ENCLOSURE

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Inspection Report: 50-397/96-05

License: NPF-21

Licensee: Washington Public Power Supply System
3000 George Washington Way
P.O. Box 968, MD 1023
Richland, Washington

Facility Name: Washington Nuclear Project-2

Inspection At: Richland, Washington

Inspection Conducted: May 6-9, 1996

Inspector: L. T. Ricketson, P.E., Senior Radiation Specialist
Plant Support Branch

Approved: Blaine Murray 5/24/96
Blaine Murray, Chief, Plant Support Branch — Date
Division of Reactor Safety

Inspection Summary

Areas Inspected: Routine, announced inspection of radiation protection activities conducted in support of the 1996 refueling outage. The inspection included reviews of: audits and appraisals, changes, training and qualifications, planning and preparation, external exposure controls, internal exposure controls, controls of radioactive materials and contamination, surveying and monitoring, the program to maintain radiation exposures as low as is reasonably achievable (ALARA).

Results:

Plant Support

- Quality assurance oversight of radiation protection activities during the refueling outage was adequate (Section 2.1).
- The radiation protection organization was placed under the supervision of the chemistry manager. No other structural changes were made (Section 2.2).
- A new radiation protection manager was appointed. The individual met the qualification requirements of Technical Specification 6.3.

Contractor radiation protection technicians also met qualification requirements (Section 2.3).

- Sufficient supplemental staffing and appropriate quantities of supplies and equipment were available. The quality of job planning was mixed and was greatly dependent on the individual planner. Weak procedural guidance or inconsistencies in implementing ALARA job planning may have contributed to ineffective planning and inefficient scheduling of some sequences of work in the drywell. Procedural guidance was also weak with respect to the need for ALARA prejob briefings (Section 2.4).

- Good implementation of exposure controls was noted. Radiation work permits furnished appropriate guidance to radiation workers. Posting and area controls met regulatory requirements, but there were examples of postings that could lead workers to be insensitive to potential hazards. Routine general area air sampling did not meet management's expectations. Increases in internal exposures were expected and proved to be small (Section 2.5 and 2.6).

- Good contamination controls were implemented throughout the inspection. Good performance was noted during an emergency evacuation of a worker. The radiation survey program provided current information regarding radiological conditions in work areas (Section 2.7).

- In some areas, such as control rod drive work, large radiation dose savings were accomplished. However, ALARA goals were not particularly challenging in view of the advances made in source term reduction. Good ALARA initiatives were implemented to reduce radiation dose (Section 2.8).

Summary of Inspection Findings:

- Violations 397/9521-01; 397/9521-02; 397/95109-1013, 397/95109-1023, 397/95109-1033, and 397/95109-1043 were closed (Section 3).

Attachment:

- Attachment - Persons Contacted and Exit Meeting

DETAILS

1 PLANT STATUS

The inspection was conducted during days 24 through 27 of the 1996 refueling outage (R11).

2 OCCUPATIONAL EXPOSURE DURING EXTENDED OUTAGES (83729)

2.1 Audits and Appraisals

The inspector interviewed quality assurance representatives concerning oversight of radiation protection activities during the refueling outage. Quality assurance personnel explained the plan that was implemented to review outage activities and stated that no major concerns had been identified. Quality assurance representatives stated that the results of all quality assurance surveillance activities would be documented in one report following the outage. The inspector concluded that oversight of radiation protection activities was adequate.

2.2 Changes

The radiation protection organization was placed under the supervision of the chemistry manager. The former radiation protection manager assumed the responsibilities of the nuclear training manager. The individual filling the radiation protection manager position was on a temporary duty assignment from the Institute of Nuclear Power Operation. No other major organization, facility, equipment, or program changes were made involving the radiation protection program.

2.3 Training and Qualifications

The inspector reviewed selected resumes of contractor senior radiation protection technicians to determine if they met the requirements of Technical Specification 6.3.

