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# Report to Congress on Abnormal Occurrences

July - September 1980

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**U.S. Nuclear Regulatory  
Commission**

Office of Management and Program Analysis



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U. S. NUCLEAR REGULATORY COMMISSION

PREVIOUS REPORTS IN THE SERIES.

*Report to the Congress on Abnormal Occurrences, January-June 1975,*  
USNRC Report, NUREG 75/090, October 1975.

*Report to Congress on Abnormal Occurrences, July-September 1975,*  
USNRC Report, NUREG-0090-1, March 1976.

*Report to Congress on Abnormal Occurrences, October-December 1975,*  
USNRC Report, NUREG-0090-2, March 1976.

*Report to Congress on Abnormal Occurrences, January-March 1976,*  
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*Report to Congress on Abnormal Occurrences, July-September 1976,*  
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USNRC Report, NUREG-0090-10, March 1978.

*Report to Congress on Abnormal Occurrences, January-March 1978,*  
USNRC Report, NUREG-0090, Vol. 1, No. 1, June 1978.

*Report to Congress on Abnormal Occurrences, April-June 1978,*  
USNRC Report, NUREG-0090, Vol. 1, No. 2, September 1978.

*Report to Congress on Abnormal Occurrences, July-September 1978,*  
USNRC Report, NUREG-0090, Vol. 1, No. 3, December 1978.

*Report to Congress on Abnormal Occurrences, October-December 1978,*  
USNRC Report, NUREG-0090, Vol. 1, No. 4, March 1979.

*Report to Congress on Abnormal Occurrences, January-March 1979,*  
USNRC Report, NUREG-0090, Vol. 2, No. 1, July 1979.

*Report to Congress on Abnormal Occurrences, April-June 1979,*  
USNRC Report, NUREG-0090, Vol. 2, No. 2, November 1979.

*Report to Congress on Abnormal Occurrences, July-September 1979,*  
USNRC Report, NUREG-0090, Vol. 2, No. 3, February 1980.

*Report to Congress on Abnormal Occurrences, October-December 1979,*  
USNRC Report, NUREG-0090, Vol. 2, No. 4, April 1980.

*Report to Congress on Abnormal Occurrences, January-March 1980,*  
USNRC Report, NUREG-0090, Vol. 3, No. 1, September 1980.

*Report to Congress on Abnormal Occurrences, April-June 1980,*  
USNRC Report, NUREG-0090, Vol. 3, No. 2, November 1980.

ABSTRACT

Section 208 of the Energy Reorganization Act of 1974 identifies an abnormal occurrence as an unscheduled incident or event which the Nuclear Regulatory Commission determines to be significant from the standpoint of public health or safety and requires a quarterly report of such events to be made to Congress. This report covers the period from July 1 to September 30, 1980.

The following incidents or events, including any submitted by the Agreement States, were determined by the Commission to be significant and reportable:

1. There was one abnormal occurrence at the nuclear power plants licensed to operate. The event involved failure of the salt water cooling system.
2. There were no abnormal occurrences at the fuel cycle facilities (other than nuclear power plants).
3. There was one abnormal occurrence at other licensee facilities. The event involved the improper use and inadequate control of licensed material (radiopharmaceuticals).
4. There were three abnormal occurrences reported by the Agreement States. One involved inadequate security and the other two involved overexposure of radiographers.

This report also contains information updating some previously reported abnormal occurrences.

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## PREFACE

## INTRODUCTION

The Nuclear Regulatory Commission reports to the Congress each quarter under provisions of Section 208 of the Energy Reorganization Act of 1974 on any abnormal occurrences involving facilities and activities regulated by the NRC. An abnormal occurrence is defined in Section 208 as an unscheduled incident or event which the Commission determines is significant from the standpoint of public health or safety.

Events are currently identified as abnormal occurrences for this report by the NRC using the criteria delineated in Appendix A. These criteria were promulgated in an NRC policy statement which was published in the Federal Register (42 FR 10950) on February 24, 1977 (Ref. 1). In order to provide wide dissemination of information to the public, a Federal Register notice is issued on each abnormal occurrence with copies distributed to the NRC Public Document Room and all local public document rooms. At a minimum, each such notice contains the date and place of the occurrence and describes its nature and probable consequences.

The NRC has reviewed Licensee Event Reports, licensing and enforcement actions (e.g., violations, infractions, deficiencies, civil penalties, license modifications, etc.), generic issues, significant inventory differences involving special nuclear material, and other categories of information available to the NRC. The NRC has determined that only those events, including those submitted by the Agreement States, described in this report meet the criteria for abnormal occurrence reporting. This report covers the period between July 1 to September 30, 1980.

Information reported on each event includes: date and place; nature and probable consequences; cause or causes; and actions taken to prevent recurrence.

## THE REGULATORY SYSTEM

The system of licensing and regulation by which NRC carries out its responsibilities is implemented through rules and regulations in Title 10 of the Code of Federal Regulations. To accomplish its objectives, NRC regularly conducts licensing proceedings, inspection and enforcement activities, evaluation of operating experience and confirmatory research, while maintaining programs for establishing standards and issuing technical reviews and studies. The NRC's role in regulating represents a complete cycle, with the NRC establishing standards and rules; issuing licenses and permits; inspecting for compliance; enforcing license requirements; and carrying on continuing evaluations, studies and research projects to improve both the regulatory process and the protection of the public health and safety. Public participation is an element of the regulatory process.

In the licensing and regulation of nuclear power plants, the NRC follows the philosophy that the health and safety of the public are best assured through the establishment of multiple levels of protection. These multiple levels can be achieved and maintained through regulations which specify requirements which will assure the safe use of nuclear materials. The regulations include design and quality assurance criteria appropriate for the various activities licensed by NRC. An inspection and enforcement program helps assure compliance with the regulations. Requirements for reporting incidents or events exist which help identify deficiencies early and aid in assuring that corrective action is taken to prevent their recurrence.

After the accident at Three Mile Island in March 1979, the NRC and other groups (a Presidential Commission, Congressional and NRC special inquiries, industry, special interests, etc.) spent substantial efforts to analyze the accident and its implications for the safety of operating reactors and to identify the changes needed to improve safety. Some deficiencies in design, operation and regulation were identified that required actions to upgrade the safety of nuclear power plants. These included modifying plant hardware, improving emergency preparedness, and increasing considerably the emphasis on human factors such as expanding the number, training, and qualifications of reactor operating staff and upgrading plant management and technical support staffs' capabilities. In addition, each plant has installed dedicated telephone lines to the NRC for rapid communication in the event of any incident. Dedicated groups have been formed both by the NRC and by the industry for the detailed review of operating experience to help identify safety concerns early, to improve dissemination of such information, and to feed back the experience into the licensing and regulation process.

