



**FEMA**

May 25, 2004

Mr. Tim McGinty, Chief  
Inspection and Communications Section (EPPO-A)  
Emergency Project Office  
Office of Nuclear Reactor Regulation  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555

Dear Mr. McGinty:

Enclosed is one copy of the Radiological Emergency Preparedness Medical Services (MS-1) Drill Report for the Enrico Fermi 2 Nuclear Power Plant drill conducted on April 20, 2004.

The drill participants included the State of Michigan Department of Environmental Quality (DEQ), Hart Medical, Inc. Ambulance Services, and Mercy Memorial Hospital. No Deficiencies and no Areas Requiring Corrective Action (ARCA) were identified as a result of this drill. One ARCA previously assessed against the DEQ, during the D. C. Cook Nuclear Power Station MS-1 drill conducted on May 8, 2003, under Criterion 6.d.1 - Transportation and Treatment of Contaminated Injured Individuals was corrected.

Copies of this report also were sent to the State of Michigan, NRC Region III, and DHS/FEMA Headquarters.

If you have any questions, please contact Ms. Sandra Bailey or me at (312) 408-5353 or 408-5207 respectively.

Sincerely,

A handwritten signature in black ink that reads "William E. King" with "for" written below it.

Patrick J. Glithero, Acting Chief  
Technical Services Branch



# FEMA

## **Medical Services Drill Report**

### **Enrico Fermi 2 Nuclear Power Plant**

**Licensee: Detroit Edison Company**

**Exercise Date: April 20, 2004**

**Report Date: May 25, 2004**

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**U.S. DEPARTMENT OF HOMELAND SECURITY  
FEMA REGION V  
536 South Clark Street, 6th Floor  
Chicago, Illinois 60605-1521**

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## **I. EXECUTIVE SUMMARY**

On April 20, 2004, the Department of Homeland Security - FEMA, Region V, conducted a Medical Services drill (MS-1) in the 10-mile plume exposure pathway Emergency-Planning Zone around the Fermi 2 Nuclear Power Plant (NPP). The purpose of the medical services drill was to assess the ability of off-site agencies to respond to a medical emergency involving a potentially radiologically contaminated member of the public. The MS-1 was held in accordance with DHS-FEMA's policies and guidance concerning the exercise of State and local radiological emergency response plans.

The following criteria, which are part of the Federal Register Notice entitled "Radiological Emergency Preparedness: Exercise Evaluation Methodology", Vol. 67 FR, No. 80, dated April 25, 2002, which amends earlier guidance provided in FEMA-REP 14, Radiological Emergency Preparedness Exercise Manual, were evaluated during the MS-1 drill. They are Criterion 1.e.1 - Equipment and Supplies to Support Operations; Criterion 3.a.1 - Implementation of Emergency Worker Exposure Control; Criterion 3.b.1 - Implementation of KI Decision; and Criterion 6.d.1 - Transportation and Treatment of Contaminated Injured Individuals.

DHS-FEMA wishes to acknowledge the efforts of personnel from the Hart Medical Inc. Ambulance Service, the Mercy Memorial Hospital, and the State of Michigan Department of Environmental Quality (DEQ) who participated in the MS-1 drill.

The scenario for the medical services drill was developed by personnel from the State of Michigan and coordinated with staff from the Fermi 2 NPP. The scenario stated that a release had occurred at the Fermi 2 NPP and was terminated. The State Emergency Operations Center (EOC), Monroe County EOC, and the State Field Team Center were operational in response to the event. Areas 1, 2, and 3 were evacuated. A Monroe County Sheriffs Deputy was out patrolling the evacuated area and noticed a man lying on the ground near a parked vehicle. The man was evacuating when he had a flat tire. While changing his tire, the jack slipped and forcibly struck him in the right arm and head, and he fell to the ground. Moulage was used to simulate scrapes on his left arm, a right forearm injury, and bleeding from a head wound. While lying on the ground, the man became contaminated, including the wounded areas. The man's injuries included a superficial laceration to the left side of the head along the hairline above the ear, which was bleeding moderately, scrapes on the left arm; and an obvious fracture of the lower right arm. The person was conscious, bleeding moderately, and complaining of pain in his head and arm.

The Monroe County Sheriffs Deputy radioed dispatch and requested Emergency Medical Service (EMS) assistance to the scene. The call to dispatch was simulated, and a controller directly called the responding EMS crew, which was pre-staged at a nearby location. Ambulance personnel received an explanation that they were notified of the incident by the Monroe County Dispatch. The controller provided dosimetry to the EMS personnel and a briefing on equipment use and completion of paperwork in lieu of a County briefing. Personnel from the State of Michigan, DEQ also responded to provide radiological assistance to the EMS crew and hospital.

