

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

Report of Inspection

CO Report Nos. 289/70-2
320/70-2

Licensee: Metropolitan Edison Company
(Three Mile Island Units 1 and 2)
License No. CPPR-40 and 66
Category A

Date of Inspection: March 30-31, 1970

Date of Previous Inspection: January 13, 1970 (December 9, 1969)

Inspected by: *D M Hunnicutt for* 4/21/70
F. S. Cantrell, Reactor Inspector (principal inspector) Date

D M Hunnicutt 4/21/70
D. M. Hunnicutt, Reactor Inspector Date

D. E. Whitesell 4/21/70
D. E. Whitesell, Reactor Inspector (Construction) Date

Reviewed by: *N. C. Moseley* 4/21/70
N. C. Moseley, Senior Reactor Inspector Date

Proprietary Information: NONE

SUMMARY

Met Ed has investigated and evaluated information obtained from Fort Calhoun about Pipeco pipe and their NDT program. Met Ed has concluded that the Pipeco pipe is acceptable for use in nuclear piping. (Paragraph III.B.2)

One design mix in each class is now used to manufacture concrete for both Unit 1 and 2. The change in concrete manufacturers was reviewed and found acceptable. The QC program for concrete was not changed. (Paragraph III.A.2 and III.C.1)

Met Ed suspects that large stainless steel valves (10") are being furnace sensitized while curing stellite to the valve seat. (Paragraph III.B.3)

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NDT procedure qualifications for the containment liner were not found at the site. Met Ed is initiating action to obtain the qualification. (Paragraph III.E.1.c)

A crack was found in the weld prep area of a four inch stainless steel valve purchased from Alloyco for the rad waste system. It was determined the valve was cracked during shipment, and was not representative of the whole order. (Paragraph III.C.2)

Approximately 340 feet of 2½ inch and 3 inch ASTM A-312 stainless steel pipe purchased for the rad waste system contained filler metal. The pipe has been rejected for use in nuclear systems. (Paragraph III.B.1)

I. Scope

A routine announced inspection was made to the site of the pressurized water reactor being constructed on Three Mile Island near Middletown, Pennsylvania. The purpose of the inspection was to audit records, observe the program of work and to transfer the primary inspection responsibility to Mr. D. M. Hunnicutt. Mr. D. E. Whitesell, Reactor Inspector (Construction), Region I, accompanied to observe work and review records associated with the containment building. Mr. D. Ross, DRL, HQ, accompanied to familiarize himself with the program of work for both TMI-1 and TMI-2.

II. Persons Contacted

A. Met Ed

Mr. George Bierman, Project Manager
Mr. Gene Hreczuch, Construction Engineer
Mr. Vern Stuebuer, Resident Engineer, Unit 1
Mr. Will Shepard, Resident Engineer, Unit 2
Mr. Earl Allen, Resident QA Engineer
Mr. B. G. Avers, QA Manager, GPU

B. UE&C

Mr. J. E. Fant, Site QC Manager
Mr. H. A. Hardy, Assistant QC Supervisor

III. Details

A. Organization

1. QA Manager

Mr. Milo Prisuta, Site QC Manager for UE&C, resigned. UE&C transferred Mr. J. E. Fant from Indian Point 2 to Three Mile Island vice

Mr. Prisuta. Mr. Fant had been QA Manager for UE&C on the Indian Point 2 project.

2. Concrete Manufacturer

Met Ed sold the concrete batch plant on the site to National Mobile Incorporated and contracted to buy their concrete from them. There has been no change in the testing and inspection requirements. Concrete is still manufactured on the site. UE&C and Pittsburgh Testing Lab perform the same inspections and tests as when UE&C was responsible for the manufacture of concrete.* Met Ed pays the contract price for acceptable concrete and pays for only the materials used in "reject" concrete.

B. Piping

1. Stainless Steel Pipe, ASTM A-312**

The inspectors reviewed Met Ed's disposition of 2½ inch and 3 inch pipe, ASTM A-312, suspected of incomplete fusion or the addition of filler metal.*** Samples were sent to three independent laboratories for evaluation; and a consultant was asked to evaluate the lab reports. Based on differences in the chemical analysis of the weld metal and the parent metal, it was concluded that filler metal was added.

