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Forwards deficiency repts dtd 770818, 770705, 770818, 770915, 771114, 761105, 761217, 770224, 780530, 780526, 771227, 780410 & 781106 (ANO 7811220197), copies of which had not been forwarded to Director of I & E, but were sent to Reg V.

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CONSTRUCTION DEFICIENCY REPORT (10CFR50.55E)

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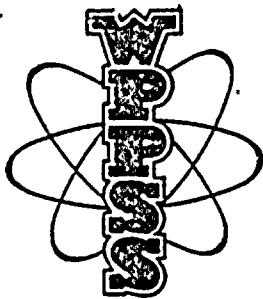
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NOTES: SEND ALL FSAR & ER AMDTS TO L CHANDLER. BILL PATON (OELD) 1 CY ER AMDTS.

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REGULATORY DOCKET FILE COPY

Washington Public Power Supply System
A JOINT OPERATING AGENCY

P. O. Box 968 3000 GEO. WASHINGTON WAY RICHLAND, WASHINGTON 99352 PHONE (509) 375-5000

November 30, 1978

QA-78-001

Nuclear Regulatory Commission
Office of Inspection & Enforcement
Washington, D. C. 20555

Attention: Mr. Ernest Volgenau, Director

Subject: REPORTABLE 10CFR50.55(e) REPORTS

Dear Mr. Volgenau:

In accordance with the provisions of 10CFR50.55(e), written reports on reportable deficiencies must be made to the appropriate NRC Regional Office within 30 days after verbal notification. Copies of reports shall be sent to the Director of Inspection and Enforcement, NRC, Washington, D. C.

The attached reports are reportable deficiencies under the provisions of 10CFR50.55(e). They have been reported to the Nuclear Regulatory Commission, Region V within the required 30 days.

Copies of these reports were not sent to the Director of Inspection and Enforcement, NRC, Washington, D.C. The attached reports correct this situation and, in the future, your office will receive copies concurrently with the Region V office.

List of attachments:

Letter No.: G02-77-303 - Docket Number 50-397, CPPR-93
Date: August 18, 1977
Description: WNP-2 Overload of Standby Gas Treatment System
Due to Fuel Pool Boil-Off at 212°F

Letter No.: G01-77-362, G01-77-480, G01-77-558, G01-77-722,
G01-78-62 - Docket Number 50-460, CPPR-134
Date: July 5, 1977, August 18, 1977, September 15, 1977
November 14, 1977 and January 23, 1978
Description: Voids in Concrete Placement No. 28-GSB-1 - WNP-1

Letter No.: G01-76-694, G01-76-767, G01-77-133 - Docket Numbers
50-460 and 50-513
Date: November 5, 1976, December 17, 1976 and February 24, 1977
Description: Seismic Analysis of General Services Buildings of
WPPSS Projects Numbers 1 & 4

Letter No.: G02-78-151 - Docket Number 50-397, CPPR-93
Date: May 30, 1978
Description: Opening in Tornado Missile Barrier in Diesel
Generator Building - WNP-2

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S

Mr. Ernest Volgenau
Page 2
Reportable 10CFR50.55(e) Reports

Letter No.: G02-78-150 - Docket Number 50-397, CPPR-93
Date: May 26, 1978
Description: Possible Overexposure of Control Room Operators
to Radiation Following a LOCA - WNP-2

Letter No.: G02-77-504, G02-78-121 - Docket Number 50-397, CPPR-93
Date: December 27, 1977 and April 10, 1978
Description: Cracks in Structural Steel Platform at 541'
Elevation Inside Containment - WNP-2

Letter No.: G02-78-245 - Docket Number 50-397, CPPR-93
Date: November 6, 1978
Description: Tilting Disc Check Valves Failure to Close with
Gravity in Vertical Position - WNP-2

If you require additional information, please contact us.

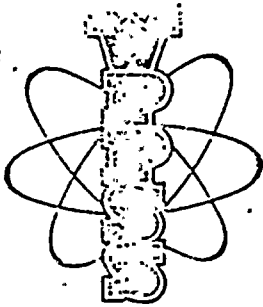
Very truly yours,

D L Renberger

D. L. RENBERGER
Assistant Director,
Technology

DLR:DDO:seb

Attachments



Washington Public Power Supply System
A JOINT OPERATING AGENCY

P. O. Box 968 3000 GEO. WASHINGTON WAY RICHLAND, WASHINGTON 99352 PHONE (509) 375-5000

August 18, 1977
60-77-303

Nuclear Regulatory Commission
Region V
Suite 202, Walnut Creek Plaza
1990 N. California Boulevard
Walnut Creek, California 94596

Attention: Mr. R. H. Engelken, Director

Subject: WPPSS NUCLEAR PROJECT NO. 2
DOCKET NUMBER 50-397, CPPR-93
REPORTABLE EVENT - 10CFR50.55(e)

Dear Mr. Engelken:

Your staff was informed of a reportable deficiency under the provisions of 10CFR50.55(e) by telecon on July 29, 1977.

Attached is our report on this problem.

If you require additional information, please feel free to contact us.

Very truly yours,

D. L. RENBERGER
Assistant Director
Generation & Technology

DLR:DCT:dag

Attachment

cc: D. Roe, BPA (1)

ATTACHMENT #1

REPORTABLE DEFICIENCY AND CORRECTIVE ACTION
WNP-2 OVERLOAD OF STANDBY GAS TREATMENT
SYSTEM DUE TO FUEL POOL BOIL-OFF AT 212°F

Washington Public Power Supply System
Docket No. 50-397
License No. CPPR-93

Description of the Deficiency

The Standby Gas Treatment System (SGTS) is an Engineered Safety Feature (ESF) filter system required to perform safety-related functions following a design basis accident. The SGTS, post-LOCA, is required to maintain a negative 0.25 in. w.g. pressure in the reactor building to prevent direct outleakage of radioactive fission products to the environment. This design criteria would be violated during a LOCA subsequent to a Safe Shutdown Earthquake (SSE). The SGTS capacity would be exceeded due to moisture overload resulting in a reduction in the Reactor Building negative pressure.

Cause and Analysis

The fuel pool cooling system is Seismic Category II and is assumed to fail during an SSE. The fuel pool water temperature will rise to 212°F, thereby gradually increasing the rate of evaporation causing the SGTS capacity to be exceeded. The extent of overload is dependent upon the amount of spent fuel stored in the fuel pool, e.g., two 30% cores will exceed the capacity by about 32%. The effect of this overload would be to reduce the negative pressure in the reactor building from 0.25 in. w.g. to a negative pressure of 0.03 in. w.g. This condition does not conform to safety analysis report design criteria and is a significant deficiency in the final design as approved and released for construction.

