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Chicago, Illinois 60690

December 19, 1984

Mr. Harold R. Denton, Director  
Office of Nuclear Reactor Regulation  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555

Subject: Dresden Station Unit 2  
Stainless Steel Pipe  
Inspection Results  
NRC Docket No. 50-237

Reference (a): B. Rybak letter to H. R. Denton  
dated September 17, 1984.

Dear Mr. Denton:

Ultrasonic (UT) inspection of the stainless steel piping done in substantive agreement with Generic Letter 84-11, is now complete. The initial sampling plan of 84 welds, as detailed in Items 2 and 3 of Reference (a), found crack indications in the RWCU system - no new crack indications were found in any other system. Due to the RWCU indications, the UT inspection was expanded to include all accessible RWCU welds (1-6 inch weld, 24-8 inch welds and 5-10 inch welds) bringing the inspection total to 102 welds. Fifteen RWCU welds were found to have crack indications; ten welds outside of the drywell and five welds inside. It is our intent, dependent on material delivery, to replace the Class 1 piping outside of containment with conforming material and to overlay the other five welds. If the piping exterior to the drywell is replaced the interior surface of the normally inaccessible weld inside of the drywell penetration, 8-11N, will be dye penetrant tested. Overlays will be designed using the same methodology employed at other CECO units for welds of this size assuming i.e., 100% thru-wall and the measured length.

If you have any additional questions regarding this matter, please contact this office.

One signed original and forty (40) copies of this letter and the attachments are provided for your use.

Very truly yours,

B. Rybak  
Nuclear Licensing Administrator

lm

cc: R. Gilbert - NRR  
NRC Resident Inspector - Dresden

Attachment

9543N

A047  
1/1

ATTACHMENT 1

Results of Augmented Examinations

Dresden Unit 2

Fall 1984

9543N

## Results of Examinations

### Augmented ISI

Dresden Unit 2    Fall 1984

Augmented inservice inspection of welds in stainless steel piping susceptible to intergranular stress corrosion cracking (IGSCC) was conducted at Dresden Unit 2 during the Fall 1984 outage which began October 4, 1984. The inspections were performed to meet the intent of Generic letter 84-11 and were in accordance with the sampling plan submitted to Mr. Denton in a letter dated September 17, 1984. The table titled "Augmented ISI" from the sampling plan is provided as a reference for reporting the results of the inspections. It should be noted that the number of welds for the 8" portion of the Reactor Water Clean Up (RWCU) system has been increased to 27 from the previously stated 26. All of the welds in the last column of the table identified as the "Total" weld sample were examined ultrasonically. The Level II and III UT personnel performing evaluations of indications were qualified by having successfully performed the practical examination required by IE Bulletin 83-02.

Crack indications were found in the 8" and 10" portions of the RWCU piping. A small circumferential indication not believed to be IGSCC was found in one of the 28" Recirculation system welds (Weld No. PDIA-D14). The remainder of the Recirculation system and the other inspected systems were free of crack indications. The length and depth (7/8" x 4% of wall) of the indication in the 28" weld do not exceed the criteria for Allowable Planar Indications in ASME Section XI Table IWB-3514-2; therefore no extension of the examinations to additional 28" welds was done. Weld PDIA-D14 will be UT examined at the next refueling outage.

Upon finding crack indications in the original samples of the 8" and 10" RWCU piping welds, additional welds were examined as required by ASME Section XI paragraph IWB-2430. Cracking indications were found in the additional samples with the result that all 8" and 10" RWCU welds were examined. At the completion of all inspections, 11 of the 27 8" welds and 4 of the 5 10" welds in the RWCU system had crack indications. Three of the 27 8" welds were inaccessible for inspection; two of these inaccessible welds are saddle reinforced branch connections and the remaining inaccessible weld is within the flued head penetration through the drywell. A fourth inaccessible weld is a saddle reinforced connection for the 6" branch line off the 10" line.

