U.S. NUCLEAR REGULATORY COMMISSION

REGION V

Report No. 50-397/91-15

License No. NPF-21

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

Facility Name: Washington Nuclear Project No. 2 (WNP-2) Inspection at: WNP-2 Site, Benton County, Washington Inspection Conducted: May 20 through 24, 1991

Inspected by:

Reactor, Radiation Specialist Date

Signed

Date

Approved by:



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G.P./Yuhas, Chief Reactor Radiological Protection Branch

Summary:

<u>Areas Inspected</u>: Routine unannounced inspection of the licensee's radiation protection activities during the refueling outage (R-6) including: occupational radiation exposure controls, exposure reduction techniques (ALARA), radioactive material controls, surveys, personal dosimeters, radwaste effluents, and follow-up on previous inspection findings. Inspection procedures 83524, 83726, 83729, 84750, and 92701 were used.

<u>Results</u>: The licensee's ALARA program showed that R-6 outage radiation exposures were lower than the previous outages. The ALARA program showed improvement in the planning and implementation of health physics outage activities. Therefore, the expected ALARA exposure goals were lowered. No violations or deviations were identified.



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DETAILS

1. Persons Contacted

Licensee

- J. Baker, Plant Manager L. Harrold, Assistant Plant Manager
- R. Graybeal, Health Physics (HP)/Chemistry Manager
- D. Pisarcik, Assistant HP/Chemistry Manager J. Arbuckle, Plant Technical Compliance Engineer
- C. Madden, Quality Assurance (QA) Engineer
- L. Bradford, HP/Chemistry Supervisor
- J. Allen, Radwaste Supervisor
- L. Pritchard, HP Operations Supervisor A. Davis, Principal Radiochemist/Effluents Engineer
- G. Oldfield, Principal HP R. Wardlow, Radiological Services Supervisor
- B. Rathbone, Corporate Sr. HP R. James, ALARA Coordinator
- B. Baumann, Corporate Sr. HP

In addition to those individuals noted above, the inspectors met and held discussions with other members of the licensee's staff.

Follow-up of Previous Inspection Findings (92701) 2:

Follow-up Item 50-397/91-07-02 (Closed): This item concerned the identification of two radwaste transfer piping terminations located outside of the Radwaste Building. The inspector verified that warning labels were placed on the two terminations and the isolation valves locked. The inspector had no further questions regarding this matter.

Occupational Exposures During Extended Outages (83729) 3.

A. QA Audits and Appraisal

The inspector reviewed the licensee's "QA R-6 Outage Issues" and "QA Communiques" regarding R-6 outage items. The QA Issues listed observations and concerns identified by QA engineers involving HP and chemistry related operations. QA had identified 47 radiological control deficiencies as of May 5, 1991. The QA Communiques identified areas that QA planned to focus on during an upcoming week; it also highlighted accomplishments, concerns and findings from the previous week's activities.

The inspector's noted that the QA findings were probing and seemed to be a useful tool for assessing performance and prompting corrective actions.

No violations or deviations were identified.





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B. ALARA

The inspector reviewed the status of the licensee's R-6 outage goals established on April 1, 1991 for radiation exposures, skin, and clothing contaminations incidents. Records provided by the ALARA group on May 20, 1991, indicated:

RADIATION	GOAL	STATUS: May 20th
Exposure (person-rem)	300	146.54
Skin Contaminations	80	15
Clothing Contaminations	60 s	47

The licensee projected they would be well under their exposure goals and requested that the Sr. ALARA Committee reduce the R-6 outages exposure goal to 270 person-rem. The Sr. ALARA Committee did approve the ALARA goal revision for exposure expenditures to 270 person-rem with the provision that each plant work group redistributed any available exposures to groups that had reached their allocation.

