U. S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-219/88-11

Docket No. 50-219

License No. DPR-16

Licensee: GPU Nuclear Corporation
P. O. Box 388
Forked River, New Jersey 08731

Facility Name : Oyster Creek Nuclear Generating Station

Inspection At: Forked River, New Jersey

Inspection Conducted: April 11-15, 1988

Inspector: S. Sherbini 5/9/88
S. Sherbini, Senior Radiation Specialist, date
Facilities Radiation Protection Section

Approved by: M. S. Shanbaky 5/11/88
M. M. Shanbaky, Chief, Facilities date
Radiation Protection Section

Inspection Summary: Inspection on April 11-15, 1988 (Report No. 50-219/88-11)

Areas Inspected: A routine safety inspection to review the status of items identified during the 1987 Integrated Performance Assessment Team inspection (IPAT), the status of measures to control drywell access during fuel movements, and the status of corrective actions in connection with a recent Licensee Event Report.

Results: One violation of the requirements of 10 CFR Part 20 was identified (detailed in section 6).

## DETAILS

### 1.0 Personnel Contacted

### 1.1 Licensee Personnel

* K. Barnes, Licensing Engineer
  T. Feldman, Systems Safety Engineer
* P. Fiedler, Vice President, Oyster Creek
* J. Kowalski, Licensing Manager
  T. Milligan, Instructor, Training
  M. Rossi, Instructor, Training
* P. Scallon, Manager, Radwaste Operations
  G. Seals, Radiological Engineer
* M. Slobodien, Director, Radiological Controls
* P. Thompson, QA Auditor
* K. Wolf, Manager, Radiological Engineering

### 1.2 NRC Personnel

* J. Wechselberger, Senior Resident Inspector
* E. Collins, Resident Inspector
* M. Shanbaky, Chief, Facilities Radiation Protection Section, Region I
* M. Markley, Radiation Specialist, Region I

### 2.0 Review of the status of the Integrated Performance Assessment Team (IPAT) items

Several weaknesses in the radiological controls program at Oyster Creek were identified during the Integrated Performance Assessment Team (IPAT) inspection that took place in 1987. These items were discussed in the IPAT report but were not separately numbered as open items.

### 2.1 Training and experience Requirements:

IPAT finding: "The lack of clearly defined training and experience requirements (for the supervisory staff) and clear organization relationships is a weakness".

A compilation of job descriptions for the supervisory staff in the Radiological Controls Department has been completed. The job descriptions also specify the minimum qualification requirements for each position.

The training requirements for radiological engineers have been established and a training program for the engineers was recently started. The program consists of a series of modules, each dealing with a topic of interest to the engineers. The modules are to be taught by subject experts, either from the GPU organization or from outside that organization. Attendance of offsite courses is also part of the training program. The training program for the group radiological controls supervisors (GRCS) has not yet been established. The licensee stated that they expect that the supervisor's program will include attending the training program for the radiological controls technicians as well as relevant parts of the training program for the radiological engineers. This item is considered closed. The training program for the GRCS's will be reviewed during a future inspection.

2.2 Trigger Levels for ALARA Reviews:

IPAT finding: "The trigger levels for ALARA reviews are quite high. The estimated dose for the job must exceed 5 man rem before an ALARA review is triggered".

The practice at Oyster Creek is that a job gets an ALARA review by a radiological engineer if the estimated exposure for the job is equal to or exceeds 5 man rem. The practice common in the nuclear power industry is to provide ALARA reviews for jobs in excess of 1 man rem. The licensee stated that the finding that 5 man rem is the trigger level for an ALARA review is misleading because station procedures specify other criteria for initiating a review. Procedure 9300-ADM-4010.02, "ALARA review Procedure", specifies the following criteria:

. If estimated total exposure is over 5 man rem
. If dose to the skin may be limiting
. If airborne concentrations may exceed 50 MPC
. If there may be a release of radioactive material directly to the environment
. If work is inside highly contaminated systems or components
. If the radiological controls supervisor or engineer feel that a review is advisable

The licensee also stated that data from the previous outage showed that over 90% of the cumulative radiation exposure was received during work on jobs that had ALARA reviews. The licensee stated that lowering the trigger level for a review to 1 man rem would increase the number of reviews substantially without a corresponding benefit in dose reduction. The inspector stated that licensee performance in the area of ALARA will be

reviewed during future inspections to decide whether a lower trigger level would be beneficial. This item is considered closed.