The inspector interviewed the newly assigned radiation protection manager with regard his technical and professional experience. Technical Specification 6.3.1 states that the radiation protection manager shall meet or exceed the qualifications of Regulatory Guide 1.8, Revision 1-R, May 1977. The regulatory guide states that a radiation protection manager should have at least five years of professional experience in applied radiation protection. At least three years of this professional experience should be in applied radiation protection work in a nuclear facility dealing with radiological problems similar to those encountered in nuclear power stations, preferably in an actual nuclear power station.

The radiation protection manager provided a copy of his resume and highlighted the experiences that he felt directly addressed the items in Regulatory Guide 1.8.

After consultation with the Office of Nuclear Reactor Regulation, it was agreed that the radiation protection manager met the qualification guidance in Regulatory Guide 1.8.

The licensee had written guidelines for evaluating the experience of applicants. The inspector reviewed the guidance and determined that it was similar to guidance used at other sites and was appropriate. Resumes chosen at random demonstrated that individuals had the necessary experience to met qualification requirements for senior radiation protection technicians.

All senior radiation protection technicians were required to take a screening examination to test their knowledge of health physics practices. The examination was similar to the Northeast Utilities examination. The inspector concluded that this was an appropriate screening tool.

2.4 Planning and Preparation

The inspector reviewed supplemental staffing, ALARA reviews, radiation instrument stock, and consumable supplies in order to evaluate the radiation protection department's planning and preparation to support the refueling outage activities.

2.4.1 Staffing

The licensee hired 83 additional junior and senior radiation protection technicians to supplement the permanent staff of technicians. The inspector determined, based on the workload during the inspection, that supplemental staffing of the radiation protection organization was sufficient to properly support outage activities.

2.4.2 Instrumentation and Supplies

During tours of work areas, the inspector reviewed supplies of radiation protection instruments and supplies and interviewed radiation protection personnel. Based on observations and personnel discussions, the inspector concluded that sufficient supplies were available.

2.4.3 ALARA Prejob Reviews

The inspector reviewed selected ALARA prejob reviews and interviewed ALARA planners.

The inspector determined from interviews with licensee personnel that some completed activities, such as control rod drive rebuilding, were conducted very efficiently. Good performance indicated good planning. However, planning and scheduling the sequences of other work activities were not performed as efficiently as they might have been. Examples of such work activities included the repetitive shielding and unshielding of Nozzles N6A, N6B, and N6C to remove insulation and to perform inservice inspections. Other examples included the erection, removal, and re-erection of scaffolding and

the coordination of work activities and system draindowns. Had the work activities been considered in groups rather than as individual tasks, they could have been coordinated and sequenced better. The inspector determined through personnel interviews that these activities were not scheduled by the same individuals as had planned them prior to the previous refueling outage.

The inspector reviewed the guidance provided to ALARA planners in Procedure 11.2.2.5, "ALARA Job Planning and Reviews," Revision 4. Section 6.1.2 of the procedure states, "An ALARA planner should review the ALARA job history files to identify problems and successes encountered during similar jobs in the past." ALARA planners demonstrated their review of job histories by scrolling through computer records of selected work histories. Hard copies of these job histories were provided to the inspector for review.

An important element in preparing a prejob review is the review of lessons learned from previous, similar work activities; therefore, the recording and retrieving of such information is essential to good planning. Through personnel interviews and records review, the inspector determined that lessons learned were not recorded in a consistent manner. Some lessons learned were recorded in job histories; some appeared in the ALARA outage reports. The guidance to ALARA planners in Procedure 11.2.2.5, Section 6.1.2, addressed only the review of information in job histories. Therefore, if lessons learned were recorded in ALARA outage reports instead of the job history, the planner would have to go beyond the procedural guidance to retrieve the information. This depended on the personal initiative of the planner or the personal knowledge the planner acquired through previous experience of planning the same task.

The inspector also determined that there was no consistent method of recording job histories. Some job histories were kept on computer record; others were on hard copy. Either method was acceptable according to Procedure 11.2.2.5. According to licensee personnel, it was dependent on the preferences of the individual planner.