Safety Implications

For the reactor building to qualify as a secondary containment for the purpose of fission product control, the volume should be held at a minimum negative pressure of 0.25 in.w.g. when compared with adjacent regions. This criteria is valid up to wind speeds which cause diffusion adequate to compensate for the increased exfiltration with respect to site boundary exposures. Considering the 0.03 in. w.g. negative pressure, the wind speed trade-off is not justified. Since an adequate negative pressure is not maintained, a positive pressure time period must be assumed for the reactor building which causes direct outleakage, thus allowing no credit or a significantly reduced credit for fission product control by the SGTS. This increases the calculated site boundary and low population zone post-LOCA doses presented in the safety analysis report, Chapter 15.

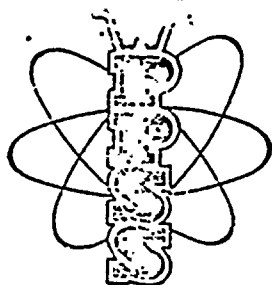
Corrective Action Taken and Planned

The SGTS is being modified to include cooling coils in the inlet to each unit to condense the water vapor and reestablish the design conditions for the system. In this manner, the capacity for the SGTS is not exceeded and a negative 0.25 in. w.g. pressure is maintained in the reactor building.

The spent fuel storage rack design is currently being modified to accommodate high density storage. The design change impacts the water evaporation rate from the spent fuel pool after an assumed SSE, and, thereby, influences the design criteria for the cooling coils. The cooling coil design will be completed in conjunction with the high density fuel storage modification.

The incorporation of the cooling coils into the SGTS will be noted in the safety analysis report as verification that the deficiency has been corrected.

This deficiency is considered to be an isolated case. The deficiency was identified during a routine audit, indicating the system of checks and reviews is performing its function. Due to the extensive reviews in the past by our own personnel and the Architect-Engineer of design criteria, the system designs and design interfaces, the PSAR and FSAR, no specific additional action is required related to this deficiency.



Washington Public Power Supply System
A JOINT OPERATING AGENCY

P. O. Box 968 3000 GEO WASHINGTON WAY RICHLAND, WASHINGTON 99352 PHONE (509) 946-1611

July 5, 1977
G01-77-362

Nuclear Regulatory Commission
Region V
Suite 202, Walnut Creek Plaza
1990 N. California Boulevard
Walnut Creek, California 94596

Attention: Mr. R. H. Engelken, Director

Subject: WPPSS NUCLEAR PROJECT NO. 1
DOCKET NUMBER 50-460, CPPR-134
REPORTABLE EVENT - 10CFR50.55(e)

Dear Mr. Engelken:

Your staff was informed of a reportable deficiency under the provisions of 10CFR50.55(e) by telecon on June 6, 1977.

The interim report attached provides our initial report on the problem. A final report will be provided by August 19, 1977.

If you require additional information, please feel free to contact us.

Very truly yours,

D. L. RENBERGER
Assistant Director
Generation & Technology

DLR:DHW:vh

Attachment

cc: CR Bryant, BPA

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REPORTED DEFICIENCY AND CORRECTIVE ACTION
FOR VOIDS IN CONCRETE PLACEMENT NO. 28-GSB-1
INTERIM REPORT

Description of the Deficiency

On May 23, 1977 voids were discovered on the north face of Placement No. 28 when the forms were removed. Exploratory chipping of concrete has revealed that the voids are located around the third and fourth layers of top mat reinforcing steel. They appear to extend from 5 to 15 feet into Block No. 28 in a north-south direction and are located 1 to 8 feet from the west edge of the foundation mat. Vertical height of the voids was from 8 inches to less than 1 inch. All exploratory work to-date has been performed from the underside of the top mat reinforcing steel.

Cause and Analysis

The voids in Placement No. 28-GSB-1 have been attributed to improper consolidation of concrete in an area of extensive rebar congestion.

Required spacing of reinforcing, by design, is one No. 11 reinforcing bar spaced every 7 inches. North-south reinforcing bars in the third and fourth layers where lap splices are not staggered were to lap a minimum of 10 feet; however, the bars were detailed and fabricated such that only 8 feet 6 inches of lap existed. An additional 25 feet 6 inch bar was added to provide required lap. This increased the density of reinforcing steel in this area above that provided by the original design. In spite of the increased steel density, the voids would not have occurred if the concrete had been properly consolidated.

Safety Implications

Incomplete concrete bonding to reinforcing steel in the void areas could have affected the ability of the structure to resist design forces.

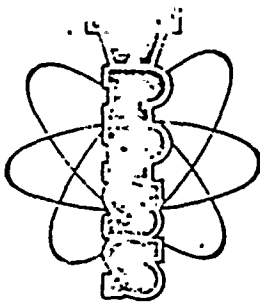
Corrective Action Taken and Planned

The following actions have been taken or are planned to correct the deficiency:

- Exploratory chipping has been conducted, in accordance with approved procedures, to determine the extent of the voids.
- A four (4) inch core boring was performed to determine if any other voids may be present in another area of high rebar congestion in Placement No. 28. Upon inspection of the core, it has been determined that no other voids exist in areas tested.
- Concrete will be removed from the top of the foundation mat to expose all voids in the top mat in the affected area. Concrete above the void areas will also be removed. Reinforcing steel which must be cut to facilitate concrete removal will be cadweld spliced to bars in the adjacent segment. Supplemental lap bars in the highly congested area will be eliminated where possible and main reinforcing bars will be cadweld spliced to reduce the density of reinforcing and permit space for proper placement and consolidation.
- The surface of the concrete will be cleaned of loose material, coated with an approved bonding agent and concrete placed in the affected area in accordance with approved concrete repair procedures. The repair will ensure that there will be no impairment to the integrity of the completed structure.
- All work associated with the repair is expected to be completed approximately August 1, 1977. A complete report will be provided fifteen (15) calendar days following completion of repairs.

The following actions have been taken or are planned to reduce the potential for similar occurrences:

- Lap splices in reinforcing steel in the corresponding area of the General Services Building of WNP-4 Nuclear Project have been staggered to provide increased space for concrete placement.
- Other areas of dense reinforcing will be reviewed by the AE, and any appropriate adjustments made to provide additional space for vibrator operation to assure proper consolidation of concrete.



Washington Public Power Supply System
A JOINT OPERATING AGENCY

P. O. Box 968 3000 GEO. WASHINGTON WAY RICHLAND, WASHINGTON 99352 PHONE (509) 946-1611

August 18, 1977
601-77-480

Nuclear Regulatory Commission
Region V
Suite 202, Walnut Creek Plaza
1990 N. California Boulevard
Walnut Creek, California 94596

Attention: Mr. R. H. Engelken

Subject: WPPSS NUCLEAR PROJECT NO. 1
DOCKET NUMBER 50-460, CPPR-134
REPORTABLE 10CFR50.55(e) - CONCRETE VOIDS

Dear Mr. Engelken:

Your staff was informed of a reportable deficiency under the provisions of 10CFR50.55(e) by telecon on June 6, 1977. An initial report was transmitted July 5, 1977.