The State and local organizations demonstrated knowledge of their organizational emergency response plans and procedures and adequately implemented them. No Deficiencies and no Areas Requiring Corrective Actions (ARCAs) were identified as a result of this drill. One prior ARCA for the State of Michigan DEQ under Criterion 6.d.1: Transportation and Treatment of Contaminated Injured Individuals was resolved during this drill.

## II. DRILL EVALUATION AND RESULTS

Contained in this section are the results and findings of the evaluation of all jurisdictions and functional entities that participated in the April 20, 2004, medical services drill to test the ability of off-site agencies to respond to a medical emergency involving a potentially radiologically contaminated member of the public in the area surrounding the Fermi 2 Nuclear Power Plant.

This section provides information on the evaluation of each participating jurisdiction and functional entity, in a jurisdiction based, issues only format. Presented below is a definition of the terms used in this subsection relative to criteria demonstration status.

- **Met** - Listing of the demonstrated exercise criteria under which no Deficiencies or ARCAs were assessed during this drill and under which no ARCAs assessed during prior exercises or drills remain unresolved.
- **Area Requiring Corrective Actions (ARCA)** - Listing of the demonstrated exercise criteria under which one or more ARCAs were assessed during the current drill or ARCAs assessed during prior exercises or drills remain unresolved. Included is a description of the ARCAs assessed during this drill and the recommended corrective action to be demonstrated before or during the next biennial exercise.
- **Not Demonstrated** - Listing of the exercise criteria, which were not demonstrated, as scheduled during this drill and the reason they were not demonstrated.
- **Prior ARCAs - Resolved** - Descriptions of ARCAs assessed during previous exercises or drills, which were resolved in this drill and the corrective actions demonstrated.
- **Prior ARCAs - Unresolved** - Descriptions of ARCAs assessed during prior exercises or drills, which were not resolved in this drill. Included is the reason the ARCA remains unresolved and recommended corrective actions to be demonstrated before or during the next biennial exercise.

DHS-FEMA has developed a standardized system for numbering exercise issues (Deficiencies and ARCAs). This system is used to achieve consistency in numbering exercise issues among DHS-FEMA Regions and site-specific exercise reports within each Region. It also is used to expedite tracking of exercise issues on a nationwide basis.

The identifying number for Deficiencies and ARCAs includes the following elements, with each element separated by a hyphen (-).

- **Plant Site Identifier** - A two-digit number corresponding to the Utility Billable Plant Site Codes.

- **Exercise Year** - The last two digits of the year the exercise was conducted.
- **Criterion Number** - An alpha and two-digit number corresponding to the criteria numbers in the six Exercise Evaluation Areas described in Federal Register notice/Vol. 67, No. 80 dated April 25, 2002, which amends FEMA-REP 14, *Radiological Emergency Preparedness Exercise Manual*.
- **Issue Classification Identifier** - (D = Deficiency, A = ARCA). Only Deficiencies and ARCAs are included in exercise reports.
- **Exercise Issue Identification Number** - A separate two (or three) digit indexing number assigned to each issue identified in the exercise.

**A. STATE OF MICHIGAN**

**1. Department of Environmental Quality**

- a. **MET: Criteria 1.e, 3.a.1, 3.b.1, and 6.d.1.**
- b. **DEFICIENCY: NONE**
- c. **AREAS REQUIRING CORRECTIVE ACTION: None**
- d. **NOT DEMONSTRATED: NONE**
- e. **PRIOR ARCAs - RESOLVED: 6.d.1.**

**Issue No: 15-03-6.d.1-A-02**

**Condition:** The State of Michigan Department of Environmental Quality (DEQ) Radiation Specialist did not control the spread of contamination to herself, provide adequate contamination control guidance to the Emergency Medical Technicians (EMTs), or engage in proper monitoring techniques while surveying a potentially contaminated individual.

**Corrective Action Demonstrated:** Training was conducted with the involved specialist as an immediate corrective action. DEQ conducted training prior to December 31, 2003, for its personnel, which emphasized contamination control, best methods of providing guidance to local responders in areas where radiological contamination is present, and the importance of participating in drills as real events without simulating basic practices or techniques. During the exercise, DEQ personnel followed good contamination control procedure, provided good guidance to the EMTs, and engaged in good monitoring techniques.

