



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
230 PEACHTREE STREET, N. W. SUITE 818
ATLANTA, GEORGIA 30303

January 5, 1977

E. Volgenau, Director, Inspection and Enforcement

SURRY UNIT 2 NEUTRON SHIELD TANK

In a recent telephone conversation you requested that I look into the facts concerning a question which was raised about possible weld deficiencies in the Surry Unit 2 Neutron Shield Tank. I reviewed the Surry inspection report file and discussed the matter personally with [redacted] and W. Swan and by telephone with [redacted]. At the time the fabrication of the neutron shield tank for Unit 2 was being inspected [redacted] was the responsible Senior Inspector (equivalent to Branch Chief in today's organization). [redacted] was the assigned Principal Inspector, and Swan was the inspector who made the final inspection finding that the shield tank was satisfactory for service.

The conclusion of my review of the available facts is that Region II inspectors (Swan and [redacted]) and the responsible supervisor were satisfied that the Unit 2 shield tank was adequately constructed for the service for which it was intended. None of the three individuals had any recollection of any pressure put on any NRC (then AEC) employee to minimize the problems or to accept any resolution short of a technically adequate one. The Surry inspection reports contain a history of the problem and its resolution.

Excerpts from the appropriate inspection reports are attached. The chronology is as follows:

1. Attachment 1 - Pages 4 and 5 Appendix III, Section B of CO Report 50-280/70-1, 50-281/70-1

This attachment is an excerpt from the report of a team site inspection performed February 4-6, 1970. The inspector who prepared this section was J. M. Varela. In the excerpted section Varela describes the deficiencies he noted during his inspection. The deficiencies were principally related to the surface roughness of some of the welds and to some discontinuities in one weld seam.

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2. Attachment 2 - Pages 4 and 5 of Summary Section of CO Report 50-280/70-3, 50-281/70-3

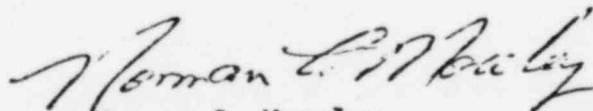
This attachment is an excerpt from a report of a team site inspection performed April 21-23, 1970. The inspector who prepared this section was [redacted] describes information he received during the exit interview from licensee personnel about actions the licensee had taken in resolving the deficiencies described in Attachment 1. A rework program was described by the licensee personnel and informed them that the repair work would be observed during a subsequent inspection.

3. Attachment 3 - Page 17 of Details, Section K and Pages 3, 4 and 5, Appendix III of CO Report 50-280/70-4, 50-281/70-4.

This attachment is composed of excerpts from a report of a team site inspection performed July 22-24 and August 10-14, 1970. The page 17 excerpt was prepared either by [redacted] as a summary of Swan's more detailed discussion of the Section K excerpts or was directly prepared by Swan as a "cut and paste" insert to a jointly prepared section. Both excerpts describe continuing dissatisfaction with the condition of the tank.

4. Attachment 4 - Pages 2 and 14 of Appendix III of CO Report 50-280/70-6, 50-281/70-5.

This attachment contains information from a team site inspection performed October 1-2 and 6-9, 1970. The inspector who prepared these was W. Swan. In the excerpts Swan describes corrective actions which were taken. He describes dissatisfaction with the sequence of events which resulted in less than desirable resolution from the standpoint of good Quality Control. The report does not concisely close the welding questions, however, Swan verbally informed Moseley on December 27, 1976, that it was closed at that time and that he then (in October, 1970) had no concern for the safety of operations using the tank as fabricated.



Norman C. Moseley
Director

IE:II:NCM

Attachments:
As stated

Handwritten notes:
A. [unclear]
B. [unclear]

B. Neutron Shield Tank

1. Manufacturing Requirements

Both Surry 1 and 2 neutron shield tanks were at the site. (See Exhibit E and Exhibit A, Photo No. 21.) The S&W general specification for fabrication of the neutron shield tank is on file at CO:II. The fabricator is the Newport News Shipbuilding and Drydock Company, by purchase orders SN-85 and SN-1044.

Of particular significance are the following manufacturing requirements specified under General Notes of Reactor Neutron Shield Tank Assembly Drawing No. 11448-FV-7A by Stone and Webster:

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Page 2

"All welds on the outside vertical wall of the tank (skirt excluded) shall be ground flush. All welds on inside of tank shall be ground smooth, and all pits and gouges shall be filled with weld metal and ground smooth.

"All welds, wherever possible, shall be 100% radiographed. All welds that cannot be radiographed shall be either dye penetrant or magnetic particle checked at the root pass, the final pass and at the intermediate depths of 1/2-inch increments maximum. The surface of all welds shall be ground to a surface condition suitable for the checking procedure used.

