



**FEMA**

December 15, 2007

Mr. Jim Caldwell  
Regional Administrator  
U.S. Nuclear Regulatory Commission, Region III  
2443 Warrenville Road  
Lisle, Illinois 60532-4352

Dear Mr. Caldwell:

Enclosed is one copy of the Byron Station Medical Services (MS-1) Drill Report. The drill was conducted in Freeport, Illinois, on November 16, 2007. Participants included members from the Illinois Emergency Management Agency, Star Ambulance Service and the Freeport Memorial Hospital.

No Deficiencies and no Areas Requiring Corrective Action were identified during this drill. If you have any questions, please contact me at (312) 408-5575 or Delwyn Kinsley at (312) 408-5558.

Sincerely,

A handwritten signature in black ink, appearing to read "William E. King".

William E. King, Chairman  
Regional Assistance Committee

Enclosure

CC: Mr. Anthony McMurtray, Chief  
Inspection and Communication Section  
U.S. Nuclear Regulatory Commission  
Mail Stop: O-6H2  
Washington, DC 20555-0001

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# FEMA

## **Final Medical Services (MS-1) Drill Report**

### **Byron Station**

Licensee: Exelon Corporation

Exercise Date: November 16, 2007

Report Date: December 15, 2007

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U.S Department of Homeland Security  
Federal Emergency Management Agency  
Region V

536 S. Clark St.  
Chicago, Illinois 60605 - 1521

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## I. EXECUTIVE SUMMARY

On November 16, 2007, the U.S. Department of Homeland Security's (DHS) Federal Emergency Management Agency (FEMA), Region V, evaluated a Medical Services (MS-1) drill in the 10-mile plume exposure pathway Emergency Planning Zone (EPZ) around the Byron Station. The purpose of the MS-1 drill was to assess the ability of off-site agencies to respond to a medical emergency involving a potentially radiological contaminated member of the public. The MS-1 drill was held in accordance with DHS/FEMA's policies and guidance concerning the exercise of State and local radiological emergency response plans.

DHS/FEMA wishes to acknowledge the efforts of the personnel from the State of Illinois Emergency Management Agency (IEMA), Star Ambulance Service, and the Freeport Memorial Hospital who participated in the MS-1 drill.

The scenario for the MS-1 Drill was developed by personnel from the State of Illinois. The Byron Station had declared a general emergency. The emergency alert sirens had sounded, the public was directed to evacuate the affected areas and to report to the appropriate reception center. The scenario was based on a farmer tilling the soil and listening to CDs in the cab of his tractor. He did not hear the alert sirens or the initial public broadcasts on the radio. When he turns on the radio in his tractor, he hears a public broadcast message that a radioactive release had occurred from the Byron Station and that members of the public living in his area were to report to the reception center located in Dixon, Illinois.

The farmer drove his tractor back to his farm and placed his animals on stored feed and water. While watering his horses, one kicks him in the left arm. When he completed taking care of his animals, he got into his truck and drove to the Dixon Reception Center. The farmer entered the reception center holding his arm and talked about the accident to reception staff members. The local 911 Center was contacted to transport the individual to the hospital at 1054 hours. As the IEMA staff processes him through the radiological monitors, they discover that he is contaminated (simulated). As the farmer is being surveyed, he has an intense pain in his left arm.

During the MS-1 drill, Criterion 6.d.1 - Transportation and Treatment of Contaminated Injured Individuals, which is part of the six Exercise Evaluation Areas described in Federal Register notice [67 FR 20580-20602], April 2002, which amends the FEMA-REP 14, Radiological Emergency Preparedness Exercise Manual, was evaluated. The State and local organizations demonstrated knowledge of their organizational emergency response plans and procedures and adequately implemented them. No issues were identified as a result of this drill.



## II. DRILL NARRATIVES

### Medical Services (MS-1) Transportation – Star Ambulance Service

On Friday, November 16, 2007, a Medical Services (MS-1) Drill was conducted at the Freeport Memorial Hospital, 1045 West Stephenson Street, Freeport, Illinois. In accordance with the extent of play agreement, the Illinois Emergency Management Agency (IEMA) Radiological Monitor (RM) and the ambulance and crew from the Star Ambulance Service, Freeport, Illinois are assigned to provide services at the simulated reception center and participated in the MS-1 Transportation drill.

The Byron Station had declared a General Emergency. The emergency alert sirens had sounded; the public was directed to evacuate affected areas and to report to the appropriate reception center. A farmer, who was tilling the soil and listening to CDs in the cab of his tractor, did not hear the alert sirens or initial public broadcasts on the radio. When he turns on the radio in his tractor, he hears the public broadcast that a radioactive release had occurred at the Byron Station and that members of the public living in his area were to report to the reception center located in Dixon, Illinois.

The farmer drove his tractor back to his farm and placed his animals on stored feed and water. While watering his horses, one kicks him in the left arm. When he finishes taking care of his animals, he gets in his truck and drives to the Dixon Reception Center. The farmer entered the reception center holding his arm and talked about the accident to reception staff members. As the IEMA staff processes him through the radiological monitors, they discover that he is contaminated (simulated). As the farmer is being surveyed, he has an intense pain in his left arm. The local 911 Center was contacted to transport the individual to the hospital at 1054 hours.

