NUREG--0090-Vol.12-No.3

TI90 007273

Report to Congress on Abnormal Occurrences

July – September 1989

Date Published: January 1990

Office for Analysis and Evaluation of Operational Data
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Previous Reports in Series

NUREG 75/090, January-June 1975, published October 1975
NUREG-0090-1, July-September 1975, published March 1976
NUREG-0090-2, October-December 1975, published March 1976
NUREG-0090-3, January-March 1976, published July 1976
NUREG-0090-4, April-June 1976, published March 1977
NUREG-0090-5, July-September 1976, published March 1977
NUREG-0090-6, October-December 1976, published June 1977
NUREG-0090-7, January-March 1977, published June 1977
NUREG-0090-8, April-June 1977, published September 1977
NUREG-0090-9, July-September 1977, published November 1977
NUREG-0090-10, October-December 1977, published March 1978
NUREG-0090, Vol.1, No.1, January-March 1978, published June 1978
NUREG-0090, Vol.1, No.2, April-June 1978, published September 1978
NUREG-0090, Vol.1, No.3, July-September 1978, published December 1978
NUREG-0090, Vol.1, No.4, October-December 1978, published March 1979
NUREG-0090, Vol.2, No.1, January-March 1979, published July 1979
NUREG-0090, Vol.2, No.2, April-June 1979, published November 1979
NUREG-0090, Vol.2, No.3, July-September 1979, published February 1980
NUREG-0090, Vol.2, No.4, October-December 1979, published April 1980
NUREG-0090, Vol.3, No.1, January-March 1980, published September 1980
NUREG-0090, Vol.3, No.2, April-June 1980, published November 1980
NUREG-0090, Vol.3, No.3, July-September 1980, published February 1981
NUREG-0090, Vol.3, No.4, October-December 1980, published May 1981
NUREG-0090, Vol.4, No.1, January-March 1981, published July 1981
NUREG-0090, Vol.4, No.2, April-June 1981, published October 1981
NUREG-0090, Vol.4, No.3, July-September 1981, published January 1982
NUREG-0090, Vol.4, No.4, October-December 1981, published May 1982
NUREG-0090, Vol.5, No.1, January-March 1982, published August 1982
NUREG-0090, Vol.5, No.2, April-June 1982, published December 1982
NUREG-0090, Vol.5, No.3, July-September 1982, published January 1983
NUREG-0090, Vol.5, No.4, October-December 1982, published May 1983
NUREG-0090, Vol.6, No.1, January-March 1983, published September 1983
NUREG-0090, Vol.6, No.2, April-June 1983, published November 1983
NUREG-0090, Vol.6, No.3, July-September 1983, published April 1984
NUREG-0090, Vol.6, No.4, October-December 1983, published May 1984
NUREG-0090, Vol.7, No.1, January-March 1984, published July 1984
NUREG-0090, Vol.7, No.2, April-June 1984, published October 1984
NUREG-0090, Vol.7, No.3, July-September 1984, published April 1985
NUREG-0090, Vol.7, No.4, October-December 1984, published May 1985
NUREG-0090, Vol.8, No.1, January-March 1985, published August 1985
NUREG-0090, Vol.8, No.2, April-June 1985, published November 1985
NUREG-0090, Vol.8, No.3, July-September 1985, published February 1986
NUREG-0090, Vol.8, No.4, October-December 1985, published May 1986
NUREG-0090, Vol.9, No.1, January-March 1986, published September 1986
NUREG-0090, Vol.9, No.2, April-June 1986, published January 1987
NUREG-0090, Vol.9, No.3, July-September 1986, published April 1987
NUREG-0090, Vol.9, No.4, October-December 1986, published July 1987
NUREG-0090, Vol.10, No.1, January-March 1987, published October 1987
NUREG-0090, Vol.10, No.2, April-June 1987, published November 1987
NUREG-0090, Vol.10, No.3, July-September 1987, published March 1988
NUREG-0090, Vol.10, No.4, October-December 1987, published March 1988
NUREG-0090, Vol.11, No.1, January-March 1988, published July 1988
NUREG-0090, Vol.11, No.2, April-June 1988, published December 1988
NUREG-0090, Vol.11, No.3, July-September 1988, published January 1989
NUREG-0900, Vol.11, No.4, October-December 1988, published April 1989
NUREG-0900, Vol.12, No.1, January-March 1989, published August 1989
NUREG-0900, Vol.12, No.2, April-June 1989, published October 1989

ABSTRACT

Section 208 of the Energy Reorganization Act of 1974 identifies an abnormal occurrence as an unscheduled incident or event that 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, 1989.

For this reporting period, there were five abnormal occurrences. One abnormal occurrence took place at a licensed nuclear power plant and involved significant deficiencies associated with the containment recirculation sump at the Trojan facility. The other four abnormal occurrences took place under other NRC-issued licenses: the first involved a medical diagnostic misadministration; the second involved a medical therapy misadministration; the third involved a radiation overexposure of a radiographer; and the fourth involved a significant breakdown and careless disregard of the radiation safety program at three of a licensee's manufacturing facilities. The Agreement States reported no abnormal occurrences during the reporting period.

The report also contains information that updates some previously reported abnormal occurrences.

CONTENTS

CONTENTS (Continued)

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 that 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 listed in Appendix A. These criteria were promulgated in an NRC policy statement that was published in the Federal Register on February 24, 1977 (Vol. 42, No. 37, pages 10950-10952). In order to provide wide dissemination of information to the public, a Federal Register notice is issued on each abnormal occurrence. Copies of the notice are distributed to the NRC Public Document Room and all Local Public Document Rooms. At a minimum, each notice must contain the date and place of the occurrence and describe its nature and probable consequences.

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 from July 1 to September 30, 1989.

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. This includes public participation as an element. 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.

In licensing and regulating 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 specifying requirements that 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.

REPORTABLE OCCURRENCES

Actual operating experience is an essential input to the regulatory process for assuring that licensed activities are conducted safely. Licensees are required to report certain incidents or events to the NRC. This reporting helps to identify deficiencies early and to assure that corrective actions are taken to prevent recurrence.

For nuclear power plants, dedicated groups have been formed both by the NRC and by the nuclear power 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 licensing, regulations, and operations. In addition, the NRC and the nuclear power industry have ongoing efforts to improve the operational data systems, which include not only the type and quality of reports required to be submitted, but also the methods used to analyze the data. In order to more effectively collect, collate, store, retrieve, and evaluate operational data, the information is maintained in computer-based data files.

Two primary sources of operational data are Licensee Event Reports (LERs) and immediate notifications made pursuant to 10 CFR 50.72.

