U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-255/94012(DRP)

Docket No. 50-255 License Nos. DPR-20

Licensee: Consumers Power Company
212 West Michigan Avenue
Jackson, MI 49201

Facility Name: Palisades Nuclear Generating Facility

Inspection At: Palisades Site, Covert, Michigan

Inspection Conducted: July 1 through August 19, 1994

Inspectors: M. E. Parker
D. G. Passehl
R. L. Hague
J. F. Schapker
C. N. Orsini
K. Salehi

Approved By: _____ 9/8/94
W. J. Kropp, Chief Date
Reactor Projects Section 2A

Inspection Summary

Inspection from July 1 through August 19, 1994; Report No. 50-255/94012(DRP)
Areas Inspected: Routine, unannounced safety inspection by resident and regional inspectors of actions on previous inspection findings, operational safety verification, engineered safety feature systems, onsite event follow-up, current material condition, housekeeping and plant cleanliness, radiological controls, security, safety assessment/quality verification, maintenance, surveillance, engineering and technical support, and dry cask storage of spent fuel.

Results: Within the 12 areas inspected, no cited violations or deviations were identified. One noncited violation was identified (paragraph 7).

The following is a summary of the licensee's performance during this inspection period:

Plant Operations

The licensee's performance in this area was adequate. The plant operated at essentially full power since startup on June 18, 1994.

The licensee's response to a July 27, 1994, firemain rupture was mixed. Operators quickly recognized the situation and deenergized the fire water pumps to prevent more extensive soil washout and damage to other structures in the vicinity. Fire suppression capability was returned within a reasonable time after assessing the consequences of the event. However, areas requiring continuous firewatches due to inoperable fire suppression capability were not adequately established. The inspector found the licensee's procedures and training in this regard were lacking.

The licensee's response to an August 9, 1994, overflow of water from the valve pit adjacent to the Primary System Storage Tank and the Utility Water Storage Tank was good. Operators and health physics personnel took immediate steps to identify and isolate the leak.

There was an adverse trend in Charging Pump P-55A availability due to material condition deficiencies. Several times during the past summer the pump has been inoperable, causing an increased out-of-service time to necessitate repairs.

The licensee's actions on monitoring and evaluating Dose Equivalent Iodine were satisfactory. The current average monthly activity level is approximately 0.045 microcuries per milliliter. The licensee has secured the services of two contractors in its "fuel integrity working group," that meets regularly to review and discuss the data.

Safety Assessment/Quality Verification

Consumers Power Company's Management and Safety Review Committee (MSRC) for the Big Rock Point and Palisades nuclear plants met on June 29, 1994. The members met to discuss recent plant operations, outages, internal assessment findings, program changes, and future schedules. Issues were discussed based on plant tours, interviews, and discussions with various licensee personnel. The MSRC made several positive observations and suggestions for improvement at the meeting.

Maintenance and Surveillance

The licensee's performance in this area was adequate. The licensee continued to experience problems with the Main Generator Voltage Regulator Firing Circuit. Although work to disable the west firing circuit module trip was effective, there have been other spurious alarms associated with the main generator control circuits showing that equipment problems still exist.

Engineering and Technical Support

The licensee's performance in this area was adequate. The inspectors met with licensee representatives working the alternate spent fuel pool cooling project. The licensee appears to have adequate measures in place to assure a successful completion of the project.

Dry Cask Storage Of Spent Fuel

The licensee's performance in this area was adequate. A noncited violation was issued for failing to provide double verification for sampling and analysis of the boron concentration of the spent fuel pool water during dry cask loading.

On July 28, 1994, the licensee identified three minor indications on the multi-assembly scaled basket (MSB) #4 that were not identified during the original review of the radiographs. The licensee subsequently performed an operability evaluation and determined that the MSB #4 was operable. This determination was based upon testing performed on the MSB prior to it being placed into service on the storage pad. The licensee was in the process of completing a more detailed operability assessment that includes a fracture analysis. The licensee is making plans to unload the MSB.

Dose rates higher than expected were identified on Ventilated Concrete Casks (VCC) #3 and #4 after loading. The highest dose rate for VCC #3 was 60 mrem/hr (0.6 mSv/hr), and for VSC #4 was 56 mrem/hr (0.56 mSv/hr). The licensee followed the required actions of the license, which included verifying the correct fuel loading and performing an analysis to demonstrate compliance with 10 CFR Part 20 and 10 CFR Part 72 with regard to dose to the general public. These requirements were completed satisfactorily.

Improvements were observed during loading of multi-assembly sealed basket (MSB) #4 over the previous loading of MSB #3. There was better preparation and planning, greater control over the assigned tasks, enhanced communication, and more direct management oversight. Radiological controls were effectively implemented during loading and handling operations. Contamination control practices were generally good.