For demonstrations purposes, the IEMA RM operationally checked the survey equipment that would be used during the drill. This operation was observed at the Freeport Memorial Center prior to departing for the simulated reception center. The meters were checked to ensure that they contained fresh batteries.

The survey meters and probes were secured in plastic bags to protect them from contamination. Additional bags were available in case a bag became contaminated and had to be replaced. The survey meters were turned on and allowed to warm up, and headphones were attached to the meters. The survey instruments used included: Bicon Micro-R meter, last calibrated on July 13, 2007, and due for calibration on July 13, 2008; a Ludlum 2241-3 digital scalar/rate meter with pancake probe last calibrated on July 17, 2007, with the next calibration due on July 17, 2008. The instruments passed an operational battery test and a source response check prior to use by the IEMA RM. The source was imbedded in the side of the carrying case used to transport the equipment. The source was a 10uCi, CS-137 source dated November 2005. The operability check, exposure rate and count rate were recorded on a label affixed on the side of the instrument (Bicon Micro-R meter was 1.1-1.8mR/hr and the Ludlum 2241-3 was 21.6-36.0k cpm).

For the drill, the Dixon Reception Center (simulated) was set up at the Star Ambulance Building approximately 4.5 miles from the receiving hospital. The IEMA RM arrived with a field supply kit containing personal dosimetry, and other support supplies such as disposable gloves, swipes and plastic bags. Supplies also included copies of the Decontamination Center Monitoring/Action Log Form [IL 473-0258 (Rev. 1/97) Job # 1173]. A copy of this form was used during the drill to record patient survey information.

The personal dosimetry kit included the following: a Dosimeter Corporation of America Model 622 Direct-Reading Dosimeter (DRD) with a range of 0-20 R, leak tested on May 9, 2007; a permanent reading Landauer Optically Stimulated Luminescent Dosimeter (LD) with an effective date of July 06 – June 08; a Radiation Exposure Record card with space to record user information; an instruction sheet describing use and precautions for ingesting potassium iodide (KI); and 14 doses of KI provided by iOSAT, in 130 mg tablets individually sealed with an expiration date of June 2007. A printed card inside the kit advised the user that the KI was tested and the drug was found to be viable so the expiration date was extended. Through interview, it was stated that a copy of the extension letter, which identifies the extension date as June 2008, is kept in the command vehicle located at the reception center from which the IEMA RM was dispatched.

At 1056 hours, the ambulance crew from the Star Ambulance Service received a call from the 911 dispatch center deploying them to the reception center. The ambulance used for the drill was equipped with an 800 MHz radio system, which had the capability to communicate with the 911 center, hospital and other response units. The ambulance also had a regional medical channel. The Star Ambulance EMT's had cell phones for back-up communication. Drill records indicated that the ambulance crew contacted the Freeport Memorial Hospital at 1100 hours, and informed the 911 center that they were en-route with a contaminated patient and they would call back later with additional information.

The IEMA RM took background readings in the area of the reception center. Using a Bicon Micro-R meter, readings of 40 counts per minute were noted in the reception center. This level was established as background and was used to establish the decontamination level. The State of Illinois has established a decontamination level of two times background. Monitoring of the patient was conducted in a low radiation background area. The individual was surveyed while waiting for the ambulance. Contamination was detected and recorded.

The patient was examined using a Ludlum Model 2241-3 survey instrument equipped with a pancake probe, speaker and set-able alarm. The monitoring techniques used were slow and methodical, with proper positioning of the probe for personnel monitoring. Contamination was found on the victim and documented on a Decontamination Center Monitoring/Action Log Form as follows: neck - 3000 cpm; right hand - 3000 cpm; left knee - 1500 cpm; with a background - 40 cpm. Personal information and comments containing information regarding the injury also were recorded on the form.

At 1105 hours, EMT's from the Star Ambulance Service arrived at the reception center. The EMT's were given a status of the patient's condition by the IEMA RM. The EMTs took caution in their approach to the victim; this ensured their safety. The EMTs took universal contamination control precautions while treating the patient. They wore paper coveralls, booties, hair protection, face and eye protection, and rubber gloves. The information the IEMA RM gathered during the victim survey was passed on to the Star Ambulance Service crew upon arrival at the Dixon Reception Center.

The EMT's assessed the patient's level of consciousness, level of pain and vital signs. The victim was mobile and sitting in a chair as the EMT gathered patient information and assessed vital signs. The victim answered questions while the Star Ambulance EMTs readied the stretcher. The stretcher was prepared with a double wrap of sheets and a blanket. The patient laid down on the stretcher with assistance from the ambulance crew. He was then wrapped in sheets and secured to the stretcher with three patient straps. The ambulance crew then moved the victim to the back of the ambulance and placed the stretcher and patient into the ambulance.

At 1117 hours, the EMTs recorded the patient's contamination information provided by the IEMA RM. The EMTs prepared to transport the patient to the hospital. During this preparation the ambulance crew took vital signs, and simulated placing the patient on oxygen, starting an IV of .9 Normal Saline, and placing the patient on a heart monitor. The EMT riding in the back of the ambulance provided medical care and gathered personal information from the patient to relay to the hospital. The patient's medical treatment received the highest priority from the ambulance crew. The ambulance crew requested orders from the hospital to administer pain medication. After receiving the authorization the EMT pulled the drug box out of the cabinet and simulated administering the pain medication.