Most NRC licensee employees who work with or in the vicinity of radioactive materials are required to utilize personnel monitoring devices such as film badges or TLD (thermoluminescent dosimeter) badges. These badges are processed periodically and the exposure results normally serve as the official and legal record of the extent of personnel exposure to radiation during the period the badge was worn. If an individual's past exposure history is known and has been sufficiently low, NRC regulations permit an individual in a restricted area to receive up to three rems of whole body exposure in a calendar quarter. Higher values are permitted to the extremities or skin of the whole body. For unrestricted areas, permissible levels of radiation are considerably smaller. Permissible doses for restricted areas and unrestricted areas are stated in 10 CFR Part 20. In any case, the NRC's policy is to maintain radiation exposures to levels as low as reasonably achievable.

#### REPORTABLE OCCURRENCES

Since the NRC is responsible for assuring that regulated nuclear activities are conducted safely, the nuclear industry is required to report incidents or events which involve a variance from the regulations, such as personnel over-exposures, radioactive material releases above prescribed limits, and malfunctions of safety-related equipment. Thus, a reportable occurrence is any incident



or event occurring at a licensed facility or related to licensed activities which NRC licensees are required to report to the NRC. The NRC evaluates each reportable occurrence to determine the safety implications involved.

Because of the broad scope of regulation and the conservative attitude toward safety, there are a large number of events reported to the NRC. The information provided in these reports is used by the NRC and the industry in their continuing evaluation and improvement of nuclear safety. Some of the reports describe events that have real or potential safety implications; however, most of the reports received from licensed nuclear power facilities describe events that did not directly involve the nuclear reactor itself, but involved equipment and components which are peripheral aspects of the nuclear steam supply system, and are minor in nature with respect to impact on public health and safety. Many are discovered during routine inspection and surveillance testing and are corrected upon discovery. Typically, they concern single malfunctions of components or parts of systems, with redundant operable components or systems continuing to be available to perform the design function.

Information concerning reportable occurrences at facilities licensed or otherwise regulated by the NRC is routinely disseminated by NRC to the nuclear industry, the public, and other interested groups as these events occur. Dissemination includes deposit of incident reports in the NRC's public document rooms, special notifications to licensees and other affected or interested groups, and public announcements. In addition, a biweekly computer printout containing information on reportable events received from NRC licensees is sent to the NRC's more than 120 local public document rooms throughout the United States and to the NRC Public Document Room in Washington, D.C.

The Congress is routinely kept informed of reportable events occurring at licensed facilities.

#### AGREEMENT STATES

Section 274 of the Atomic Energy Act, as amended, authorizes the Commission to enter into agreements with States whereby the Commission relinquishes and the States assume regulatory authority over byproduct, source and special nuclear materials (in quantities not capable of sustaining a chain reaction). Comparable and compatible programs are the basis for agreements.

Presently, information on reportable occurrences in Agreement State licensed activities is publicly available at the State level. Certain information is also provided to the NRC under exchange of information provisions in the agreements. NRC prepares a semiannual summary of this and other information in a document entitled, "Licensing Statistics and Other Data," which is publicly available.

In early 1977, the Commission determined that abnormal occurrences happening at facilities of Agreement State licensees should be included in the quarterly report to Congress. The abnormal occurrence criteria included in Appendix A

is applied uniformly to events at NRC and Agreement State licensee facilities. Procedures have been developed and implemented and abnormal occurrences reported by the Agreement States to the NRC are included in these quarterly reports to Congress.

## REPORT TO CONGRESS ON ABNORMAL OCCURRENCES

JULY - SEPTEMBER 1980

### NUCLEAR POWER PLANTS

The NRC is reviewing events reported at the nuclear power plants licensed to operate during the third quarter of 1980. As of the date of this report, the NRC had determined that the following was an abnormal occurrence.

#### 80-7 Failure of Salt Water Cooling System

The following incident was previously reported as an Appendix C - Other Events of Interest in NUREG-0090, Vol. 3, No. 1, "Report to Congress on Abnormal Occurrences, January-March 1980." Following completion of an engineering evaluation, it has been upgraded to an abnormal occurrence since the incident satisfies one of the general criteria in Appendix A: major degradation of essential safety-related equipment. In addition, deficiencies in management or procedural controls were noted. Federal Register noticing is being made in conjunction with the noticing of issuance of this report.

Date and Place - On March 10, 1980, San Onofre Unit 1, a 456-MWe pressurized water reactor that is operated by Southern California Edison Company in San Diego County, experienced the failure of the Salt Water Cooling system (SWCS).

Nature and Probable Consequences - The Salt Water Cooling System is a safety-related system that supplies cooling water to safety equipment such as heat exchangers and necessary auxiliary safety-related equipment. The SWCS is required for normal operation and safe shutdown of the plant under certain transient and accident conditions. Therefore, if the system is inoperable, the reactor is required to be shut down. This event involved the loss of two redundant safety-grade pumps; the loss of a third pump which was a safety-related pump in the Salt Water Cooling System; and the failure of the plant staff to shut down the plant as required by the plant technical specifications and the plant operating procedures. During this event, there was no associated accident or radioactivity releases. The temperature in the Component Cooling Water System (CCWS), which is cooled by the Salt Water Cooling System, increased 16°F but was within normal operating parameters.

The sequence of events was as follows: While the plant was operating at 100% power, the shaft on the south salt water cooling pump failed and the pump stopped pumping. The redundant north pump automatically started, but did not supply salt water cooling to the component cooling system since its isolation valve failed to automatically open. Subsequently, the plant operators attempted to start the auxiliary salt water cooling pump, but there was insufficient priming and the pump was stopped. After about fifteen minutes, the operators, following plant emergency procedures, supplied a source of water for component cooling by aligning the screen wash pumps to the salt water cooling system, a manual operation. About twenty minutes later, the auxiliary salt water pump

was adequately primed and placed in service, and about two and one-half hours later one of the main salt water cooling pumps was made operable when its isolation valve was opened. The plant Technical Specifications require that the reactor not be maintained critical unless two salt water cooling pumps are operable, or one salt water cooling pump and the auxiliary salt water cooling pump are operable. The existing plant emergency procedure required a reactor trip. Although a plant shutdown was initiated about 45 minutes after the initial loss of the salt water cooling system, it was terminated after a power reduction of about three megawatts following consultation with offsite plant management.

As stated, the decision to continue operations was contrary to the plant license conditions stated in the Technical Specifications and contrary to established emergency operating procedures; the intent of both is to require that the plant be placed in a safe shutdown condition upon the complete loss of an important safety system and that a safety evaluation be made prior to restart. In this case, the decision to terminate the shutdown included consideration of the effects of perturbing stable plant operating conditions including increasing the heat load on the component cooling water system, manning the control room while shutting down and simultaneously working on returning the SWCS to operation, and the indications of adequate interim cooling from the screen wash pumps and the auxiliary SWC pump which were supplying saltwater flow. However, the cooling capacity of the screen wash pump in this mode was heretofore untested, unanalyzed, and unproven under full power operation or maximum CCWS heat load conditions.