DETAILS

1. Persons Contacted

Consumers Power Company

*#R. A. Fenech, Vice President, Nuclear Operations
* T. J. Palmisano, Plant General Manager
W. F. Peabody, NECO Manager (Interim)
* R. D. Orosz, Director, NOD Services
* R. M. Swanson, Director, NPAD
* D. D. Hice, Nuclear Training Manager
* S. Y. Wawro, Acting Operations Manager
#D. W. Rogers, Safety & Licensing Director
R. B. Kasper, Maintenance Manager
* R. C. Miller, System Engineering Manager
#K. M. Haas, Radiological Services Manager
C. R. Ritt, Administrative Manager
* J. C. Griggs, Human Resource Director
* H. A. Heavin, Controller
M. A. Savage, Corporate Communications
* D. G. Malone, Shift Operations Superintendent
D. J. Malone, Radiological Services Supervisor
* T. P. Neal, Health Physics Support Superintendent
#R. A. Vincent, Licensing Administrator
#J. Decker, General NDT Supervisor
*#D. Fadel, NECO Engineering Program Manager
#M. Ferens, NECO Dry Fuel Storage Procurement Manager
#S. MacLean, NECO Dry Fuel Storage Engineer
#J. Nordby, NECO Welding Engineer
*#J. Pomaranski, NECO Construction Manager
*#R. Smedley, Licensing Staff Engineer
#D. Zeigler, NDT Field Services Supervisor

Nuclear Regulatory Commission

* W. J. Kropp, Reactor Projects Section Chief
*#M. E. Parker, Senior Resident Inspector
* D. G. Passehl, Resident Inspector
#C. Haughney, Branch Chief, NMSS
#S. O'Connor, Team Leader, NMSS
#J. Smith, Reactor Inspector, RIII

*Denotes those attending the exit interview conducted on August 19, 1994.
#Denotes those attending the exit interview conducted on August 3, 1994.

The inspectors also had discussions with other licensee employees, including members of the technical and engineering staffs, reactor and auxiliary operators, shift engineers and electrical, mechanical and instrument maintenance personnel, and contract security personnel.

2. Action on Previous Inspection Findings (92701)

a. (Closed) Inspection Followup Item 255/91009-01(DRP): Maintenance personnel used an uncontrolled copy of a vendor manual during a maintenance activity to disassemble and clean a raw water strainer. No Notice of Violation was issued because this was considered an additional example of a violation issued in Inspection Report 255/91006(DRSS) involving use of uncontrolled vendor manuals. Closure of this issue will be tracked under violation 91006-03(DRSS), which is still open and will be reviewed for closeout at a later date. This item is closed.

b. (Closed) Inspection Followup Item 255/92006-01(DRP): Concrete spalling in auxiliary feedwater (AFW) pump room. This item concerned the licensee's evaluation of the impact of feedwater heater E-4A settling on the integrity of the AFW pump room. The inspector's review of this issue was documented in Inspection Report 50-255/92027(DRP). This item is closed.

c. (Closed) Inspection Followup Item 255/92021-01(DRP): Steam leaks in vents for reheaters. This item was opened to track the licensee's root cause determination and corrective action for accelerated steam erosion of the vent header piping on feedwater heaters E-6A and E-6B. The licensee's review determined that the running vent configuration was changed during installation of new E-6A/B feedwater heaters in 1990. At that time, the vents were modified to combine three 1" running vents into a single 1" running vent. This 1" running vent discharged into a 3" vent header. Since the single running vent passed the same flow, 1 to 2 percent of the steam supplied to the heaters, the velocity in this line was increased by a factor of three. The running vent entered the header at a 45° angle, which contributed to the steam cutting at the pipe wall.

The licensee has implemented several corrective actions that included:

- The schedule 40 carbon steel vent header piping was replaced with schedule 160 stainless steel. This increased the wall thickness and erosion resistance of the piping.
- The running vent was modified to enter the vent header along the centerline, thus eliminating steam cutting at the header wall.
- Operations procedures were changed to keep the running vents closed during startup and normal power operation, and to open the running vents once per month for a six hour purge of the heaters.

The licensee has been monitoring the heaters as part of the Thermal Performance Monitoring Program to ensure that the heaters do not become air bound. No adverse affects of the modification and the procedure change have been identified by the licensee. This item is closed.

No violations, deviations, unresolved, or inspection followup items were identified in this area.