As reported previously, all of the pipe involved was rejected for nuclear service. Replacement pipe manufactured to ASTM A-358 or ASTM A-376 specifications has been specified as replacement for the rejected pipe.

2. Stainless Steel Pipe, ASTM A-358, Class I and II by Grinnell Corp.****

The inspector asked about Met Ed interpretation of paragraph 4.2.3 of ASTM A-358 concerning visual inspection of pipe welds, in particular, the requirement for no valleys in the center line or at the edge of the weld. Mr. Avers stated that he was aware of a problem concerning Allegheny-Ludlum pipe ordered for Grinnell. Grinnell

*CO Report Nos. 289/69-2 and 289/69-4

**CO Report No. 289/69-5, Paragraph III.4.a(5)

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****Memo from J. P. O'Reilly, 2/4/70 concerning telephone inquiry from Allegheny-Ludlum Steel Corporation

received the pipe from Allegheny-Ludlum through Youngstown Welding and Pipe Company. Radiographs showed a line down the center of the weld. Met Ed rejected the pipe as not meeting specification for A-358 pipe; and requested replacement or repair of the pipe. The pipe was returned to the vendor for repairs. Mr. Avers stated that repairs have been made, and that Met Ed will read the radiographs before the pipe is accepted for fabrication by Grinnell.

Met Ed (using UE&C and MPR as well as their own inspectors) performs the vendor inspections for Grinnell on pipe ordered for Unit 1. The original piping contract for Unit 1 did not specify vendor surveillance by Grinnell. According to Mr. Avers, Met Ed and Grinnell could not agree on the terms to rewrite the piping contract to include vendor inspections by Grinnell, however, an agreement was reached for Met Ed to perform the inspections instead of Grinnell. According to Mr. Avers, Met Ed reads all radiographs on nuclear pipe before it is accepted.

3. Stainless Steel Pipe Supplied by Pipeco

The inspector reviewed vendor inspection reports made at Pipeco on September 26, 1969, October 1, 1969 and February 5, 1970. UE&C participated in all inspections. MPR was involved in the September and February inspections. GPU (for Met Ed) took part in the February inspection.

After Met Ed learned of the Fort Calhoun evaluation of Pipeco*, a sample of the pipe supplied by Pipeco was sent to another testing laboratory for a separate evaluation. The following report was supplied:

"All results of the checks are within limits of ASTM A-376. However, the results of the physical tests give reason to question Pipeco test. Comparisons are listed below".

	<u>Pipeco</u>	<u>A-376 Specifications</u>	<u>Independent Test</u>
Tensile	89,610	75,000	133,419
Yield (0.2% offset)	50,350	30,000	82,811
Elongation	60%	35% min.	40%

Because of the above results, additional samples from three different heats were sent to three other laboratories. Results are shown below:

*Private conversation between Met Ed and Fort Calhoun. Problem reported in CO Report No. 285/69-6

	<u>Heat No.</u>	<u>Yield</u>	<u>Tensile</u>	<u>Elongation %</u>	<u>Roc. "B"</u>
	<u>80,694</u>				
Lehigh		42,780	83,500	60	84
		42,860	85,190	59	85
Industrial		42,000	88,500	62	91
		42,500	88,800	60.5	92
Coleman		46,846	92,247	56.5	92
Pipeco (Mill Certs)		50,350	89,610	69.0	--
	<u>80,691</u>				
Lehigh		43,120	87,500	56	86
		42,820	86,670	58	86
Industrial		42,200	93,800	57	94
		44,600	93,200	58	95
Coleman		47,764	89,441	54.5	94
Pipeco		51,200	90,890	75	--
	<u>80,677</u>				
Lehigh		40,510	83,850	61	85
		40,390	84,160	60	83
Industrial		43,200	93,800	58	91
		44,600	93,200	60	92
Coleman		41,914	83,330	58	92
Pipeco		49,360	86,190	70	--

Met Ed has evaluated these results against the original analysis supplied by Pipeco and has concluded that the Pipeco pipe meets the specifications and is satisfactory for use as nuclear piping. Mr. Avers stated that the "Met Ed" inspections have indicated that Pipeco does perform the ultrasonic test required and that heat treatment records are available. These records were reviewed by Met Ed and were satisfactory. Mr. Avers stated that the certification supplied meet the code requirements for hydrostatic testing, however, Met Ed intends to perform a system hydrostatic test that will also meet the code requirements.