A final report was to have been provided by August 19, 1977. However, due primarily to contractual problems with the contractor responsible for the work (Hoffman Construction Company) the repair work associated with the deficiency has not been completed.

Work is continuing to remove defective concrete and assure that no additional voids exist. In addition, rock pockets have been identified on the south face of GSB No. 1 placement 8U. The presence of these rock pockets indicates the potential for voids in this area also.

Your office will be kept informed of WPPSS progress in evaluation of the extent of the voids and of the progress towards final repair.

It is anticipated at this time, that a final report on the incident will be provided by September 16, 1977.

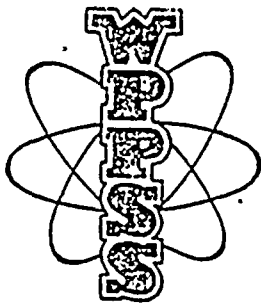
Very truly yours,

D. L. Renberger
D. L. RENBERGER
Assistant Director, Projects

DLR:DHW:djs

cc: SB Barnes - UE&C, Field
EC Haren - UE&C, Field
CR Bryant - BPA

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Washington Public Power Supply System
A JOINT OPERATING AGENCY

P. O. Box 968 3000 GEO WASHINGTON WAY RICHLAND, WASHINGTON 99352 PHONE (509) 946-1611

September 15, 1977
G01-77-558

Nuclear Regulatory Commission
Region V
Suite 202, Walnut Creek Plaza
1990 N. California Boulevard
Walnut Creek, California 94596

Attention: Mr. R. H. Engelken

Subject: WPPSS NUCLEAR PROJECT NO. 1
DOCKET NUMBER 50-460 - CPPR-134
REPORTABLE 10CFR50.55(e) - CONCRETE VOIDS

Dear Mr. Engelken:

Your staff was informed of a reportable deficiency under the provisions of 10CFR50.55(e) by telecon on June 6, 1977. An initial report was transmitted July 5, 1977 and an interim status report sent on August 18, 1977.

The August 18, 1977 letter stated a final report would be issued September 16, 1977. Since the contractor has not yet completed the repair, a final report cannot be issued at this time.

Work is continuing to remove defective concrete and to prepare the area for replacement of reinforcing steel which had to be removed to allow access to the void. The reinforcing steel in the void area is being redesigned to relieve the congestion in the area to facilitate a successful repair.

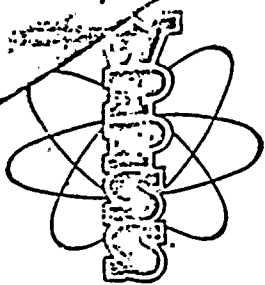
Your office will be kept informed of WPPSS progress in evaluation of the extent of the voids and the progress toward final repair.

Reevaluation of the time necessary to effect the repair indicates a completion of repair and issuance of a final report by November 15, 1977.

Very truly yours,

D. L. RENBERGER
Assistant Director
Generation & Technology

DLR:DWH:LEN:vh



Washington Public Power Supply System
A JOINT OPERATING AGENCY

P O Box 968 3000 GEO. WASHINGTON WAY RICHLAND, WASHINGTON 99352 PHONE (509) 946-1611

November 14, 1977
G01-77-722

Nuclear Regulatory Commission
Region V
Suite 202, Walnut Creek Plaza
1990 N. California Boulevard
Walnut Creek, California 94596

Attention: Mr. R. H. Engelken

Subject: WPPSS NUCLEAR PROJECT NO. 1
DOCKET NUMBER 50-460 - CPPR-134
REPORTABLE 10CFR50.55(e) CONCRETE VOIDS

Dear Mr. Engelken:

Your staff was informed of a ^{S.}reportable deficiency under the provisions of 10CFR50.55(e) by telecon on June 6, 1977. An initial report was transmitted July 5, 1977 and interim status reports sent on August 18, 1977 and September 15, 1977.

The September 15, 1977 letter stated a final report would be issued November 15, 1977. Since the repair has not been completed, a final report cannot be issued at this time.

An attempt has been made to determine the acceptability of concrete outside of the known voids using ultrasonics and core boring. During the core boring operation another area of unsound concrete was discovered. This new area is now under investigation and further tests are being conducted to identify any other problem areas. Additional core borings are being taken to assure concrete integrity along the entire west wall of GSB No. 1 placement 28.

Your office will be kept informed of WPPSS progress in evaluation of the extent of the voids and the progress toward final repair.

Mr. R. H. Engelken
Page 2

November 14, 1977
G01-77-722

The nature of the exploratory work in this placement makes an accurate prediction of the completion date very difficult. A status report will be issued by January 31, 1977.

Very truly yours,

D. L. Renberger

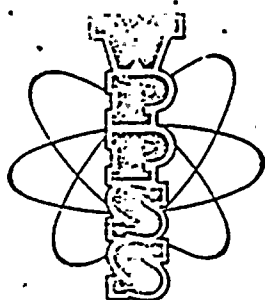
D. L. RENBERGER
Assistant Director
Generation & Technology

DLR:DHW:LEN:djs

cc: CR Bryant - BPA
SB Barnes - UE&C, Field
EC Haren - UE&C, Field

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Washington Public Power Supply System
A JOINT OPERATING AGENCY

P. O. Box 968 3000 GEO. WASHINGTON WAY RICHLAND, WASHINGTON 99352 PHONE (509) 946-1611

January 23, 1978
G01-78-62

Nuclear Regulatory Commission
Region V
Suite 202, Walnut Creek Plaza
1990 N. California Boulevard
Walnut Creek, California 94596

Attention: Mr. R. H. Engelken

Subject: WPPSS NUCLEAR PROJECTS NOS. 1/4
DOCKET NUMBER 50-460 - CPPR-134
REPORTABLE 10CFR50.55(e) ^S CONCRETE VOIDS

Dear Mr. Engelken:

Your staff was informed of a ^S reportable deficiency under the provisions of 10CFR50.55(e) by telecon on June 6, 1977. An initial report was transmitted July 5, 1977 and interim status reports sent on August 18, 1977, September 15, 1977 and November 14, 1977.

The attached report provides our ^S final statement concerning the extent of the problem, the actions taken to correct the discrepancy and the actions taken to prevent recurrence of this type of incident.

If you require additional information, please feel free to contact us.