2.3 Formal Training in ALARA:

IPAT finding: "Interviews with technicians indicate that they...use ALARA techniques but they have not been formally trained in ALARA nor is ALARA a formal responsibility".

Since the IPAT inspection, an ALARA training program has been implemented. The program consists of a two-day combination lecture and workshop training that is now part of the required initial training for all maintenance and construction personnel. Portions of this course will be made part of the retraining material, including the technician's retraining program. Radiological controls technicians are also required to attend these training sessions. The licensee stated that the training is provided jointly to the maintenance and radiological controls personnel. This was found to be a very useful forum for exchange of ideas between workers from different departments of the station. This item is considered closed.

2.4 Survey Meter Source Check:

IPAT finding: "Survey meters are source checked only by mid-shift technicians for use the next day. Due to the delay between the source check and field use of the meter, there is a possibility that the meter could become inoperative".

The meters in question are ion chamber survey meters issued to workers signing on RWPs for entry into high radiation areas. The licensee stated that the meters are checked once a day and that a source check sheet is maintained at the issue desk to document these checks. The licensee also stated that the chance of a meter malfunctioning within 24 hours after a source check with the meter not in use is very small. The licensee further stated that the worker is required to review the source check sheet as part of the meter checkout procedure; also, the worker should be able to recognize a malfunctioning meter as he proceeds into the radiation and high radiation areas because these areas have background fields that should register a reading on the meter. The inspector stated that this appears to be an adequate procedure provided the workers are trained to understand and look for such signs of malfunction. The licensee stated that workers are adequately trained in the use of survey instruments. The training of technicians on the use of survey meters will be reviewed during a future inspection. This item is considered closed.

2.5 High background levels at frisking stations:

IPAT finding: "The inspector noted that all four of the booths (frisking booths inside the reactor building) had background levels that exceeded the maximum allowable, making it difficult and, in some cases, impossible to perform a proper frisk in that booth".

Station procedure 9300-ADM-4330.02, "Monitoring for Personnel Contamination", states that the background is to be less than 300 cpm on the frisker before starting a frisk. If the background is higher, then the worker should notify radiological controls. Contamination is considered to exist if the net count rate above background is over 100 cpm. Personnel are expected to frisk as they leave posted contamination areas. The licensee stated that much of the observed high background was caused by the proximity of contaminated equipment, such as pipes containing radioactive materials. These components have been, or are being, decontaminated to reduce the radiation fields they generate. In addition, the licensee stated that they may install whole body friskers with adequate shielding at key frisking locations. This is expected to alleviate the frisking problems. The licensee stated that in addition to frisking at the exits to contamination areas, workers must pass through whole body friskers before they leave the radiological controls area. Therefore, any contamination that may be missed at the frisking stations will be detected at these more sensitive friskers. The inspector stated that a check by the inspector of the alarm setpoints of various friskers in the reactor building showed that they alarmed at widely different count rates above background. These alarm count rates varied between 100 cpm above background to over 350 cpm above background. The licensee stated that the alarm setpoints are not very accurate and that the workers must monitor the meters on the friskers and not rely solely on the alarms. The inspector stated that the licensee should ensure that these points are clearly explained to the workers during their training. This item is considered closed. The licensee's training in this area will be reviewed during future inspections.

2.6 Potential for contamination of the breathing air supply:

IPAT finding: "A potential for the contamination of the breathing air supply from a bottled gas station near the compressor house air intake was noted".

The compressor is used to supply breathing and service air to various locations within the plant. The compressor is housed in a sheet metal shack adjacent to the turbine building. Adjacent to that shack is a storage area for bottles of compressed industrial gases, such as nitrous oxide, acetylene, nitrogen, propane, etc. Part of the pipe runs that carry these gases from the cylinders to locations inside the building pass through the air compressor shack. The concern is that if a leak occurs from one of these pipes, it may release gases that may be drawn into the compressor air

intake. The gases will then contaminate the breathing air and may pose a danger to users of this air. The licensee prepared a safety report on this issue and concluded that leakage within the compressor building is not a credible event and should therefore not be considered any further. The report did identify hazards connected with the gas cylinders that were not mentioned in the IPAT report, and have taken action to reduce these hazards. These hazards were in connection with the possibility of damage to the gas cylinders and pipes resulting from trucks and other traffic in the area. The inspector stated that although the report appears to be well researched, it does not present an analysis of the concentrations of gas in the compressor building if a leak did occur, and whether such a leak would pose a danger. The licensee stated that they will calculate the concentrations to be expected in case of a leak. This item will be reviewed during a future inspection.