"After completion of shop assembly, the fabricator shall remove all slag, scale, weld spatter, grit, dirt, water, and other foreign material from all surfaces of the tank."

2. Deficiencies

Inspection by CO revealed that the Unit 2 vessel is in nonconformance with the above requirements. There is no evidence, visual or written, that this vessel was rejected. The discrepancies reported are the findings of CO. These were as follows:

- a. The interior girth weld contained three separate discontinuities or lack of fusion 3/8-inch to 1/2-inch long and 1/32-inch to 1/64-inch long at the center or widest point. The girth weld was not ground smooth. (See Exhibit A, Photo No. 20.)
- b. The welding of the reinforcement plates for the coolant piping bosses was not ground and was coarse.
- c. The stainless steel ventilation manifold weldments were unground and were coarse.
- d. Other weldments were only partially ground and contained many pits.
- e. The inside of the tank contained grit, weld spatter, penetrant developer and other foreign matter.
- f. The foregoing discrepancies cannot be successfully radiographed, dye penetrant inspected, or magnetic particle inspected.
- g. S&M Specification and ASME Section VIII, UW-51 requires the removal of weld surface irregularities. (See preceding Item A.2.b.)

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Progress in resolution of the deficiencies observed in the Unit No. 2 neutron shield tank and the spent resin dewatering tank was as follows:

The deficient welding of the neutron shield tank was rejected on R/D Report No. 270, dated February 9, 1970. The condition

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of the tank was investigated by the responsible S&W engineer, M. Scheibner, of the Boston office. The corrective work is to be performed onsite in accordance with written instructions by Scheibner, dated March 9, 1970. Arrangements have been made for Newport News Ship Building and Drydock Company to perform the necessary work. Rework has not started as of this inspection date.

The deficiencies observed in tank 1-L-W-TK-10, spent resin dewatering tank were rejected on R/D Report No. 268, dated February 9, 1970. The vendor, PX Engineering Company, was contacted for backcharge estimate on February 23, 1970. The repairs will be performed by S&W personnel onsite. Rework had not started at the time of the inspection.

The inspector informed Perkins that repair work would be observed at a subsequent inspection. Arrangements were also made at this time for a forthcoming review of the licensee's program for electrical and instrumentation installation.

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Page 1

K. Neutron Shield Tank for Unit No. 2

The inspection and listing of the discrepancies found by Compliance are included in CO Report No. 50-281/70-1, Appendix III, Section B, and further discussed in CO Report No. 50-281/70-3.

Following Varela's listing of discrepancies on this vessel in February 1970, S&W had prepared a P&D report. This report subsequently showed S&W acceptance of the tank on June 17, 1970, although grinding of welds required by the specifications and drawings and as recommended by S&W engineering had not been done.

The neutron shield tank had been cleared by site QC for installation after only minor items had been reworked and in direct disregard of written instructions from S&W engineering to grind major welds and reinspect.

This is not a coded tank, but it is Class I and the restricted space between it and the reactor vessel will prevent in-service rework or even inspection, so any leakage could cause an operational shutdown of the reactor.

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PAGE 2

C. Discrepant Neutron Shield Tank for No. 2 Unit (Reference CO Report No. 50-281/70-1, Appendix III, Section B)

Following Varela's listing of discrepancies on this vessel in February 1969, S&W had prepared a R&D report. This report showed S&W acceptance of the tank on June 17, 1970, although grinding of welds required by the specifications and drawings and as recommended by S&W engineering had not been done.

At exit interview, they were told that AEC considers the vessel unacceptable because there was noncompliance with design requirements, there was no certification that radiography had been done, and the rough surfaces of the welds would have detracted from the effectiveness of RT, MT and PT. In addition, there was no record of the required close tolerance dimensional check having been made (5/16-inch out of roundness at any horizontal section), and the specifications were deficient in that no axial tolerances had been called out.

This is not a coded tank, but restricted space between it and the reactor vessel will prevent in-service rework or even inspection, so any leakage could cause an operational shutdown of the reactor.

Four items of nonconformance with specifications cited (reference CO Report No. 50-281/70-1) were listed on a S&W R&D report, R&D 270,

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Page 3

on February 9, 1970, and QC reject tag T858 was attached to the vessel. The items listed were:

1. Interior circumferential weld seam located 14 feet from the top of the shield tank (reference Det. U, Drawing 11548-FY-7B) contains various cold shunts.
2. Interior seam welds are not ground smooth in accordance with Drawing 11548-FY-7A.
3. Six inserts of primary shield cooling piping not ground smooth (reference Drawing FY-7K).
4. Various pits, gouges and weld deposits on interior surface.