Subsequent analysis has confirmed that either during normal shutdown while on residual heat removal (RHR) cooling with a large decay heat load or under certain steam line break conditions, the loss of the SCWS could result in serious degradation of safety functions if prompt corrective actions are not taken. The timing and details of these actions were not fully known prior to the event. Detailed engineering analysis that was conducted after the event indicated that component cooling water temperatures could exceed cooling limits on pump bearings in the charging system (high head Emergency Core Cooling System, ECCS), the RHR system, and the reactor cooling system. Significant damage to the pumps in these vital systems could have therefore resulted. The complete loss of the SWCS and the adequacy of alternative cooling pathways had not been thoroughly analyzed prior to the event. Further, the licensing process has traditionally not required analyses of the loss of complete safety systems caused by such interactions.

In addition to the loss of the SWCS, the plant was also being operated with the instrument air system contaminated with desiccant particles. The desiccant problem had contributed to at least one previously reported safety-related valve failure (failure to operate) and was suspected to be a cause for other valve problems such as sluggish operation. Contamination in the instrument air system can affect performance, causing multiple failures. It is thought that the desiccant may have contributed to the failure of the isolation valve to open on one of the SWCS pumps.

Analysis also indicated that the equipment failures might have been prevented if adequate preventive maintenance programs existed. Deficiencies in the licensee's preventive maintenance program and noncompliance with requirements for pump testing and for inservice testing of pumps and valves were identified to the licensee as a result of a February 1979 inspection by the NRC (Ref. 2).

The NRC considers the multiple equipment failures, the failure to shut down the plant according to the Technical Specifications and plant procedures, and the uncorrected deficiencies in the preventive maintenance program to be indicative of deficiencies in management and procedural controls.

Cause or Causes - The equipment failure causes were: one SWCS pump shaft failed due to apparent excessive vibration (a worn bushing in the pump had been previously noted); the other SWCS pump isolation valve failed to open due to a deteriorated O-ring in a solenoid valve on the valve operator; and the auxiliary SWCS pump failed to prime due to an air leak into the priming system (this situation had occurred previously).

Other potential contributing factors are deficiencies previously noted in the licensee's preventive maintenance program and the existence of some desiccant in the plant's service air lines. The plant staff did not shut down the facility as required due to apparent misunderstandings of the Technical Specification requirements and the technical basis for the requirements.

#### Actions Taken to Prevent Recurrence

Licensee - The licensee has taken, or will take, action as follows:

- (1) The equipment that failed was, or will be, repaired and returned to service. System redesign and changes to the preventive maintenance program will be implemented to improve system reliability.
- (2) Desiccant was being flushed from the plant service air system during the summer refueling outage. The licensee is preparing a report on the extent of the desiccant contamination and associated problems.
- (3) Management has taken action to improve the plant staff's knowledge of the Technical Specifications and their basis. Tighter controls were also placed on the administrative process for changing procedures. Clarifications are also being made to the Technical Specifications.
- (4) A review is being made of the capability of the plant to withstand postulated accidents if the SWCS and/or its alternative cooling pathways are unavailable.

NRC - The NRC has conducted special inspections of the facility related to this event and through its routine inspection and enforcement process has inspected the adequacy of management and administrative controls, including the preventive maintenance program. Based on the inspection of this event, the licensee has been cited with infractions of NRC regulations for failure to shut the plant

down when both salt water cooling pumps and the auxiliary salt water cooling pumps were inoperable. As a result of a February 1979 inspection, the licensee was cited in January 1980 (Ref. 2) for noncompliance with requirements for procedures for pump testing and for inservice testing of pumps and valves and a number of deficiencies related to the preventive maintenance program. The NRC requested the licensee to further assess the implications of a loss of SWCS during postulated accidents. The NRC met with the licensee in October to discuss the evaluations conducted and the planned and completed corrective actions. It is also continuing to review the adequacy of the licensee's corrective actions.

This incident is closed for purposes of this report.

#### FUEL CYCLE FACILITIES

(Other than Nuclear Power Plants)

The NRC is reviewing events reported by these licensees during the third quarter of 1980. As of the date of this report, the NRC had not determined that any were abnormal occurrences.

#### OTHER NRC LICENSEES

(Industrial Radiographers, Medical Institutions,  
Industrial Users, etc.)

There are currently more than 8,000 NRC nuclear material licenses in effect in the United States, principally for use of radioisotopes in the medical, industrial, and academic fields. Incidents were reported in this category from licensees such as radiographers, medical institutions, and byproduct material users.

The NRC is reviewing events reported by these licensees during the third quarter of 1980. As of the date of this report, the NRC had determined that the following was an abnormal occurrence.

#### 80-8 Improper Use and Inadequate Control of Licensed Material (Radiopharmaceuticals)

Preliminary information pertaining to this incident was reported in the Federal Register (Ref. 3). Appendix A (Example 11 of "For All Licensees") of this report notes that a serious deficiency in management or procedural controls in major areas can be considered an abnormal occurrence.

Date and Place - On July 31, 1980, the Nuclear Regulatory Commission's Region III office in Glen Ellyn, Illinois received a communication indicating that patients of Lakeview Hospital in Wauwatosa, Wisconsin had routinely received double the prescribed dose of radiopharmaceuticals for diagnostic scans since 1976. The hospital currently holds an NRC license, originally issued in 1959 and most recently renewed in 1979, to possess radioactive isotopes for medical diagnostic procedures.

Nature and Probable Consequences - Investigations revealed that the licensee's nuclear medicine staff were routinely administering more than the prescribed doses of radiopharmaceuticals to patients, most of them age 65 and over, for those diagnostic scans of the brain, bone, liver, spleen and lung in which technetium-99m (Tc-99m) was incorporated as part of the scanning agent. This involved 20 to 30 patients per month. The doses administered were generally twice that prescribed; the highest dose administered to a patient was 42 millicuries of Tc-99m DTPA\* for a brain scan, instead of the 15 millicuries which the hospital's written protocol prescribed. This would have resulted in a whole body dose of 840 millirems, and a dose to the critical organ (urinary bladder) of 23 rems. (By comparison, a normal chest X-ray is equal to a whole body dose of 20 to 50 millirems.) The increased dosages were unnecessary because they did not result in any corresponding benefit to the patients.

The purposes of the dosage increases were to decrease scanning time (from about 30-45 minutes to about 15-20 minutes) and to obtain brighter images before the patients moved. This was done by administering increased dosages despite available alternate means to accomplish the same purpose without subjecting the patients to unnecessary radiation.

In addition to the misadministrations, the investigation identified several items of noncompliance with the license concerning failure to maintain accurate records, inadequate equipment calibration, and inadequate radiation surveys.

Cause or Causes - The principal causes of the incident were the improper use of the radiopharmaceuticals by the licensee staff and inadequate procedural controls for the program. Further, the licensee's technetium utilization log was falsified to indicate that proper dosages had been administered. This prevented NRC inspectors from detecting this practice.