Very truly yours,

R. E. Smith for

D. L. RENBERGER
Assistant Director
Generation & Technology

DLR:DHW:LEN:djs

Attachment

cc: CR Bryant - BPA
SB Barnes - UE&C, Field
EC Haren - UE&C, Field

01431660

- The excavated area extended approximately 4 feet in depth, along the entire west face of Placement 28 and 8 feet from the west face.
- After all known defective concrete had been removed, additional core borings were taken from the western edge of the excavated area easterly into segment 28 to verify the integrity of the remainder of the segment. These additional core borings were examined and indicated no additional problem or suspect areas.
- Reinforcing steel removed to facilitate concrete removal was replaced by cadweld splicing to bars in the adjacent segment or to bars within segment 28 as appropriate. Supplemental lap bars in the highly congested area were eliminated where possible and main reinforcing bars were cadweld spliced to reduce the density of reinforcing and increase space available for placement and consolidation.
- The surface of the concrete was cleaned of loose material, coated with an approved bonding agent and concrete placed in the affected area in accordance with approved concrete repair procedures. The repair ensures that there will be no impairment to the integrity of the completed structures.
- The concrete pour-back took place on January 9, 1978 in accordance with the disposition to Nonconformance Report 1-NCR-205-183.

The following actions have been taken or are planned to reduce the potential for similar occurrences:

- Lap splices in reinforcing steel in the corresponding area of the General Services Building of WNP-4 have been staggered to provide increased space for concrete placement and consolidation.
- Other areas of dense reinforcing will be reviewed by the AE, and appropriate adjustments made to provide additional space for vibrator operation to assure proper consolidation of concrete.
- The Contractor involved has conducted training sessions to demonstrate proper consolidation procedures to supervision and workmen involved in concrete placement.
- Inspection activities by the Contractor was increased and additional surveillance effort by the Architect Engineer and the Owner was conducted. The results from this effort indicated no similar problems exist in other placements.

011431669

REPORTED DEFICIENCY AND CORRECTIVE ACTION
FOR VOIDS IN CONCRETE PLACEMENT NO. 28-GSB-1

Description of the Deficiency

On May 23, 1977 voids were discovered on the north face of Placement No. 28 when the forms were removed. Exploratory chipping and core boring of concrete has revealed that the voids are located around the third and fourth layers of top mat reinforcing steel. They extend the full width of Block No. 28 in a north-south direction and are located 1 to 8 feet from the west edge of the foundation mat. Vertical height of the voids was from 8 inches to less than 1 inch.

Cause and Analysis

The voids in Placement No. GSB-1-28 have been attributed to improper consolidation of concrete in an area of extensive rebar congestion.

Required spacing of reinforcing, by design, is one No. 11 reinforcing bar placed every 7 inches. North-south reinforcing bars in the third and fourth layers where lap splices are not staggered were to lap a minimum of 10 feet; however, the bars were detailed and fabricated such that only 8 feet 6 inches of lap existed. An additional 25 feet 6 inch bar was added to provide required lap. This increased the density of reinforcing steel in this area above that provided by the original design. In spite of the increased steel density, the voids would not have occurred if the concrete had been properly consolidated.

Additional voids were discovered south of the areas of extensive rebar congestion. These additional voids were in an area of relatively low rebar density and can only be attributed to poor consolidation practices.

Safety Implications

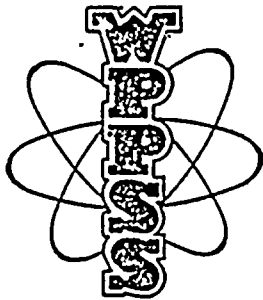
Incomplete concrete bonding to reinforcing steel in the void areas could have affected the ability of the structure to resist design forces.

Corrective Action Taken and Planned

The following actions have been taken to correct the deficiency:

- Exploratory chipping of concrete from the top west face of the foundation was performed to determine the extent of the voids and to implement the repair. Core borings were taken from the west face of the placement horizontally to a depth of approximately 8 feet to further define the extent of the defect. The core borings indicated the presence of defective concrete along the entire west edge of Block No. 28. Existing reinforcing steel in all four layers of the top mat and at the west side of the placement was removed as required to provide access for chipping equipment. All concrete above and including the defective area has been removed.

01 143 1670



Washington Public Power Supply System
A JOINT OPERATING AGENCY

P. O. Box 968 3000 GEO. WASHINGTON WAY RICHLAND, WASHINGTON 99352 PHONE (509) 946-1611

November 5, 1976
G01-76-694

Nuclear Regulatory Commission
Region V
Suite 202, Walnut Creek Plaza
1990 N. California Boulevard
Walnut Creek, California 94596

Attention: Mr. R. H. Engelken, Director

Subject: WPPSS NUCLEAR PROJECTS NOS. 1 AND 4.
POTENTIALLY REPORTABLE EVENT
DOCKET NUMBERS 50-460 AND 50-513

Dear Mr. Engelken:

This is to inform you of an event which is potentially reportable under the provisions of 10CFR50.55(e). The event involves seismic design of the WNP-1/4 General Services Buildings. A key assumption used in the original analysis considered all floors as rigid extensions of the exterior walls. We have subsequently developed an analysis which allows the floors to flex in direct proportion to the force applied and in inverse proportion to stiffness. Preliminary evaluation indicates there may be a potential for a change in the resultant stresses on the substructure. Our AE is in the process of performing a detailed computer analysis to determine if redesign of the substructure is required.

W. G. Albert of your staff was verbally informed of this during his inspection of WNP-1 activities the week of October 18, 1976.

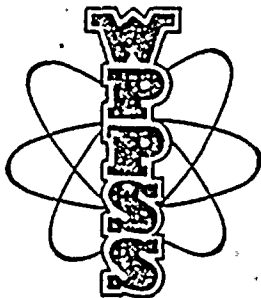
The Supply System is investigating the problem and will inform you of the results of their review.

Very truly yours,

D. L. Renberger

D. L. RENBERGER
Assistant Director,
Generation & Technology

DLR:DHV:vh



Washington Public Power Supply System
A JOINT OPERATING AGENCY

P. O. Box 968 3000 GEO. WASHINGTON WAY RICHLAND, WASHINGTON 99352 PHONE (509) 946-1611

December 17, 1976
G01-76-767

Nuclear Regulatory Commission
Region V
Suite 202, Walnut Creek Plaza
1990 North California Boulevard
Walnut Creek, California 94596

Attention: Mr. R. H. Engelken, Director

Subject: WPPSS NUCLEAR PROJECTS NOS. 1 AND 4
REPORTABLE EVENT - 10CFR50.55(e)
DOCKET NOS. 50-460 AND 50-513

Reference: G01-76-694, D. L. Renberger, WPPSS, to R. H. Engelken,
NRC, same subject, dated November 5, 1976.

