#43

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Draft 3 10/12/84

AM-11, etc. /CP5

CDR

SSER

1. Allegation Group: Mechanical and Piping Category 43
Poor welding conditions for ~~spent~~ fuel ~~storage~~ pool liner

2. Allegation Number: AM-11, AW-40, AW-42, AQW-80, AW-81, and AW-82

3. Characterization: It is alleged that:

(a) AM-11 - Incorrect fitup and poor welding technique resulted in thin welds joining stainless steel liner plates for fuel pools in the fuel building and reactor building for Unit 1.

(b) AW-40 - One seam is largely rust and concrete

(c) AW-42 - Poor welding conditions for field installation of the stainless steel liners in the spent fuel pools of the fuel handing facility.

(d) AQW-80 - Liner plate weld seams do not match drawing locations on floor around Unit 1 reactor vessel.

(e) AW-81 - The stainless steel floor plate liners in the spent fuel pool and transfer canal are supposed to overlap the angle at the bottom edge of wall to floor. There were areas of no overlap and weld was built up to meet.

(f) AW-82 - A single block, related to the leak chase channels under the floor liner of the fuel pools or fuel transfer canal is defective and could affect leak detection.

4. Assessment of Safety Significance: The TRT review for the evaluation of the above allegations included a study of the applicable specifications, drawings, procedures, documentation, regulatory guides, NRC Region IV investigation reports (IRs) and NRC memos. The TRT also performed visual inspections of the fuel pool liners. The visual inspection was general for the overall liner instalaltion and a more expertise examination of approximately 20% of the welding in the spent fuel pool, reactor fuel pool, and fuel transfer canal. The areas of weld inspection covered the floor plate liners, those portions of the wall liners which were easily accessible from the floor, and areas adjacent to the sparger spray system which runs horizontally, about half way up two walls of the fuel pools. The liner installations are complete and the details of the leak chase channel network, and floor inbeds are not accessible for visual examination. The following is a brief description of the liner details: The wall liner plates are joined by full penetrations butt welding using a backing strip. A C3x4.1 S.S channel is welded over the back side of every seam to provide a leak chase, where any leakage through a liner seam weld will be collected. The completed sections of wall liners become the form for the pouring of concrete wall structure of the fuel pools. The concrete floor is poured prior to floor liner installation. The leak chase grooves in the floor are molded during the pouring of concrete using "blockouts". Also 3/8" x 2" bar strips are imbedded to be flush with the surface of the concrete floor. These imbeds form the lattice work to which the

floor liner plates are fillet welded. Both the wall liner plates and floor imbeds are anchored in the concrete using nelson studs. The design features of the fuel pool liners include a system of drains where each drain connects to a sectional group of leak chase channels or grooves to provide an early detection system for leakage from a given number of seam welds. It also provides a means to recycle the captured leakage.

Gibb & Hill (G&H) specification 2323-SS-18, Rev. 3 "stainless steel liners," and B&R's Quality Assurance Instruction QI-QAP-11.4, Rev. 0, "welding inspection of stainless steel liners," cover the requirements for the fuel pool liners. Material is specified as ASTM grades of type 304L. Liner sheets are seal welded by inert gas-shielded (gas tungsten-arc) welding. Welding procedure qualifications and welders performances are required to be qualified in accordance with ASME B&PV Code, Section IX. The required inspections are visual, liquid dye penetrant, and radiographed where specified by drawing. It also requires the entire length of all seal welds to be vacuum box leak tested. The liner system was also water leak tested. Surfaces of welds are required to be smooth and free of irregularities and may be ground to obtain this smooth finish. A weld reinforcement of 3/32" maximum and a weld undercut of 1/32" below minimum wall tolerance is permitted. The G&H drawings 2323-5-0831 through 0834 show the liner is fabricated predominantly from 3/16" and 1/4" sheet and assembled using fillet and full penetration groove welds.

The TRT's visual inspection revealed that the placement of floor plate was not necessarily uniform. There were some areas where the gap between floor plates was such that the fillet welds washed together and one area gave the appearance of a butt weld. All wall liner butt welds were ground flush and most of the floor fillet welds were cosmetic ground. The inspection could not determine excessive butt gaps or where tightly butted joints would cause insufficient penetration. The examination did establish that gas tungsten-arc (GTA) welding, if not exclusively used, had been extensively used. This conclusion was based on the appearance of unground welds. No butt welds were observed to have reinforcement exceeding the 3/32" maximum. Seam weld undercut may exceed 1/32" in some locations. A more cursory examination was made of liner welds in the fuel pools of Unit 2 and in all cases the general appearance of welding was smooth, clean, and sound.

The TRT review included seismic and regulatory requirements that apply to the fuel pool liners.

The U. S. NRC Memorandum, dated February 6, 1979:

For: R. T. Carlson, Chief, Reactor Construction and Engineering Support Branch, RI

From: G. W. Reinmuth, Assistant Director, Division of Reactor Construction Inspection, IE

Subject: Classification of Spent Fuel Liner Plates (A1TSF12193141) (A1TSF30382H1)

States . . . "fuel pool liners are not required to be designed and errected to seismic Category I requirements."

No where in the codes, specifications or Regulatory Guides are the liners for fuel pools specifically addressed. The U. S. NRC Regulatory Guide 1.29 classifies the spent fuel storage pool structure, including the fuel racks to seismic Category 1 design requirements. The liners become a permanant attachment, integral to the fuel pool structure. However, the liners serve no structural integrity. The U.S. NRC memorandum also states, " . . . The primary function is to provide a leak tight barrier and a surface suitable for decontamination, rather than to serve as a critical safety structure." The fuel pools are lined with stainless steel plate to provide durability, life expectancy and the stability of properties in an irradiated environment. The memorandum further states, " . . . The probability of large leaks occurring and being undetected over a period of time such that a potential hazard might be incurred is acceptably low." The fuel pool liners are, therefore, classified as seismic Category II which refers to those portions of systems or components whose continued functioning is not required, but whose failure could reduce the functioning of any Category I system or component to an unacceptable level (as defined in Regulatory Guide 1.29). The Regulatory Guide 1.29 also stated that the pertinent quality assurance requirements of Appendix B to

10 CFR Part 50 should be applied to all activities affecting the safety-related functions of those portions of structures, systems,, and components which are classified as seismic Category II. The pertinent quality assurance requirements are defined and implemented by B&R's Instruction No. QI-QAP-11.1-4, Revision 0 and gives reference to B&R's CP-NDEP Manual.

The following is more specific to the allegations.

(a) AM-11

This allegation is concerned that:

(1) The fitup of 3/16" and 1/4" thick stainless steel liner plates for butt welding was supposed to result in a joint gap of 3/16" to 3/8" to facilitate making a full penetration weld but tightly butted joints were encountered. These joints were partial penetration welded by laying weld filler wire on the joint line and fusing it in.

(2) Gapped butt joints were incorrectly welded by either building up weld metal in the middle of the gap and then bridging the gap at the top with a thin weld or by laying weld rod in the gap and welding over it.

B&R Procedure CCP-38, Revision 4 (dated January 5, 1984), Stainless Steel Liner Erection, was also reviewed. The 3/16" to 3/8" joint gap for fitup of stainless steel plates for butt welding, which is identified in paragraph 4.3.3 of CCP-38 and was a requirement

only for automatic welding. Narrower weld gaps were identified as acceptable for manual welding. However, the TRT notes that tightly butted joints would preclude making full penetration welds in the 3/16" and 1/4" thick liner plants using the manual GTAW process. All of the fuel pool liner welding were performed using the manual GTAW process.

(b) AW-40

This allegation is concerned with water from poured concrete. It was stated that the water had entered leak chase channels and run past backing strips into weld joint areas. The allegation does not identify any specific weld or area. However, the TRT's visual examination did detect two questional spots of corrosion. Both were on the north wall liner of Unit 1 spent fuel pool. A buildup of corrosion products was observed on a horizontal seam weld located about half way up the wall. The corrosion products were located between the midsupport for the pipe and the nearest light pole. The second questionable spot was in a horizontal seam below the sparger about level with the top of the fuel storage rack. It was located about opposite the northeast corner of the rack. There was no buildup of corrosion products but there was a light rust colored stain that appeard to have been caused by water leaking from a small spot in the weld seam. There was, however, no obvious hole or pore in the weld.

(c) AW-42 - Inasmuch as both Unit 1 and 2 fuel pools are complete, the current TRT visual examination could neither substantiate or refute the allegation regarding welding conditions, fitup, and welding technique during liner fabrication. However, reported by the NRC Region IV in IR 79-15 dated May 21, 1979, concluded that the allegation may be substantially true. In addition, DC/DDA 2946, Revision 1, dated November 13, 1978, documents a modification accomplished to drain leak chase channels containing water interfering with welding, supporting the NRC Region IV findings. At least to the extent of this evidence, welding conditions were not ideal.

(d) AQW-80 - This allegation has similarities to allegations M-11 and AW-81. During the TRT examination of liner welds, some lack of conformancy was noted; i.e., variations in fitup gap, and certain areas giving the appearance of butt joint in lieu of an overlap. However, the TRT examination of the welds could find no evidence that the welds were not sound or that an adequate seal was not achieved. The RT's evaluation for safety significance is based on their visual examination of liner welds, the requirements that apply to the designed purpose of the liners and the final acceptance of the required NDE examinations and leak tests.

(e) AW-81 - This allegation is similar to AQW-80 except that it applies to the floor plate where it mates with the wall plate. The floor plate is supposed to overlap and be fillet welded to the leg of angle attached at the

bottom edge of the wall liner. The TRT did observe some apparent butt joints in this area. Where this condition exists, the TRT was unable to determine whether there was any weld buildup to compensate for an excessive fitup gap. The TRT's evaluation of safety significance is based on the same evidence as AQW-80 above.

(f) AQ-82 - Since the details of the leak chase channel network are not accessible for visual examination and due to the lack of specificity, the TRT review has attempted to identify the alleged "defective block" and evaluate the affect to the functional aspect of the leak chase system as well as safety significance, regardless of its location and extent of defect. The review of details shown in G&H drawings 2323-5-0831 through -0834 and B&R drawing WRB-10559 determined that only two items in the construction of the leak chase channels and floor grooves could apply to the alleged block:

(1) Blockouts - which were used to form the leak chase channels during the pouring of the concrete floor of the fuel pools. After the setting of concrete, the blockouts were removed and any chipping or damage to the chase was repaired.

(2) 3/8" x 2" Imbedded Bar which is shown to be imbedded and flush to the surface of the concrete pool floor and anchored using Nelson studs. The bars are centered between the leak chase grooves and form a grid framework to which the floor liner plates are fillet welded.

The review of documentation discovered a CPSES Design Change Authorization (DCA) No. 5687 where a 3/8" x 2" imbedded strip identified "F-15" was omitted. The DCA solution was: "Plates P186 and W135 shall be butt welded together and laid as one unit." The location of this deviation is at the junction of the fuel transfer canal and the cask pit entrance.

The TRT reviewed the drawings and determined that the functional purpose of the chase channels was not affected (to detect leakage through the pool liner and to locate the leakage within a sectional area using the system of drains where a section of chase grooves empty into a single drain).

The TRT also reviewed transcripts where issues pertaining to the fuel pool liners were discussed from Sept. 10 through Sept. 21, 1984. These discussions question the adequacy of inspections and governing procedures, and the adherence to the procedures. For the most part, the activities which took place from the back side of the liners were discussed (the side which becomes the interface to the concrete). i.e., tack welding the backing strip in place to accomplish the wall liner plate to plate fitup, and the attachment of the leak chase channels which are fillet welded and form the enclosure around the backing strip. The purpose of the leak channels does not include the intent to be a secondary seal to the plate to plate seal weld. Therefore, there are no regulatory requirements for documentation of

visual examinations for cleanliness of attachment locations to the back surface of the liners. The requirements which are established in accordance with the pertinent portions of Appendix B to the 10 CFR 50, and defined in B&R's Quality Instruction QA-QAP-11.1-4, apply only to the plate to plate "seal" weld. Normally these requirements include visual examinations for cleanliness, fitup, and the completed weld; a liquid penetrant examination of the completed weld and a liquid film vacuum box "bubble" test for leakage. All of these examinations are performed to the front (exposed) surface. The fact that the backing strip is no longer visable from the back side is of no consequence. Over and above any regulatory requirement the drawings specified certain areas to be radiographed. Some of these areas did not receive the radiography but were dispositioned by NCR to be examined using the magnetic particle method. There were other areas that were examined by the Mass Spectrometer Leak Testing method. As mentioned earlier in this report, the pools were also "water" leak tested. QC personnel was permanently assigned to the areas of fabrication and installation of the fuel pool liners to monitor the activities. The allegations and transcribed discussions lack specificity to the extent that traceability to a specific occurrence cannot be positively shown. However, documentation of nonconformances, conditions that were not ideal, and certain deviations to procedural sequence of operation were reviewed.

5. Conclusion and Staff Positions: The TRT concludes that the basic requirement of seal welds to be leak tight has been obtained, and

that the applicable seismic and regulatory requirements have been satisfied. Due to the lack of specificity, the TRT cannot fully substantiate the allegations. Considering the possibility of substantial truth in the allegations, the TRT review finds no safety significance or generic implications. However, TUEC action is required for corrective measures of the questionable rust spots in the welds described and located in Item 4.b.b) AW-40, page 7 of this report.

6. Actions Required: TUEC shall inspect and evaluate the two suspicious spots in liner welds identified by the TRT. Should leak paths be verified, appropriate measures should be taken, both for repair of these spots and verification that additional such areas do not exist in the liners of the spent fuel pool, refueling cavity, transfer canals and cask loading pits within the Reactor Building and Fuel Building of Units 1 and 2.

[redacted]

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8. Attachments: None

9. Reference Documents:

(a) G&I Specification No. 2323-SS-18, Revision 3, April 6, 1979 "Stainless Steel Liners," issued for B&R Construction

(b) G&I drawings:

(1) 2323-S-0831, "F.B. Spent Fuel Pool Liner Details"

(2) 2323-S-0832, "F.B. Spent Fuel Pool Liner Details"

(3) 2323-S-0833, "F.B. Spent Fuel Pool Liner Details"

(4) 2323-S-0834, "F.B. Spent Fuel Pool Liner Details"

(c) B&R drawing WRB-10559, Sheet 1, "Fuel pool liners Imbeds - Weld Identification No's"

(d) B&R Procedures:

(1) QI-QAP-11.1-4, December 26, 1979, "Welding Inspection of Stainless Steel Liners" (deleted in error on January 15, 1982 and reissued with no changes on Janaury 26, 1982)

(2) CCP-38, Revision 4, dated January 5, 1984, "Stainless Steel Liner Erection"

(e) DC/DDA 2946, Revision 1, November 13, 1978

(f) Comanche Peak Steam Electric Station/Final Safety Analysis Report (CPSES/FSAR), Section 17.2, "Quality Assurance Requirements, and Section 3.2, "Design of Structures."

(g) U.S. NRC memorandum, dated January 25, 1979

From: G. W. Reinmuth, Assistant Director, Division of Reactor Construction Inspection, IE

To: D. B. Vassallo, Assistant Director for Light Water Reactors, Division of Project Management, IE

Subject: Classification of Spent Fuel Pool Liner Plates (AITS F1219H1) (AITS F30382H1)

(h) U.S. NRC memorandum, dated February 6, 1979

From: G. W. Reinmuth, Assistant Director, Division of Reactor Construction Inspection, IE

To: R. T. Carlson, Chief, Reactor Construction and Engineering Support Branch, RI

Subject: Classification of Spent Fuel Pool Liner Plates (AITS F12193H1) (AITS F30382H1)

(i) U.S. NRC Regulatory Guide 1.29, Revision 3, September 1978, "Seismic Design Classification"

(j) Region IV Report 50-445/79-15; 50-446/79-15

(k) Allegation Source:

(1) AM-11 --- 84-006, 3/7/84, A-4 Testimony Pages 51, 52-55

(2) AW-40 --- Testimony dated 5/24/82, Page 65A.36.b, IR-79-15

(3) AW-42 --- Testimony dated 5/24/82, Page 65A.36.b, IR-79-15

(4) AQW-80 --- A-49, 8/8/84, and A-4, 8/24/84

(5) AW-81 --- A-4, 8/24/84

(6) AW-82 --- A-4, 8/24/84

10. This statement prepared by: C. E. Richards _____

Name Date

Reviewed by: _____ _____

Group Leader Date

Approved by: _____ _____

Project Director Date

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SSER WRITEUP DOCUMENT CONTROL ROUTE SHEET

IAT Group *Mechanical & Piping Category 43*
Subject of Allegation *Poor welding conditions for fuel pool liners*
Allegation Numbers *AM-14, AW-40, AW-42, AQW-80, AW-81, AW-82*
Author: *C. D. Richards*

This sheet will be initialed by each reviewer. It stays with all revisions to the SSER writeup and serves as a routing and review record. It will be filed in the work package when the writeup is published.

Draft Number

Draft	1	2	3	4	5
Author			*CDRichards*		
Group Leader					
Tech. Editor (cont.)					
J. Gagliardo					
I. Ippolito					

Revision Number

Final	1	2	3	4	5
Author					
Tech. Editor					
Group Leader					
J. Gagliardo					
I. Ippolito					

Administrative

Writeup integrated into SSER___________
Potential Violations to Region IV___________
Workpackage File Complete_______________
Workpackage Returned to Group Leader__________

FOIA-85-59
L/108

#43

CDR

SSER

1. Allegation Group: Mechanical and Piping Category 43
Poor welding conditions for ~~spent~~ fuel ~~storage~~ pool liner

2. Allegation Number: AM-11, AW-40, AW-42, AQW-80, AW-81, and AW-82

3. Characterization: It is alleged that:

(a) AM-11 - Incorrect fitup and poor welding technique resulted in thin welds joining stainless steel liner plates for fuel pools in the fuel building and reactor building for Unit 1.

(b) AW-40 - One seam is largely rust and concrete

(c) AW-42 - Poor welding conditions for field installation of the stainless steel liners in the spent fuel pools of the fuel handing facility.

(d) AQW-80 - Liner plate weld seams do not match drawing locations on floor around Unit 1 reactor vessel.

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The TRT's visual inspection revealed that the placement of floor plate was not necessarily uniform. There were some areas where the gap between floor plates was such that the fillet welds washed together and one area gave the appearance of a butt weld. All wall liner butt welds were ground flush and most of the floor fillet welds were cosmetic ground. The inspection could not determine excessive butt gaps or where tightly butted joints would cause insufficient penetration. The examination did establish that gas tungsten-arc (GTA) welding, if not exclusively used, had been extensively used. This conclusion was based on the appearance of unground welds. No butt welds were observed to have reinforcement exceeding the 3/32" maximum. Seam weld undercut may exceed 1/32" in some locations. A more cursory examination was made of liner welds in the fuel pools of Unit 2 and in all cases the general appearance of welding was smooth, clean, and sound.

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This allegation is concerned that:

(1) The fitup of 3/16" and 1/4" thick stainless steel liner plates for butt welding was supposed to result in a joint gap of 3/16" to 3/8" to facilitate making a full penetration weld but tightly butted joints were encountered. These joints were partial penetration welded by laying weld filler wire on the joint line and fusing it in.

(2) Gapped butt joints were incorrectly welded by either building up weld metal in the middle of the gap and then bridging the gap at the top with a thin weld or by laying weld rod in the gap and welding over it.

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This allegation is concerned with water from poured concrete. It was stated that the water had entered leak chase channels and run past backing strips into weld joint areas. The allegation does not identify any specific weld or area. However, the TRT's visual examination did detect two questional spots of corrosion. Both were on the north wall liner of Unit 1 spent fuel pool. A buildup of corrosion products was observed on a horizontal seam weld located about half way up the wall. The corrosion products were located between the midsupport for the pipe and the nearest light pole. The second questionable spot was in a horizontal seam below the sparger about level with the top of the fuel storage rack. It was located about opposite the northeast corner of the rack. There was no buildup of corrosion products but there was a light rust colored stain that appeard to have been caused by water leaking from a small spot in the weld seam. There was, however, no obvious hole or pore in the weld.

(c) AW-42 - Inasmuch as both Unit 1 and 2 fuel pools are complete, the current TRT visual examination could neither substantiate or refute the allegation regarding welding conditions, fitup, and welding technique during liner fabrication. However, reported by the NRC Region IV in IR 79-15 dated May 21, 1979, concluded that the allegation may be substantially true. In addition, DC/DDA 2946, Revision 1, dated November 13, 1978, documents a modification accomplished to drain leak chase channels containing water interfering with welding, supporting the NRC Region IV findings. At least to the extent of this evidence, welding conditions were not ideal.

(d) AQW-80 - This allegation has similarities to allegations M-11 and AW-81. During the TRT examination of liner welds, some lack of conformancy was noted; i.e., variations in fitup gap, and certain areas giving the appearance of butt joint in lieu of an overlap. However, the TRT examination of the welds could find no evidence that the welds were not sound or that an adequate seal was not achieved. The TRT's evaluation for safety significance is based on their visual examination of liner welds, the requirements that apply to the designed purpose of the liners and the final acceptance of the required NDE examinations and leak tests.

(e) AW-81 - This allegation is similar to AQW-80 except that it applies to the floor plate where it mates with the wall plate. The floor plate is supposed to overlap and be fillet welded to the leg of angle attached at the

bottom edge of the wall liner. The TRT did observe some apparent butt joints in this area. Where this condition exists, the TRT was unable to determine whether there was any weld buildup to compensate for an excessive fitup gap. The TRT's evaluation of safety significance is based on the same evidence as AQW-80 above.

(f) AQ-82 - Since the details of the leak chase channel network are not accessible for visual examination and due to the lack of specificity, the TRT review has attempted to identify the alleged "defective block" and evaluate the affect to the functional aspect of the leak chase system as well as safety significance, regardless of its location and extent of defect. The review of details shown in G&H drawings 2323-5-0831 through -0834 and B&R drawing WRB-10559 determined that only two items in the construction of the leak chase channels and floor grooves could apply to the alleged block:

(1) Blockouts - which were used to form the leak chase channels during the pouring of the concrete floor of the fuel pools. After the setting of concrete, the blockouts were removed and any chipping or damage to the chase was repaired.

(2) 3/8" x 2" Imbedded Bar which is shown to be imbedded and flush to the surface of the concrete pool floor and anchored using Nelson studs. The bars are centered between the leak chase grooves and form a grid framework to which the floor liner plates are fillet welded.

The review of documentation discovered a CPSES Design Change Authorization (DCA) No. 5687 where a 3/8" x 2" imbedded strip identified "F-15" was omitted. The DCA solution was: "Plates P186 and W135 shall be butt welded together and laid as one unit." The location of this deviation is at the junction of the fuel transfer canal and the cask pit entrance.

The TRT reviewed the drawings and determined that the functional purpose of the chase channels was not affected (to detect leakage through the pool liner and to locate the leakage within a sectional area using the system of drains where a section of chase grooves empty into a single drain).

The TRT also reviewed transcripts where issues pertaining to the fuel pool liners were discussed from Sept. 10 through Sept. 21, 1984. These discussions question the adequacy of inspections and governing procedures, and the adherence to the procedures. For the most part, the activities which took place from the back side of the liners were discussed (the side which becomes the interface to the concrete). i.e., tack welding the backing strip in place to accomplish the wall liner plate to plate fitup, and the attachment of the leak chase channels which are fillet welded and form the enclosure around the backing strip. The purpose of the leak channels does not include the intent to be a secondary seal to the plate to plate seal weld. Therefore, there are no regulatory requirements for documentation of

visual examinations for cleanliness of attachment locations to the back surface of the liners. The requirements which are established in accordance with the pertinent portions of Appendix B to the 10 CFR 50, and defined in B&R's Quality Instruction QA-QAP-11.1-4, apply only to the plate to plate "seal" weld. Normally these requirements include visual examinations for cleanliness, fitup, and the completed weld; a liquid penetrant examination of the completed weld and a liquid film vacuum box "bubble" test for leakage. All of these examinations are performed to the front (exposed) surface. The fact that the backing strip is no longer visable from the back side is of no consequence. Over and above any regulatory requirement the drawings specified certain areas to be radiographed. Some of these areas did not receive the radiography but were dispositioned by NCR to be examined using the magnetic particle method. There were other areas that were examined by the Mass Spectrometer Leak Testing method. As mentioned earlier in this report, the pools were also "water" leak tested. QC personnel was permanently assigned to the areas of fabrication and installation of the fuel pool liners to monitor the activities. The allegations and transcribed discussions lack specificity to the extent that traceability to a specific occurrence cannot be positively shown. However, documentation of nonconformances, conditions that were not ideal, and certain deviations to procedural sequence of operation were reviewed.

5. Conclusion and Staff Positions: The TRT concludes that the basic requirement of seal welds to be leak tight has been obtained, and

that the applicable seismic and regulatory requirements have been satisfied. Due to the lack of specificity, the TRT cannot fully substantiate the allegations. Considering the possibility of substantial truth in the allegations, the TRT review finds no safety significance or generic implications. However, TUEC action is required for corrective measures of the questionable rust spots in the welds described and located in Item 4.b.b) AW-40, page 7 of this report.

6. Actions Required: TUEC shall inspect and evaluate the two suspicious spots in liner welds identified by the TRT. Should leak paths be verified, appropriate measures should be taken, both for repair of these spots and verification that additional such areas do not exist in the liners of the spent fuel pool, refueling cavity, transfer canals and cask loading pits within the Reactor Building and Fuel Building of Units 1 and 2.

[redacted]

8. Attachments: None

9. Reference Documents:

   (a) G&I Specification No. 2323-SS-18, Revision 3, April 6, 1979 "Stainless Steel Liners," issued for B&R Construction

   (b) G&I drawings:

      (1) 2323-S-0831, "F.B. Spent Fuel Pool Liner Details"

      (2) 2323-S-0832, "F.B. Spent Fuel Pool Liner Details"

      (3) 2323-S-0833, "F.B. Spent Fuel Pool Liner Details"

      (4) 2323-S-0834, "F.B. Spent Fuel Pool Liner Details"

   (c) B&R drawing WRB-10559, Sheet 1, "Fuel pool liners Imbeds - Weld Identification No's"

(d) B&R Procedures:

(1) QI-QAP-11.1-4, December 26, 1979, "Welding Inspection of Stainless Steel Liners" (deleted in error on January 15, 1982 and reissued with no changes on Janaury 26, 1982)

(2) CCP-38, Revision 4, dated January 5, 1984, "Stainless Steel Liner Erection"

(e) DC/DDA 2946, Revision 1, November 13, 1978

(f) Comanche Peak Steam Electric Station/Final Safety Analysis Report (CPSES/FSAR), Section 17.2, "Quality Assurance Requirements, and Section 3.2, "Design of Structures."

(g) U.S. NRC memorandum, dated January 25, 1979

From: G. W. Reinmuth, Assistant Director, Division of Reactor Construction Inspection, IE

To: D. B. Vassallo, Assistant Director for Light Water Reactors, Division of Project Management, IE

Subject: Classification of Spent Fuel Pool Liner Plates (AITS F1219H1) (AITS F30382H1)

(h) U.S. NRC memorandum, dated February 6, 1979

From: G. W. Reinmuth, Assistant Director, Division of Reactor Construction Inspection, IE

To: R. T. Carlson, Chief, Reactor Construction and Engineering Support Branch, RI

Subject: Classification of Spent Fuel Pool Liner Plates (AITS F12193H1) (AITS F30382H1)

(i) U.S. NRC Regulatory Guide 1.29, Revision 3, September 1978, "Seismic Design Classification"

(j) Region IV Report 50-445/79-15; 50-446/79-15

(k) Allegation Source:

(1) AM-11 --- 84-006, 3/7/84, A-4 Testimony Pages 51, 52-55

(2) AW-40 --- Testimony dated 5/24/82, Page 65A.36.b, IR-79-15

(3) AW-42 --- Testimony dated 5/24/82, Page 65A.36.b, IR-79-15

(4) AQW-80 --- A-49, 8/8/84, and A-4, 8/24/84

(5) AW-81 --- A-4, 8/24/84

(6) AW-82 --- A-4, 8/24/84

10. This statement prepared by: C. E. Richards _____

Name Date

Reviewed by: _____ _____

Group Leader Date

Approved by: _____ _____

Project Director Date

Comments by H Livermore QA/QC group

3

AM-11, etc. (DCPS)

SSER

1. Allegation Group: Mechanical and Piping Category No. 43, Poor Welding Conditions for Spent Fuel Storage Pool Liner

2. Allegation Number: AM-11, AW-40, AW-42, AQW-80, AW-81, and AW-82

3. Characterization: It is alleged that:

(a) AM-11 - Incorrect fitup and poor welding technique resulted in thin welds joining stainless steel liner plates for fuel pools in the fuel building and reactor building for Unit 1.

(b) AW-40 - One weld seam in the spent fuel pool liner is largely rust and concrete.

(c) AW-42 - Poor welding conditions existed for field installation of the stainless steel liners in the spent fuel pools of the fuel handing facility.

(d) AQW-80 - Liner plate weld seams do not match drawing locations on the flooring around the Unit 1 reactor vessel pool.