3. Plant Operations (71707, 93702)

The plant has operated up to 100 percent power since startup on June 18, 1994.

a. Operational Safety Verification (71707)

The inspectors verified that the facility was being operated in conformance with the license and regulatory requirements and that the licensee's management control system was effective in ensuring safe operation of the plant. On a sampling basis, the inspectors verified proper control room staffing and coordination of plant activities; verified operator adherence with procedures and technical specifications; monitored control room indications for abnormalities; verified that electrical power was available; and observed the frequency of plant and control room visits by station management. The inspectors reviewed applicable logs and conducted discussions with control room operators throughout the inspection period. The inspectors observed a number of control room shift turnovers. The turnovers were conducted in a professional manner and included log reviews, panel walkdowns, discussions of maintenance and surveillance activities in progress or planned, and associated LCO time restraints, as applicable.

b. Engineered Safety Feature (ESF) Systems (71707)

During the inspection period, the inspectors selected accessible portions of several ESF systems to verify status. Consideration was given to the plant mode, applicable Technical Specifications (TS), Limiting Conditions for Operation (LCO) requirements, and other applicable requirements.

Various observations, where applicable, were made of hangers and supports; housekeeping; whether freeze protection, if required, was installed and operational; valve position and conditions; potential ignition sources; major component labeling, lubrication, cooling, etc.; whether instrumentation was properly installed and functioning and significant process parameter values were consistent with expected values; whether instrumentation was calibrated; whether necessary support systems were operational; and whether locally and remotely indicated breaker and valve positions agreed.

During the inspection, the accessible portions of the High Pressure Safety Injection and Low Pressure Safety Injection were walked down.

The following items were identified during the walkdowns:

- A pipe support on the miniflow recirculation line for high pressure safety injection pump P-66A was missing.

- Protective grating around a floor penetration for a sensing line for pressure transmitter PT-0306 (low pressure safety injection pump discharge pressure) was lifted from the floor and resting on the ¼ inch sensing line.

In response to the above items, the licensee evaluated the conditions and took appropriate action.

c. Onsite Event Follow-up (93702)

During the inspection period, the licensee experienced several events, some of which required prompt notification of the NRC pursuant to 10 CFR 50.72. The inspectors pursued the events onsite with licensee and/or other NRC officials. In each case, the inspectors verified that any required notification was correct and timely. The inspectors also verified that the licensee initiated prompt and appropriate actions. The specific events were as follows:

- Fire Main Rupture: On July 27, 1994, the firemain system ruptured underground at the south end of the screen-house building. The rupture caused the loss of all automatic fire suppression capability throughout the plant. The licensee implemented several contingency actions, such as notifying the Covert fire department, increasing plant fire tours, and canceling a preplanned outage on an emergency diesel generator. By midnight the licensee identified the location of the break to be just downstream of fire water to cooling tower isolation valve MV-FP-176. The licensee closed the valve thereby isolating the break. Automatic fire suppression capability was returned shortly thereafter to all areas of the plant, with the exception of the cooling towers and some nonessential areas.

  The rupture caused a buckling of the ground surface above the failed section of pipe and washout of soil in the vicinity of the break location. A concrete pillar supporting the 90 inch cooling tower return line, located near the center of the newly-formed 12 foot diameter sink hole, remained unaffected. No movement of the cooling tower support was noted to date. The licensee has been monitoring the line for any movement since the event occurred.

The licensee determined the probable cause of the failure was bending and twisting forces at the failure location due to cyclic loading from heavy loads on the ground above, combined with the more brittle nature of the pipe material (Grade D cast iron).

Repairs include replacing the section of failed pipe with a stronger, more ductile pipe material, and restoring the affected soil to proper design compaction.

The inspector found the licensee's response to this event to be mixed. The licensee's immediate response was good. Operators quickly recognized the situation and deenergized the fire water pumps to prevent more extensive soil washout and damage to other structures in the vicinity. Fire suppression capability was returned within a reasonable time after assessing the consequences of the event.

However, areas requiring continuous firewatches due to inoperable fire suppression capability were not adequately established. The inspector found the licensee's procedures and training in this regard were lacking. The weaknesses in the licensee's procedures and training in this area is considered an Inspection Followup Item pending further review by the NRC (255/94012-01).

- Overflow Of Slightly Radioactive Water From The Utility Water Storage Tank: On August 9, 1994, the licensee discovered an overflow of water from the valve pit adjacent to the Primary System Storage Tank and the Utility Water Storage Tank, T-90 and T-91 respectively. Subsequent evaluation determined that the water was coming from tank T-91, which receives distillate from the dirty waste evaporator. Health Physics took immediate action to rope off the area and obtain soil samples. Soil samples around the tank where the overflow occurred indicated low levels of activity. The licensee has removed some contaminated soil and is continuing to perform a more detailed radiation survey to determine the extent of contamination. Once the valve pit was pumped down, the licensee was able to determine that the leak was on a recirculation line in the valve pit.

