UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

NOV 10 1977

MEMORANDUM FOR: K. R. Goller, Assistant Director for Operating Reactors, DOR

FROM: D. G. Eisenhut, Assistant Director for Operational Technology, DOR

SUBJECT: PROPOSED SECTION 208 ABNORMAL OCCURRENCE EVENT - GENERAL ELECTRIC TEST REACTOR

After several discussions with OMIPC, we have determined that the recent events related to the shutdown of the General Electric Test Reactor meet the criteria for reporting the event as an Abnormal Occurrence. Specifically, the events constitute the discovery of a major condition not specifically considered in the Safety Analysis Report which required immediate remedial action.

We request that you provide a proposed Federal Register Notice for this event to this Office by COB November 16, 1977. Utilizing your input, we will coordinate further actions related to the reporting of this event with OMIPC.

A copy of a Federal Register Notice for a previously reported Abnormal Occurrence is enclosed for your information.

D. G. Eisenhut, Assistant Director
for Operational Technology
Division of Operating Reactors

Enclosure:
As stated

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Cause or Causes - The cause of the breach of the security system was the failure of the personnel on duty to comply with security directives for the control of access to the protected and vital areas of the plant.

Actions Taken to Prevent Recurrence

Licensee - The licensee reviewed the adequacy of the existing security plan. Additional measures were taken to strengthen the security program through personnel instruction, monitoring for enforcement, auditing and increased security staffing at security stations during periods of heavy personnel traffic.

NRC - NRC expressed its concern about the serious nature of this type of security breakdown and identified the actions deemed necessary to correct the situation during the inspection, as well as at a special corporate meeting on April 22 in Denver, Colorado. Enforcement action also included a proposed civil penalty in the amount of eight thousand dollars.

Following completion of a rulemaking proceeding addressed to upgrading of physical security requirements at all nuclear power plants, the NRC issued revised physical security regulations (10 CFR 73.55) in February 1977 which require more stringent security measures to be implemented at this plant and other nuclear power plants.

During the period May 17-24, 1977, inspectors verified that corrective actions had been implemented.

Future reports will be made as appropriate.

77-3 Fuel Rod Failures at Nuclear Power Reactor

Preliminary information pertaining to this event was reported in the Federal Register (42 FR 36897) on July 18, 1977.

Date and Place - On May 15, 1977, during refueling operations at Dairyland Power Cooperative's LaCrosse Boiling Water Reactor (LACBWR) located in Vernon County, Wisconsin, the licensee noted that 3 of the 72 fuel assemblies in the core had localized fuel rod failures with portions of the fuel rods within the assembly missing. A total of 26 of the 72 fuel assemblies exhibited some degree of fuel degradation.

Nature and Probable Consequences - The nuclear steam supply system of LACBWR, a 165 megawatt (thermal) plant, was provided by Allis Chalmers. The LACBWR is the only operating boiling water power reactor which utilizes fuel rods with stainless steel cladding. Each fuel rod consists of uranium-dioxide fuel pellets housed in a closed hollow tube of stainless

steel about 0.4 inches in diameter and about 8 feet long. The tube, or fuel cladding, is one of the several barriers designed to contain the radioactive fission products produced during reactor operation. Failure of fuel cladding causes the release of radioactive fission products into the reactor coolant which generally results in an increase in environmental releases above normally expected levels. Fuel clad failures can vary in degree from small perforations in the clad material to fuel rod failures. Fuel rod failures are a safety concern due to the potential for affecting adjacent fuel rods or control rods and for affecting the course of events in postulated accidents. However, the limiting conditions for plant performance are such that plant operation is conservatively restricted before a safety problem develops or environmental radioactive releases become a safety concern.

For approximately a five-month period prior to reactor shutdown for the current refueling outage, the reactor was operated at reduced power levels in order to maintain radioactivity releases to the environs within the prescribed limits for reactor operation.

During refueling operations following reactor shutdown at the completion of Fuel Cycle No. 4, portions of fuel rods were found to be missing from three fuel assemblies (each assembly contains 100 fuel rods in a 10 x 10 array). Visual inspections resulted in the identification of defective fuel rods in six fuel rod assemblies with an average of 4 to 5 defective rods per assembly. Three of these assemblies were observed to have some sections of fuel rod missing. An approximate total of 55 inches (length) of fuel rod was missing representing parts of 7 fuel rods. Subsequently, several of the missing rod pieces were recovered from the top of adjacent fuel assemblies in the reactor core and another piece was recovered in the spent fuel storage pool. In addition to the 6 fuel assemblies which exhibited visual damage, 20 fuel assemblies were found to exhibit fission gas release rates above specified limits based on the results of fuel "sipping" examinations which measure fuel assembly radioactive releases to core cooling water.

The average exposure of the 26 damaged fuel assemblies is greater than 16,000 megawatt days per metric ton of uranium. This is the highest average exposure of discharged fuel in the history of LACBWR's operation.

Although this event is not the first incidence of fuel rod failures at LACBWR, the extent and degree of the previous failures were significantly less than for this occurrence.

The precise nature of the significance to public health of this type event can vary from no effect to a health hazard if consequent occupational overexposures or large uncontrolled radioactivity releases occur. The consequences of this event were a reduction in electrical generating capacity, increased radiation levels in the reactor coolant and various other areas at the plant, and a possible extended refueling outage to

evaluate the extent of fuel damage and to recover missing pieces of fuel and cladding located within the reactor vessel. There were no personnel exposures to radiation and no radioactive releases to the environs in excess of regulatory limits as a result of this occurrence. No health hazards resulted.

Cause or Causes - Based on preliminary investigations, observed defects in the cladding of the damaged fuel rods are quite similar to the circumferential cracks observed in previous fuel inspections at LACBWR. However, the longitudinal failures evidenced in fuel rods of the three most severely affected fuel assemblies appear to have been caused by a combination of fuel/clad interaction and accelerated stress corrosion cracking. The intersections of the longitudinal cracks and the circumferential cracks resulted in losses of complete sections of the cladding.

Actions Taken to Prevent Recurrence

Licensee - The licensee is continuing to inspect the damaged fuel and to determine the cause of fuel rod failures. The specific actions to prevent recurrence will be determined based on the results of these investigations.

NRC - The NRC is reviewing the licensee's findings and, prior to granting the licensee authorization to return the reactor to power operation, will establish appropriate operating restrictions to prevent similar fuel rod failures in the future.

Future reports will be made as appropriate.

FUEL CYCLE FACILITIES

(Other Than Nuclear Power Plants)

There were no abnormal occurrences at fuel cycle facilities during this period.

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.