Except for records exempt from public disclosure by statute and/or regulation, information concerning reportable occurrences at facilities licensed or otherwise regulated by the NRC is routinely disseminated by the NRC to the nuclear industry, the public, and other interested groups as these events occur.

Dissemination includes special notifications to licensees and other affected or interested groups, and public announcements. In addition, information on reportable events is routinely sent to the NRC's more than 100 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 in licensed facilities.

Another primary source of operational data is reports of reliability data submitted by licensees under the Nuclear Plant Reliability Data System (NPRDS). The NPRDS is a voluntary, industry-supported system operated by the Institute of Nuclear Power Operations (INPO), a nuclear utility organization. Both engineering and failure data are submitted by nuclear power plant licensees for specified plant components and systems. The Commission considers the NPRDS to be a vital adjunct to the LER system for the collection, review, and feedback of operational experience; therefore, the Commission periodically monitors the NPRDS reporting activities.

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). Agreement State programs must be comparable to and compatible with the Commission's program for such material.

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.

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

are 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.

FOREIGN INFORMATION

The NRC participates in an exchange of information with various foreign governments that have nuclear facilities. This foreign information is reviewed and considered in the NRC's assessment of operating experience and in its research and regulatory activities. Reference to foreign information may occasionally be made in these quarterly abnormal occurrence reports to Congress; however, only domestic abnormal occurrences are reported.

REPORT TO CONGRESS ON ABNORMAL OCCURRENCES
JULY-SEPTEMBER 1989

NUCLEAR POWER PLANTS

The NRC is reviewing events reported at the nuclear power plants licensed to operate. For this report, the NRC has determined that the following event was an abnormal occurrence.

89-8 Significant Deficiencies Associated with the Containment Building Recirculation Sump at the Trojan Nuclear Power Plant.

The following information pertaining to this event is also being reported concurrently in the Federal Register. Appendix A (see the second general criterion) of this report notes that major degradation of essential safety-related equipment can be considered an abnormal occurrence.

Date and Place - July 17, 1989; Trojan Nuclear Plant, a Westinghouse-designed pressurized water reactor (PWR), operated by Portland General Electric Company and located in Columbia County, Oregon.

Nature and Probable Consequences - During July 1989, significant deficiencies were discovered regarding the containment building recirculation sump (sump). The existing condition, based on engineering judgement, represented a major degradation of essential safety-related equipment which would likely have seriously degraded the ability of the emergency core cooling system (ECCS) to mitigate the consequences of a loss of coolant accident (LOCA) during the recirculation phase of emergency operation. The ECCS is specifically designed to remove residual heat from the reactor fuel rods (i.e., prevent fuel rod melting) should the normal core cooling system fail. Details of the event are as follows.

On July 17, 1989, with the reactor plant in cold shutdown condition (mode 5), a licensee inspection of the sump found that a 3/16-inch wire mesh screen, required by design to be installed on the top of the sump enclosure, was not installed. This inspection was being conducted due to a significant amount of debris that had been previously found within the sump by NRC inspectors and licensee personnel since July 8, 1989. The screen is an important design feature of the sump; therefore the plant did not conform with required design bases. Subsequent inspections by NRC inspectors and licensee personnel identified other deficiencies, including gaps in the 3/16-inch screen on the side of the sump enclosure, openings through sump walls that were not screened, and additional debris. Based on Trojan records and the physical condition of the debris, it was determined that the damaged and missing sump screens, and some of the debris in the sump, had existed for an extended period (at least one operating cycle, approximately a year, and possibly since initial operation in 1975).

The sump is a large collecting reservoir designed to provide an adequate supply of water with a minimum amount of particulate matter to the ECCS during the recirculation phase of a LOCA. The recirculation phase is that portion of the LOCA when injection of water from the refueling water storage tank has been essentially completed, and the ECCS is configured to recirculate water from the sump back to the reactor coolant system. The sump design includes an arrangement of screens, bars, and plates completely surrounding the sump to prevent floating debris and large water-entrained particles from entering the sump. For high

density material that passes through this arrangement, there is a settling (low velocity flow) region which is designed to remove the debris prior to it reaching ECCS suction. The smallest screen in this arrangement has a 3/16-inch maximum opening, such that debris that passes into the sump through the 3/16-inch screen is small enough in dimension to pass through any restriction in the ECCS. Therefore, with the missing and damaged 3/16-inch screens, debris larger than the design bases material could pass into the sump and render portions of the ECCS degraded or inoperable during the recirculation phase of a postulated LOCA.

Further, the debris found inside the sump by NRC inspectors and licensee personnel included piping insulation, pieces of metal wire and fabricated steel, pipe fittings, a bundle of 30 inch-long plastic tie wraps, and weld rod material. Based on the staff's engineering judgement, the debris was of such a size and physical characteristics that it would likely have been transported to the ECCS suction in the sump.

The safety significance of these conditions and a high potential that a problem would occur are best demonstrated by an experience at Trojan in 1980, when an operating ECCS Residual Heat Removal pump seized, and stopped, due to a piece of weld rod lodged between the impeller ring area and casing ring.

The deficiencies (debris plus missing and damaged sump screens) would likely have prevented the ECCS from performing its intended function as required had the equipment actually been called upon during the recirculation phase of a LOCA.

Cause or Causes - The direct cause of the top sump screen not being installed, openings through sump walls not being screened, and gaps in the screens was the failure to acceptably complete the installation of the 3/16-inch screen on the sump enclosure during initial construction. Contributory causes include:

1. Failure to perform adequate surveillance, and provide acceptable procedural guidance for surveillance of the sump's material condition in accordance with requirements of the plant Technical Specifications.

2. Failure to perform an adequate design basis verification by the System Engineers during Design Basis Document walkdowns.

3. Failure of the licensee to comprehensively analyze the issue of sump design based on NRC Generic Letter 85-22 (Ref. 1) regarding the potential for sump screen plugging due to debris within the containment building.

The direct cause of the debris in the sump was lack of attention to post-work cleanliness requirements and failure of post-work cleanliness inspections to identify the debris. Contributory causes include:

1. Failure to provide adequate procedural guidance for sump cleanliness and associated inspections in accordance with Technical Specifications.

2. Failure of personnel to assure that sump cleanliness inspections were performed in accordance with Technical Specifications.

3. Failure of the licensee to properly address the issue of debris in the sump based on several previous instances where there were indications of debris in the sump area between 1980 and July 1989.