Dear Mr. Engelken:

You were informed of a potentially reportable design deficiency in the reference letter. Subsequently, on November 19, 1976, your staff was informed by telephone that the Supply System had determined that this potential deficiency was reportable under the provision of 10CFR50.55(e) and that there were two aspects to the problem.

Attachments to this letter are reports from our Architect-Engineer which summarize the problems and describe in a summary form the corrective actions taken. You will note that two problems are addressed separately to facilitate your review:

- a) The first aspect is related to seismic design of the General Services Building (GSB) for the horizontal earthquake, and analysis assumptions for floors. This problem is the one which we reported as affecting the substructure and horizontal shear loads in GSB interior walls.
- b) The second aspect of the problem is related to the vertical earthquake and assumptions used for analysis of floor slabs. The integrity of the structure itself was not at issue, but rather the indirect effects of seismic forces acting on equipment within the building.

We have reviewed our Architect-Engineer's narrative report. Members of our technical staff have audited the analysis methods and techniques and evaluated the conclusions. The Supply System finds the resolution of these deficiencies to be acceptable:

If you require any additional information, please feel free to contact us.

Very truly yours,

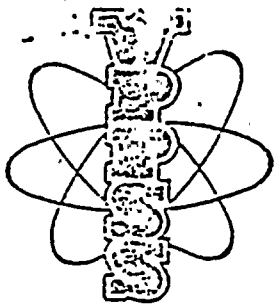
D L Renberger

D. L. RENBERGER
Assistant Director
Generation & Technology

DLR:MEW:km

Attachments

cc: JR Schmieder - UE&C
GE Thornes - UE&C
CR Bryant - BPA
JB Knotts - C&K



Washington Public Power Supply System
A JOINT OPERATING AGENCY

P. O. Box 968 3000 GEO. WASHINGTON WAY RICHLAND, WASHINGTON 99352 PHONE (509) 946-1611

February 24, 1977
G01-77-133

Nuclear Regulatory Commission
Region V
Suite 202, Walnut Creek Plaza
1990 North California Boulevard
Walnut Creek, California 94596

Attention: Mr. R. H. Engelken, Director

Subject: WPPSS NUCLEAR PROJECTS NOS. 1 AND 4
REPORTABLE EVENT - 10CFR50.55(e)
DOCKET NOS. 50-460 AND 50-513

Reference: Letter, R. H. Engelken to D. L. Renberger, same subject,
dated January 19, 1977

Dear Mr. Engelken:

The referenced letter requested that additional questions be responded to by the Supply System. Our response is as follows and is formulated in accordance with the two items identified in the original report.

Question: (assumed distribution of Lateral Seismic Forces)

"What were the causes of the design deficiencies...?"

Response:

The original design of the General Service Building assumed that the floor slabs acted as rigid diaphragms and delivered horizontal seismic loads to the vertical walls in proportion to the shear stiffness of the walls. During the design of the floor slabs in the superstructure of the General Service Building, it was found that the slabs themselves would not transfer these horizontal forces in a manner to support the original assumptions.

The validity of the assumption of rigid diaphragms was reevaluated as a result of the superstructure design process. The superstructure design process was not completed prior to release of the substructure drawings. The redesign of the substructure was done subsequent to its original release as a result of the normal superstructure design review process.

Question:

"Did they represent a breakdown in the design review process...?"

Response:

The seismic analysis incident involving horizontal shear distribution through the General Service Building structure developed as a result of the designers investigation of the validity of analysis methods, techniques and assumptions which have commonly been accepted within the industry, and previously used for the design of nuclear facilities. For multi-story structures it is commonly assumed that concrete floor slabs act as rigid diaphragms in transmitting horizontal earthquake forces to the structure walls and foundation.

As a result of the designer's review and investigation of this generally accepted basic analysis assumption, it was determined that, because of the uniqueness of the WNP-1/4 General Service Building design, the original assumption was not valid for this particular structure. It was determined that more refined analysis methods and techniques should be used to account for flexibility of the floor slabs in the horizontal direction. Consequently, it was decided that a three-dimensional finite element analysis should be performed.

The designer's evaluation of the application of finite element theory to seismic analysis of the General Service Building determined that a much better definition of the structural response to earthquake motion could be obtained than with the methods of seismic analysis previously employed.

No breakdown in the design review process at either UE&C or WPPSS occurred but rather a natural design evaluation took place employing more sophisticated methods and assumptions.

Question:

"What corrective action is planned?"

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Response:

No corrective action is required since this design was changed as a result of the designer's efforts to investigate the applicability of commonly accepted assumptions which have previously been used as a basis for analysis of nuclear facilities. Such review of assumptions by senior AE personnel are routinely conducted as a part of the design review process. This was and is an ongoing process, and no corrective action is necessary.

Question: (Vertical component of earthquake forces)

"What were the causes of the design deficiencies...?"

Response:

The causes of the design changes were the use of assumptions in the original design which were later found to be non-conservative. Reevaluation of the design assumptions was brought about as a result of review of other SARs issued subsequent to the design of the WNP-1/4 General Service Building.

Question:

"Did they represent a breakdown in the design review process...?"

Response:

The seismic analysis incident involving the vertical response of floor slabs within the General Service Building developed as a result of the designer's review of other safety analysis reports. These documents indicated that floor slabs could have amplified response in the vertical direction as opposed to the commonly used assumption that floor slabs respond the same as the supporting walls. Further evaluation of this phenomenon revealed that flexibility of the General Service Building floor slabs would allow some amplification in the vertical direction.

No breakdown in the design review process occurred either at UE&C or at WPPSS. On the contrary, the fact that improved analysis techniques were evaluated and implemented demonstrates that the review process is working as intended.

Question:

"What corrective action is planned?"

Nuclear Regulatory Commission
Page 4

Response:

No corrective action is planned as the design was changed as a result of the designer's actions to review other PSAR's which have been filed with the NRC and subsequent efforts to evaluate the impact of the application of more refined analysis methods on the General Service Building design. Such review of assumptions by senior AE personnel are routinely conducted as a part of the design review process. This was and is an ongoing process, and no corrective action is necessary.

If you require any additional information, please feel free to contact us.