It is our intent, dependent on piping availability, to replace the RWCU piping outside the drywell. Replacement would eliminate two of the presently inaccessible saddle reinforced welds (Weld Nos 8X-1 and 6X-2) and also permit access for a liquid penetrant examination of the inside surface of the weld within the flued head penetration (Weld No. 8-11N). With replacement of piping outside of drywell, the only remaining inaccessible weld would be where the RWCU system branches off the Shutdown Cooling line (also designated Weld No. 8X-1). The saddle welds on this branch connection were liquid penetrant examined.

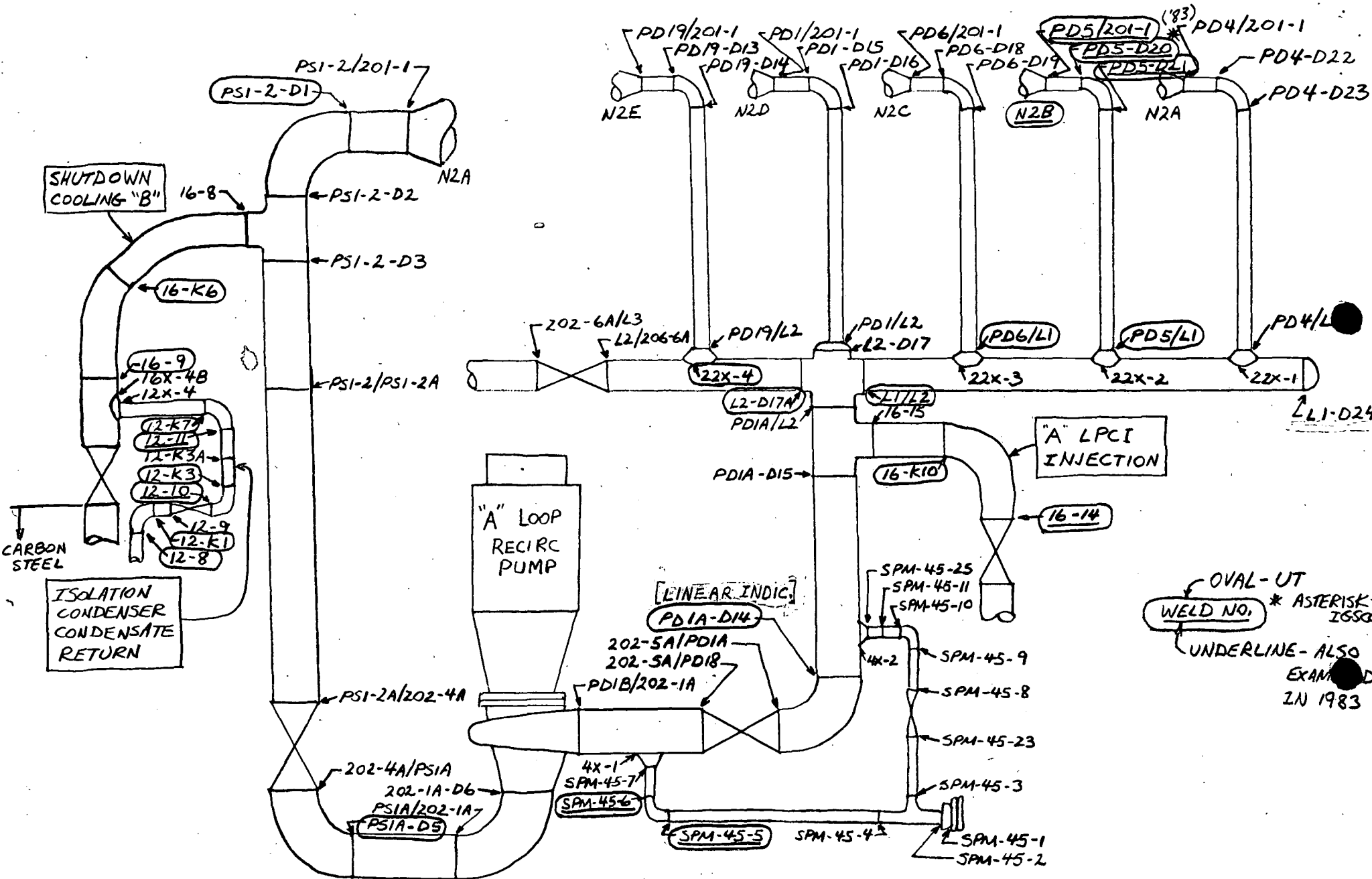
Marked piping drawings are provided of the systems which identify the inspected welds. The very small linear indication in the 28" Recirculation piping is noted, as is the extent of the cracking in the RWCU system. The four inaccessible welds in the RWCU system are also noted on that drawing.