Actions Taken to Prevent Recurrence

Licensee - All installation and operational discrepancies have been corrected. The appropriate screens were installed and/or repaired and debris removed, shortly after the problems were noted. Performance expectations will be reinforced by training of all personnel to assure that individuals are responsible and accountable for post-work clean up with particular emphasis given to areas inside the containment. The outstanding performance of the individual who raised this issue has been recognized, and those who failed to perform to expectations are being dealt with on a case-by-case basis.

The procedures for inspection of the containment and sump were revised to include detailed inspection criteria, and pre-inspection briefings were required to assure understanding of individual responsibilities. Additional training is also to be provided, including the basis for the revised inspection criteria.

An upgrade of the licensee's Design Basis Documentation program is being undertaken that includes additional review to assure complete, accurate system descriptions, and required walkdowns of systems will be performed with adequate engineering and quality assurance personnel under specific management guidance.

Licensee top-level management has instituted organizational changes to improve overall Trojan performance with particular emphasis on problem identification and resolution.

NRC - A special inspection of the circumstances associated with the degradation of ECCS was conducted and documented in Inspection Report 50-344/89-19 (Ref. 2). This inspection identified violations of NRC requirements, and an Enforcement Conference was held with licensee management on August 24, 1989 (Ref. 3). The NRC staff will continue inspection of licensee activities to assure that the corrective actions have been implemented and are effective.

On October 5, 1989, the NRC issued a Notice of Violation and Proposed Imposition of Civil Penalty in the amount of $280,000 (Ref. 4). The violations were aggregated into a single problem that was categorized as Severity Level II (out of five severity levels in which Severity Levels I and V are the most and least significant, respectively). The base value of a civil penalty for a Severity Level II problem is $80,000. However, the base civil penalty was escalated 250 percent to $280,000 because of licensee poor past performance, numerous missed opportunities for identification and correction of the problems, and the long duration of the sump's inoperability. The licensee has paid the fine in full.

This item is considered closed for the purposes of this report.

* * * * * * * *

FUEL CYCLE FACILITIES
(Other Than Nuclear Power Plants)

The NRC is reviewing events reported by these licensees. For this report, the NRC has not determined that any events were abnormal occurrences.

* * * * * * * *

OTHER NRC LICENSEES
(Industrial Radiographers, Medical Institutions, Industrial Users, etc.)

There are currently about 9,000 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. For this report, the NRC has determined that the following events were abnormal occurrences.

89-9 Medical Diagnostic Misadministration

The following information pertaining to this event is also being reported concurrently in the Federal Register. Appendix A (see the general criterion) of this report notes that an event involving a moderate or more severe impact on public health or safety can be considered an abnormal occurrence.

Date and Place - May 23, 1989; Abbott Northwestern Hospital; Minneapolis, Minnesota.

Nature and Probable Consequences - A female patient, intended to receive a diagnostic administration, was administered the wrong radiopharmaceutical that resulted in a radiation dose in the therapeutic range. Prior to the date of administration, the patient's physician telephoned the licensee's nuclear medicine department requesting that his patient be given a thyroid scan. The woman, who had been diagnosed as having a thyroid nodule, was to be treated on an outpatient basis. A thyroid scan typically utilizes 300 microcuries of iodine-123 (which would result in a dose to the thyroid of about 5 rads) and is designed to locate a thyroid disorder. (Iodine-123 is accelerator-produced and is not under NRC regulatory jurisdiction.)

When the referring physician telephoned the order, a scheduling secretary incorrectly wrote "thyroid iodine-131 caps," rather than "thyroid scan." This may have resulted from a misunderstanding with the physician. A technologist, seeing the order for thyroid iodine-131 caps, assumed the female patient was to receive a whole-body scan, and administered 3 millicuries of iodine-131 to the patient on May 23, 1989. (A millicurie is one-thousandth of a curie; a microcurie is one-millionth of a curie.) The purpose of the whole-body scan is to look for thyroid cancer tissue that has traveled to other parts of the body. Patients who receive such a scan have had their thyroids removed or made "nonfunctional" by therapy. Three millicuries of iodine-131 can damage a normal thyroid gland.

The licensee's chief nuclear medicine technologist discovered the error about 30 minutes after the patient received the iodine-131. The patient was given Lugol's solution to reduce the effects of the iodine on the thyroid, and the patient's physician was notified. The NRC also was notified of the misadministration by telephone on May 25, 1989, and a written report was submitted on June 6, 1989.

The licensee estimated the patient's thyroid radiation dose to be in the range of 3000 rads. However, the NRC's medical consultant estimated the dose to be 4700 rads. The NRC's medical consultant also observed that the patient would have a 10 percent chance of developing hypothyroidism within two years, and a 25 percent chance in 12 years. He recommended that the patient receive routine testing for thyroid function every four to six months.

Cause or Causes - The licensee did not have adequate procedures to assure that prescriptions were in writing and that dosages were verified before they were administered. As a result, there was an error in communication between the patient's physician and the secretary scheduling the nuclear medicine exam (she listed the wrong isotope on the nuclear medicine schedule). The technologist assumed that a whole-body thyroid scan had been ordered because "iodine-131 caps" was listed on the schedule. The technologist stated that if he had checked the admitting diagnosis, "thyroid nodule," he would have known that iodine-131 was the wrong isotope to use. The hospital had no procedure or requirement that technologists check the admitting diagnosis before giving radiopharmaceuticals to patients.

Actions Taken To Prevent Recurrence

Licensee - The hospital established procedures requiring that iodine-131 be given to patients only with the prior approval of those individuals listed on the hospital's NRC license as "authorized" physicians. The licensee also established a procedure requiring a physician to submit a written prescription for the use of iodine-131. In addition, nuclear medicine technologists will review a physician's reason for giving a patient iodine-131 to make sure that the right isotope is used with the prescribed procedure. They also will make certain that the proper amount of iodine-131 is administered.

NRC - The NRC conducted a special safety inspection of the facility on June 20-21, 1989 (Ref. 5). No violations of NRC requirements were identified during the course of the inspection. However, the NRC raised concerns about the licensee's procedures. A management meeting was held by telephone on July 18, 1989, to discuss the misadministration and the NRC's concern about the adequacy of the licensee's procedures. The licensee outlined new procedures it had instituted and agreed to add these procedures to its NRC license. The procedure changes included a check with the referring physician prior to administration in cases where the physician requests a specific radiopharmaceutical dose. The licensee also reviewed its nuclear medicine and therapy program for additional problems that could lead to a misadministration. The procedure modifications were added to the license on November 14, 1989.

This item is considered closed for the purposes of this report.