- f. **PRIOR ARCAs - UNRESOLVED: NONE**

**B. MONROE COUNTY**

**1. Hart Medical Inc. Ambulance Service**

- a. **MET: Criteria 1.e, 3.a.1, 3.b.1, and 6.d.1.**
- b. **DEFICIENCY: NONE**
- c. **AREAS REQUIRING CORRECTIVE ACTION: NONE**
- d. **NOT DEMONSTRATED: NONE**

- e. **PRIOR ARCAs - RESOLVED: NONE**
- f. **PRIOR ARCAs - UNRESOLVED: NONE**

**2. Mercy Memorial Hospital**

- a. **MET: Criteria 1.e, 3.a.1, and 6.d.1.**
- b. **DEFICIENCY: NONE**
- c. **AREAS REQUIRING CORRECTIVE ACTION: NONE**
- d. **NOT DEMONSTRATED: NONE**
- e. **PRIOR ARCAs - RESOLVED: NONE**
- f. **PRIOR ARCAs - UNRESOLVED: NONE**

### III. DRILL NARRATIVES

#### EVALUATION AREA 1: EMERGENCY OPERATIONS MANAGEMENT

##### *Sub-element 1.e. Equipment and Supplies to Support Operations*

**Criterion 1.e.1:** Equipment, maps, displays, dosimetry, potassium iodide (KI), and other supplies are sufficient to support emergency operations.

Criterion Status: Met

#### Department of Environmental Quality

The Department of Environmental Quality (DEQ) is the radiation control agency for the State of Michigan. DEQ Radiation Specialists dispatched to support an incident at the Fermi 2 Nuclear Power Plant (NPP) provide their own dosimeters and maintain their own record system. Two DEQ Radiation Specialists participated in the drill.

One DEQ Radiation Specialist was dispatched to assist the Emergency Medical Technicians (EMT) from the Hart Medical Inc. Ambulance Service. He had dosimetry with him upon arrival at the drill site. His dosimetry consisted of one Civil Defense Category V Model 826 (CD V-826) Direct-Reading Dosimeter (DRD) with a range of 0-200 milliRoentgens (mR), one CD V-742 DRD with a range of 0-200 Roentgens (R), one Thermoluminescent Dosimeter (TLD), one Emergency Worker Dosimetry Instruction and Record Card, one bottle of Thyro-Block Potassium Iodide (KI) with 14 KI tablets, and a KI ingestion instruction sheet.

In accordance with the State of Michigan procedures, DRDs are sent to the State of Ohio's Radiation Laboratory every four years for calibration. After the DRDs are calibrated they are returned to the State of Michigan and are leak tested quarterly. Leak testing and calibration of each DRD was performed and recorded as indicated in the State of Michigan's Annual Letter of Certification (ALC).

Another DEQ Radiation Specialist was deployed to and arrived at the Mercy Medical Hospital. Upon his arrival, he had in his possession a Bicon Survey Meter Model 2000 with pancake probe covered in plastic, having a range of 0-2000 mR, last calibrated on May 29, 2003.

The DEQ Radiation Specialist also had a DRD manufactured by Dosimeter Corporation of America Model (DCA) # 608, having a range of 0-10R, a Victoreen Model # 541R DRD, having a range of 0-200 mR, and a Landauer TLD. A DCA Model # 909 Charger also was available to zero each of the DRDs. Leak testing and calibration of each DRD was performed and recorded as indicated in the State of Michigan's ALC.

### Hart Medical Inc. Ambulance Service

Upon notification of an incident at the Fermi 2 NPP, the Hart Ambulance Service was advised to have someone go to the Monroe County Public Health Department, 2353 South Custer Road, Monroe, Michigan, to pick up dosimetry packets for their employees.

The Hart Ambulance Service, Monroe, Michigan, participated in the medical drill in accordance with the extent-of-play agreement. The controller provided dosimetry packets to the ambulance personnel. Each dosimetry packets included both a CD V-826 DRD and a CD V-742 DRD, a TLD, a State of Michigan Emergency Worker Individual Dosimetry Report Form, a dose limit and turn back value information card, a Permanent Total Exposure Record, one bottle of Thyro-Block KI tablets (14 tablets per bottle), and a Radiological Emergency Response Standard Operating Procedures NKI Consent and Record Form. Leak testing and calibration of each DRD was performed as required by the State of Michigan procedures.

The Emergency Medical Technicians in the ambulance crew performed the required periodic checks of their DRDs while aboard the ambulance to demonstrate their knowledge of the procedures they would follow if they were actually dispatched.