(e) AW-81 - The stainless steel floor plate liners in the spent fuel pool and transfer canal are supposed to overlap the angle member at the bottom edge of the wall-to-floor joint. There were areas of no overlap and the weld was built up to bridge a gap.

(f) AW-82 - A single block related to the leak chase channels under the floor liner of the fuel pools or fuel transfer canal is defective and could affect leak detection.

4. Assessment of Safety Significance: The TRT review for the evaluation of the above allegations included a study of the applicable specifications, drawings, procedures, documentation, regulatory guides, NRC Region IV inspection reports (IRs) and NRC memos. The TRT review included seismic and regulatory requirements that apply to the fuel pool liners.

The TRT also performed visual inspections of the fuel pool liners. The visual inspection was general for the overall liner installation and included a more detailed examination of approximately 20% of the weld in the spent fuel pools and fuel transfer canals. The areas of weld inspection covered the floor plate liners, those portions of the wall liners which were easily accessible from the floor, and areas adjacent to the sparger spray system which runs horizontally, about half-way up two walls of each of the spent fuel pools. The liner installations are complete and the details of the leak chase channel networks, and floor imbedments are not accessible for visual examination.

The TRT's visual inspection revealed that the placement of floor plates was not necessarily uniform. There were some areas where the gap between floor plates was such that the fillet welds washed together and one area gave the appearance of a butt weld. All wall liner butt welds were ground flush and most of the floor fillet welds were

cosmetic ground. The inspection could not determine excessive butt gaps or where tightly butted joints would cause insufficient penetration. The examination did establish that gas tungsten-arc (GTA) welding, if not exclusively used, had been extensively used. This conclusion was based on the appearance of unground welds. No butt welds were observed to have reinforcement exceeding the 3/32" maximum. Seam weld undercut may exceed the specified 1/32" maximum in some locations. A more cursory examination was made of liner welds in the fuel pools of Unit 2 and in all cases the general appearance of welding was smooth, clean, and sound.

(a) AM-11

This allegation is concerned that:

(1) The fitup of 3/16" and 1/4" thick stainless steel liner plates for butt welding was supposed to result in a joint gap of 3/16" to 3/8" to facilitate making a full penetration weld, but welders encountered tightly butted joints. These joints were partial-penetration welded by laying weld filler wire on the joint line and fusing it in.

(2) Gapped butt joints were incorrectly welded by either building up weld metal in the middle of the gap and then bridging the gap at the top with a thin weld or by laying weld rod in the gap and welding over it.

This would indicate that there were no specific gap requirements for manual welding. True — or it's a convenient change to procedure to allow for the below minimum gaps.
Manual WPSs usually specify 0–1/8" gap

B&R Procedure CCP-38, Revision 4 (dated January 5, 1984), Stainless Steel Liner Erection, specified that 3/16" to 3/8" joint gap for fitup of stainless steel plates for butt welding was a requirement only for automatic welding. Narrower weld gaps were acceptable for manual welding. However, the TRT notes that tightly butted joints would preclude making full penetration welds in the 3/16" and 1/4" thick liner plates using the specified manual GTAW process. All of the fuel pool liner welding was apparently performed using the manual GTAW process.

(b) AW-40

The allegation states that water from poured concrete had entered leak chase channels and run past backing strips into weld joint areas. The allegation does not identify any specific weld or area. However, the TRT's visual examination did detect two questionable spots of corrosion. Both were on the north wall liner of Unit 1 spent fuel pool. A buildup of corrosion products was observed on a horizontal seam weld located about half way up the wall. The corrosion products were located between the midsupport for the pipe and the nearest light pole. The second questionable spot observed by the TRT was in a horizontal seam below the sparger about level with the top of the fuel storage rack. It was located opposite the northeast corner of the rack. There was no buildup of corrosion products but there was a light rust colored stain that appeared to have been caused by water leaking from a small spot in the weld seam. However, the TRT could find no obvious hole or pore in the weld.

(c) AW-42

Inasmuch as both Unit 1 and 2 spent fuel pools are complete, TRT visual examination could neither substantiate nor refute the allegation regarding poor welding conditions, incorrect fitup, and poor welding technique during liner fabrication. However, NRC Region IV IR 79-15 dated May 21, 1979, concluded that the allegation may be substantially true. In addition, DC/DDA 2946, Revision 1, dated November 13, 1978, documents a modification made to drain leak chase channels containing water interfering with welding, a modification supporting the NRC Region IV findings. At least to the extent of this evidence, welding conditions were not ideal.

(d) AQW-80

This allegation has similarities to allegations AM-11 and AW-81. During the TRT examination of liner welds, some lack of conformancy was noted; i.e., possible variations in fitup gap, and certain areas giving the appearance of butt joint in lieu of an overlap. However, the TRT examination of the welds could find no evidence that the welds were not sound or that an adequate seal was not achieved. The TRT's evaluation for safety significance is based on its visual examination of liner welds, the requirements that apply to the design purpose of the liners and the final acceptance of the required NDE examinations and leak tests.

(e) AW-81 - This allegation is similar to AQW-80 except that it applies to the floor plate where it mates with the wall plate. The floor plate is supposed to overlap and be fillet welded to the leg of the angle attached at the bottom edge of the wall liner. The TRT did observe some apparent butt joints in this area. Where this condition exists, the TRT was unable to determine whether there was any weld buildup to compensate for an excessive fitup gap. The TRT's evaluation of safety significance is based on the same evidence as AQW-80 above.

(f) AW-82

Since the details of the leak chase channel network are not accessible for visual examination and because the allegation lacks specificity, the TRT review has attempted to identify the alleged "defective block" and evaluate the affect on the function of the leak chase system as well as its safety significance, regardless of the location and extent of the defect. A review of details shown in G&H drawings 2323-5-0831 through -0834 and B&R drawing WRB-10559 determined that only two items in the construction of the leak chase channels and floor grooves could apply to the alleged block:

(1) Blockouts - These are wood blocks used to form the leak chase channels during the pouring of the concrete floor of the fuel pools. After the setting of concrete, the blockouts were removed and any chipping or damage to the chase was repaired.

(2) 3/8" x 2" Imbedded Bars - These are bars imbedded in and flush with the surface of the concrete pool floor and anchored using Nelson studs. The bars are centered between the leak chase grooves and form a grid framework to which the floor liner plates are fillet welded.

In its review of documentation, the TRT discovered CPSES Design Change Authorization (DCA) No. 5687 where a 3/8" x 2" imbedded strip identified as "F-15" was omitted. The DCA solution was that: "Plates P186 and W135 shall be butt welded together and laid as one unit." The location of this deviation is at the junction of the fuel transfer canal and the cask pit entrance.

The TRT reviewed the drawings and determined that the functional purpose of the chase channels (to detect leakage through the pool liner and to locate the leakage within a sectional area using the system of drains where a section of chase grooves empty into a single drain) was not affected.

The TRT also reviewed ASLB testimony where issues pertaining to the fuel pool liners were discussed from Sept. 10 through Sept. 21, 1984. These discussions question the adequacy of inspections and governing procedures, and adherence to the procedures. For the most part, the activities which took place from the back side of the liners (the side which becomes the boundary to the concrete) were discussed in the testimony, i.e., tack welding the

backing strip in place to accomplish the wall liner plate-to-plate fitup, and the attachment of the leak chase channels which are fillet welded and form the enclosure around the backing strip. The purpose of the leak channels does not include the intent to be a secondary seal to the plate-to-plate seal weld. Therefore, there are no regulatory requirements for documentation of visual examinations for cleanliness of attachment locations to the back surface of the liners. The requirements which are established in accordance with the pertinent portions of Appendix B to the 10 CFR 50, and defined in B&R's Quality Instruction QA-QAP-11.1-4, apply only to the plate to plate "seal" weld. ~~Normally~~ These requirements include visual examinations for cleanliness, fitup, and the completed weld; a liquid penetrant examination of the completed weld and a liquid film vacuum box "bubble" test for leakage. All of these examinations are performed at the front (exposed) surface. The fact that the backing strip is no longer visible from the back side is of no consequence. Over and above any regulatory requirement the drawings specified certain areas to be radiographed. TUSI letter TUQ-041 dated September 4, 1975 to B&R permitted the substitution of magnetic particle inspection in lieu of radiography for vertical containment liner welds in the ~~reactor cavity~~ refueling pool. (The TRT notes that magnetic particle inspection is not applicable to the liner material, which is type 304L austenitic stainless steel. It is probable that liquid penetrant inspection was actually used. There were other areas that were examined by the Mass Spectrometer Leak Testing method. As mentioned earlier in this

Do not agree. All welding is safety related & they're committed to App B.

Shows how qualified they really were!

MP can't be used! mST STL. steel is non magnetic.

— Makes you wonder how many MP inspections were signed off by QC?

SSER, the pools were also "water" leak tested. QC personnel were permanently assigned to the areas of fabrication and installation of the fuel pool liners to monitor the activities. The allegations and transcribed discussions lack specificity to the extent that traceability to a specific occurrence cannot be positively shown. However, documentation of nonconformances, conditions that were not ideal, and certain deviations to procedural sequence of operation were reviewed.

5. Conclusion and Staff Positions: The TRT's review established that considerable difficulty was encountered in fabrication and installation of the liners. Documentation in part substantiated the allegations. However, the primary function of the stainless steel liners is to provide a leak tight barrier and a surface which may be easily decontaminated. The TRT concludes that these basic requirements have been met. The TRT also established, on the basis of a U.S. NRC Memorandum entitled "Classification of Spent Fuel Liner Plates" dated February 6, 1979, that fuel pool liners are not required to be designed and erected to Seismic Category I requirements. The TRT, therefore, concludes the allegations have no safety significance or generic implications.

Actions Required: TUEC shall inspect and evaluate the two suspicious spots in liner welds identified by the TRT. Should leak paths be verified, appropriate measures should be taken,

both to repair these spots and to verify that additional areas of this kind do not exist in the liners of the spent fuel pool, refueling cavity, transfer canals and cask loading pits within the Reactor Building and Fuel Building of Units 1 and 2. ~~This action shall be completed prior to attainment of 5% power.~~

[redacted]

8. Attachments: None.

9. Reference Documents:

   1. G&I Specification No. 2323-SS-18, Revision 3, April 6, 1979 "Stainless Steel Liners," issued for B&R Construction
   2. G&I drawings:
      (1) 2323-S-0831, "F.B. Spent Fuel Pool Liner Details."
      (2) 2323-S-0832, "F.B. Spent Fuel Pool Liner Details."
      (3) 2323-S-0833, "F.B. Spent Fuel Pool Liner Details."
      (4) 2323-S-0834, "F.B. Spent Fuel Pool Liner Details."
   3. B&R drawing WRB-10559, Sheet 1, "Fuel pool liners Imbeds - Weld Identification No's."
   4. B&R Procedures:
      (1) QI-QAP-11.1-4, December 26, 1979, "Welding Inspection of Stainless Steel Liners" (deleted in error on January 15, 1982 and reissued with no changes on Janaury 26, 1982).
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6. Comanche Peak Steam Electric Station/Final Safety Analysis Report (CPSES/FSAR), Section 17.2, "Quality Assurance Requirements, and Section 3.2, "Design of Structures."

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Subject: Classification of Spent Fuel Pool Liner Plates (AITS F1219H1) (AITS F30382H1).

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9. U.S. NRC Regulatory Guide 1.29, Revision 3, September 1978, "Seismic Design Classification."

10. Region IV Report 50-445/79-15; 50-446/79-15.

11. Allegation Source:
(1) AM-11 --- 84-006, 3/7/84, A-4 Testimony Pages 51, 52-55.
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(5) AW-81 --- A-4, 8/24/84.

(6) AW-82 --- A-4, 8/24/84.

10. This statement prepared by: _____ _____

E. G. Thompson Date

C. Richards,

TRT Technical Reviewers

Reviewed by: _____ _____

L. C. Shao, Date

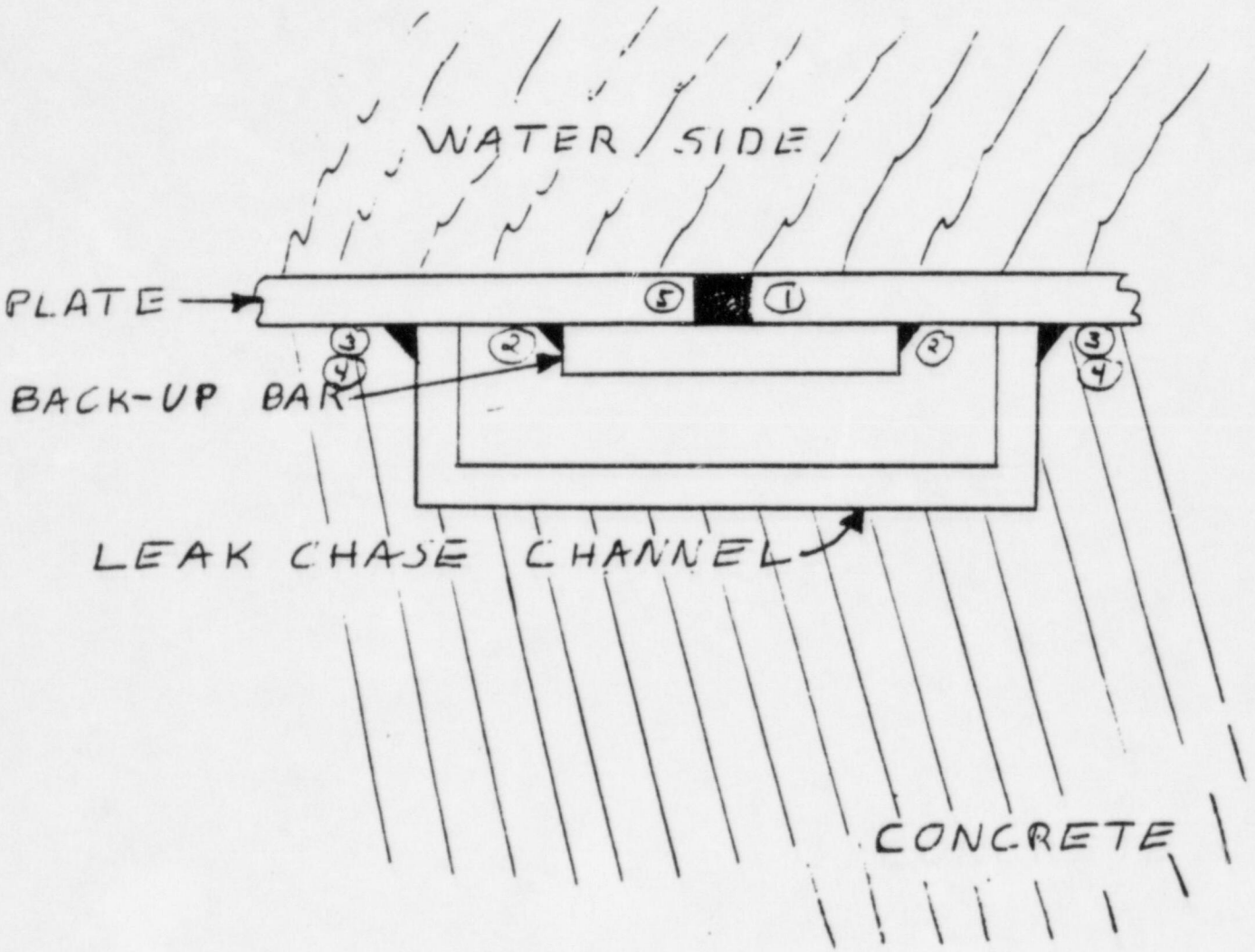
Group Leader

Approved by: _____ _____

V. Noonan, Date

Project Director

QA/QC Sketch



LINER PLATE-TO-PLATE WELD

5

SEER WRITEUP DOCUMENT CONTROL SHEET

TAT Group: Mechanical and Piping Category 43
Subject of Allegation: Peer welding conditions for spent fuel storage Pool liner.
Allegation Numbers: AM-11, AW-40, AW-42, AQW-80, AW-81, AW-82
Author: E.G. Thompson / C. Richards

This sheet will be initialed by each reviewer. It stays with all revisions to the SEER writeup and serves as a routing and review record. It will be filed in the work package when the writeup is published.

Draft Number

Draft	1	2	3	4	5
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Tec					
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L.					

For Larry Shao review

WCO 11/2

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Administrative

Writeup integrated into SEER_____
Potential Violations to Region IV_____
Workpackage File Complete_____
Workpackage Returned to Group Leader_____

L110

SSER

1. Allegation Group: Mechanical and Piping Category No. 43, Poor Welding Conditions for Spent Fuel Storage Pool Liner

2. Allegation Number: AM-11, AW-40, AW-42, AQW-80, AW-81, and AW-82

3. Characterization: It is alleged that:

   (a) AM-11 - Incorrect fitup and poor welding technique resulted in thin welds joining stainless steel liner plates for fuel pools in the fuel building and reactor building for Unit 1.

   (b) AW-40 - One weld seam in the spent fuel pool liner is largely rust and concrete.

   (c) AW-42 - Poor welding conditions existed for field installation of the stainless steel liners in the spent fuel pools of the fuel handing facility.

   (d) AQW-80 - Liner plate weld seams do not match drawing locations on the flooring around the Unit 1 reactor vessel pool.

   (e) AW-81 - The stainless steel floor plate liners in the spent fuel pool and transfer canal are supposed to overlap the angle member at the bottom edge of the wall-to-floor joint. There were areas of no overlap and the weld was built up to bridge a gap.

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4. Assessment of Safety Significance: The TRT review for the evaluation of the above allegations included a study of the applicable specifications, drawings, procedures, documentation, regulatory guides, NRC Region IV inspection reports (IRs) and NRC memos. The TRT review included seismic and regulatory requirements that apply to the fuel pool liners.

The TRT also performed visual inspections of the fuel pool liners. The visual inspection was general for the overall liner installation and included a more detailed examination of approximately 20% of the weld in the spent fuel pools and fuel transfer canals. The areas of weld inspection covered the floor plate liners, those portions of the wall liners which were easily accessible from the floor, and areas adjacent to the sparger spray system which runs horizontally, about half way up two walls of each of the spent fuel pools. The liner installations are complete and the details of the leak chase channel networks, and floor imbedments are not accessible for visual examination.

The TRT's visual inspection revealed that the placement of floor plates was not necessarily uniform. There were some areas where the gap between floor plates was such that the fillet welds washed together and one area gave the appearance of a butt weld. All wall liner butt welds were ground flush and most of the floor fillet welds were

cosmetic ground. The inspection could not determine excessive butt gaps or where tightly butted joints would cause insufficient penetration. The examination did establish that gas tungsten-arc (GTA) welding, if not exclusively used, had been extensively used. This conclusion was based on the appearance of unground welds. No butt welds were observed to have reinforcement exceeding the 3/32" maximum. Seam weld undercut may exceed the specified 1/32" maximum in some locations. A more cursory examination was made of liner welds in the fuel pools of Unit 2 and in all cases the general appearance of welding was smooth, clean, and sound.

(a) AM-11

This allegation is concerned that:

(1) The fitup of 3/16" and 1/4" thick stainless steel liner plates for butt welding was supposed to result in a joint gap of 3/16" to 3/8" to facilitate making a full penetration weld, but welders encountered tightly butted joints. These joints were partial-penetration welded by laying weld filler wire on the joint line and fusing it in.

(2) Gapped butt joints were incorrectly welded by either building up weld metal in the middle of the gap and then bridging the gap at the top with a thin weld or by laying weld rod in the gap and welding over it.

B&R Procedure CCP-38, Revision 4 (dated January 5, 1984), Stainless Steel Liner Erection, specified that 3/16" to 3/8" joint gap for fitup of stainless steel plates for butt welding was a requirement only for automatic welding. Narrower weld gaps were acceptable for manual welding. However, the TRT notes that tightly butted joints would preclude making full penetration welds in the 3/16" and 1/4" thick liner plates using the specified manual GTAW process. All of the fuel pool liner welding was apparently performed using the manual GTAW process.

(b) AW-40

The allegation states that water from poured concrete had entered leak chase channels and run past backing strips into weld joint areas. The allegation does not identify any specific weld or area. However, the TRT's visual examination did detect two questionable spots of corrosion. Both were on the north wall liner of Unit 1 spent fuel pool. A buildup of corrosion products was observed on a horizontal seam weld located about half way up the wall. The corrosion products were located between the midsupport for the pipe and the nearest light pole. The second questionable spot observed by the TRT was in a horizontal seam below the sparger about level with the top of the fuel storage rack. It was located opposite the northeast corner of the rack. There was no buildup of corrosion products but there was a light rust colored stain that appeard to have been caused by water leaking from a small spot in the weld seam. However, the TRT could find no obvious hole or pore in the weld.

(c) AW-42

Inasmuch as both Unit 1 and 2 spent fuel pools are complete, TRT visual examination could neither substantiate nor refute the allegation regarding poor welding conditions, incorrect fitup, and poor welding technique during liner fabrication. However, NRC Region IV IR 79-15 dated May 21, 1979, concluded that the allegation may be substantially true. In addition, DC/DDA 2946, Revision 1, dated November 13, 1978, documents a modification made to drain leak chase channels containing water interfering with welding, a modification supporting the NRC Region IV findings. At least to the extent of this evidence, welding conditions were not ideal.

(d) AQW-80

This allegation has similarities to allegations AM-11 and AW-81. During the TRT examination of liner welds, some lack of conformancy was noted; i.e., possible variations in fitup gap, and certain areas giving the appearance of butt joint in lieu of an overlap. However, the TRT examination of the welds could find no evidence that the welds were not sound or that an adequate seal was not achieved. The TRT's evaluation for safety significance is based on its visual examination of liner welds, the requirements that apply to the design purpose of the liners and the final acceptance of the required NDE examinations and leak tests.

(e) AW-81 - This allegation is similar to AQW-80 except that it applies to the floor plate where it mates with the wall plate. The floor plate is supposed to overlap and be fillet welded to the leg of the angle attached at the bottom edge of the wall liner. The TRT did observe some apparent butt joints in this area. Where this condition exists, the TRT was unable to determine whether there was any weld buildup to compensate for an excessive fitup gap. The TRT's evaluation of safety significance is based on the same evidence as AQW-80 above.

(f) AW-82

Since the details of the leak chase channel network are not accessible for visual examination and because the allegation lacks specificity, the TRT review has attempted to identify the alleged "defective block" and evaluate the affect on the function of the leak chase system as well as its safety significance, regardless of the location and extent of the defect. A review of details shown in G&H drawings 2323-5-0831 through -0834 and B&R drawing WRB-10559 determined that only two items in the construction of the leak chase channels and floor grooves could apply to the alleged block:

(1) Blockouts - These are wood blocks used to form the leak chase channels during the pouring of the concrete floor of the fuel pools. After the setting of concrete, the blockouts were removed and any chipping or damage to the chase was repaired.

(2) 3/8" x 2" Imbedded Bars - These are bars imbedded in and flush with the surface of the concrete pool floor and anchored using Nelson studs. The bars are centered between the leak chase grooves and form a grid framework to which the floor liner plates are fillet welded.

In its review of documentation, the TRT discovered CPSES Design Change Authorization (DCA) No. 5687 where a 3/8" x 2" imbedded strip identified as "F-15" was omitted. The DCA solution was that: "Plates P186 and W135 shall be butt welded together and laid as one unit." The location of this deviation is at the junction of the fuel transfer canal and the cask pit entrance.

The TRT reviewed the drawings and determined that the functional purpose of the chase channels (to detect leakage through the pool liner and to locate the leakage within a sectional area using the system of drains where a section of chase grooves empty into a single drain) was not affected.

The TRT also reviewed ASLB testimony where issues pertaining to the fuel pool liners were discussed from Sept. 10 through Sept. 21, 1984. These discussions question the adequacy of inspections and governing procedures, and adherence to the procedures. For the most part, the activities which took place from the back side of the liners (the side which becomes the boundary to the concrete) were discussed in the testimony, i.e., tack welding the

backing strip in place to accomplish the wall liner plate-to-plate fitup, and the attachment of the leak chase channels which are fillet welded and form the enclosure around the backing strip. The purpose of the leak channels does not include the intent to be a secondary seal to the plate-to-plate seal weld. Therefore, there are no regulatory requirements for documentation of visual examinations for cleanliness of attachment locations to the back surface of the liners. The requirements which are established in accordance with the pertinent portions of Appendix B to the 10 CFR 50, and defined in B&R's Quality Instruction QA-QAP-11.1-4, apply only to the plate to plate "seal" weld. Normally these requirements include visual examinations for cleanliness, fitup, and the completed weld; a liquid penetrant examination of the completed weld and a liquid film vacuum box "bubble" test for leakage. All of these examinations are performed at the front (exposed) surface. The fact that the backing strip is no longer visible from the back side is of no consequence. Over and above any regulatory requirement the drawings specified certain areas to be radiographed. TUSI letter TUQ-041 dated September 4, 1975 to B&R permitted the substitution of magnetic particle inspection in lieu of radiography for vertical containment liner welds in the reactor cavity. (The TRT notes that magnetic particle inspection is not applicable to the liner material, which is type 304L austenitic stainless steel. It is probable that liquid penetrant inspection was actually used. There were other areas that were examined by the Mass Spectrometer Leak Testing method. As mentioned earlier in this

SSER, the pools were also "water" leak tested. QC personnel were permanently assigned to the areas of fabrication and installation of the fuel pool liners to monitor the activities. The allegations and transcribed discussions lack specificity to the extent that traceability to a specific occurrence cannot be positively shown. However, documentation of nonconformances, conditions that were not ideal, and certain deviations to procedural sequence of operation were reviewed.

5. Conclusion and Staff Positions: The TRT's review established that considerable difficulty was encountered in fabrication and installation of the liners. Documentation in part substantiated the allegations. However, the primary function of the stainless steel liners is to provide a leak tight barrier and a surface which may be easily decontaminated. The TRT concludes that these basic requirements have been met. The TRT also established, on the basis of a U.S. NRC Memorandum entitled "Classification of Spent Fuel Liner Plates" dated February 6, 1979, that fuel pool liners are not required to be designed and erected to Seismic Category I requirements. The TRT, therefore, concludes ~~the~~ allegations have ~~no~~ neither safety significance ~~or~~ nor generic implications.

6. Actions Required: Prior to attaining 5 percent of full power, TUEC shall inspect and evaluate the two suspicious spots in liner welds identified by the TRT. Should leak paths be verified, appropriate measures should be taken,

both to repair these spots and to verify that additional areas of this kind do not exist in the liners of the spent fuel pool, refueling cavity, transfer canals and cask loading pits within the Reactor Building and Fuel Building of Units 1 and 2. ~~This action shall be completed prior to attainment of 5% power.~~

[redacted]

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8. Attachments: None.

9. Reference Documents:

1. G&I Specification No. 2323-SS-18, Revision 3, April 6, 1979 "Stainless Steel Liners," issued for B&R Construction

2. G&I drawings:

(1) 2323-S-0831, "F.B. Spent Fuel Pool Liner Details."

(2) 2323-S-0832, "F.B. Spent Fuel Pool Liner Details."

(3) 2323-S-0833, "F.B. Spent Fuel Pool Liner Details."

(4) 2323-S-0834, "F.B. Spent Fuel Pool Liner Details."

3. B&R drawing WRB-10559, Sheet 1, "Fuel pool liners Imbeds - Weld Identification No's."

4. B&R Procedures:

(1) QI-QAP-11.1-4, December 26, 1979, "Welding Inspection of Stainless Steel Liners" (deleted in error on January 15, 1982 and reissued with no changes on Janaury 26, 1982).

(2) CCP-38, Revision 4, dated January 5, 1984, "Stainless Steel Liner Erection."

5. DC/DDA 2946, Revision 1, November 13, 1978.

6. Comanche Peak Steam Electric Station/Final Safety Analysis Report (CPSES/FSAR), Section 17.2, "Quality Assurance Requirements, and Section 3.2, "Design of Structures."

7. U.S. NRC memorandum, dated January 25, 1979

   From: G. W. Reinmuth, Assistant Director, Division of Reactor Construction Inspection, IE

   To: D. B. Vassallo, Assistant Director for Light Water Reactors, Division of Project Management, IE

   Subject: Classification of Spent Fuel Pool Liner Plates (AITS F1219H1) (AITS F30382H1).

8. U.S. NRC memorandum, dated February 6, 1979

   From: G. W. Reinmuth, Assistant Director, Division of Reactor Construction Inspection, IE

   To: R. T. Carlson, Chief, Reactor Construction and Engineering Support Branch, RI

   Subject: Classification of Spent Fuel Pool Liner Plates (AITS F12193H1) (AITS F30382H1).

9. U.S. NRC Regulatory Guide 1.29, Revision 3, September 1978, "Seismic Design Classification."

10. Region IV Report 50-445/79-15; 50-446/79-15.

11. Allegation Source:

   (1) AM-11 --- 84-006, 3/7/84, A-4 Testimony Pages 51, 52-55.

   (2) AW-40 --- Testimony dated 5/24/82, Page 65A.36.b, IR-79-15.

   (3) AW-42 --- Testimony dated 5/24/82, Page 65A.36.b, IR-79-15.