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73-74

AUGMENTED ISI  
DRESDEN UNIT 2 FALL 1984

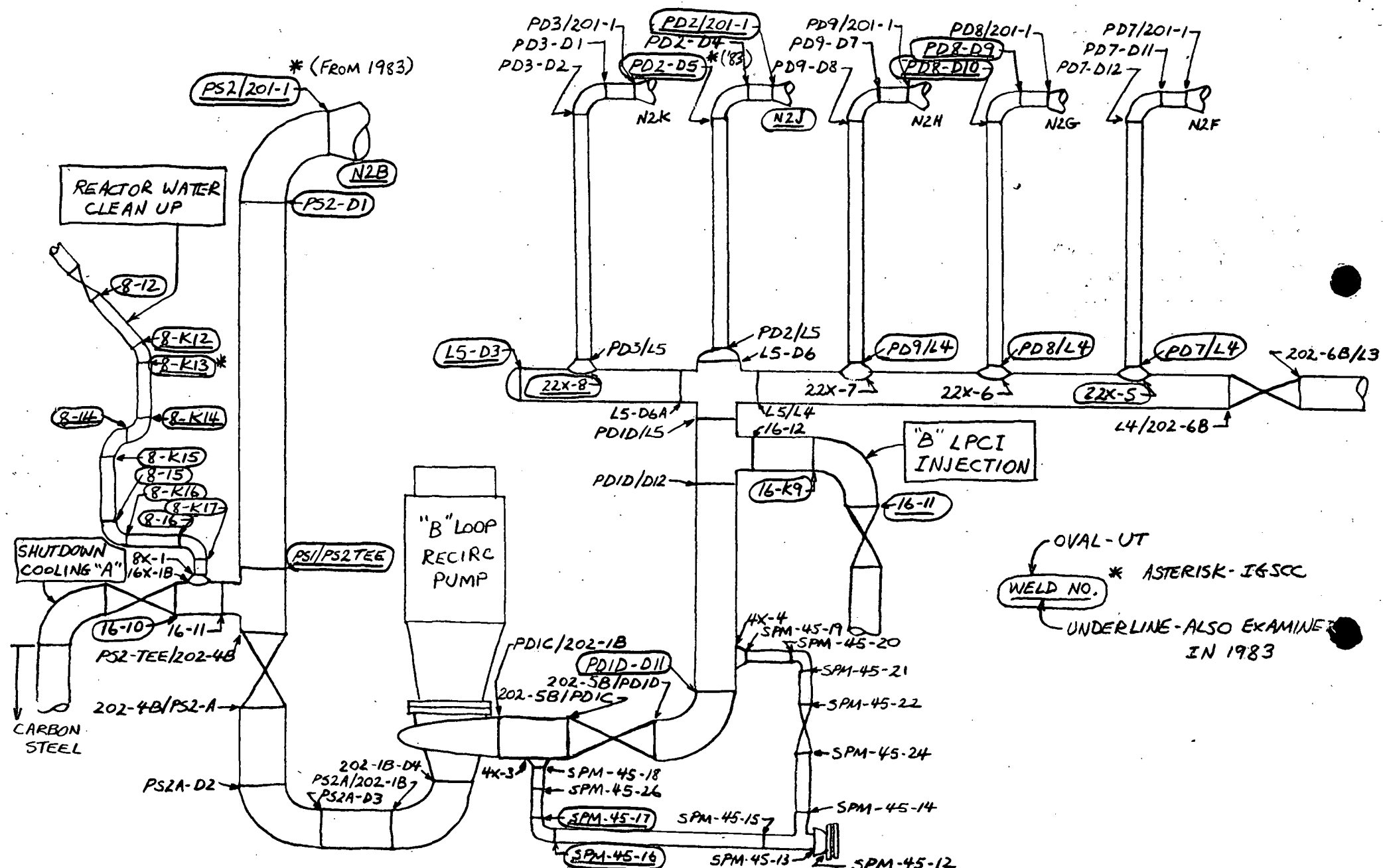
SYSTEM	TOTAL WELDS	EXAMINED 1983	WELD SAMPLE - FALL 1984		TOTAL
			EXAMINED PREVIOUSLY	NOT PREV EXAMINED	
<u>Recirculation</u>					
Risers (12")	40	35 <sup>3</sup>	7 <sup>1</sup>	5	12 <sup>1</sup>
SE/Nozzle	10	10	2	0	2
Outlets (28")	31	6 <sup>2</sup>	2 <sup>2</sup>	5	7 <sup>2</sup>
SE/Nozzle	2	2	1	0	1
Header (22")	18	6	2	4	6
Bypass (4")	23	20	4	0	4
<u>Residual Heat Removal</u>					
LPCI/SDC (16")	42	4	2	8	10
SDC (14")	4	0	0	2 <sup>4</sup>	2 <sup>4</sup>
<u>Reactor Water Clean Up</u>					
6"	2	0	0	1 <sup>5</sup>	1 <sup>5</sup>
8"	27	4	2	5	7
10"	5	0	0	4	4
<u>CRD Return</u> - (4")	6	1	1	4	5
<u>Head Vent</u> - (4")	3	0	0	3	3
<u>Isolation Condensor</u>					
Supply (14")	16	0	0	4	4
Return (12")	13	2	2	4	6
<u>Jet Pump Inst.</u>	10	4	4	6	10
	251	94	29	55	84

