APPENDIX B

U. S. NUCLEAR REGULATORY COMMISSION

REGION V

Report No. 50-397/90-22

License No. NPF-21

Licensee: Washington Public Power Supply System (WPPSS)
P. O. Box 968
3000 George Washington Way
Richland, WA 99352

Facility Name: WPPSS Nuclear Project No. 2 (WNP-2)

Inspection at: WNP-2 site, Benton County, Washington

Inspection Conducted: August 8-10, 1990

Inspected by: _____ 8/22/90
H. D. Chaney, Senior Radiation Specialist — Date Signed

Approved by: _____ 8/24/90
G. P. Yuhas, Chief Reactor Radiological — Date Signed
Reactor Radiological Protection Branch

Summary:

Areas Inspected: Routine unannounced inspection of the licensee's radiation protection (RP) program including: radioactive material transportation activities, review of RP staff assignments, follow-up on previous inspection findings, and the follow-up on the licensee's reported broken fuel rod incident. NRC Inspection procedures 83750, 86721, 93701, and 93702 were used.

Results: One violation (two examples) concerning the timely assessment of personnel exposures to airborne radioactivity was identified (see paragraphs 2.a and 3.c) and one unresolved item concerning maintaining on file Specification 7A package tests, (see paragraph 5). No deviations were identified. The licensee's program appears to be adequately implemented to ensure compliance with most NRC requirements. Licensee management described to the inspector actions that have been initiated and those planned to address both NRC and licensee self identified weaknesses in the RP program. The licensee has initiated a comprehensive and critical self assessment of the RP program. The licensee's onsite Quality Assurance (QA) surveillance group staffing, staff experience, and scheduled surveillances appear adequate to ensure that RP activities receive adequate performance based reviews in addition to any programmatic audits by the Corporate QA group. The licensee's initial actions and long term RP action plan for surveillance of spent fuel pool work activities, following the breaking of a fuel rod on July 31, 1990, appear to be adequate to ensure possible hot particles/fuel debris are quickly identified and personnel exposures are minimized (see paragraph 2.b for further discussion of this item).

DETAILS

1. Persons Contacted

Licensee

*J. Baker, Plant Manager
*J. Harmon, Maintenance Manager
*S. Washington, Compliance Supervisor
*D. Pisarcik, Health Physics (HP) Support Supervisor
*L. Pritchard, HP Craft Supervisor
*R. Graybeal, HP/Chemistry Manager
*R. Madden, Acting Plant QA Manager
*C. Madden, QA Engineer
*R. Higgins, QA Engineer
*D. Larson, Radiological Programs Manager
*S. Regev, Senior Health Physicist
*R. Wardlow, Radiological Services Supervisor
*J. Allen, HP Craft Supervisor
L. Bradford, Health Physics Supervisor
D. Werlau, Technical Training Department Manager
R. Day Phalen, Principal Training Specialist
R. Utter, Principal HP Instructor

Others

*P. Capin, NRC Inspector-in-Training
C. Bosted, Senior NRC Resident Inspector
C. Sorensen, NRC Resident Inspector
P. Ing, NRC Project Manager

*Denotes those attending the exit meeting on August 10, 1990. Additional licensee personnel were contacted during the course of the inspection, and on August 15 and 17, 1990.

2. Follow-up

a. Previous Inspection Findings (92701)

Unresolved Item 397/90-18-01 (Closed): This item involved a possible failure of the licensee to properly assess in a timely manner the exposure on May 20, 1990, of an individual to airborne radioactivity. This item was previously discussed in NRC Inspection Reports 50-397/90-15 and 50/397/90-18. Since the licensee's performance in this area is considered a violation of 10 CFR Part 20.103, this unresolved item is being closed. See paragraph 3.c of this report for further details.

b. Licensee Events (93702)

Open Item 397/90-22-01 (Open): This item concerns the licensee's RP actions taken upon the breaking of a used fuel rod during fuel integrity inspections in the spent fuel pool on July 31, 1990. A