### Mercy Memorial Hospital

The Mercy Memorial Hospital, located at 718 N. Macomb Street, Monroe, Michigan, has six DRDs manufactured by DCA Model # 883 having a range of (0-550 mR), six TLDs manufactured by Landauer Corporation, and one DRD charger manufactured by DCA, Model # 910. Both DRDs and TLDs are provided to Mercy Memorial Hospital by the Fermi 2 NPP. The Fermi 2 NPP is responsible for ensuring that annual leak testing and calibration is performed.

To assist in securing the Radiological Emergency Area (REA), the hospital has an adequate supply of radioactive signs, stanchions, plastic rope, heavy-duty plastic bags for contaminated items, step-off pads for exiting the REA, and containers for hazardous waste bi-products that would be generated during the decontamination phase.

Available Personal Protective Equipment (PPE) for individuals entering the REA consisted of Tyvek suits, booties, hairnets, plastic gloves, and face shields.

In addition, the buffer nurse had the following forms available during the exercise: a body chart depicting the areas where the patient sustained (simulated) contamination in counts per minute; a personnel dosimetry log to be used to record DRD and TLD numbers and reading for instruments issued to individuals entering the REA; a Contaminated Injured Patient Status Sheet; an Emergency Physician Record form; an Emergency Triage Record form; and an Emergency Department Continuing Care Notes form. The buffer nurse also had an instruction sheet available providing the correct procedures to be followed when donning their PPE when exiting the REA.

### **EVALUATION AREA 3: PROTECTIVE ACTION IMPLEMENTATION**

#### ***Sub-element 3.a. Implementation of Emergency Worker Exposure Control***

**Criterion 3.a.1:** 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.

Criterion Status: Met

#### Department of Environmental Quality

The State of Michigan's Department of Environmental Quality (DEQ) personnel provide their own dosimeters and maintain their own records. A DEQ Radiation Specialist rode in the ambulance with the Emergency Medical Technicians (EMTs) to Mercy Hospital. He periodically reminded the EMTs to check their Direct-Reading Dosimeters (DRDs) while he read his DRD at the same time. He recorded the results on his individual dosimeter record card, and knew to turn in all record cards to his supervisor at the end of his mission. The DEQ Technician wore a Thermoluminescent Dosimeter (TLD), and was aware of the State of Michigan administrative dose limits of 1 Roentgen (R) in any 24-hour period, and not to exceed a total exposure in excess of 3R.

Another DEQ Radiation Specialist was sent to and arrived at Mercy Memorial Hospital at approximately 0740 hours (controller inject) to assist with patient monitoring and to answer any radiation safety questions posed by the hospital staff. Upon arrival he zeroed his low and high range DRDs and recorded the results of the readings appropriately on his exposure card. He also wore a TLD.

The DEQ Radiation Specialist advised the Radiological Emergency Area (REA) staff that their DRDs should be read every 30 minutes and that he would assume responsibility to ensure that this was accomplished. At 0830 hours, the DEQ Radiation Specialist advised REA staff members that he would read each individual's DRD and provide the results to the buffer nurse. The DEQ Radiation Specialist also was aware of the administrative dose limit of 1R and that he should not exceed a total exposure of 3R.

#### Hart Medical Inc. Ambulance Service

Two Hart Medical Ambulance Service EMTs received a briefing on the use of dosimetry, and followed dosimetry use procedures during the drill. They wore their dosimetry on the outside of their jackets, between their shoulder and waist. They were aware of the State of Michigan administrative dose limits of 1R in any 24 hour period, and not to exceed a total exposure in excess of 3R. A simulated call, from a 911 dispatcher, was made every 30 minutes to the EMTs to remind them to read their DRDs and record the results on their individual Dosimeter Record Card. They knew to report any problems to their supervisor. At the end of their shift they were instructed to turn in their dosimetry and record cards to appropriate personnel.

### Mercy Memorial Hospital

The Mercy Memorial Hospital is located outside of the 10-mile emergency planning zone of the Fermi 2 Nuclear Power Plant. Therefore, hospital personnel are not considered to be emergency workers. However, they still are required to wear a DRD and TLD when a potentially contaminated individual arrives at their location. Potassium Iodide is not part of their dosimetry packet.

Upon notification that a potentially contaminated patient was being transported to Mercy Memorial Hospital, each REA nurse received one DRD and one TLD from the buffer nurse. The buffer nurse recorded each REA nurse's name, the serial number for the issued DRD and the TLD, the reading ranges for the DRD, and advised that the DRD should be read every 30 minutes. At 0830 hours, the DEQ Radiation Specialist took the REA nurse's DRD readings and provided this information to the buffer room nurse who recorded the reading numbers. Each REA nurse wore their TLD in between their first and second Tyvek suit and wore their DRD on the outside of their outer Tyvek suit.