In addition, the licensee retracted the following telephone notifications made earlier to the NRC:

- Control Room Heating, Cooling, and Ventilation (HVAC) System Failed To Meet Design Basis Flow Requirements: On May 22, 1994, a non-emergency 4-hour report was made based on the results of the service water flow test for the control room HVAC coolers. The report stated that the flow required to

support the service water temperature analyzed upper limit of 81.5 degrees F at 46 gpm was not met during the testing. The test results showed flows through HVAC condensing units VC-10 at 45 gpm, and VC-11 at 44 gpm. The condition was reported per 10 CFR 50.72(b)(2)(iii) and under 10 CFR 50.72(b)(2)(i).

After further reviews, the licensee determined that the plant would not have exceeded the design basis, and the control room HVAC coolers would have been able to perform their design basis function. This was based on the service water flow data and the lake temperature during the late fall and winter time period when the low flow condition existed concurrent with the unit at power.
The licensee had November temperature data that showed the lake water temperature at approximately 50 degrees F. Therefore, ample margin existed in the service water temperature to make up for the apparent 1-2 gpm drop in service water flow.

- Emergency Diesel Generator (EDG) Potential Overload: On April 27, 1994, a non-emergency 4-hour report was made when the licensee found that the potential existed for the EDG to exceed the two hour rating if emergency safeguards system pumps were all operating at run-out conditions concurrent with a Loss of Coolant Accident with a Loss of Offsite Power and only one EDG operating. The condition was reported per 10 CFR 50.72(b)(2)(iii)(D).

  The licensee subsequently determined that the inputs for the time to initiate manual loading of a hydrogen recombiner and a second battery charger were not realistic. The licensee concluded that there would be 30 minutes into the event before the hydrogen recombiner was put in operation and the second battery charger would not be energized until after one hour into the event.

  With this information the EDG loading calculation was revised and resulted in a total load within the two hour rating.

d. Current Material Condition (71707)

The inspectors performed general plant as well as selected system and component walkdowns to assess the general and specific material condition of the plant, to verify that work requests had been initiated for identified equipment problems, and to evaluate housekeeping. Walkdowns included an assessment of the buildings, components, and systems for proper identification and tagging, accessibility, fire and security door integrity, scaffolding, radiological controls, and any unusual conditions. Unusual

conditions included but were not limited to water, oil, or other liquids on the floor or equipment; indications of leakage through ceiling, walls, or floors; loose insulation; corrosion; excessive noise; unusual temperatures; and abnormal ventilation and lighting.

Material condition this inspection period was generally good, but some areas warrant continued attention, including Charging Pump P-55A. The inspector noted an increase in equipment problems associated with P-55A over the past few months. The licensee has been unable to obtain an acceptable seal package for the pump. The pump has leaked excessively several times during the past few months necessitating repairs and challenging the TS LCO.

There have been other problems with the pump as revealed by a review of control room logs. The inspector reviewed the control room logs for the past three months and noted in the past two months alone the pump ran for only 15, 16, and 11 days, respectively, before being declared inoperable for repacking. Historically, the pump would run for approximately two months before repacking became necessary. Other noted deficiencies throughout the period included:

- Loss of automatic speed control;
- Pieces of RTV sealant floating in the plunger well area;
- Unexplained banging noises in the fluid drive section near the pump discharge;
- Clattering of the discharge check valve.

Although some of the problems, such as the short life of the packing, appear to be design related; other problems were due to questionable maintenance work practices that led to maintenance rework. Involvement by engineering was satisfactory. The inspector found the system engineer appropriately involved with resolution of the design discrepancies. The material condition of Charging Pump P-55A is considered an Unresolved Item pending further review by the NRC and licensee (255/94012-02). Considering the previous problems with the material condition of the charging pumps, the licensee has agreed to respond to this Unresolved Item within 60 days of receipt of this letter. The response should address what actions the licensee plans to take to improve the material condition of the charging pump and to reduce the out-of-service time and potential challenge to the T.S. LCO.

e. Housekeeping and Plant Cleanliness (71707)

The inspectors monitored the status of housekeeping and plant cleanliness for fire protection and protection of safety-related

equipment from intrusion of foreign matter. No significant concerns were identified this inspection period.

f. Radiological Controls (71707)

The inspectors verified that personnel were following health physics procedures for dosimetry, protective clothing, frisking, posting, etc., and randomly examined radiation protection instrumentation for use, operability, and calibration.

The inspectors reviewed the licensee's current action on Dose Equivalent Iodine (DEI). Dose equivalent iodine values are used as an indicator of failed fuel. The current average monthly activity level is approximately 0.045 microcuries per milliliter. The TS have an upper limit of 1.00 microcuries per milliliter before plant shutdown is required.