   (4) AQW-80 --- A-49, 8/8/84, and A-4, 8/24/84.

(5) AW-81 --- A-4, 8/24/84.

(6) AW-82 --- A-4, 8/24/84.

10. This statement prepared by: _____ _____

E. G. Thompson Date

C. Richards,

TRT Technical Reviewers

Reviewed by: _____ _____

L. C. Shao, Date

Group Leader

Approved by: _____ _____

V. Noonan, Date

Project Director

Review Notes re testimony of C. Thomas

7c, 7d

Safety Significance of S.S. Liners

≈140 travelers signed off on 3/3/83 by [redacted] 7c for missing signatures

Reviewed:

1) Case's Evidence of a Quality Control Breakdown
2) Report of Investigation, Commanche Peak Steam Electric Station: Alleged Intimidation of Personnel, March 7, 1984, OI Field Office: Region IV. (Attachment 1 to case's 9/27/84 filing).
   These are selected pages of alleger testimony which I already have. Also a group of all the attachments
3) CASE's Further Evidence of a Quality Control Breakdown in the Construction, Installation and Inspection of the Stainless Steel Liner Plate dated Nov 15, 1984 (28 pages + 3 pages of attachments)
4) Prefiled Testimony of C. Thomas Brandt, 10/3/84 (ASLB testimony pages: 45357 - 45480
   Goes one by one thru travelers signed by reviewer.
5) Prefiled Testimony of C. Thomas Brandt Regarding CASE's Further Evidence of a Quality Control Breakdown in the Construction, Installation and Inspection of the Stainless Steel Liner Plate dated 11/21/84

[redacted]

L111

Re Semmes 5

Safety relation of liner plate

: ...Lin... plates -

Category 43

Jan 30, '85 Noonan to - ?

Still out on this. Bill Campbell

Don't know what to say

AQW-30, Category 2

Bachmann - cross reference

This allegation is substantiated

only if ~~the~~ it is substantiated that falsification of QA/QC data occurred.

Last statement of Assessment - there was at least one

interview - Dec 10 Noonan, Zudans, at Texas

↓

The general subject was dealt with QA/QC

Granbury Texas

Zudans

Noonan

Halenson

Cliff Hale

Tom Curry

Vic Wenzel

Van Watson

[redacted]

7c, 7d

5

Draft 5 1/29/85

AM-11, etc. (DCP5)

SSER

1. Allegation Group: Mechanical and Piping Category No. 43, Poor Welding Conditions for Spent Fuel Storage Pool Liner

2. Allegation Number: AM-11, AW-40, AW-42, AQW-80, AW-81, and AW-82

3. Characterization: It is alleged that:

- (a) AM-11 - Incorrect fitup and poor welding technique resulted in thin welds joining stainless steel liner plates for fuel pools in the fuel building and reactor building for Unit 1.

(b) AW-40 - One weld seam in the spent fuel pool liner is largely rust and concrete.

(c) AW-42 - Poor welding conditions existed for field installation of the stainless steel liners in the spent fuel pools of the fuel handing facility.

- (d) AQW-80 - Liner plate weld seams do not match drawing locations on the flooring around the Unit 1 reactor vessel pool.

- (e) AW-81 - The stainless steel floor plate liners in the spent fuel pool and transfer canal are supposed to overlap the angle member at the bottom edge of the wall-to-floor joint. There were areas of no overlap and the weld was built up to bridge a gap.

- (f) AW-82 - A single block related to the leak chase channels under the floor liner of the fuel pools or fuel transfer canal is defective and could affect leak detection.

4. Assessment of Safety Significance: The TRT review for the evaluation of the above allegations included a study of the applicable specifications, drawings, procedures, documentation, regulatory guides, NRC Region IV inspection reports (IRs) and NRC memos. The TRT review included seismic and regulatory requirements that apply to the spent fuel pool liners.

The TRT also performed visual inspections of the fuel pool liners. The visual inspection was general for the overall liner installation and included a more detailed examination of approximately 20% of the welds in the spent fuel pools and fuel transfer canals. The areas of weld inspection covered the floor plate liners, those portions of the wall liners which were easily accessible from the floor, and areas adjacent to the sparger spray system which runs horizontally about half-way up two walls of each of the spent fuel pools. The liner installations are complete and the details of the leak chase channel networks and floor imbedments are not accessible for visual examination.

The TRT's visual inspection revealed that the placement of floor plates was not necessarily uniform. There were some areas where the gap between floor plates was such that the fillet welds washed together and one area gave the appearance of a butt weld. All wall liner butt seam welds were ground flush or concave and most of the floor fillet welds were cosmetic ground. The inspection could not

could not determine if the gap was excessive or if it was tightly butted.

if butt welds had What does this mean. Unprogrammatical construction.

determine excessive ~~butt~~ fitup gaps or ~~where~~ had tightly butted joints which would ~~cause insufficient penetration~~ preclude full penetration welds. The examination did establish that gas tungsten-arc ~~(GTA)~~ (GTAW) welding, if not exclusively used, had been extensively used. This conclusion was based on the appearance of unground welds. No butt welds were observed to have reinforcement exceeding the 3/32" maximum. Seam weld concavity may exceed 1/32" in some locations due to grinding of weld surfaces. A more cursory examination was made of liner welds in the fuel pools of Unit 2 and in all cases the general appearance of welding was smooth, clean, and sound.

(a) AM-11

This allegation is concerned that:

(1) The fitup of 3/16" and 1/4" thick stainless steel liner plates for butt welding was supposed to result in a joint gap of 3/16" to 3/8" to facilitate making a full penetration weld, but welders encountered tightly butted joints. These joints were partial-penetration welded by laying weld filler wire on the joint line and fusing it in.

(2) Gapped butt joints were incorrectly welded by either building up weld metal in the middle of the gap and then bridging the gap at the top with a thin weld or by laying weld rod in the gap and welding over it. (i.e. less than full penetration)

This is a totally inadequate response to the allegation.

I agree but I have doubts that further info can be developed.

B&R Procedure CCP-38, Revision 4 (dated January 5, 1984), Stainless Steel Liner Erection specifies that 3/16" to 3/8" joint gap for fitup of stainless steel plates for butt welding was a requirement only for automatic welding. Narrower weld gaps were acceptable for manual welding. However, the TRT notes that tightly butted joints ~~would~~ could preclude making full penetration welds in the 3/16" and 1/4" thick liner plates using the specified manual GTAW process. All of the fuel pool liner welding was apparently performed using the manual GTAW process.

The TRT examination could not confirm gap conditions for joints

The TRT is preparing a summary of its findings on allegation AM-11 to forward to the alleger, who declined an interview.

Mention gaps too wide - TRT could not determine excessive gap or fill bridging over.

(b) AW-40

The allegation states that water from poured concrete had entered leak chase channels and run past backing strips into weld joint areas. The allegation does not identify any specific weld or area. ~~However~~, the TRT's visual examination did detect two questionable spots of corrosion. Both were on the north wall liner of Unit 1 spent fuel pool. A buildup of corrosion products was observed on a horizontal seam weld located about half way up the wall. The corrosion products were located between the midsupport for the pipe and the nearest light pole. The second questionable spot observed by the TRT was in a horizontal seam below the sparger about level with the top of the fuel storage rack. It was

located opposite the northeast corner of the rack. There was no buildup of corrosion products but there was a light rust colored stain that appeard to have been caused by water leaking from a small spot in the weld seam. However, the TRT could find no obvious hole or pore in the weld. What is the significance of this finding? Any corrective action necessary?

Arrangements are to be made for the TRT to review its findings on allegation AW-40 with the alleger.

This is inconsistent w/ the TRT write-up on pp 2-3, & p. 6.

(c) AW-42

Inasmuch as both Unit 1 and 2 spent fuel pools are complete, TRT visual examination could neither substantiate nor refute the allegation regarding poor welding conditions, incorrect fitup, and poor welding technique during liner fabrication. However, NRC Region IV IR 79-15 dated May 21, 1979, concluded that the allegation may be substantially true. In addition, DC/DDA 2946, Revision 1, dated November 13, 1978, documents a modification made to drain leak chase channels containing water interfering with welding, ~~a modification supporting the NRC Region IV findings. At least to the extent of~~ this evidence, welding conditions were not ideal.

Arrangements are to be made for the TRT to review its findings on allegation AW-42 with the alleger.

(d) AQW-80

This allegation has similarities to allegations AM-11 and AW-81. During the TRT examination of liner welds, some lack of conformancy was noted; i.e., possible variations in fitup gap, and certain areas giving the appearance of butt joint in lieu of an overlap. However, the TRT examination of the welds could find no evidence that the welds were not sound or that an adequate seal was not achieved. ~~The TRT's evaluation for safety significance is based on its visual examination of liner welds, the requirements that apply to the design purpose of the liners and the final acceptance of the required NDE examinations and leak tests.~~

The TRT is preparing a summary of its findings on allegation AQW-80 to forward to the alleger, who declined an interview.

(e) AW-81

This allegation is similar to AQW-80 except that it applies to the floor plate where it mates with the wall plate. The floor plate is supposed to overlap and be fillet welded to the leg of the angle attached at the bottom edge of the wall liner. The TRT did observe some apparent butt joints in this area. Where this condition exists, the TRT was unable to determine whether there was any weld buildup to compensate for an excessive fitup gap. ~~The TRT's evaluation of safety significance is based on the same evidence as AQW-80 above.~~ ~~Not~~ good enough.

The TRT is preparing a summary of its findings on allegation AW-81 to forward to the alleger, who declined an interview.

(f) AW-82

Since the details of the leak chase channel network are not accessible for visual examination and because the allegation lacks specificity, the TRT review has attempted to identify the alleged "defective block" and evaluate the affect on the function of the leak chase system as well as its safety significance, regardless of the location and extent of the defect. A review of details shown in G&H drawings 2323-5-0831 through -0834 and B&R drawing WRB-10559 determined that only two items in the construction of the leak chase channels and floor grooves could apply to the alleged block:

(1) Blockouts - These are wood blocks used to form the leak chase channels during the pouring of the concrete floor of the fuel pools. After the setting of concrete, the blockouts were removed and any chipping or damage to the chase was repaired.

(2) 3/8" x 2" Imbedded Bars - These are bars imbedded in and flush with the surface of the concrete pool floor and anchored using Nelson studs. The bars are centered between the leak chase grooves and form a grid framework to which the floor liner plates are fillet welded.

In its review of documentation, the TRT discovered CPSES Design Change Authorization (DCA) No. 5687 where a 3/8" x 2" imbedded strip identified as "F-15" was omitted. The DCA solution was that: "Plates P186 and W135 shall be butt welded together and laid as one unit." The location of this deviation is at the junction of the fuel transfer canal and the cask pit entrance.

The TRT reviewed the drawings and determined that the functional purpose of the chase channels (to detect leakage through the pool liner and to locate the leakage within a sectional area using the system of drains where a section of chase grooves empty into a single drain) was not affected. The TRT also reviewed ASLB testimony where issues pertaining to the fuel pool liners were discussed from Sept. 10 through Sept. 21, 1984. These discussions question the adequacy of inspections and governing procedures, and adherence to the procedures. For the most part, the activities which took place from the back side of the liners (the side which becomes the boundary to the concrete) were discussed in the testimony, i.e., tack welding the backing strip in place to accomplish the wall liner plate-to-plate fitup, and the attachment of the leak chase channels which are fillet welded and form the enclosure around the backing strip. The purpose of the leak channels does not include ~~the~~ being ~~intent~~ to be a secondary seal to the plate-to-plate seal weld. ~~Therefore, there are no regulatory requirements for~~ documentation of visual examinations for cleanliness of attachment locations to

~~the back surface of the liners.~~ The requirements which are established in accordance with the pertinent portions of Appendix B to the 10 CFR 50, and defined in B&R's Quality Instruction QA-QAP-11.1-4, apply only to the plate to plate "seal" weld. Normally these requirements include visual examinations for cleanliness, fitup, and the completed weld; a liquid penetrant examination of the completed weld and a liquid film vacuum box "bubble" test for leakage. All of these examinations are performed at the front (exposed) surface. The fact that the backing strip is no longer visible from the back side ~~is of no consequence.~~

Over and above any regulatory requirement the drawings specified certain areas to be radiographed. TUSI letter TUQ-041 dated September 4, 1975 to B&R permitted the substitution of magnetic particle inspection in lieu of radiography for vertical ~~containment~~ liner welds in the reactor cavity. (The TRT notes that magnetic particle inspection is not applicable to the liner material, which is type 304L austenitic stainless steel.) There were other areas that were examined by the Mass Spectrometer Leak Testing method. As mentioned earlier in this SSER, the pools were also "water" leak tested. QC personnel were permanently assigned to the areas of fabrication and installation of the fuel pool liners to monitor the activities. The allegations and transcribed discussions lack specificity to the extent that traceability to specific welds cannot be positively shown. However, documentation of nonconformances, conditions that were

not ideal, and certain deviations to procedural sequence of operation were reviewed.

The TRT is preparing a summary of its findings on allegation AW-82 to forward to the alleger, who declined an interview.

5. Conclusion and Staff Positions: The TRT's review established that considerable difficulty was encountered in fabrication and installation of the liners. Documentation in part substantiated the allegations. However, the primary function of the stainless steel liners is to provide a leak tight barrier and a surface which may be easily decontaminated. The TRT concludes that these basic requirements have been met. The TRT also established, on the basis of a U.S. NRC Memorandum entitled "Classification of Spent Fuel Pool Liner Plates," dated February 6, 1979, that fuel pool liners are not required to be designed and erected to Seismic Category I requirements. The TRT, therefore, concludes that although some of the allegations are valid, they have no safety significance.

6. Actions Required: None.

[redacted]

8. Attachments: None.

9. Reference Documents:

1. G&H Specification No. 2323-SS-18, Revision 3, April 6, 1979 "Stainless Steel Liners," issued for B&R Construction
2. G&H drawings:
   (1) 2323-S-0831, "F.B. Spent Fuel Pool Liner Details."
   (2) 2323-S-0832, "F.B. Spent Fuel Pool Liner Details."
   (3) 2323-S-0833, "F.B. Spent Fuel Pool Liner Details."
   (4) 2323-S-0834, "F.B. Spent Fuel Pool Liner Details."
3. B&R drawing WRB-10559, Sheet 1, "Fuel pool liners Imbeds - Weld Identification No's."
4. B&R Procedures:
   (1) QI-QAP-11.1-4, December 26, 1979, "Welding Inspection of Stainless Steel Liners" (deleted in error on January 15, 1982 and reissued with no changes on Janaury 26, 1982).
   (2) CCP-38, Revision 4, dated January 5, 1984, "Stainless Steel Liner Erection."
5. DC/DDA 2946, Revision 1, November 13, 1978.
6. Comanche Peak Steam Electric Station/Final Safety Analysis Report (CPSES/FSAR), Section 17.2, "Quality Assurance Requirements, and Section 3.2, "Design of Structures."
7. U.S. NRC memorandum, dated January 25, 1979
   From: G. W. Reinmuth, Assistant Director, Division of Reactor Construction Inspection, IE
   To: D. B. Vassallo, Assistant Director for Light Water Reactors, Division of Project Management, IE
   Subject: Classification of Spent Fuel Pool Liner Plates (AITS F1219H1) (AITS F30382H1).

8. U.S. NRC memorandum, dated February 6, 1979

   From: G. W. Reinmuth, Assistant Director, Division of Reactor Construction Inspection, IE

   To: R. T. Carlson, Chief, Reactor Construction and Engineering Support Branch, RI

   Subject: Classification of Spent Fuel Pool Liner Plates (AITS F12193H1) (AITS F30382H1).

9. U.S. NRC Regulatory Guide 1.29, Revision 3, September 1978, "Seismic Design Classification."

10. Region IV Report 50-445/79-15; 50-446/79-15.

11. Allegation Source:

   (1) AM-11 --- 84-006, 3/7/84, A-4 Testimony Pages 51, 52-55.

   (2) AW-40 --- Testimony dated 5/24/82, Page 65A.36.b, IR-79-15.

   (3) AW-42 --- Testimony dated 5/24/82, Page 65A.36.b, IR-79-15.

   (4) AQW-80 --- A-49, 8/8/84, and A-4, 8/24/84.

   (5) AW-81 --- A-4, 8/24/84.

   (6) AW-82 --- A-4, 8/24/84.

10. This statement prepared by:

   _____ _____
   E. G. Thompson Date
   C. Richards,
   TRT Technical Reviewers

   Reviewed by:

   _____ _____
   L. C. Shao, Date
   Group Leader

   Approved by:

   _____ _____
   V. Noonan, Date
   Project Director

5

Draft 6 3/5/85

AM-11, etc. (DCP5)

SSER

1. Allegation Group: Mechanical and Piping Category No. 43, Poor Welding Conditions for Spent Fuel Storage Pool Liner

2. Allegation Number: AM-11, AW-40, AW-42, AQW-80, AW-81, and AW-82

3. Characterization: It is alleged that:

   (a) AM-11 - Incorrect fitup and poor welding technique resulted in thin welds joining stainless steel liner plates for fuel pools in the fuel building and reactor building for Unit 1.

   (b) AW-40 - One weld seam in the spent fuel pool liner is largely rust and concrete.

   (c) AW-42 - Poor welding conditions existed for field installation of the stainless steel liners in the spent fuel pools of the fuel handing facility.

   (d) AQW-80 - Liner plate weld seams do not match drawing locations on the flooring around the Unit 1 reactor vessel pool.

   (e) AW-81 - The stainless steel floor plate liners in the spent fuel pool and transfer canal are supposed to overlap the angle member at the bottom edge of the wall-to-floor joint. There were areas of no overlap and the weld was built up to bridge a gap.

   (f) AW-82 - A single block related to the leak chase channels under the floor liner of the fuel pools or fuel transfer canal is defective and could affect leak detection.

4. Assessment of Safety Significance: ~~The TRT review for the evaluation~~ of the ~~above~~ allegations included a study of the applicable specifications, drawings, procedures, documentation, regulatory guides, NRC Region IV inspection reports (IRs) and NRC memos. The TRT review included seismic and regulatory requirements to determine those requirements that apply to the liners for the fuel pool, transfer canal, and reactor refueling cavity. These requirements are: (a) The ASME B&PV Code sets forth Seismic Category I requirements for the structure of the fuel pools and makes reference only to the extent that the Seismic Category 1 requirements do not apply to the liners; (b) The U.S. NRC Regulatory Guide 1.29 classifies the spent fuel storage pool structure, including the fuel racks to be Seismic Category I design requirements. The regulatory guide also states that the pertinent quality assurance requirements of Appendix B to the 10 CFR 50 should be applied to all activities affecting the safety-related functions of those portions and functions of structure, systems, and components which are classified as Seismic II; (c) ~~The~~ U.S. NRC Memorandum dated February 6, 1979, states "...fuel pool liners are not required to be designed and erected to Seismic Category I requirements." The memorandum further states "...The primary function of the liners is to provide a leak tight barrier and a surface suitable for decontamination, rather than to serve as a critical safety structure."; and, "...The probability of large leaks occurring and being undetected over a period of time such that a potential hazard might be incurred is acceptably low."; ~~(d) The Comanche Peak Steam Electric Station/Final Safety Analysis Report (CPSES/FSAR), does not include any assessment of analysis for the pool liners; and,~~ ~~(e) Gibbs & Hill (G&H) Specification 2323-SS-18, Rev. 3,~~

"stainless steel liners," and B&R's Quality Assurance Instruction QI-QAP-11.4, Rev. 0, "welding inspection of stainless steel liners," cover the requirements for the fuel pool liners. Material is specified asASTM grades of type 304L. Liner sheets shall be seal welded by inert gas-shielded (gas tungsten-arc) welding. Welding procedure qualifications and welders performances are required to be qualified in accordance with ASME B&PV Code, Section IX. The required inspections are visual, liquid dye penetrant, and radiographed where specified by drawing. It also requires the entire length of all seal welds to be vacuum box leak tested. Surfaces of welds are required to be smooth and free of irregularities and may be ground to obtain this smooth finish. A weld reinforcement of 3/32" maximum and a weld undercut of 1/32" below minimum wall tolerance is permitted. The G&H drawings 2323-5-0831 through -0834 show the liner is fabricated predominantly from 3/16" and 1/4" sheet and assembled using fillet and full penetration groove welds.

The TRT's review of requirements has determined that the pool liners are classified as Seismic Category I and that the only regulating requirements that apply to the fabrication (more specifically welding) and erection of stainless steel liners are:

(1) The QA/QC requirements in accordance with Appendix B to the 10 CFR 50.

NOTE: The QA/QC aspects concerning the issues relating to the liners are addressed in the TRT's QA/QC SSER.

(2) The requirements specified by the G&H and B&R specifications, procedures, and drawings.

NOTE: The TRT's review of B&R's procedure CCP-38 found the gap requirement to be 3/16" minimum and 3/8" maximum. The welding shall be Gas Tungsten Arc Welding (GTAW). The B&R Weld Process Specification (WPS) 99020 used for the liner welding is for the GTAW process and shows the minimum fit-up gap to be 3/16". These requirements are consistent with the G&H specifications.

4.3 Description of Details

~~To provide basis for better understanding of the TRT's remaining reviews and assessments in this report, the following brief description of liner details is provided~~: The wall liner plates are joined by full penetrations butt welding using a backing strip. A C3x4.1 S.S channel is welded over the back side of every seam to provide a leak chase, where any leakage through a liner seam weld will be collected. The completed sections of wall liners become the form for the pouring of concrete wall structure of the fuel pools. The concrete floor is poured prior to floor liner installation. The leak chase grooves in the floor are molded during the pouring of concrete using "blockouts." Also 3/8" x 2" bar strips are imbedded ~~to be~~ flush ~~with~~ To the surface of the concrete floor. These imbeds form the lattic work to which the floor liner plates are fillet welded. Both the wall liner plates and floor imbeds are anchored in the concrete using nelson studs. The design features of the fuel pool liners include a system of drains where each drain connects to a sectional group of leak chase channels or grooves to provide an early detection system

for leakage from a given number of seam welds. It also provides a means to recycle the captured leakage.

Insert #3

4.4 Fabrication Technique

4.5 The TRT also performed visual inspections of the fuel pool liners. A general visual inspection for the overall liner installation was performed, and a more detailed examination of approximately 20% of the welds in the spent fuel pools and fuel transfer canal. The areas of weld inspection covered the floor plate liners, those portions of the wall liners which were easily accessible from the floor, and areas adjacent to the sparger spray system which runs horizontally, about half way up two walls of each of the spent fuel pools. The liner installations are complete and the details of the leak chase channel networks and floor imbedments are not accessible for visual examination.

The TRT's visual inspection revealed that the placement of floor plates was not necessarily uniform. There were some areas where the gap between floor plates was such that the fillet welds washed together and one area gave the appearance of a butt weld. All wall liner butt seam welds were ground flush (or slightly concave) to the liner surface, and most of the floor fillet welds were cosmetic ground. The inspection could not determine if the fit-up gap was excessive or if it was tighly butted (tightly butted joints could cause insufficient penetration). The examination did establish that gas tungsten-arc welding (GTAW), if not exclusively used, had been extensively used. This conclusion was based on the appearance of unground welds. No butt welds were

observed to have reinforcement exceeding the 3/32" maximum. The TRT did not measure dimensions. Seam weld concavity, ~~may exceed 1/32"~~ However, in some locations due to grinding of weld surfaces, it appeared that concavity may ~~have~~ exceed 1/32". A more cursory examination was made of liner welds in the fuel pools of Unit 2 and in all cases the general appearance of welding was smooth, clean, and sound.

Insert #4

4. TRT's Review and Assessment Specific To the Allegations

(a) AM-11

This allegation is concerned that:

(1) The fitup of 3/16" and 1/4" thick stainless steel liner plates for butt welding was supposed to result in a joint gap of 3/16" to 3/8" to facilitate making a full penetration weld, but welders encountered tightly butted joints. These joints were partial-penetration welded by laying weld filler wire on the joint line and fusing it in.

(2) Gapped butt joints were incorrectly welded by either building up weld metal in the middle of the gap and then bridging the gap at the top with a thin (less than full penetration) weld or by laying weld rod in the gap and welding over it.

The TRT inspection of the liner welds reasonably supports that all of the welding was performed using the GTAW process. The inspection could not confirm the preweld, fut-up gap conditions to have been tighly butted, excessively gapped, or to have been bridged over. The overall surface appearance of the completed welds. The TRT notes that using the GTAW process, tightly butted

joint could preclude making a full penetration weld in the 3/16" thickness, and more probable in the 1/4" thickness stainless steel material specified for the liners.

Insert #5

The TRT is preparing a summary of its findings on allegation AM-11 to forward to the alleger, who declined an interview.

(b) AW-40

The allegation states that water from poured concrete had entered leak chase channels and run past backing strips into weld joint areas. The allegation does not identify any specific weld or area. ~~The TRT's visual examination did detect two~~ questionable spots of corrosion. Both were on the north wall liner of Unit 1 spent fuel pool. A buildup of corrosion products was observed on a horizontal seam weld located about half way up the wall. The corrosion products were located between the midsupport for the pipe and the nearest light pole. The second questionable spot observed by the TRT was in a horizontal seam below the sparger about level with the top of the fuel storage rack. It was located opposite the northeast corner of the rack. There was no buildup of corrosion products but there was a light rust colored stain. The TRT could not determine the source causing these stains. No obvious hole or pore could be found in the weld. The TRT finds no safety significance to these spots. ~~However, a~~ To preclude the possibility of a source of leakage, a closer examination ~~would not be harmful~~ should be performed.

Insert #6

The alleger was contacted to arrange a meeting to review the TRT's evaluation and finding. The alleger indicated he has no concerns with CPSES and is not interested in a review meeting with the TRT. ~~Arrangements are to be made for the TRT to review its findings on allegation AW-40 with the alleger.~~

(c) AW-42

The allegation shows considerable concern regarding poor welding conditions during the construction of the fuel pools and fabrication of liners, i.e., seepage slury from the pouring of concrete causing interference to welding operations. The TRT's visual inspection of the completed liners did not reveal any evidence of conditions that existed during the construction phase. However, the review of documentation revealed numerous NCRs. There were several cases where the QA inspector(s) wrote about interferring conditions as being source giving cause for the defect. Some of these conditions were: (1) welder had to reach through a maze of rebar to make the weld; (2) water seeping from locations where concrete had been poured and contaminating components of liners being fabricated; (3) water in leak chase channels interferring with welding; and (4) to many activities causing interference. A Design Change/Design Deviation Authorization (DC/DDA) No. 2946, REv. 1, dated November 13, 1978, authorizes 1/2" holes to be drilled in a leak chase channel to drain and/or dry out residual moisture causing interference to welding. Afterwards the holes were repair welded using the GTAW process and groundflush to surrounding surface. The conclusions reported in NRC Region IV's IR 79-15 dated May 21, 1979, states that the allegations regarding poor welding conditions may be substantially true. The TRT's review did find documented evidence of conditions that were

Insert #7 (for Item #1)

Start new line for Items (1), (2), (3) & (4) Also

The source of contamination described in Item (2) of AW-40 is more reasonable

The source of water described in Item (6) of AW-40 is also reasonable to believe.

Insert #8

not necessarily ideal. However, the TRT cannot conscientiously take the position that these conditions were worse than normal for ~~a~~ Typical construction ~~of this magnitude~~ industry. ~~The TRT notes that it is normal to have some unforeseeable conditions that is dependent on the skills and expertise of the craft, engineering and QC to cope with and determine resolutions that will provide a completed product that complies with the minimum requirements implemented by the codes and specifications.~~ The TRT review cannot find any safety significance resulting from these reported and alleged conditions.

Report statement in red at Top of page 8 here

~~Arrangements are to be made for the TRT to review its findings on allegation AW-42 with the alleger.~~

(d) AQW-80

The concerns of this allegation are that weld seams do not match drawing locations on the floor around the Unit 1 reactor vessel pool. The TRT review of the drawings determined that the liner weld seams must mate with the 2" wide bar imbeds which provide a backing plate for the weld. The TRT notes that the weld seam could vary across the width of the imbed without consequence or safety significance. The TRT's inspection of liner welds did notice that weld runs from plate to plate joints were not consistent but did not consider these variations to be excessive. The TRT also observed variations such as the appearance of a butt joint in lieu of an overlap (fillet type) joint. (Identical to AW-81) The review of documentation found several NCRs covering ~~those~~ such conditions.

TRT's inspection of liner welds and review of documentation cannot find evidence of poor welds or that the welds were not sound or that the required seal was not achieved. Insert #9 The final acceptance of the liners is based on the visual, liquid penetrant, ~~and~~ vacuum box leak testing, and the 48 hour water fill test. ~~was also reviewed and~~ The TRT could not determine any evidence that the completed liner installation was not in accordance with the requirements as defined early in this report, and does not determine any safety significance to the concerns of this allegation.

The TRT is preparing a summary of its findings on allegation AQW-80 to forward to the alleger, who declined an interview.