At 1120 hours, the ambulance crew departed the scene. The IEMA RM rode with the ambulance to the hospital. During the entire demonstration, the ambulance crew and the IEMA RM remained aware of potentially contaminated areas, and conducted contamination surveys when contamination was suspected. The ambulance personnel changed gloves frequently and placed them, and all equipment used, into a bag that indicated that the contents contained contaminated items.

During transport, an EMT carefully removed the patient's (simulated) contaminated clothing (a Tyvek suit) by cutting, removing and placing the removed items in a marked bag. The patient's contaminated shirt and pants were cut down the center and rolled inside to the outside to contain the contamination. Again the EMT changed gloves before touching either the patient or equipment. Through interview, the patient decontamination process was discussed and could occur in route to the hospital. The locations of the patient which were contaminated and were covered by clothing were deemed decontaminated by the controller.

At 1124 hours, the EMT Paramedic communicated the patient's condition with Freeport Memorial Hospital's Emergency Department staff via cell phone. The EMT reported the

ambulance was in route with a patient whose chief complaint (Blunt trauma from a horse kick to the anterior left forearm, with some swelling and no deformity), radiological contamination readings and the location of contamination, level of consciousness and vital signs. The EMTs further reported the patient's respiratory rate, pulse, skin color, temperature, blood pressure, patient's history and treatment in progress. Upon further query by the Freeport Memorial Hospital, the EMT reported that the patient was cocooned. The EMTs gave an estimated time of arrival of 10 minutes.

At 1126 hours, the Star Ambulance EMT discussed flushing the area of contamination (simulated) using Normal Saline. The EMT discussed how the run off of water and waste product would have been contained and disposed of adequately.

Documentation indicated that the hospital was informed that they would be receiving a contaminated patient picked up at the Dixon Reception Center in advance of the patient's arrival.

The Star Ambulance Service arrived at the Freeport Memorial Hospital at 1131 hours. The Emergency Department Staff and IEMA RM met the ambulance personnel in the receiving area. The ambulance crew was directed to back the ambulance into the receiving area. The patient was then removed from the ambulance. This area was on a hill, the Ambulance crew noted the sloping area and suspected difficulty. The hospital agreed and the transfer area was moved to a level area in the receiving bay.

The Emergency Department staff was briefed on the patient's condition (by the ambulance crew). The patient was then transferred from the stretcher to the Hazardous Material Gurney which contained a yellow waste water collection system. The IEMA RM provided the patient's information to the Freeport Memorial Hospital staff and IEMA RM assigned to the Hospital. This information was recorded earlier on a Decontamination Center Monitoring/Action Log Form.

After the patient was transferred to hospital personnel, the EMTs, equipment, and ambulance were surveyed for contamination by the IEMA RM. The ambulance crew and IEMA RM displayed a good awareness for the location of potential contamination. Also surveyed were all locations touched by the EMTs during treatment and monitoring of the patient during transport to the hospital.

For demonstration purposes, one EMT was partially monitored and demonstrated the proper doffing of anti-contamination clothing. Due to a real world event, the ambulance and crew were moved to receive another ambulance at the hospital. The EMT doffing and IEMA RM survey methods were discussed and adequate for the demonstration. Potentially contaminated clothing and equipment was double bagged and appropriately labeled for transfer to the appropriate receiving agency.

The IEMA RM discussed taking a swipe of any area found to be contaminated. The swipe would be bagged and the sample transferred later to the State laboratory. The ambulance receiving area was monitored and found clean. Through interview, decontamination

procedures were reviewed with the IEMA RM and ambulance crew. The steps the IEMA RM described would have adequately decontaminated the ambulance. Further discussions indicated the ambulance and ambulance equipment would have been adequately monitored for contamination, and released back to service.

Through interview, the ambulance crew stated that they knew what locations are designated as monitoring and decontamination facilities in the local area. They would report to one of these locations, or they would be told where to go for decontamination in the event they needed this service. They were familiar with the hazards of radiation contamination and the precautions to take to avoid the spread of contamination. Through interview, the ambulance crew demonstrated that they were aware of the primary route to the Freeport Memorial Hospital and other hospitals in the area that could treat radiological exposed patients. The crew was able to identify and describe alternative routes to the Medical Center in the event that the primary route was blocked.

The IEMA RM discussed the process of surveying the Freeport Memorial Hospital receiving area with the Ludlum 2241-3 survey meter. She demonstrated and described what actions would be taken should contamination be found in this area. The IEMA RM stated that they have an established priority for getting the ambulance and the hospital's receiving area cleared and the radiation monitoring process completed to ensure that the ambulance and hospital receiving area were placed back into service as soon as possible. All areas of the hospital and path from the ambulance to the treatment room were surveyed and deemed cleared by controller injects. These areas had a readings of background.

All activities described in the demonstration criterion were carried out in accordance with the plan, procedures, and extent of play agreement.

### Medical Services (MS-1) Hospital – Freeport Memorial Hospital, Freeport, Illinois

The State of Illinois' Medical Services (MS-1) Freeport Memorial Hospital (FMH) Drill was performed out of sequence on November 16, 2007, commencing at 1040 hours, in Freeport, Illinois. At that time, an IEMA Radiological Monitor (RM) dispatched (simulated) by his supervisor arrived at the FMH to provide survey and verbal technical support to hospital personnel, and to survey the areas used in patient treatment.