#### Actions Taken to Prevent Recurrence

Licensee - The licensee cooperated in the investigation, took prompt action to correct deficiencies including suspension and later removal of two employees involved, and stopped all licensed activities when NRC suspended their license. Patients requiring nuclear medicine diagnostic procedures were referred to a nearby county medical complex which is authorized to perform procedures involving radiopharmaceuticals. In early September in the reply to the NRC Order to Show Cause (described below) and during a subsequent NRC-licensee management meeting, the licensee submitted new procedures aimed at correcting the identified problems. In addition, the two employees, initially suspended, were discharged.

NRC - An NRC investigation, begun on August 1 and completed August 7, 1980, included interviews with an authorized user and three nuclear medicine technicians, as well as a review of records. On August 11, 1980, the NRC issued an Order Suspending License, effective immediately, and an Order to Show Cause

\*Diethylenetriamine pentaacetic acid (DTPA) labelled with Tc-99m is a radiopharmaceutical used for brain and kidney imaging.

(Ref. 4) why the license should not be revoked; this was also published in the Federal Register (Ref. 5). An investigation by the NRC Office of Inspector and Auditor is complete and has been forwarded to the Department of Justice for whatever action they deem appropriate. The licensee's response to the Order to Show Cause was reviewed by the NRC and was determined to have shown sufficient cause why the license should not be revoked. On October 8, 1980, the suspension order was rescinded and a Confirmatory Order Modifying License (Ref. 6) was issued to incorporate the licensee's corrective action in the license. The NRC will conduct inspections in the future to determine the adequacy of the licensee's corrective actions.

This incident is closed for purposes of this report.

#### AGREEMENT STATE LICENSEES

Procedures have been developed for the Agreement States to screen unscheduled incidents or events using the same criteria as the NRC (see Appendix A) and report the events to the NRC for inclusion in this report. During the third quarter of 1980, the Agreement States reported the following abnormal occurrences to the NRC. All three items were reported by the Radiation Control Branch of the Texas Department of Health (designated the "State Agency" in the descriptions below).

##### AS80-1 Overexposure of Radiographers

Appendix A (Example 1, "For All Licensees") of this report notes that exposure of the whole body of any individual to 25 rems or more of radiation can be considered an abnormal occurrence.

Date and Place - Weatherby Engineering Company of Corpus Christi, Texas, reported that on July 8, 1980, two employees received overexposures, one of 75 rem and the other of 198 rem, when a 72 Ci Ir-192 source remained in a source guide tube.

Nature and Probable Consequences - Two nonradiographic personnel (not on the Weatherby license) were instructed to make an unsupervised exposure of a weld; the company radiographers were working nights. The exposure was made, the camera supposedly surveyed and the equipment returned to its storage locations: the camera was stored in a shielded vault and the guide tube and crankout assembly were coiled on a rack in the darkroom. The Radiation Safety Officer (R.S.O.) was in the darkroom doing paperwork for about two hours that evening. The following morning, about three hours into the workday, radiographers from another company doing work for Weatherby discovered, when they borrowed the camera, that the source was missing. The building was evacuated, the source was determined to be in the guide tube in the darkroom, the guide tube was removed from the building and the source was recovered.

During an investigation conducted by the State Agency, it was determined that the employee who originally set up the shot did not know to connect the pigtail



to the crankout cable. Consequently, when he attempted to retract the source, it remained in the collimated end of the guide tube. No film badge readings were available as the film badge contract had been cancelled. Re-enactment of the post shot events indicated that the person who set up and dismantled the equipment received a whole body exposure of 75 rem. The calculated whole body dose to the R.S.O., sitting about one foot from the source for two hours, was 198 rem. To determine exposures to personnel in the building, dosimeters were placed in various locations in the building and the source was cranked out. Thirty-one other personnel who were in the building the evening after the shot was made and before the source was recovered received from 0.9 to 4.0 rem.

The individual who received the 75-rem exposure displayed no immediate clinical symptoms of radiation overexposure, no erythema or blood anomalies. The individual who received the 198-rem exposure stated that he had some chromosomal aberration, a sperm count lower than normal (38 million/ml) and a melanoma in one eye. This information was transmitted verbally (the medical reports are pending). He stated that he experienced some pain in his legs and buttocks. A bone marrow sample was taken but results are not yet available to the State Agency, nor are other followup results.

Cause or Causes - It is the conclusion of the State Agency that two major factors contributed to the incident: pressure from management which caused the bypassing of radiation safety measures (i.e., licensed radiographers should have performed the exposure) and the failure to perform a proper post-exposure survey.

#### Actions Taken to Prevent Recurrence

Licensee - The exposed radiographer was assigned nonradiographic work. Dosimeters have been placed around the building and are monitored daily. Only the R.S.O. will have access to the radiographic equipment. Management has indicated a greater commitment to radiation safety.

State Agency - An investigation was conducted in which numerous items of non-compliance with regulatory requirements were identified. The source was impounded and the radioactive materials license was suspended for 90 days. The licensee did not contest the license suspension and has subsequently submitted corrective actions to preclude future such incidents.

Further reports will be made as appropriate.

#### AS80-2 Overexposure of a Radiographer

Appendix A (Example 1, "For All Licensees") of this report notes that exposure of the whole body of any individual to 25 rems or more of radiation can be considered an abnormal occurrence.

Date and Place - Technical Welding Laboratory, Inc., of Houston, Texas, reported that on August 14, 1979, a radiographer received a whole body exposure of 35 rem while working around a 40 Ci Ir-192 source stuck in a guide tube.

Nature and Probable Consequences - While performing radiography work, the radiographer noticed that their film was turning out dark. They stopped shooting and placed the camera in the storage vault and the source guide tube and crankout assembly in the radiography truck. The camera was transported again later that evening to another job site; this job was cancelled and the camera returned to the storage vault. The next morning an individual checking survey meters noticed excessive readings in the office area. The radiation source was located in the guide tube in the truck. It was recovered and placed in the camera.

When it was first noticed that the film was not turning out, the radiographer switched cameras. There was some difficulty in disconnecting the source pigtail from the drive cable; it is assumed that this is the point at which the source was left out of the camera. The overexposure occurred during the time spent transporting the source to and from the various job sites and during a half-hour period the radiographer spent in the darkroom, about two feet from the source.

The calculated exposure and the film badge exposure both indicated a whole body exposure of 35 rem and a calculated exposure of about 41 rem to the hands. The biological dose assessment has not been released by the attending physician. The radiographers are being notified that if they want their exposure evaluated by the State Agency they will have to obtain their medical records from the physician.

Consequences due to the overexposures are unavailable as the radiographer is not presently available and the attending physician has not released any information.

Cause and Causes - The principal cause of the incident was failure to make a radiation survey following the source disconnect difficulty. Reading the pocket dosimeters at the end of the job would have alerted the radiographer to the problem and prevented at least part of the overexposure. Also, the unsatisfactory film exposures should have indicated a possible exposed source.

#### Actions Taken to Prevent Recurrence

Licensee - A meeting of all personnel was held to discuss safety in radiography stressing the proper methods of handling radioactive material and the importance of camera surveys. The radiographer involved was removed from radiography work.

State Agency - During an investigation of the incident, several items of non-compliance were identified. The company satisfactorily addressed these items.

This incident is closed for purposes of this report.