Very truly yours;

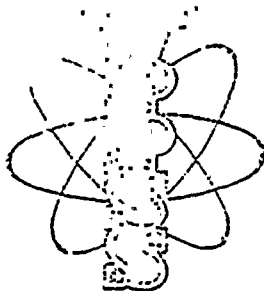
D L Renberger

D. L. RENBERGER
Assistant Director
Generation & Technology

DLR:MEW:DLS:DHM:vh

cc: JR Schmieder, UE&C
GE Thornes, UE&C
CR Bryant, BPA

010851756



Washington Public Power Supply System
A JOINT OPERATING AGENCY

P O BOX 968 3000 G20 WASHINGTON WAY A. LAND, WASHINGTON 98332 PHONE (206) 246-1611

15.55
602-78-151
May 30, 1978

0 2 2 8 1 1 7 8 2
Nuclear Regulatory Commission
Region V
Suite 202, Walnut Creek Plaza
1900 N. California Boulevard
Walnut Creek, California 94596

Attention: Mr. R. H. Engelken, Director

Subject: WPPSS NUCLEAR PROJECT NO. 2
DOCKET NUMBER 50-397, CPPR-93
S REPORTABLE EVENT - 10CFR50.55(a)

Dear Mr. Engelken:

Your staff was informed of a reportable deficiency under the provisions of 10CFR50.55(a) by telephone on April 24, 1978.

Attached is our report on this problem. Corrective action is being taken as described in the report.

If you have any questions concerning this matter, please contact us.

Very truly yours,

D. L. Renberger

D. L. RENBERGER
Assistant Director
Generation and Technology

DLR:EAF:cph

Attachment

cc: JJ Byrnes, B&R.
D. Roe, BPA

G-02-78-151

REPORTABLE DEFICIENCY AND CORRECTIVE ACTION
WPPSS NUCLEAR PROJECT NO. 2
OPENING IN TORNADO MISSILE BARRIER
IN DIESEL GENERATOR BUILDING

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
DOCKET NO. 50-397
LICENSE NO. CPPR-93

Description of the Deficiency

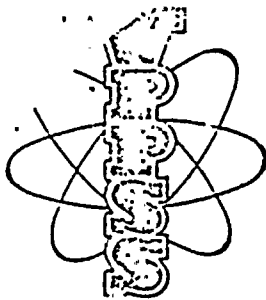
At the three exterior doors at ground level at the south exterior wall of the Diesel Generator Building, reinforced concrete L-shaped interior walls are provided to protect the diesel generators from tornado-propelled missiles. These L-shaped walls were designed and constructed, however, so that they do not completely block the door opening. A "window", or line-of-sight gap approximately 3 inches wide by 7 feet high exists through which an externally-generated missile could pass.

Safety Implications

The L-shaped walls do not fully block the door openings in the exterior walls of the Diesel Generator Building. Consequently, a tornado-propelled missile having a low trajectory in a direction approximately 60 degrees east of North, could penetrate the exterior door and not be intercepted by the L-shaped missile barrier wall. This could result in damage to one of the diesel generator units, which, when combined with a single active failure of one of the other diesel generator units under emergency conditions, could preclude safe shutdown of the reactor.

Corrective Action

A structural element will be provided at each of the three door openings, attached to the inside face of the exterior wall, which will be capable of intercepting and preventing penetration by design basis tornado-generated missiles. These structural elements will consist of steel plate enclosures anchored to the wall, and filled with plain concrete. These will extend vertically from the floor to above the door opening.



Washington Public Power Supply System
A JOINT OPERATING AGENCY

P. O. Box 968 3000 GEO. WASHINGTON WAY RICHLAND, WASHINGTON 99352 PHONE (509) 946-1611

G02-78-150
May 26, 1978

Nuclear Regulatory Commission
Region V
Suite 202 Walnut Creek Plaza
1900 N. California Boulevard
Walnut Creek, California 94596

Attention: Mr. R. H. Engelken, Director

Subject: WPPSS NUCLEAR PROJECT NO. 2
DOCKET NUMBER 50-397, CPPR-93
S REPORTABLE DEFICIENCY - 10CFR50.55(e)

Dear Mr. Engelken:

In accordance with the provisions of 10CFR50.55(e), your staff was informed by telephone on April 24, of a reportable deficiency involving control room air handling unit leakage which could result in the possible over exposure of Control Room Operators to radiation following a LOCA.

Attached is our report on this deficiency.

Please contact us if you have additional questions.

Very truly yours,

D L Renberger

D. L. RENBERGER
Assistant Director
Generation and Technology

DLR:HLB:cph

attachment

cc: JJ Byrnes, B&R
JJ Verderber, B&R
D. Roe, BPA

REPORTABLE DEFICIENCY AND CORRECTIVE ACTION
WPPSS NUCLEAR PROJECT NO. 2
POSSIBLE OVEREXPOSURE OF CONTROL ROOM
OPERATORS TO RADIATION FOLLOWING A LOCA

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
DOCKET NO. 50-397
LICENSE NO. CPPR-93

Description of Deficiency

As currently designed, the air handling unit blower discharges directly from the air handling unit into the control room air supply ducting. This arrangement results in pressures inside the air handling unit case which are lower than the pressure in the surrounding HVAC equipment rooms and promotes the possible in-leakage of unfiltered air into air handling units.

The leakage criteria contained in the control room air handling unit specification was based on the guide lines given in Regulatory Guide 1.52, "Design, Testing and Maintenance Criteria for Atmosphere Cleanup Systems Air Filtration and Adsorption Units of Light-Water-Cooled Nuclear Plants" Revision 0, June, 1973. The leakage rate indicated was 1% of rated flow for recirculating primary atmosphere cleanup housings and ductwork. Certified leak test results for the two control room air handling units were 62 and 70 cfm, respectively, which is approximately 0.03% of rated flow.

The possibility for airborne radioactive contaminants to exist within the HVAC equipment rooms results from the fact that HVAC equipment room heating, ventilating and airconditioning is provided by critical switch gear room HVAC equipment. The air supply for the critical switch gear room HVAC equipment is from the inlet plenum area which also serves the control room HVAC systems during normal operation. This plenum inlet may be exposed to radioactive releases following accident conditions.

To reduce the thyroid dose, which is indicated as the most critical, will require limiting air handling unit in-leakage to at least 0.02% of total air handling unit flow.

Safety Implication

Unless the reportable deficiency is corrected, the infiltration of airborne radioactive contaminants into the control room following a LOCA may possibly result in a 30-day integrated radiation dose to Control Room Operators which exceeds specified limits.

Corrective Action

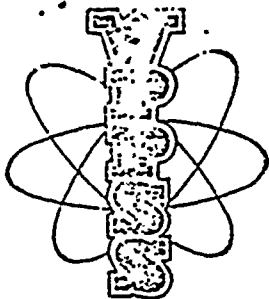
Following identification of the reportable deficiency a number of possible modifications to the control room HVAC system and air handling unit were investigated to reduce or eliminate the air handling unit in-leakage. These modifications included (1) isolating the control room HVAC equipment in separate leak tight rooms, (2) enclosing the air handling unit in an additional pressurized case, and (3) replacing the existing air handling unit blower with a separate blower at the air handling unit inlet.