- 1 - Includes 2 unrepaired cracked welds.
- 2 - Includes 1 unrepaired cracked weld.
- 3 - Includes 2 unrepaired and 7 repaired cracked welds.
- 4 - Two inaccessible welds (saddle reinforcements).
- 5 - One inaccessible weld (saddle reinforcement).



REACTOR RECIRCULATION SYSTEM "A" LOOP DRESDEN UNIT 2

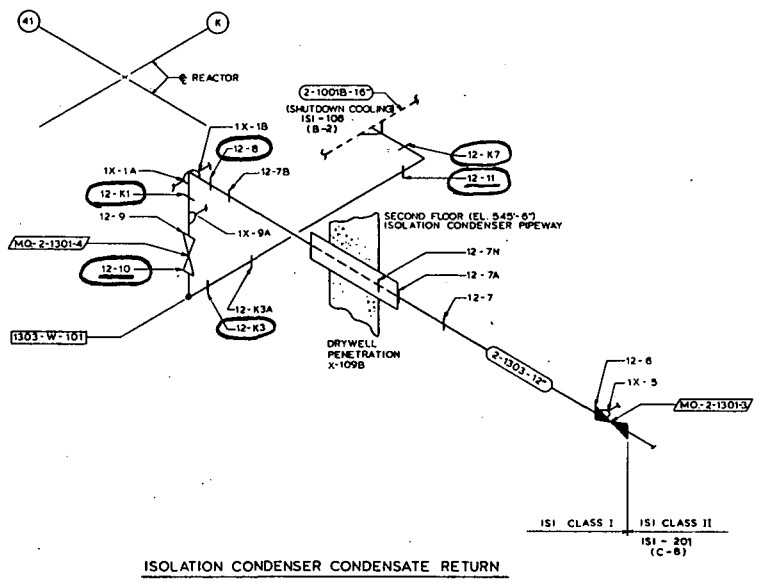
OVAL - UT  
 WELD NO. \* ASTERISK -  
 26SCC  
 UNDERLINE - ALSO  
 EXAMINED  
 IN 1983