* * * * * * * *

89-10 Medical Therapy Misadministration

The following information pertaining to this event is also being reported concurrently in the Federal Register. Appendix A (see the general criterion) of this report notes that an event involving a moderate or more severe impact on public health or safety can be considered an abnormal occurrence.

Date and Place - July 24, 1989; Worcester City Hospital; Worcester, Massachusetts.

Nature and Probable Consequences - On July 24, 1989, the licensee notified the NRC that a misadministration occurred earlier that day when the wrong patient was administered 250 rads (from a cobalt-60 teletherapy unit) to the lumbar/sacral spine. The radiation therapy technician called the right patient's name, but did not confirm the patient's identity with the available photograph. The wrong patient responded and was set up using freckles on his back which were mistaken for the patient's treatment positioning tattoos. When the patient indicated that his set-up wasn't correct, the technician called the Oncology Physician to verify that the required treatment was correct on the patient's chart. The physician verified that the treatment was correct on the chart but did not speak to or examine the patient. The patient was in the therapy department for treatment of his right lung.

The licensee has advised the NRC that no adverse effects are anticipated as a result of the misadministration.

Cause or Causes - The cause is attributed to human error by the staff of the licensee's Radiotherapy Department. The radiation therapy technician had been on vacation and had not previously seen the patient. She did not confirm the patient's identity with the available photograph and did not recognize the absence of treatment positioning tattoos in the patient's lumbar-sacral spine area. In verifying the correctness of treatment, the Oncology Physician performed a chart review, but did not verify patient identity.

Actions Taken to Prevent Recurrence

Licensee - The licensee's corrective actions included strengthening of their patient identification policies and training of technicians to obtain physician verification of patient set-up before initiating treatment in questionable cases.

NRC - NRC Region I inspectors conducted a special safety inspection on August 28, 1989, of the circumstances associated with the misadministration, and agreed with the licensee's actions to prevent recurrence (Ref. 6). No violations of NRC requirements were identified.

This item is considered closed for the purposes of this report.

* * * * * * * *

89-11 Radiation Overexposure of a Radiographer

The following information pertaining to this event is also being reported concurrently in the Federal Register. Appendix A (see Example 1 of "For All Licensees") of this report notes that exposure of the whole-body of any individual to 25 rem or more of radiation can be considered an abnormal occurrence.

Date and Place - August 2, 1989; Glitsch Field Services/NDE, Inc.; North Canton, Ohio; the radiation overexposure occurred at a customer's site near the licensee's Erie, Pennsylvania facility.

Nature and Probable Consequences - On August 3, 1989, the licensee notified the NRC that a licensee-trained and qualified radiographer with six years experience may have received a whole-body radiation exposure of 93.4 rem on August 2, 1989, while involved in radiographic operations using a radiography device containing an 87 curie, iridium-192 sealed source. (A radiography device uses a radioactive sealed source to make X-ray-like pictures of welds and heavy metal objects.) The circumstances associated with the radiation overexposure are described below.

After completing a radiograph, the radiographer retracted the source into its shielded position inside the device and surveyed the device and guide tube to verify that the source was fully retracted. He failed, however, to "lock" the source into its shielded position. As a result, while setting up the next radiograph and repositioning the radiography device, the iridium-192 source apparently moved outside its shielded position when the source's crank mechanism rotated. He continued his activities, not knowing that he was working within the radiation field of the unshielded radioactive source. After performing the radiograph, he took the exposed film to a darkroom for development and analysis.

At this time, he checked his pocket dosimeter, a radiation measuring device, and noticed it was offscale (greater than 200 milliroentgen). He reset his dosimeter to zero and continued radiographic operations, completing the remaining planned radiographs even though he reportedly was aware that NRC regulations and licensee procedures require that all work be stopped and immediate notification made when a dosimeter is discovered offscale. The individual later said he believed that his radiography work had been done properly and that the dosimeter had drifted or been jarred offscale. He notified one of the licensee's Assistant Radiation Safety Officers of the offscale dosimeter at 7 a.m., August 2, 1989, several hours after the event.

A TLD (dosimeter) worn by the individual during radiographic operations from July 10, 1989, to August 2, 1989, revealed a cumulative exposure of about 93.5 rem. (The applicable NRC limit for whole-body exposure to a radiation worker is 3 rem per calendar quarter.)

Based on licensee statements, interviews with the involved radiographer and NRC reenactments of the individual's actions during the event, NRC inspectors concluded that the 93.4 rem exposure was valid and localized to the individual's right hip. The majority of the radiation dose (greater than 90 percent) was to the radiographer's right hip, which was as close as two inches from the unshielded source during radiograph preparation. As of December 1989, no significant medical effects have been observed. The radiographer remains under a doctor's care, and an NRC medical consultant continues to monitor the individual.

Cause or Causes - The radiographer failed to lock or otherwise secure the radioactive source into its shielded position. Movement of the radiography device and the rotation of the source crank handle allowed the source to move from its fully shielded position and expose the radiographer to direct radiation. The radiographer also failed to make an adequate radiation survey to ensure the source was inside the shielding before he approached the device.

Actions Taken to Prevent Recurrence

Licensee - For corrective actions, the licensee revoked the radiographer's radiographic certification pending retraining and testing; obtained physician's care for the individual; ordered a drug test (results were negative); and conducted tests of the radiography equipment to rule out a malfunction. The day after the incident, the licensee conducted a two-hour radiation safety training class for radiography personnel in the Erie, Pennsylvania, facility. Refresher safety training was conducted for all of the licensee's radiography personnel.

NRC - The NRC conducted a special safety inspection on August 4 and August 14-15, 1989, at the licensee's Erie, Pennsylvania, and North Canton, Ohio, facilities (Ref. 7). During the inspection, the NRC reviewed and reenacted circumstances surrounding the overexposure, verifying that the reported 93.4 rem overexposure was valid. NRC Region III conducted an enforcement conference with the licensee on September 7, 1989, to discuss the event. The licensee agreed to modify its procedures to ensure that sources are locked in the devices and to take disciplinary actions for failure to follow procedures. A Notice of Violation was sent to the licensee on December 27, 1989 (Ref. 8). No civil penalty was proposed.

Unless new, significant information becomes available, this item is considered closed for the purposes of this report.

* * * * * * * *

89-12 Significant Breakdown and Careless Disregard of the Radiation Safety Program at Three General Electric Manufacturing Facilities.

The following information pertaining to this event is also being reported concurrently in the Federal Register. Appendix A (see the third general criterion) of this report notes that major deficiencies in the use of, or management controls for licensed facilities or material can be considered an abnormal occurrence. In addition, Example 11 of "For All Licensees" of Appendix A notes that serious deficiency in management or procedural controls in major areas can be considered an abnormal occurrence.