When the doctor arrived outside of the REA, he also was provided a DRD (simulated) and a TLD (simulated) by the buffer nurse.

#### ***Sub-element 3.b. Implementation of KI Decision***

**Criterion 3.b.1:** KI and appropriate instructions are available should a decision to recommend use of KI be made. Appropriate record keeping of the administration of KI for emergency workers and institutionalized individuals (not the general public) is maintained.

Criterion Status: Met

### Department of Environmental Quality

The State of Michigan's Department of Environmental Quality (DEQ) personnel dispatched to support an incident at the Fermi 2 Nuclear Power Plant provide their own Potassium Iodide (KI) tablets and maintain their own record system. The DEQ Radiation Specialist who provided support to the Emergency Medical Technicians (EMTs) had a bottle of KI tablets and an instruction sheet. He was knowledgeable of the reason for taking KI, desired dosages and time periods for ingesting KI, and the possible side effects of KI. He maintained his own record card and reported ingestion results to his supervisor at the end of the mission.

### Hart Medical Inc. Ambulance Service

Each of the two Hart Medical Ambulance Service EMTs participating in the drill had a dosimetry packet that included a bottle of 14 KI tablets and a KI instruction sheet. They also received a briefing that included the reason for taking KI, the desired dosages and time period within which KI should be taken, and the possible side effects of KI. The EMTs were required to sign a consent form. Records are kept of all persons receiving KI. The EMTs knew not to ingest KI unless instructed to do so by a Governor's order, and that ingestion of KI was a voluntary action. The KI documentation records are provided

in the Annual Letter of Certification.

**EVALUATION AREA 6: SUPPORT OPERATION/FACILITIES**

***Sub-element 6.d. Transportation and Treatment of Contaminated Injured Individuals***

**Criterion 6.d.1:** The facility/ORO has the appropriate space, adequate resources, and trained personnel to provide transport, monitoring, decontamination, and medical services to contaminated injured individuals.

Criterion Status: Met

Department of Environmental Quality

At 0728 hours, the Hart Medical Ambulance Service was notified by the Monroe County Sheriff's Dispatcher of an incident at the Fermi 2 Nuclear Power Plant involving an individual that was injured during an evacuation. Two Emergency Medical Technicians (EMTs) and a State of Michigan, Department of Environmental Quality (DEQ) Radiation specialist arrived at the accident scene by 0735 hours. A Monroe County Sheriff's Deputy informed the DEQ Technician how the individual was injured. The DEQ Radiation Specialist surveyed the individual using a Bicron Surveyor 2000 survey meter equipped with a pancake Geiger-Mueller (GM) detector that was covered in plastic and determined that he was contaminated. After placing the patient on a gurney and placing the gurney in the ambulance, the EMTs removed their gloves and protective clothing and disposed of them in a hazardous waste bag handled by the DEQ Technician. The DEQ Technician removed his booties prior to entering the ambulance.

At 0756 hours, the ambulance arrived at Mercy Hospital. The patient's radiological condition upon arrival at Mercy Hospital was: left side of the head (wound area) - 600 Counts Per Minute (cpm), left arm (scrapes) N 500 cpm; shoes and lower pants - 4000 cpm; and shirt sleeves - 2000 cpm. The DEQ Technician reported the patient's contamination levels to the Emergency/Trauma Staff Nurse.

Prior to releasing the ambulance back into service, the DEQ Technician surveyed the ambulance's interior and exterior for possible contamination. At 0805 hours, he found the following simulated contamination levels: wheels/wheel well area - 3400 cpm; brake and gas pedals - 1200 cpm; back step of the ambulance - 500 cpm; and floor of the ambulance - 700 cpm. Local area background was determined to be 150 cpm. Maximum allowable contamination limits were greater than 2 times background. Decontamination was successfully performed by the DEQ Technician inside the ambulance, and contaminated paper towels that were used to decontaminate "dirty" areas were placed in yellow plastic bags, for returned to the Fermi 2 NPP for proper disposal. Based on the level of contamination found on the wheels, the ambulance driver was instructed to drive the ambulance to the closest decontamination center.

Another DEQ Radiation Specialist arrived at Mercy Memorial Hospital at approximately 0740 hours (controller inject) to assist with patient monitoring and to answer any questions that hospital staff might have when the accident victim arrived. Upon his

arrival he determined that radiation background was zero and donned protective clothing acquired from the buffer nurse.