By S&W interoffice correspondence to V. Suziedelis dated March 9, 1970, from M. Scheibner, states, in part, "Please review QC Rejection Report No. 270. The repair shall be done as follows: Condition Detail No. 1: Chip out defect areas and perform a MT after excavation. Preheat tank area to 200°F and weld using an ASTM E7016 or E7018 electrode. After completion of the weld repair perform a MT inspection. Condition Detail No. 2: Weld seams shall be ground flush to facilitate future testing (during shutdown). Condition Detail No. 3: Let them rework the six inserts. Condition Detail No. 4: Any weld deposit or weld splatter shall be removed."

By I.C. dated April 23, 1970, to D. H. Armstrong, Scheibner states: "Please refer to the above matter and to I.C. between our Vito Suziedelis and myself dated March 9, 1970. Condition Detail No. 2 should read: 'All welds on the outside vertical walls of the neutron shield tank (skirt excluded) shall be ground flush. All welds on the inside of the shield tank shall be ground smooth, but need not be ground flush. For reference see NUS-96, revised September 20, 1968, page 4, third paragraph.'"

Despite these clear instructions from the mechanical equipment design supervisor, a QC R&D disposition was signed off on June 11, 1970, directly under a typed notation that "Repairs will be performed in accordance with attached I.C. from M. Scheibner to V. Suziedelis dated March 9, 1970."

The acceptance notations are:

"Items 1 and 4 completed and accepted.
Item 3 acceptable as is.

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Page 4

Item 2 acceptable as is - see attached test records certifying sound welds."

The inspector found that items 1 and 4 had been completed acceptably.

No grinding had been done of the welds on the six inserts under item No. 3 and the weld surfaces were very rough.

The test records used as basis to accept item 2 consisted of Xerox reproductions of MT report cards and a statement by X-18 Weldors that all MT and/or PT inspection had been accomplished and that 50 N.N. Forms 1211 (Radiographic Repair Data) were on file at X-18 Weldors' office. It appears that radiographs were made of repairs found necessary by MT.

The rough surface of the welds could mask additional flaws.

S&W brought Scheibner to the site to talk to the inspector concerning NN SB&DD disregard of specification requirements and site QC overriding his written additional instructions. He had no explanation of the QC action. He did say that he thought Newport News Shipbuilding and Drydock Company and X-18 Weldors have adequate NDT records. He agreed that better test interpretations could have been obtained if the welds had been ground smooth.

Scheibner then pointed out a weakening ambiguity in the Specification NUS-96, revised September 20, 1960:

On page 4, third paragraph, the second sentence says "All welds on the inside of the tank shall be ground smooth, but need not be ground flush."

On page 5, fourth paragraph, the next to last sentence says, "The surface of all welds shall be ground to a surface condition suitable for the checking procedure used."

He was told, as were those at the exit interview, that the fabricator had ignored, and the inspection agents at the shop and at the site had condoned the ignoring, measures (grinding) which could have been imposed to give greater assurance of the quality of the vessel.

S&W was told that Compliance considers the vessel discrepant because of these omissions.

The possibility of the inspectors visiting the fabricator's and X-18 Weldors' office for review of radiographs was discussed.

Attachment 4
PAGE 1

2. Discrepant Neutron Shield Tank for No. 2 Unit (Reference CO Report No. 50-280/70-1, Appendix III, Section B)

Tank has been released for installation by S&W QC through engineering dispositions after minor grinding and sandblasting of inner wall surface. This incident highlights a failure of shop inspection followed by a substitution of field QC judgment for specification requirements, followed by stubborn refusal to take corrective action, culminating in forcing engineering to write an acceptance disposition contrary to prior engineering written corrective instructions. (See discussion on pages 3-6 of Appendix III to CO Report No. 50-280/70-4.)

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Page 2

D. Neutron Shield Tank for Unit No. 2 (CO Report No. 50-280/70-4,
Appendix III, pages 3 to 6

The neutron shield tank was inspected in the storage yard in company with West. It was found that the tank had been sandblasted and cleaned. The sandblasting improved visual inspection of the major welds. However, the unground welds cited in the referenced report still had such a rough surface that effective PT was unlikely.

The R/D document was reviewed. It showed that the tank had been released on August 27, 1970, by QC for installation after the receipt of engineering disposition from M. Scheibner stating that inspection records on the welds show they are acceptable and that radiographic records are available for review at X-18 Welders' shop. Spence was defensive and asked the inspector if AEC considers the tank unacceptable. He was told that Compliance does not accept or reject hardware. We observe and report. VEPCO and its agents are responsible for hardware acceptance and safe operation. In a discussion with Perkins at end of the exit interview, the inspector stated that the handling of the problem on this tank indicated a severe lack of prudence concerning possible future operating difficulties.