Date and Place - During 1988 and 1989, major deficiencies were identified in the radiation safety program at three facilities in Ohio operated by General Electric (GE) Company's Lighting Business Group. Two of the facilities, the Tungsten Products Plant and the Chemical Products Plant, are in Cleveland, and the third, the Ravenna Lamp Plant, is in Ravenna.

Nature and Probable Consequences - Major deficiencies in control in the NRC-licensed use of dispersible powdered thorium (a naturally-occurring, radioactive alpha-emitting material) were identified at the licensee's facilities.

The deficiencies posed a possible threat to plant workers due to potential internal deposition of the thorium.

The licensee uses a thorium compound prepared at the Chemical Products Plant to coat lamp electrodes at the Ravenna plant. The Tungsten Products Plant produces lamp filaments made from thorium and tungsten. Periodic radiation surveys are required at the facilities to identify any thorium contamination in and around work areas. The licensee is also required to perform surveys and evaluations necessary to control radiation exposures to employees.

NRC inspections in August 1988 and June 1989 determined that the licensee was not performing some of the required contamination surveys or radiation exposure evaluations. Because of these deficiencies, some contaminated areas were not being identified and there were uncertainties in determining employees' exposure to airborne thorium.

The June 1989 inspection identified ten violations of NRC license requirements, some of which were repetitive from earlier inspections. Six violations involved failures to perform various required radiation surveys for surface and airborne contamination due to alpha radiation. Others included failure to initiate cleanup procedures when radioactive contamination was detected above an NRC-specified level, failure to evaluate possible hazards during thorium handling and maintenance activities, failure to evaluate means for reducing radiation exposures when two employees exceeded an NRC-specified action level for exposure to airborne radioactivity in January 1989, and failure to post an area as having a potential airborne radioactivity hazard. The repetitive violations included two for failing to perform surveys or monitoring, one for failing to decontaminate when required, and one for failing to post an airborne radioactivity area.

During preparations for replacement of the ventilating system at Ravenna in August 1989, a licensee contractor found thorium contamination in the room containing the thorium processing equipment. The contamination levels, while low, exceeded the levels specified in the NRC license as requiring decontamination. The contamination apparently occurred when a loss of power for the ventilation system allowed the backflow of air containing thorium into the work area.

Although there were major deficiencies in the licensee's survey and monitoring programs, subsequent bioassay tests of employees have indicated that no GE employee exceeded NRC limits for exposure to thorium.

Cause or Causes - Inadequate management attention to radiation safety provisions and past corrective actions that were not implemented or that were ineffective in resolving the problems were the cause of the existence of problems for extended periods and the repetition of problems. This demonstrated a serious breakdown in management controls of the radiation control program, as well as a careless disregard for NRC requirements.

Actions Taken to Prevent Recurrence

Licensee - Subsequent to the August 1988 and June 1989 inspections, the licensee has revamped its radiation safety programs, emphasized closer supervision at Ravenna by corporate and plant management, and undertaken a major modification of the thorium handling system at the Ravenna plant. The electrode

coating was previously performed in a vented hood. The licensee has installed an enclosed glove box system to minimize the possible exposure of workers to airborne thorium. The glove box system includes a new ventilation system which prevents the back flow of thorium contamination into the work area.

As a result of NRC findings on the inadequacy of the licensee's monitoring and exposure assessment, the licensee performed whole-body radiation counts of employees who routinely handled thorium and contract personnel involved in work on the filtering system for the thorium work area at Ravenna. (The whole-body count, conducted by an independent, outside consultant, would determine if there had been any internal deposition of thorium as a result of inhalation or ingestion.) Since a number of licensee workers expressed concerns about the thorium contamination of the Ravenna facility, the licensee provided whole-body counts for any employees who requested them. More than 400 employees and contract workers were given whole-body counts. No GE employees or contract workers at the Ravenna facility showed any evidence of internal deposition of thorium in the whole-body counts. Two GE workers at the Tungsten Products Plant showed possible evidence of low-level internal deposition of thorium. The licensee is currently evaluating the test data and may perform additional bioassay testing.

NRC - As a result of the June inspection findings, the NRC issued a Confirmatory Action Letter on June 2, 1989 (Ref. 9), documenting the licensee's agreement to take prompt corrective actions to deal with the violations identified. These actions included performing radiation and contamination surveys, decontamination of any contaminated area, and a daily program for surveying employees using thorium. The licensee also agreed to institute a monthly management audit plan to assure compliance with NRC requirements. The NRC conducted an Enforcement Conference with the licensee on July 12, 1989, to review the inspection findings and to assure that the licensee was taking appropriate actions.

On August 25, 1989, the NRC issued a proposed $24,000 fine for the violations identified in the June 1989 inspection (Ref. 10). A breakdown in a licensee's program is usually classified as a Severity Level III violation (out of five severity levels in which Severity Levels I and V are the most and least significant, respectively). The NRC staff determined, however, that the licensee's continued poor performance reflected a careless disregard for NRC requirements, and categorized the violations as Severity Level II, carrying a higher civil penalty. The base value for a Severity Level II violation is $8,000 but the civil penalty was increased 200 percent to $24,000 because previous corrective actions were not timely or comprehensive, the NRC identified all of the violations, and the licensee's past performance was poor. The licensee subsequently paid the fine in full.

This item is considered closed for the 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. For this report, the Agreement States reported no abnormal occurrences to the NRC.

* * * * * * * *

REFERENCES

1. Generic Letter 85-22, "Potential for Loss of Post-LOCA Recirculation Capability Due to Insulation Debris Blockage," from Hugh L. Thompson, Jr., Director, Division of Licensing, NRC Office of Nuclear Reactor Regulation, to all licensees of operating reactors, applicants for operating licensees, and holders of construction permits, December 3, 1985.*

2. Letter from J. B. Martin, Administrator, NRC Region V, to David W. Cockfield, Vice President, Nuclear, Portland General Electric Company, forwarding Inspection Report No. 50-344/89-19, Docket No. 50-344, August 15, 1989.*

3. Letter from J. B. Martin, Administrator, NRC Region V, to David W. Cockfield, Vice President, Nuclear, Portland General Electric Company, forwarding "Enforcement Conference on Containment Recirculation Sump Debris and Design Problems," Docket No. 50-344, September 1, 1989.*

4. Letter from John B. Martin, Administrator, NRC Region V, to David W. Cockville, Vice President, Nuclear, Portland General Electric Company, forwarding Notice of Violation and Proposed Imposition of Civil Penalty - $280,000," EA 89-162, Docket No. 50-344, October 5, 1989.*