2.7 Training on the placement of TLD dosimeters:

IPAT finding: "During General Employee Training (GET), workers were instructed to turn their TLD badge around when taping it to their protective clothing".

This practice requires that the workers wear their TLD badges with the front side of the badge facing away from the source of radiation. This practice was adopted because the sticking tape used to tape the TLD to the clothing stuck to the paper name label on the front of the dosimeter and removed it when the tape was being removed. The licensee stated that the dosimeter holder is symmetrical front to back, with both sides equipped with a beta window. The dosimeter itself is also nearly symmetrical, with both front and back faces equipped with beta windows. The inspector maintained, however, that the dosimeter was not symmetrical internally, and that the back side of the dosimeter had slightly more shielding material than the front side. This additional shielding was believed to be sufficient to change the dosimeter's response to beta radiation. The licensee has since revised their practice, and workers are now instructed to tape their dosimeters with the front face facing the radiation field. This item is considered closed.

2.8 Pass/Fail Requirements for training quizzes:

IPAT finding: "Although the technicians must pass their requalification examination, there is no requirement to pass the cyclic quizzes. ..There appears no incentive for the technicians to do well in the cyclic training".

The licensee stated that passing the requalification exams is part of the technician's job description but passing the cyclic quizzes is not. The

licensee also stated that, although the absence of a requirement to pass the cyclic quizzes has been a problem in the past, the problem has been solved without imposing a pass/fail requirement. The results of the cyclic quizzes are reported to the technician's supervisor who then reviews the results and investigates the reasons for any poor performance. These reviews and the corrective actions taken are documented. This item is considered closed.

3.0 Worker Concerns Regarding Assignment of Intakes:

Some workers told an NRC inspector that they are concerned about a practice they observed when using personnel air samplers. They stated that the radiological controls technicians sometimes require them to turn on their air samplers long before they enter the airborne radioactivity areas. The workers felt that this practice dilutes the air sample collected and leads to underestimation of the intake of radioactive materials assigned to them. The inspector attempted to verify the validity of this concern by discussions with radiological controls technicians and supervisors but the consensus was that this is not a common practice at the site. The inspector reviewed the procedures dealing with air sampling and analysis. The procedures were found to be weak because they failed to address important questions such as when to turn on the air samplers, who is to turn on the samplers, and various other important items, including definitions of such quantities as collection time and stay time. The inspector examined the formulae used to calculate air intakes from air sample data. It was found that the practice of turning on the samplers before entry into airborne radioactivity areas does not affect the assigned intake, provided the stay time used in the calculation is equal to the sample collection time. A review of randomly selected air sample records showed that these times are often, but not always, equal. However, although the use of equal stay times and sample collection times leads to correct intake values regardless of the time at which the sampler is turned on, sampling clean air will affect the average concentration calculated from this data. Although this concentration is not needed to calculate the assigned intake (MPC-Hr), it is used as a trigger point to calculate intakes. Air samples showing average concentrations less than 0.25 MPC fraction will cause intakes to be ignored and entered in the record as zero. (MPC fraction is equal to the actual concentration divided by the maximum allowable concentration). Therefore, dilution of the sample may cause some intakes to be assigned as zero when they should not have been so assigned. The licensee stated that they will review the procedures and the current air sampling practice and take appropriate corrective action. The inspector stated that the licensee should explain these considerations to the workers and technicians in order to address their concerns. The licensee stated that this will be done. Corrective actions in this area will be reviewed during a future inspection.

4.0 Drywell Access During Fuel Movements:

Boiling water reactor drywell-containments Marks I, II, and III have been found to pose potential radiation exposure hazards because of insufficient shielding between the refueling cavity/transfer canal areas and the drywell. As a result of this shielding problem, very high dose rates may be produced in the drywell during fuel movements. General Electric has published generic letters alerting their customers to the dangers and suggesting corrective actions, both physical and administrative. A review of the licensee's corrective actions by the inspector showed that several questions should be answered before this item can be considered closed. The corrective measures taken by the licensee include the following.