The IEMA RM arrived with a metal carrying case containing survey meters, personnel dosimetry, and other support supplies such as disposable gloves and forms. Monitoring equipment, personal dosimetry, potassium iodide supplies, accompanying instructions and record keeping forms were operationally checked by the IEMA RM before the MS-1 drill began. These efforts were observed by the evaluation team and the demonstration findings are reported under the MS-1 Transportation narrative.

The IEMA RM was questioned about his knowledge to manage radiological exposure for emergency workers. The IEMA RM was familiar with proper procedures to complete the Radiation Exposure Record card with name, social security number, and current date; knew

how to wear the permanent Landauer Luminescent Dosimeter, and to check the DRD every 15-30 minutes and record readings on the record cards. He was aware of the administrative reporting limit (3R) and turn-back value (10R). By monitoring his own DRDs and using radiation survey equipment, the IEMA RM at the hospital was aware of local conditions and could advise FMH personnel of changes in readings, if any. Only a very low level of exposure was expected at this facility. After this assignment, the IEMA RM could be reassigned to another location. Equipment would be checked for contamination at the end of the mission.

According to the extent of play agreement negotiated with the Department of Homeland Security/Federal Emergency Management Office, Region V, personal dosimetry was not issued to FMH personnel by IEMA.

Using a Bicron Micro-R meter, the IEMA RM conducted a background check in areas that would be used for patient treatment. A reading of 80-100 counts per minute was noted. This level was established as background to be used for future patient and emergency worker care. Decontamination levels established by the State of Illinois are two times background. Throughout the drill, the IEMA RM played an active part in radiation monitoring activities and in advising the hospital staff on radiation safety protocols.

At 1055 hours, a telephone call was received by the FMH Emergency Room Charge Nurse from a member of the Star Ambulance Service Dispatch Center. The purpose of the telephone call was to inform the FMH that the ambulance Emergency Medical Technicians (EMTs) were responding to a radiation incident to pick up a patient contaminated by radioactive materials (simulated). The EMTs would contact the hospital later when they had more information on the patient's medical and contamination condition.

Concurrent with the incoming call from the EMTs, an announcement was made over the hospital's public address system at 1104 hours, informing personnel that a radiation decontamination drill was in progress. Hospital personnel were requested to report to the Emergency Department (ED) for the drill.

The FMH followed their procedures and established a secure Emergency Department Decontamination Area (EDDA) for receipt of a contaminated injured patient. Hospital personnel responding for the drill included personnel from Security, Maintenance, Nuclear Medicine [Radiation Safety Officer (RSO) and Assistant], and the ED (Physician on duty, buffer zone nurse, two nurses to attend to the patient, and ancillary personnel.) Other FMH department personnel observed the drill or were called in later to assist with patient care (Safety Officer, Environmental Services, Laboratory, Imaging Services, etc.). It should be noted that persons assisting and observing the drill, along with other hospital and ambulance personnel received Emergency Medical Services for Radiation Accidents training presented by the Illinois Emergency Management Agency (IEMA) the day prior to the MS-1 Drill. About 15 persons attended the training session.

The entrance road to the EDDA and the EDDA itself provided an area that could be controlled with minimal need for security personnel and traffic barriers. The entrance road

ran up a slight incline past a door leading directly into the EDDA. Patients could be transferred to the hospital in this area. If the weather was inclement, the road continued through an adjacent ambulance bay (large enough to hold four ambulances – two side by side). The ambulance bay had overhead garage doors at both ends to provide protection from the weather or allow traffic to continue on to the main road. Patients also could be off loaded in the ambulance bay. During the drill, the patient was removed from the ambulance on an ambulance gurney. This gurney was rolled into the ambulance bay where patient transfer, ambulance gurney to hospital gurney, occurred before the patient was taken to the EDDA. Ropes and radioactive signage was available to mark off areas inside and outside the FMH, as needed.

Entrance to the EDDA was through a door located just off the ambulance bay. The EDDA was a large room that contained a sink, space for a gurney, desk, shower stall, and room for multiple medical persons to maneuver with ease. The shower stall could be used to decontaminate ambulatory patients. Across the room from the ambulance bay door was a small alcove with another door that opened up into the main ED. The layout of the EDDA allowed for a controlled environment. Patients could be brought directly into the EDDA, treated and decontaminated, and then moved out into other areas of the hospital as circumstances required. The secure doorway alcove was used as a buffer zone. During the drill, chucks were taped to the floor, outside of the EDDA doorway alcove, as step off pads for persons exiting the EDDA and as visual barriers to secure the area. Security personnel and the buffer zone nurse controlled the area; preventing non-essential or not approved persons from entering potentially contaminated areas.

During the drill, the buffer zone nurse stood on the other side of the doorway to control movement of persons and supplies into and out of the EDDA. In addition to collecting all medical samples (after they were surveyed by an IEMA Radiological Monitor (RM) before they were sent to a laboratory for analysis, the buffer zone nurse recorded medical and radiation survey information gathered during patient treatment. All information was recorded on hospital forms: Radiation Emergency Response Incident Checklist; EDP History & Physical Worksheet, General Adult; Emergency Department Triage; and Emergency Department Nursing Notes. A copy of the hospital's Radioactive Decontamination Plan revised: November 2007 was provided to the evaluator for review.