#### AS80-3 Inadequate Security

Appendix A (Example 8, "For All Licensees") of this report notes that any substantial breakdown of physical security that significantly weakened the protection against theft, diversion, or sabotage can be considered an abnormal occurrence.

Date and Place - On September 24, 1980, Coastal Testing Laboratory of Pasadena, Texas, reported that a Soiltest, Inc., Model NIC-5 moisture density gauge containing 10 mCi Cs-137 and 60 mCi Am-241 was stolen.

Nature and Probable Consequences - An employee of Coastal Testing Laboratory discovered on September 23, 1980, that an unsecured NIC-5 moisture density gauge was stolen from a job site while he was using the restroom. The source was in the shielded position at the time of the theft.

The licensee contacted the police and local media and began canvassing the immediate area. The gauge was recovered in the afternoon of September 24, 1980 by the licensee. They had gone to an elementary school about four blocks from the job site and went from classroom to classroom with a similar gauge, asking if anyone had seen the device. A ten year old boy admitted to having taken it. The source was recovered still in the shielded position. Followup information is pending from the licensee. It appears that the boy did not receive any significant exposure.

Cause or Causes - The cause has been attributed to inadequate security against unauthorized removal of the moisture density gauge.

Action Taken to Prevent Recurrence

Licensee - A safety meeting of all employees was held during which source security was stressed.

State Agency - The licensee was cited for several items of security-related violations. An adequate response was received from the licensee.

This incident is closed for purposes of this report.

## REFERENCES

1. U.S. Nuclear Regulatory Commission, "Abnormal Occurrence Reports: Implementation of Section 208, Energy Reorganization Act of 1974; Policy Statement," Federal Register, Vol. 42, No. 37, February 24, 1977, 10950-10952.
2. Letter from J. L. Crews, NRC, to J. B. Moore, Southern California Edison Company, "NRC Management Inspection of San Onofre Unit 1," Docket No. 50-206, January 16, 1980.\*
3. U.S. Nuclear Regulatory Commission, "Abnormal Occurrence: Improper Use and Inadequate Control of Licensed Material (Radiopharmaceuticals)," Federal Register, Vol. 45, No. 252, December 31, 1980, 86583-86584.
4. Letter from Victor Stello, Jr., NRC, to Lakeview Hospital, "Order to Show Cause and Order Suspending License," License No. 48-04585-01, August 11, 1980.\*
5. U.S. Nuclear Regulatory Commission, "Lakeview Hospital, Order to Show Cause and Order Suspending License (Effective Immediately)," Federal Register, Vol. 45, No. 166, August 25, 1980, 56477-56478.
6. Letter from Victor Stello, Jr., NRC, to Dr. F. E. Hecker, Lakeview Hospital, forwarding "Rescission of Suspension Order and Confirmatory Order Modifying License," License No. 48-04585-01, October 8, 1980.\*

\*Available in NRC Public Document Room, 1717 H Street, NW., Washington, D.C. 20555, for inspection and copying for a fee.

## APPENDIX A

## ABNORMAL OCCURRENCE CRITERIA

The following criteria for this report's abnormal occurrence determinations were set forth in an NRC policy statement published in the Federal Register on February 24, 1977 (Vol. 42, No. 37, pages 10950-10952).

Events involving a major reduction in the degree of protection of the public health or safety. Such an event would involve a moderate or more severe impact on the public health or safety and could include but need not be limited to:

1. Moderate exposure to, or release of, radioactive material licensed by or otherwise regulated by the Commission;
2. Major degradation of essential safety-related equipment; or
3. Major deficiencies in design, construction, use of, or management controls for licensed facilities or material.

Examples of the types of events that are evaluated in detail using these criteria are:

For All Licensees

1. Exposure of the whole body of any individual to 25 rems or more of radiation; exposure of the skin of the whole body of any individual to 150 rems or more of radiation; or exposure of the feet, ankles, hands or forearms of any individual to 375 rems or more of radiation (10 CFR Part 20.403(a)(1)), or equivalent exposures from internal sources.
2. An exposure to an individual in an unrestricted area such that the whole body dose received exceeds 0.5 rem in one calendar year (10 CFR Part 20.105(a)).
3. The release of radioactive material to an unrestricted area in concentrations which, if averaged over a period of 24 hours, exceed 500 times the regulatory limit of Appendix B, Table II, 10 CFR Part 20 (10 CFR Part 20.403(b)).
4. Radiation or contamination levels in excess of design values on packages, or loss of confinement of radioactive material such as (a) a radiation dose rate of 1,000 mrem per hour three feet from the surface of a package containing the radioactive material, or (b) release of radioactive material from a package in amounts greater than the regulatory limit (10 CFR Part 71.36(a)).

5. Any loss of licensed material in such quantities and under such circumstances that substantial hazard may result to persons in unrestricted areas.
6. A substantiated case of actual or attempted theft or diversion of licensed material or sabotage of a facility.
7. Any substantiated loss of special nuclear material or any substantiated inventory discrepancy which is judged to be significant relative to normally expected performance and which is judged to be caused by theft or diversion or by substantial breakdown of the accountability system.
8. Any substantial breakdown of physical security or material control (i.e., access control, containment, or accountability systems) that significantly weakened the protection against theft, diversion or sabotage.
9. An accidental criticality (10 CFR Part 70.52(a)).
10. A major deficiency in design, construction or operation having safety implications requiring immediate remedial action.
11. Serious deficiency in management or procedural controls in major areas.
12. Series of events (where individual events are not of major importance), recurring incidents, and incidents with implications for similar facilities (generic incidents), which create major safety concern.

For Commercial Nuclear Power Plants

1. Exceeding a safety limit of license Technical Specifications ( CFR Part 50.36(c)).
2. Major degradation of fuel integrity, primary coolant pressure boundary, or primary containment boundary.
3. Loss of plant capability to perform essential safety functions such that a potential release of radioactivity in excess of 10 CFR Part 100 guidelines could result from a postulated transient or accident (e.g., loss of emergency core cooling system, loss of control rod system).
4. Discovery of a major condition not specifically considered in the Safety Analysis Report (SAR) or Technical Specifications that requires immediate remedial action.

5. Personnel error or procedural deficiencies which result in loss of plant capability to perform essential safety functions such that a potential release of radioactivity in excess of 10 CFR Part 100 guidelines could result from a postulated transient or accident (e.g., loss of emergency core cooling system, loss of control rod systems).

For Fuel Cycle Licensees

1. A safety limit of license Technical Specifications is exceeded and a plant shutdown is required (10 CFR Part 50.36(c)).
2. A major condition not specifically considered in the Safety Analysis Report or Technical Specifications that requires immediate remedial action.
3. An event which seriously compromised the ability of a confinement system to perform its designated function.