5. Letter from Bruce S. Mallett, Chief, Nuclear Materials Safety Branch, NRC Region III, to Donald Brunn, Senior Administrator, Abbott Northwestern Hospital, forwarding Inspection Report No. 030-02223/89002, Docket No. 030-02223, License No. 22-04588-01, August 9, 1989.*

6. Letter from Mohamed M. Shanbaky, Chief, Nuclear Materials Safety Section A, Division of Radiation Safety and Safeguards, NRC Region I, to Roger P. Winn, Worcester City Hospital, forwarding Inspection Report No. 030-00242/89-002, Docket No. 030-00242, License No. 20-05969-03, October 17, 1989.*

7. Letter from Charles E. Norelius, Director, Division of Radiation Safety and Safeguards, NRC Region III, to J. McArdle, President, Glitsch Field Services/NDE, Inc., forwarding Inspection Report No. 030-07682/89001, Docket No. 030-07682, September 1, 1989.*

8. Letter from A. Bert Davis, Administrator, NRC Region III, to J. G. McArdle, President, Glitsch Field Services/NDE, Inc., forwarding a Notice of Violation, Docket No. 030-07682, December 27, 1989.*

9. Confirmatory Action Letter from A. Bert Davis, Administrator, NRC Region III, to A. L. Kaplan, Manager, Lighting Environmental Operation, General Electric Company, Docket No. 40-00534, June 2, 1989.*

10. Letter from A. Bert Davis, Administrator, NRC Region III, to A. L. Kaplan, Manager, Lighting Environmental Operation, General Electric Company, forwarding Notice of Violation and Proposed Imposition of Civil Penalty and Inspection Report No. 040-00534/89001, Docket No. 40-00534, August 25, 1989.*

---

*Available in NRC Public Document Room, 2120 L Street, NW, (Lower Level) Washington, D.C., for public inspection and/or copying.

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).

An event will be considered an abnormal occurrence if it involves 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 rem or more of radiation; exposure of the skin of the whole body of any individual to 150 rem or more of radiation; or exposure of the feet, ankles, hands or forearms of any individual to 375 rem or more of radiation [10 CFR 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 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 [CFR 20.403(b)(2)].

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 1000 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.

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 that is judged to be significant relative to normally expected performance and that 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 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 [10 CFR 50.36(c)].

2. Major degradation of fuel integrity, primary coolant pressure boundary, or primary containment boundary.

3. Loss of plant capability to preform 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 that 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 system).

For Fuel Cycle Licensees

1. A safety limit of license technical specifications is exceeded and a plant shutdown is required [10 CFR 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 that 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 1989 period, NRC licensees, Agreement States, Agreement State licensees, and other involved parties, such as reactor vendors and architect-engineering firms, 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 subsequent updating information on the abnormal occurrences discussed. The updating provided generally covers events that took place during the report period; some updating, however, is more current as indicated by the associated event dates. Open items will be discussed in subsequent reports in the series.

NUCLEAR POWER PLANTS

79-3 Nuclear Accident at Three Mile Island

This abnormal occurrence was originally reported in NUREG-0090, Vol. 2, No. 1, "Report to Congress on Abnormal Occurrences: January-March 1979," and updated in each subsequent report in this series (NUREG-0090, Vol. 2, No. 2 through Vol. 12, No. 2). It is planned to continue these updates until defueling activities at the site are completed. The update of activities for this report period is as follows:

Reactor Vessel and Ex-Vessel Defueling Operations

During the July through September 1989 period, approximately 10,000 pounds of fuel and debris were removed from the reactor vessel (RV). The total mass loaded into canisters as of the end of the period was approximately 283,000 pounds (about 94 percent out of a total of approximately 300,000 pounds of core debris and other materials). The total mass to be removed includes the mass of the core; structural and absorber materials; mass added by oxidation of core and structural material; and portions of the baffle plates, formers, and other components that have become commingled with core debris during defueling operations. Removal of the baffle plates and defueling of the area between the core baffle plates and the core barrel have begun. The remaining fuel debris is principally located behind the remaining baffle plates, on the RV lower head, and in the outer periphery of the lower core support assembly (LCSA).

Decontamination and Dose Reduction Activities

Since early December 1988, the licensee focused its efforts on the completion of defueling and the support of that activity. Decontamination (other than reactor building) and system flushing activities are currently suspended, except limited efforts to maintain access to and operability of plant systems.

Fuel Cask Shipments

During the period, one additional shipment containing about 31,500 pounds of core debris was made from TMI-2 to the Idaho National Engineering Laboratory (INEL). The total amount shipped is about 266,800 pounds of core debris, which represents about 89 percent of the total to be shipped.

Post-Defueling Monitored Storage

On September 14, 1989, the NRC staff issued Supplement 3 to the Programmatic Environmental Impact Statement (PEIS) related to the decontamination and disposal of radioactive waste resulting from the March 28, 1979, accident at TMI-2 (Ref. B-1). This supplement evaluates the impacts of the licensee's proposal to place the facility in long term storage, called Post-Defueling Monitored Storage (PDMS) by the licensee, until Unit 1 is ready for decommissioning. At that time, both units would then be decommissioned simultaneously. The NRC staff is currently reviewing the licensee's Safety Analysis Report on PDMS.

Disposal of Accident-Generated Water

On September 11, 1989, the NRC staff issued a license amendment removing the prohibition to dispose of the Accident Generated Water (AGW). Issuance of this license amendment is the result of a two and one half year review of the licensee's proposal that included a public hearing before the NRC Atomic Safety and Licensing Board Panel. The licensee began construction of the evaporator that will be used to dispose of the AGW in mid-August 1989 and expects to complete testing and begin operation of the evaporator in late 1989.

TMI-2 Advisory Panel Meetings

The Advisory Panel for the Decontamination of Three Mile Island Unit 2 (Panel) met on Thursday, September 21, 1989. The NRC staff briefed the Panel members on the final revision of the PEIS on PDMS. Licensee staff members briefed the Panel on radiation monitoring programs and cleanup progress, funding, and schedule. The Panel members also discussed planning and funding for the ultimate disposal of the facility.

Future reports will be made as appropriate.