C. Exposure Controls (83524)

The inspector examined several aspects of the external radiation exposure control program including:

- Administrative Dose Extensions
- ALARA Techniques used for the R-6 outage
- . ALARA Post Job Reviews
- . Sr. ALARA Committee
- . Radiological Occurrence Reports (RORs)
- . Personal Dosimetry (April to May 1991)
- . Exposure Control Design Features

Administrative Dose Extensions

The licensee authorized 200 administrative dose extensions, during this R-6 outage, compared to 660 dose extensions in the 1990 R-5 outage. The inspector examined several dose extension records known as, "Increased Exposure Request", to determine compliance with 10 CFR 20.101, "Radiation dose standards for individuals in restricted areas" and 10 CFR 20.102, "Determination of prior dose." Each request appeared complete and was appropriately reviewed by the worker, his supervisor and HP supervision. The licensee's dose extension program seemed satisfactory and the inspector had no concerns.

ALARA Techniques used for the R-6 Outage

The inspector reviewed licensee exposure reduction ALARA techniques implemented during the R-6 outage. The inspector focused on outage activities associated with the elevation 606' refueling floor of the Reactor Building. The HP planning group explained that five major sources of radiation existed on elevation 606' from the previous R-5

outage. The reactor vessel cavity dose rates averaged twice the intensity during this outage as compared to the R-5 outage. According to HP planning, the higher dose rates were attributed to an ineffective decontamination and the inadvertent fuel pool cooling system flooding in November 1990. The HP planning group used fewer radiation work permits (RWPs) and HP technicians to cover elevation 606' Reactor Building during the R-5 outage work. During the R-6 outage, HP planning required more HP technicians to cover each job described on RWPs.

The inspector reviewed the dose accumulated during the reactor vessel disassembly. RWP data confirmed that dose rates were higher this outage and the time required to complete the work took 16% longer. However, the total accumulated dose was less.

. R-5 Vessel Disassembly 792.7 person-hrs. 9.38 person-rem . R-6 Vessel Disassembly 940.3 person-hrs. 9.15 person-rem

ALARA planning noted that the increased HP coverage was in response to deficiencies identified during the R-5 outage. The inspector had no concerns in this area.

ALARA Post Job Reviews

The inspector reviewed six ALARA post job reviews and two continuing job exposure status reports. The inspector noted that the majority of jobs reviewed had accumulated less than the projected exposures. The lower exposures were despite significant under estimations of pre-job completion times (person-hrs), by factors of four on average.

The licensee tracked motor operated valve (MOV) and reactor water clean-up valve RWCU-V-4 work. The overall MOV work had a projected exposure of 28.47 person-rem; as of May 21, 1991, the licensee had only expended 12.56 person-rem. The RWCU-V-4 exposure expenditure was estimated at 8.0 person-rem; as of May 21,1991, the expenditure was 5.96 person-rem.

The licensee's ALARA dose reduction techniques seemed effective, the inspector had no concerns in this area.

Sr. ALARA Committee Meeting

The inspector attended the licensee's Sr. ALARA Committee meeting on May 22, 1991. This committee consisted of licensee senior management The personnel from HP, operations, outage management, and engineering. following were some items discussed by the committee:

- . R-6 outage ALARA exposure goal reduction
- . How to get the ALARA mission statement communicated to workers.
- . R-6 outage exposure status of major jobs (positives & negatives) . Source term reductions, system flushes, and decontaminations based on Reactor Building radiation levels.



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The Sr. ALARA Committee recommended that HP develop a plan on how to reduce plant area radiation levels. One committee member pointed out that such an effort to reduce the radiation source term would require an integrated effort on the part of other site groups. The licensee's Sr. ALARA Committee was able to assess the level of support needed by HP and the ALARA planning group to assure the success of this R-6 outage and prepare for the next outage.

The inspector had no concerns with the licensee's ALARA program.