Procedure 11.2.2.5 also contained inconsistencies. Some forms, such as the "Prejob ALARA Review Checklist," required by Section 6.1.3 of the procedure, were not included as part of the procedure. However, forms such as the "ALARA In-Progress Review," required by Section 6.4.1, were included as an attachment to Procedure 11.2.2.5. The radiation protection manager was unable to explain the reason for the inconsistency and acknowledged the inspector's comment.

The inspector concluded that the quality of job planning was mixed and was greatly dependent on the personal knowledge or initiative of the individual planner. Weak procedural guidance or inconsistencies in implementing ALARA job planning may have contributed to ineffective planning and inefficient scheduling of some sequences of work in the drywell. These two factors made the success of work planning more dependent on the individual planner than on

program guidance. The procedural guidance did not promote continuity in the ALARA planning program by ensuring that lessons learned were preserved and easily retrievable by those ALARA planners with no personnel knowledge of previous, similar work.

2.4.4 ALARA Prejob Briefings

No ALARA prejob briefings were conducted during the inspection; therefore, no assessment could be made of the briefing quality. A previously identified violation involving the content of ALARA prejob briefings is closed in Section 3.5.

To determine which work activities required prejob briefings, the inspector reviewed the "R-11 Drywell RWP Index." The document listed radiation work permit numbers, work descriptions, estimated person-rems, estimated person-hours, and ALARA briefing requirements. The inspector then compared the projected dose accruals and work hour requirements of jobs requiring an ALARA prejob briefing with jobs that did not require an ALARA prejob briefing. The inspector calculated average radiation dose accrual rates using the licensee's estimates of person-rems and person-hours. Examples of the radiation work permits and associated information and requirements are shown in the table below:

Radiation Work Permit	Work Description	Estimated Person-rems/ Estimated Person-hours	Average Radiation Dose Accrual Rate	ALARA Prejob Briefing Required
95000289	Control Rod Drive Rebuild Room and Transfers	3.695/162	22 mrems/hr	YES
96000033	Drywell Pre-shielding Work	0.112/14	8 mrems/hr	YES
96000139	Flushing for RWCU Piping and RRC Low Point Drains	0.360/6.1	59 mrems/hr	YES
96000147	S/T R-11 PREP:FLUSH/SHIELD MSIV LLRT	1.258/85.5	15 mrems/hr	YES
96000186	Remove and Replace CRDMs Undervessel	17.253/256.5	67 mrems/hr	YES
95000275	Work on RHR Loop A in Drywell	21.1/155.1	136 mrems/hr	NO

95000286	Undervessel Work	18.222/200.9	90 mrems/hr	NO
95000300	Work on RWCU in Drywell	5.790/63.6	91 mrems/hr	NO
96000097	Drywell Shielding	3.810/60.5	63 mrems/hr	NO
96000156	Permanent Shielding in Drywell	39.955/591.5	67.5 mrems/hr	NO

The inspector noted that some radiation work permits for jobs with higher projected doses and higher dose accrual rates did not require workers to attend prejob briefings. The inspector reviewed Procedure 11.2.2.5, "ALARA Job Planning and Reviews," Revision 4, to determine what guidance was provided. Section 6.3.1 of the procedure stated:

> ALARA prejob briefings are performed to ensure workers understand the radiological conditions, RWP requirements, and work instructions associated with specific tasks and evolutions when:
>
> a. Coordination within the work group or among different work groups is critical for ensuring that personnel exposures for the job/task will be ALARA.
>
> b. The potential exists for sudden changes in radiological conditions.

Criteria based on total radiation dose or dose rate in working areas were not included as part of the guidance.

For further explanation, the inspector asked the radiation protection manager and the ALARA coordinator why some radiation work permits required ALARA prejob briefings while others that accrued more dose at higher rates did not. They responded that most of the radiation work permits were further divided into tasks. For example, Radiation Work Permit 95000275 was divided into approximately 35 tasks. Each task was reviewed by the ALARA planner and the ALARA planner made the decision, based on the above procedural guidance, as to whether a formal ALARA prejob briefing was required or whether a less formal briefing by radiation protection personnel at the access control points would suffice to inform workers of the radiological hazards.