After the ambulance's gurney was wheeled into the Radiological Emergency Area (REA), the DEQ Radiation Specialist monitored the floor between the doorway of the hospital and the doorway of the REA. The area surveyed by the DEQ Radiation Specialist was determined to be clean (controller inject). At the time the patient was being questioned by the REA nurses about his medical condition, the ambulance's gurney was surveyed by the DEQ Radiation Specialist and found to be clean of contamination (controller inject).

Prior to leaving the REA, both paramedics were monitored by the DEQ Radiation Specialist. Contamination was found on one of the paramedics gloves (100 cpm and 200 cpm on the bottom of his protective booties. Gloves and booties were removed while the paramedic was still inside the REA. These items were placed into a hazardous waste receptacle. The paramedic was re-monitored by the DEQ Radiation Specialist, and determined to be clean (controller inject). As the paramedics departed from the hospital entranceway, the DEQ Radiation Specialist monitored their pathway leaving the hospital. The path taken was determined to be clean (controller inject).

After a doctor attended to the patient's medical needs, the patient was monitored by the DEQ Radiation Specialist. Since contamination was presents, and to inhibit the spread of contamination, the DEQ Radiation Specialist advised the REA staff to periodically change their gloves. Equipment, such as the scissors used by the REA nurse to cut off the patient's clothes was monitored by the DEQ Radiation Specialist. No contamination was found (controller inject). The DEQ Radiation specialist oversaw the decontamination process performed on the patient, read REA direct reading dosimeters, and monitored the REA staff members and hospital equipment for potential contamination.

The DEQ conducted training prior to December 31, 2003, for its personnel, which emphasized contamination control, best methods of providing guidance to local responders in areas where radiological contamination is present, and the importance of participating in drills as real events without simulating basic practices or techniques. During the exercise, DEQ personnel followed good contamination control procedure, provided good guidance to the EMTs, and engaged in good monitoring techniques, thereby correcting ARCA 15-03-6.d.1-A-02.

#### Hart Medical Inc. Ambulance Service

At 0728 hours, the Hart Medical Inc. Ambulance Service was notified by the Monroe County Sheriff's Dispatcher that a person was found lying on the ground near a parked vehicle. The ambulance, crewed by two EMTs and a DEQ Radiation Specialist, arrived at the accident scene by 0735 hours. The Sheriff's Deputy at the scene explained that the citizen was evacuating when he had a flat tire. While the tire was being changed, the jack slipped and forcibly struck the person in the right arm and head. The person had scrapes on the left arm and had a head injury that was bleeding. The DEQ Radiation Specialist advised the EMTs that the patient was contaminated with radiation picked up from lying on the ground. The EMTs determined the person's injuries included a superficial

laceration to the left side of the head along the hairline above the ear, which was bleeding moderately, scrapes on the left arm, and a fracture to the lower right arm. The person was conscious, and complained of pain in his head and arm.

The EMTs treated the head injury by applying a compress and wrapping it with gauze. The DEQ Radiation specialist monitored the individual for possible contamination on his feet. The EMTs then placed the individual on backboard covered with a disposable plastic sheet and a blanket. The plastic sheet was used to cocoon the individual to avoid spreading possible contamination. At 0740 hours, the EMTs recorded the individual's vital signs: pulse 120 and weak; respiratory 28 and heavy; blood pressure 115/75; skin sweaty; no LOC (loss of consciousness); and pupils were alert and oriented-3mm R&R (equal and responsive). The EMTs continued to treat the individual by using a splint on the lower right arm to stabilize its position. They moved the individual to a gurney and placed him in the ambulance. After pacing the patient in the ambulance, the EMTs removed their gloves and protective clothing, and disposed of them in a hazardous waste bag handled by the DEQ Radiation Specialist. The DEQ Radiation Specialist removed his booties prior to entering the ambulance. They all read their dosimeters at this time.

At 0751 hours, one of the EMTs established contact with Mercy Hospital. He related the individual's personal information and vitals read: pulse 100 with oxygen; respiratory 20; blood pressure 115/75; skin normal; primary/secondary survey- a superficial laceration to the left side of his head along the hairline above the ear, scrapes on his left arm and a fracture of the lower right arm. The EMT gave an estimated time of arrival of 0800 hours.