The EDDA was readied for patient arrival. The EDDA was a large room filled with equipment and supplies used for routine emergency treatment. Hospital personnel visually surveyed the room and removed nonessential equipment into the main ED. Excess wall equipment that could not be removed was covered with sheets. A privacy curtain was simulated removed. Chucks were taped to the floor just outside of the buffer zone doorway. A yellow disposable plastic self contained decontamination unit made by RMC Medical was opened and placed on a portable gurney. This unit was connected to a water collection container.

The supply desk was outfitted with equipment needed for wound, decontamination, and post decontamination treatment (soap, water, saline solution, gauze wipes, chucks, towels, blankets, patient gowns, stethoscope, scissors, etc.). Additional medical supplies were

available in the ED, if needed. Two small hazards waste cans were placed in the EDDA. These would be used to collect contaminated water. At least four clearly marked red hazardous waste cans were placed in the room for use in collecting contaminated waste. More collection cans were available, if needed.

A communications center was located inside the main ED. The communications center contained various 2-way radio units including a dedicated Emergency Medical Services call in line and the Star Com Radio System. The radio systems provided coordinated communication links between the hospital staff and personnel staffing area fire and ambulance field based units. Personnel from the ED used one of the 2-way radios to listen to and speak with an EMT from the Star Ambulance Service who participated in this drill.

In preparation to treat a contaminated patient, EDDA personnel each donned Personnel Protective Equipment (PPE) to include a plastic apron over their scrubs, two pairs of gloves, face mask, safety glasses, booties, and hair cover. The RSO stood by and provided guidance to hospital personnel on how to secure their PPE to maintain the highest contamination control possible. Discussion occurred between the IEMA RM and hospital personnel on the best way to use a portable x-ray unit should it be needed in the EDDA for patient treatment.

At 1124 hours, the ED received a call over a 2-way radio from a Star Ambulance Service EMT that they were en-route to the Hospital with a patient. The following patient information was given: exposed to radiation with contamination on the right side of the neck and hand and left knee, blunt trauma from horse kick with hematoma and slight swelling of the left arm, alert and oriented, respirations 20, pulse 110, blood pressure 130/100, history of hypertension, allergy information, patient disrobed and cocooned, and estimated time of arrival about 10 minutes.

After receiving the call and logging this information on a hospital form, the ED nurse walked over to the EDDA and briefed the medical personnel about the incoming patient and that the person was contaminated. It was confirmed that the EDDA was secured and that the IEMA RM established background reading of the area at 100 cpm. The IEMA RM announced that he checked his personal dosimeter and record the reading as his first check. The team awaited the arrival of the patient.

At 1131 hours, the ambulance arrived at the FMH. The ambulance pulled up to the entrance door to the EDDA. Patient transfer occurred. The patient was unloaded from the ambulance and transferred to the portable hospital gurney with the yellow disposable plastic self contained decontamination unit. The ambulance IEMA RM, assisting with the patient at the simulated reception center and in the ambulance, provided verbal and written format [form: IL 473-0258 (Rev. 1/97) Job # 1173] information to the IEMA RM at the Hospital. The patient's survey information indicated that initial contamination occurred as follows: right palm 3000 cpm, right front of neck 3000 cpm, pants at left knee 1500 cpm. The pants and shirt were cut away during transport to the hospital; through interview these areas were decontaminated and cleared by the ambulance IEMA RM after clothing removal. It was reported that the patient was cocooned twice. The patient was wheeled

into the EDDA. Here the IEMA RM surveyed the wheels of the gurney and EDDA floor to confirm that no cross contamination had occurred to the treatment room. He reported that all reading were at the established 100 cpm background levels.

The first priority of the EDDA physician was to do a quick, on the spot, assessment of the patient's medical condition. Priority was given to ensuring that the patient was medically stable and the injury was treated prior to treatment for the exposure to radiation. Medical treatment was administered. While the assessment was underway, the hospital staff checked the patient's vital information. The buffer zone nurse recorded the information on a hospital form and also informed the RSO about the patient's medical condition and contamination status.

While the medical assessment was underway, the IEMA RM monitored the patient and found elevated counts on the right palm (3000 cpm). Therefore, the IEMA RM used masking tape to decontaminate the right palm, which brought the contamination level down to 1000 cpm. The area was again decontaminated with masking tape. This time these efforts reduced the reading to below twice background. It was reported that the right palm was successfully decontaminated.

The IEMA RM continued monitoring the patient. Contamination levels of approximately 3000 cpm were found on the front right side of the neck. Decontamination efforts were conducted using masking tape and the levels were reduced to 1000 cpm. A second decontamination effort was conducted by the IEMA RM and the levels were reduced to below twice time's background. This area was determined to be successfully decontaminated. A slow methodical survey was conducted on the patient's back, along the right side of the neck, and other areas not previously surveyed. All survey results indicated that these areas were free on contamination. After the patient was decontaminated, the rest of his clothing was cut off (simulated) and rolled inside to the outside and disposed of in a marked container. The patient was rolled onto a clean sheet and a final survey was conducted.