Replacement of the air handling unit blower with a separate blower unit which will blow through the air handling unit has been selected as the course of action to be followed in correcting the design deficiency. This modification provides for pressurizing the air handling unit casing and ducting thereby eliminating in-leakage of air downstream of the blower unit.

In addition to the above indicated changes, the planned modifications will require (1) revision of outside air intake ductwork and automatic damper locations, (2) revision of ductwork from the emergency filter units to the air handling unit blower, (3) sealing the present return air openings through the floor slab and bottom of the air handling unit mixed air/filter section and (4) relocating the present 3 hour fire door to a new return air slab opening in the new fan inlet plenum.

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Washington Public Power Supply System
A JOINT OPERATING AGENCY

P. O. Box 968 3000 GEO. WASHINGTON WAY RICHLAND, WASHINGTON 99352 PHONE (509) 946-9081

G02-77-504
December 27, 1977

Nuclear Regulatory Commission
Region V
Suite 202, Walnut Creek Plaza
1990 N. California Boulevard
Walnut Creek, California 94596

Attention: Mr. R. H. Engelken, Director

Subject: WPPSS NUCLEAR PROJECT NO. 2
DOCKET NUMBERS 50-397, CPPR-93
S REPORTABLE EVENT - 10CFR50.55(e)

Dear Mr. Engelken:

Your staff was informed of a reportable deficiency under the provisions of 10CFR50.55(e) by telecon on December 2, 1977.

Attached is our interim report on this problem. Metallurgical studies are still underway to determine the factors which caused the deficiency to occur. We anticipate our welding consultant's report will be completed and additional information regarding the cause of this deficiency will be transmitted to you within 30 days.

Should you have any additional questions, please contact us.

Very truly yours,

D L Renberger

D. L. RENBERGER
Assistant Director
Generation and Technology

Attachment

DLR:RJS:df

cc: JJ Byrnes, B&R (NY)
JD Wilson, B&R (Site)

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ATTACHMENT #1

Reportable Deficiency and Corrective Action
WPPSS Nuclear Project No. 2
Cracks in Structural Steel Platform at 541'
Elevation Inside Containment

Washington Public Power Supply System
Docket No. 50-397
License No. CPPR-93

INTERIM REPORT

Description of the Deficiency

0 2 2 5 3 4 9
Inspection results have identified cracks in field welds made to heavy structural beams which makeup the 541' elevation platform inside the containment drywell. This platform spans between the sacrificial shield and the containment vessel and is primarily designed to carry pipe whip restraint loads for large diameter and high energy piping systems including Main Steam and Reactor Feedwater lines. In addition, this platform is used for supporting secondary loads including air handling equipment, recirculating pump motors, pipe hangers and snubber supports as well as structural supports for other miscellaneous equipment in that vicinity. The cracks were identified as a result of extra inspection requirements imposed to resolve a nonconforming condition related to welding procedures. This was further expanded to include a baseline magnetic particle examination of all field welds which had been made on this platform structure. Of the 83 field weld locations, 20 were accepted, 7 were identified as major cracks, 39 were rejected as minor surface indications and 17 were inaccessible because of equipment or other temporary obstructions.

Cause and Analysis

Several contributing factors are considered as having caused the cracks in the 541' elevation platform including deficient welding and fabrication sequence procedures, incomplete inprocess inspection and possible metallurgical conditions associated with hydrogen embrittlement and nil ductility transition temperatures. This matter is currently being analyzed by our metallurgical consultant. Detailed information is pending completion of our consultant's report. This information should be available within 30 days.

Safety Implication

The structural members, in which cracks were identified, are designed to carry the primary loads associated with the pipe whip restraints of high energy piping systems including Main Steam and Reactor Feedwater lines. Under pipe break loads, which constitutes a failed load condition, the members are designed for plastic deformation. The cracked welds could result in a local failure within the structure, thereby, reducing the effectiveness of a pipe whip restraint.

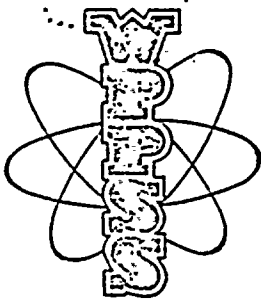
Corrective Action Taken and Planned

In response to the initial identification of cracks in the 541' platform, additional magnetic particle inspection was performed on all the field welds made to that platform structure. In addition, the Architect Engineer/Construction Manager performed a visual inspection of other structural field welds made by the Contractor inside containment.

A stringent repair program has been implemented and is being directed by our Architect/Engineer. The Supply System's welding consultant concurs with this repair program.

To assure adherence to the repair procedures, the Architect/Engineer is performing second party inspection along with specific inprocess inspection hold points requiring A/E acceptance.

The Supply System is evaluating additional corrective actions affecting welding processes and inspection criteria which may be utilized to prevent recurrence of these conditions. Any corrective actions will be based on this review and the review made by our consultant. The results of this review and any additional actions planned or taken will be included in our final report.



Washington Public Power Supply System.
A JOINT OPERATING AGENCY

P. O. Box 968 3000 GEO. WASHINGTON WAY RICHLAND, WASHINGTON 99352 PHONE (509) 946-9681

April 10, 1978
G02-78-121

Nuclear Regulatory Commission
Region V
Suite 202, Walnut Creek Plaza
1900 N. California Boulevard
Walnut Creek, California 94596

Attention: Mr. R. H. Engleken, Director

Subject: WPPSS NUCLEAR PROJECT NO. 2
DOCKET NUMBER 50-397, CPPR-93
S REPORTABLE EVENT - 10CFR50.55(e)

Reference: Letter, G02-77-504, same subject, dated 12/27/77

Dear Mr. Engleken:

The reference letter transmitted our interim report describing a reportable deficiency under the provisions of 10CFR50.55(e) concerning cracks in the structural steel platform at 541' elevation inside containment.

Attached is our final report on this matter.

Should you have any additional questions, please contact us.

Very truly yours,

D L Renberger

D. L. RENBERGER
Assistant Director
Generation and Technology

Attachment

DLR:RJS:df

cc: JJ Byrnes, B&R (New York)

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ETP

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Reportable Deficiency and Corrective Action
WPPSS Nuclear Project No. 2
Cracks in Structural Steel Platform at 541'
Elevation Inside Containment

Washington Public Power Supply System
Docket No. 50-397
License No. CPPR-93

FINAL REPORT

Description of the Deficiency

Inspection results have identified cracks in field welds made to heavy structural beams which makeup the 541' elevation platform inside the containment drywell. This platform spans between the sacrificial shield and the containment vessel and is primarily designed to carry pipe whip restraint loads for large diameter and high energy piping systems including Main Steam and Reactor Feedwater lines. In addition, this platform is used for supporting secondary loads including air handling equipment, recirculating pump motors, pipe hangers and snubber supports as well as structural supports for other miscellaneous equipment in that vicinity. The cracks were identified as a result of extra inspection requirements imposed to resolve a nonconforming condition related to welding procedures.