At 0756 hours, the ambulance arrived at Mercy Hospital. The ambulance driver stopped at the Emergency Room entrance where she was met by the Emergency Room/Trauma Staff Nurse. The staff nurse was briefed on the condition and contamination levels of the patient by the EMTs and DEQ Radiation Specialist. Following the patient transfer, the EMTs and ambulance were surveyed for contamination by the DEQ Radiation Specialist.

#### Mercy Memorial Hospital

At 0731 hours, Mercy Memorial Hospital received a call from an ambulance crew over a two-way radio advising the hospital that the ambulance crew was responding to an incident involving a person injured while evacuating from the area. The man had sustained an injury while changing a flat tire. The emergency room nurse receiving the call assigned run number 1868 to the incident.

At 0735 hours, Mercy Memorial Hospital received another call from the ambulance crew responding to run number 1868 advising that they had arrived on the scene. They reported that the person sustained a superficial laceration to the left side of his head along the hairline above the ear, had scrapes on his left arm, and a fracture to his lower right arm. Also, the man was exposed to radiation while lying on the ground.

After receiving notification that the injured person had sustained radiation exposure, the emergency room nurse advised key staff members to setup the REA. Mercy Memorial

Hospital utilizes a separate entrance into their emergency room for incidents involving radiation exposure. Stanchions, radioactive signs, and rope were used to cordon off the area from the parking lot down the sidewalk into the entranceway that would be used to gain access into the REA. The REA was a separate room within six feet of the entranceway to the hospital and was totally isolated from the rest of the emergency room. Two doors provide limited access into the REA.

Inside the REA, hospital staff provided a modified gurney that is used when decontamination procedures may be implemented. This modified gurney allows the run-off of liquids to flow into a receptacle located at the foot of the gurney.

While the REA was being setup, three emergency room nurses began donning protective clothing. For protective clothing they wore two one piece blue Tyvek suits, two pairs of plastic gloves, one pair of booties, a hair net, and a face shield. Booties also were taped to their outer Tyvek suit. As the three emergency room nurses were donning their protective clothing, a buffer nurse was explaining the location of the hot-zone (potentially contaminated) versus the cold zone (contamination free). The three emergency room nurses would be located in the REA (hot zone) while the buffer nurse would stay in the cold zone. A DEQ Radiation Specialist from the State of Michigan's DEQ arrived to assist with patient monitoring and to answer any technical questions from the hospital staff.

Two large containers (approximately 30 gallons each) were provided by hospital staff to collect any hazardous waste that might be generated when the patient arrived, one was located inside the REA, and the other was located outside of the hospital doorway. The floor was covered with paper (simulated) from the entranceway into the hospital to the room that was used as the REA. This entranceway was approximately six by eight feet.

The inside of the REA contained a machine to take vital signs and miscellaneous medical supplies including two boxes of plastic gloves. All other medical equipment was removed from the REA prior to the arrival of the patient.

Immediately outside of the REA doorway was a step-off pad and written instructions on the wall regarding proper procedures to follow when doffing potentially contaminated clothing. Each REA nurse was briefed by the buffer nurse regarding the patient's medical condition and level and location of possible contamination.

At 0751 hours, Mercy Hospital received a call over their two-way radio from the ambulance crew (controller inject) that the injured victim was en-route to the hospital. During this call, the patient's vital signs were provided to the hospital as follows: pulse 100 with oxygen, respiratory 20, blood pressure 115/75, skin normal, superficial laceration to the left side of his head along the hairline above the ear, scrapes on left arm, and a fracture of lower right arm. The patient was diagnosed as being alert and oriented. Hospital staff was advised that the patient was given an IV (simulated) prior to departure from the accident site. Estimated time of arrival to the hospital was approximately five minutes.

At 0751 hours, the ambulance arrived at Mercy Memorial Hospital. The patient lying on a gurney and back-boarded was wheeled directly into the REA. As the paramedics were transferring the patient from the ambulance gurney to the hospital gurney, they briefed the REA nurses on the patient's medical condition. Immediately following, the REA nurses questioned the patient. The buffer nurse was responsible for recording all answers to questions asked by the REA nurses.

At 0809 hours, the doctor arrived outside of the REA. Upon his arrival, he properly donned his protective Tyvek suit (simulated) and was issued dosimetry (simulated). The patient's medical needs were attended to and then the patient was monitored by the DEQ Radiation Specialist.

Contaminated items from the ambulance were gathered and placed into the plastic container outside of the hospital doorway. Since the patient was determined to have open wounds with the potential of contamination being present, the DEQ Radiation Specialist advised REA staff to change their gloves. All REA staff members replaced their gloves and placed the potentially contaminated gloves into the hazardous waste receptacle inside the REA.

