

U. S. NUCLEAR REGULATORY COMMISSION

REGION V

Report No. 50-397/82-18

Docket No. 50-397 License No. CPPR-93 Safeguards Group \_\_\_\_\_

Licensee: Washington Public Supply System

P. O. Box 968

Richland, Washington 99352

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

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

Inspection conducted: August 16 - 31, 1982

Inspectors: *R. J. Dodds* 9/27/82  
A. D. Toth, Senior Resident Inspector Date Signed

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Date Signed

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Date Signed

Approved by: *R. T. Dodds* 9/27/82  
R. T. Dodds, Chief Date Signed  
Reactor Projects Section I

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Date Signed

Summary:

Inspection August 16 - 31, 1982 (Report No. 50-397/82-18)

Areas Inspected: Routine, unannounced inspection of reactor pressure vessel hydrotest, the mechanical contractor's records review program and correction activities, work reverification program activities, reactor coolant pressure boundary piping nondestructive examination, structural repairs to the sacrificial shield wall, and follow-up on employee concerns and NRC inspection findings. The inspection involved 72 inspection hours on-site by the resident inspector.

Results: No items of noncompliance were identified.

## DETAILS

### 1. Persons Contacted

#### Washington Public Power Supply System

- G. Baker, Quality Assurance Engineer Lead
- \*C. Carlisle, Deputy Program Director
- \*L. Floyd, Senior Quality Assurance Engineer
- \*R. Glasscock, Licensing and Assurance Director
- \*R. Knawa, Quality Verification Program Manager
- \*B. Twitty, Hydrotest Coordinator
- \*W. Willier, Acting Project Quality Assurance Manager

#### Burns and Roe Engineers (B&R)

- \*J. Forrest, Project Director
- \*H. Tuthill, Quality Assurance Manager

#### Bechtel Power Corporation (BPC)

- H. Boarder, Quality Assurance Engineer
- \*D. Cosgrove, Quality Assurance Engineer
- \*J. Gatewood, Project Quality Assurance Engineer
- \*T. Mangelsdorf, Project Manager
- R. Scott, WBG Documentation Review Manager
- C. Shelton, Quality Control Inspector

#### Wright-Schuchart-Harbor/Boecon Corp./General Energy Resources, Inc. (WBG)

- C. Fox, Quality Assurance Documentation Supervisor

#### Brand Examination Services and Testing Company (BESTCO)

- D. Rickey, Foreman

#### Bonanza Power Administration (BPA)

- \*P. Grady, Representative
- \*W. Chin, Representative

#### Other General Contacts and Notes

In addition to the persons identified above, the inspector interviewed many other construction, engineering, and quality control personnel from the site contractor organizations and the ASME authorized inspection agencies associated with the reactor vessel hydrotest.

\*Denotes personnel present at the exit management meeting.

2. General

The resident inspector was on-site August 16-21, 23-27 and 30-31. On Saturday, August 21 and Friday evening August 27 the inspector examined the preparations for, and the conduct of the hydrotest of the reactor vessel and connected piping.

Two regional office inspectors (J. Elin and A. D'Angelo) were on-site August 9-13. Three regional office inspectors (J. Elin, D. Willett and G. Yuhas) were also on-site August 30-31. Their activities are documented in separate inspection reports.

A regional office inspection supervisor (R. Dodds) was on-site September 1-2, 1982.

The resident inspector attended a September 2, 1982 subcommittee meeting of the Advisory Committee on Reactor Safeguards, in Richland Washington.

3. Mechanical Contractor Records Review Program

The inspector attended an August 20 presentation regarding the scope, approach, status, and results of the extensive records review and discrepancy evaluation and disposition activities of the mechanical contractor. This activity is essentially complete, with review of structural steel documentation being the principal remaining work in-progress. The Bechtel and WBG staffs described the following matters:

Purchase orders were examined and discrepancies resolved to develop a list of acceptable materials. This list included identification of applicable Code Cases, supplemental specification requirements, and status of restraints from known reports of discrepancies. This list was then used to check installation documentation to verify that the intended material had been installed at each location.