## APPENDIX B

## UPDATE OF PREVIOUSLY REPORTED ABNORMAL OCCURRENCES

During the July through September 1980 period, the NRC, NRC licensees, Agreement States, Agreement State licensees, and other involved parties, such as reactor vendors and architects and engineers, continued with the implementation of actions necessary to prevent recurrence of previously reported abnormal occurrences. The referenced Congressional abnormal occurrence reports below provide the initial and any updating information on the abnormal occurrences discussed. Those occurrences not now considered closed will be discussed in subsequent reports in the series.

## NUCLEAR POWER PLANTS

The following abnormal occurrence was originally reported in NUREG-0090, Vol. 2, No. 1, "Report to Congress on Abnormal Occurrences: January-March 1979," and updated in subsequent reports in the series, i.e., NUREG-0090, Vol. 2, No. 2, Vol. 2, No. 3, Vol. 2, No. 4, Vol. 3, No. 1, and Vol. 3, No. 2. It is further updated as follows:

79-3 Nuclear Accident at Three Mile Island(1) Decontamination of the TMI-2 Reactor Building Atmosphere

Decontamination of the TMI-2 reactor building atmosphere by controlled purging to the atmosphere was completed on July 11, 1980. This purging operation had been initiated on June 28, 1980.

The Environmental Protection Agency (EPA) monitored the purging operation and has completed the final assessment of maximum exposure to the general population resulting from the release of the krypton-85. All exposures to the general population were well within the exposures predicted in Section 7.1 of Volume 1 of the NRC staff's "Final Environmental Assessment for Decontamination of the Three Mile Island Unit 2 Reactor Building Atmosphere" (NUREG-0662, Ref. B-1). EPA also concluded that no adverse health effects can be expected to result from the krypton purging.

The actual quantity of krypton-85 purged from the TMI-2 reactor building to the environment was approximately 45,000 curies rather than the estimated initial inventory of 57,000 curies. The principal reason for the difference between these values was that the initial concentration of krypton-85 in the reactor building atmosphere was approximately 0.8  $\mu\text{Ci/cc}$  rather than the assumed 1.0  $\mu\text{Ci/cc}$ .

(2) Reactor Building Entry

On July 23, 1980, the first manned entry into the TMI-2 reactor building was made by two licensee representatives. The purpose of this entry was to perform radiation surveys. The duration of this entry was 20 minutes and was limited



to a sector of the reactor building between the concrete shield ring around the reactor and the reactor building wall at the 305-foot elevation (ground level). Each entry team member received a total body gamma radiation exposure of about 180 mrem. Gamma radiation readings inside the reactor building ranged from 300 to 700 mr/hr in the general areas above the concrete floor surfaces. These readings were about 50% of what had been predicted in the NRC staff's "Draft Programmatic Environmental Impact Statement Related to Decontamination and Disposal of Radioactive Wastes Resulting from March 28, 1979, Accident Three Mile Island Nuclear Station, Unit-2" (NUREG-0683, Ref. B-2)

A second manned entry into the reactor building was performed by four men on August 15, 1980. The planned duration of the entry was 40 minutes. After approximately 20 minutes inside the reactor building, one of the men became physically exhausted and requested to come out. He and another man were directed to exit the reactor building. The two remaining men exited the reactor building after approximately 40 minutes. All men were physically exhausted. Exhaustion was attributed to the use of several layers of protective clothing, full face respirator, and 85°F to 90°F temperatures inside the reactor building. The maximum total body dose to any member of the entry team was less than 300 mrem.

The entry team surveyed the 305-foot elevation (ground level) and the 347-foot elevation (refueling floor). General area gamma readings on the 305-foot elevation were 400-700 mr/hour in those areas outside the shield ring. The average general area gamma readings on the 347-foot elevation were between 100 and 300 mr/hour. A reading 12 feet from the reactor head indicated 150 mr/hour.

The entry team energized the reactor building lights and over 50% of the lights illuminated. The reactor building sump water was observed to be murky with floating debris. Some electric wires on the 347-foot elevation were very brittle and crumbled when touched. A standard black telephone was partially melted and deformed. A 55-gallon drum with the top cover still attached was partially crushed. Numerous rusted surfaces were observed; however, the reactor head appeared to be in good condition.

The third entry into the Unit 2 reactor building was completed at 11:54 a.m. on Thursday, October 16, 1980. The entry team of three health physics technicians and two maintenance men remained in the reactor building for up to 87 minutes. The maximum exposure, based on dosimeter readings, was less than 500 mr.

A preamplifier for an inoperable neutron source range monitor was removed and the two associated neutron sensors were jumpered to wires which terminate outside of the reactor building. The preamplifier will be inspected and repaired if necessary. The two neutron sensors will be tested from outside of the reactor building. Tentative tasks for the next entry, which is scheduled in November, will include reassembly of the preamplifier and the neutron sensor connections.

The maintenance personnel also reset tripped differential pressure interlocks on the equipment hatch personnel airlock. The interlocks tripped and failed to reset when the differential pressure on either side of the airlock doors exceeded approximately 0.5 psid.

An inoperable noise monitor preamplifier was removed for offsite analysis. Photographs, swipes, and area radiation surveys were also made during the entry. The duration of the entry was extended past the scheduled 60 minutes to complete the assigned tasks which required more time than anticipated. The entry team was not exhausted physically and did not exceed the precalculated dose of 500 mr. The entry team's physical comfort was improved by a decrease in protective clothing requirements and by cooler temperatures in the reactor building.

(3) Draft Programmatic Environmental Impact Statement (PEIS)

The "Draft Programmatic Environmental Impact Statement Related to Decontamination and Disposal of Radioactive Wastes Resulting from March 28, 1979, Accident Three Mile Island Nuclear Station, Unit 2" (NUREG-0683, Ref. B-2) was issued for public comment on August 14, 1980. The PEIS focuses on the environmental issues and alternative methods associated with the performance of these cleanup activities. On September 12, 1980, the Commission agreed to extend the comment period for the PEIS to November 20, 1980 in response to requests by Pennsylvania Governor Thornburgh, EPA, and members of the public.

(4) EPICOR-II Radwaste System

The EPICOR-II Radwaste System was shut down on August 13, 1980 after processing approximately 500,000 gallons of waste water and removing 55,000 curies of radioactivity from this volume of water. This represents the processing of the total basic inventory of accident-generated water that had been stored in the tanks in the auxiliary and fuel handling buildings. Overall system decontamination factors greater than 1,000,000 have been achieved for the dominant radionuclides of cesium and strontium. The decontaminated water is being stored onsite; alternatives for its disposal are presented in the PEIS. In the future, the system will be used for processing water collected in the auxiliary building sump from sources of normal component and system inleakage to equipment and floor drains. The EPICOR-II System will also treat the processed water used in flushing and spraying operations associated with decontamination of building tanks and piping.

(5) Auxiliary Building Decontamination

Decontamination of open areas (corridors, stairwells, etc., in the auxiliary building and fuel handling building) is over 90% complete. Contamination levels on the 328-foot and 305-foot elevations have been reduced to less than 500 DPM\*/100 cm<sup>2</sup> and general radiation levels are less than 1 mr/hr. Approximately one-third of the 328-foot and 305-foot elevations have been decontaminated and released for entry without anti-contamination clothing. Contamination of the 280-foot 6-inch elevation general area has been reduced to less than 1000 DPM/100 cm<sup>2</sup> and general radiation levels are less than 1 mr/hr.