Smears were ordered and taken around the nose, ears, and mouth. Also during the course of medical treatment, smears were taken from the injury site - as a precautionary measure to ensure that the injury site had not become contaminated. All samples were handled in the same careful manner. The nurse taking the smear ensured that her hands were clean either by having them surveyed by the IEMA RM or by changing gloves. A smear was taken and carefully placed into a plastic zip bag held by another nurse. The bag was closed and the IEMA RM surveyed the outside of the bag. The bag was labeled with the patient's information. The bag indicated that it contained a hazardous sample. The clean bag was passed outside of the EDDA to the buffer zone nurse who double bagged the sample so the swabs could be sent to the laboratory for analysis.

As the patient was considered clean and medically stable, he was given instructions to get off the gurney. He received a clean gown to cover himself and was told to move towards the buffer zone doorway for an x-ray of the left arm. A portable x-ray machine was rolled up to the buffer zone doorway. A high surgical tray was moved to the doorway on the

inside of the EDDA and covered with a towel. The x-ray film was bagged and placed on the towel. The patient walked up to the doorway and laid his arm on the tray. An extension arm of the portable x-ray machine was moved into the EDDA and stationed above the patient's arm. Medical staff simulated taking the x-ray. The x-ray technician was careful not to step across the buffer zone threshold when attending to the tasks at hand. The IEMA RM surveyed the x-ray before it left the EDDA and after it was double bagged. The towel and tray were surveyed. All were found to be clean. The x-ray extension arm was pulled out of the EDDA and the x-ray was simulated sent to the radiology department for processing.

Throughout the Hospital portion of the drill, monitoring of the patient was conducted in a low radiation background area. The patient was examined using a Ludlum Model 2241-3 survey instrument equipped with a pancake probe, speaker and set-able alarm. The *monitoring techniques used were slow and methodical, with proper positioning of the probe for personnel monitoring.* As monitoring occurred, contamination readings found on the patient were verbally given to the buffer zone nurse, who recorded the information on a hospital form. The medical team and IEMA RM were aware that contamination could be spread from the patient to them and the hospital. They were diligent about changing their gloves frequently and having the IEMA RM monitor their hands and equipment brought in contact with the patient. All supplies used during treatment and contaminated clothing were properly disposed of in a container marked with a hazardous waste sign.

For demonstration purposes, the IEMA RM performed a survey of the physician as he exited the EDDA. The physician started out by removing the outer gloves on both hands, rolling the outside of the glove to the inside during removal and then putting the gloves into a hazmat waste container. The physician removed his gown rolling the inside to the outside and put the gown in the radiation waste container. He removed his mask and hair net and also disposed of them.

The IEMA RM performed a slow and methodical full body survey with the probe held about one-half to one inch away from the survey area. This was the same technique used for all survey attempts conducted during the drill. The probe was moved along the right shoulder, down the outside of the arm, around the hand, back up the inside of the arm, and then down the right side of the torso and along the right leg to the foot. Continuing on, the probe was moved along the inside contour of the legs, and then followed the left body contour from the foot to the head, and around the head to the starting point on the right shoulder. The head and body, front and back, were surveyed. All surveyed areas were determined to be clean.

The IEMA RM surveyed the physician's gloved hands and they were found clean. The physician moved to the buffer zone doorway. Holding on to the doorframe, he removed one bootie, had his foot surveyed, and when it was determined to be clean, he stepped back into the clean side of the hospital onto the clean floor chuck. This same process was followed while removing the other bootie. The physician removed his final pair of gloves and had his hands surveyed one last time. He was determined to be free from contamination and was released from the EDDA. The IEMA RM stated that he would

follow the same procedures to clear and release the rest of the medical team from the EDDA.

The IEMA RM stated that after medical personnel were cleared, he would survey the EDDA for contamination, paying attention to the door jam and used equipment (gurney, backboard, scissors, stethoscope, etc). A sweep of the floor, following a grid patten, would clear the EDDA. If contamination was found at any spot, a surface wipe would be done at the location and the area would be resurveyed. If an area could not be decontaminated, the EDDA would be closed off until more thorough decontamination efforts could be done. Radioactive waste would be double bagged and sealed. Bags would be labeled with information identifying the contents of the bag and level of contamination, if known. The IEMA RM would provide advice on waste disposal that would be provided to him from other IEMA officials.

All activities described in the demonstration criterion were carried out in accordance with the plan, procedures, and extent of play agreement.

### III. EXTENT OF PLAY AGREEMENT

#### EXTENT OF PLAY AGREEMENT FOR THE MEDICAL SERVICES EXERCISE November 16, 2007

Location: Freeport Memorial Hospital      Transportation Provider: Freeport Ambulance  
1045 West Stephenson  
Freeport, Illinois 61032

**Participants:**

Victim (volunteer)

Lead Controller: Larry Gerovac (IEMA)

IEMA ER Monitor: Don Eastep

IEMA Hospital Controller: Ken Evans

IEMA Ambulance Monitor: Julie Dixon

IEMA Ambulance Controller: Kathy Allen

Criteria that can be re-demonstrated immediately for credit, at the discretion of the evaluator, include the following: For Transportation: 1.d.1, 3.a.1 and 6.d.1; for the Hospital, 1.d.1, 1.e.1, 3.a.1 and 6.d.1. Criteria may be re-demonstrated, as agreed by the Lead Controller and FEMA Evaluators.

**Introduction:**

An offsite medical drill will be conducted to demonstrate the State of Illinois' concept of operations for handling contaminated injured individuals. This Medical Services drill is structured to address MS-1 Hospital and Transportation evaluation criteria.