The inspector then selected examples of radiation work permits requiring ALARA prejob briefings and reviewed the associated ALARA briefing attendance lists. The inspector then compared the ALARA briefing attendance lists with lists of individuals using selected radiation work permits to enter the radiological controlled area, and the inspector confirmed that individuals received the required ALARA briefings. Licensee representatives explained that the names

on briefing attendance lists were entered into one of the fields of the access control computers. If an individual's name did not appear in this field, the individual could not log onto the particular radiation work permit and gain access to the radiological controlled area.

The inspector concluded that the guidance for determining the necessity of an ALARA briefing was vague. Because of this, the decision of whether an ALARA briefing was needed was based on the subjective judgment of the individual ALARA planner. Once it was determined that ALARA briefings were necessary, the method used by the licensee to ensure that individuals received the briefings worked well.

2.5 External Exposure Controls

The inspector reviewed area posting and high radiation area controls, radiation work permits, access controls, and radiation protection job coverage in order to evaluate the licensee's external exposure controls.

2.5.1 Posting

During tours of the radiological controlled area, including the drywell, the inspector reviewed area postings and made independent radiation measurements.

Posting met the requirements of 10 CFR 20.1902; however, the inspector observed a posting practice that could desensitize workers to warning signs indicating radiation hazards. The licensee posted, in some areas of the turbine generator building, signs with the standard radiation symbol and the word "Staged" printed on removable inserts. The inspector noted that the posting was not reserved for isolated areas of the plant, but were used in areas where the inspector routinely observed people working.

Licensee representatives explained that these signs were posted (staged) in areas that would require posting during operation. The inserts would be changed to reflect the local conditions, such as a radiation area. Restart after the outage was anticipated to begin in June, and licensee representatives stated that having the signs in place would expedite the reposting process.

The inspector expressed a concern that the use of the radiation symbol in this manner, particularly for relatively long periods of time, could lessen its effectiveness in warning workers of potentially hazardous conditions. The inspector asked how the subject was presented during general employee training or radiation worker training.

Licensee representatives stated that radiation worker training did not address the use of staged warning signs. Licensee representatives stated that they would review the matter to determine if they would continue the practice and, if so, determine the need for added training to address the issue.

2.5.2 High Radiation Area Controls

During tours of the radiological controlled area, including the drywell, the inspector reviewed high radiation area controls and later conducted a review of high and very high radiation area key controls. No problems were identified. Corrective actions for previous violations had been implemented. See Section 3.

The inspector also concluded that high radiation area controls conformed to the requirements of Technical Specification 6.12.

2.5.3 Radiation Work Permits and Radiation Protection Job Coverage

The inspector reviewed selected radiation work permits and concluded that they provided appropriate radiation safety information and controls. A previously identified violation involving the radiation work permit program is closed in Section 3.3.

Because of the licensee's work schedule during the week of the inspection, there were limited opportunities to observe work that required full time coverage by radiation personnel. However, coverage of work activities observed by the inspector were adequate to prevent unnecessary exposure. A previously identified violation involving continuous health physics coverage is closed in Section 3.6.

2.6 Internal Exposure Controls

The inspector reviewed respiratory protection use, whole body counting, and air sampling to evaluate the licensee's internal exposure controls.

2.6.1 Respiratory Protection Equipment

No respirators had been issued for radiological use.

2.6.2 Airborne Radioactivity Monitoring

Radiation protection personnel stated that air sampling was specifically performed to monitor work activities expected to present a airborne problem. Air sampling was also conducted to monitor general area airborne radioactivity concentrations. Continuous air monitors were not placed in the drywell because of space limitations. During tours of the drywell, the inspector observed that several grab air samplers were in operation to monitor general area airborne radioactivity.