REACTOR RECIRCULATION SYSTEM "B" LOOP DRESDEN UNIT 2

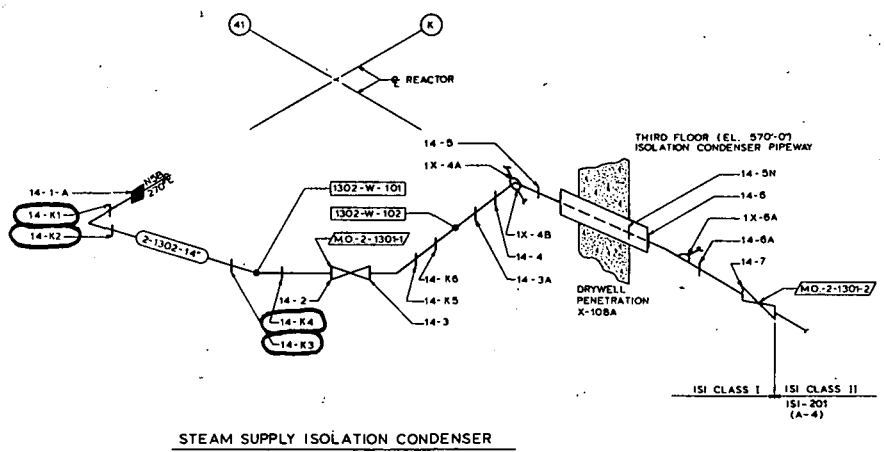
OVAL - UT  
 \* ASTERISK - I&SCC  
 WELD NO.  
 UNDERLINE - ALSO EXAMINED IN 1983

OVAL-UT  
WELD No.  
 UNDERLINE - ALSO EXAMINED  
 IN 1983



ISOLATION CONDENSER CONDENSATE RETURN

APPLICABLE SECTION XI CATEGORIES	NUMBER OF ITEMS
CATEGORY F	1
CATEGORY G-2	2
CATEGORY J	18 (WELDS)
CATEGORY J	0 (BPC)
CATEGORY K-1	2
CATEGORY K-2	2
CATEGORY M-2	2



STEAM SUPPLY ISOLATION CONDENSER

APPLICABLE SECTION XI CATEGORIES	NUMBER OF ITEMS
CATEGORY G-2	2
CATEGORY J	13 (WELDS)
CATEGORY J	0 (BPC)
CATEGORY K-1	1
CATEGORY K-2	1
CATEGORY M-2	2

NOTE:  
(1) SAFE END REPLACED IN SPRING 1976.



FOR LEGEND & SYMBOL SEE ISI-100

DRAWING RELEASE RECORD					DRAWING RELEASE RECORD					SCALE	ISONE	PROJECT NUMBER	SARGENT & LUNDY	DRAWING NO.	REV.
REV.	DATE	PREPARED	REVIEWED	APPROVED	REV.	DATE	PREPARED	REVIEWED	APPROVED						