All weld records were examined to identify the welder who made each weld and to develop a list of qualifications and qualifications maintenance for each welder, weld-procedure and essential variable.

All installation records were examined to confirm welder qualifications, weld inspection, and completion of acceptable nondestructive examination.

Identified discrepancies were then transferred to Bechtel for validation and resolution by rework or referral to Burns & Roe

for engineering direction. Some items were dispositioned as non-valid when Bechtel personnel inspected the physical conditions and determined that field conditions were no longer relevant to the discrepancy (WBG staff effort did not include field verifications).

Burns and Roe revised project specifications to eliminate various requirements, and contractors revised their work procedures accordingly. The WBG reviews, and similar reviews by other contractors, were then done to the new procedure revisions. Many originally discrepant conditions were then dispositioned as accept-as-is, on the basis that the current procedure revision no longer includes the requirement in question. In many cases, the basis for the specification and procedure changes involved ASME Code Cases recognized by NRC Regulatory Guides.

The contractors compiled the results of the reviews in terms of numbers of Inspection Reports and numbers of Nonconformance Reports that were evaluated and dispositioned. Each such report may involve several or many individual hardware items. Neither the contractors nor the Supply System compiled data relating to amounts of actual hardware which has required rework as a result of findings from the reviews.

During this review the Supply System discussed the relationship of this effort to the overall Reverification Program (RVP). The RVP will take credit for the extensive document review, in view of the direct Bechtel management and the independent monitoring conducted by the Bechtel quality control organization during the review activities.

Bechtel discussed WBG Special Requirements Checklists. These were generic problem lists which WBG had intended to insert into each applicable work package to assure 100 percent review of specific attributes, and 100 percent re-inspection of hardware for specific attributes. The specific attributes had been derived from generic type discrepancy documents (such as NRC enforcement or other findings, Corrective Action Reports, and 50.55(e) reports). During the work restart review by NRC (reference inspection report 50-397/81-10), NRC inspectors based several of their conclusions of "acceptable corrective action plans" on the planned special requirements checklist implementation. The checklists have been deleted, however, the requirements have been incorporated into the WBG documentation review procedures. Where hardware inspections were called for, the reverification program would be applied. However, the RVP program is based upon a 10 percent sample, until/unless

the re-inspection results show cause for additional sample size. The Supply System RVP personnel stated that the RVP re-inspections are essentially complete for the WEG contract work and results show no significant problems nor any need to increase sample size. This appears to contradict the apparent generic basis for the original Special Requirement Checklists and their prescribed 100 percent re-inspections. The basis for the inconsistency was not available at the time of the August 31 management meeting, but Bechtel stated that such basis would be defined. This matter is unresolved (397/82-18-01).

4. Reverification Program

In response to the June 17 NRC inquiry under 10 CFR 50.54(f) the Supply System, Bechtel, and site contractors have been engaged in a reverification program which includes review of records and re-inspections of hardware installed prior to July 1980. The Supply System described the policies for conduct of reviews and re-inspections in the WPPSS July 17, 1980 reply to the NRC inquiry. One of the policies read "This program will have priority over on-gong work. The project construction work pace will be adjusted accordingly." Another Supply System policy included integration of the reverification effort into the general project completion activities. However, associated with this integration has been a drain of personnel from the reverification effort, and a postponement of reverification activities to support the recent reactor vessel hydrotest. The reverification staff has been reporting this status to the Supply System management in weekly progress reports. Following the management meeting, the WPPSS Director of Licensing and Quality stated that this was his first notification of staffing problems with the reverification group, and he indicated that additional support in this area may be forthcoming.

At this time, the Supply System appears to be prioritizing the reverification work to support construction completion schedules. A special reverification report was issued for the reactor pressure vessel hydro boundary. This documents the reviews and re-inspection performed, the sampling basis, the results, and the evaluation of results. For the 12 systems planned for inclusion in the hydrotest, there were 80 small bore and 90 large bore piping isometric drawings involved. The reverification review and inspection included 14 of the large bore and 6 of the small bore piping drawings. The reverification effort identified only minor discrepancies, none of which appeared to warrant further inspection or increased sample size.