The current DEI value has placed the plant in the second of four "Action Levels" ($0.03 < DEI < 0.12$) per plant procedure COP-1, "Primary Coolant System Chemistry." At this level the licensee is required to increase primary coolant sampling frequency to daily, and to evaluate the efficiency of the Chemical Volume and Control System demineralizers. The licensee has performed these actions in addition to several others, including review of chemistry data by outside contractors, NWT and Siemens Power Corporation. The two contractors are members of the licensee's "fuel integrity working group," that meet regularly to review and discuss the data.

The current position of the group is that there is between one and three leaking fuel rods in the core, likely in a second cycle "N" fuel assembly.

The inspectors found that the licensee is taking appropriate actions to track and evaluate the data. The group has predicted that based on current trends, the DEI activity level should be about 0.08 microcuries per milliliter at the end of this cycle.

g. Security (71707)

Each week during routine activities or tours, the inspectors monitored the licensee's security program to ensure that observed actions were being implemented according to the approved security plan. The inspectors noted that persons within the protected area displayed proper photo-identification badges and those individuals requiring escorts were properly escorted. The inspectors also verified that checked vital areas were locked and alarmed. Additionally, the inspectors also observed that personnel and packages entering the protected area were searched by appropriate equipment or by hand.

No violations, deviations, unresolved, or inspection followup items were identified in this area.

4. Safety Assessment/Quality Verification (40500 and 92700)

Consumers Power Company's Management and Safety Review Committee (MSRC) for the Big Rock Point and Palisades nuclear plants met on June 29, 1994. The members met to discuss recent plant operations, outages, internal assessment findings, program changes, and future schedules. Issues were discussed based on plant tours, interviews, and discussions with various licensee personnel. The MSRC made several positive observations and suggestions for improvement.

No violations, deviations, unresolved, or inspection followup items were identified in this area.

5. Maintenance/Surveillance (62703 and 61726)

a. Maintenance Activities (62703)

Routinely, station maintenance activities were observed and/or reviewed to ascertain that they were conducted in accordance with approved procedures, regulatory guides and industry codes or standards, and in conformance with technical specifications.

The following items were also considered during this review: LCOs were met while components or systems were removed from service; approvals were obtained prior to initiating the work; functional testing and/or calibrations were performed prior to returning components or systems to service; quality control records were maintained; and activities were accomplished by qualified personnel.

The inspectors were concerned with the large number (approximately 1800) of outstanding non-outage corrective maintenance work orders in the licensee's backlog. The licensee was aware of the issue and has begun steps to address the issue. The inspectors will continue to follow the licensee's progress in resolving the backlog.

Portions of the following maintenance activities were observed or reviewed:

- Work Instruction WI-24413037-02: Disable Main Generator Voltage Regulator Firing Circuit Module Trip: Workers used the work instruction and Temporary Modification TM-94-072 to disable the west firing circuit module trip in the main generator's voltage regulator to avoid an unanticipated turbine/reactor trip. The work was performed by electrical maintenance personnel with support from system engineering. The quality of support for this job appeared good. The

licensee had extensive vendor input and held discussions with other nuclear utilities that had experienced similar problems. The job was performed satisfactorily.

However, there have been other spurious alarms associated with the main generator control circuits that indicate equipment problems still exist. The licensee appears to have taken appropriate followup actions, including continuous monitoring of suspect components.

- Work Orders 24412845, 24411704, 24413113, 24413114, 24413145, and 24413782: Addresses various Charging Pump P-55A deficiencies which is further discussed in paragraph 3.d of this report.

- Work Order 24413584: Repair fire main rupture which is further discussed in paragraph 3.c of this report.

- Work Order 24413217 and 24413262: Resolve TI-0122HA, "A" Hot Leg Temperature Indication Fluctuations

- Work Order 24410670: Load and Transport Multi-Assembly Sealed Basket (MSB) No. 3

- Work Order 24410664: Load and Transport Multi-Assembly Sealed Basket (MSB) No. 4

- Work Order 24413278: Lower High Temperature Alarm Setpoint Per Temporary Modification 94-069 From 175 to 147 Degrees F on Primary Coolant Pump P-50D

- Work Order 24412785: Erect Masonry Block Wall around Fuel Oil Transfer Pumps P18A and P18B for Seiche Protection

b. Surveillance Activities (61726)

During the inspection period, the inspectors observed TS required surveillance testing and verified that testing was performed in accordance with adequate procedures, that test instrumentation was calibrated, that results conformed with technical specifications and procedure requirements and were reviewed, and that any deficiencies identified during the testing were properly resolved.

The inspectors also witnessed or reviewed portions of the following surveillances:

- MO-7A-2, "Emergency Diesel Generator 1-2 (K-6B)," Rev.31

- FPSP-MO-1, "Fire Suppression System Valve Alignment," Rev.0

- MI-6, "Area Monitor Operational Check," Rev.1

No violations, deviations, unresolved, or inspection followup items were identified in this area.

