Medical Services Drill Report
Ogle County, Illinois

Byron Nuclear Power Station

Licensee:	**Commonwealth Edison Company**
Exercise Date:	**October 13, 1999**
Report Date:	**November 10, 1999**

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I. EXECUTIVE SUMMARY

On October 13, 1999, a medical drill was conducted at the Byron Nuclear Power Station by the Federal Emergency Management Agency (FEMA), Region V. The purpose of the medical drill was to assess the ability of offsite agencies to respond to a medical emergency involving a potentially radioactively contaminated plant worker. The medical drill was held in accordance with FEMA's policies and guidance concerning the exercise of State and local emergency response plans.

FEMA wishes to acknowledge the efforts of Byron Nuclear Power Station, City of Byron Fire Department Paramedic Ambulance Service and Rockford Memorial Hospital staff who participated in this medical drill.

The scenario for this medical drill was developed by personnel from the Byron Nuclear Power Station and coordinated with the State of Illinois. The following objectives, which are part of the 33 standardized objectives contained in FEMA's Exercise Manual (FEMA-REP-14) are normally evaluated during a medical drill.

> **Objective 5: Emergency Worker Exposure Control.** Demonstrate the capability to continuously monitor and control radiation exposure to emergency workers.
>
> **Objective 14: Implementation of Protective Actions – Use of KI for Emergency Workers, Institutionalized Individuals, and the General Public.** Demonstrate the capability and resources to implement potassium iodide (KI) protective actions for emergency workers, institutionalized individuals, and, if the State plan specifies, the general public.
>
> **Objective 20: Medical Services – Transportation.** Demonstrate the adequacy of vehicles, equipment, procedures, and personnel for transporting contaminated, injured, or exposed individuals.
>
> **Objective 21: Medical Services – Facilities.** Demonstrate the adequacy of the equipment, procedures, supplies, and personnel of medical facilities responsible for the treatment of contaminated, injured, or exposed individuals.

In this drill only Objectives 20 and 21 were evaluated.

The local organizations, except where noted in this report, demonstrated knowledge of their organizational emergency response plans and procedures, and adequately implemented them. There were no Deficiencies or Areas Requiring Corrective Actions (ARCAs) identified as a result of this drill.

II. EXERCISE EVALUATION AND RESULTS

This section contains the results and findings of the evaluation of all offsite jurisdictions and functional entities that participated in the October 13, 1999 medical drill to test their ability to respond to an on-site medical emergency involving a potentially radioactively contaminated plant worker at the Byron Nuclear Power Station.

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

- **Met** – Listing of the demonstrated exercise objectives under which no Deficiencies or ARCAs were assessed during this exercise and under which no ARCAs assessed during prior exercises remain unresolved.

- **Deficiency** – Listing of the demonstrated exercise objectives under which one or more Deficiencies was assessed during this exercise. Included is a description of each Deficiency and recommended corrective actions.

- **Area Requiring Corrective Actions (ARCA)** – Listing of the demonstrated exercise objectives under which one or more ARCAs were assessed during the current exercise or ARCAs assessed during prior exercises remain unresolved. Included is a description of the ARCAs assessed during this exercise and the recommended corrective action to be demonstrated before or during the next biennial exercise.

- **Not Demonstrated** – Listing of the exercise objectives which were not demonstrated as scheduled during this exercise and the reason they were not demonstrated.

- **Prior ARCAs – Resolved** – Descriptions of ARCAs assessed during previous exercises which were resolved in this exercise and the corrective actions demonstrated.

- **Prior ARCAs – Unresolved** – Descriptions of ARCAs assessed during prior exercises which were not resolved in this exercise. Included is the reason the ARCA remains unresolved and recommended corrective actions to be demonstrated before or during the next biennial exercise.

The following are definitions of the two types of exercise issues which are discussed in this report.

- A **Deficiency** is defined in FEMA-REP-14 as "...an observed or identified inadequacy of organizational performance in an exercise that could cause a finding that offsite emergency preparedness is not adequate to provide reasonable

assurance that appropriate protective measures can be taken in the event of a radiological emergency to protect the health and safety of the public living in the vicinity of a nuclear power plant."

- An ARCA is defined in FEMA-REP-14 as "...an observed or identified inadequacy of organizational performance in an exercise that is not considered, by itself, to adversely impact public health and safety."