(e) AW-81

This allegation is similar to AQW-80 except that The Alleger is concerned ~~it applies to~~ about the floor plate fit-up that mates to ~~where it mates with~~ the wall plate. The floor plate is supposed to overlap and be fillet welded to the leg of the angle attached at the bottom edge of the wall liner. The TRT did observe some apparent butt joints in this area. There were several NCRs written which covered these conditions. Where these conditions existed, the TRT was unable to determine whether there was any weld buildup to compensate for an excessive fitup gap, However Buttering is permitted (See Para. 2(e)4(d); N-Exo-h/a 0R/00A #7353522[illegible]. Based on the inspection of welds, the review of documents and the final acceptance examinations, the TRT determined that these conditions were resolved without violation, and not to be safety significant.

The TRT is preparing a summary of its findings on allegation AW-81 to forward to the alleger, who declined an interview.

(f) AW-82

The alleger is concerned about a defective block under the floor liner in one of the fuel pools or transfer canals that could affect leak detection. Since the details of the leak chase channel network are not accessible for visual examination and because the allegation lacks specificity, the TRT review has attempted to identify the alleged "defective block" and evaluate the affect on the function of the leak chase system as well as its safety significance, regardless of the location and extent of the defect. A review of details shown in G&H drawings 2323-5-0831 through -0834 and B&R drawing WRB-10559 determined that only two items in the construction of the leak chase channels and floor grooves could apply to the alleged block:

(1) Blockouts - ~~These are wood blocks~~ lengths of material cut to the required dimensions for the leak chase system. used to form the leak chase channels during the pouring of the concrete floor of the fuel pools. The B&R procedure CCP-38 states that after the setting of concrete, the blockouts shall be removed and any chipping or damage to the chase repaired, and that the chase grooves be coated with a sealant film. A final visual examination was required for these operations. It is not reasonable to believe that a blockout was left in place, or if defective, to cause subsequent affect to the requirements.

(2) 3/8" x 2" Imbedded Bars - ~~These are bars~~ stainless steel bar stock which is imbedded ~~in and~~ flush with the surface of the concrete pool floor, and anchored using Nelson studs. The bars are centered between the leak chase grooves and form a grid framework to which the floor liner plates are fillet welded.

In its review of documentation, the TRT discovered CPSES Design Change Authorization (DCA) No. 5687 where a 3/8" x 2" imbedded strip identified as "F-15" was omitted. The DCA solution was that: "Plates P186 and W135 shall be butt welded together and laid as one unit." The location of this deviation is at the junction of the fuel transfer canal and the cask pit entrance.

The TRT reviewed the drawings and the functional purpose of the chase channels (as described in 4.3 "Description of Details") (to detect leakage through the pool liner and to locate the leakage within a sectional area using the system of drains where a section of chase grooves empty into a single drain). Since the design drawings locate the chase groove to run parallel on each side of the imbedded bar to which the plates are normally welded, they would therefore, remain to be parallel to each side of the butted plate to plate seam weld (relating to DCA No. 5687). Therefore, any leakage that might occur through the weld joint would be collected and detected in the same manner as it would if the imbedded bar were in plate. The TRT could find no safety significance regarding this DCA.

Insert #10

The TRT ~~also~~ reviewed ASLB testimony where issues pertaining to the fuel pool liners were discussed from Sept. 10 through Sept. 21, 1984. These discussions question the adequacy of inspections and governing procedures, and adherence to the procedures. ~~For the most part, the activities which took place from the back side of the liners (the side which becomes the boundary to the concrete) were discussed in the testimony, i.e., tack welding the backing strip in place to accomplish the wall liner plate to-~~

plate fitup, and the attachment of the leak chase channels which are fillet welded and form the enclosure around the backing strip. These testimonial issues and the implementation of requirements in accordance with Appendix B to the 10 CFR 50 are covered in the TRT's QA/QC SSER.

Go To pg 14 Item 5 "Conclusions"

The TRT review of G&H Specification No. 2323-SS-18 and G&H drawings (ref. "F.B. Spent Fuel Pool Liner Details") noted that the requirement for welding the nelson studs to the liners which provided the anchors in the concrete structure, shall be in accordance with AWS D1.1 (not mentioned in the earlier listing of requirements). The G&H drawings call for these welds to be radiographed. During the review of ducumentation, the TRT observed a TUSI letter TUQ-041 dated September 4, 1975, addressed to B&R which permitted the substitution of magnetic particle inspection in lieu of radiography for vertical liner welds in the reactor cavity. The TRT notes that since the liner material is Type 304L austinetic stainless steel (non-ferris), magnetic particle examination cannot be valid. The TRT also notes that these welds were liquid penetrant examined which satisfies the AWS requirements for accordance.

Over and above any specified requirements, the TRT noted that there were areas which were examined by the mass spectrometer leak testing method. Also that the pools were "water filled" leak tested.

The TRT has also reviewed the NRC memorandum dated January 17, 1985 for Vince S. Noonan from Olan D. Parr. The TRT's position regarding seismic category requirement for the fuel pool liners is:

(1) The liners were not designed by TUEC to be a seismic Category I fabrication and the requirements established by TUEC for their fabrication does not support seismic Category I requirements.

(2) Since the liners provide no structural support to the concrete pool structure, and that a seal weld failure would not be safety significant because (a) the concrete pool structure is designed as seismic Category I structure and has the capability to contain the water, (b) there are redundant systems to replenish water in great volume, (c) the liners provide an early detection system for leakage and the capability to recycle this leakage, and (d) any such leakage through the liners would not release any levels of radiation through the pool structure or outside containment to be harmful to personnel. The fuel pool liners need not be seismic Category I.

The TRT is preparing a summary of its findings on allegation AW-82 to forward to the alleger, who declined an interview.

5. Conclusion and Staff Positions: The TRT's review of the allegations and issues regarding the concerns about the fuel pool liners has concluded that they have no safety significance.

6. Actions Required: None.

[redacted]

8. Attachments: None.

9. Reference Documents:

1. G&H Specification No. 2323-SS-18, Revision 3, April 6, 1979 "Stainless Steel Liners," issued for B&R Construction
2. G&H drawings:
   (1) 2323-S-0831, "F.B. Spent Fuel Pool Liner Details."
   (2) 2323-S-0832, "F.B. Spent Fuel Pool Liner Details."
   (3) 2323-S-0833, "F.B. Spent Fuel Pool Liner Details."
   (4) 2323-S-0834, "F.B. Spent Fuel Pool Liner Details."
3. B&R drawing WRB-10559, Sheet 1, "Fuel pool liners Imbeds - Weld Identification No's."
4. B&R Procedures:
   (1) QI-QAP-11.1-4, December 26, 1979, "Welding Inspection of Stainless Steel Liners" (deleted in error on January 15, 1982 and reissued with no changes on Janaury 26, 1982).
   (2) CCP-38, Revision 4, dated January 5, 1984, "Stainless Steel Liner Erection."
5. DC/DDA 2946, Revision 1, November 13, 1978.
6. Comanche Peak Steam Electric Station/Final Safety Analysis Report (CPSES/FSAR), Section 17.2, "Quality Assurance Requirements, and Section 3.2, "Design of Structures."

7. U.S. NRC memorandum, dated January 25, 1979
From: G. W. Reinmuth, Assistant Director, Division of Reactor Construction Inspection, IE
To: D. B. Vassallo, Assistant Director for Light Water Reactors, Division of Project Management, IE
Subject: Classification of Spent Fuel Pool Liner Plates (AITS F1219H1) (AITS F30382H1).

8. U.S. NRC memorandum, dated February 6, 1979
From: G. W. Reinmuth, Assistant Director, Division of Reactor Construction Inspection, IE
To: R. T. Carlson, Chief, Reactor Construction and Engineering Support Branch, RI
Subject: Classification of Spent Fuel Pool Liner Plates (AITS F12193H1) (AITS F30382H1).

9. U.S. NRC Regulatory Guide 1.29, Revision 3, September 1978, "Seismic Design Classification."

10. Region IV Report 50-445/79-15; 50-446/79-15.

11. Allegation Source:
(1) AM-11 --- 84-006, 3/7/84, A-4 Testimony Pages 51, 52-55.
(2) AW-40 --- Testimony dated 5/24/82, Page 65A.36.b, IR-79-15.
(3) AW-42 --- Testimony dated 5/24/82, Page 65A.36.b, IR-79-15.
(4) AQW-80 --- A-49, 8/8/84, and A-4, 8/24/84.
(5) AW-81 --- A-4, 8/24/84.
(6) AW-82 --- A-4, 8/24/84.

10. This statement prepared by:

E. G. Thompson
C. Richards,
TRT Technical Reviewers

Date

Reviewed by:

L. C. Shao,
Group Leader

Date

Approved by:

V. Noonan,
Project Director

Date

5

SSER WRITEUP DOCUMENT CONTROL ROUTE SHEET

TAT Group: Mechanical and Piping Category 43
Subject of Allegation: Peer welding conditions for spent fuel storage pool liners
Allegation Numbers: AM-11, AW-40, AW-42, AQW-80, AW-81, AW-82
Author: E.G. Thompson / C. Richards

This sheet will be initialed by each reviewer. It stays with all revisions to the SSER writeup and serves as a routing and review record. It will be filed in the work package when the writeup is published.

Draft Number

Draft	1	2	3	4	5
Author			E.G. Thompson		E.G. Thompson
Group Leader			J. Hou		
Tech. Editor (cont.)			WEB 10/2		
J. Gagliardo					
I. Inzolito					

Revision Number

Final	1	2	3	4	5
Author					
Tech. Editor					
Group Leader					
J. Gagliardo					
I. Inzolito					

Administrative

Writeup integrated into SSER_____
Potential Violations to Region IV_____
Workpackage File Complete_____
Workpackage Returned to Group Leader_____

Draft ~~5~~ 6 ~~1/29/85~~ 3/5

AM-11, etc. (DCP5)

SSER

1. Allegation Group: Mechanical and Piping Category No. 43, Poor Welding Conditions for Spent Fuel Storage Pool Liner

2. Allegation Number: AM-11, AW-40, AW-42, AQW-80, AW-81, and AW-82

3. Characterization: It is alleged that:

   (a) AM-11 - Incorrect fitup and poor welding technique resulted in thin welds joining stainless steel liner plates for fuel pools in the fuel building and reactor building for Unit 1.

   (b) AW-40 - One weld seam in the spent fuel pool liner is largely rust and concrete.

   (c) AW-42 - Poor welding conditions existed for field installation of the stainless steel liners in the spent fuel pools of the fuel handing facility.

   (d) AQW-80 - Liner plate weld seams do not match drawing locations on the flooring around the Unit 1 reactor vessel pool.

   (e) AW-81 - The stainless steel floor plate liners in the spent fuel pool and transfer canal are supposed to overlap the angle member at the bottom edge of the wall-to-floor joint. There were areas of no overlap and the weld was built up to bridge a gap.

   (f) AW-82 - A single block related to the leak chase channels under the floor liner of the fuel pools or fuel transfer canal is defective and could affect leak detection.

4. Assessment of Safety Significance: The TRT review for the evaluation of the above allegations included a study of the applicable specifications, drawings, procedures, documentation, regulatory guides, NRC Region IV inspection reports (IRs) and NRC memos. The TRT review included seismic and regulatory requirements to determine those requirements that apply to the liners for the fuel pool, a transfer canal, and a reactor refueling cavity. ~~liners~~.

Insert #1

Insert #2 (from Typed pages)

The TRT also performed visual inspections of the fuel pool liners. ~~The~~ A general visual inspection ~~was general~~ for the overall liner installation was performed and ~~included~~ a more detailed examination of approximately 20% of the welds in the spent fuel pools and fuel transfer canals. The areas of weld inspection covered the floor plate liners, those portions of the wall liners which were easily accessible from the floor, and areas adjacent to the sparger spray system which runs horizontally, about half way up two walls of each of the spent fuel pools. The liner installations are complete and the details of the leak chase channel networks, and floor imbedments are not accessible for visual examination.

The TRT's visual inspection revealed that the placement of floor plates was not necessarily uniform. There were some areas where the gap between floor plates was such that the fillet welds washed together and one area gave the appearance of a butt weld. All wall liner butt seam welds were ground flush or concave and most of the floor fillet welds were cosmetic ground. The inspection could not

determine if the fitup gap was excessive or if it was tightly butted ~~excessive butt gaps or where~~ (tightly butted joints could ~~would~~ cause insufficient penetration). The examination did establish that gas tungsten-arc ~~(GTA)~~ welding (GTAW), if not exclusively used, had been extensively used. This conclusion was based on the appearance of unground welds. No butt welds were observed to have reinforcement exceeding the 3/32" maximum. Seam weld concavity may exceed 1/32" in some locations due to grinding of weld surfaces. A more cursory examination was made of liner welds in the fuel pools of Unit 2 and in all cases the general appearance of welding was smooth, clean, and sound.

(a) AM-11

This allegation is concerned that:

(1) The fitup of 3/16" and 1/4" thick stainless steel liner plates for butt welding was supposed to result in a joint gap of 3/16" to 3/8" to facilitate making a full penetration weld, but welders encountered tightly butted joints. These joints were partial-penetration welded by laying weld filler wire on the joint line and fusing it in.

(2) Gapped butt joints were incorrectly welded by either building up weld metal in the middle of the gap and then bridging the gap at the top with a thin (less than full penetration) weld or by laying weld rod in the gap and welding over it.

Insert #3

B&R Procedure CCP-38, Revision 4 (dated January 5, 1984), Stainless Steel Liner Erection specifies that 3/16" to 3/8" joint gap for fitup of stainless steel plates for butt welding was a requirement only for automatic welding. Narrower weld gaps were acceptable for manual welding. However, the TRT notes that tightly butted joints would preclude making full penetration welds in the 3/16" and 1/4" thick liner plates using the specified manual GTAW process. All of the fuel pool liner welding was apparently performed using the manual GTAW process.

The TRT is preparing a summary of its findings on allegation AM-11 to forward to the alleger, who declined an interview.

(b) AW-40

The allegation states that water from poured concrete had entered leak chase channels and run past backing strips into weld joint areas. The allegation does not identify any specific weld or area. ~~However,~~ the TRT's visual examination did detect two questionable spots of corrosion. Both were on the north wall liner of Unit 1 spent fuel pool. A buildup of corrosion products was observed on a horizontal seam weld located about half way up the wall. The corrosion products were located between the midsupport for the pipe and the nearest light pole. The second questionable spot observed by the TRT was in a horizontal seam below the sparger about level with the top of the fuel storage rack. It was

located opposite the northeast corner of the rack. There was no buildup of corrosion products but there was a light rust colored stain, ~~that appeard to have been caused by water leaking from a small spot in the weld seam. However, the TRT could find~~ no obvious hole or pore in the weld. The TRT could not determine the source causing these stains. The TRT could be found no safety significants to these spots. However a closer examination would not be harmfull. Arrangements are to be made for the TRT to review its findings on allegation AW-40 with the alleger.

(c) AW-42

Inasmuch as both Unit 1 and 2 spent fuel pools are complete, TRT visual examination could neither substantiate nor refute the allegation regarding poor welding conditions, incorrect fitup, and poor welding technique during liner fabrication. However, NRC Region IV IR 79-15 dated May 21, 1979, concluded that the allegation may be substantially true. In addition, DC/DDA 2946, Revision 1, dated November 13, 1978, documents a modification made to drain leak chase channels containing water interfering with welding, a modification supporting the NRC Region IV findings. At least to the extent of this evidence, welding conditions were not ideal.

Insert #4

Arrangements are to be made for the TRT to review its findings on allegation AW-42 with the alleger.

(d) AQW-80

Insert # 5 → ~~This allegation has similarities to allegations AM-11 and AW-81.~~ ~~During the TRT examination of liner welds, some lack~~ of ~~conformancy was noted; i.e., possible~~ The TRT also observed variations in fitup gap, and certain areas giving the appearance of butt joint in lieu of an overlap. There were several NCRs covering these conditions. ~~However,~~ the TRT examination of the welds could find no evidence that the welds were not sound or that an adequate seal was not achieved. The TRT's evaluation for safety significance is based on its visual examination of liner welds, the requirements that apply to the design purpose of the liners and the final acceptance of the required NDE examinations and leak tests.

The TRT is preparing a summary of its findings on allegation AQW-80 to forward to the alleger, who declined an interview.

(e) AW-81

This allegation is similar to AQW-80 except that it applies to the floor plate where it mates with the wall plate. The floor plate is supposed to overlap and be fillet welded to the leg of the angle attached at the bottom edge of the wall liner. The TRT did observe some apparent butt joints in this area. There were several NCRs written which covers these Where these conditions existed, the TRT was unable to determine whether there was any weld buildup to compensate for an excessive fitup gap. ~~The TRT's evaluation of safety significance is based on the same evidence as AQW-80 above.~~ Based on the inspection of welds, the review of documents and the final acceptance examinations, the TRT determined these conditions not to be safety significant.

The TRT is preparing a summary of its findings on allegation AW-81 to forward to the alleger, who declined an interview.

(f) AW-82 The alleger is concerned about a defective block under the floor liner in ~~the pool~~ one of the fuel pools or transfer canal that could affect leak detection.

Since the details of the leak chase channel network are not accessible for visual examination and because the allegation lacks specificity, the TRT review has attempted to identify the alleged "defective block" and evaluate the affect on the function of the leak chase system as well as its safety significance, regardless of the location and extent of the defect. A review of details shown in G&H drawings 2323-5-0831 through -0834 and B&R drawing WRB-10559 determined that only two items in the construction of the leak chase channels and floor grooves could apply to the alleged block:

(1) Blockouts - These are wood blocks used to form the leak chase channels during the pouring of the concrete floor of the fuel pools. The B&R procedure CCP-98 states that After the setting of concrete, the blockouts ~~were~~ shall be removed and any chipping or damage to the chase ~~was~~ repaired, and that the chase grooves be coated with a sealant film. A final visual examination was required for these operations. It is not reasonable to believe that a blockout was left in place, or is defective, because subsequent [redacted] would reflect to the requirements.

(2) 3/8" x 2" Imbedded Bars - These are bars imbedded in and flush with the surface of the concrete pool floor and anchored using Nelson studs. The bars are centered between the leak chase grooves and form a grid framework to which the floor liner plates are fillet welded.

In its review of documentation, the TRT discovered CPSES Design Change Authorization (DCA) No. 5687 where a 3/8" x 2" imbedded strip identified as "F-15" was omitted. The DCA solution was that: "Plates P186 and W135 shall be butt welded together and laid as one unit." The location of this deviation is at the junction of the fuel transfer canal and the cask pit entrance.

The TRT reviewed the drawings ~~and determined that~~ and the functional purpose of the chase channels (to detect leakage through the pool liner and to locate the leakage within a sectional area using the system of drains where a section of chase grooves empty into a single drain), ~~was not affected~~.

INSERT #6

The TRT also reviewed ASLB testimony where issues pertaining to the fuel pool liners were discussed from Sept. 10 through Sept. 21, 1984. These discussions question the adequacy of inspections and governing procedures, and adherence to the procedures. For the most part, the activities which took place from the back side of the liners (the side which becomes the boundary to the concrete) were discussed in the testimony, i.e., tack welding the backing strip in place to accomplish the wall liner plate-to-plate fitup, and the attachment of the leak chase channels which are fillet welded and form the enclosure around the backing strip. ~~The purpose of the leak channels does not include the intent to be a secondary seal to the plate-to-plate seal weld. Therefore, there are no regulatory requirements for documentation of visual examinations for cleanliness of attachment locations~~ These Testimonial Issues and the implementation of requirements in accordance with Appendix B to the 10 CFR 50 are covered in the TRT's QA/QC SSER.

the back surface of the liners. The requirements which are established in accordance with the pertinent portions of Appendix B to the 10 CFR 50, and defined in B&R's Quality Instruction QA-QAP-11.1-4, apply only to the plate to plate "seal" weld. Normally these requirements include visual examinations for cleanliness, fitup, and the completed weld; a liquid penetrant examination of the completed weld and a liquid film vacuum box "bubble" test for leakage. All of these examinations are performed at the front (exposed) surface. The fact that the backing strip is no longer visible from the back side is of no consequence.

Insert #7

Over and above any regulatory requirement the drawings specified certain areas to be radiographed. TUSI letter TUQ-041 dated September 4, 1975 to B&R permitted the substitution of magnetic particle inspection in lieu of radiography for vertical containment liner welds in the reactor cavity. (The TRT notes that magnetic particle inspection is not applicable to the liner material, which is type 304L austenitic stainless steel.) There were other areas that were examined by the Mass Spectrometer Leak Testing method. As mentioned earlier in this SSER, the pools were also "water" leak tested. QC personnel were permanently assigned to the areas of fabrication and installation of the fuel pool liners to monitor the activities. The allegations and transcribed discussions lack specificity to the extent that traceability to specific welds cannot be positively shown. However, documentation of nonconformances, conditions that were

not ideal, and certain deviations to procedural sequence of operation were reviewed.

The TRT is preparing a summary of its findings on allegation AW-82 to forward to the alleger, who declined an interview.

5. Conclusion and Staff Positions: The TRT's review established that considerable difficulty was encountered in fabrication and installation of the liners. Documentation in part substantiated the allegations. However, the primary function of the stainless steel liners is to provide a leak tight barrier and a surface which may be easily decontaminated. The TRT concludes that these basic requirements have been met. The TRT also established, on the basis of a U.S. NRC Memorandum entitled "Classification of Spent Fuel Pool Liner Plates," dated February 6, 1979, that fuel pool liners are not required to be designed and erected to Seismic Category I requirements. The TRT, therefore, concludes that although some of the allegations are valid, they have no safety significance.

6. Actions Required: None.

[redacted]

5

8. Attachments: None.

9. Reference Documents:

1. G&H Specification No. 2323-SS-18, Revision 3, April 6, 1979 "Stainless Steel Liners," issued for B&R Construction
2. G&H drawings:
   (1) 2323-S-0831, "F.B. Spent Fuel Pool Liner Details."
   (2) 2323-S-0832, "F.B. Spent Fuel Pool Liner Details."
   (3) 2323-S-0833, "F.B. Spent Fuel Pool Liner Details."
   (4) 2323-S-0834, "F.B. Spent Fuel Pool Liner Details."
3. B&R drawing WRB-10559, Sheet 1, "Fuel pool liners Imbeds - Weld Identification No's."
4. B&R Procedures:
   (1) QI-QAP-11.1-4. December 26, 1979, "Welding Inspection of Stainless Steel Liners" (deleted in error on January 15, 1982 and reissued with no changes on Janaury 26, 1982).
   (2) CCP-38, Revision 4, dated January 5, 1984, "Stainless Steel Liner Erection."
5. DC/DDA 2946, Revision 1, November 13, 1978.
6. Comanche Peak Steam Electric Station/Final Safety Analysis Report (CPSES/FSAR), Section 17.2, "Quality Assurance Requirements, and Section 3.2, "Design of Structures."
7. U.S. NRC memorandum, dated January 25, 1979
   From: G. W. Reinmuth, Assistant Director, Division of Reactor Construction Inspection, IE
   To: D. B. Vassallo, Assistant Director for Light Water Reactors, Division of Project Management, IE
   Subject: Classification of Spent Fuel Pool Liner Plates (AITS F1219H1) (AITS F30382H1).

8. U.S. NRC memorandum, dated February 6, 1979

From: G. W. Reinmuth, Assistant Director, Division of Reactor Construction Inspection, IE

To: R. T. Carlson, Chief, Reactor Construction and Engineering Support Branch, RI

Subject: Classification of Spent Fuel Pool Liner Plates (AITS F12193H1) (AITS F30382H1).

9. U.S. NRC Regulatory Guide 1.29, Revision 3, September 1978, "Seismic Design Classification."

10. Region IV Report 50-445/79-15; 50-446/79-15.

11. Allegation Source:

(1) AM-11 --- 84-006, 3/7/84, A-4 Testimony Pages 51, 52-55.

(2) AW-40 --- Testimony dated 5/24/82, Page 65A.36.b, IR-79-15.

(3) AW-42 --- Testimony dated 5/24/82, Page 65A.36.b, IR-79-15.

(4) AQW-80 --- A-49, 8/8/84, and A-4, 8/24/84.

(5) AW-81 --- A-4, 8/24/84.

(6) AW-82 --- A-4, 8/24/84.

10. This statement prepared by:

E. G. Thompson
C. Richards,
TRT Technical Reviewers

Date

Reviewed by:

L. C. Shao,
Group Leader

Date

Approved by:

V. Noonan,
Project Director

Date

5, 7c

DCP5 - AM-11, etc.

Draft 7 - 3/20/85

SSER

1. Allegation Group: Mechanical and Piping Category No. 43, Poor Welding Conditions for Spent Fuel Storage Pool Liner

2. Allegation Number: AM-11, AW-40, AW-42, AQW-80, AW-81, and AW-82

3. Characterization: It is alleged that:

   (a) AM-11 - Incorrect fitup and poor welding technique resulted in thin welds joining stainless steel liner plates for fuel pools in the fuel building and reactor building for Unit 1.

   (b) AW-40 - One weld seam in the spent fuel pool liner is largely rust and concrete.

   (c) AW-42 - Poor welding conditions existed for field installation of the stainless steel liners in the spent fuel pools of the fuel handing facility.

   (d) AQW-80 - Liner plate weld seams do not match drawing locations on the flooring around the Unit 1 reactor vessel pool.

   (e) AW-81 - The stainless steel floor plate liners in the spent fuel pool and transfer canal are supposed to overlap the angle member at the bottom edge of the wall-to-floor joint. There were areas of no overlap and the weld was built up to bridge a gap.

   (f) AW-82 - A single block related to the leak chase channels under the floor liner of the fuel pools or fuel transfer canal is defective and could affect leak detection.

L 116

4.0 Assessment of Safety Significance: To provide a better clarification of the alleged concerns and issues, and their review and assessment, this section is divided under the following subtitles: 4.1 Scope, 4.2 Applicable Requirements, 4.3 Description of Details, 4.4 Fabrication Technique, 4.5 TRT Visual Inspection, 4.6 TRT Review of Documentation, 4.7 TRT Review and Assessment Specific to Allegations, and 4.8 Additional Findings and Assessment.

4.1 Scope: This TRT review and assessment is regarding the alleged concerns and issues about the "subject" stainless steel liners for the spent fuel pools, transfer canal, and reactor refueling cavities. In addition to that which is alleged, the concerns have given birth to issues that question the adequacy of Comanche Peak Steam Electric Station (CPSES) failure safety analysis report (~~CPSES~~/FSAR), the requirements which were implemented, the fabrication processes, and the acceptance criteria to assure that the liners will not affect ~~be harmful to~~ the safe operation of the plant. The TRT objective is to report their finding of fact, review the concerns, and to make an assessment of safety significance.

I would add these to title to make it properly descriptive

4.2 Applicable Requirements: The following regulatory sources which either impose or exclude requirements for the "subject" liners were reviewed and are listed in descending order:

(a) CPSES/FSAR does not list the liners for the spent fuel pools, transfer canal, and reactor refueling cavity, as "Q" items. The CPSES/FSAR does not make mention of these liners.

What Section?

(b) ASME B&PV Code sets forth the requirements for concrete structure of the fuel pools and clasifies the structure to be seismic Category I. The Code makes mention of the fuel pool liners only to exclude them from these requirements.

(c) The U.S. NRC Regulatory Guide 1.29 classifies the spent fuel storage pool structure, including the fuel racks to be Seismic Category I design requirements. The regulatory guide also states that the pertinent quality assurance requirements of Appendix B to the 10 CFR 50 should be applied to all activities affecting the safety-related functions of those portions and functions of structure, systems, and components which are classified as Seismic II.

Does ~~this~~ or does it not apply?

(d) The U.S. NRC Memorandum dated February 6, 1979, states "...fuel pool liners are not required to be designed and erected to Seismic Category I requirements." The memorandum further states "The primary function of the liners is to provide a leak tight barrier and a surface suitable for decontamination, rather than to serve as a critical safety structure."; and, "The probability of large leaks occurring and being undetected over a period of time such that a potential hazard might be incurred is acceptably low."

If this whole section relates only to requirements for spent fuel pools, you better be sure it is so identified.

1. Materials shall be ASTM grade, Type 304L stainless steel, 3/16-inch and 1/4-inch thickness.

2. Liner plates shall be seal welded by inert-gas-shielded (gas tungsten-arc) welding (GTAW), using fillet and full penetration groove welds.

3. Welding procedure specifications ~~qualifications~~ and welders' performances shall be qualified in accordance with ASME B&PV Code Section IX.

4. Plate-to-plate fitup gap using backing strip for manual GTAW shall be:

   (a) other than prequalified joints - minimum 1/16-inch,

   (b) for prequalified joints as shown in prequalified details - 1/16-inch + 1/4-inch (without backing strip - 1/16-inch + 1/16-inch),

   (c) "high-low" mismatch between abutting end preps shall not exceed 1/8-inch.

   (d) If root opening (gap) exceeds its applicable requirements, one or both end preps shall be buttered until gap is within acceptable tolerances.

5. Surfaces shall be smooth and free from irregularities and may be ground to a smooth finish.

6. Stud welding (ASTM A108 Nelson studs) shall be automatically controlled equipment which shows ~~un~~acceptable undercut. Lack of 360° fillet may be corrected by additional manual GTAW. Installation, inspection and acceptance of anchor studs shall conform to the applicable requirements of the AWS D1.1 Structural Welding Code.