RORs & Skin Contamination Doses (83726)

The inspector reviewed 12 Radiological Occurrence Reports (RORs) that were opened during this outage. Most of those RORs were to investigate contamination incidents, both personnel and material. RORs are licensee higher tier root cause/corrective action documents, whereas the Problem Evaluation Request (PER) merely identified most deficiencies and assigned responsible parties for evaluations. The inspector examined two RORs that detailed hot particle personnel contaminations. ROR-291-271 described a 300K disintegrations per minute (DPM) hot particle found on an individual April 19, 1991. The initial skin dose estimated was 2.13 rem. ROR-291-403 described a 350K DPM hot particle found on an individual May 20, 1991. The initial skin dose estimated was 1.12 rem. Both ROR contamination incidents had Skin Contamination Reports attached with various supporting documents (questionnaires, survey records and isotopic analysis). Both of these RORs required corporate HP personnel to implement procedure RPI 4.15, "Skin Dose Evaluation," to assess the individual's official dose of record.

The inspector discussed the dose assessment process with the responsible corporate Sr. HP. The Sr. HP stated the two above-mentioned hot particle incidents were the only evaluations required by his department this year. The inspector examined several previous dose assessments and compared the preliminary skin dose estimates to the final official dose. The licensee used a Varskin computer code and the final results were generally within 5% of the initial skin dose estimate. The inspector examined two reports that explained the basis of their beta dose determination program:

"Assessment of Beta Skin Dose Through Protective Clothing and Penetrating Eye Dose from WNP-2 Beta Radiation," May 12, 1988

"Overview of External Beta Radiation," January 9, 1989

The inspector had no concerns with the licensee's ability to perform beta dose assessments.

Personal Dosimetry (83524)

The inspector reviewed personal dosimetry records for thermoluminescent dosimeters (TLDs) issued for the period of April 1 through May 1, 1991. The licensee processed 81 TLDs, 61 worker beta/gamma TLDs, 10 normalization standard TLDs, and 10 QA TLDs. There were no significant exposures based on the results reviewed, nor were there any beta

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exposures indicated. The inspector asked the licensee about their ability to detect beta radiation with their TLDs. The corporate Sr. HP referenced the aforementioned beta dose reports listed in the above section. In addition, the Sr. HP explained that the TLD algorithm for determining beta dose used a 1.1 correction factor from the beta dose basis reports. The inspector also examined the neutron and penetrating/surface gamma components of the licensee's TLD algorithms. The inspector's tour of the TLD processing facility found it to be well maintained. This aspect of the licensee's program seemed fully capable of achieving its 10 CFR 20.202, "Personnel Monitoring", objectives.

Exposure Control Design Features (83524 & 83726)

The inspector examined the Sr. ALARA Committee's concern with source term reduction. General radiation levels in the Reactor Building exceeded the Final Safety Analysis Report (FSAR) design values. FSAR Chapter 12.3.1.1 provides the radiation protection design basis features and radiation zone designations for WNP-2. The licensee addressed this Reactor Building problem in Problem Evaluation Report (PER)-290-555, dated July 10, 1990. The PER stated that the licensee had failed to recognize the significance of the increasing radiation background levels on safety related calculations, equipment qualifications (EQ) and the FSAR design basis. The PER implied that an incorrect 10 CFR 50.59, "Changes, test and experiments," assessment was made on this issue. There were two recommendations made in the PER to reduce radiation levels:

. System shielding, flushing, and cleaning

. Revision of the FSAR, WNP-2 dose calculations, and EQ files

At the time of this inspection, the licensee was strongly considering a more substantive flush program and FSAR revisions. The inspector reviewed several Reactor Building survey maps with the licensee's HP' supervisor and the engineer responsible the for FSAR revision. Based on the excessive Reactor Building radiation levels the licensee would propose the following changes:

Elevation (EL) 548' designed as a Zone II area (2.5 millirem/hour (mr/hr)), displayed actual level of 10 - 80 mr/hr general area as of February 1991. The proposed change would redesignate this area as Zone III (15 mr/hr limit) and Zone IV (100 mr/hr limit). The Residual Heat Removal (RHR) Heat Exchanger Room , a designed Zone III area, had general area radiation levels of 20 - 100 mr/hr, and would be redesignated as Zone IV.

EL 522' was designed as Zone III in the Control Rod Drive (CRD) module areas. Those same general areas had radiation level of 20 -35 mr/hr, and would be redesignated as Zone IV.