6. Engineering and Technical Support (37700)

The inspectors met with licensee representatives working the alternate spent fuel pool cooling project. The purpose of the project was to upgrade the material condition of components (valves, piping, etc.) associated with the spent fuel pool cooling systems and component cooling water cooling systems during the next refueling outage in 1995. The discussions centered on the system design and layout, design contingencies, and preliminary work plan.

The licensee appears to have adequate measures in place to assure a successful completion of the project. The alternate cooling system is scheduled to be in effect for about thirty days when there would be minimal heat load in the spent fuel pool. The portions of the system that were in safety related areas of the plant would meet seismic requirements, materials would be certified to appropriate standards where appropriate, and a backup class 1E power supply would be available. Procedures were in place to operate and maintain the system during normal and off-normal conditions.

The inspectors will continue to periodically monitor the licensee's progress on this project.

No violations, deviations, unresolved, or inspection followup items were identified in this area.

7. Dry Cask Storage of Spent Fuel (83750, 37700)

The inspectors monitored the licensee's loading of spent fuel assemblies from the spent fuel pool fuel storage racks to the dry cask MSBs. This inspection covered loading of two dry casks, Nos. 3 and 4. Dry Cask No. 3 was loaded on June 20, 1994, and Dry Cask No.4 was loaded on July 11, 1994. Although overall the loadings were performed successfully, several weaknesses were observed with loading of MSB No.3, whereas loading of MSB 4 was greatly improved.

a. Background

The licensee contracted with Pacific Sierra Nuclear Corporation (PSN) to design and construct a dry cask spent fuel storage facility to be partially constructed onsite for long term temporary storage of spent fuel. The licensee has documented a 10 CFR 50.59 evaluation as required by 10 CFR 72.212 (Subpart K), showing that use of the general license for storage of spent fuel at the power reactor site will not involve an unreviewed safety question or Technical Specification (TS) change.

The PSN cask design consists of a steel multi-assembly sealed basket (MSB) which holds 24 spent fuel assemblies (sealed) and a

steel clad ventilated concrete cask (VCC) which provides biological shielding and MSB protection.

The PSN cask design has been granted a Certificate of Compliance (C of C) by the NRC. This inspection was conducted using the specifications, standards, codes, and commitments described in the licensee's design certification.

b. Radiological and Fuel Handling Observations For MSB No. 3

The inspectors observed radiological practices and monitored the loading of 15 spent fuel assemblies from the spent fuel pool to MSB 3 on June 20, 1994. Radiological controls were generally good. In the area of fuel handling, there were several concerns identified due to poor preparation and a lack of ownership by operations personnel.

Radiological controls during loading of MSB 3 were effectively implemented during loading and handling operations. Contamination control practices were generally good. There were some problems with personnel walking past contaminated area boundaries without the proper protective clothing. This was caused when the boundary was moved as the multi-assembly transfer cask (MTC) and MSB were lifted from the fuel pool to the cask wash down pit. The licensee indicated that the posting criteria would be reviewed for the job to determine if a more effective means could be implemented for future cask loading operations.

During reviews of fuel handling operations for the loading of MSB No. 3 on June 20, 1994, the inspectors identified the following concerns:

- The spent fuel pool boron was not sampled in accordance with the C of C requirements. A violation was issued (paragraph 7.c);
- Operators worked up to 16 hours to accomplish the activity in a high temperature and high humidity environment. This increased the likelihood for error;
- Communications and video recording gear were not properly prestaged prior to loading fuel, causing unnecessary delays;
- A hose used to filter spent fuel pool water was found to interfere with movement of the fuel handling machine and had to be re-located, causing extra effort to control contamination and unnecessary delays;
- Some contamination boundary postings were inconspicuous as described above.

These concerns were discussed with the licensee. During subsequent loading of MSB No. 4 on July 11, 1994, the inspectors did not identify any similar concerns. The inspectors noted that the licensee took extensive measures to address these concerns, including dedicating a senior reactor operator to be in overall control of fuel loading activities. The inspectors considered the licensee's actions to correct the above concerns noted during the loading of MSB No. 3 as effective.

c. Violation For Inadequate Boron Sampling of the Spent Fuel Pool

The C of C for dry cask fabrication and loading required the licensee to sample and analyze the boron concentration of the spent fuel pool water within four (4) hours of setting the first fuel assembly in the MSB. The requirement mandated double verification for sampling and analysis. Specifically, double verification required two independent technicians take samples and perform independent analyses. Contrary to this requirement, during loading of MSB No. 3, the licensee identified that a routine sample was taken and analyzed by only one technician. Although the licensee took three separate samples between 2:05 p.m. and 7:17 p.m. (the time of the first fuel assembly loading), the samples were not taken by two persons and were not independently analyzed.

