

U. S. ATOMIC ENERGY COMMISSION  
DIVISION OF COMPLIANCE  
REGION 1

CO Inspection Report No. 50-247/71-19

Subject: Consolidated Edison Company

Indian Point 2

License No. \_\_\_\_\_

Location: Buchanan, New York

Priority \_\_\_\_\_

Category B

Type of Licensee: PWR

Type of Inspection: Evaluation of the WEDCo Repair Procedure for the Safety  
Injection System Accumulator Check Valves

Dates of Inspection: December 20, 1971

Dates of Previous Inspection: December 13, 1971

Principal Inspector: G. L. Madsen, Reactor Inspector

\_\_\_\_\_  
Date

Accompanying Inspectors: *J. H. Tillou*  
(Report Prepared By) J. H. Tillou, Reactor Inspector (Const.)

1-10-72  
Date

\_\_\_\_\_  
Date

Other Accompanying Personnel: NONE

\_\_\_\_\_  
Date

Reviewed By: *E. M. Howard*  
E. M. Howard, Senior Reactor Inspector (Const.)

1-10-72  
Date

Proprietary Information: NONE

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SECTION I

Enforcement Action

- A. The use of Courter Company Welding Procedure No. 8, "Butt and Socket Welding of Stainless Steel Piping" for the overlay repair of the safety injection system check valve castings. (Paragraph 4)
- B. The failure of WEDCo to include a radiographic requirement in their repair procedure. (Paragraph 5)
- C. The failure of the WEDCo repair procedure to require a hydrostatic test of the repaired valves. (Paragraph 6)
- D. The failure of the WEDCo repair procedure to require a reheat-treatment of the valves following the welding repairs. (Paragraph 7)

Licensee Action on Previously Reported Enforcement Matters

Not Applicable.

Unresolved Items

- A. Neither WEDCo nor Branche Testing Laboratory have developed a reliable procedure to verify that the welding repair will produce a wall thickness to meet the dimensional and wall thickness requirements of ANSI B16.5 for the temperature and pressure service of these valves. (Paragraph 8)
- B. There is no record or planned inspection effort to verify that the interpass welding temperature and welding current requirements of Courter Welding Procedure No. 8 have been maintained during the overlay welding of the valve castings when the castings were filled with water. (Paragraph 9)

Status of Previously Reported Unresolved Items

Not Applicable.

Design Changes

None

Unusual Occurrences

Not Applicable.

Persons Contacted

Consolidated Edison

Mr. A. D. Kohler, Indian Point 2 Project Manager  
Mr. Ed Dadson, Site QA Supervisor  
Mr. R. Schuster, QC Engineer, Welding

WEDCo

Mr. W. Dibeler, Site QC Manager  
Mr. Hughes, Pipe/Welding Site QC Engineer  
Mr. J. McLaughlin, Site Welding Engineer

Branche Testing Laboratory

Mr. Joe Manno, QC Supervisor  
Mr. Gordon Langeman, NDT Inspector

Management Interview

At the conclusion of the inspection, an exit interview was conducted with Messrs. E. Dadson and R. Schuster of the licensee's site QA Group. The following subjects were discussed:

- A. The Courter Welding Procedure No. 8, "Butt and Socket Welding of Stainless Steel Piping" is not an appropriate qualified procedure for the overlay repair of ASTM-A-351 valve castings where the valve and associated piping are full of 100°F water. (Paragraph 4)
- B. No reliable dimensional measuring method has been provided for Branche Testing Laboratory personnel use to verify that the repair welding has increased the valve wall thickness to meet the minimum requirements of ANSI B16.5. In addition, there are no recorded dimensional records of the caliper measurements made to date. (Paragraph 8)
- C. The WEDCo repair procedure for the safety injection accumulator check valves does not include an X-ray requirement after the completion of the repairs, as required by ANSI B31.1, Code Case N-9. (Paragraph 5)
- D. The WEDCo repair procedure for the safety injection system accumulator check valves does not provide for a re-pressure test of the repaired valves in accordance with the requirements of ASTM-A-351. (Paragraph 6)
- E. The failure of the WEDCo repair procedure for the safety injection system accumulator check valves to provide for a reheat-treatment of the repaired areas in accordance with ANSI B31.1, Code Case N-9, (Paragraph 7)

The Con Ed site QC staff expressed their concern over the identified inadequacies in the WEDCo repair procedure and the failure of either the WEDCo or the Con Ed site QC personnel to have recognized these deficiencies. They further assured the inspector that revisions would be made to the welding procedure to incorporate the omissions or they would insist that WEDCo provide an engineering evaluation and justification for their omission from the repair procedure.