Is something missing in this sentence?

7. All seams welds shall be dye penetrant tested, and shall also be tested by vacuum box for leak tightness for their entire length. Also, all liner systems shall be filled with water and monitored for 48 hours for leakage. An optional test may be performed for locating leakage by filling the leak chase system (see 4.3 Description of Details) with helium and scanning the welds with an instrument sensitive to and capable of signaling the presence of helium that permeates through the weld. Any leakage shall be repaired and testing repeated until successful completion. No test is considered complete until accepted by Engineering. The TRT notes that no acceptance criteria was specified for the dye penetrant test until January 3, 1985 by DCA to the procedure (see section 5. "Conclusion and Staff Position).

Note: The QA/QC aspects regarding the issues relating to the liners are covered in the TRT's QA/QC SSER.

add Category d allegation numbers

4.3 Description of Details: The wall liner plates are joined by full penetration~~s~~ butt weld~~ing~~ using a backing strip. A C3x4.1 S.S channel is welded ~~over~~ straddling? the back side of every seam to provide a leak chase, where any leakage through a liner seam weld will be collected. ~~The completed sections of wall liners become the form for the pouring of concrete wall structure of the fuel pools. The concrete floor is poured prior to floor liner installation.~~ The leak chase grooves in the floor are molded ~~during the pouring of~~ in the concrete, ~~using "blockouts."~~ Also 3/8" x 2" bar strips are imbedded to be flush with the surface of the concrete floor. These imbeds form the lattice work to which the floor liner plates are fillet welded. Both the wall liner plates and floor imbeds are anchored in the concrete using nelson studs welded to the back side. The design features of the fuel pool liners include a system of drains where each drain connects to a sectional group of leak chase channels or grooves to provide an early detection system for leakage from a given number of seam welds. It also provides a means to recycle the captured leakage.

4.4 Fabrication Technique: Each liner system, for the spent fuel pools and reactor refueling cavities, was fabricated and erected to be a single "box" like unit (excluding the floor plate). The fabrication was performed outside the buildings where ~~the process was to accomplish~~ the plate-to-plate fitups were accomplished by tack welding the backing strips in place and fillet welding the leak chase "U" channels as defined in 4.3. The inside of each liner unit was heavily braced which supported the erected liners, and ~~It was also necessary for the~~

~~bracing to~~ provide rigid "backup" strength, because ~~to the liner units since~~ they also served as the form for the concrete ~~pour of the pool~~ cavity structure. The Nelson studs, ~~which were~~ are located on 12-inch centers (certain details required much closer centers), and become anchored ~~were welded to the~~ ~~liners~~ in the concrete structure. ~~after the liner unit was located in place. This minimized possible damage to the welded studs since the next step of activity was the concrete~~ pour. ~~The concrete structure encapsulates the Nelson studs and~~ the features of the leak chase channels form a "tongue and groove" type mating with the structure. ~~Hence, the liners become~~ essentially, the liners are an intregal attachment to the concrete structure. The plate-to-plate groove welding on the exposed side of the liners was completed after the concrete had set and the bracing removed. The floor plates were the final installations as described in 4.3

Note: The transfer canal liner was similarly fabricated except that the wall liners were fabricated in two half sections and welded to a single unit after they had been located in place.

Unit 1?

4.5 A general observation of the overall liner installation and a more detailed examination of approximately 20% of the welds in the spent fuel pools and fuel transfer canal were made. The areas of weld inspection covered the floor plate liners, those portions of the wall liners which were easily accessible from the floor, and areas adjacent to the sparger spray system which runs horizontally, about half way up two walls of each of the spent fuel pools. The liner installations are complete and the details of the leak chase channel networks and floor imbedments are not accessible for visual examination.

The TRT's visual inspection revealed that the placement of floor plates was not necessarily uniform. There were some areas where the gap between floor plates was such that the fillet welds washed together and one area gave the appearance of a butt weld. All wall liner ~~butt~~ seam welds were ground flush (or slightly concave) to the liner surface. Most of the floor fillet welds were cosmetic ground. The inspection could not determine if the fit-up gap was excessive or if it was tighly butted (tightly butted joints could cause insufficient weld penetration). The examination did establish that gas tungsten-arc welding (GTAW), if not exclusively used, had been extensively used. This conclusion was based on the appearance of unground welds. No butt welds were observed to have reinforcement exceeding the 3/32-inch maximum. The TRT did not dimension seam weld concavity. However, in some locations due to grinding of weld surfaces it appeared that concavity may exceed 1/32-inch. A more cursory examination was made of liner welds in the fuel pools of Unit 2 and in all cases the general appearance of welding was smooth, clean, and sound.

The TRT did detect two questionable spots of corrosion. Both were on the north wall liner of Unit 1 spent fuel pool. A buildup of corrosion products was observed on a horizontal seam weld located about half way up the wall. The corrosion products were located between the midsupport for the pipe and the nearest light pole. The second questionable spot observed by the TRT was in a horizontal seam below the sparger about level with the top of the fuel storage rack. It was located

opposite the northeast corner of the rack. There was no buildup of corrosion products but there was a light rust colored stain. The TRT could not determine the source causing these stains. No obvious hole or pore could be found in the weld. The TRT also observed certain inconsistancies in joint configuration; i.e., an area where the joint appeared to be a butt type in lieu of an overlaped, fillet welded joint. ~~Other inconsistancies or variations were noticed but the TRT could not consider these findings to be excessive or having any safety significance (example DC/DDAs: No. 1858 & 9700).~~

4.6 TRT's Review of Documentation was initially to review all possible sources of codes and other regulatory documents to determine the requirements ~~that was specifically imposed and~~ applicable to the liners. The CPSES/FSAR ~~was also reviewed which provides the basis for either adopting~~ or not adopting any additional requirements provided by the Codes and other regulatory source where those ~~requirements are not specifically addressed to be applicable to the liners~~. ~~The TRT also reviewed~~ the NRC Regulatory Guide 1.29 which is dated subsecuent to the CPSES/FSAR but prior to the G&H specification for the fabrication and erection of the fuel pool liners. Regulatory Guide 1.29 defines the clasification of seismic categories, and also states that the pertinant portions of Appendix B to 10 CFR 50 should be applied to the liners, ~~which~~ establishes QA/QC requirements for the control of the fabrication processes and documentation. The TRT reviewed the G&H specification and B&R specifications and procedures and found the trace of requirements through the procedures were consistant. These applicable requirements are as identified in 4.2.

The TRT also reviewed B&R's welding process specifications (WPS) 99020 for machine GTAW, WPS 88023 for manual GTAW welding which was used for the liner applications; and WPS 10071 which was used for stud welding using the automatically controlled welding equipment, and WPS 18013 which was used where stud weld repair was required. These WPSs are consistant with the applicable requirements for liner welding.

the TRT performed a general review of welding documentation, numerous NCRs, and many DCAs, ~~etc.~~ where certain observations ~~that~~ appeared to have ~~some~~ relevance to the allegations, ~~were noted.~~

G&H and B&R drawings were reviewed for detail requirements. These drawings are listed in section 9(2) and (3) of this report.

The review includes the Region IV reports 79-15 and related testimonies; and to date the TRT has remained current with their review of NRC memorandums. These memorandums are ~~basically~~ regarding the level of safety relationship that should be established (if any) basis for determining for the liner systems.

4.7 TRT's Review and Assessment Specific to the Allegations:

(a) AM-11

This allegation is concerned that:

(1) The fitup of 3/16" and 1/4" thick stainless steel liner plates for butt welding was supposed to result in a joint gap of 3/16" to 3/8" to facilitate making a full penetration weld, but welders encountered tightly butted joints. These joints were partial-penetration welded by laying weld filler wire on the joint line and fusing it in.

(2) Gapped butt joints were incorrectly welded by either building up weld metal in the middle of the gap and then bridging the gap at the top with a thin (less than full penetration) weld or by laying weld rod in the gap and welding over it.

The TRT visual inspection of the liner welds reasonably supports that all of the welding was performed using the GTAW process. The inspection could not confirm the preweld, fit-up gap conditions to have been tightly butted, excessively gapped, or to have been bridged over. The overall surface appearance of the completed welds was smooth, clean, and sound. Incomplete Sentence The TRT notes that using the GTAW process, a tightly butted joint could preclude making a full penetration weld in the 3/16" thickness, and more probable in the 1/4" thickness stainless steel material specified for the liners. (~~The contention is~~ TRT estimates, for the worst case using GTAW and for 1/4-inch thick liner material, a 95% probability to produce 65% penetration.) However, the TRT did conduct an interview with an individual who is currently employed with B&R, and had been a fitup man for the liner

fabrications for more than 1 year. He stated that all the fitups that he was responsible for were gapped; but he could not (at present) recall what the gap requirement was. He also stated that he did not recall having seen any tightly butted fitups. The TRT ~~wishes to recall that Requirement Section 4.2(e)4(d)~~ notes that subsection 4.2(e)4(d) "Requirements" shows that buttering is permitted where gaps exceed the specified requirement.

The TRT review cannot substantiate the concerns regarding this allegation; nor does the review determine any safety significance.

Wasn't this covered in our Dillingham interview?

~~The TRT is preparing a summary of its findings on allegation AM-11 to forward to the alleger, who declined an interview.~~

(b) AW-40

The allegation states that water from poured concrete had entered leak chase channels and run past backing strips into weld joint areas. The allegation does not identify any specific weld or area. During a personally conducted interview with a B&R employee, ~~including~~ and additional? casual discussions with B&R's welding engineer and QA personnel, the TRT learned:

(1) During the concrete pour of the pools' cavity structure, there were certain areas where spillage of concrete ran down the exposed side of the liners/plates. ~~There were portions of~~

~~Some spillage that became lodged in some areas of the fitup~~ grooves ~~where the~~ plate-to-plate ~~seam~~ ~~welding~~ had not been performed. ~~Some~~ seepage of water from ~~this source~~ could ~~enter the leak chase~~ between the plate and backing strip.

(2) During the liner fabrication activites, the overhead (roof) structures of the buildings that contain the liner system were not in place. This was to facilitate the locating of liner units described in 4.4 "Fabrication Technique." Plastic had been stretched across the span of these openings. However, ~~every time it rained, water~~ poured into the pool areas and ran down the exposed sides of the liners. Where the seam welding was not performed, the water entered the leak chase system by seeping between the liner plate and backing strip.

There are several NCRs describing welding preparations being contaminated with concrete and/or water. In every case, appropriate measures were documented to clean and achieve acceptable welds. More specific cases are addressed in allegations (c) AW-42 and (d) AQW-80.

The visual inspection of the liners detect two questionable spots of corrosion as described in the final paragraph of 4.5, "TRT's Visual Inspection."

The TRT determined the concerns of this allegation not to be safety significant. However, a more decisive examination method should be considered to determine the exact causes for the two questionable spots of corrosion to preclude the possibility of leakage.

The alleger was contacted to arrange a meeting to review the TRT's evaluation and finding. The alleger indicated he has no concerns with CPSES and is not interested in a review meeting with the TRT.

(c) AW-42

The allegation shows considerable concern regarding poor welding conditions during the construction of the fuel pools and fabrication of liners, i.e., seepage slurry from the pouring of concrete causing interference to welding operations. The TRT's visual inspection of the completed liners did not reveal any evidence of conditions that existed during the construction phase. However, the review of documentation revealed numerous NCRs. There were several cases where the QA inspector(s) wrote about interfering conditions ~~as being source~~ giving cause for the defect. Some of these ~~conditions~~ were:

I don't understand this phrase.

(1) weld was defective because Welder had to reach through a maze of rebar to make the weld. This was relating to a stud weld that did not have a 360° fillet. The existance of rebar was an unavoidable condition. The stud welding was performed after the liner

units were located and the rebar was in place and ready for the concrete ~~already anchored in the concrete floor~~. During an interview with a B&R employee, he recalled having to occasionally provide clearance for the welder by using a come-along to pull rebar aside.

(2) Water seeping from locations where concrete had been poured and contaminating components of liners being fabricated.

(3) Water in leak chase channels interfering with welding. This source of water described in Item (b) of AW-40 is also reasonable to believe.

(4) To many activities causing interference. The conditions already described are considered by the TRT to be not unusual to the industry and for construction activities conducted in environments which are open to the elements. The B&R employee who was interviewed and other B&R personnel (during casual discussions) could not recall any additional conditions that could be considered "poor". More than one B&R employee mentioned that on occasion individual employees were indisposed to perform work as directed due to personal reasons, thereby enhancing any existing "poor" condition.

The TRT notes that ~~Also, a Design Change/Design Deviation Authorization~~ (DC/DDA) No. 2946, Rev. 1, dated November 13, 1978, authorizes 1/2" holes to be drilled in a leak chase channel to drain and/or dry out residual moisture causing

interference to welding. Afterwards the holes were repair welded using the GTAW process and groundflush to surrounding surface. The conclusions reported in NRC Region IV's IR 79-15 dated May 21, 1979, states that the allegations regarding poor welding conditions may be substantially true. The TRT's review did find documented evidence of conditions that were not necessarily ideal. However, the TRT cannot conscientiously take the position that these conditions were worse than normal for typical construction industry. The TRT review cannot find any safety significance resulting from these reported and alleged conditions.

The alleger was contacted to arrange a meeting to review the TRT's evaluation and finding. The alleger indicated he has no concerns with CPSES and is not interested in a review meeting with the TRT.

(d) AQW-80

The concerns of this allegation are that weld seams do not match drawing locations on the floor around the Unit 1 reactor vessel pool. The TRT review of the drawings determined that the liner weld seams must mate with the 2" wide bar imbeds which provide a backing plate for the weld. The TRT notes that the weld seam could vary across the width of the imbed without consequence or safety significance. The TRT's inspection of liner welds did notice that weld runs from plate to plate joints were not

consistent but did not consider these variations to be excessive. The TRT also observed variations such as the appearance of a butt joint in lieu of an overlap (fillet type) joint (Identical to AW-81). The review of documentation found several NCRs covering such conditions.

Should we identify these?

TRT's visual inspection of liner welds and review of documentation cannot find evidence of poor welds or that the welds were not sound or that the required seal was not achieved. The TRT noted that at least one area, which had been contaminated with concrete [see description of source Ref. AW-40, Item (a)], could not be adequately cleaned and an acceptable weld could not be achieved. This condition was resolved by grinding the descrepant weld flush to the liner plate, cutting a "patch" from liner material to completely cover the descrepant weld, and the patch fillet welded all the way around and to the liner plate surface. This condition was documented by an NCR and the resolution authorized by a DC/DDA. The final acceptance of the liners is based on the visual, liquid penetrant, and vacuum box leak testing. The TRT could not determine any evidence that the completed liner installation was not in accordance with the requirements as defined early in this report, and does not determine any safety significance to the concerns of this allegation.

7c

[redacted]

I sent this to you (I thought), I gave you a draft of what to say.

The TRT is preparing a summary of its findings on allegation AQW-80 to forward to the alleger, ~~who declined an interview.~~

7c

(e) AW-8

This allegation is similar to AQW-80 except that the alleger is concerned about the floor plate fitup that mates to the wall plate. The floor plate is supposed to overlap and be fillet welded to the leg of the angle attached at the bottom edge of the wall liner. The TRT did observe some apparent butt joints in this area. There were several NCRs written which covered these conditions. Where these conditions existed, the TRT was unable to determine whether there was any weld buildup to compensate for an excessive fitup gap. However, buttering is permitted (see 4.2(e), 4(d), and example DC/DDA 795 & 3221). Based on the inspection of welds, the review of documents and the final acceptance examinations, the TRT determined that these conditions were resolved without violation, and not safety significant.

[redacted] The TRT is preparing a summary of its findings on allegation AW-81 to forward to the alleger,

(f) AW-82

The alleger is concerned about a defective block under the floor liner in one of the fuel pools or transfer canals that could affect leak detection. Since the details of the leak chase channel network are not accessible for visual examination and because the allegation lacks specificity, the TRT review has attempted to identify the alleged "defective block" and evaluate the affect on the function of the leak chase system as well as

its safety significance, regardless of the location and extent of the defect. A review of details shown in G&H drawings 2323-5-0831 through -0834 and B&R drawing WRB-10559 determined that only two items in the construction of the leak chase channels and floor grooves could apply to the alleged block:

(1) Blockouts - Lengths of material cut to the required dimension for the leak chase grooves, and used to form the leak chase channels during the pouring of the concrete floor of the fuel pools. The B&R procedure CCP-38 states that after the setting of concrete, the blockouts shall be removed and any chipping or damage to the chase repaired, and that the chase grooves be coated with a sealant film. A final visual examination was required for these operations. It is not reasonable to believe that a blockout was left in place, or if defective, to cause subsequently affect to the requirements.

(2) 3/8" x 2" Imbedded Bars - Stainless steel bar stock which is imbedded flush with the surface of the concrete pool floor, and anchored using Nelson studs. The bars are centered between the leak chase grooves and form a grid framework to which the floor liner plates are fillet welded.

In its review of documentation, the TRT discovered CPSES Design Change Authorization (DCA) No. 5687 where a 3/8" x 2" imbedded strip identified as "F-15" was omitted. The DCA

solution was that: "Plates P186 and W135 shall be butt welded together and laid as one unit." The location of this deviation is at the junction of the fuel transfer canal and the cask pit entrance.

The TRT reviewed the drawings and the functional purpose of the chase channels as described in 4.3, "Description of Details" (to detect leakage through the pool liner and to locate the leakage within a sectional area using the system of drains where a section of chase grooves empty into a single drain). Since the design drawings locate the chase groove to run parallel on each side of the imbedded bar to ~~which~~ the plates are normally welded, they would therefore, remain to be parallel to each side of the butted plate to plate seam weld (relating to DCA No. 5687). Therefore, any leakage that might occur through the weld joint would be collected and detected in the same manner as it would if the imbedded bar were in plate. The TRT could find no safety significance regarding this DCA.

(3) During the recorded TRT interview with the alleger in Grandbury, Texas, ~~dated~~ on March 5, 1985, the alleger described the "block" to be an area where the leak chase grooves were deliberately interrupted. This area served as a dam to prevent leakage from one leak chase section and drain to ~~enter the~~ an adjacent section. The leak chase grooves are now sealed beneath the floor plate which precludes visual examination. However, the TRT notes that B&R's procedure CCP-38 provides the

7c

necessary steps to repair any chipping or damage caused during removal of the blockouts, and a final inspection after the application of sealant coating. The TRT does not determine this concern to be safety significant.

7c

The TRT is preparing a summary of its findings on allegation AW-82 to forward to the alleger ~~who declined an interview.~~

4.8 Additional Concerns and Findings: During the TRT interview with the alleger identified in the transcript dated March 5, 1985 at Granbury, Texas, additional allegations regarding the liners were presented. Those allegations are characterized as follows:

(1) Floor plate liners are supposed to overlap the angle member at the bottom edge of the wall-to-floor joint.

(2) Plate-to-plate seal welds are so thin that a man pushed a pin through a weld.

(3) Liner waviness and floor elevations exceed allowable tolerances.

(4) A particle of concrete trapped in the weld could eventually eat its way through and cause leakage.

The TRT assessment for safety significance of these concerns are as follows:

(a) The overlap weld joint concern is an exact repeat of allegation AW-81. The TRT found these conditions resolved and having no safety significance.

(b) The alleger identified the person who pushed a pin through a liner seal weld. The TRT located and interviewed this person who said "Yes, I made a statement like that!" and related the following event. He said that while he and a few other workers? were standing in a group having a typical "nonsense" conversation, he pulled a pack of cigarettes from his pocket where he has the habit of carrying pins and said, "Aw hell, I bet I could just walk over there and stick this pin through the weld." He continued to tell the TRT that it would be impossible to push a pin through any of those welds and that he is surprized that this "nonsense" remark could have been overhead and interpreted that he had actually stuck a pin through one of the liner welds. The TRT finds no safety significance to this allegation.

(c) The TRT reviewed DC/DDA 602 which clarifies the waviness and elevation requirements and these "as-built" conditions of the liners fall within the elevation and waviness requirements of plus and minus 1/2-inch each side of the mean. The TRT finds no safety significance to this allegation.

(d) The presence of concrete contamination significant to the quality of the weld would cause significant blow holes and splatter to be easily detected by visual examination and certainly by dye penetrant examination. A particle so minute that it's disintegration or outgasing as a result of contact with molten welding material, and be so incapsolated not to be detectable by the dye penetrant examination, such a particle would be no more apt to eventually eat through the weld than would the contact of massive concrete structure to eat through the liners. The weld is acceptable in accordance with the applicable requirements. The TRT does not consider this concern to have any safety significance.

Very awkward sentence in the middle

The TRT reviewed ASLB testimony where issues pertaining to the fuel pool liners were discussed from Sept. 10 through Sept. 21, 1984. These discussions question the adequacy of inspections and governing procedures, and adherence to the procedures. These testimonial issues and the implementation of requirements in accordance with Appendix B to the 10 CFR 50 are covered in the ~~TRT's QA/QC SSER.~~ the Category —, allegations —, —, —.

5. Conclusion and Staff Positions: The TRT review of requirements established the following facts:

The CPSES/FSAR does not list the liners for the spent fuel pools, transfer canal, and reactor refueling cavity as a "Q" item, and does not show any failure safety analysis. There are no industry codes that directly specifies requirements and criterian applicable to the liners. The G&H specification 2323-SS-18 is the source document for requirements and criterion specifically applicable to the liners. The TRT has determined that there is continuity between the G&H specification requirements do trace through the and B&R procedures. The TRT notes that B&R procedure CCP-38 does not make mention of Appendix B to 10 CFR 50, nor does it reference the G&H specification. However, it does identify QC activities and responsibilities for inspections, testing and documentation for control of processes and records storage, utilizing the existing QA/QC organization and program plans which do comply with the adopted requirements of the G&H specification.

< were there some requirements that weren't adopted?

The TRT determined the trace of requirements to be in compliance with the source G&H specification and acceptable.

The review of all requirements, including pertinent reports and memorandums regarding seismic classifications, levels of safety relationship, and NRC staff positions, has established the following TRT position (The TRT believes this to be consistent with the NRC staff position):

The liners for the spent fuel pools, transfer canals, and reactor refueling cavities are not required to be seismic category I because damage or loss of the plate would not result in a

significant loss of water since the concrete cavity structure would withstand the effects of a safe shutdown earthquake without significant damage. The primary purpose of the plate is to provide a smoother and less permeable surface which is easy to decontaminate; and also provide a construction form for the cavity. The liners do not provide any structural integrity to the concrete structure. Therefore, the concrete structure is the only concern and not the liner plate.

From its
~~The IRT's~~ review of allegations, related concerns, and issues described in this report, and based on the findings and position established, the TRT determines there to be no safety significance to the alleged concerns.

6. Actions Required: None.

[redacted]

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8. Attachments: None.

9. Reference Documents:

1. G&H Specification No. 2323-SS-18, Revision 3, April 6, 1979 "Stainless Steel Liners," issued for B&R Construction
2. G&H drawings:
   (1) 2323-S-0831, "F.B. Spent Fuel Pool Liner Details."
   (2) 2323-S-0832, "F.B. Spent Fuel Pool Liner Details."
   (3) 2323-S-0833, "F.B. Spent Fuel Pool Liner Details."
   (4) 2323-S-0834, "F.B. Spent Fuel Pool Liner Details."

3. B&R drawing WRB-10559, Sheet 1, "Fuel pool liners Imbeds - Weld Identification No's."

4. B&R Procedures:

   (1) QI-QAP-11.1-4, December 26, 1979, "Welding Inspection of Stainless Steel Liners" (deleted in error on January 15, 1982 and reissued with no changes on Janaury 26, 1982).

   (2) CCP-38, Revision 4, dated January 5, 1984, "Stainless Steel Liner Erection."

5. DC/DDA 2946, Revision 1, November 13, 1978.

6. Comanche Peak Steam Electric Station/Final Safety Analysis Report (CPSES/FSAR), Section 17.2, "Quality Assurance Requirements, and Section 3.2, "Design of Structures."

7. U.S. NRC memorandum, dated January 25, 1979

   From: G. W. Reinmuth, Assistant Director, Division of Reactor Construction Inspection, IE

   To: D. B. Vassallo, Assistant Director for Light Water Reactors, Division of Project Management, IE

   Subject: Classification of Spent Fuel Pool Liner Plates (AITS F12193H1) (AITS F30382H1).

8. U.S. NRC memorandum, dated February 6, 1979

   From: G. W. Reinmuth, Assistant Director, Division of Reactor Construction Inspection, IE

   To: R. T. Carlson, Chief, Reactor Construction and Engineering Support Branch, RI

   Subject: Classification of Spent Fuel Pool Liner Plates (AITS F12193H1) (AITS F30382H1).

9. U.S. NRC Regulatory Guide 1.29, Revision 3, September 1978, "Seismic Design Classification."

10. Region IV Report 50-445/79-15; 50-446/79-15.

11. Allegation Source:

(1) AM-11 --- 84-006, 3/7/84, A-4 Testimony Pages 51, 52-55.

(2) AW-40 --- Testimony dated 5/24/82, Page 65A.36.b, IR-79-15.

(3) AW-42 --- Testimony dated 5/24/82, Page 65A.36.b, IR-79-15.

(4) AQW-80 --- A-49, 8/8/84, and A-4, 8/24/84.

(5) AW-81 --- A-4, 8/24/84.

(6) AW-82 --- A-4, 8/24/84.

10. This statement prepared by:

E. G. Thompson — Date
TRT Technical Reviewer

C. Richards — Date
TRT Technical Reviewer

Reviewed by:

L. C. Shao — Date
Group Leader

Approved by:

V. Noonan — Date
Project Director

7c

Geary Mizuno - Telecon - 2/85/05

Category 43 - Stainless Steel Liners

1) Does ASLB regard this as safety related?

Don't know. Testimony is that not, We are litigating it

[illegible] testimony [illegible] Applicant [illegible] safety related

2) What is ASLB status or position on this item?

It is an open issue [illegible], very big

Sub Applicant [illegible] by Casa's

[redacted]

7c

3) Who represents NRC at hearings

Attorney Dick [crossed out]? [illegible] Bachmann

handling the [illegible]

Someone [illegible]

on this [illegible] I) [illegible]

To [illegible]

F [illegible]

T [illegible]

[illegible]

November 21, 1984

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
TEXAS UTILITIES GENERATING COMPANY, et al.	)	Docket Nos. 50-445-2 and 50-446-2
	)	
	)	
(Comanche Peak Steam Electric Station, Units 1 and 2)	)	(Application for Operating Licenses)

PREFILED TESTIMONY OF C. THOMAS BRANDT REGARDING CASE'S FURTHER "EVIDENCE" OF A QUALITY CONTROL BREAKDOWN IN THE CONSTRUCTION, INSTALLATION AND INSPECTION OF THE STAINLESS STEEL LINER PLATE

Q1. Mr. Brandt, have you had an opportunity to review the memorandum concerning the stainless steel liner plate filed by the Citizens Association for Sound Energy on November 15, 1984?

A1. Yes.

Q2. Mr. Brandt, directing your attention to page two of that memorandum, CASE contends that applicants incorrectly assert that the liner plate is not safety-related. Do you see that passage?

A2. Yes. It is set out in the first three paragraphs on the page.

Q3. Is that contention correct?

A3. No. CASE's contention shows a lack of understanding of my testimony and the procedures applicable to the fabrication and installation of the stainless steel liner plate. As I testified before, the fabrication and installation of the stainless steel liner have been designated safety-related activities by the architect engineer. I would like to note my testimony on this point appears at page 45,315 of the transcript of this proceeding. Therefore, CASE is factually incorrect when it asserts that applicants have testified that the liner plate is not safety related. What I testified to, and what CASE appears not to understand, is that the welds in question are non-structural; this point is different from, and unrelated to, the fact that the fabrication and installation of the liner plate are safety-related activities.

The significance of the welds being non-structural is that the architect-engineer did not impose stringent requirements such as those imposed by the ASME code, for the fabrication, installation, inspection and testing of the liner and the welding associated with these activities. The architect-engineer's only concern was that the welds not leak. Accordingly, welding on the liner ~~place~~ plate? is not now, nor has it even been, under the jurisdiction of the ASME Code.

Only two matters remotely tie the liner plate to ASME activities, but neither of these matters apply ASME fabrication and installation requirements to the liner plate.

First, the specification for the liner plate requires that welders who work on, and welding procedures used in connection with, the liner plate be qualified in accordance with Section IX of the ASME Code. This Section, however, is limited to the qualifications of procedures and welders, and it is not a fabrication code. Accordingly, the Code's fabrication requirements simply do not apply to the liner plate. Second, as an administrative matter, the inspection group originally assigned to perform these inspections was the ASME group. In February 1982, responsibility for these inspections was transferred to the non-ASME inspection group; this transfer was also an administrative matter. Again, I want to emphasize that these assignments were unrelated to the applicability of the ASME Code requirements to the fabrication and installation of the liner plate.