Subsequently, magnetic particle examination has been expanded to include all field welds which affect the integrity of the pipe whip support structures throughout containment and in the main steam tunnel. Presently over 60 field welds on the 541' elevation platform have been repaired. As repair efforts at this elevation near completion, inspections and necessary repairs will commence at other pipe whip support locations.

Cause and Analysis

Several contributing factors are considered as having caused the cracks in the 541' elevation platform including deficient welding and fabrication sequence procedures, incomplete inprocess inspection and possible metallurgical conditions associated with hydrogen embrittlement and nil ductility transition temperatures.

Our consultant concluded that the most likely explanation for the major cracks is that they initiated as hydrogen induced cold cracks in the HAZ regions following weld cooldown. These hydrogen cracks were in turn enhanced by the weld shrinkage stresses associated with the restrained structural configurations and reduced toughness properties of the materials which were exposed to ambient temperatures below 32°F.

Safety Implication

The structural members, in which cracks were identified, are designed to carry the primary loads associated with the pipe whip restraints of high energy piping systems including Main Steam and Reactor Feedwater lines. Under pipe break loads, which constitutes a failed load condition, the members are designed for plastic deformation. The cracked welds could result in a local failure within the structure, thereby, reducing the effectiveness of a pipe whip restraint.

Corrective Action Taken and Planned

In response to the initial identification of cracks in the 541' platform, additional magnetic particle inspection was performed on all the field welds made to that platform structure.

In addition, magnetic particle examination is being performed on all field welds which are critical to the assembly or function of the pipe whip support structures within the drywell or in the main steam tunnel. Those field welds not yet completed shall be subject to magnetic particle examination of root pass, mid-point and final weld-out. All welds (including repairs) which require magnetic particle examination, shall be inspected 72 hours after cooldown.

Upon completion of repairs and cooldown of the 541' elevation platform, it shall be visually inspected to assure its acceptance.

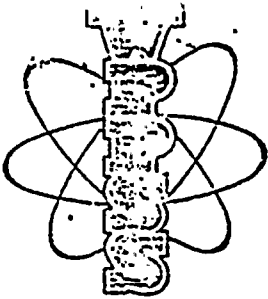
A stringent repair program has been implemented and is being directed by WPPSS/Architect/Engineer. Included in this program are directions for sequencing weld repairs in such a manner as to minimize weld shrinkage stresses and associated distortion. The Supply System and our welding consultant concurs with this repair program.

To assure adherence to the repair procedures, the Architect/Engineer is performing second party inspection along with specific inprocess inspection hold points requiring A/E acceptance by an AWS QC I certified welding inspector.

All further structural welding will be performed in accordance with sequence procedures prepared by the Contractor and approved by the Architect/Engineer.

To assure the pipe whip support members remain well above the nil-ductility transition temperature during cold weather, the minimum drywell temperature shall be maintained at 70°F for the duration of construction activities.

Additionally, review of the fracture toughness of the pipe whip support structures at the anticipated operating temperatures and design loads is now in progress. Many of the support structures have been fabricated from A516GR70 and A537CL2 materials with designated impact properties. However, a sampling of those supports which were fabricated from conventional A-36 materials are being further evaluated by WPPSS' consultants to determine their ability to resist brittle fracture at operating conditions. Should the results of this review indicate that a reportable condition exist, the NRC shall be so advised.



com
Washington Public Power Supply System
A JOINT OPERATING AGENCY

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Bm

P. O. Box 968

3000 GEO. WASHINGTON WAY

RICHLAND, WASHINGTON 99352

PHONE (509) 375-5000

G02-78-245

November 6, 1978

Nuclear Regulatory Commission
Region V
Suite 202 Walnut Creek Plaza
1900 N. California Boulevard
Walnut Creek, California 94596.

Attention: Mr. R. H. Engelken, Director

Subject: WPPSS NUCLEAR PROJECT NO. 2
DOCKET NUMBER 50-397, CPPR-93.
REPORTABLE DEFICIENCY - 10CFR50.55(e)

Dear Mr. Engelken:

In accordance with the provisions of 10CFR50.55(e), your staff was informed by telephone on October 10, 1978, of a reportable deficiency involving Anchor/Darling tilting disc check valves in the Residual Heat Removal System failing to close with gravity when installed in a vertical position which could potentially result in damage to the system or a delay in system response. This problem had been previously identified in IE Circular No. 78-15. Attached is our report on this deficiency.

If you require additional information, please feel free to contact us.

Very truly yours,

D L Renberger

D. L. RENBERGER
Assistant Director
Technology

DLR:JAO:cph

Attachment

cc: JJ Verderber, B&R
RC Root, B&R Site
JJ Byrnes, B&R
D. Roe, BPA
E. Volgenau, NRC, Washington, D.C.

REPORTED DEFICIENCY AND CORRECTIVE ACTION
FOR TILTING DISC CHECK VALVES FAILURE TO CLOSE
WITH GRAVITY IN VERTICAL POSITION

11-6-78

Nature of Deficiency:

Anchor/Darling informed Burns and Roe by letter, dated June 18, 1978, that their tilting disc check valves of a specific pressure class and size may not close by gravity alone once they are fully opened if mounted in a vertical pipe. The cause is that the disc center of gravity travels beyond or is directly above the disc pivot point when the valve is fully open.

This problem has been identified in IE Circular No. 78-15.

We have identified all these valves in safety-related systems, i.e. the Residual Heat Removal (RHR) pump discharge check valves (RHR-V-31A, B and C) and determined that RHR-V-31B will not close by gravity when fully opened.

Safety Implications

Failure of the pump discharge check valve to close will drain the RHR/Low Pressure Coolant Injection (LPCI) discharge piping into the suppression chamber. The water leg pump will not be able to maintain the piping full due to the flow path to the suppression chamber. Subsequent start of the RHR pump may result in water hammer which could disable the RHR/LPCI Loop. Also, the time required for LPCI to inject water into the reactor may be increased beyond the time assumed in the accident analyses, due to the extra time required to refill the discharge piping. An additional single failure would reduce the Emergency Core Cooling Systems below minimum requirements.

Corrective Action Taken and Planned

Anchor/Darling has been contacted by WPPSS about modifying the disc by adding a weld buildup or a lug to the disc counterweight so as not to allow the disc center of gravity to travel over the disc pivot point. The modification will be coordinated with Anchor/Darling and it is expected to be completed by March, 1979. The field Quality Assurance program will inspect and verify after the fix that this valve will close by gravity when fully opened.