility. Provides them no information as to they will be an Emergency Worker Monitoring and Decontamination Location to receive a contaminated patient
- 08:35 AM The **county controller** ensures that EMS notifies the Hospital that a potentially contaminated injured victim is being brought in. The nature of the injuries and the extent of contamination is unknown at this time.
- 08:40 AM The **county controller** release the ambulance to leave for the hospital at this time.
- 09:15 AM The **ambulance** notifies the **hospital** that a contaminated/injured victim is being brought in. The nature of the injuries and the extent of contamination is unknown at this time. (**Grantley EMS**)

Controller cautions the driver not to use emergency lights or sirens.

All communications should be precede and conclude with “THIS IS AN EXERCISE”

**SPECIAL NOTE:** Hanover Hospital has a radiological portal monitor at the EMS entrance door. Controller should indicate that the monitor has sounded as patient passes.

**CONTROLLER NOTE:** If the ambulance crew does not have monitoring equipment, the patient should be treated as **potentially contaminated** and injuries communicated to the crew as indicated in the attachments. During hospital monitoring of the victim, inform the monitor of the injuries and contamination levels as indicated by the attachments.

### CONTROLLER ASSIGNMENTS

Communications  
All other

York County  
PEMA & EXELON

Begin and end all communications with  
"THIS IS AN EXERCISE"

## ATTACHMENT 1

### INJURED PERSON

**Situation:** During an evacuation of the Three Mile Island Emergency Planning Zone an EMS Personnel arrives at an emergency worker monitoring and decontamination station. The EMT was part of a crew working to extricate an auto accident patient in the Emergency Planning Zone. While extricating the patient the EMT cut her cheek on piece of jagged metal. Medical care was rendered on scene and is passing through decon to be assessed medically now that the mission is accomplished. At the Emergency Worker Decontamination Site she was noted to be contaminated. When contamination was found in the laceration on her cheek the site leader decided to transport him to the MS-1 Hospital rather than attempt debridement. A second ambulance handled the patient so she could seek treatment. The decon station has kept her dosimetry.

Note that the EMT had contamination on her clothing which was removed and retained at Decon.

**Injuries:** EMT presents with a laceration to her cheek.

**Contamination:** Initial readings at the hospital are indicated in counts per minute (cpm) below:

- 1) Laceration to Left cheek - (3500 cpm) Initial
- 2) Left Hand - (2000 cpm) Initial

**Blood Pressure:** 136/78

**Pulse:** 90

**Breathing:** 18

**Temperature:** Normal

**Nausea:** No

**Vision:** Clear, eyes equal and reactive (PEARL)

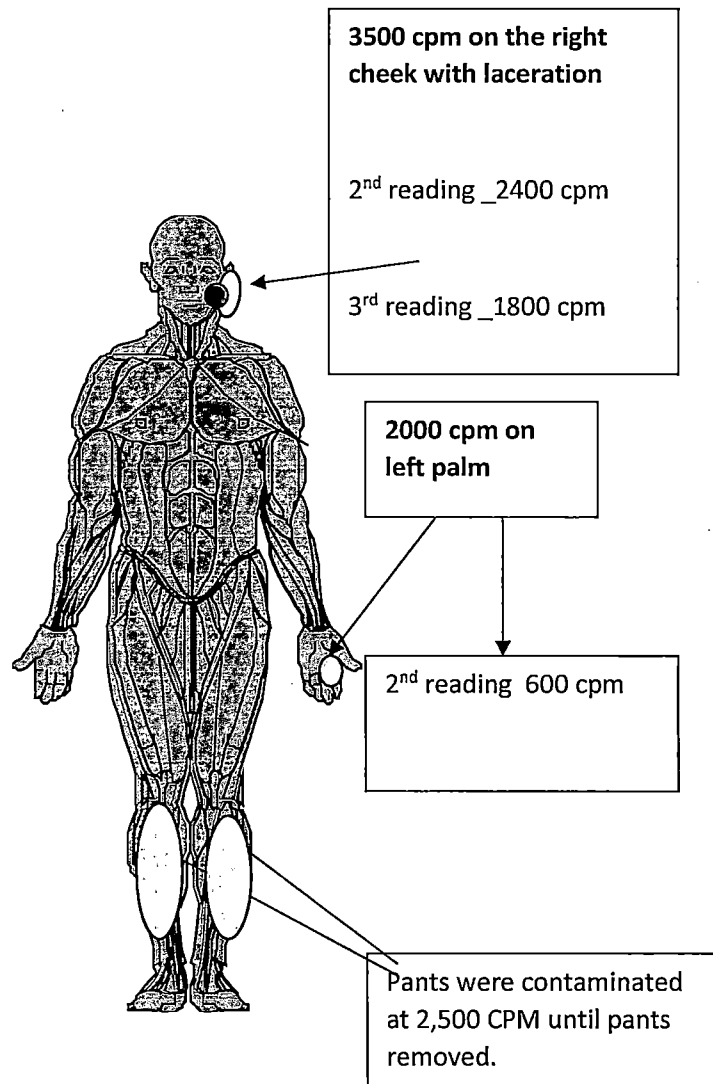
**No Known Allergies.**

**Complaint of pain in left cheek. Patient will indicate pain upon palpation. Movement of left ankle causes extreme pain. Upon inspection, medical providers will see a 3" diagonal laceration to the left cheek. The injury happened about 7:15 this morning**