Q4. Mr. Brandt, directing your attention to pages two and three of CASE's memorandum, CASE asserts that the correct traveler form was used for weld no. 988, and that you either were wrong in testifying that all travelers were initiated on the wrong form or that you knew that some travelers were initiated on the correct form and your testimony was deceptive. Do you see these allegations?

A4. Yes, I do.

Q5. Is CASE correct?

A5. No. First, my testimony was that I could find no evidence that the correct traveler form was used before April 18, 1979. My review of the travelers indicates that the correct form was used after that date. Second, all of my testimony, as I have stated several times, is limited to the travelers for the Unit 2 refueling cavity, which is located inside the Unit 2 reactor building. All thirteen hundred travelers at issue in this proceeding are for that cavity. I would like to point out that I made this point on pages 15,921-923, 15,927 of the transcript of this proceeding. Traveller 988 cited by CASE is not for a weld in this cavity. It is for a weld in the Unit 2 fuel transfer canal, which is located inside the fuel building. This is not only a completely different cavity; it is for a cavity located in a completely different building. Thus, CASE's allegation is premised on a traveler that was not even included in the travelers that were the subject of my testimony.

Q6. Directing your attention to page 3 of Exhibit I to CASE's memorandum, CASE alleges that certain welds lack QC verification of the fit-up and cleanliness of the outside welds. In support of this allegation, CASE identifies a total of 147 welds which it claims lack QC verification of the fit-up and cleanliness of outside welds. Do you see those allegations?

A6. Yes I do.

Q7. Have you reviewed the travelers for these welds?

A7. Yes.

Q8. What were the results of your review?

A8. In each instance, I found that there was either a chit and/or a traveler documenting QC verification of the fit-up and cleanliness of the outside weld. Accordingly, CASE's allegation is factually wrong.

Q9. CASE asserts on page three of Exhibit 1, "it is evident that the chits [attached to the 147 travelers] were not intended to verify step 1, but was [sic] intended to verify Step 3 and/or 2 only." Is this correct?

A9. No. The chits themselves reflect that they document QC verification of the fit-up and cleanliness of the outside weld.

Q10. CASE also alleges on page 3 that 170 other welds lack QC verification for fit-up and cleanliness of the outside weld. Did you review the documentation for these welds?

A10. Yes.

Q11. What were the results of your review?

A11. With the exception of weld 326, I found that there was a chit and/or traveler substantiating the QC inspection of the fit-up and cleanliness of the concrete side of these welds. Thus, with the exception of weld 326, CASE's allegation is factually wrong.

Q12. Have you determined why there was no documentation verifying the cleanliness and fit-up of the outside weld for traveler 326?

A12. Yes, I have.

Q13. Why was documentation of the QC verification for this weld not found during your review?

A13. The weld has not been made. It is a weld between an angle and the top plate of the cavity, which as of November 20, 1984, had not yet been fit-up.

Q14. CASE next states on page four of Exhibit 1 that five welds lacked QC verification of fit-up and cleanliness for the outside welds prior to welding which allegedly renders their conditions indeterminate, contrary to procedure and 10 C.F.R. Part 50, Appendix B, Criteria V. Do you agree with this characterization?

A14. I cannot agree with CASE's position. I do agree with CASE's contention that, because of the dates of the signatures, the chits attached to these travelers do not definitely establish that the five cleanliness and fit-up inspections were performed prior the time the backing strip was tack-welded to the plates. This is a violation of site procedures, and I have directed that an NCR be written to address this deficiency.

While I agree that there is a paper problem with these five travelers, I cannot agree that the deficiency is technically significant. The fit-up of the plates associated with the travelers identified by CASE was reverified and documented and the cleanliness of the inside joint was verified and documented prior to making the inside welds. Under these circumstances, the verification of the fit-up and cleanliness of the plates prior to tack-welding the

backing strip to the plates is not a technical concern. The only purpose of verifying the cleanliness of the plates prior to tack-welding the backing strip to the plates was to assure that the backing strip could be securely tacked on and would not become dislodged inside the leak chase channel. The sole purpose for the inspection is to ensure that the backing strip remains in place until the time of the inside fit-up. The reason for verifying fit-up prior to tack-welding the backing strip to the plates was to prevent difficult rework which would be required after the attachment of the leak chase channel if the original fit-up between the plates was out of tolerance. In any event, if the backing strip had dislodged or if the fit-up have been improper those deficiencies would have been noted when the cleanliness and fit-up inspections were performed for the inside welds.

Q15. On page five of Exhibit 1, CASE identifies a number of welds which were done using welding procedure 88023 and claims that the correct procedure for those welds was welding procedure 88025. Do you agree with this assertion?

A15. No. The welds CASE identified are embed to plate welds. All welds made on the liner plates between embeds and plates are groove welds in which the deposited weld metal thickness (joint thickness) is .1875" (the thickness of the plate). The proper procedure for making this weld in 1978 was WPS 88023, which was qualified for thickness ranges .0625" through .750". Prior to October 15, 1979, WPS 88025

was qualified for welds with thicknesses of 0.75" through 3.5". On October 15, 1979, WPS 88025 was revised and the thickness range was expanded from 0.75" through 3.5" to 0.185" through 3.50". After this date either WPS 88023 or WPS 88025 could have been followed when making the welds to which CASE refers. Therefore, CASE is wrong in contending that the wrong procedure was used in making the referenced welds. To confirm my observations on this point, copies of WPS 88023, WPS 88025 and 1977 ASME IX, QW 202.2 are appended to my testimony as attachments 1, 2 and 3 respectively.

Q16. On page six of Exhibit 1, CASE identified 243 travelers which CASE claims lack QC verification for Step 5, fit-up and cleanliness of the inside welds. Have you reviewed the traveler packages for these welds?

A16. Yes.

Q17. What was the result of your review?

A17. It is difficult to understand CASE's allegations with respect to the various welds included on the lists on page 6 of Exhibit 1 to CASE's memorandum. Initially, it is important to note that CASE's list includes five-line travelers and eight-line travelers. With respect to the five-line travelers, for example weld 6, the fifth line is for the final V.T. inspection, not for a fit-up and cleanliness inspection. Thus, CASE's allegations for the five-line travelers does not make any sense. In any event,

where the fifth line of the five-line traveler is unsigned, it simply means that weld is in process, and it does not reflect any paper or technical deficiency.

The eight-line travelers on the list fall into several categories. First, many of the travelers are for welds that are welded on one side only (welds 875, 896, 901, 908, 909, 910, 912, 682, 713, 714, 779, 783, 784, 785, 797, 798, and 799). For these welds CASE's allegation is wrong because there is welding on only one side of the liner; consequently, there are no fit-up or cleanliness inspections to be performed on the second side of the liner. Second, CASE is correct with respect to a small group of eight-line travelers (welds 12, 51, 59, 65,66, 72, 73, 90, 93, 107, 147, 203, 709, 851, and 907), and I have directed that an NCR be written identifying the welds for which the inside fit-up and cleanliness inspections have not been documented. Finally, my examination of all of the remaining eight-line travelers on CASE's list reveals that CASE is factually wrong because the inside fit-up and cleanliness inspections were performed and documented.

Q17. On pages 7-8 of Exhibit 1, CASE lists twenty-seven (27) welds which CASE contends are missing the final V.T. of the inside weld. Have you reviewed this allegation?

A17. Yes.

Q18. What conclusions have you drawn as a result of that review?

A18. This is another example of CASE's lack of understanding of the fabrication and inspection process. CASE is correct in noting that a final visual inspection has not been performed for these welds, but the final visual inspection has not been performed because the welding/inspection process has not been completed. My review of the travelers indicates that no holdpoints have been bypassed and no violation exists for any of these welds.

Q19. Mr. Brandt, CASE also lists twenty-two (22) welds on page 8 for which WFMLs are not in the package. Have you had an opportunity to review this allegation?

A19. Yes. However, the absence of WFMLs in these traveler packages does not constitute a violation of procedure or a deficiency. There is simply no requirement specifying that a copy of the applicable WFML is to be kept in each traveler. I might also add, there is no requirement for filler metal traceability on any of these welds.

Q20. On pages 9-15 of Exhibit 1, CASE alleges that WFMLs are referenced on travelers indicating that new welding was done, but there is no QC verification or involvement when the welding is done. Assuming this to be true, what significance does this allegation have?

A20. Although I have not reviewed all the travelers listed by CASE on pages 9-15, I have reviewed enough to lead me to believe that this is another instance where CASE does not understand the requirements and/or the fabrication sequence. In all travelers I reviewed, no inspection hold-

points have been bypassed. If CASE is attempting to infer that QC must perform some type of "verification" each day welding is performed, this simply is not the case. All required inspections are procedurally described, and there is no requirement for "verification" each day welding is performed. From the sample I reviewed, I am unable to detect any violation.

Q21. Mr. Brandt, turning your attention to pages 16-20 of Exhibit 1, CASE lists numerous welds for which welding was done, but no QC verification or involvement is shown, and that WFMLs are attached to, but not references on, the travelers. What significance, if any, is there to this allegation.

A21. None. Once again, as I discussed above, this is apparently another instance where CASE is attempting to assert that verification of welding must be performed on each day that welding occurs. Of the travelers that I reviewed in connection with this allegation, all welds were still in-process, i.e., they had not yet received final inspection. CASE's observation that WFMLs are attached to, but not referenced on, the travelers is correct; however, the allegation is without significance. This information is not required by specification, and serves no quality function. The millwrights are procedurally (construction procedure) 11/29 10:35 AM-TBrandt required to enter this information but they simply have not done so as of this date.

Q22. Mr. Brandt, CASE identifies 5 NCRs on page 21 of Exhibit 1 which describe welds for which vacuum box testing was improperly noted as not applicable. Is there significance to this observation?

A22. No. It was an error made by the inspector, but was properly reported and dispositioned on an NCR.

Q23. On page 22, CASE lists fifty-seven (57) welds which it alleges are deficient because final V.T. has been performed without vacuum box and/or liquid penetrant examination being performed. Have you reviewed this allegation?

A23. Yes, I have.

Q24. What was the result of your review?

A24. CASE apparently misunderstands the inspection testing sequence. The final V.T. precedes the vacuum box testing and the liquid penetrant examination. As these welds are clearly still in process, no holdpoints have been bypassed and no violation exists.

Q25. On the bottom of page 22, CASE notes "the final V.T. of the inside welds were signed off on the following welds by other inspectors." What is the significance, if any, of this observation?

A25. I am not quite sure to whom CASE is referring by the use of the phrase "other inspectors." I assume CASE is referring to the fact that the final V.T. has been performed by inspectors other than those who performed the P.T. and/or V.B. test. If this is CASE's allegation, it is without

merit because there is no requirement that the same inspector perform V.T. and P.T. and/or vacuum box testing. No violation exists.

Q26. Mr. Brandt, on page 23 of Exhibit 1, CASE lists 131 welds which it alleges are deficient because the "completion of weld inspection block on attachment 1 signed off as completed prior to the completion on welds prior to [sic] vacuum box testing and/or P.T. inspection being performed." Have you reviewed this allegation?

A26. Yes, I have.

Q27. What did your review indicate?

A27. The welds listed fall into several different categories. For a number of welds which CASE asserts that "completion of weld inspection block on attachment 1 signed off as completed prior to the completion on welds prior to [sic] vacuum box testing and/or P.T. inspection being performed," CASE is incorrect as the travelers clearly indicate that the weld is still in process. Welds 5, 7, and 8 are examples of this category. As the welds are incomplete, no violation exists. For a small group of welds, (weld numbers 1240, 1242, 1245, 1248, 1182, 1209, and 1210), CASE is correct and I have directed that an NCR be written identifying the condition as nonconforming. For all other welds listed on page 23, CASE is incorrect because the referenced tests are not required; therefore, no violation exists.

Q28. CASE alleges on page twenty-four of Exhibit 1 that "[m]any NCR's were written for welds that James Cole had N/A'd the vacuum box test on. The vacuum box test has been reestablished on all but the ones below." Have you had an opportunity to review this allegation and the travelers involved with this allegation?

A28. Yes, I have.

Q29. What was the result of your review?

A29. Apparently CASE alleges that vacuum box was required for these welds. CASE lists eighty-eight (88) welds which it believe are deficient. As a result of my review, I have determined that with one excpetion (weld 932) that CASE's allegation is incorrect. All other wleds are not pressure boundary welds and therefore do not require vacuum box testing, and the step is properly marked not applicable ("N/A") on the traveler. I have directed that an NCR be written for weld 932 noting that the vacuum box test for that weld was improperly marked "N/A."

Q30. Mr. Brandt, CASE alleges on the bottom of page twenty-four of Exhibit 1, that "PT test has been performed on these welds but vacuum box has not". Have you had an opportunity to review this allegation and the related travelers.

A30. Yes I have.

Q31. What were the result of your review of these travelers?

A31. CASE lists an additional forty-eight (48) welds for which vacuum box has not been performed. For four (4) of these welds (welds 1230, 1232, 1235, and 1238), CASE is correct

and I have directed that an NCR be prepared describing this condition. For all other welds listed here, CASE is incorrect; the step has properly been marked not applicable as these welds do not require vacuum box testing.

Q32. Mr. Brandt, directing your attention to page twenty-five of Exhibit 1, in particular to CASE's discussion of NCR M-83-01847 dated 7/7/83. CASE states that "The NCR was written in 1983 and a hold tag applied. It has not been dispositioned yet, and there is no copy of this NCR in traveler 151. There is no RPS in package for weld 154. 154 was signed off by Don Vogt, S.M. McCoy, for steps 2, 3, and 4. Jim Cole inspected 151 on 4/20/80 and 153 on 4/24/80." What is the significance, if any, of these allegations?

A32. First, CASE is incorrect in stating that "...it has not been dispositioned yet." In fact, CASE describes the disposition of this NCR on page 25 of Exhibit 1. Second, original NCRs are not filed with traveler packages, nor does the lack of a copy of the NCR in package 151 constitute a violation of any code, standard, specification, or procedure. Third, CASE's observation that no RPS is in package 154 is correct, but it is without significance for two reasons: first, the repair is not yet complete, and second, the repair, when completed, will be of weld 151, not weld 154, and accordingly a copy of the RPS will be in package 151, not 154. Fourth, with respect to CASE's observation that "Jim Cole inspected weld 151 on 4/20/80, [actually 4/2/80] and 153 on 4/24/80," CASE is apparently

speculating on Mr. Cole's ability as an inspector. There is no indication that weld 153 was improperly inspected. The NCR clearly states that the backing bar had been ground through. No evidence exists which indicates that the backing bar was not intact when Mr. Cole performed his inspection on 4/24/80, and, as CASE notes, the incident (grinding through the backing bar) was properly reported as nonforming. In the other incident described, i.e., the failure of the backing bar to continue for the full length of the weld at the intersection of welds 166 and 153, CASE again seems to allege that this weld was improperly inspected by Mr. Cole. Although not extremely clear from the face of the document, what Mr. Halcomb, the originator of the NCR, was attempting to indicate by attaching the Chit for first fit-up of weld 154, was that the "deficient" backing strip was from weld 154, not from weld 151. Therefore, Mr. Cole clearly was not involved with this deficiency. The deficient condition becomes clearer after looking at the drawing. Weld 151 is a vertical weld which attaches a plate (A35) to a gate guide. Although the vertical weld continues on down the gate guide, it is numbered differently for each plate it attaches. Welds 151, 155, 157, and 159 all form the vertical weld which attaches a gate guide to plates A35, B35, M35 and M35, respectively. This weld (although 4 weld numbers) was fit up on 5/17/79. The backing strip for this weld (weld numbers 151, 155, 157, and 159) was continuous for the length of the weld. The fact

that the backing strip for weld 154 lacked 3/8" from running the full length of the weld was properly reported on an NCR, and is attributable to inspector error.

Q33. On page 26 of Exhibit 1, CASE refers to a numbering discrepancy which was reported on NCR M-83-00907. What significance, if any, is there for this allegation?

A33. This allegation is correct, however without significance. In this case the construction group which issued the travelers, assigned separate weld numbers for the welds attaching the backing strip and leak chase to the gate guide. Although clearly indicated on the traveler, the millwrights were not timely in assignment of these weld numbers to the marked-up drawing which they were procedurally required to maintain. This condition was properly identified by QC on an NCR and the situation was corrected. In no way was this an inspection deficiency.

Q34. Mr. Brandt, on page 27 of Exhibit 1, CASE identifies two nonconformance reports, NCR M84-01969 and NCR M84-00498. Have you had a chance to review CASE's allegation regarding these NCRs?

A34. Quite frankly, I am unable to find that CASE alleges anything with regard to these two NCRs. Both identified problems, and both were properly dispositioned in accordance with site procedures. CASE's note regarding the absence of a copy of the NCR in all of the packages is not a violation of any requirement. As I stated earlier, the original NCR is filed in a location separate from the

traveler package. All packages do contain the corrected PT report and reference NCR M-84-00948. Other than the deficiency which was reported on these two NCRs, I am not aware of any deficiency in the way they were processed or dispositioned.

questions and then Mr. Watkins will correct it if it turns out to be wrong.

MR. ROISMAN: Mr. Brandt seems to be still looking and rather than have us all sit and look, he can do that at a break and I'll just move on to something else and he can do that later.

MR. WATKINS: I want to make sure he has enough time to review.

JUDGE BLOCH: How much time do you need to review that?

THE WITNESS: I don't know. The table is 50-something pages long.

MR. ROISMAN: He indicated earlier, I think in answer to a question about the appropriate table of the FSAR, that this stainless steel liner was listed as "non-safety," and I'm asking him to identify where that is in there.

MR. WATKINS: To correct the testimony, that it was "non-ASME."

JUDGE BLOCH: Non-ASME.

MR. ROISMAN: I believe it was non-safety. I don't know what his current testimony is but —

THE WITNESS: What I intended was non-ASME. My prefiled testimony clearly states that it is safety-related, and it is considered safety-related by the designer.

FOIA-85-59

Mechanical & Piping Group interview B & L 3-5-85

drop gate guides (2 ~~Attny's~~ [illegible] drop gate guides) [illegible] performance [illegible]
[illegible] item #3
Covered in Cat 41 (Mech & Pip.) AQW79

Claud Mo~~[illegible]~~
271

Ernie Thompson's 1[00] PM
& Boatman +.

L 120

4. Assessment of Safety Significance: The TRT review for the evaluation of the above allegations included a study of the applicable specifications, drawings, procedures, documentation, regulatory guides, NRC Region IV investigation reports (IRs) and NRC memos. The TRT also performed visual inspections of the fuel pool liners. The visual inspection was general for the overall liner instalaltion and a more expertise examination of approximately 20% of the welding in the spent fuel pool, reactor fuel pool, and fuel transfer canal. The areas of weld inspection covered the floor plate liners, those portions of the wall liners which were easily accessible from the floor, and areas adjacent to the sparger spray system which runs horizontally, about half way up two walls of the fuel pools. The liner installations are complete and the details of the leak chase channel network, and floor inbeds are not accessible for visual ~~examination~~. ~~The~~ following ~~is a brief~~ description of ~~the~~ liner details is provided: The wall liner plates are joined by full penetrations butt welding using a backing strip. A C3x4.1 S.S channel is welded over the back side of every seam to provide a leak chase, where any leakage through a liner seam weld will be collected. The completed sections of wall liners become the form for the pouring of concrete wall structure of the fuel pools. The concrete floor is poured prior to floor liner installation. The leak chase grooves in the floor are molded during the pouring of concrete using "blockouts". Also 3/8" x 2" bar strips are imbedded to be flush with the surface of the concrete floor. These imbeds form the lattice work to which the

To provide basis for better understanding of the TRT's remaining reviews and assessments in this report

Continued

Insert #2 (continued)

floor liner plates are fillet welded. Both the wall liner plates and floor imbeds are anchored in the concrete using nelson studs. The design features of the fuel pool liners include a system of drains where each drain connects to a sectional group of leak chase channels or grooves to provide an early detection system for leakage from a given number of seam welds. It also provides a means to recycle the captured leakage.

Insert to Insert #1

(e) Gibb & Hill (G&H) specification 2323-SS-18, Rev. 3 "stainless steel liners," and B&R's Quality Assurance Instruction QI-QAP-11.4, Rev. 0, "welding inspection of stainless steel liners," cover the requirements for the fuel pool liners. Material is specified as ASTM grades of type 304L. Liner sheets ~~are~~ shall be seal welded by inert gas-shielded (gas tungsten-arc) welding. Welding procedure qualifications and welders performances are required to be qualified in accordance with ASME B&PV Code, Section IX. The required inspections are visual, liquid dye penetrant, and radiographed where specified by drawing. It also requires the entire length of all seal welds to be vacuum box leak tested. ~~The liner system was also water leak tested.~~ Surfaces of welds are required to be smooth and free of irregularities and may be ground to obtain this smooth finish. A weld reinforcement of 3/32" maximum and a weld undercut of 1/32" below minimum wall tolerance is permitted. The G&H drawings 2323-5-0831 through 0834 show the liner is fabricated predominantly from 3/16" and 1/4" sheet and assembled using fillet and full penetration groove welds.

Insert #3

The TRT inspection of the liner welds reasonably supports that all of the welding was performed using the GTAW process. The inspection could not confirm the pre-weld, fitup gap conditions to have been tightly butted, excessively Gaped, or to have been bridged over. The over all surface appearence of the completed welds. The TRT notes that using the GTAW process, tightly butted joint could preclude making a full penetration weld in the 3/16" Thickness, and more probable in the 1/4" Thickness Stainless Steel material specified for the liners.

INSERT #4

The allegation shows considerable concern regarding poor welding conditions during the construction of the fuel pools and fabrication of liners, i.e., seepage slury from the pouring of concrete causing interference to welding operations. The TRT's inspection of the completed liners did not reveal any evidence of conditions that existed during the construction phase. However, the review of documentation revealed numerous NCRs. There were several cases where the QC inspector (s) wrote about interfering conditions as being source giving cause for the defect. Some of these conditions were: welder had to reach through a maze of rebar to make the welds; water seeping from locations where concrete had been poured and contaminating components of liners being

Insert #4 (continued)

fabricated; water in lock chase channels interfering with welding; and to many activities causing interference. A Design Change/Design Deviation Author ~~ion~~ (DC/DDA) No. 2946 Rev. 1, dated November 13, 1978, authorizes ½" holes to be drilled in a lock chase channel ~~drain~~ drain and/or dry out residual moisture causing interference to welding. Afterwards the holes were repair welded (using) the GTAW process and ground flush to surrounding surface. The conclusions reported in NRC Region IV's IR 79-15 dated May 21, 1979, states that the allegations regarding poor welding conditions may be substantially true. The TRT's review did find documented evidence of condition that were not ideal. However The TRT cannot conscientiously take the position that these conditions were worse than normal for a construction of this magnitude. The TRT notes that it is normal to have some unforseeable conditions that is dependant on the skills and expertise of the craft, engineering, and QC To to cope with and determin resolutions that will produce a completed product that complies with the minimum requirements implemented by the Codes and specifications. The TRT review can not find any safety significance resulting from these reported and alleged conditions.

Insert #5

The concerns of this allegation is that weld seams do not match drawing locations on the floor around the unit 1 reactor vessel pool.
The TRT review of the drawings determined that the liner weld seams must mate with the 2" wide bar inbeds which provide a backing plate for the weld. The TRT notes that the weld seam could vary across the width of the inbed with out consequence or safety significance. The TRT's inspection of liner welds did notice that weld runs from plate to plate joints were not consistent but did not consider these variations to be excessive. The TRT also observed variations such as the appearance of a butt joint in lieu of an overlap (fillit type) joint. The review of documentation found several NCRs covering these conditions.
TRT's inspection of liner welds and review of documentation can not find evidence of poor welds or that the welds were not sound or that the required seal was not achieved. The final acceptance of visual, liquid penetrant and vacuum box leak testing was also reviewed and the TRT could not determin any evidence that the completed liner installation was not in accordance with the requirements as defined early in this report.

Insert #6

Since the design drawings locates the chase groove To run parallel on each side of the imbedded bar To which the plates are normaly welded, They would Therefor remain To be parallel To each side of the butted plate To plate seam weld relating To DCA No 5687. Therefor, any leakage That might occure through the weld joint would be collected and detected in the same manner as it would if the imbedded bar were in place. The TRT could find no safety significance regarding this DCA.

Insert #7

The TRT review of G&H specification No 2323-55-18 and G&H drawings (ref. "F.B. Spent Fuel Pool Liner Details") noted That The requirement for welding The nelson studs To the liners which provided the anchors in the concrete structure, shall be in accordance with AWS D1.1 (not mentioned in the earlier listing of requirements). The G&H drawings call for These welds To be radiographed. During the review of Documentation the TRT obsaved a TUSI letter TUQ-041 dated September 4, 1975, addressed To B&R which permitted the substitution of magnetic particle inspection in lieu of radiography for vertical liner welds in the reactor cavity. The TRT notes That since the liner material is type 304L austinetic stainless steel (Non-Ferris), Magnetic particle examination can not be valid. The TRT also notes That These welds were liquid penetrant

(continued)

Insert #7 (continued)

examined which satisfies the AWS requirements for acceptance.

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[redacted]

The TRT has also reviewed the NRC memorandum dated January 17, 1985 for Vince S. Noonan from Olan D. Parr. The TRT's position regarding seismic category requirement for the fuel pool liners is:

1) The liners were not designed (by TUEC) to be a seismic category I fabrication and the requirements established (by TUEC) for their fabrication does not support seismic categor I requirements.

2.) Since the liners provide NO STRUCTURAL support to the concrete pool structure, and that a seal weld failure would not be safety significant because (a) The concrete pool structure is designed as seismic Category I structure and has the capability to contain the water (b) there are redundant systems to replenish water in great volume (c) The liners provide an early detection system for leakage and the capability

Insert 7 (continued)

To recycle this leakage, and (d) any such leakage through the liners would not release any levels of radiation through the pool structure or outside containment to be harmfull to personel. The ~~Fuel~~ pool liners need not be Seismic Category I.

5. Conclusions and Staff position:

The TRT's review of the allegations and issues regarding the concerns about the fuel pool lines has concluded that that they have no safety significance.

Insert #1

These requirements are:

(a) The ASME B&PV Code sets fourth Seismic Category I requirements for the structure of the fuel pools and ~~makes reference to the liners~~ only to the extent that the seismic category I requirement do not apply to the liners. (b) The U.S. NRC Regulatory Guide 1.29 classifies the spent fuel storage pool structure, including the fuel racks to be seismic category I design requirements. The Regulatory Guide also states that the pertinent quality assurance requirements of Appendix B to the 10 CFR 50 should be applied to all activities affecting the safety-related functions of those portions and functions of structure, systems, and components which are classified as Seismic II. (c) The U.S. NRC Memorandum, dated February 6, 1979, states ... "fuel pool liners are not required to be designed and erected to seismic category I requirements." The memorandum further states, ..." The primary function of the liners is to provide a leak tight barrier and a surface suitable for decontamination, rather than to serve as a critical safety structure."; And, ..." The probability of large leaks occuring and being undetected over a period of time such that a potential hazard might be incurred is acceptably low."

(d) The Comanche Peak Steam Electric Station / Final Safety Analysis Report (CPSES / FSAR), does not include any assessment of analysis for the pool liners. ~~The NRC's review of requirements has determined that the pool liners are classified as seismic category II and that the only code requirements applicable to the welding of the liner "seal" joints are the~~

To Insert #1

Insert #1 (continued)

P The TRT's review of requirements has determined that the pool liners are classified as Seismic Category II and that the only regulating requirements that apply to the fabrication (more specifically welding) and erection of stainless steel liners are:

1) The QA/QC requirements in accordance with Appendix B To The 10CFR50

Note: The QA/QC aspects concerning the issues relating To the liners are addressed in the TRT's QA/QC SSER.

2) The requirements pecified by the G&H and B&R Specifications, procedures and drawings.

Note: The TRT's review of B&R's procedure CCP-38, found the gap requirement To be 3/16" minimum and 3/8" Maximum. The welding process shall be Gas Tungsten Arc Welding (GTAW). The B&R Weld Process Specification (WPS) 99020 used for the liner welding is for the GTAW process and shows the minimum fit-up Gap To be 3/16". These requirements are consistent with the G&H Specification.

4. Assessment of Safety Significance: The TRT review for the evaluation of the above allegations included a study of the applicable specifications, drawings, procedures, documentation, regulatory guides, NRC Region IV investigation reports (IRs) and NRC memos. The TRT also performed visual inspections of the fuel pool liners. The visual inspection was general for the overall liner instalaltion and a more expertise examination of approximately 20% of the welding in the spent fuel pool, reactor fuel pool, and fuel transfer canal. The areas of weld inspection covered the floor plate liners, those portions of the wall liners which were easily accessible from the floor, and areas adjacent to the sparger spray system which runs horizontally, about half way up two walls of the fuel pools. The liner installations are complete and the details of the leak chase channel network, and floor inbeds are not accessible for visual ~~examination~~. The following ~~is a brief~~ description of ~~the~~ liner details is provided: The wall liner plates are joined by full penetrations butt welding using a backing strip. A C3x4.1 S.S channel is welded over the back side of every seam to provide a leak chase, where any leakage through a liner seam weld will be collected. The completed sections of wall liners become the form for the pouring of concrete wall structure of the fuel pools. The concrete floor is poured prior to floor liner installation. The leak chase grooves in the floor are molded during the pouring of concrete using "blockouts". Also 3/8" x 2" bar strips are imbedded to be flush with the surface of the concrete floor. These imbeds form the lattice work to which the

To provide basis for further understanding of the TRT's remaining reviews and assessments in this report.