EL 441' and 448' overhead areas, originally designed Zone II would be redesignated as Zone III and Zone IV, based on February 1991 radiation levels.



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Licensee management was studying this problem from various aspects including comparisons with other licensees. The licensee's actions to understand and mitigate this increase in exposure rates will be reviewed during subsequent inspections (50-397/91-15-01).

D. Surveys, Monitoring & Radioactive Material Controls (83726)

Survey Instruments

The inspector toured the licensee's corporate calibration facility and discussed R-6 outage support activities with supervisory staff. Most HP instrument calibrations were performed during the backshift. The inspector asked how the calibration facility assured that the HP operations staff had an adequate number of survey instruments. The calibration staff updated and tracked user group's instrument needs on a status board and computer sort. The inspector surveyed the calibration facility and reviewed the calibration/irradiator utilization log books.

The inspector examined survey and monitoring equipment located in the Technical Support Center (TSC) to assess its readiness for emergency operations. HP controlled the keys to the emergency cabinets. The inspector found emergency items in the TSC as specified in procedure 13.14.4, "Emergency Equipment," for emergency preparedness.

The inspector had no concerns in this area.

Radioactive Material Controls

The inspector toured the facility with the supervisor of radwaste; those areas toured included:

- . Dry active waste (DAW) sorting area east of the condenser
- . DAW storage area north side of the condenser
- . Radwaste (compactor area, resin liner storage/loading bay)

Of particular interest to the inspector was how the licensee handled solid radwaste (SRW) during the R-6 outage. The areas inspected were generally clean, however, the amount of bagged material waiting to be processed made some areas appear cluttered. The inspector observed a SRW cask loaded with reactor water clean-up (RWCU) resins which was prepared for shipment.

The inspector reviewed a letter addressed to the licensee, from the contractor who assisted in preparing the RWCU resin shipment No. 91-20-02. The letter dated May 23, 1991, was in response to a commitment the licensee made to the NRC and the State of Washington, that an independent review of SRW documentations be conducted. The waste burial Site Use Permit No. 8138 agreement between the State of Washington and the licensee was reinstated and the RWCU shipment left the WNP-2 Site May 24, 1991.

The licensee's implementation of their exposure control program during the R-6 outage was adequate to accomplish its safety objectives. There were no violations or deviations identified.

Radioactive Waste Treatment and Effluent Monitoring (84750)

Liquid and Gaseous Effluents

The inspector reviewed liquid radwaste (LRW) and gaseous radwaste (GRW) discharge releases conducted during the R-6 outage. As of May 21, 1991, the licensee had released 23 batches of LRW. Each batch represented a tank of LRW, approximately 15000 gallons. According to the licensee's effluent radiochemist, their dilution flow corrections were conservatively based on system and instrument errors. The inspector examined the basis of this conservatism when comparing the maximum radioactive material released under ideal system conditions to what was most likely released due to system inaccuracies. The inspector concluded that the licensee reported overestimated release effluent data. The release records reviewed, both LRW and GRW, seemed in accordance with the WNP-2 Offsite Dose Calculation Manual.

The inspector had no radiological concerns with the licensee's program.

Technical Specification (TS) Review

The licensee reported, during the entrance meeting, that several LRW and GRW effluent monitor surveillances were not performed in compliance with the TS. The licensee was conducting an independent review of their adherence with TS requirements. The review found that LRW and GRW effluent monitoring instruments required per TSs 3/4.3.7.11 & 12 were installed with improper designs. These monitors did not provide trip and alarm functions that allowed channel functional testing and surveillances in the manner specified by TS requirements. This concern involved six LRW and GRW monitors. The licensee stated that these issues would be addressed in Licensee Event Report (LER) 91-013, June 6, 1991. This issue will be further reviewed by NRC Region V staff after receipt of the LER (50-397/91-15-02).

The licensee's program seemed adequate to accomplish its safety objectives. No violations or deviations were identified.

5. Exit Meeting

The inspector met with licensee representatives identified in Section 1 of the report on May 24, 1991. The inspector discussed the scope and findings of the inspection. No violations or deviations were identified.



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