The inspector reviewed Procedure 11.2.13.8, "Airborne Radioactivity Surveys," Revision 5 and found no guidance with respect to the maximum collection time for air samples. Licensee representative informed the inspector that the air sample collection time in the drywell was 12 hours. Air sample collection time on the refueling floor was 24 hours.

Because the airborne radioactivity concentration is the quotient of the sample activity divided by the sample volume, the inspector expressed a concern that, by allowing the air samplers to run for an extended time, temporary increases in airborne radioactivity or "spikes" might not be detected. Any indication of sudden increases in airborne radioactivity, for whatever the reason, would be "averaged away" by unnecessarily high sample volumes. A knowledge of these increases could be important for calculating the internal dose to individuals in the area if they were not monitored by job specific air sampling.

The radiation protection manager was questioned regarding his expectations for routine, general area air sample duration. He responded that he believed such air samplers should be run no more than four hours. The radiation protection manager stated that the matter would be reviewed to determine the need for additional guidance concerning air sample collection times.

2.6.3 Whole Body Counting

The inspector interviewed licensee personnel and determined that the number of identified examples of internal depositions of radioactivity for the current outage was higher than the two previous refueling outages. Licensee representatives stated that this was expected because no control rod drives were rebuilt in 1995. The number was higher than during the 1994 refueling outage because respiratory protection equipment was used in 1994.

The inspector determined through interviews that the licensee had identified approximately 35 examples of internal exposures, thus far in the current outage, in which the preliminary calculations indicated a committed effective dose equivalent of 5 millirems or greater. During the previous refueling outage, approximately 5 examples were identified. The highest radiation dose assigned was less than 100 millirems. Based on the magnitudes of the internal exposures, the inspector concluded that internal exposure controls were good.

2.7 Control of Radioactive Contamination, Surveying and Monitoring

The inspector reviewed radiation worker practices, release of items from contaminated areas, radiation survey results and records, and survey instrument use to evaluate the licensee's survey program and controls of radioactive contamination.

2.7.1 Contamination Controls

The inspector observed that radiation workers generally used good health physics techniques when working or leaving contaminated areas. Contaminated areas were properly posted. Radiation protection personnel monitored potentially contaminated items appropriately before releasing them.

The inspector noted that radiation protection personnel performed well at controlling the spread of contamination on May 7, when an individual working under the reactor vessel became ill and had to be evacuated. Radiation personnel performed radiation surveys and removed minor contamination on route to a medical facility.

2.7.2 Surveying and Monitoring

The inspector reviewed selected survey records and noted that the records were complete and survey information was current. The inspector conducted independent surveys and confirmed radiation measurements in selected areas.

The inspector reviewed radiation survey instruments used by technicians in the field and noted that all were within the calibration intervals and all had been properly performance tested.

2.8 ALARA

The inspector reviewed ALARA goals, initiatives, training, and practices to evaluate the licensee's ALARA program.

2.8.1 ALARA Outage Goal

The ALARA staff's projections of dose accrual during work activities were known as "ALARA budgets." This term was used to differentiate these projections from the longer range ALARA goals that appeared in the licensee's business plan. The total ALARA budget for the outage was 360 person-rem. Licensee representatives were optimistic that the total outage dose accrual would be significantly less that the projected value.

The inspector interviewed ALARA personnel to evaluate the licensee's goal-setting process. ALARA personnel stated that the ALARA budgets were based primarily on historical information. When the inspector stated that the goals did not appear to be challenging, licensee representatives acknowledged the comment and stated that this, in part, was because successes in source term removal had reduced projected dose rates. This had not been taken into account in some ALARA budget projections. Licensee representatives stated that the performance for the present outage would probably be used as the new baseline for calculating ALARA budgets.

One example in which the licensee performed much better than the ALARA budget was the control rod drive rebuilding activities. The ALARA budget was 72 person-rems; the actual total accrual was approximately 25 person-rems. A number of ALARA suggestions were implemented prior to the outage to improve the control rod drive rebuild facilities. Licensee representatives stated that a significant part of the dose savings was attributable to the fact that only the most experienced vendor personnel were used to perform the work. The need for this was identified previously as a lesson learned.