The Supply System has implemented a procedure QVI-09 (Special Structural Steel Reinspection Criteria). This document allows deviations from AWS-D.1 welding visual examination criteria for items within its definition of structural steel. The Supply System stated that an amendment to the final safety analysis report (FSAR) is in-process to define the AWS deviation. (WPPSS in-house change notice SCN-82-165, dated August 27, 1982) The notice defines structural steel as including radial and structural framing systems, steam tunnel beams and pipe hangers. The procedure QVI-09 also mentions ductwork, stiffeners, cable trays, brackets and similar components. The Supply System verbally advised the inspector that the pipe support and hanger portions were limited to those parts excluded from ASME Section NF jurisdiction. It is not clear that that WPPSS defined exclusions are consistent with the ASME definitions. This matter will be re-examined following NRC review of the amendment. (397/82-18-02)

As a result of record reviews, the Supply System identified that records did not appear to confirm that required load tests had been performed on parts of the reactor building crane. On August 21 the inspector observed on-site 125 percent load-test of the I-hook of the reactor building crane. A procedure and checklist were being applied, with observation by reverification program staff. The test lift was successful. No items of noncompliance were identified.

5. Reactor Pressure Vessel Hydrostatic Pressure Test

On August 27 the reactor pressure vessel and connected piping to the first isolation valve outside the containment building were subjected to the 125 percent hydrostatic pressure test prescribed by ASME Code Section III. The test pressure of at least 1563 psig was maintained for 10-minutes to stress the system, and then reduced to 1270 psig to permit teams of Bechtel quality control inspectors to examine the piping and each weld. The Bechtel inspectors were accompanied by ASME authorized nuclear inspectors. For some work performed by Johnson Controls Incorporated and General Electric, these companies performed their own inspections along with ASME inspectors. The various inspections identified no weld defects/leaks (although minor valve packing or similar connector leakage sources were located and identified for repair.

The NRC inspector independently verified several test aspects:

- . Absence of leakage at pipe-welds inside the drywell
- . Calibration status and records of the official test gage
- . Test pressure and holding time
- . Cleanliness of piping surfaces for examination
- . Presence and calibration status of pressure relief valves

The inspector interviewed personnel and examined records which showed that outstanding nonconformances had been corrected prior to the test. This included review of: (1) the Bechtel quality assurance department evaluation of outstanding NRC items (letter BECMCL-82-0544), (2) the WPPSS quality assurance department evaluation of 50.55(e) reports (Memorandum QA2-82-143), (3) the Bechtel quality assurance department handling of last few non-conformance reports applicable to the hydrotest (NCR-2123 and NCR-2157), and (4) the Bechtel handling of last-minute items identified during final walk-down activities. The inspector also examined circumstances related to a piping wall-thickness question raised by an NDE technician during interviews. The inspector found that the condition had been dispositioned accept-as-is by engineers, based upon design calculations, as documented in nonconformance report NCR-2016. The NDE technician was unaware of this disposition.

The inspector reviewed the WPPSS hydrotest procedure (SLT-S1.0-1 Revision 1), the Bechtel hydrotest procedure (SWP/P-G-3 Revision 3), and the Bechtel Quality Control Instruction. Requirements of ASME Section III and FSAR Section 5.2 were considered. No items of noncompliance were noted.

The WPPSS procedure was used as the controlling document for heatup and pressurization of the system, whereas individual contractors and Bechtel used their own procedures to govern control instruction (QCI-T-1.00) included various requirements relating to the Bechtel standard hydrotest procedures. It was not until start of test preparations heatup that the responsible management decided that some of the line items of the QCI were not to be performed by the Bechtel inspectors (e.g. open valves required to be off their backseats). In addition, there was insufficient space on the forms for sign-off by the great number of inspection personnel involved. The test pressure had been increased to 1200 psig when Bechtel personnel identified that prerequisites and some discrepancy resolution checks had not yet been signed as completed by individual inspectors. This resulted in delays of several hours while the final inspections and reviews were completed prior to continuing pressurization to 1563 psig. Additionally, some of the prescribed Bechtel inspection activities were previously performed by the WPPSS activity. The above problems occurred in spite of daily management coordination meetings and quality assurance surveillance of activities.