Continued

Insert 2 (continued)

floor liner plates are fillet welded. Both the wall liner plates and floor imbeds are anchored in the concrete using nelson studs. The design features of the fuel pool liners include a system of drains where each drain connects to a sectional group of leak chase channels or grooves to provide an early detection system for leakage from a given number of seam welds. It also provides a means to recycle the captured leakage.

Insert 1 To Insert A

(e) Gibb & Hill (G&H) specification 2323-SS-18, Rev. 3 "stainless steel liners," and B&R's Quality Assurance Instruction QI-QAP-11.4, Rev. 0, "welding inspection of stainless steel liners," cover the requirements for the fuel pool liners. Material is specified as ASTM grades of type 304L. Liner sheets ~~are~~ shall be seal welded by inert gas-shielded (gas tungsten-arc) welding. Welding procedure qualifications and welders performances are required to be qualified in accordance with ASME B&PV Code, Section IX. The required inspections are visual, liquid dye penetrant, and radiographed where specified by drawing. It also requires the entire length of all seal welds to be vacuum box leak tested. ~~The liner system was also water leak tested.~~ Surfaces of welds are required to be smooth and free of irregularities and may be ground to obtain this smooth finish. A weld reinforcement of 3/32" maximum and a weld undercut of 1/32" below minimum wall tolerance is permitted. The G&H drawings 2323-5-0831 through 0834 show the liner is fabricated predominantly from 3/16" and 1/4" sheet and assembled using fillet and full penetration groove welds.

Insert 3

The TRT inspection of the liner welds reasonably supports that all of the welding was performed using the GTAW process. The inspection could not confirm the pre-weld, fitup gap conditions to have been tightly butted, excessively gaped, or to have been bridged over. The over all surface appearence of the completed welds. The TRT notes that using the GTAW process, tightly butted joint could preclude making a full penetration weld in the 3/16" thickness, and more probable in the 1/4" thickness stainless steel material specified for the liners.

INSERT 4

The allegation shows considerable concern regarding poor welding conditions during the construction of the fuel pools and fabrication of liners, i.e., seepage slurry from the pouring of concrete causing interference to welding operations. The TRT's inspection of the completed liners did not reveal any evidence of conditions that existed during the construction phase. However, the review of documentation revealed numerous NCRs. There were several cases where the QC inspector(s) wrote about interfering conditions as being source giving cause for the defect. Some of these conditions were: welder had to reach through a maze of rebar to make the weld; water seeping from locations where concrete had been poured and contaminating components of liners being

Insert #4 (continued)

fabricated; water in lock chase channels interfering with welding; and To many activities causing interference. A Design Change/Design Deviation Author - ion (DC/DDA) No. 2946 Rev. 1, dated November 13, 1978, authorizes ½" holes to be drilled in a lock chase channel to drain and/or dry out residual moisture causing interference to welding. Afterwards the holes were repair welded using the GTAW process and ground flush to surrounding surface. The conclusions reported in NRC Region IV's IR 79-15 dated May 21, 1979, states that the allegations regarding poor welding conditions may be substantially true. The TRT's review did find documented evidence of condition that were not ideal. However The TRT cannot conscientiously take the position that those conditions were worse than normal for a construction of this magnitude. The TRT notes that it is normal to have some unfavorable conditions that is dependent on the skills and expertise of the craft, engineering, and QC To To cope with and determin resolutions that will produce a completed product that complies with the minimum requirements implemented by the Codes and specifications. The TRT review can not find any safety significance resulting from These reported and alleged conditions.

Insert #5

The concerns of this allegation is that weld seams do not match drawing locations on the floor around the unit 1 reactor vessel pool.
The TRT review of the drawings determined that the liner weld seams must mate with the 2" wide bar inlets which provide a backing plate for the weld. The TRT notes that the weld seam could vary across the width of the inlet without consequence or safety significance. The TRT's inspection of liner welds did notice that weld runs from plate to plate joints were not consistent but did not consider these variations to be excessive. The TRT also observed variations such as the appearance of a butt joint in lieu of an overlap (KILLIT Type) joint. The review of documentation found several NCRs covering these conditions. TRT's inspection of liner welds and review of documentation can not find evidence of poor welds or that the welds were not sound or that the required seal was not achieved. The final acceptance of visual, liquid penetrant and vacuum box leak testing was also reviewed and the TRT could not determine any evidence that the completed liner installation was not in accordance with the requirements as defined early in this report.

Insert #6

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Continued

Insert 7 (continued)

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Insert 7 (continued)

To recycle this leakage, and (d) any such leakage through the liners would not release any levels of radiation through the pool structure or outside containment to be harmfull to personal. The ~~Fuel~~ pool liners need not be Seismic Category I.

5. Conclusions and Staff position:

The TRT's review of the allegations and issues regarding the concerns about the fuel pool lines has concluded that that they have no safety significance.

The TRT's review of Position To Docket No. 50-445-2 and 50-446-2, Sept. 27, 1984.

Subject: CASE's evidence of a Quality Control Breakdown.

The TRT can visualize the working conditions during the construction phase of the fuel pools. These pools are deep pits where such activities as installing rebar; fabricating, erecting and bracing of forms; positioning blockout forms and the bars which become the inbeds to which the floor liners are welded; the installation of the wall liner plates which also serve as forms for the wall concrete structure; cutting or trimming liners plates & associated material to required lengths; making fit ups and welding; Concrete being poured; materials and equipment being lowered in or lifted out of the pit area, and other overhead activities; Personnel working from ladders, scaffolding and bosun chairs. In such a pit where there is no natural escape for concrete slurry to run off, or for the toxic elements of the concrete & welding fumes. Where most of these activities are being performed simultaneously, Even at the best, working conditions are

never Ideal. Any person assigned to work in a coal mine should not expect to hear a canary sing. Construction does not offer many ideal working conditions, but if all work is stopped, a canary might be heard.

The sole structural integrity of the fuel pools is in the concrete design (rebar, cross section thickness, and aggregate). The thin liner plate (3/16" to 1/4" thick) installed over the vast surface areas of these pools serve no more structural integrity than wallpaper to a wall in an ordinary dwelling structure. All of the requirements for structural and seismic integrety which are implemented by Code apply to the concrete structure and nowhere does any Code address requirements for the liners.

The Regulatory Guide 1.29 is the only source giving direction to establish requirements for the fuel pool liners. Reg. Guide 1.29 states "pertenent portions of the 10CFR50 Apendix B shall apply to the fuel pool liners." Even a gross failure in the liners would have no significant effect to safety or functional capacity of the facility providing the failure does not cause functional damage to structure or component having structural integrity and seismic requirements.

On the basis that the liners are a stainless steel membrane attached to the surface of the final pool structure, are pertinent portions of requirements selected. The major advantage in using stainless steel liners is that they provide a smooth hard surface which is least permiable, a long life expectancy, and easily cleaned as compared to a painted seal coating that would other wise serve the same purpose.

The design of the wall liners include leak chase channels which inclose the back side of every liner plate join and provides a chamber which will collect any minor leakage through the liner plate seal weld as well as an early detection system through a series of drains and even provide the capability to recycle the leakage. An unmentioned advantage to the leak chase design is that it adds strength to each and every wall liner seal weld join. The wall liner seal weld is a butt join using a backing strip. This weld join design provides strength equal to or greater than the base material itself.

The TRT has reviewed the fuel pool liner installations, the applicable requirements, and performed a visual examination of the liner welds. It is not difficult for the TRT to substantiate the poor conditions that existed during these installations. The truth of the matter is (in general) construction work does not afford many ideal conditions. The construction of the fuel pools and installation of liners entails a multitude of activity which takes place in a deep pit where there is no natural escape for welding fumes and slurry run offs from freshly poured concrete. It is typical that this phase of construction is one of the least for ideal conditions; And, there is sufficient evidence of these conditions documented in nonconformance reports (NCR's).

The leak chase is a 2x4 Stainless Steel Channel which is located on the back side of the liner and straddles the liner seam weld. The Two legs of the channel are fillet welded respectivilly to the Two plates that constitutes the seal weld. Theoretically the over all join strength is doubled.

Comanche Peak Open Issue Action Plan

Task: Welding - Poor welding conditions for spent fuel pool liners.

Ref. No.: AM-11, AW-40, AW-42, AQW-80, AW-81, AW-83

Characterization: It is alleged that:

AM-11: Incorrect fitup and poor welding technique resulted in thin welds joining stainless steel liner plates for fuel pools in fuel building and reactor building for Unit 1.

AW-40: One seam is largely rust and concrete.

AW-42: Poor welding conditions for field installations of the stainless steel liners in the spent fuel pools of the fuel handling facility.

AQW-80: Liner plate weld seams do not match drawing locations on floor around Unit 1 reactor vessel.

AW-81: The stainless steel floor plate liners in the spent fuel pool and transfer canal are supposed to overlap the angle at the bottom edge of wall to floor. There were areas of no overlap and weld was builtup to meet.

AW-82: A single block, related to the leak chase channels under the floor liner of the fuel pools or transfer canal, is defective and could affect leak detection.

Initial Assessment of Significance: Allegations having similar concerns and relating to the fuel pool liners, were dispositioned in IR 50-445/79-15 and 50-446/79-15. The allegations in this category are general and lack specificity. However, the nature of these issues, as such, warrant investigation.

Source: Mechanical & Piping Category No. 43; see allegation list.

Approach to Resolution:

1. Review source transcript 84-006 interviews and testimony, A-4 and A-49 testimony, and testimonies dated 5/24/82.

2. Review IR 79-15.

3. Review applicable codes, specifications, drawings, documentation, and any other source of information beneficial to determine the requirements (i.e., CPSES/FSAR, memorandums, etc.).

4. Visually inspect liner installation for any variance or deviation from the requirements for placement, fitup, and welding (final configuration).

5. Evaluate the findings in accordance with the requirements and identify any violations.

6. Evaluate allegation for generic/safety implications.

Related Open Issues:

1. Using system codes from the tracking system open item list and identify any open items.

2. Review activities necessary to close or partially close related items.

3. While performing physical inspections, examine surrounding system, components, and structures for any apparent defect or indicator of faulty workmanship.

4. Complete portion of IE Module on welding if it relates to effort made on allegation.

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COMANCHE PEAK NUCLEAR POWER PLANT
ALLEGATIONS AND/OR INVESTIGATIONS SUMMARY

TASK NO	ALLEGATION OR CONCERN	ACTION/STATUS	SOURCE ANON	SOURCE CONFID	BN/DATE	CROSS REF./OR TRACKING SYSTEM NO.	COMPLETION CATEGORY 1-7** LEAD	SCHEDULE OPEN	SCHEDULE COMPLETE	ALLEGER-DATE RECEIVED SOURCE DOCUMENT PAGE
AM-8	Improper installation of condenser tubes, split tube sheets, damaged tubes						1 RIV			84-006 3/7/84 A-4, Testimony, P. 22-28, 32, 42, 44, 92
AM-9	Condenser tube support sheet discrepancies						1 RIV			84-006 3/7/84 A-4, Testimony, P. 40
AM-10	Incorrect alignment between main turbine and condenser						1 RIV			84-006 3/7/84 A-4, Testimony, P. 47, 48, 49, 50
AM-11	Incorrect fit up on stainless steel liners in reactor building and fuel building.						1 RIV			84-006 3/7/84 A-4, Testimony, P. 51,52-55
AM-12	Installation discrepancies on CCW Surge Tank						1 RIV			84-006 3/7/84 A-4, Testimony, P. 61-64
AM-13	Problems in the manufacture of pumps by Hayward-Tyler Pump Co.	Under review	X			ASLB Pre-filed testimony (Taylor)	1 RIV			Unknown 3/82 Testimony dtd. 5/24/82, P. 99, A. 64
AM-14	Ironworkers damaged diesel generator						1 RIV			84-006 3/7/84 A-22, Statement, P. 1
AM-15	Improper shimming of polar crane					IM-2	1 RIV			84-006 3/7/84 A-22, Statement, P. 2
AM-16	Improper installation of Polar Crane	Initial disposition IR 82-11				RIV-82-A-23	1 RIV			Confidential 82 None

D. M. H.

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COMANCHE PEAK NUCLEAR POWER PLANT
ALLEGATIONS AND/OR INVESTIGATIONS SUMMARY

TASK NO.	ALLEGATION OR CONCERN	ACTION/STATUS	SOURCE ANON	SOURCE CONFID	BN/DATE	CROSS REF./OR TRACKING SYSTEM NO.	COMPLETION CATEGORY 1-7 LEAD	SCHEDULE OPEN	SCHEDULE COMPLETE	ALLEGER-DATE RECEIVED SOURCE DOCUMENT PAGE
[illegible]	Diesel Generator system weld repair without authorization/procedure						1 ART			4-006 3/7/84 A-4, P. 12 and Testimony P. 15-17
AW-39	Vendor weld discrepancies on pressurizer tank in Unit 1	No weld problem Maybe QA/QC problem Transfer to Hubbard?					3 RIV			4-84-006; 3/7/84 A-45, P. 3
AW-40	One weld seam largely rust and concrete	Initial disposition IR-79-15				ASLB Pre-filed Testimony (Taylor)	1 ART			Testimony, dtd 5/24/82, P. 65 A.38.b, IR-79-15
AW-41	Improper welds in primary coolant system	Initial disposition IR-79-22 IR-80-02				ASLB Pre-filed testimony (Stewart)	1 ART			Testimony, dtd 5/24/82 P. 65-66 A.38.c, IR-79-22, [illegible]
AW-42	Spent fuel pool liner welding conditions poor	Initial disposition IR-79-15				ASLB Pre-filed testimony (Taylor)	1 ART			Testimony, dtd 5/24/82, P. 65, A.38.b, IR-79-15
AW-43	Improper Welding of Socket Welds	Open				RIV-84-A-0000	1 ART			Unknown (1/84)
[illegible]	Improper Weld Design: Welding A588 Plate to Cadweld sleeves	Open. I. Barnes to investigate				RIV-84-A-0011	1 ART			Unknown (1/84)
AW-45	SS Piping not purged during welding						1 ART			4-83-005 [illegible]/20/83 A-10, P. 2,3, Testimony P. 38, 39
[illegible]	Inadequate grounding during welding						1 ART			4-006 3/7/84 A-3 Testimony, P. 22

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COMANCHE PEAK NUCLEAR POWER PLANT
ALLEGATIONS AND/OR INVESTIGATIONS SUMMARY

TASK NO.	ALLEGATION OR CONCERN	ACTION/STATUS	SOURCE ANON	SOURCE CONFID	BN/DATE	CROSS REF./OR TRACKING SYSTEM NO.	COMPLETION CATEGORY 1-7 LEAD	SCHEDULE OPEN	SCHEDULE COMPLETE	ALLEGER-DATE RECEIVED SOURCE DOCUMENT PAGE
AQW-77	Lack of weld inspection at RHR heat exchanger tube supports	Open M/P Cat. 7		X			1 TRT			A-49, 8/8/84 8/23/84
AQW-78	Incorrect welding documentation of oxygen analyzer	Open		X			1 TRT			A-49, 8/8/84 8/23/84
AQW-79	NDE (RT) of bottom of drop gate guides for spent fuel pool not performed to procedures	Open		X			1 TRT			A-4, 8/24/84
AQW-80	Liner plate weld seams do not match drawing locations on floor around Unit 1 reactor vessel	Open M/P Cat. 43		X			1 TRT			A-49, 8/8/84 ~~8/23/84~~ A-4, 8/24/84
AQW-81	Floor plate weld deficiencies at intersection of floor plate and wall in fuel transfer canal and fuel pool	Open M/P Cat. 43					1 TRT			A-4, 8/24/84
AW-82	Leak chase channel under floor of spent fuel pool fuel transfer canal is defective	Open M/P Cat. 43					1 TRT			A-4, 8/24/84

Testimony Bd 5/24/82

A.38.b. NRC Inspection Report 79-15 reported an investigation of a series of six interrelated allegations concerning the welding of the stainless steel liner system in the fuel handling facility spent fuel storage pools. The allegations, simply stated, indicated that welding conditions were very poor; that welders were unqualified; that QC inspections were inadequate; that welding procedures were not followed; and that at least one weld seam was largely rust and concrete. The investigation indicated that the allegations concerning poor welding conditions were substantially true and that some of the welds might well be of relative low strength. The allegation about unqualified welders was found not to be the case in a technical sense, since each welder had passed the necessary tests. It was apparent that the alleger meant that the welders were not competent in his opinion. The matter of QC inspections and welding out of procedure could neither be substantiated nor refuted since it was just one person's word with no other confirmation. In any case, the matter was considered to be unimportant since the welds in question were seal welds rather than strength welds and not of any safety significance.

AW-42 AW-40 AW-40 AW-41 AW-42

A.38.c. [redacted] NRC Investigation Report 79-22 related to allegations by a former Comanche Peak employee which appeared in a news article of the University of Texas at

Arlington "Shorthorn," dated July 18, 1979. The alleger stated that he was told that improper welds were made on the primary coolant system and that he was told that a 6" check valve weld deficiency had been repaired without correct procedural instructions. Subsequent interviews with the alleger and on-site investigations by NRC inspectors established that the allegations either had no merit or could not be substantiated.

AW41

AW-40
AW-41
AW-42

A.38.d. [redacted] NRC Inspection Report 80-02 discussed an investigation of allegations that had appeared in a local newspaper. The allegations were reported to have been by three Authorized Nuclear Inspectors who had left the site due to dissatisfaction with B&R's "lax QC procedures" and were further reported to have records and photographs to support contentions that poor welds in the reactor coolant piping existed. Interviews with the allegers revealed no specific facts that could be further investigated. The allegers stated to the investigators that their concerns did not appear to have any safety consequences.

A.38.e. [redacted] NRC Inspection Report 80-22 discussed an investigation of allegations to the effect that B&R QA management was not ensuring that corrective actions were taken for documented nonconformances; that nonconformance reports were disapproved and subsequently destroyed; and

5 - ITEM 21

DCP5 - AW-43, 60, 65, 73, AQW-77

Draft 9 - 1/29/85

SSER

1. Allegation Group: Mechanical and Piping Category No. 45, Miscellaneous Welding Deficiencies

2. Allegation Numbers: AW-60, AW-84, AW-43, AW-65 and AQW-77 It was transferred
What happened to AW-73?

3. Characterization: It is alleged (1) that ~~there are defective welds~~ full penetration welds OK on the steam generator top head insulation supports (AW-60); (2) that excessive grinding of weld surfaces has taken place (AW-84); (3) that an unqualified pipefitter fit and welded socket joints in one of the boron systems (AW-43); (4) that circumferential butt welds were made in the fuel transfer tubes ? yes of Units 1 and 2 and that these welds had incomplete penetration (AW-65); (5) that anti-vibrational straps attached as supports to the auxiliary building 790-foot elevation heat exchanger tubing exhibited unacceptable burn through of the welds (AQW-77); and, (6) that the weld-numbering sequence on the weld data cards revealed duplicate weld numbers for the top and bottom strap supports (AQW-77).

4. Assessment of Safety Significance:

To assess the safety significance of these allegations the NRC Technical Review Team (TRT) reviewed codes, specifications, quality control (QC) inspection reports, and other pertinent documents

applicable to each of the several allegations to determine requirements. The resolution of each allegation is addressed separately in the remainder of this report.

AW-60

To assess the safety significance of allegation AW-60, the TRT reviewed testimony of the alleger and of Brown & Root (B&R) personnel and reviewed vendor drawings and nonconformance report (NCR) M-82-01178, which was initiated by QC.

The TRT reviewed the vendor drawings for the Mirror Insulation to determine if full penetration weld joints were called for, as alleged. The TRT found that the drawings called for fillet joints and partial penetration joints, but no full penetration joints.

A review of NCR M-82-01178 revealed that the following rejectable defects, per the requirements of American Welding Society (AWS) D1.1, "Structural Welding Code," were found on the welds of the insulation supports:

- arc strikes
- undercut
- overlap
- weld spatter
- lack of fusion

These defects were reworked per the instructions from the repair process sheet (RPS) issued by welding engineering. The NCR was closed on August 26, 1982.

The TRT is preparing a summary of its findings on allegation AW-60 to forward to the alleger, who declined an interview.

AW-84

The TRT reviewed AWS D1.1 and the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (B&PV), Sections III and VIII applicable to allegation AW-84 and found no requirements in that prohibit or encourage grinding of the weld surface. The TRT noted that grinding of the surface of the weld may be used to remove irregularities that interfere with liquid penetrant, radiograph and ultrasonic inspections; to remove notches which could act as stress risers; to remove overlap and blend undercut; and to enhance the surface for the application of protective coatings.

Attempts to contact the alleger to review with him the TRT's findings on allegation AW-84 have been unsuccessful.

AW-43

Since allegation AW-43 did not refer to a specific system, the TRT selected several documentation packages from the boron recycle system. The TRT reviewed weld data cards and inspection reports, but found no evidence of any rejectable fitups or welds.

The alleger of allegation AW-43 is unknown.

In assessing allegation AW-65, the TRT visually examined both the internal surface of the fuel transfer tube between the Unit 1 Reactor Building and the Fuel Building and the external surface of the fuel transfer tube behind welds 3a and 3c. As identified in design change authorization (DCA) 6560, Revision 3, weld 3a is the penetration sleeve-to-expansion joint weld; weld 3c is the fuel transfer sleeve-to- expansion joint weld.

The TRT found no circumferential butt welds in the fuel transfer tube. This was in accordance with Westinghouse drawing 1209E53. Note 7 of this drawing states that "the tube shall be fabricated in one length without circumferential splice welds." The fuel transfer tube was made from plate, brake press formed and longitudinally welded. The alleger may have been referring to weld 3a, which was originally designed as a circumferential butt weld, but was modified to use a washer type ring to accommodate diametral mismatch between the penetration sleeve and the expansion joint mating parts. DCA 6560, revision 2, pages 3 and 5 shows the modified joint designs for Units 1 and 2. These joints, however, would not affect the fuel transfer tube in the manner alleged.

The TRT noted that the expansion joint assembly contains 0.024-inch thick butt lap welds joining the end members to the bellows. The cross-sectional area of these joints is significantly less than the approximately 1/2-inch thick welds that join the expansion joint assembly to either the penetration sleeve or the fuel transfer tube. During a visual examination, the TRT observed that the expansion joint

assemblies at the containment building end of both fuel transfer tubes contained debris and dirt. One assembly had a flapper sander and a "throw-away" paint brush lying on the bellows convolutions and a second flapper sander lying on the near bellows end fitting. Dirt was piled up against the weld 3a spacer. The other assembly had a rag and a piece of pipe about 1-inch long lying in the near bellows end fitting. There was also some dirt against the weld 3a spacer.

The TRT is preparing a summary of its findings on allegation AW-65 to forward to the alleger, who declined an interview.

AQW-77

The TRT reviewed allegation AQW-77 and the August 8 and 23, 1984, transcripts of the alleger interviews in an attempt to identify the heat exchanger in question. The TRT inspected the immediate location specified by the alleger and found that four heat exchangers were located just outside the auxiliary building in Rooms 68 and 69 on the 790-foot elevation of the Unit 1 Safeguards Building. The TRT identified these heat exchangers as residual heat removal (RHR) heat exchangers (HX) TBX-RHAHRS-1 and TBX-RHAHRS-2 and containment spray (CT) heat exchangers HX CP1-CTAHCS-1 and CP1-CTAHCS-2. The TRT reviewed the manufacturer's drawings (for the HX's - found by the inspectors) (Joseph Oat Corporation) and found that the RHR HXs were purchased by Westinghouse Corporation and the anti-vibration straps were a vendor-supplied item. (Supplied by what vendor? Is this relevant?)

The TRT interviewed Westinghouse personnel and learned that the strap supports for the tubing were added by the manufacturer to correct an unacceptable tubing vibration condition detected at some other location. The TRT searched the nonconformance report (NCR) records

From this point the discussion is a long, rambling narrative w/no focus.

for the two RHR HXs and found no NCRs issued to modify or add anti-vibration straps. Based upon these facts, the TRT eliminated the RHR HXs from consideration for the allegation.

A further search of the NCR records yielded NCR numbers M-5102S and M-5103S for the CT HXs, both issued on the same day and both containing nonconforming conditions very similar to those described by the alleger. The TRT determined that NCR M-5103S was reported by the alleger; however, part 2 of the NCR indicates a condition different from the allegation specified on page 52 of the August 8, 1984, interview. What is this?

The NCR specified that only nine welds were made, but the weld data card (WDC) indicates that ten welds were required. The allegation stipulated that there were duplicate weld numbers on the top and bottom strap supports. The TRT could find no evidence? that duplicate weld numbers were used or that more than one set of strap supports were required. Both Texas Utilities Electric Company (TUEC) and cognizant personnel from Joseph Oat Corporation were contacted, and confirmed that only one set of strap supports, located at the top bend of the tube bundle for each HX, was required by the modification.

This does not make sense

Since the NCR was initiated by the alleger when he inspected the welding, the second part of the allegation which was alleged during the August 8 and 23, 1984, interviews appeared to be an error. On September 20, 1984, the TRT contacted the alleger, who confirmed that the nonconforming conditions listed on the NCR were correct. Further

examination of the NCR package revealed that DCA 16462 was written to explain the discrepancy in the weld numbers. The TRT discussed the DCA with B&R QA and Welding Engineering and found that the disposition was satisfactory.

The TRT reviewed the traveler package for each NCR and found the following discrepancies. For NCR M-5103S: (1) the traveler was stamped with the statement "Work requires TUGCO operations to process an ASME Code NIS-2 Form," and no form was completed; (2) CP-CPM-6.9G required that the Authorized Nuclear Inspector (ANI) initial the WDC to indicate whether a hold point was required, and there was no evidence of the ANI's initials on the WDC; and (3) QI-QAP-11-1-26 required B&R QC to complete a visual examination, and no evidence of such an examination was found. The same discrepancies as identified in (1) and (2) also were identified in NCR M-5102S. The TRT found evidence of a completed visual inspection checklist for this NCR.

The TRT interviewed two B&R QA employees to determine whether the CT HX modification required an ANI review. Both QA employees said that the statement requiring an NIS-2 form to be completed was a mistake and that the form was not required since the welding was not to the pressure boundary. Both of these employees also recalled discussing this problem with TUEC Operation and Maintenance (O&M) engineering at the time of the modification. They indicated that to the best of their recollection O&M agreed with their position, but they could not

explain why the paperwork had not been changed, nor could they document that the discussion had taken place. The TRT interviewed the O&M engineer who, at the time of the modification, was the TUEC QA inspector indicated on the NCR disposition. He confirmed that the NIS-2 form should not have been required (as stamped on the traveler), but he could not provide any documentation of conversations with B&R QA to this effect.

During the TRT interview, both B&R QA employees indicated that the visual inspection checklist should have been completed and that the original of the form should be in the fabrication package in the QA vault. A review of these records did not produce the missing checklist. Further discussions with B&R QA revealed that the manufacturer's representative from Joseph Oat Corp. had inspected the weld burn-through and had accepted it for the intended service. This was confirmed in a Telex (February 2, 1983), which was the basis for the dispositioning of part (1) of the NCR. The TRT contacted the Joseph Oat Corp. representative identified in the Telex. He confirmed that he had personally inspected both of the CT HXs for the burn-through condition on the anti-vibration straps. After checking his notes and files on these items, the manufacturer's inspector indicated that his inspection had revealed no damage to the HX tubing and that the welding on the straps was adequate for the intended service. The TRT then talked to the QC inspector who had signed off the "QC

Verification" block on both of the NCRs. He indicated that he had completed the visual examination checklist on NCR M-5102S, which he co-authored; however, he could not remember completing a similar checklist for the NCR initiated by the alleger (NCR M-5103S). The inspector also indicated that the individual who signed the "QC Verification" block on the NCR was only ensuring that the proper paperwork was completed, and that he could have interpreted the manufacturer's representative inspection as meeting the requirements for NCR M-5103S.

The TRT then interviewed Welding Engineering and Civil/Mechanical Engineering personnel to determine whether an ANI inspection was required on the CT HX tubing modification. All individuals contacted stated that since no welding had been done to the pressure boundary, no ANI inspection was required. Welding Engineering referred to procedure CP-QAP-2.4 which governed the repair or alteration of ASME N-stamped components. This procedure currently is voided, but was in effect during the modification in January/February 1983. Paragraph 6.4.1 of this procedure required the "Owner to assure that the repair procedure is acceptable to the Owner's ANI, and for review by the ANI for assignment of hold points." The TRT spoke with the ANI assigned at the time of the modifications. The ANI indicated that he was present during the modifications but did not personally inspect the burnthrough weld condition on the straps. The ANI also stated that no

welding was performed on the pressure boundary, but he could not state that the burn-through condition on the straps had damaged the thin-wall tubing. According to the ANI, QA, O&M, and Civil/Structural Engineering, the type of modifications made did not require a rehydrotest of the unit.