SECTION II

Additional Subjects Inspected, Not Identified in Section I, Where No Deficiencies or Unresolved Items Were Found

1. General Background and Correspondence Covering SIS Accumulator Check Valves

The problem with the safety injection system accumulator check valves (eight-inch Darling) is of long standing. It was first identified and brought to the licensee's attention in March 1970 that the material for the valves was ASTM A-351, Grade CF8 (304 material) in place of ASTM A-351, Grade CF8M (316 material), as called for in the Westinghouse Purchase Order No. 546K70123B dated April 17, 1967, from Westinghouse to the Darling Valve Company. Considerable correspondence has been exchanged between the Westinghouse and Con Ed engineering departments on this subject. The matter has gradually escalated from the original problem involving the substitution of CF8 material for the CF8M material called for in the specification, on through additional problems involving the rating of the valve in accordance with MSS-SP-66 in place of the original ANSI B16.5, on to the rating of the valves and their design and testing to meet the original ANSI B16.5 1500 pound ratings, and from there on to the deficiency of wall thickness immediately behind the machined weld prep area.

It appears that, in each case, as problems were identified, Westinghouse has attempted to engineer the problem away by utilizing the most advantageous values, factors, or measures, but never actually attacking the problem at its source. Finally, in October 1971, Mr. R. B. Bremmer, Manager, Westinghouse Mechanical QA, assigned ultrasonic technicians to conduct a complete investigation into the valve wall thickness on the eight safety injection system accumulator check valves manufactured by the Darling Valve Company. This report contained sufficient information so that the WEDCo site QC personnel revised their Field Deficiency Report No. 10086 to indicate that each of the above described valves will need to be repaired.

On October 20, 1971, a letter was forwarded by Mr. H. A. Croyle, Project Engineer, Indian Point Plants, stating as follows:

"A review of the QA measurement records pertaining to the subject valves indicates that all eight valves need weld buildup on both ends. To minimize additional problems resulting from removal of starts and stops, it is recommended that the repair be made for the entire 360° of the circumfer-

ence of the machined bands behind the weld preparations. The repair of the complete circumference precludes the need for additional ultrasonic inspection . . . All eight valves shall have a minimum of 3/16 of an inch thick uniformly deposited after finished grinding. The only exception is Valve No. 895A, Heat No. 13209-3, which will require an additional 3/16 inch layer of the bottom half of the valve body, beginning and ending at the horizontal centerline on the inlet end.

The repairs shall be accomplished in accordance with the following:

- a. Qualified weld overlay procedure (Courter Procedure No. 8, which permits MIG or TIG in any combination).
- b. Use of a qualified welder in all positions (flat, horizontal, vertical, and overhead).
- c. Dye penetrant inspect each layer in accordance with ASME, B&PV Code, Section III, 1968, Paragraph N-627.

. . . ."

On December 3, 1971, Mr. A. D. Kohler, Resident Construction Manager for Con Ed, forwarded a letter to Mr. M. L. Snow, Manager Quality Assurance, WEDCo, Subject: Indian Point Unit 2 Accumulator Check Valve No. 897D, wherein he identified that the Con Ed site QC inspector had verified that there was a 3/8" long crack-like indication existing 4-1/2 inches behind the weld repair in the body of Valve No. 897D. In his communication he stated in part,

"We expect WEDCo to conduct a complete investigation of all eight valves. This inspection should provide sufficient information to determine whether the other Darling Valves also contain rejectable indications . . . In addition, you are requested to transmit to this office the following information:

1. Wall thickness of the valves as found by Westinghouse during their ultrasonic thickness check.
2. The minimum wall thickness required by the applicable specification and a copy of your calculations to establish this minimum thickness.

- "3. The technique to be employed by WEDCo to assure that the weld metal overlay has provided sufficient material to meet the above calculated minimum thickness requirement.

\* \* \*

Your early reply is required for Con Ed to meet our commitments to the AEC, Division of Compliance."