Prior to the actual test, the inspector attended an RPV HYDRO LESSONS LEARNED meeting regarding the preparations for the

hydrotest. Items under discussion included (1) confirmed hanger loads, (2) communications, (3) paper flow, (4) boundary identification. This meeting was attended by the WPPSS program director, and action assignments were made. At the exit meeting the WPPSS management stated that the procedure weaknesses and coordination would be considered along with other items in additional lessons learned sessions.

No items of noncompliance were identified.

6. Preservice Inspection

During the reactor vessel hydrotest activities, the WPPSS operations quality assurance department performed visual inspection of welds under requirements of ASME Section X. This included welds of the following:

- . small bore valves RFW-V32A and V32B, RHR-V113, RHR V123A and V123B, RRC V-60A and V60B.
- . 6-inch diameter level switch chamber MSOLS-24B
- . reactor vessel recirculation system nozzles N2A through N2K relating to safe-end repairs)

These quality assurance inspections were governed by WPPSS checklist IR-82-097. The checklist appeared to encompass the principal parameters of pressure, temperature, pressure and temperature rate limits, holding time, pressure gauge calibration, and visual inspection.

No items of noncompliance were identified.

7. Licensee Event Reports 10 CFR 50.55(e)

A Bechtel sampling of pipe-weld radiographs of the mechanical contractor (WGB) revealed a significant number that do not meet ASME Code requirements for film quality, filming techniques or weld integrity.

The licensee verbally reported this to the NRC on November 19, 1981, under 10 CFR 50.55(e), and filed written reports December 21, 1981; March 11, 1982; and May 18, 1982. Previous NRC follow-up actions are described in NRC inspection reports 50-397/81-12, 82-05 and 82-14. The licensee's report of May 18, 1982 described that the film quality measurements for film density and geometric unsharpness had been made for 1373 welds, but would not be made for the remaining of what has now been identified as a total of 2690 candidate welds unless the level II examiner believed the film could not be properly inspected. NRC inspection report 50-397/82-14 questioned the statistical basis for abandoning the film density measurements and geometric unsharpness calculations, and noted the inspector's understanding that summary data would be provided.



On August 23 the licensee's quality assurance manager advised that the above noted summary data had not been compiled during the original review process, and would not be compiled now. He stated that the data would probably show a normal distribution around the required parameters and would not change the current conclusions. He emphasized that repeat radiography of many of the radiographs rejected for film quality has shown no hardware rejections.

The inspector noted that in the first phase review 65 of the 1373 welds identified in radiographs have been rejected for apparent weld defects. In the second phase, following the elimination of the film quality review aspect, only 16 of the 1317 welds remaining were rejected for apparent weld defects identified in radiographs. Level III personnel also reviewed each film that the level II personnel rejected.

The original approach of the reviewers appeared to be that, if an area on the film appear not to meet Code criteria they called for a repair. If no indications were present, but the film quality parameters were nonconforming, they called for repeat radiography. No defects/repairs resulted from the repeat radiography, indicating that the reviewers had been conservative in their evaluation of film. These same reviewers performed the reviews of the remaining radiographs for 1317 welds where film quality measurements were not made. The reviewers advised the inspector that they were free to reject and call for re-radiography or repairs where they observed suspicious indications. They offered no information regarding relaxation of their interpretations.

The above data appears to support the Supply System qualitative conclusion that film quality defects were not so extreme as to mask, or make undiscernable, any rejectable weld conditions. The continuity of the review personnel supports a conclusion that significant weld defects were identified for repair.

At this time, the inspector is unconvinced of the Supply System's and Bechtel's position that strict adherence to these attributes of film quality criteria may not be relevant since the film had already been reviewed and accepted by the radiographer, Engineer and Code inspector. The apparent quantitative departures from film density and geometric unsharpness criteria of ASME Code Section V does not appear consistent with the unequivocal commitment to the ASME Code in the Safety Analysis Report Section 3.2.