Further reports will be made as appropriate.

\* \* \* \* \*

\*Disintegrations per minute.

The following abnormal occurrence was originally reported in NUREG-0090, Vol. 2, No. 2, "Report to Congress on Abnormal Occurrences: April-June 1979." It is further updated as follows:

#### 79-6 Damage to New Fuel Assemblies

The two plant workers who surrendered to Surry County authorities on June 19, 1979 admitted deliberately damaging the new fuel assemblies. They were later tried and convicted.

The two workers made a number of allegations pertaining to operational and security inadequacies at the Surry Power Station, which is operated by Virginia Electric and Power Company (VEPCO). Several attempts were made by the NRC to elicit sufficient details from the two individuals to permit a proper investigation. Subpoenas were issued and the two individuals were interviewed separately under oath during November 1979.

A total of 46 allegations were identified and addressed during the NRC investigation. Six were wholly or partially substantiated; that is, the allegation was true in fact or in substance and involved noncompliance with NRC requirements. Six additional allegations were determined to be essentially correct as to fact or substance but did not involve noncompliance with NRC requirements and had no nuclear safety significance. The remaining 34 allegations were unsubstantiated due to either a lack of corroborative evidence or to contradicting evidence obtained during the investigation.

The NRC cited VEPCO for seven items of noncompliance, ranging from inadequate monitoring and recording of liquid waste activity to inadequate escorting of individuals not authorized access to protected areas. NRC inspectors have confirmed that corrective action has been taken and will continue to monitor future compliance at Surry.

A copy of the investigation report (Ref. B-3) has been made available at the NRC Public Document Room at 1717 H Street, NW, Washington, D.C. 20555, and at the Local Public Document Room for the Surry plant, located in the Swem Library, College of William and Mary, Williamsburg, Virginia 23185.

This incident is closed for purposes of this report.

\* \* \* \* \*

The following abnormal occurrence was originally reported in NUREG-0090, Vol. 3, No. 1, "Report to Congress on Abnormal Occurrences: January-March 1980." It is further updated as follows:

#### 80-2 Transient Initiated by Partial Loss of Power

As previously reported, the Director, NRR issued a Confirmatory Order on April 14, 1980 (Ref. B-4), addressing commitments made by the licensee (Florida Power Corporation) to make systems and procedural changes to reduce the probability

of recurrence of the event at Crystal River Unit 3. These changes were completed and tested by July 31, 1980. NRC personnel witnessed major portions of the testing of the revised systems as well as reviewing the system and procedural modifications. The plant returned to operation on August 8, 1980, when it was made critical, and began power production on August 10, 1980.

Also, as previously reported, the NRC is studying the question of sensitivity of Babcock & Wilcox (B&W)-designed plants to transient response and failures of the instrumentation and control systems on a generic basis. This study includes the review of the Crystal River Unit 3 event and the responses to Inspection and Enforcement Bulletin No. 79-27 (Ref. B-5). This Bulletin was issued on November 30, 1979 as a result of an incident at Oconee Unit 3 on November 10, 1979, wherein a loss of nonnuclear instrumentation resulted in a partial loss of indication in the control room. The purpose of the Bulletin was to both request review and appropriate modifications to reduce the probability of such an event happening again and to have licensees prepare emergency procedures to mitigate the effects of any similar future events. Later, self-terminating Confirmatory Orders requesting responses were issued to those licensees who had not responded within the 90-day period specified in the Bulletin.

The NRC is now reviewing the licensee responses to the Bulletin. The review also includes the recommendations of the joint report (Ref. B-6) of the Institute of Nuclear Power Operations and the Nuclear Safety Analysis Center (INPO/NSAC), dated March 11, 1980, regarding the Crystal River Unit 3 event. The review is scheduled to be completed by late March 1981. Safety evaluations for each plant are scheduled to be complete during April 1981.

Further reports will be made as appropriate.

## APPENDIX C

## OTHER EVENTS OF INTEREST

The following events are described below because they may possibly be perceived by the public to be of public health significance. None of the events involved a major reduction in the level of protection provided for public health or safety; therefore, they are not reportable as abnormal occurrences.

1. Containment Sump Valve Open During Reactor Operation

On July 28, 1980, Consumers Power Company notified the NRC that a valve in the emergency core cooling system at its Palisades Nuclear Power Station had been incorrectly placed in the open position for a 36-hour period. The plant utilizes a pressurized water reactor and is located in Van Buren County, Michigan.

A reactor operator had apparently opened the valve inadvertently while performing a surveillance test on another system. The plant was operating at 88% power during the period July 25 to July 27 when the valve was open. The mispositioned valve had no effect on normal plant operation, startup, or shutdown. The valve is normally closed, but in the event of a loss-of-coolant accident would open automatically, when the Refueling Water Storage Tank level reached the low level setpoint. This feature is provided so that water from the reactor containment sump can be pumped back into the reactor. Under certain unlikely accident conditions, the open valve could have impaired the function of pumps in one of the redundant portions of the emergency core cooling system and related safety systems (the high pressure safety injection system, the low pressure safety injection system, and the containment spray system). Pumps in the other redundant portion of each of these emergency systems, however, would be unaffected by the open valve. An analysis by the licensee, reviewed by the NRC, determined that the emergency systems would perform their safety function even with the valve open.

When the incorrect valve position was discovered, the valve was immediately closed. The licensee has instituted new valve and safety system check procedures to detect any incorrect valve positions in the future. The containment sump valve had not previously been included in the valve check list for each shift because the position of the valve is not normally changed.

The NRC has levied a \$16,000 fine against Consumers Power Company for items of noncompliance with NRC regulations associated with the valving error (Ref. C-1). The NRC Office of Inspection and Enforcement has reviewed the incident and the licensee's corrective actions.

Since analysis has shown that the emergency systems would have performed their safety functions, in the event of a loss-of-coolant accident, even with the valve open, there was no major reduction in the degree of protection of the public health or safety; therefore, the event is not considered reportable as an abnormal occurrence.

## 2. Concern Over Licensed Operator Performance at a Power Reactor

At 6 a.m. on August 8, 1980, the NRC Senior Resident Inspector at Commonwealth Edison Company's Dresden Nuclear Power Station entered the control room and observed that two of the four licensed reactor operators appeared to be asleep. Units 2 and 3 were in operation; Unit 1 is shut down for safety modifications. The Dresden units utilize boiling water reactors and are located in Grundy County, Illinois.

The inspector reported his finding to a manager, who called the control room. When the inspector and the manager arrived at the control room, the operators were awake and attentive. The operators denied that they had been asleep. The inspector did not report the incident to his NRC Region III (Chicago) supervisors, but planned to document it in his monthly inspection report. In the meantime, news media representatives became aware of the incident and there was extensive news media coverage.