* * * * * * * *

85-14 Management Deficiencies at Tennessee Valley Authority

This abnormal occurrence was originally reported in NUREG-0090, Vol. 8, No. 3, "Report to Congress on Abnormal Occurrences: July-September 1985," and updated in Vol. 9, No. 1; Vol. 9, No. 2; Vol. 9, No. 3; Vol. 10, No. 2; Vol. 10, No. 4; Vol. 11, No. 1; Vol. 11, No. 2; Vol. 11, No. 3, Vol. 11, No. 4; and Vol. 12, No. 1. It is further updated for this report as follows:

Sequoyah

In June 1989, NRC senior management decided to remove the Sequoyah site from the list of plants requiring enhanced attention.

Browns Ferry

Browns Ferry Units 1, 2, and 3 have been shutdown and de-fueled since 1985. Since that time, TVA has made substantial progress in implementing various corrective action programs to address the problems which led to the shutdowns.

As a result of this progress and subsequent NRC audits and inspections conducted to assure that personnel, procedures, and training necessary to support a safe refueling and transition to a fueled shutdown mode were completed, TVA was allowed to reload fuel at Unit 2. Currently, TVA anticipates the restart of Unit 2 in May 1990. Prior to granting permission for restart, the NRC will conduct a thorough technical review, audit and inspection program to ensure that the deficiencies previously identified are corrected and that plant systems, procedures and personnel are adequate to operate the unit safely. The staff's technical reviews completed to date are contained in two Safety Evaluation Reports (SERs) on TVA: Browns Ferry Nuclear Performance Plan (NUREG-1232, Vol. 3, and Supplement 1 to NUREG-1232, Vol. 3). A final Supplement to the SER is planned prior to restart.

Watts Bar

On May 22, 1989, the applicant submitted its plan for the licensing of Watts Bar Unit 1 in Volume 4 of the TVA Nuclear Performance Plan (NPP) as the Watts Bar NPP (WBNPP). This was in response to the issues raised by the NRC in a letter dated September 17, 1985 pursuant to 10 CFR 50.54(f). In this submittal, the applicant described the actions taken or planned to identify, document, investigate, and correct problems at the Watts Bar nuclear power plant. The WBNPP also makes reference to the Corrective Actions Programs (CAPs) prepared for Watts Bar. At present, the applicant is developing a detailed schedule for implementing the CAPs and the completion of the Watts Bar nuclear power plant.

The NRC staff is presently reviewing the CAPs and the WBNPP and a number of team inspections are underway. The staff is also developing a licensing plan, including both technical review and inspection activities to be conducted by the staff, consistent with the applicant's licensing schedule for Unit 1. TVA is currently evaluating the licensing schedule.

Future reports will be made as appropriate.

* * * * * * * *

OTHER NRC LICENSEES

86-23 Release of Americium-241 Inside a Waste Storage Building at Wright-Patterson Air Force Base

This abnormal occurrence was originally reported in NUREG-0090, Vol. 9, No. 4, "Report to Congress on Abnormal Occurrences: October-December 1986," and updated in NUREG-0090, Vol. 10, No. 4 and Vol. 11, No. 2. It is further updated, and closed out, as follows:

On June 8, 1989, the NRC issued an order to the United States Air Force Radioisotope Committee, imposing civil monetary penalties in the amount of $102,500 (Ref. B-2) for two violations associated with the spills of americium-241 in 1986 at Wright-Patterson Air Force Base (WPAFB) near Dayton, Ohio. The first violation, pertaining to the accuracy and timeliness of reporting the event to the NRC, was assessed a civil penalty of $100,000. The violation was categorized as Severity Level I (out of five severity levels in which Severity Levels I and V are the most and least significant, respectively). The second violation,

categorized as Severity Level III and assessed a civil penalty of $2,500, pertained to an apparent overexposure to airborne radioactivity to a member of the WPAFB staff during cleanup activities.

The Air Force has paid the civil penalties, but has contested the $2,500 civil penalty for the apparent overexposure. The NRC staff is reviewing information submitted by the Air Force in support of its position.

On October 21, 1988, the former Radiation Safety Officer at Wright-Patterson pleaded guilty to possession of a radioactive material (americium-241) without NRC authorization. On December 13, 1988, he received a suspended sentence of two years imprisonment and a requirement to perform 200 hours of community service. A second charge of making a false statement to the NRC was dismissed.

Unless new, significant information becomes available, this item is considered closed for the purposes of this report.

* * * * * * * *

87-13 Significant Breakdown in Management and Procedural Controls at an Industrial Radiography Licensee

This abnormal occurrence, involving United States Testing Company, Inc., Unitech Services Group, San Leandro, California, was originally reported in NUREG-0090, Vol. 10, No. 2, "Report to Congress on Abnormal Occurrences: April-June 1987," updated in NUREG-0090, Vol. 11, No. 2, and closed out in Vol. 11, No. 4. It is being reopened, and then reclosed, to report the following new, significant information:

On September 22, 1989, the NRC issued a notice of violation (NOV) and proposed imposition of civil penalties in the amount of $280,000 (Ref. B-3), based on inspections performed during 1987. Previous to the September 22, 1989, enforcement action, the NRC had issued to the licensee: (1) a Confirmatory Action Letter on February 13, 1987 (Ref. B-4), confirming actions taken by the licensee to assure compliance with radiography training and certification procedures; (2) Inspection Report No. 30-20402/87-01 on June 16, 1987 (Ref. B-5), documenting the 1987 inspection findings; and (3) an Order Modifying License on June 17, 1987 (Ref. B-6), specifying stringent conditions for continued operations.

As discussed in the September 22, 1989, enforcement letter, the violations were grouped as follows: (1) violations involving use of untested and uncertified radiographers and assistant radiographers; (2) violations involving unauthorized use of the licensee's facility in Hoboken, New Jersey; and (3) violations involving radiation protection, unauthorized use of equipment, transportation, recordkeeping, and audit requirements. The enforcement action was delayed pending completion of the NRC Office of Investigations (OI) inquiry as to whether certain of the violations were willful.

The OI has completed its investigation and concluded that: (1) the licensee's former Radiation Safety Director knowingly allowed numerous violations of NRC requirements to occur, constituting a disregard for the NRC license conditions and the safety of licensee employees; (2) the licensee's former President and Vice President willfully neglected their responsibilities to manage radiographic activities in a safe manner throughout the United States; and (3) management's

neglect was motivated by profit incentives to give the licensee an unfair business advantage over its radiography competitors.

The three groups of violations were categorized as Severity Levels I, I, and II, respectively (out of five severity levels in which Severity Levels I and V are the most and least significant, respectively). The proposed civil penalties for the three groups were $100,000, $100,000, and $80,000, respectively, for a total of $280,000. The NRC recognized that, since these violations occurred, significant corrective action has been taken by U.S. Testing. The corrective action involved major management changes, including the resignation of the Vice President and Radiation Safety Director, and the retirement of the President. The civil penalty reflected that corrective action. But for these changes that appear to have addressed the root cause of the violations, NRC would have initiated action to suspend or revoke U.S. Testing's license in addition to the civil penalty.