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 FEMA Regions and site-specific exercise reports within each Region. It is also 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.
- **Objective Number** – A two-digit number corresponding to the objective numbers in FEMA-REP-14.
- **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.

1. OGLE COUNTY

1.1 Byron Fire Department Paramedic Ambulance Service

a. **MET:** Objective 20

b. **DEFICIENCY:** NONE

c. **AREAS REQUIRING CORRECTIVE ACTION:** NONE

d. **NOT DEMONSTRATED:** NONE

e. **PRIOR ARCAs – RESOLVED:** NONE

f. **PRIOR ARCAs – UNRESOLVED:** NONE

1.2 Rockford Memorial Hospital

a. **MET:** Objective 21

b. **DEFICIENCY:** NONE

c. **AREAS REQUIRING CORRECTIVE ACTION:** NONE

d. **NOT DEMONSTRATED:** NONE

e. **PRIOR ARCAs – RESOLVED:** NONE

f. **PRIOR ARCAs – UNRESOLVED:** NONE

III. EXERCISE NARRATIVES

These narrative summaries detail the activities demonstrated during the October 13, 1999 medical drill for the Byron Nuclear Power Station.

OBJECTIVE 20: MEDICAL SERVICES – TRANSPORTATION

Demonstrate the adequacy of vehicles, equipment, procedures, and personnel for transporting contaminated, injured, or exposed individuals.

Objective Status: Met

At 0806 hours the Byron Fire Department Paramedic Ambulance Service (BFDPAS) received a call to respond to an accident at the Byron Nuclear Power Station (BYNPS) involving an injured contaminated plant worker. The accident occurred when an engineer, performing pre-outage inspections in Area #5 of the Unit 1 penetration area, fell approximately 10 feet from the mezzanine level onto the floor below. Plant personnel found the victim at 0802 hours; and she was unconscious and bleeding from the mouth. Other injuries included a two-inch laceration on the frontal region of the cranium, an open fracture of the left humerus, and a three-inch laceration to the femoral region of the right leg. The BFDPAS ambulance crew arrived at the accident scene at 0829 hours. Prior to the arrival of the ambulance, the plant incident response team administered first aid to the victim and monitored her vital signs. A Radiation Protection Technician (RPT) monitored the victim for radioactive contamination and the following results were obtained: with clothing in place, whole body – 1,000 counts per minute (cpm); with clothing removed, face, right leg – 1,000 cpm. Once the ambulance team arrived on scene, the team was briefed on the status of the patient and a paramedic re-checked the victim's vital signs. Then the patient was placed on a backboard, wrapped to minimize the spread of radioactive contamination, placed on a gurney and transferred to the awaiting ambulance. The ambulance departed the plant site at 0900 hours and a RPT accompanied the patient in the ambulance to the Rockford Memorial Hospital. The ambulance maintained effective communications with the hospital while en route to the facility, and arrived at the hospital at 0932 hours.

The BFDPAS paramedics were issued plant dosimetry consisting of a Merlin Guerin Model DMC-100, electronic dosimeter (range: 0 – 10R), and a thermoluminescent dosimeter (TLD). The accident scene and victim were monitored with an Eberline, Model E520, survey meter, Serial #3581, equipped with a Geiger-Mueller (GM) – type pancake probe, with a calibration due date of 7/30/00. Area dose rates were determined using a Biocron, Model R50 – 50E, survey meter, Serial # E2647E, equipped with an internal ion chamber and a beta shield, with a calibration due date of 12/14/99.

All activities described in the demonstration criteria for this objective were carried out in accordance with the plan, procedures, and extent-of-play agreement.

OBJECTIVE 21: MEDICAL SERVICES - FACILITIES

Demonstrate the adequacy of equipment, procedures, supplies, and personnel of medical facilities responsible for treatment of contaminated, injured, or exposed individuals.

Objective Status: Met

At approximately 0850 hours, the Rockford Memorial Hospital emergency room staff received a call from the Byron Nuclear Power Station (BYNPS) regarding an incident. The Shift Manager at the station's control room informed the hospital that a possible injured contaminated patient would be arriving shortly at the hospital. An emergency room nurse received the initial call. At 0852 hours, the nurse placed a called back to the Byron Station and verified the initial call. The Shift Manager updated the nurse regarding the patient's injuries.