standard twelve foot fuel rod was broken apart at approximately 3 feet from the bottom of the rod while pushing of the rod through a cleaning funnel. HP technicians covering the job immediately assessed radiation and airborne radioactivity levels. No change was noted due to the rod breakage. The spent fuel pool circulating activity had been on the increase since the start of the fuel integrity inspections. This was primarily due to deposition of corrosion products into the spent fuel pool water during cleaning of fuel rods prior to visual inspection with underwater cameras. Currently the dose rates around piping of the spent fuel clean up and cooling system are approximately four times normal, creating several extended high radiation areas around spent fuel pool cleanup and cooling equipment. The spent fuel pool area, encompassing the fuel integrity inspection area, was already a hot particle control area and special surveys of materials and personnel were being performed. The lower portion of the rod has been replaced into the fuel assembly matrix and the longer upper portion of the broken fuel rod has been placed in a special spent fuel rod holder that is designed to hold 26 fuel rods. The licensee's engineers have determined that it was unlikely that any fuel pellets had fell or escaped from the severed fuel rod pieces. This was determined by the size and type of the break. The licensee had determined that a License Event Report was not required and all aspects of the event were documented in fuel surveillance procedures and a plant Problem Event Report. As to the elevated spent fuel pool piping dose rates, the ALARA coordinator had initiated a design change request for the piping modifications to eliminate excessive horizontal runs and provide system flushing points. HP group have an increased level of attention directed at the spent fuel pool areas involving the monitoring and identifying operations that may cause exposure to fuel debris and hot particles. This item will remain open pending further NRC inspector review of long term actions to clean up the spent fuel pool circulating and deposited radioactivity that is impacting the general area dose rates.

3. Occupational Exposure, Shipping, and Transportation (83750)

The licensee's RP program was examined to determined compliance with the requirements of Technical Specifications (TS) 6.2, 6.10, 6.11, and 6.12; 10 CFR Parts 20.101, 20.103, 20.201, 20.203, and 20.409; and agreement with the commitments contained in Sections 12.5.2 and 12.5.3.7 of the Final Safety Analysis Report for WNP-2 (FSAR); and agreement with the guidance contained in NRC Regulatory Guides 1.8, 8.8, 8.9, 8.10, 8.15, and 8.26, Industry Standard ANSI N343-1978, and NRC Inspection and Enforcement Information Notices (IEINs) 82-18, 86-23, 87-39, and 90-33.

a. Audits and Appraisals

The NRC inspector examined the licensee's onsite Quality Assurance Surveillance Groups staffing, staff qualification, schedule of surveillance, and selective surveillance reports. The licensee had recently hired two new QA engineers with experience in RP programs and auditing of RP programs. The inspector reviewed a surveillance performed by one of the new QA engineers (SR 2-90-057, dated July 3,

1990). The surveillance examined HP work practices during the WNP-2 R-5 refueling outage. The surveillance was comprehensive and probing in nature and resulted in the issuance of one Quality Finding Report 2-90-057-01 concerning the need of additional HP work practice training for workers, supervisory oversight in work areas, and a higher level of individual accountability regarding HP requirement compliance.

b. Changes

The NRC inspector reviewed the licensee's HP group staffing, and discussed current staffing levels (26 HP technicians). Considering the size of WNP-2 and the need for the licensee to improve radiological work performance and staff adherence to radiological procedures and instructions (as indicated in recent QA surveillances) the HP staffing level appears to be marginal for all but routine plant operations.. The licensee has been filling vacancies in an expedient manner and tightly controls the utilization of contractual help. Management is awaiting the results of a critical self assessment of the RP program, that includes evaluation of HP staff manning, before committing to increasing the HP staff manning. The were no major organization changes implemented since the last review of this area (50-397/90-01). A review of HP technician terminations indicated that the licensee holds HP technicians to an adequate performance level and effectively implements administrative disciplinary actions as warranted.

c. Internal Exposure Control

The inspector examined the licensee's actions regarding the NRC's identification of an error in calculating and tracking MPC-hrs (Maximum Permissible Concentration - hour) of exposure for a worker involved in a radioactive materials contamination loss of control event on May 20, 1990. This event was documented by the licensee on Report of Radiological Occurrence (ROR) No. 2-70-021, dated May 20, 1990. The licensee is still conducting a formal root cause analysis/investigation into the May 20th event.

Background

NRC inspection reports previously noted in paragraph 2.b of this report provide sufficient discussion of the events leading up to and surrounding the personal contamination of a contract worker and the spread of contamination in the spent fuel pool area on May 20, 1990; and also the circumstances surrounding a personal contamination event and subsequent assessment of possible airborne radioactivity uptake on April 30, 1990. The licensee has completed a root cause analysis/investigation into the April 30 event. The NRC issued a Notice of Violation (NOV) in NRC Inspection Report No. 50-397/90-15, following an inspector review of the event, concerning the failure to properly perform surveys prior to the April 30th event. NRC Inspection Report No. 50-397/90-18 acknowledges the receipt of the

licensee's acceptance of the NOV, their response to the NOV, and partial verification of the licensee corrective actions by the NRC.