. Installation of additional shielding in the fuel transfer canal between the refueling cavity area and the fuel pool. The design specifications call for 12" of steel on the side of the shield sitting on the bottom of the transfer canal. The licensee's calculations show that this shield would be sufficient to reduce the dose rates in the upper parts of the drywell to approximately 100 mrem/hr in case of a fuel drop accident in the transfer canal. However, the licensee was unable to verify that the shield was constructed in accordance with the design specifications. The licensee stated that the as-built shield specifications will be produced for examination during a future inspection.

. Two area radiation monitors were installed in the upper parts of the drywell. These monitors are equipped with alarms to warn personnel in the drywell of any unusually high radiation fields. However, the acoustics in the drywell are not good, and people in some parts of the drywell would probably not hear the alarms. The licensee stated that alarms also sound at the drywell control point. If the alarm is triggered, the radiological controls technician at the control point would sound a loud air powered bullhorn at the entrance to the drywell. The licensee stated that the horn is easily heard everywhere in the drywell and is recognized as an evacuation signal by all personnel. Another problem with these two radiation area monitors is that, although procedures requires frequent operability checks, these checks appear to be electronic checks. There was no mention in the procedures of source checks of the system. The licensee did not know whether such source checks are required, but stated that they will investigate this point. The alarm setpoints for the monitors are specified by procedure to be 2-5 times ambient background. The inspector pointed out that the drywell is often a relatively high background area and that a setpoint 2-5 times this high background level may be unacceptably high. The licensee stated that this requirement will be reviewed and changed to address this concern. These item will be reviewed during a future inspection.

. Drywell access is permitted by the licensee during fuel movements, but is restricted to the lower elevations, below the 51' elevation. Access above the 51' elevation is permitted only by special permission. The drywell is

usually posted as a locked high radiation area. As such, workers are generally equipped with alarming dosimeters. However, the general practice is to provide one or two such dosimeters per group of workers working in the same location. The inspector pointed out that this practice may not be adequate for workers permitted above the 51' elevation because of the expected sharp radiation field gradients and possible streaming. The licensee stated that the procedural requirements will be changed. This item will be reviewed during a future inspection.

. Procedures for reactor defueling and refueling incorporate safety measures to minimize the radiation hazards in the drywell. The procedures require that the shield in the transfer canal be installed before any fuel movements (the shield is not left permanently in place but is removed after refueling). Fuel movements in the refueling cavity beyond the boundaries of the reactor vessel, except in the transfer canal, are not permitted unless the drywell is evacuated and locked. However, this is an administrative restriction; there are no corresponding physical constraints, such as limit switches or barricades to prevent such inadvertent movements. The inspector stated that it is necessary to determine the dose rates in the upper as well as the lower parts of the drywell in case such fuel movements do occur, or in case a fuel drop accident results in a fuel rod falling in the cavity beyond the reactor vessel. This data is necessary in order to decide whether evacuation of the drywell in such a situation would be feasible without excessive exposures to the workers being evacuated. The licensee stated that they will obtain the required data. This item will be reviewed during a future inspection.

5.0 Licensee Event Report (LER) 87-041:

This LER was issued on February 1, 1988 following an incident that resulted in improper classification and control of a locked high radiation area. The incident occurred when a radiological controls technician (RCT) was instructed by his supervisor to remove a temporary shield from an internally contaminated fuel pool cooling system pipe. The intent was to remove one layer of the two layers of shielding that were in place on the pipe. The technician and his supervisor misunderstood and removed both shields. The technician surveyed the area after removing the shields and found the highest exposure rate to be 900 mR/hr. He therefore left the area posted as a high radiation area. The technician's supervisor witnessed the shield removal and the survey and concurred with the results. About 40 hours later, a radiological engineer discovered that the exposure rate in the area is actually 4 R/hr with a 6 R/hr hot spot. He reclassified the area as a locked high radiation area until shielding was re-installed. The inspector reviewed the circumstances of the incident and also the radiological incident report (RIR) generated to critique the events. The RIR was found to be inadequate because it failed to address many of the deficiencies that caused this incident. The LER and critique were made

required reading as a way to educate site personnel to avoid recurrence. However, the LER is written in such a manner as to suggest that the event was due to negligence on the part of the technician who removed the shield. A review of the details indicates that this is an inaccurate evaluation of the situation. Since the critiques are normally used as a training tool for site personnel in the form of required reading, the required reading in this case will not serve its training function. A review of the sequence of events by the inspector revealed several weaknesses:

. Each temporary shield must be labeled. The shields in question were two separate temporary shields, installed at different times, one on top of the other, and with different authorizations. They therefore required separate identification labels. One of the two shields, however, was unlabeled, leading the technician to believe that the entire shield assembly was in fact one unit. The RIR did not address the reasons for the unlabeled temporary shield.