The TRT interviewed the alleger regarding allegation AQW-77 on November 14, 1984. The TRT told the alleger that his concern had been substantiated and that the Applicant would have to respond to the violation. The alleger was satisfied with the results of the review.

5. Conclusion and Staff Positions: The TRT review of vendor drawings showed that the welds in question (AW-60) were meant to be fillet or partial penetration welds, not full penetration welds. However, there were other defects present that were rejectable per requirements of AWS D.1.1. These defects were repaired by B&R on NCR M-82-01178. Accordingly, this allegation has neither safety significance nor generic implications.

The TRT concludes that the allegation of excessive grinding of weld surfaces (AW-84) is not substantiated, and has no technical merit. The various codes, standards, and specifications that are in force at Comanche Peak Steam Electric Station neither prohibit nor require grinding of the weld surface. Accordingly, the allegation has neither safety significance nor generic implications.

The TRT could not substantiate the allegation related to weld data

cards (AW-43). The weld data cards and drawings reviewed were in order and the weld data cards had been signed off by quality control as being acceptable. The TRT concludes that this allegation has neither safety significance nor generic implications.

In visual examination of the Unit 1 fuel transfer tube, the TRT found no circumferential welds as alleged (AW-65). The tube was fabricated as required by Westinghouse drawing 1209E53, Note 7. The allegation was, therefore, not substantiated. It is the TRT's opinion that the alleger may actually have been referring to one or more of the ~~modified butt~~ welds between the penetration sleeves and the several expansion joint assemblies. The two such welds examined, while not full penetration welds, were otherwise visually sound and of a cross-sectional area which would cause any failure to be in the bellows or in a bellows-to-bellows end fitting weld. In either case, the TRT concludes that this allegation has neither safety significance nor generic implications.

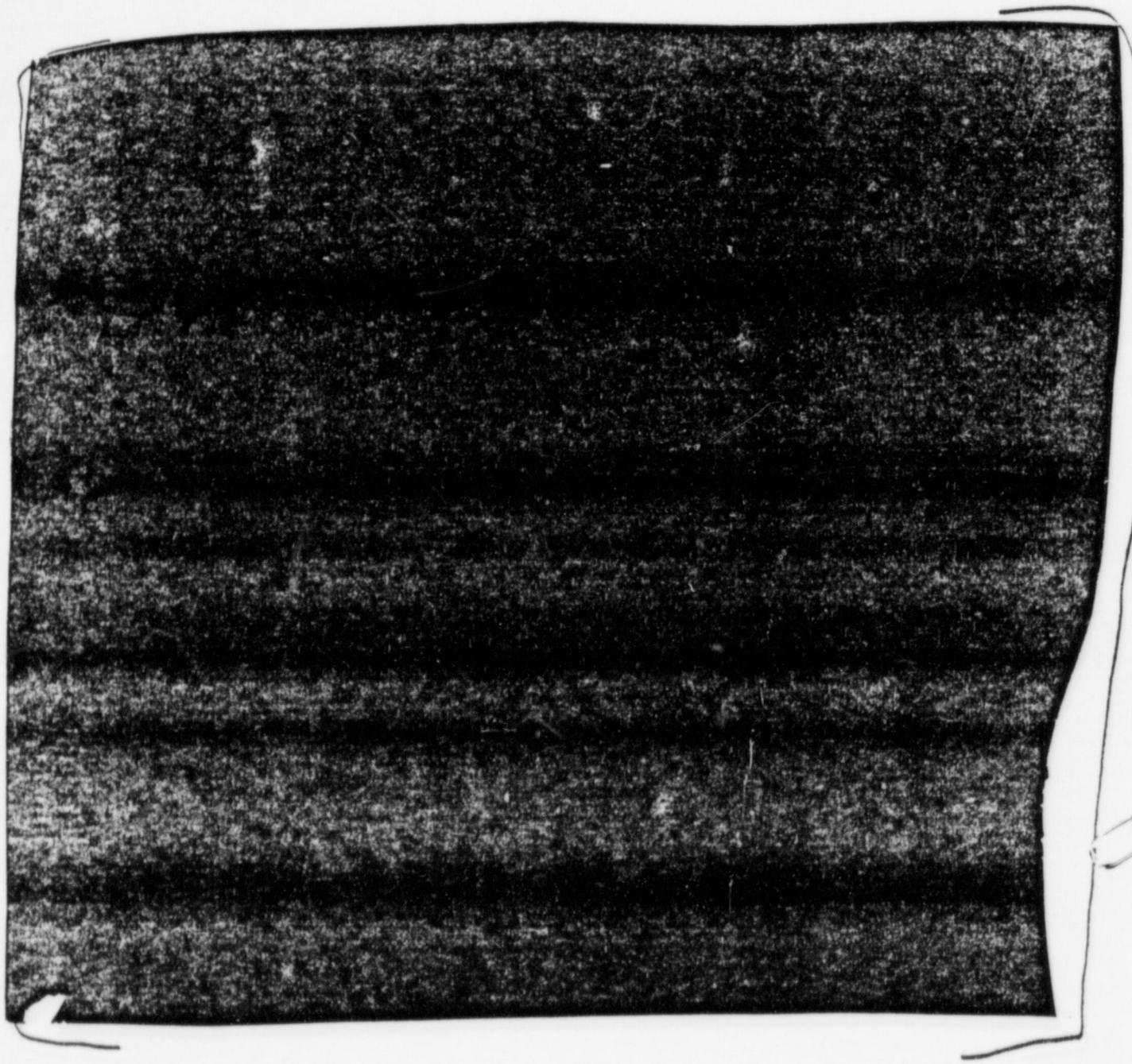
The TRT was able to determine that a visual inspection was performed on the welding modification of one CT HX, but not on the second CT HX, which was the one initially of concern to the alleger (AQW-77). The QC inspector who completed the visual examination checklist on one of the HXs could not explain why there was no completed checklist on the other HX. Concerning the lack of ANI review on both of the HX

modifications, the TRT obtained conflicting explanations from all individuals interviewed when compared to procedure CP-QAP-2.4, which requires ANI involvement and which Welding Engineering said was in effect at the time.

The TRT concludes that the allegation that the CT HX which was initially written on an NCR by the alleger had not been properly inspected by B&R QC personnel is substantiated. The WDC indicates that the first nine welds were satisfactorily inspected by the alleger; the remaining nine welds were initially accepted by the alleger who subsequently removed his signature. Further documentation on the WDC reveals that B&R QC accepted these welds based on the manufacturer's inspection and with no further B&R inspections. This finding indicates a violation of procedures for failure to visually examine the identified welds by B&R QC as indicated by Operation No. 4 on the WDC. However, the TRT concludes that this allegation has no safety significance, since the welds were inspected and approved by the manufacturer's representative, nor does it have generic implications.

6. Actions Required: None

See next page



8. Attachments:

None.

9. Reference Documents:

AW-60

1. NRC M-82-01178.
2. Drawing Mirror Insulation 590159-232C.
3. AWS D1.1 Code.

AW-84

1. NRC reports 50-445/82-11 and 50-446/82-10.
2. AWS D1.1 Code.
3. ASME Section III and VIII.

AW-43

1. Weld data cards 09666, 09682, 18942 and 33679.
2. B&R Drawings BRP-BR-X-AB-052, 025 and 036.

AW-65

1. Westinghouse Drawing 1209E53, "Fuel Transfer Element."
2. Westinghouse Drawing 1209E54, "Fuel Transfer Tube Assembly."
3. DCA 6560, Revision 3.
4. B&R Data Package, ME 80-2008-4000.
5. Westinghouse Manual, DCC-CP-0001-069.
6. WPS 11010.

7. WPS 11032.
8. WPS 88025.
9. WPS 88032.
10. Pathway Bellows, Inc., Drawing D-3-4570, Revision E.
11. Pathway Bellows, Inc., Drawing D-4-4570, Revision 4.
12. Pathway Bellows, Inc., Drawing D-5-4570, Revision E.
13. B&R Data Package, ME 81-2116.
14. G&H Specification 2323-MS-100, "Piping Erection Specification."

AQW-77

1. Interviews with the alleger on August 8, August 23, and November 14, 1984.
2. Telephone conversation with the alleger on September 20, 1984.
3. Results of eddy current tests on the CT HXs, dated November 4, 1982.
4. Daily inspection records on the ANI for January 20-22, 1983.
5. ANI interface instructions No. MEI-028.
6. NCRs M-5102S and M-5103S, dated January 23, 1983.
7. Traveler packages ME83-1010-4800 and ME83-1012-4800.
8. B&R procedures CP-QAP-2.4, CP-CPM-6.96, QI-QAP-11.1-26, and CP-QAP-18.6.
9. Joseph Oat drawings No. 5776, C-7420, and 5773.
10. Telephone conversation with Joseph Oat manufacturer's representative on September 20, 1984.

10. This statement prepared by:

D. Hansen,
TRT Technical Reviewer

Date

Reviewed by:

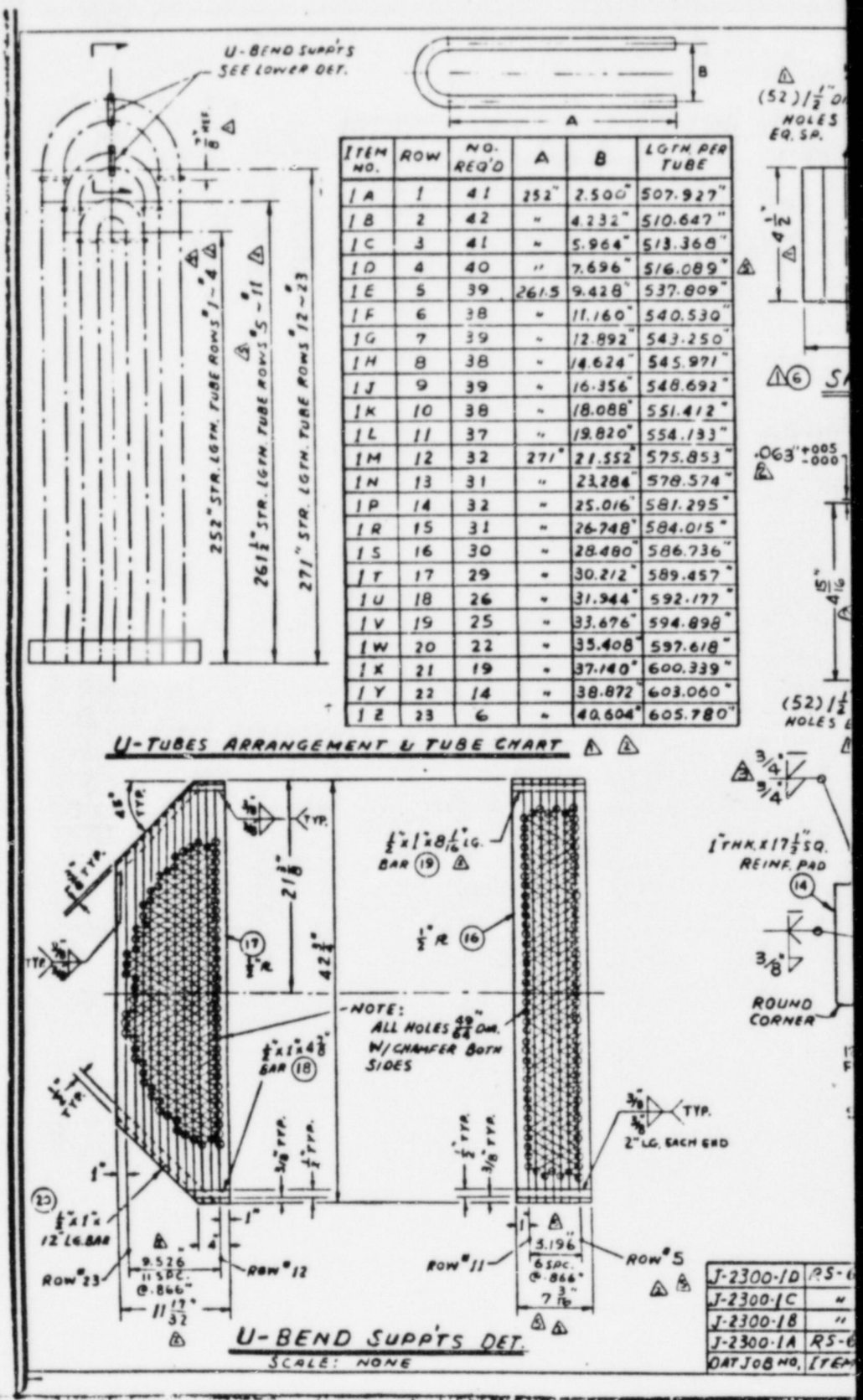
L. Shao,
Group Leader

Date

Approved by:

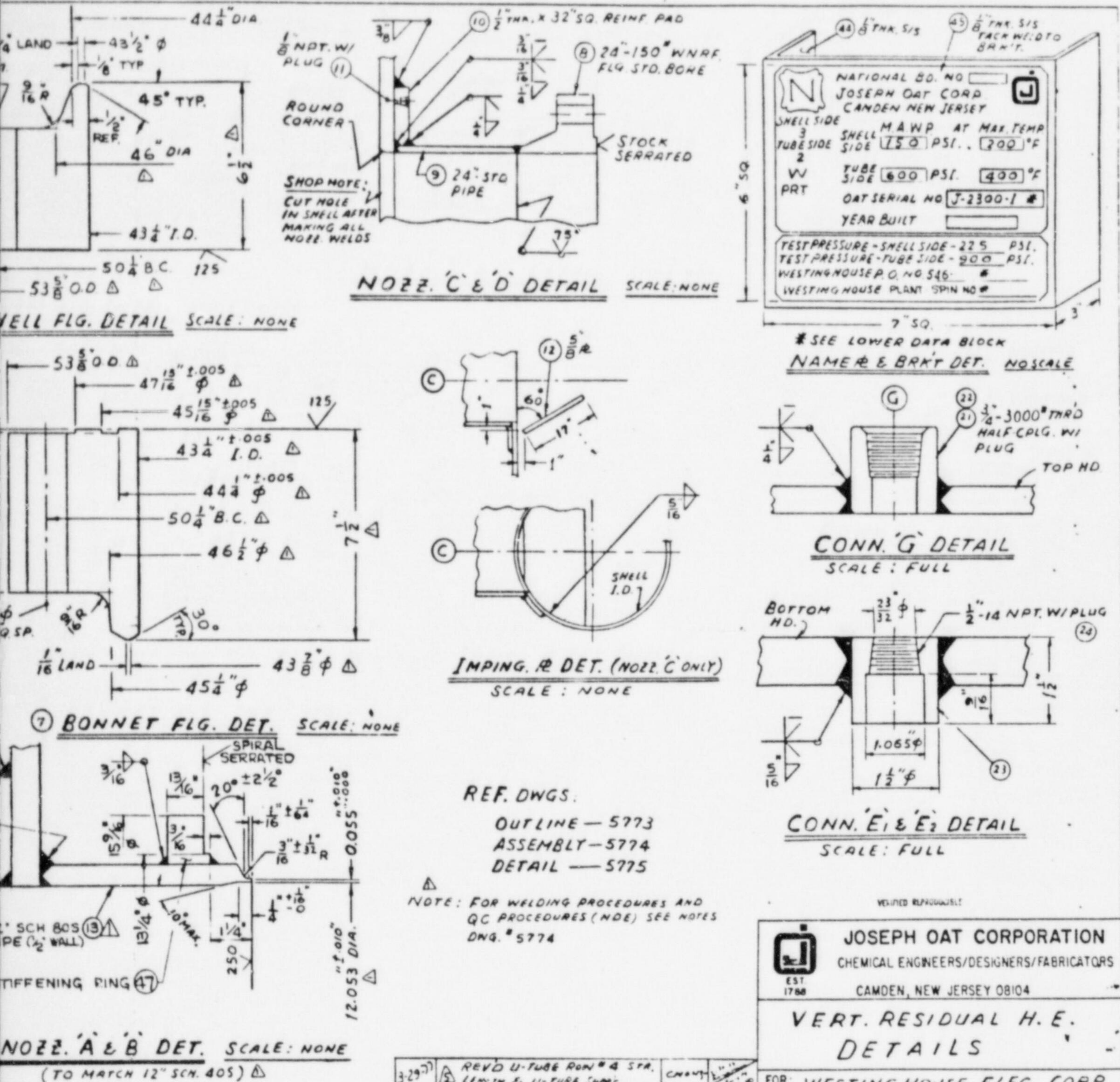
V. Noonan,
Project Director

Date



ITEM NO.	ROW	NO. REQ'D	A	B	LGTH. PER TUBE
1A	1	41	252"	2.500"	507.927"
1B	2	42	"	4.232"	510.647"
1C	3	41	"	5.964"	513.368"
1D	4	40	"	7.696"	516.089"
1E	5	39	261.5	9.428"	537.809"
1F	6	38	"	11.160"	540.530"
1G	7	39	"	12.892"	543.250"
1H	8	38	"	14.624"	545.971"
1J	9	39	"	16.356"	548.692"
1K	10	38	"	18.088"	551.412"
1L	11	37	"	19.820"	554.133"
1M	12	32	271"	21.552"	575.853"
1N	13	31	"	23.284"	578.574"
1P	14	32	"	25.016"	581.295"
1R	15	31	"	26.748"	584.015"
1S	16	30	"	28.480"	586.736"
1T	17	29	"	30.212"	589.457"
1U	18	26	"	31.944"	592.177"
1V	19	25	"	33.676"	594.898"
1W	20	22	"	35.408"	597.618"
1X	21	19	"	37.140"	600.339"
1Y	22	14	"	38.872"	603.060"
1Z	23	6	"	40.604"	605.780"

J-2300-1D	RS-6
J-2300-1C	"
J-2300-1B	"
J-2300-1A	RS-6
DAT JOB NO.	ITEM



REF. DWGS.
OUTLINE — 5773
ASSEMBLY — 5774
DETAIL — 5775

NOTE: FOR WELDING PROCEDURES AND QC PROCEDURES (NDE) SEE NOTES DWG. # 5774

546-CAZ-241672-BN	RHAHRS-2	TCX
" "	" -1	TCX
546-CAZ-241671-BN	RHAHRS-2	TBX
" "	" -1	TBX
W.E.P.O. NO.	SPIN NO.	PLANT

DATE	REVISION	CHKD	APPRVD
3-29-77	5 REV'D U-TUBE ROW # 4 STR. LENGTH & U-TUBE SUPT	CHONG	
11-18-76	4 ADDED STIFFENING RING NOZZS. 'A' & 'B'	FMcA	
9-30-76	3 NOZZ A & B REVISED PAD WELD	FMA	
9-1-76	2 REV'D BONNET FLG TORQUE & THK. REV'D TUBE CHART & U-TUBE SUPT	CHONG	
6-2-76	1 REVISED BODY FLGS. TUBE CHART. NOZZ. NECKS A & B WERE ℞ + REVISED ATTACH. U-BEND SUPPT	FMA	

JOSEPH OAT CORPORATION
CHEMICAL ENGINEERS/DESIGNERS/FABRICATORS
EST 1788
CAMDEN, NEW JERSEY 08104

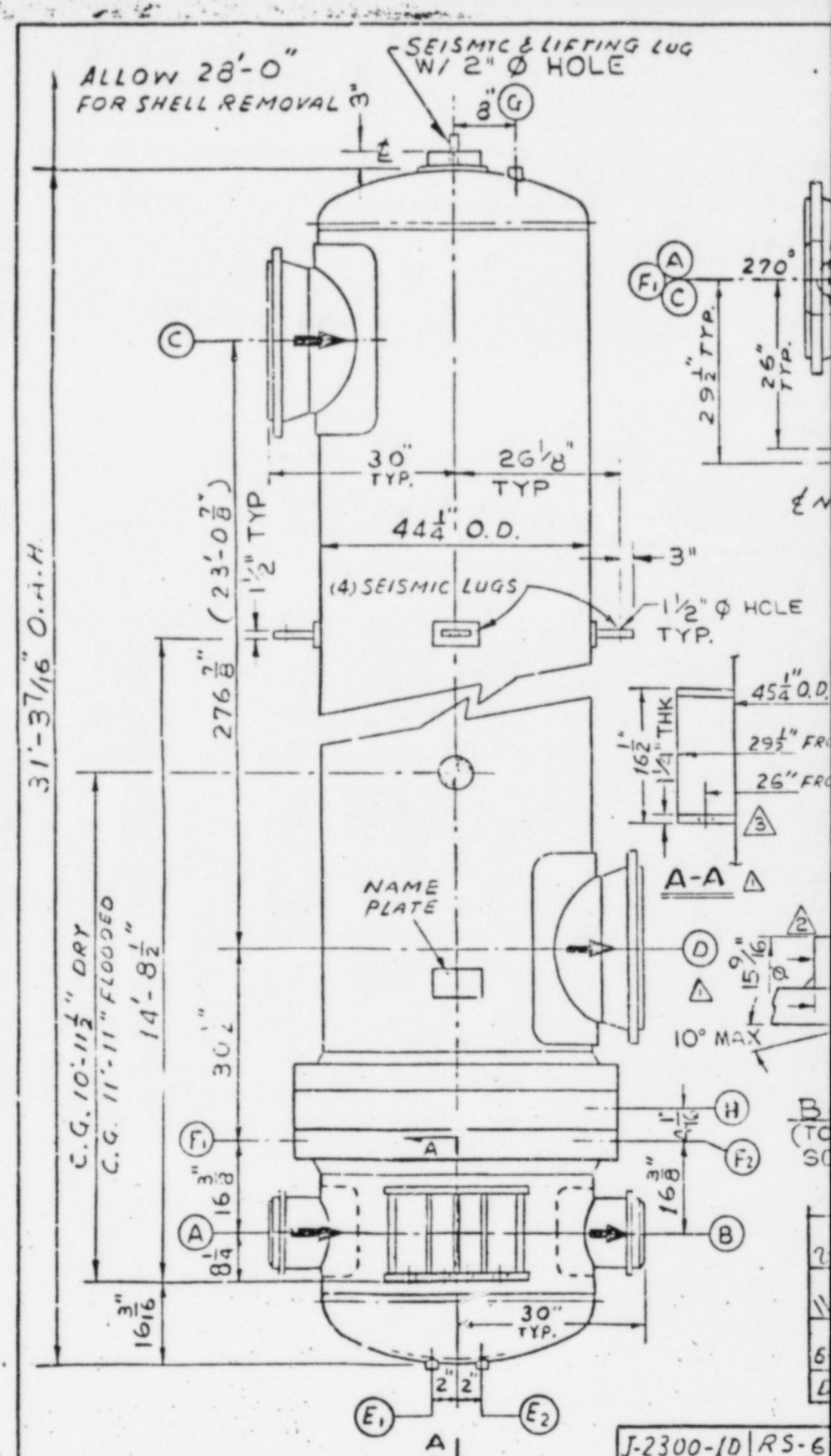
VERT. RESIDUAL H.E.
DETAILS

FOR: WESTINGHOUSE ELEC. CORP.
PWRSD
PITTSBURGH PA.

REF. NO
P.O. NO 546-AAZ-241670-BN — JOB NO. J-2300-1 A-D
DRAWN T. CHONG — DATE 2-10-76 — DRAWING NO 5776 — REV. 5
CHECKED S. Raynes — DATE
APPROVED — NO REQ'D (4)

0 A B C D

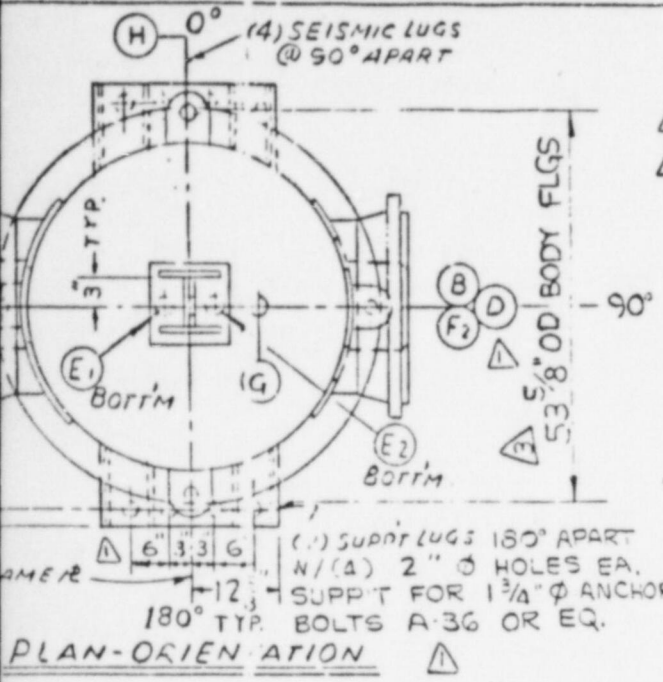
8606040277-01



REF. DWGS:
ASSEMBLY-5774,
DETAIL-5775, · DETAIL-5776.

J-2300-1D	RS-6
J-2300-1C	"
J-2300-1B	"
J-2300-1A	RS-6
OAT JOB NO.	ITEM

13 12 11 10 9 8 7 6 5 4 3



(4) SUPPORT LUGS 180° APART
N/(4) 2" ∅ HOLES EA.
SUPPORT FOR 1 3/4" ∅ ANCHOR BOLTS A-36 OR EQ.

PLAN-ORIENTATION

NOZZLE SCHEDULE						
	MARK	SIZE	SCH	RATING	PURPOSE	REMARKS
1	A	12"	1/2" WALL	—	TUBE IN*	B.W. (PREP. FOR SCH. 40S)
1	B	12"	" "	—	TUBE OUT*	" "
	C	24"	STD.	150#	SHELL IN	WN RF. FLG.
	D	24"	"	150#	SHELL OUT	WN RF. FLG.
	E_1 & E_2	3/4"	—	3000#	TUBE DRAIN	S.W. CPLG. (2) REQ'D
	F_1 & F_2	3/4"	3000# S.W. SIZE		TUBE VENT	IN BONNET FLG. (2) REQ'D
	G	3/4"	—	3000#	SHELL VENT	THR'D HALF CPLG.
	H	3/4"	NPT. IN T.S.		SHELL DRAIN	—

1 * TUBESIDE FLOW MAY BE REVERSED

CLASSIFICATION
ASME CODE SECT III
CLASS 3 SHELL SIDE
CLASS 2 TUBE SIDE

WEIGHTS
EMPTY 29,400#
FLOODED 47,000#
BUNDLE 16,600#
SHELL 7,750#

MATERIAL
SHELL SIDE - C/S
TUBE SIDE - 304S/S

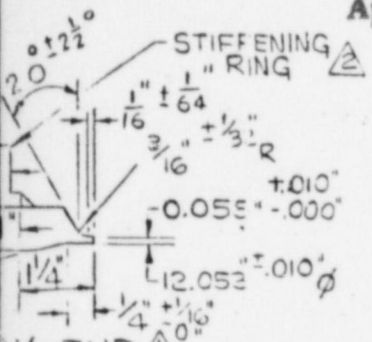
TI APERTURE CARD

Also Available On Aperture Card

CHANNEL

...E OF VESSEL

...E OF VESSEL



W. END 1
MATCH 12" (H 40S PIPE)

1 SAFE SHUTDOWN EARTHQUAKE
1.0 G HORIZ "Y & "Z" AXIS
1.0 G VERT "X" AXIS

1 * NOTES
1) SUBSCRIPTS DENOTE VECTORIAL DIRECTIONS
2) 'Z' AXIS IS 90°-270° PLANE
'Y' AXIS IS 0°-180° PLANE
'X' AXIS IS VERT. DIRECTION

FOR OFFICE AND ENGINEERING USE ONLY

DATE	REVISION	BY	APP'D
2-77	3 REMOVED REINF. PAD + ADDED GUSSETS ON SUPP'TS.	FMcA	3-3-77
A 76	2 ADDED STIFFENING RING NOZZS. 'A' & 'B'	FMcA	1-3-77
30-76	1 REVISED SUPP'TS. + PER PARS #2 & 4 ADDED SEISMIC NOTES	FMcA	9-30-76

NO.	W.E. P.O. NO.	SPIN NO.	PLANT
81	546-CAZ-241672-BN	RHAHRS-2	TCX
	" "	" -1	TCX
	546-CAZ-241671-BN	RHAHRS-2	T8X
81	" "	" -1	T8X

JOSEPH OAT CORPORATION
CHEMICAL ENGINEERS/DESIGNERS/FABRICATORS
EST. 1888
CAMDEN, NEW JERSEY 08104

OUTLINE DWG. VERT. RESIDUAL H. E.

FOR: WESTINGHOUSE ELEC. CORP.
PWRSD PITTSBURGH, PA.

REF. NO. —	JOB NO. J-2300-1 A~D	
P.O. NO. 546-AAZ-241670-BN		
DRAWN: T. CHONG DATE: 2-24-76	NO. REQD (4)	REV.
CHECKED: S. ZAYNES DATE: 3-24-76	DRAWING NO. 5773	3
APPROVED:		

8606040277-02