Requirements

10 CFR Part 20.103(a)(3) requires, in part, that for the purpose of determining compliance with the requirements of this section the licensee shall use suitable measurements of concentrations of radioactive materials in air for detecting and evaluating airborne radioactivity in restricted areas and in addition, as appropriate shall use measurements of radioactivity in the body ... as may be necessary for timely detection and assessment of individual intakes of radioactivity by exposed individuals. Furthermore, this part requires that when assessment of a particular individual's intake of radioactive material is necessary, intakes less than those which would result from inhalation for 2 hours in any one day or for 10 hours in any one week at uniform concentrations specified in Appendix B, Table I, Column 1 need not be included in such assessment, provided that for any assessment in excess of these amounts the entire amount is included.

May 20, 1990 Event

The licensee's HP support group performed whole body counting (WBC) of the worker in accordance with WNP-2 procedures (RPI 5.7, 5.8, and 5.9) on May 20-21, 1990. WBC consisted of WNP-2 counting and having a local contracted laboratory also perform WBC counting of the worker. The licensee issued a formal assessment report of the individual's uptake on June 27, 1990. Even though the licensee had documentation that some of the activity attributed to a lung burden by the licensee was in fact a gastrointestinal burden (identified by the contract WBC laboratory), the licensee elected to treat the uptake activity conservatively as representing a lung burden of 0.160 microCurie (uCi) of insoluble cobalt 60. The NRC inspector noted that the licensee's formal assessment narrative erroneously referenced WBC results using nCi (nanoCuries) when the values in fact represented microCurie quantities. The official WBC results attached to the report provided the correct quantities. Values contained in the narrative yielded meaningless results.

Prior to the May 20th WBC, the subject worker's activities in the spent fuel pool area had resulted in the worker being exposed to approximately 1.2 MPC-hrs of airborne radioactivity on May 20th, as determined by air sampling. This was documented in the site MPC-hr Log maintained by the plant HP group. The licensee's subsequent assessment of the worker's WBC results stated that, via calculations, using a total uptake to the lungs of 0.160 uCi of cobalt 60, the worker was exposed to approximately 0.58 MPC-hrs of airborne radioactivity. This value is less than that already documented for the individual prior to whole body counting which is a routine finding, but incongruous with the determination that the worker had a 0.160 uCi uptake which was approximately 13 percent of a maximum permissible organ burden - MPOB (1.2 uCi - Table 5, ANSI N343).

The inspector determined on August 1, 1990, during an examination of the licensee's assessment report that an error had been made in the back calculating of the airborne radioactivity concentrations necessary to produce an uptake of 0.160 uCi to the lungs. NRC calculations using the guidance contained in NRC Regulatory Guide 8.26, "Applications of Bioassay for Fission and Activation Products," industry standard ANSI N343-1978, "American National Standard for Internal Dosimetry for Mixed Fission and Activation Products," and ICRP II, "Report of International Commission on Radiation Protection Committee II on Permissible Dose for Internal Radiation," (1959) indicated that the worker involved in the May 20th event was exposed to, at the minimum, 114 MPC-hrs of airborne radioactivity. The methodology used by both the NRC and the licensee was in agreement with the guidance contained in IEIN No. 82-18, "Assessment of Intakes of Radioactive Materials by Workers," which establishes the methodology for determining compliance with 10 CFR Part 20.103 requirements.

On August 2, 1990, the NRC inspector and the Region V Reactor Radiological Protection Branch Chief contacted the individual (HP support group licensee employee) that performed the WBC assessment and wrote the narrative report of the worker's uptake calculations, to discuss the apparent discrepancies in the licensee's assessment calculations. The licensee representative stated that they (licensee) were aware of the error and the MPC-hrs of exposure for the worker had been revised to approximately 113 MPC-hrs, and that the initial low MPC-hr value was due to a mathematical manipulation error. The licensee's assessment of resultant annual and 50 year committed dose to the worker's lungs was determined to be less than a total of 1 REM with the majority of the dose being experienced in the first year following the uptake. There were no discrepancies noted with these calculations. These calculations are not specifically required by 10 CFR Part 20. A 50 year committed dose equivalence limitation of less that 15 REM per year limitation is discussed in ICRP literature (1978 ICRP 30). The overall risk associated with this dose to the worker is negligible considering the worker's life time exposure to date. However, the inspector is concerned about the licensee's ability to properly assess and track workers' exposures to airborne radioactivity as required by 10 CFR Part 20.103. The licensee provided the worker with a statement of exposure to radioactive materials while employed at WNP-2 (via mail) as required by 10 CFR Part 20.408, stating that an uptake of 0.160 uCi had been measured.