The Supply System quality assurance manager stated that the question of SAR revision would be reviewed. The inspector deferred resolution of this matter pending WPPSS submittal of a final report and NRC regional office review.

8. Bechtel Lost Inspection Records

On August 19 the Supply System quality assurance manager advised the inspector regarding Bechtel Nonconformance Reports NCR-1960 and NCR 1967. These reports describe lost and incomplete Bechtel records of welding (form W100A) and piping installation (form P-1.10).

The NCR-1960 does not identify the number of lost records, but states that "Approximately 3000 W-100A QCIR's have been issued to date...Less than 5 percent of these records are known to have been lost, making it undocumented whether the fitup inspection was performed or not."

The NCR's have been evaluated and dispositioned as documentation problems, Bechtel and Supply System quality assurance departments concurred with the evaluation. Record reviews and final inspections have been designated to be performed and documented in each case of a lost or incomplete record. Although in-process inspection evidence has been irretrievably lost, Bechtel believes that the program provides for an optional surveillance versus inspection (hold point) designation for the in-process inspection activities. Bechtel argues that "It is only necessary to perform sufficient inspections (less than 100 percent) to verify that the in-process work is under control." However, the NCR disposition does not provide data relating to the 3000-record population to show that the process has in fact been under control relative to the in-process aspects in question (e.g. fit-up, protection of valve internals during welding or heat treatment, and checking of flanges). The NCR disposition indicates that adequacy of some of these matters will be affirmed during system operational tests. The Supply System quality assurance manager stated that evaluations were underway to assess and improve the controls in this area.

The Bechtel control of records and process control will be further reviewed. (Follow-up item 397/82-18-03)

9. Examination of Employee Concerns

During this inspection period, the inspector encountered concerns by BESTCO personnel regarding the Bechtel direction relative to nondestructive examination results:

- a. There were cases where BESTCO personnel had examined a specific weld or repair area, and, while doing so, they had noted indications in adjacent areas. The adjacent

indications would normally be recorded as unacceptable in accordance with usual criteria for the material being examined. However, Bechtel administrators had advised the BESTCO personnel to ignore and not document the indications, since they were outside the specific area of interest.

One such case involved pipe-wall-thickness measurements at a base-metal repair area on line RRC-564-1.3, hanger RRC-1C-1. The minimum thickness criteria for the repair area was 1295-inch (87.5 percent of nominal). During the examination of the repair area the examiner noted a 0.278-inch thickness adjacent to a lug. Bechtel instructed the examiner to not be concerned with the adjacent reading. This concerned the examiner, who apparently was not aware that the general area had been previously repaired and examined, and that the general pipe-wall-thickness reduction was accepted by the engineer on the basis of design requirements. (This is documented in DIR-RRC-564-006 through 008, weld records FWBMR-2 through 5, and BESTCO reports UT-1407 and 1494).

The Bechtel personnel advised the inspector that there are many areas in the plant where such discrepant conditions have been identified and previously evaluated by the engineers with an accept-as-is disposition. They propose that BESTCO personnel should assume that adjacent area findings have already been identified and evaluated. This approach is unpalatable to the BESTCO ASME level II certified examiners. For relief, BESTCO management has advised the examiners to note on the inspection record any such cases which "in their opinion is significant". These then would be subject to accept/reject determination by the Bechtel quality control personnel, who have access to applicable records. This appears to place a subjective evaluation burden on the examiner. It also introduces the potential to ignore a questionable deviation which may not have been previously identified and evaluated.

- b. A BESTCO examiner measured a pipe wall-thickness at 0.643-inch. A second technician measured it at 0.645-inch. Bechtel personnel instructed the BESTCO foreman to not submit the 0.643-inch report. The foreman voided the 0.643-inch report, with the notation, that it was voided by direction from Bechtel recognizing that this amount of instrument deviation is insignificant. The BESTCO personnel were concerned over this type of selective reporting.