4. Observation of Work

UE&C are currently installing the river water secondary heat ex-

changers for nuclear service. The inspector observed that the weld history records for each weld joint are being maintained. Also 19 welds were observed to have been rejected and red tagged. Each red tag referenced Deficiency Report (DR) No. 0174. The inspector reviewed this deficiency report and found that the rejected welds had been improperly marked by using high stress stamps. The report noted that new low stress stamps had been ordered. The corrective action relative to the removal of the high stress stamp markings was being routed for approval and initiation. (5405.06 a3)

C. Valves

1. Potentially Sensitized Stainless Steel Valves

Mr. Avers stated that Met Ed was evaluating possible furnace sensitization of large diameter stainless steel valves (>10") with steel seats. Met Ed believes the valves are being heated several hours at 900 to 1100° F with the possibility the valves are being sensitized.

2. Cracked Stainless Valve (4")*

Six four inch valves were received from Alloyco for use in the rad waste system. One valve was cracked in the machined weld prep area. The other five valves were acceptable. The cracked valve was returned to Alloyco. According to Mr. Hreczuch, Met Ed and Alloyco investigated the inspection program and concluded that the valve was cracked during shipment. Met Ed has accepted Alloyco's evaluation that the cracked valve was not representative of the group of valves. (Subsequent to the inspection, Mr. Avers informed the inspector of two additional cracked valves received from Alloyco and that Met Ed had reopened their investigation).

D. Concrete

1. Review of QC Documents (4605.04)

- a. Some problems have been generated by the fact that two A&Es, B&R and GAI, each have a separate design mix for each class of concrete, which had to be batched and transported with common facilities. To eliminate these problems a new mix was designed for each class of concrete, which was acceptable to each A&E. This eliminates the problems, and also the need for the second

*CO Report No. 289/69-5, paragraph III.6.b

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batch plant as previously reported.* Trial mixes were prepared by Mester Builders Engineering Lab for each design for both Medusa and Allentown cements. The 28 day test results for the selected mixes had an average strength ranging from 130% to 137% of the design strength. (4605.04 b1 and b2)

- b. Since the source of the cement, aggregates and additives are the same, the specified ASTM tests for these materials were audited on a previous inspection and were not audited during this inspection.**

2. Followup Record Audit (4605.05)

- a. PTL reports relative to verification test of the tensile and yield strengths of the rebars, concrete strength results and cadweld splice strength results were audited and no deficiencies were noted. The production concrete average strengths were ranging from 125% to 170% of the design strengths. (4605.05 a1)
- b. The slump, air entrainment, concrete temperatures, sieve analysis etc are recorded on the pour records and were found to be within the limits stipulated in the specifications. (4605.05 a2 and a3)
- c. The sign-off records that are signed by the various craft supervisors, certifying that all embedments, block outs, sleeves, inserts, etc are in place, and the area is ready for concrete, were audited, together with the pour record showing the design mix required and the batch tickets showing the design mix delivered. No deficiencies were noted. (4605.05 b7)

3. Observation of Work (4605.06)

Due to inclement weather cadweld splices were not being made and the only concrete work in progress was pouring a wall in the auxiliary building. It was observed that adequate tremies were in place and there was an adequate work force available to handle the work. (4605.06 a, b5 and 4605.04 h4)

E. Prestressed Concrete (4700)

1. Implementation of QA Program (4705.03)

The test blocks for monitoring and testing tendons have been installed. The test blocks contain six ducts, two open each end,

four sealed and capped at each end. Two tests are being set up, one is for the tendons protected with Visconorust No. 2690 grease only, the second test is for an inner coat of FCR-AA with a wrapping to hold the innercoat in place, and an outer coat of ECP-BB over the wrapper. The temperature and humidity are monitored daily. As soon as the humidity and temperature stabilizes, the tendons will be button-headed and tensioned. (4705.04)

2. Followup Record Audit (4705.05)

The mill certificates for the anchor plates for both Unit 1 and 2 were audited. The plates for Unit 1 are ASTM A-36, no deficiencies were noted in the mill certificates. The mill certificates for the anchor plates in Unit 2 were to ASTM A-516, Grade 70, normalized to ASTM A-300 for fine grain (noted to be 7-8). The normalizing temperature was shown to be 1650° F, and the Charpy V notch results were given. The mill certificates for the tendon ducts were also audited. No deficiencies were noted. (4705.05 a1)