In response to the above letter, Mr. J. M. McLaughlin, WEDCo Welding Engineer, prepared a procedure on December 2, 1971, which contained instructions for the repair of the linear type indication located in the outlet nozzle of the subject valve, No. 897D. This procedure delineated the following steps:

- a. Use a carbide burring tool to remove the indication completely in 1/32 inch increments.
- b. Dye penetrant each area after each grinding. Actual depth of grinding permitted by this instruction is 11/32. If the indication still exists, cease operations and contact Mr. J. Moorehead, WEDCo Engineer, for further instructions.
- c. If indications are eliminated within 3/32 of an inch the excavation shall be provided with a generous radius extending into the base metal and no weld deposit is required.
- d. If indications are eliminated within 11/32 of an inch limitation, the size of the excavation shall be sloped 20° minimum with a gradual lead-in and exit to provide access for repair welding.
- e. Use the Courter and Company Welding Procedure No. 8 with welding parameters specified by the inert gas tungsten arc welding process. Deposit weld metal to be flush with surrounding base metal, use ER308 filler metal.
- f. Perform a final dye penetrant examination on the as-welded final surface. Remove any relevant indications as required by the applicable DP procedure.
- g. Clean area thoroughly of all dye penetrant testing residue by swabbing in acetone and final rinsing with distilled water.

2. Welder and Welding Procedure Qualification

Based on the repair welding records for each of the eight subject valves, it was ascertained that ten welders had participated in the repair welding on the subject valves. A review of the records indicated that each of these welders was properly certified to the Courter Welding Procedure No. 8, "Butt and Socket Field Welds of Stainless Steel Pipe, Fittings, and Flanges." A further review of the records indicates that the Courter Weld Procedure No. 8 "Butt and Socket Field Welds of Stainless Steel Pipe, Etc" has been properly qualified in accordance with Section IX of the ASME Code and the ANSI B31.1 "Power Piping Code."

3. Dye Penetrant Inspection and Records

A review of the informal dye penetrant records maintained for the repair inspection for each of the affected valves by the Branche Inspection Agency indicates that a first pass and final dye penetrant inspection have been satisfactorily accomplished on both the inlet and discharge end of each valve where the repairs are complete. The final pass of the weld repair is, as yet, not completed on Valves No. 897A, 897B, 895B, and 895D.

Records were produced to verify that both Mr. Joe Manno and Mr. Gordon Langeman of Branche Testing Laboratory were qualified in accordance with SNT-TC-1A for nondestructive testing utilizing the dye penetrant method.

Details of Subjects Discussed in Section I

4. Courter Welding Procedure No. 8, "Butt and Socket Field Welds in Stainless Steel Pipe, Etc" Is Not a Qualified Overlay Procedure

In his letter of October 20, 1971, Mr. H. A. Croyle, Westinghouse Project Engineer for Indian Point Stations, states in his procedure for the repair of the Darling check valves,

"The repair shall be accomplished in accordance with the following:

- a. A qualified weld overlay, Courter Procedure No. 8 (which permits MIG or TIG in any combination)."

The FSAR states that ANSI B31.1 shall be the governing piping code for Indian Point 2.

ANSI B31.1, in Chapter V, Table 126.1 establishes ASTM A-351 as the governing specification for austenitic steel castings.

ASTM A-351 in paragraph 16.2, requires that casting repairs shall be made in accordance with ASTM A-488, "Qualification of Procedures and Personnel for Welding Steel Castings."

ASTM A-488, in paragraph 9 "Re-qualification of a Procedure", states in part, "Changes (to a welding procedure) other than those listed (essential variables) may be made without requalification, provided the procedure is revised to show these changes."

The valve casting repairs are being accomplished using the Courter Welding Company Procedure No. 8 "Butt and Socket Welding of Stainless Steel Pipe, Etc" with no change or supplement to verify its adequacy or to authorize its use in accomplishing exterior overlay casting repairs when the interior of the valve and associated piping is filled with water.

Mr. McLaughlin, WEDCo Site Welding Engineer, defended the use of the Courter Welding Procedure No. 8, by taking the position that the repairs were not actual repair welding to castings but were overlay only. This is scarcely a defensible position since the entire purpose of the procedure is to build-up wall thickness of the casting adjacent to the discharge and intake nozzles which increase in thickness will be used for substitution in the stress formula to establish the pressure and temperature rating of the valves.

5. Failure of the WEDCo Repair Procedure for the Subject Castings to Require X-Ray of the Repaired Areas

10 CFR 50.55(a) "Codes and Standards", states in part, "For construction permits issued before January 1, 1971, valves which are part of the reactor coolant pressure boundary shall meet the nondestructive examination and standards of ANSI B31.1 and Code Cases N-2, N-7, N-9 and N-10. . ."

ANSI B31.1, Code Case N-9, in paragraph 3 "Repair by Welding", states in part, ". . . All repair welds and surrounding area shall be examined by liquid penetrant and radiographic inspection . . ."