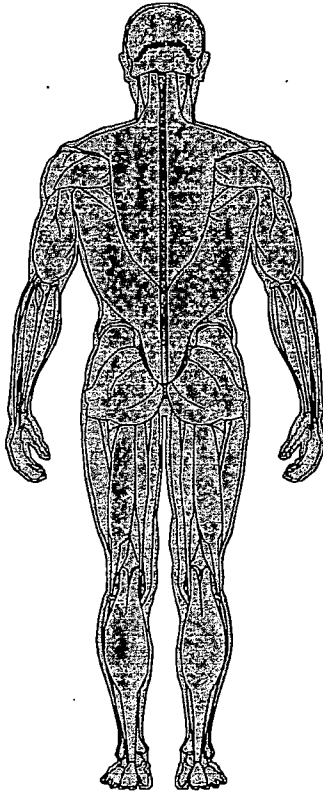
## ATTACHMENT 2

### BODY MAP

Yellow indicates areas of contamination  
Red indicates injury







**Patient complaining of pain in her left cheek. Gross decontamination (removal of turnout) has been accomplished at the Monitoring and Decon Site.**

**Controller will give initial and follow on contamination injects at the hospital. Readings will be lowered by controller after successful decontamination demonstration. Evaluator and Controller may ask questions as the exercise progresses.**

**Hospital Staff should be able to describe the proper treatment for fixed or internal contamination as posed by the cheek contamination which include calling REAC/TS, County, or other higher authority.**

# MONITORING / DECONTAMINATION REPORT FORM

NOTE: COMPLETE FOR EACH PERSON MONITORED

NAME OF PERSON MONITORED:	(Print) <u>STAR O. LEE</u>	(Signature) <u>Star O. Lee</u>
SOCIAL SECURITY NUMBER:	<u>999-88-7777</u>	
ADDRESS:	<u>911 FEAR HOUSE LANE YORK PA 17405</u>	
MONITORING LOCATION:	<u>Y AUR</u>	
BACKGROUND:	<u>54</u>	cpm

NOTE: Mark contamination location and reading from survey meter on outline below

FIRST MONITORING	SECOND MONITORING AFTER DECONTAMINATION (IF NEEDED)	THIRD MONITORING AFTER DECONTAMINATION (IF NEEDED)
Monitor's or Recorder's Name <u>CHIP DALE</u> (Please Print) Survey Meter Serial No. <u>A1234</u> DATE <u>6/23/16</u> TIME <u>0815</u> am/pm	Monitor's or Recorder's Name <u>Tom Jerry</u> (Please Print) Survey Meter Serial No. <u>A1235</u> DATE <u>6/23/16</u> TIME <u>0810</u> am/pm	Monitor's or Recorder's Name _____ (Please Print) Survey Meter Serial No. _____ DATE _____ TIME _____ am/pm

## THYROID GLAND SCREENING CHECK (Emergency Workers Only)

Monitoring includes screening for radiiodine uptake in the thyroid gland and the results recorded here. Medical referral action level for the thyroid check is 0.1 mR/hr or higher when using a CDV 700 survey meter – OR – greater than 300 cpm (above background) when using a modern survey instrument with a pancake probe.

Survey meter Serial No. <u>A1234</u>	Reading: <u>62</u>	Signature of Monitor/Recorder <u>Chip</u>
Medical Referral - subject individual sent to <u>HANOVER</u>	hospital for decontamination and/or treatment (Time) <u>08:14</u>	am/pm
on (Date) <u>6/23/16</u>	Decontamination Team Chief <u>Capt. Linden</u>	

WHITE (BRP)

YELLOW (EMA)

PINK (INDIVIDUAL)

### **Communications**

Radio  
Telephone  
Pagers  
Call back (verification)  
Relay and accuracy of patient information  
Inter staff communications

### **Contamination Control**

Glove changes  
Control of run off & Cross Contamination  
Control of contaminated waste  
Remove blankets and backboard from gurney  
Decontamination of victim/staff  
Set up of REA

### **Patient Care**

Life threatening injury takes precedence over contamination  
Treatment of injury  
Patient reassurance  
Documentation  
X-Rays  
Swabbing i.e. mouth, eyes, nose, collection of dressings, blood, urine, etc. (evidence and lab)

### **Protective clothing**

Seal openings gloves, boots, use face shields, and cover exposed skin  
Double glove (Glove Changes)  
Decon posters and (Exiting procedures from the REA – Disrobing)

### **Equipment & Supplies**

Survey Meters (calibrated)  
Dosimeters – DRD's (Leak Tested)  
PRD's  
Monitoring Procedures  
Decontamination Kit & Supplies – Check for expiration dates

### **OTHER**

Security  
Documentation of readings (forms)

# **CONTROLLER/EVALUATOR NOTES**

TOPIC	Grantley EMS	HANOVER HOSPITAL
Communications		
Contamination Control		
Clean Transfer		
Equipment		
Monitoring Procedures		
Decontamination		
Personal Protective Clothing		
Dosimetry		
Patient Care		
Response time		
Radiation Emergency Area (REA) Set-Up or Hot Zone Control		
Disrobing Procedures		
Security		
Glove changes		

**NOTES:**

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