The emergency room nurse was told that the patient would be transported to the hospital upon stabilization. At 0857 hours, the hospital's engineering staff was instructed to set up the Radiological Emergency Area (REA) to accept a potentially contaminated patient. A trauma room with a separate entrance from the main emergency room was designated as the REA. The room consisted of non-porous flooring, an autopsy table, and a shower system. A specifically designed drain board was placed on the table to facilitate patient decontamination. The engineering staff placed radiation accident instruction charts on the walls in the REA. Waste bags and fluid collection containers used for radioactive waste materials were placed in the REA. All non-essential medical equipment was removed from the room. Yellow herculite was placed on the parking lot surface and the corridor leading to the REA. Green herculite was used for the buffer zone area located adjacent to the REA. In addition, yellow heliotrope ropes were placed on stanchions to cordon-off the parking lot where the transfer would take place. Security guards were present to restrict access to the area. The REA was declared ready to accept the contaminated patient at 0917 hours.

The emergency room personnel began dressing-out in radiological surgical outfits that consisted of double blue plastic garments, yellow booties, head covering, facemasks, and two pairs of surgical gloves. At 0910 hours, the Byron Fire Department ambulance crew contacted the emergency room via cell phone that they were en route to the hospital with an injured and possibly contaminated patient. They also gave a status update on the patient and an estimated time of arrival (ETA) of twenty minutes.

The hospital staff wore thermoluminescent dosimeters (TLDs) and Merlin-Guerin Model DM-90 electronic dosimeters. The buffer nurse recorded instrument numbers and initial readings on a personnel dosimetry log. The REA staff consisted of three trained nurses, a doctor, a x-ray technician and a BYNPS Radiation Protection Technician (RPT). A nurse and an additional BYNPS RPT were stationed in the buffer zone. The RPTs performed radiological monitoring using the Station's equipment. The instruments were within calibration and proper pre-operational checks were performed.

At 0934 hours, the patient arrived at the hospital. Once the patient was in the REA, an immediate physical check was made to determine the patient's most current medical status, and swab samples were taken of the patient's ears, nostrils, eyes and throat for use in ascertaining the patient's internal exposure to particulate radiation. A nurse simulated drawing blood samples from the patient. At no time did the vials containing the blood and swab samples come into contact with the contaminated portion of the patient, and the transfer of the sample vials to the buffer zone nurse was performed in accordance with sound radiological work practices to prevent the spread of radioactive contamination.

The patient was diagnosed with a 2" laceration on the frontal region of the cranium, open fracture of the left humerus, and a 3" laceration to the femoral region of the right leg. Also, the REA RPT thoroughly monitored the patient for radioactive contamination and found 1,000 counts per minute (cpm) of contamination on the face and right leg. There was no contamination present on any other parts of patient's body.

The medical team performed an initial decontamination attempt by using sterile water, soap solution and scrubbing with a sponge. One nurse began to decontaminate the wound on patient's face, while another nurse began to decontaminate the wound on the right leg. After the first decontamination attempt, the readings were background on the face and 200 cpm on the right leg. A second attempt was made using a Betadine solution. This resulted in the patient's contamination level being decreased to 80 cpm. Prior to the second decontamination attempt the REA staff was instructed to change their gloves. A third decontamination attempt was made at 1020 hours, at which time the patient was found to be free of contamination.

Once the decontamination was completed, x-rays were taken of the patient and the film cassettes were covered in a plastic bag to avoid the spread of contamination. Before the bagged cassettes were transferred to the buffer zone nurse for developing, the REA RPT surveyed the bag for the presence of external contamination. After the bag was declared clean it was handed to buffer nurse.

The REA physician ordered a c-scan (simulated). The c-scan room staff was notified at 1018 hours to have the room ready, and the room was declared ready to receive the patient at 1030 hours. At 1035 hours, the patient was transferred to a gurney in the clean zone and, in an actual emergency, would have been immediately transported to the awaiting c-scan room.

While the REA was in operation the REA RPT performed several checks of the REA staff. He directed the staff to change gloves frequently, and they complied without hesitation. The patient and equipment were monitored frequently to aid in controlling the spread of radioactive contamination. The REA staff then correctly performed disrobing procedures at the direction of the REA RPT.

All activities described in the demonstration criteria for this objective were carried out in accordance with the plan, procedures, and the extent-of-play agreement.