The WEDCo repair procedure for the safety injection system accumulator check valves, as established in the letter prepared by Mr. H. A. Croyle, WEDCo Project Engineer, requires only that each layer of weld overlay repair receive a dye penetrant inspection. Radiography in accordance with the above paragraph in Code Case N-9 has been completely omitted.

6. WEDCo Repair Procedure for the Safety Injection System Accumulator Valves Does Not Require a Hydro-Test After Repair

10 CFR 50.55(a) "Codes and Standards" states in part, "For construction permits issued before January 1, 1971, valves which are part of the reactor coolant pressure boundary shall meet ANSI B31.1 and Code Cases in effect on the date of the order."

Code Case N-2, in paragraph 2, imposes the inspection requirements of Code Case N-10, which states in paragraph 4, "All basic requirements and optional requirements for inspection and repair of defects and re-test shall be in accordance with ASTM A-351 and shall be mandatory."

ASTM A-351, paragraph 16.3 "Repair of Defects", states in part, "Weld repairs are considered major when repaired area exceeds 10 sq. inches . . . Major repairs shall then be inspected to the same quality standards as the original inspection of the castings."

ASTM A-351, paragraph 13 states in part, "Each casting shall be tested after machining to the hydrostatic test pressures prescribed in ANSI, B16.5 . . ."

The WEDCo repair procedure, as detailed in the letter of October 20, 1971, from Mr. H. A. Croyle, Westinghouse Project Engineer for the Indian Point Station, completely omits any reference to or requirement for hydrostatic tests subsequent to the welding repairs described.

7. The WEDCo Repair Procedure for the Safety Injection Accumulator Check Valves Does Not Require Reheat-Treatment of the Castings Following the Weld Repair

10 CFR 50.55(a) imposes the ANSI B31.1 code and Code Cases N-2, N-7, N-9 and N-10 as the cognizant document to cover the quality control efforts on valves.

ANSI B31.1, Code Case N-9, in paragraph 3, states in part, "Weld repairs are permitted without reheat-treatment . . . if the total (repaired) surface area is less than 10 sq. inches."

Mr. H. A. Croyle, Westinghouse Project Engineer for Indian Point, in his letter of October 20, 1971, recommends that the repair to both the discharge and inlet end of the valves be made for the full 360° of the circumference of the machined bands behind the weld preparation. Since the repaired area, as described, is approximately 1-1/4 inches wide and extends throughout the entire 360° of the circumference of the eight-inch

valves. The total weld area is considerably in excess of 30 sq. inches, and, therefore, under Code Case N-9, will require reheat-treatment of the repaired area on each end of each valve after all welding repairs are completed.

8. Failure of Either Branche Testing Laboratory or WEDCo to Develop a Reliable Technique for Measurement of the Repaired Wall Thickness

To date, the only metrological technique utilized after repair of the valve nozzles has been a pair of twelve inch calipers to measure both the 0° - 180° and the 90° - 270° OD dimensions. This technique appears to be only an approximation to assure that the eleven inch unrepaired diameter is not a minimum of 11-3/8 inches. It gives no indication or measurement of the repaired wall thickness, which is the primary goal of the entire operation.

Mr. J. Manno of Branche Testing Laboratory agrees that this caliper measurement technique is completely inadequate and provides no reliable data concerning the increase in wall thickness for the repaired areas. Both Mr. Dadson (Con Ed QA Supervisor) and Mr. Manno (Branche Testing Laboratory) have requested that WEDCo conduct an ultrasonic examination of the repaired areas on each valve to verify that the repaired areas now meet the minimum requirements for wall thickness as established in ANSI B16.5. To date, however, Westinghouse has been reluctant to make this type of a quantitative inspection.

9. Verification of Repair Welding Within the Parameters of the Courter Welding Procedure

The Courter Welding Procedure No. 8, "Butt and Socket Field Welds in Stainless Steel Pipe, Etc" contains specific maximum and minimum welding current requirements, as well as other parameters for interpass temperature, etc. Since the repairs to the safety injection system accumulator check valves are being accomplished with the ID of the valve and associated piping completely filled with water, it appears that WEDCo (Con Ed) should have required some demonstration that the specific parameters designated in Courter Welding Procedure No. 8 would produce acceptable overlay repair welds under these conditions.

No records have been kept to date to assure that the interpass temperatures and welding current ranges, as delineated in the welding procedure, have been maintained during welding.