NOTE: Evaluators should be aware that while hospital personnel are encouraged to assume responsibility for monitoring, decontamination, and contamination control activities within their facility to the extent they are able to do so, they are advised to take direction from Illinois Emergency Management Agency (IEMA) personnel regarding these issues. The purpose of providing IEMA support is to ensure appropriate radiation protection protocols are observed.

**Extent of Play:**

Byron Nuclear Power Station has declared a general emergency. The emergency alert sirens have sounded; the public has been directed to evacuate affected areas and to report to reception centers set up in the local area. The scenario is based on a farmer tilling the soil and listening to CDs in the cab of his tractor. He does not hear the alert sirens or initial public broadcasts on the radio. When he turns on the radio while in his tractor cab he hears the public broadcast that a radioactive release has occurred from the Byron Nuclear Station and that members of the public living in his area are to report to the reception center located in Dixon, Illinois. Radiological monitoring and, if necessary, decontamination, of evacuees is provided for at these facilities by staff from IEMA under the Illinois Plant for Radiological Accidents (IPRA). The farmer drives the tractor back to his farm and puts his animals on stored feed and water. While watering his horses, one kicks him in the left arm. As soon as he finishes taking care of his animals he immediately gets in his truck and drives to the Dixon Reception Center. As the IEMA staff

processes him through the radiological monitors they discover that he is contaminated. As the farmer is being surveyed he has intense pain in the arm in which he was kicked. He explains the pain and the horse incident to the IEMA staff and they immediately call Freeport Ambulance to transport the farmer to Freeport Memorial Hospital.

1. An ambulance and EMS staff will be used to demonstrate loading, transporting and unloading the victim. EMS personnel will pick up the patient at a staged location close to the hospital. IEMA staff and the patient will be pre-staged for the ambulance arrival.
2. The ambulance crew will communicate with the receiving hospital regarding the medical status and contamination levels associated with the patient.
3. The IEMA radiological monitor will be available to conduct and/or supervise radiological monitoring and contamination control at the simulated reception center and during patient transport.
4. An IEMA radiological monitor and representative from the hospital will provide radiological exposure control and monitoring of EMS and Hospital personnel.
5. Due to the nature of the injury/illness, final radiological decontamination efforts will be deferred until the patient has arrived at the hospital and has been medically stabilized.
6. The IEMA radiological monitor will assist with ingress and egress of radiological control areas and supervise the access into the radiological control area. A buffer zone will not be set up. Monitoring will be performed prior to personnel leaving the potentially contaminated patient treatment area. Protective clothing used by hospital personnel will be identical to that used for a chemical or biological agent in accordance with hospital protocol.
7. Upon arriving at the hospital, the supervision of contamination control and radiological monitoring and activities remain the responsibility of IEMA. Hospital nuclear medicine personnel that are trained and properly equipped to address monitoring functions will assist to the extent necessary with monitoring and contamination control activities.
8. The medical facility will demonstrate or describe their procedures for the medical treatment and necessary decontamination of a contaminated injured individual. Simple methods such as saline washes will be demonstrated for the removal of patient contamination. IEMA/Nuclear medicine personnel will survey the hospital and medical personnel to maintain contamination control. These methods will include taking swipes of floors and surfaces so that the hospital and ambulance can be cleared for normal operations.

9. The IEMA radiological monitor will inform hospital personnel of the appropriate samples needed to assess internal contamination.
10. Emergency medical personnel will be able to maintain their exposure below the limits specified in 10 CFR Part 20 because for this exercise, the dose rate from the patient is below 2 mR/hr.
11. After the Hospital is notified, Hospital personnel will prepare the area to receive the patient in accordance with their procedures and provide security as necessary. IEMA as a general practice would, if necessary, post radiation signs in accordance with the requirements as set forth in 10 CFR Part 20. In this drill, even though contamination levels are less than 5,000 cpm and all dose rates less than 2 mR/hr, hospital procedures do recommend posting of the treatment room. Therefore the treatment room will be posted in accordance with hospital procedures. Hospital security will control the area in accordance with the same policies and procedures used to provide isolation in the treatment of a chemical or biological agent.
12. Regardless of specific written hospital procedures for addressing radiation contamination, the supervision and advice provided by IEMA personnel should be the governing guidance for determining whether the patient's contamination situation is appropriately addressed.

The drill shall terminate when the controller verifies that the criteria under Evaluation Area 6, Sub-element 6.d and Evaluation Area 3, Sub-element 3.a.1, have been satisfied.

### **EVALUATION AREA 1 - EMERGENCY OPERATIONS MANAGEMENT**

**Criterion 1.d.1:** At least two communication systems are available, at least one operates properly, and communication links are established and maintained with appropriate locations. Communications capabilities are managed in support of emergency operations.

The Freeport Ambulance will use 2-way radios to communicate with Freeport Memorial Hospital. Other communication systems that can be used include commercial telephone or cell phones.

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

Freeport Memorial Hospital will adequately demonstrate the ability to support operations, with adequate resources. The availability of dosimetry and KI for hospital personnel will **not** be demonstrated during this exercise, however IEMA staff will be issued dosimetry and KI as field team members.

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

**Criterion 3.a.1:** The OROs issue appropriate dosimetry and procedures, and manage radiological exposure to emergency workers in accordance with the plan 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.