Two NRC investigations were initiated after the Regional Office became aware of the incident on September 4, 1980. Region III investigated the August 8 incident to evaluate the performance of the licensee's reactor operators and management, and the Office of Inspector and Auditor (OIA) investigated the inspector's delay in notifying NRC management of the problem.

The Region III investigation determined that the two operators were not fully attentive to their licensed duties of monitoring reactor conditions, although it could not be determined whether or not the operators were actually asleep. The two operators were issued letters of reprimand by the NRC Director of the Office of Inspection and Enforcement. Commonwealth Edison is revising its training program, procedures, and policies to establish operator performance standards and provide for disciplinary action for improper conduct. On October 20, 1980, the NRC Director of the Office of Inspection and Enforcement issued a Notice of Violation and Proposed Imposition of Civil Penalty in the amount of \$40,000 to the licensee (Ref. C-2).

Consideration is being given to notification of all reactor licensees and all licensed reactor operators about the Dresden incident and the need for definitive policies and standards for reactor operator performance.

As a result of the OIA investigation findings, all resident inspectors, as well as all others on the NRC inspection staff, have been reminded that consideration of safety significance in evaluating any concern takes precedence over determining the validity of a citation for noncompliance. Further, they have been directed to report any items of potential safety significance promptly to their regional supervisors.

While the event was of safety importance, it did not involve a major reduction in the degree of protection of the public health or safety; therefore, it is not considered reportable as an abnormal occurrence.

### 3. Member of News Media Gaining Access to Control Room

On September 3, 1980, a reporter for a local Fort Pierce, Florida newspaper was allowed access to the St. Lucie Nuclear Station Control Room during a planned emergency drill. The plant utilizes a pressurized water reactor and is located in St. Lucie County, Florida. The plant is operated by the Florida Power and Light Company.

The reporter was coincidentally doing several articles on local emergency and rescue organizations when this planned drill was initiated on the morning of September 3, 1980. He accompanied the responding emergency crew to the site and, per security regulations, the emergency vehicle was granted unimpeded access to the St. Lucie protected area. An armed guard then accompanied the crew inside the vehicle to the Auxiliary Building where the crew was escorted to the Control Room. It was there, inside the Control Room, that the reporter's presence became known and he was separated from the crew and escorted offsite.

The combination of circumstances, the continuous armed escort, the removal from the site without incident, and the licensee notification to the Resident Inspector were all within NRC regulations. However, these circumstances appear to reflect procedural weaknesses which the licensee is correcting. Since there was a continuous armed escort present, there was no major reduction in the degree of protection of the public health or safety; therefore, the event is not considered to be an abnormal occurrence.

### 4. Personnel Overexposure During Steam Generator Repair

During a shutdown for refueling and steam generator repair at San Onofre Nuclear Generating Station, Unit No. 1,\* an examination of the steam generators revealed that extensive repairs would be required. Such repairs normally require entries of several personnel into the steam generator channel head area where high radiation levels may result in personnel receiving exposures approaching or exceeding NRC limits in a few minutes. Thus, careful radiation surveys must be made before workers are permitted to enter the channel heads. During the initial periods of work in the San Onofre Unit 1 steam generators, the licensee failed to make adequate surveys, resulting in overexposures to several personnel.

Following what the licensee assumed to be standard industry practice, film badges were worn only on chests of personnel during the repair work. Detailed radiation surveys indicated, however, that exposures to the head would have been from 1.32 to 2.15 times the chest exposure with an average factor of 1.65. NRC requirements and good health physics practice dictate that personnel

\*A 436 MWe pressurized water reactor located about 5 miles south of San Clemente, California (San Diego County); operated by Southern California Edison Company.

REFERENCES  
(FOR APPENDICES)

- B-1. U.S. Nuclear Regulatory Commission, "Final Environmental Assessment for Decontamination of the Three Mile Island Unit 2 Reactor Building Atmosphere," USNRC Report NUREG-0662, Vols. 1-2, May 1980.\*
- B-2. U.S. Nuclear Regulatory Commission, "Draft Programmatic Environmental Impact Statement Related to Decontamination and Disposal of Radioactive Wastes Resulting from March 28, 1979 Accident Three Mile Island Nuclear Station Unit 2," USNRC Draft Report NUREG-0683, July 1980.\*\*
- B-3. Letter from James P. O'Reilly, NRC Regional Office II, to J. H. Ferguson, Virginia Electric and Power Company, forwarding "Notices of Violation and Investigation Reports 50-280/79-70 and 50-281/79-80," Docket No. 50-280 and No. 50-281, June 27, 1980.\*\*\*
- B-4. Letter from D. G. Eisenhut, NRC, to J. A. Hancock, Florida Power Corporation, forwarding a "Confirmatory Order," Docket No. 50-302, April 14, 1980.\*\*\*
- B-5. U.S. Nuclear Regulatory Commission, Inspection and Enforcement Bulletin No. 79-27, "Loss of Non-Class-1-E Instrumentation and Control Power System Bus During Operation," November 30, 1979.\*\*\*
- B-6. Letter from E. P. Wilkinson and E. L. Zebroski, Nuclear Safety Analysis Center/Institute of Nuclear Power Operations, to Harold Denton, NRC, "Report on Crystal River Unit-3 Incident of February 26, 1980, by NSAC and INPO," March 11, 1980.\*\*\*
- C-1. Letter from Victor Stello, Jr., NRC, to R. B. DeWitt, Consumers Power Company, forwarding a "Notice of Violation and Notice of Proposed Imposition of Civil Penalties," Docket No. 50-255, September 16, 1980.\*\*\*
- C-2. Letter from Victor Stello, Jr., NRC, to James J. O'Connor, Commonwealth Edison Company, forwarding a "Notice of Violation and Proposed Imposition of Civil Penalty," Docket No. 50-237 and No. 50-249, October 20, 1980.\*\*\*

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\*Available for purchase from GPO Sales Program, Division of Technical Information and Document Control, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555 and National Technical Information Service, Springfield, Virginia 22161.

\*\*Single copies available from USNRC Division of Technical Information and Document Control, Washington, D.C. 20555.

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15. SUPPLEMENTARY NOTES				10. PROJECT/TASK/WORK UNIT NO.	
16. ABSTRACT (200 words or less) <p>Section 208 of the Energy Reorganization Act of 1974 identifies an abnormal occurrence as an unscheduled incident or event which the Nuclear Regulatory Commission determines to be significant from the standpoint of public health or safety and requires a quarterly report of such events to be made to Congress. This report covers the period July 1 to September 30, 1980.</p> <p>There was one abnormal occurrence at the nuclear power plants licensed to operate; the event involved failure of the salt water cooling system. There were no abnormal occurrences at the fuel cycle facilities (other than nuclear power plants). There was one abnormal occurrence at other licensee facilities; the event involved the improper use and inadequate control of licensed material (radiopharmaceuticals). There were three abnormal occurrences reported by the Agreement States; one involved inadequate security and the other two involved overexposure of radiographers.</p> <p>This report also contains information updating previously reported abnormal occurrences.</p>				11. CONTRACT NO.	
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