3. Observation of Work

- a. The anchor plates on Unit 1 were observed to be installed per detailed on drawings. The sheaths are connected with Dressler couplings and are checked for electrical continuity and are pressure tested at 5 psig for seal. (4705.04 c1)
- b. Mr. Mason, Job Engineer, UE&C, informed the inspector that plugs or swabs were pulled through each sheath prior to pouring concrete, and again after the concrete is poured. Any joint that opens up during pouring, is dug out, repaired and recast. (4705.06 a2)
- c. The inspector observed the grounding cables being cadwelded to the sides of the anchor plates for Unit 2. No base plates have been installed as yet in Unit 2.

F. Containment Liner

1. Review of QC System (4805.04)

- a. The inspector reviewed the system used by CB&I to identify the NDT procedure and NDT technician relative to the containment liner. The system consists of two stretch-out drawings of the containment shell. One from 0° to 180° and the other from 180° to 360°. There is one set of drawings for each NDT examination made, eg, RT, MP, DP, etc. The drawings show the seam numbers, the initials of the inspector making the examination, the date,

the exact location on the seam, and whether it was made inside or outside the containment. All such examinations were found to be traceable to the work. (4805.04 b4 and b5)

- b. Mr. Avers informed the inspectors that Met Ed visually inspects 100% of the work in order to ensure that all repairs are made prior to pouring concrete against the liner.
- c. The NDT procedures qualification documents were not found at the site. In discussing this with the licensee, the inspector was informed by Mr. Avers that they would have CB&I furnish them with a copy of the qualification documents whether or not it was a code requirement that such documents be available at the site.

IV. Exit Interview

An exit interview was held with Messrs. Hreczuch and Avers.

The inspector asked about the resolution of the questionable pipe from Pipeco. Mr. Avers stated that Met Ed had evaluated the mill certification against test reports from three different laboratories and had concluded that the independent lab reports verify the Pipeco mill certifications. Met Ed has made three audits of the Pipeco shop and concluded that Pipeco is capable of meeting the specifications required. As a result, Met Ed has accepted the Pipeco pipe for use in nuclear systems.

The inspector stated that B&W had told the compliance inspector at Mt. Vernon that the Met Ed reactor vessels did not have any sensitized safe-ends. The inspector asked if Met Ed could verify that statement. Mr. Avers stated that he would determine the status and advise Compliance.

The inspector reviewed the changes in concrete for Units 1 and 2. Mr. Hreczuch stated that selling the batch plant and contracting to buy concrete did not change any of the inspections or test procedures, that UE&C and PTL still performed the same QC function. He stated that Met Ed had instructed Gilbert Associates and Burns and Roe to arrive at a design mix that was suitable for both units. This was desirable to reduce cost and to minimize the chances for using the wrong mix. He stated the necessary tests had been run on the new design mix and that all concerned groups had approved its use for 5000 psi class concrete. Tests are currently underway to approve a design mix for 3000 psi class concrete.

The inspector reviewed problems that had been encountered at other locations in using aluminum pipe to "transport" concrete.* Mr. Hreczuch stated that Met-Ed had not used any aluminum for concrete and did not plan to use any aluminum pipe for that purpose.

*Memo from J. P. O'Reilly, dtd 2/2/70

The inspectors asked about procedures for handling the steam generators and the reactor vessel. Mr. Avers stated that B&W had submitted preliminary procedures to Met Ed. These procedures have been reviewed by UE&C, GAI and Met Ed. Comments have been forwarded to B&W.

The inspector asked about the extent of carbon steel seal rings on the stainless drain pipe from the fuel pit. Mr. Hreczuch stated that the problem had been referred to GAI for resolution. It was assumed that any leakage would be borated water. A review of construction program shows that no stainless steel pipe with carbon steel seal rings have been buried in concrete.

The inspector asked about the qualification of the NDT procedures for the containment liner. Mr. Avers stated that CB&I would be required to furnish the procedure qualification regardless of the code requirements.

In response to questions, Mr. Hreczuch stated that the A-312 pipe that was fabricated with filler metal would be used only in non-nuclear services.

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