A potential contributor to this problem was that Chemistry Department personnel were unaware of the requirement. This requirement should have been provided by the Operations Department, who had the overall responsibility of loading MSB 3. The first sample taken at 2:05 p.m. was a routine sample reported by Chemistry to the Control Room. Procedure FHSO-17, "Multi-Assembly Basket Loading Procedure," Section 3.3, did not require double verification, therefore, this sample should not have been used to meet the C of C requirement. In fact, none of the three boron samples met the C of C requirements for independent verification. On the following day, during the review of sampling records and procedure requirements, the licensee identified this problem and initiated condition report C-PAL-94-0409.

10 CFR 72.210 requires the licensee to comply with the requirements specified in the C of C pertaining to storage of spent fuel assemblies. Further, 10 CFR 72.212(b)(2)(i) requires that conditions set forth in the C of C must be met prior to loading fuel. Not meeting the specific requirement for double verification during the sampling of the SFP, as delineated in the C of C, constituted a violation of 10 CFR 72.212(b)(2)(i). In considering the violation, the enforcement discretion criteria specified in 10 CFR Part 2, Appendix C, Section VII(B)(2) was considered.

This violation will not be subject to enforcement action because the licensee's efforts in identifying and correcting the violation met the above enforcement criteria. Corrective actions included revising the governing procedure for dry cask loading with adequate cautions concerning double verification. In addition, the licensee counseled responsible department personnel and other involved individuals. Double verification of the boron was performed during the loading of MSB No. 4. Adequate checks exist to preclude reoccurrence during subsequent cask loadings.

d. Fuel Handling Observations During Loading of MSB No. 4

The loading of MSB 4 was performed on July 11, 1994, with significant improvement from MSB 3 loading activities. The inspectors observed loading of 24 fuel assemblies into MSB 4. The improvements reduced the overall length of the activity to less than a third of the time consumed during the prior cask loading. These changes reflected better preparation and planning, greater control over the assigned tasks, enhanced communication, and more direct management oversight. Proper ownership of this activity was evident from its start to its completion. Various steps were preplanned and were properly coordinated.

e. Welding Inspection

The NRC inspector observed the welding of the seal lid and structural lid of the MSB Nos. 3 and 4. The following was verified:

- The essential welding variables were controlled in accordance with the applicable welding procedure specifications (WPS FC-LID revision 4 (FCAW) and SM-LID revision 2 (SMAW)).
- The welding procedure specifications and welders and welding operators were qualified in accordance with the specification requirements.
- The helium leak test was performed in accordance with the specification requirements.
- The certified material test reports for the welding materials were reviewed. The welding wire and electrodes met the requirements of the applicable American Society of Testing Material (ASTM) standards.

The licensee's middle management supervision was apparent throughout the welding and testing of the MSB seal and structural lids. All processing observed was performed in accordance with procedure requirements.

f. Elevated Dose Rates Found On MSB 3 and MSB 4

There were higher than expected radiation measurements when the loaded MTC and MSB were lifted out of the spent fuel pool. The licensee attributed the higher reading to a new step in their procedure which required draining 75 gallons of water from the MTC/MSB as it was being lifted. This step was added to lower the water level in the MSB so the water would not interfere with subsequent welding of the lid to the MSB. This reduced the shielding effect of the water in the MSB which was compensated for by using shielding during the lid welding.

When the MTC/MSB assembly was loaded into the Ventilated Concrete Cask (VCC), further radiation dose rate surveys were required prior to moving the VCC to the storage pad. The results of these surveys indicated that some areas on the top of the VSC exceeded the maximum dose rate of 50 mrem (0.5mSv/hr) prescribed by the C of C. The highest dose rate identified was 60 mrem/hr (0.6 mSv/hr). The licensee followed the required actions of the C of C which included verifying the correct fuel loading and performing an analysis to demonstrate compliance with 10 CFR Part 20 and 10 CFR Part 72 with regard to dose to the general public. These requirements were completed satisfactorily.

A further determination of why the observed dose rates exceeded those originally predicted was also performed. This analysis stated that the dose rate predictions were based predominately on radiation emanating from spent fuel with a given burn-up and age; however, the licensee believed that early fuel assemblies contained varying amounts of Cobalt (Co)-60 in the top hardware. The Co-60 was produced by neutron activation of Co-59 which was a trace element in the assembly hardware. The concentration of Co-59 was not controlled until recently and could vary significantly from assembly to assembly.