The two reports reflected final examinations following repairs of previously identified wall-thickness discrepancies. The prior documentation showed that the engineers had required repair of a 0.571-inch area, but accepted two areas which were at least 0.645-inch (although less than 87.5 percent of nominal). A calculation backup sheet showed that 0.571-inch was the threshold for rejection, based upon design wall-thickness. It appeared that either the 0.643-inch or the 0.645-inch reports would have been acceptable to the engineers.

The inspector discussed the above matters with the WPPSS and Bechtel quality assurance departments, who have initiated action to determine other issues of concern to the BESTCO personnel and establish appropriate action. This matter is unresolved (397/82-18-04).

10. Plant Tours

The inspector toured the safety related areas of the physical plant at various times between August 16-31, and performed follow-up record reviews as indicated. He attended construction and quality management meetings relative to the reactor vessel hydrotest planning and problem resolutions. During the tours, the following items were noted:

- a. A large-bore pipe line was supported by temporary rigging from a cable tray support near hanger RCIC-906N. This appeared to be a contrary to Bechtel site procedure SWP-P-P-2; however, weld records indicated that the work had been performed by a contractor in 1980 and was now on the master work list for removal. After being noted by the inspector, the Bechtel personnel expedited removal of the rigging, and examined the cable tray support to assure absence of evidence of deformation or damage. No item of noncompliance was identified.
- b. Repair welding was in-progress on heavy structural steel pipe whip support girders W282 and W252 at elevation 567-feet of the drywell. This work involved gringing and welding of minor surface discrepancies in accordance with the AWS Code. The work was being performed in accordance with nonconformance reports NCR-918, NCR-8859 and NCR-8860. The foreman demonstrated accountability for all the individual weld discrepancy locations and status through a map of each weld location on each girder. Weld material was consistent with the material withdrawal records. The weld repairs appeared to be acceptable. The welder and foreman were interviewed and demonstrated a knowledge of the requirements of the NCR's. No item of noncompliance was identified.

- c. An employee commented that cracks had been found in the sacrificial shield wall during the weld repairs, one as much as 6-feet long; this appeared to be contrary to information previously provided to NRC in formal correspondence.

The inspector interviewed three Bechtel quality control inspectors who had monitored the repairs. They recalled an indication which they chased around a connecting "paddle"; they felt that this was a fit-up indication, rather than a crack. They recalled graffiti of a six-foot long pen marking with an arrow and note "six-foot crack" on the shield wall; they stated that no actual crack was involved. They also recalled an actual horizontal crack (under 2-feet long). The WPPSS engineer confirmed this, and noted that nonconformance report NCR-512 was prepared, resulting in examination of twelve similar configurations; lack of cracking was confirmed. This information was already in process of being incorporated into a final report to NRC regarding the sacrificial shield wall repairs. No other cracking relating items were recalled by the quality control inspectors. No items of noncompliance or deviations were identified.

11. Licensee Actions On Previous NRC Findings

(Closed) Unresolved Item (397/81-18-07)

Clarification of WPPSS replies to NRC July 11, 1980 Notice of Violation.

This matter was discussed in paragraph 8.d of report 50-397/82-15, where it was identified as item 397/80-18-07. The correct identification number is 397/81-18-07.

This matter is closed.

12. Unresolved Items

Unresolved items are matters about which more information is required in order to ascertain whether they are acceptable items, items of noncompliance, or deviations. Unresolved items identified during this inspection are discussed in paragraphs 3, 4 and 9.

13. Management Meeting

At the end of this report period on August 31, the inspector met with the Deputy Program Director, the Licensing and Assurance Director, and other licensee and construction management representatives to discuss the status of inspection findings and

other inspector activities relating to this project. Persons contacted who attended this meeting are so noted (\*) in paragraph 1 of this report.

Following this meeting the Deputy Program Director advised that "Supply System management has directed Burns and Roe and Bechtel to identify problems encountered during the RPV hydro and to develop corrective actions for these problems. Problems thus identified will be assigned to the various organizations for completion of the corrective actions. Some of the issues to be addressed are: (1) under-estimation of in-process and final inspection workload, (2) under-estimation of front-end field engineering workload, and (3) existing Bechtel paper process too cumbersome."