2.8.2 Dose Saving Initiatives

The licensee continued with the installation of permanent shielding inside the drywell. The installation was started during the 1995 refueling outage. Numerous system flushes were conducted. Licensee representatives stated that a system flush reduced dose rates from 80 rem per hours to 2.5 rem per hour on reactor water cleanup Loops A and B. Precast valve shields were used on some drywell drain valves to lower radiation dose rates.

The inspector noted that the licensee used advanced technologies such as cameras and telemetric dosimetry to monitor worker activities and radiation dose.

2.8.3 ALARA Training

According to ALARA representatives, mockup training was presented in preparation for undervessel shootout steel removal and reactor water cleanup valve work.

3 FOLLOWUP (92904)

3.1 (Closed) Violation 397/95021-01: Failure to Control High-high Radiation Area

The inspector verified the corrective actions described in the licensee's response letter, dated September 25, 1995, were implemented. No similar problems were identified.

3.2 (Closed) Violation 397/95021-02: Very High Radiation Area Keys Were Not Maintained in the Control Room

The inspector verified the corrective actions described in the licensee's response letter, dated September 25, 1995, were implemented. No similar problems were identified.

3.3 (Closed) Violation 397/109-1013: Radiation Work Permit Did Not Include Accurate Work Area Dose Rates

This item was identified during NRC Inspection 50-397/95-16. The inspector verified the corrective actions described in the licensee's response letter, dated July 20, 1995 were implemented. No similar problems were identified.

3.4 (Closed) Violation 397/109-1023: Work Continued in High Radiation Area with Dose Rates Greater Than Allowed by the Radiation Work Permit

This item was identified during NRC Inspection 50-397/95-16. The inspector verified the corrective actions described in the licensee's response letter, dated July 20, 1995 were implemented. No similar problems were identified.

3.5 (Closed) Violation 397/109-1033: Prejob briefing Did Not Include Appropriate Health Physic Instructions

This item was identified during NRC Inspection 50-397/95-16. The inspector verified the corrective actions described in the licensee's response letter, dated July 20, 1995 were implemented. No similar problems were identified.

3.6 (Closed) Violation 397/109-1043: Continuous Health Physics Coverage Was Not Provided

This item was identified during NRC Inspection 50-397/95-16. The inspector verified the corrective actions described in the licensee's response letter, dated July 20, 1995 were implemented. No similar problems were identified.

4 REVIEW OF UPDATED FINAL SAFETY ANALYSIS REPORT COMMITMENTS

A recent discovery of a licensee operating their facility in a manner contrary to the Updated Final Safety Analysis Report (UFSAR) description highlighted the need for a special focused review that compares plant practices, procedures, and/or parameters to the UFSAR description. While performing the inspection discussed in this report, the inspector reviewed the applicable portions of the UFSAR that related to the areas inspected. The inspectors verified that the UFSAR wording was consistent with the observed plant practices, procedures, and/or parameters.

ATTACHMENT 1

1 PERSONS CONTACTED

1.1 Licensee Personnel

*J. Albers, Manager, Nuclear Training Department
*W. Barley, Manager, Quality Assurance
*P. Bemis, Vice President, Nuclear Operations
*J. Doiron, Radiation Protection Manager
*C. Foley, Licensing Engineer
*T. Love, Manager, Radiation and Science Services
R. Patch, ALARA Supervisor
W. Rigby, Operations Supervisor, Radiation Protection
*R. Webring, Vice President, Operations Support

1.2 NRC Personnel

R. Barr, Senior Resident Inspector
G. Replogle, Resident Inspector

*Denotes personnel that attended the exit meeting. In addition to the personnel listed, the inspector contacted other personnel during this inspection period.

2 EXIT MEETING

An exit meeting was conducted on May 9,1996. During this meeting, the inspector reviewed the scope and findings of the report. The licensee did not express a position on the inspection findings documented in this report. The licensee did not identify as proprietary, any information provided to, or reviewed by the inspector.