The use of dosimetry and KI will not be demonstrated by hospital staff. IEMA staff will demonstrate appropriate use of dosimetry and KI.

For purposes of this exercise, if there is no medical need to bring equipment into and out of the treatment room, nasal swabs will be taken (swabs to be taken outside the nose to simulate taking swabs inside the nose) and passed out of the room to demonstrate movement of equipment and supplies into and out of the controlled area.

### **EVALUATION AREA 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.

Freeport Ambulance will demonstrate the capability to transport contaminated, injured individuals to Freeport Memorial Hospital in Freeport, Illinois. The ambulance crew will pick up a contaminated injured patient near the grounds of Freeport Memorial Hospital (simulating pick-up of a patient from Dixon Reception Center). The ambulance crew will be met by IEMA staff that will perform initial radiation monitoring, and will provide information regarding contamination levels on the patient. Freeport Ambulance will utilize universal precautions and good housekeeping practices to minimize the spread of contamination, and will focus on treating the patient's medical condition.

Freeport Ambulance will call in the information regarding the patient to Freeport Memorial Hospital in Freeport so they can prepare for receipt of a contaminated patient. IEMA personnel will accompany the patient to the hospital along with the ambulance, bringing instrumentation to provide radiation readings and guidance to the hospital.

Freeport Memorial Hospital will implement their plan for receipt, isolation and treatment of an injured contaminated patient. Medical personnel will utilize universal precautions and good housekeeping practices to minimize the spread of contamination, and will focus on treating the patient's medical condition. Simple decontamination efforts will be demonstrated after the patient has been medically stabilized. The hospital will demonstrate procedures for limiting exposure to hospital staff, decontaminating a patient, and restricting access to the area where the patient is being treated and monitored. IEMA personnel will discuss the need to take additional samples for further radiological analysis. Hospital

personnel will demonstrate their knowledge of who to call beyond IEMA for assistance in Radiological Accidents, e.g., REAC/TS.

For purposes of this exercise, another IEMA staff member will be dispatched to Freeport Memorial Hospital with radiation detection and measurement equipment in advance of the ambulance arriving. The purpose of having two separate individuals for this exercise is to facilitate monitoring the ambulance and ambulance personnel so they are not kept out of service for an extended period of time.

The drill will conclude with the hospital representative and IEMA personnel supervising the removal of protective clothing and surveying of the emergency room and hospital personnel. IEMA will also advise on the proper procedure for release or disposal of contaminated material.

Following the conclusion of the drill, a short critique will be held.

## EXERCISE SCENARIO

### NARRATIVE SUMMARY FOR FREEPORT MEMORIAL HOSPITAL MEDICAL DRILL

A Farmer was tilling his field while listening to CDs in the tractor cab. When he switched to the radio he heard a public broadcast indicating his farm was in an area requiring evacuation due to a release of radioactive material from Byron Nuclear Station. He immediately returned to the barn, placed his animals on stored feed and was watering the horses when one of them bucked kicking him in the left arm. The farmer finished watering his animals then got into his truck and drove to the Dixon Reception Center. The farmer enters the reception center and begins to feel a sharp pain in his left arm. As the farmer is being monitored by IEMA staff they identify that he is contaminated. The farmer explains to the IEMA staff that he is having severe pain in his left arm where a horse kicked it about 20 minutes earlier.

The farmer is kept comfortable while an ambulance is called. The patient's decontamination is waived due to the injury. The relocation center and portal monitor for the purpose of this scenario will be stimulated. An ambulance will be dispatched to the relocation center. For purposes of the drill, a location close to the hospital will be used to represent the actual reception center. Ambulance personnel will demonstrate patient loading and transport. Ambulance personnel will communicate with the receiving hospital. An IEMA monitor will assist EMS personnel in patient transport. Patient contact dose rates are less than 2 mR/hr. Contamination levels will be less than 5,000 cpm, which means EMS personnel are exempt from direct read dosimeters and LDs in accordance with IEMA procedures for personnel monitoring.

At the hospital the IEMA monitor will assist hospital or EMS staff in monitoring and decontamination efforts. In addition, a member of the hospital staff will assist in monitoring EMS and ambulance personnel. For purposes of this evaluated exercise, IEMA will provide two individuals to perform monitoring: one will monitor the ambulance, and the other will perform monitoring in the hospital. As noted above, hospital personnel and hospital staff will not be issued personnel monitoring devices as radiation levels are below those requiring dosimetry.

At the hospital, medical personnel will utilize universal precautions and good housekeeping practices to ensure contamination from the patient is controlled and not spread. Simple decontamination efforts will be demonstrated after the patient has been medically stabilized. IEMA personnel will discuss the need to take additional samples for further radiological analysis. Hospital personnel will demonstrate their knowledge of who to call beyond IEMA for assistance in Radiological Accidents, e.g., REAC/TS.

For purposes of this exercise, if there is no medical need to bring equipment into and out of the treatment room, nasal swabs will be taken (swabs to be taken outside the nose to simulate taking swabs inside the nose) and passed out of the room to demonstrate movement of equipment and supplies into and out of the controlled area.

The drill will conclude with the hospital representative and IEMA personnel supervising the removal of protective clothing and survey of the emergency room and hospital personnel. IEMA will also advise on the proper procedure for release or disposal of contaminated material. Following the conclusion of the drill, a short critique will be held.