Elevated dose rates were also identified on VCC No. 4. The highest dose rate was 56 mrem/hr (0.56 mSv/hr). A NRC Region III radiation specialist was sent to the site to make confirmatory surveys on VCC No. 3. In addition, the results for VCC No. 4 were reviewed. The results of these surveys were in agreement with those of the licensee. The shielding analysis for the cask assumed a uniform plane source of 50 mrem/hr(.5 mSv/hr) emanating from the top of the cask. A 29 point survey performed on the top of VCC 3 showed an average dose rate of 28.9 mrem/hr (.29 mSv/hr). Similar results were obtained for VCC 4; therefore, the dose to the public from VCC No. 3 and No. 4 was enveloped by the original shielding analysis.

In July 1994, the NRC's Office of Nuclear Material Safety and Safeguards conducted an audit of manufacturing activities of the cask vendor, Sierra Nuclear. The results of this inspection are documented in Inspection Report 94207. Several quality assurance

issues were identified involving manufacture of the fifth through the ninth casks. As a result of these concerns, the licensee elected to perform a re-review of fabrication documents associated with the four casks previously loaded.

On July 28, 1994, during a re-review of the radiographs for the multi-assembly sealed basket (MSB), the licensee identified three indications on MSB No. 4 that were not identified in the original review of radiographs. The indications were characterized as follows: 1) 3/4 inch linear longitudinal indication off center line of weld, 2) 5/16 inch traverse linear indication off center of weld, and 3) 3/8 inch linear longitudinal indication on edge of weld.

Upon discovery of the indications, the licensee subsequently performed an operability evaluation and determined that the MSB No.4 was operable. This determination was based upon testing performed on the MSB prior to being placed into service on the storage pad. The testing consisted of a hydro pressure test and vacuum drying with 30 minutes hold times. Based upon the above testing the licensee concluded that a thru-wall crack did not exist. In addition, no fatigue loading exists and, therefore, there are no forces present to propagate the present indications. The licensee is working with the cask manufacturer, Sierra Nuclear Corporation, to perform a detailed finite analysis to assure continued interim operability is not affected. (See paragraph 9.a for additional information.)

The licensee is developing plans to return MSB No. 4 to the spent fuel pool area where the fuel will be unloaded and re-loaded into another cask.

One non-cited violation was identified in this area. No deviations, unresolved, or inspection followup items were identified.

8. Report Review

During the inspection period, the inspectors reviewed the licensee's monthly operating report for June and July 1994. The inspectors confirmed that the information provided met the reporting requirements of TS 6.9.1.C and Regulatory Guide 1.16, "Reporting of Operating information."

No violations, deviations, unresolved, or inspection followup items were identified in this area.

8. Unresolved Items

Unresolved items are matters which require more information in order to ascertain whether it is an acceptable item, an open item, a deviation or a violation. One unresolved Items was disclosed during this inspection is discussed in paragraph 3.d.

9. Inspection Follow-up Items

Inspector follow-up items are matters which have been discussed with the licensee, which will be reviewed by the inspector, and which involve some action on the part of the NRC or licensee or both. One Inspection Follow-up Item disclosed during the inspection is discussed in paragraph 3.c.

10. Meetings and Other Activities

a. Management Meetings (30702)

A meeting was held between the licensee and the NRC at the Palisades Site on August 3, 1994, to discuss Consumers Power Company's (CPC's) Fabrication Validation Plan to verify acceptability of the multi-assembly sealed baskets (MSB) for the VSC-24 dry spent fuel storage system that were presently onsite.

CPC personnel briefed NRC on the Validation Plan, the implementation of the Plan on MSB No. 6., issues identified during the validation process, and resolution of the issues. The briefing consisted of background information leading to the need for the Validation Plan, results from reviews of material deficiencies on MSB Nos. 6, 7, and 8, and results from CPC vendor surveillance/audits. Implementation of the Validation Plan was not complete as of the date of the briefing.

The need for the Plan was identified through results of a Quality Assurance (QA) inspection conducted by NRC and audits conducted by utilities of the MSB fabricator, Sierra Nuclear Corporation (SNC). From this information, CPC determined that there was a need to conduct this validation program.

CPC created a checklist/matrix to document the verification of certain critical dimensions, weld quality and weld material traceability, the existence of certified material test reports, the use of approved suppliers, and other quality attributes in the fabrication of MSB Nos. 1 through 10.

In addition, CPC set up a radiographic film reader to allow NRC to review radiographs of the MSBs. Approximately half of the radiographs for MSB No. 4 were reviewed by NRC.

Based on the information presented during the briefing to NRC, and providing that the implementation of the Fabrication Validation Plan is completed satisfactorily, NRC concluded that CPC will be able to verify that the MSBs will perform as designed.

b. Exit Interview (30703)

The inspectors met with the licensee representatives denoted in paragraph 1 during the inspection period and at the conclusion of

the inspection on August 19, 1994. The inspectors summarized the scope and results of the inspection and discussed the likely content of this inspection report. The licensee acknowledged the information and did not indicate that any of the information disclosed during the inspection could be considered proprietary in nature.