The inspector determined that the site HP Supervisor was informed on May 21, 1990, by the HP support group that the worker had received less that 1 MPC-hr of exposure due to the May 20th event. As of August 9, 1990, the HP Supervisor was still unaware of the corrected exposure to the individual involved in the May 20th event and MPC-hr logs still indicated that the worker had only received approximately 1.2 MPC-hrs of exposure for that particular job. Even though the onsite HP group was unaware of the corrected exposure of the worker and the worker had completed his work at the site and departed the State, a reevaluation of the radiological protection requirements

for continued work operations was accomplished on May 20, 1990, prior to allowing work to resume. This evaluation was documented on ROR 2-70-021.

During this inspection, it was determined that an independent review of the initial calculations was not provided prior to issuance of the assessment report. The inspector also determined that identification of positive uptakes using WBC results do not result in calculations being made to determine the MPC-hr of exposure for personnel. This was verified by the review of the documentation associated with another personnel contamination incident that occurred on April 30, 1990.

April 30, 1990 Event

A worker was WBC as a result of being found with extensive facial contamination following work in the plant as documented on ROR 02-90-0009, dated April 30, 1990. Subsequent WBC on April 30 and May 1, 1990, positively identified that the worker had received an uptake of approximately 0.04 uCi of cobalt 60, 3.35 percent of an MPOB, which equates to a lung burden using ANSI N343 Table 5 data. The licensee's WBC data did not specifically identify that the activity was measured in the lungs but the reference to 3.35 percent of an MPOB directly relates to the lungs. The NRC inspector determined that such an uptake would have been the result, by back calculation to the estimated time of exposure, of being exposed to the equivalent of 28 MPC-hrs of cobalt 60 airborne radioactivity. A review of the work package associated with Radiation Work Permit (RWP) 2-90-00219 (the RWP that the worker was signed in on at the time of the April 30th event) did not include any documentation of MPC-hr tracking for the subject worker based on work related air samples or following the event/WBC. Air samples were not obtained during the April 30, 1990, work operations. The April 30th event is another example of a breakdown in licensee communications between HP support group and the onsite plant HP group.

Findings

The failure to perform accurate and timely assessments of radioactivity uptakes by workers, and a failure to accurately track personnel exposures to airborne radioactive materials are considered a violation of 10 CFR Part 20.103(a)(3) involving two examples. (397/90-22-02)

4. Transportation (86721)

The licensee's program for transportation of radioactive materials (RAM) and low level radioactive waste (LLRW) was examined for compliance with the requirements of TS 3.11.3, 10 CFR Part 71, and 49 CFR Part 173.401 (Department of Transportation - DOT regulations); and agreement with the commitment contained in Section 11.4.3.14 of the FSAR; and the guidance contained in NRC IEIN 90-31 and 90-35.

The inspector examined licensee procedures associated with the packaging, delivery, and shipment of RAM/LLRW. No major or significant changes had been implemented. The licensee's procedures include detailed checklists for various types of RAM shipments encountered at WNP-2. These procedures appear to be adequate to ensure regulatory requirements are complied with during RAM/LLRW shipments. The licensee had recently reassigned responsibility for LLRW and RAM preparation and shipment to a supervisor within the plant HP group that had previously (3 years ago) had responsibility for the RAM/LLRW shipping program.

The licensee had made approximately 43 LLRW and 8 RAM shipments since the beginning of the year. The licensee knew of no incidents involving RAM shipments originating from WNP-2.

10 CFR Part 71.5 requires, in part, that each licensee who transports licensed material outside of the confines of the plant shall comply with the regulations appropriate to the mode of transport of DOT in 49 CFR Parts 170 through 189.

49 CFR Part 173.415(a) requires, in part, that each shipper of a Specification 7A package must maintain on file for at least one year after the latest shipment, and shall provide to DOT on request, a completed documentation tests and an engineering evaluation showing that the construction methods, packaging design, and materials of construction comply with that specification.

The inspector discussed with the licensee representatives a particular shipment (90-20-02) involving Type A quantities of non-fissile radioactive materials to a local contract laboratory using a supposably DOT Specification 7A package. The licensee's representative having just taken over the program could not produce documentation attesting to the package meeting Specification 7A performance tests, but believed since they routinely use the package that the necessary documents were on file at WNP-2.

This is considered an unresolved item pending further NRC review of licensee documents during a future inspection. (397/90-22-03)

An unresolved item is a matter about which more information is required to ascertain whether it is an acceptable item, a deviation, or a violation.

No violations or deviations were identified in this area.

5. Exit Meeting (30703)

The inspector met with licensee representatives identified in paragraph 1 of the report on August 10, 1990. The inspector discussed the scope and findings of the inspection. The licensee acknowledged the inspector's findings regarding the apparent violation and initiated action to evaluate apparent corrective actions that may be necessary.