. Procedures require that a temporary shield must not remain temporary for more than one cycle. At the end of this time, the shield must either be changed to a permanent shield or removed. The unlabeled temporary shield had been in place for approximately 3 years, that is, over one cycle. The RIR did not discuss the reason for this deviation from procedure.

. The radiological engineer who requested the shield to be removed knew about the multiple temporary shields but failed to clearly instruct the GRCS (Group Radiological Controls Supervisor) in charge when he instructed him to have the shield removed.

. There is no discussion of the reasons why a RCT and his supervisor, the GRCS, improperly surveyed the area and missed a 4 R/hr field. The LER suggests that the RCT made a poor survey, which is true, but it failed to describe the nonuniform nature of the field and the streaming effects that were present because of the piping configuration. The LER and RIR did not clarify this point. This was especially important because inadequate surveys of nonuniform radiation fields has been a recurring problem at Oyster Creek and has been the subject of a number of NRC violations. The RIR is supposed to analyze the causes of poor practices with the intent of educating site personnel to avoid them. The RIR generated in this case did not accomplish this function.

The licensee stated that the whole incident was mishandled because of special circumstances that existed at the time, namely, a labor strike. Although this may have been a contributing factor, a review of the events indicates that there are programmatic weaknesses that cannot be explained by the strike, and which the licensee has failed to address. This weakness in identifying root causes of events has been pointed out in previous NRC inspection reports in connection with other events of a similar nature. The

adequacy of RIRs item will therefore be reviewed during future inspections.

6. Radiation Surveys in the Torus Room:

Work in connection with cathodic protection of the torus has been in progress since February of this year. The work is conducted in the torus room. In early April, the licensee discovered that the radiation fields in the work area had not been properly surveyed and that the radiation fields were more nonuniform than expected. As a result of the field nonuniformity, the placement of the personnel dosimetry was found to have been incorrect. The dosimeters were placed on the worker's chest area, but because of the radiation field gradient in the work area, the highest dose rates were in the head region. This constitutes an apparent violation of the requirements of 10 CFR 20.202. The licensee made a preliminary re-evaluation of the doses received by the workers involved. The results indicate that none of the workers exceeded the applicable administrative dose limit (1000 mrem). The failure to properly survey the radiation fields in the torus room is an apparent violation of the requirements of 10 CFR Part 20.201(b). (50-219/88-11-01). Although the incident was identified by the licensee, the violation cannot be mitigated because of a recent history of violations for similar failures to adequately survey nonuniform radiation fields that resulted in unexpected exposures to workers. At the time of this inspection, the licensee was still in the process of investigating this incident. Review of the detailed findings will therefore be completed during a future inspection, and final assessment of the circumstances will be left as an unresolved item (50-219/88-11-02).

7. Allegation RI-87-A-0125:

This allegation was made by a contractor worker on 10/20/87 to the Resident Inspector. The worker alleged that a radiological controls technician instructed him and co-workers to ignore some RWP requirements for making a drywell entry. Subsequently, the worker was found by the licensee to be in violation of drywell entry requirements and was disciplined. The worker also alleged that there was a possible coverup attempt of the incident by the licensee.

An NRC regional inspector interviewed the radiological controls technician referred to in the allegation, as well as his supervisors and all personnel associated with the allegation. The inspector also reviewed the RWP in question, the licensee's investigation reports of the incident, and all other material connected with the drywell entry in question. As a result of this review, the inspector was unable to substantiate the allegation of a coverup. However, multiple procedural violations, as well as technical

specifications violations associated with this incident, were previously identified by the NRC. Weaknesses in the procedures controlling drywell access were also identified. The details of this incident and associated findings were previously discussed in NRC inspection report 50-219/87-39.

8. Exit Meeting:

The inspector met with licensee representatives at the conclusion of the inspection on April 15, 1988. The inspector summarized the scope of the inspection and the findings.