This item is considered closed for the purposes of this report.

* * * * * * * *

APPENDIX C

OTHER EVENTS OF INTEREST

The following item is described because it may possibly be perceived by the public to be of public health or safety significance. The item did not involve a major reduction in the level of protection provided for public health or safety; therefore, it is not reportable as an abnormal occurrence.

1. Radioactive Spill in a Sub-basement at Nine Mile Point Unit 1

During August 1989, the NRC became aware of a long-standing significant contamination problem in the Nine Mile Point Unit 1 Radwaste Processing Building (RPB) 225' elevation sub-basement. A flooding incident during 1981 caused a radioactive spill in the room, and the room had never been decontaminated. In effect, the licensee (Niagara Mohawk Power Corporation) had been using the room since the incident as a liquid radwaste holding facility. However, the RPB was designed as a solid radwaste drumming and storage facility, not as a liquid radwaste storage facility. Nine Mile Point Unit 1 utilizes a General Electric-designed boiling water reactor and is located in Oswego County, New York.

On August 22, 1989, the NRC sent an Augmented Inspection Team (AIT) to the plant site to investigate the circumstances and safety implications of using the room as a liquid radwaste holding facility. The following details were extracted from the AIT report that was issued on October 2, 1989 (Ref. C-1).

The 225' elevation sub-basement of the RPB was flooded to just above the 229' elevation in early July, 1981. This occurred because the licensee had filled all of its liquid radwaste storage tanks and the level in some of these tanks needed to be reduced to re-establish normal radwaste processing. The tank levels were lowered by draining the tanks to the 225' elevation sub-basement with the intention of using the area as a temporary storage area. Consideration was not apparently given at the time of the decision to the potential radiological impact of using the sub-basement as a liquid radwaste holding facility.

At the time of the flooding, there were approximately 150 fifty-five gallon drums in the area, most of which were filled with radioactive waste largely consisting of dewatered filter sludge and resins. As discovered in October, 1981, the flooding floated the drums off their carriers. Since practice was to leave the tops off the drums until final preparation for transport to promote further drying, the floating of the drums resulted in the spilling of their contents into the room. Calculations indicate present estimated dose rates on the drums to be as high as 500 rem/hour and total estimated inventory in the room to be about 7,500 curies.

During the same time period, also associated with relieving the excess water in the radwaste system, the licensee made a controlled discharge of processed water to Lake Ontario and notified the NRC of this discharge. Appropriate precautions were taken by the licensee to ensure that the discharge conformed to regulatory limits.

The 225' elevation sub-basement of the RPB was used by the licensee as a liquid radioactive waste storage holding facility since July, 1981. The results of the licensee's monitoring programs and measurements did not indicate any leakage of radioactive material from the radwaste building. The NRC inspection team concluded that leakage of radionuclides from the sub-basement was negligible and

that no pathway of radioactive material from the sub-basement to the environment was identified. The radiological impact to workers and offsite was negligible and within regulatory guidelines. The licensee plans to clean, decontaminate, and repaint the entire 225' elevation sub-basement.

The AIT findings identified two problems as follows: the licensee (1) did not perform evaluations to assess the acceptability and consequences of using the sub-basement as a liquid radwaste holding facility; and (2) did not notify the NRC of flooding the sub-basement, of the decision to defer decontamination of the sub-basement, or of the costs and extent of decontamination anticipated. (The AIT report states that the licensee now estimates the decontamination/ cleanup efforts will take about seven months and will cost between $1.5 and $2.0 million.)

The NRC has held an enforcement conference with the licensee. Enforcement action is pending.

* * * * * * * *

REFERENCES (FOR APPENDICES)

B-1 U.S. Nuclear Regulatory Commission, "Programmatic Environmental Impact Statement (PEIS) Related to Decontamination and Disposal of Radioactive Wastes Resulting from March 28, 1979 Accident at Three Mile Island Nuclear Station, Unit 2, Final Supplement Dealing with Post-Defueling Monitored Storage and Subsequent Cleanup," NUREG-0683, Supplement No. 3, August 1989.†

B-2 Letter from Hugh L. Thompson, Jr., NRC Deputy Executive Director for Nuclear Materials Safety, Safeguards, and Operations Support, to Colonel Charles K. Maffett, Chairman, United States Air Force Radioisotope Committee, forwarding an Order Imposing Civil Monetary Penalties, EA 88-87, Docket No. 30-28641, June 8, 1989.*

B-3 Letter from John B. Martin, Administrator, NRC Region V, to L. Lazar, President and Chief Executive Officer, United States Testing Company, Inc., Unitech Services Group, forwarding Notice of Violation and Proposed Imposition of Civil Penalties for $280,000, EA 87-52, Docket No. 30-20402, September 22, 1989.*

B-4 Confirmatory Action Letter from B. H. Faulkenberry, Deputy Administrator, NRC Region V, to Gene Basile, President, United States Testing Company, Inc., Unitech Services Group, Docket No. 30-20402, February 13, 1987.*

B-5 Letter from Ross A. Scarano, Director, Division of Radiation Safety and Safeguards, NRC Region V, to Gene Basile, President, United States Testing Company, Inc., Unitech Services Group, forwarding Inspection Report No. 30-20402/87-01, Docket No. 30-20402, June 16, 1987.*

B-6 Letter from James M. Taylor, NRC Deputy Executive Director for Regional Operations, to Gene Basile, President, United States Testing Company, Inc., Unitech Services Group, forwarding an Order Modifying License, Effective Immediately, Docket No. 30-20402, June 17, 1987.*

C-1 Letter from Malcolm R. Knapp, Director, Division of Radiation Safety and Safeguards, NRC Region I, to Lawrence Burkhardt, III, Executive Vice President, Nuclear Operations, Niagara Mohawk Corporation, forwarding NRC Augmented Inspection Team (AIT) Inspection Report No. 50-220/89-80, Docket No. 50-220, October 2, 1989.*

---

†Available for purchase from the Superintendent of Documents, U. S. Government Printing Office, P. O. Box 37082, Washington, DC 20013-7082. Also available from the National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161. A copy is also available for public inspection and/or copying at the NRC Public Document Room, 2120 L Street, NW, (Lower Level), Washington, D.C.

*Available in NRC Public Document Room, 2120 L Street, NW, (Lower Level), Washington, D.C., for public inspection and/or copying.