At 0815 hours, as the doctor was attending to the patient's medical needs (removing collar brace and ordering an x-ray to be taken), one of the REA nurses used a pair of scissors to remove the emergency workers protective Tyvek suit. Once removed, the Tyvek suit was properly disposed of in the hazardous waste receptacle. The scissors were monitored by the DEQ Radiation Specialist. As medical equipment or supplies, requested by either the doctor or one of the REA nurses arrived, the REA nurses changed their gloves to prevent the possible spread of contamination.

The patient was monitored by the DEQ Radiation Specialist. The following contamination levels were initially noted (controller injects) and recorded by the buffer nurse: left side of head (wound area) 600 cpm, left arm scrapes 500 cpm, shoes and lower pants 4000 cpm, and the patient's shirt sleeves 2000 cpm.

Since the contamination levels were above background, one of the REA nurses implemented decontamination procedures. A supply of saline, gauze towels and swabs were requested by the REA nurse, and procured by the buffer nurse. Gloves were changed (simulated) by the REA nurse prior to receiving these items. Decontamination commenced using saline and gauze towels, and the patient's shoes and lower pants were removed. The first decontamination attempt provided the following results (controller injects): left side of the head 200 cpm, left arm scrapes 150 cpm, and feet and leg found to be clean. A sample collection (swab), taken from the patient's left side of his head, was properly bagged and identified, and given to the buffer nurse.

The second attempt of decontamination provided the following results: left side of head and left arm scrapes each had 50 cpm. The third attempt at decontamination of each of these two areas indicated that the patient was free from contamination (controller inject).

At 0826 hours, a portable x-ray machine arrived outside of the REA. The second door of

the REA was opened and the x-ray machine was brought close enough to the patient, but without entering the REA. An x-ray film was placed inside of a pillow case. After the doctor changed his gloves (simulated) he accepted the film. The x-ray technician instructed the doctor where to place the film and how to adjust the settings on the x-ray machine prior to taking the picture. After the x-ray was taken, the outside of the pillowcase was surveyed by the DEQ Radiation Specialist and determined to be free from contamination (controller inject). The pillowcase was removed and discarded in the hazardous waste receptacle. The film was surveyed, found to be clean (controller inject) and passed outside the REA to the x-ray technician. After the x-ray was taken, the backboard was removed from the patient. Monitoring results confirmed that neither the backboard nor the patient's backside was contaminated (controller inject).

At 0830 hours, the DEQ Radiation Specialist read each REA staff members DRD and provided the results to the buffer nurse who appropriately recorded the readings.

At 0831 hours, the patient lifted himself off of the gurney with assistance from REA staff. He was going to leave the REA for the surgery room as his right arm was fractured. Prior to his departure, he was surveyed and found to be free from contamination (controller inject). Paper was placed on the floor (simulated) in the second doorway where the x-ray machine was located. The paper overlapped the hot and cold zones. Even though the patient was found to be free from contamination, the patient was once again re-surveyed by the DEQ Radiation Specialist. Results confirmed that the patient was free from contamination.

At 0835 hours, the buffer nurse orchestrated doffing procedures for one of the REA nurses. The REA nurse read her DRD and provided the results to the buffer nurse who appropriately recorded the readings. Doffing procedures were implemented by the REA nurse who first removing her outer Tyvek suit, cap, and hairnet. The outer pair of plastic gloves then was removed. Subsequently, the DEQ Radiation Specialist surveyed the REA nurse's hands which were determined to be free from contamination.

The REA nurse then gave her thermoluminescent dosimeter the buffer nurse. Next, the REA nurse's booties were removed. After the first bootie was removed, a second DEQ Radiation Specialist located in the cold zone monitored the bottom of the REA nurse's shoes as she stood on one foot leaning on the wall. Survey results indicated no contamination (controller inject). The REA nurse was allowed to step onto the step-off pad located right outside of the REA door. The REA nurse proceeded to remove her second bootie. Survey results were the same. Lastly, her inner Tyvek suit was taken off and her inner pair of plastic gloves removed.

The REA nurse, standing on the step-off pad just outside of the REA, was surveyed by the DEQ Radiation Specialist located in the cold zone. No contamination was found (controller inject). No other doffing procedures were demonstrated through agreement between the controller and the evaluator.

During the medical drill demonstration, all individuals assigned to the REA changed their gloves whenever the possibility of cross-contamination occurred. The REA staff worked

as a team and methodically provided the patient with medical attention followed by monitoring and decontamination of wounds sustained during the accident.

The exercise concluded at 0840 hours.