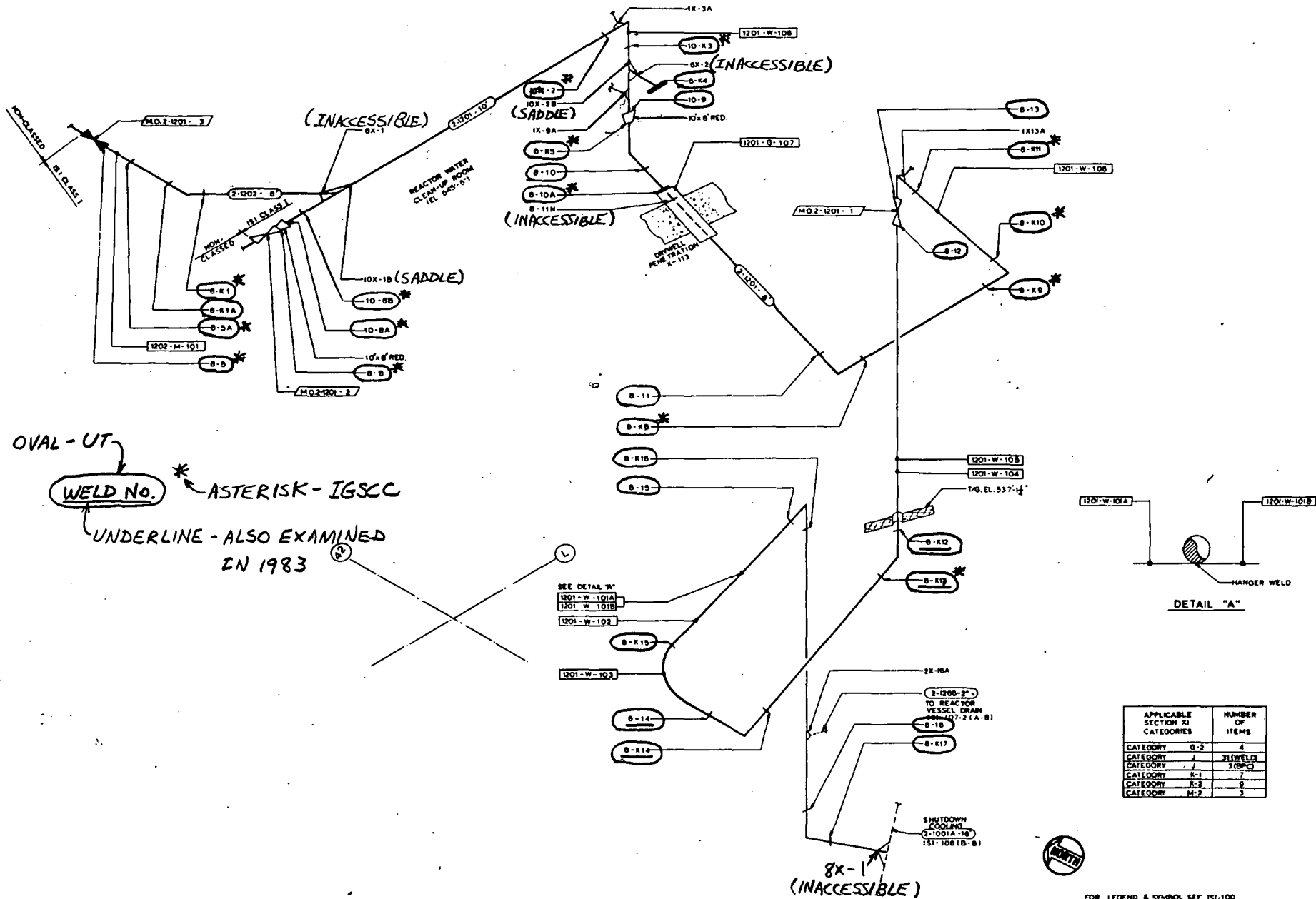
INSERVICE INSPECTION CLASS I ISOLATION CONDENSER PIPING DRESDEN NUCLEAR POWER STATION UNIT 2 COMMONWEALTH EDISON CO. CHICAGO, ILLINOIS

SARGENT & LUNDY  
 CHICAGO  
 DRAWING NO. ISI-105  
 REV. 4









OVAL - UT  
 WELD No.  
 \* ASTERISK - IGSCC  
 UNDERLINE - ALSO EXAMINED  
 IN 1983

APPLICABLE SECTION XI CATEGORIES	NUMBER OF ITEMS
CATEGORY G-2	4
CATEGORY J	31 (WELDS)
CATEGORY J	3 (BPC)
CATEGORY K-1	7
CATEGORY K-2	9
CATEGORY M-2	3

FOR LEGEND & SYMBOL SEE ISI-100

DRAWING RELEASE RECORD					DRAWING RELEASE RECORD				
REV	DATE	BY	REASON	APPROVED	REV	DATE	BY	REASON	APPROVED

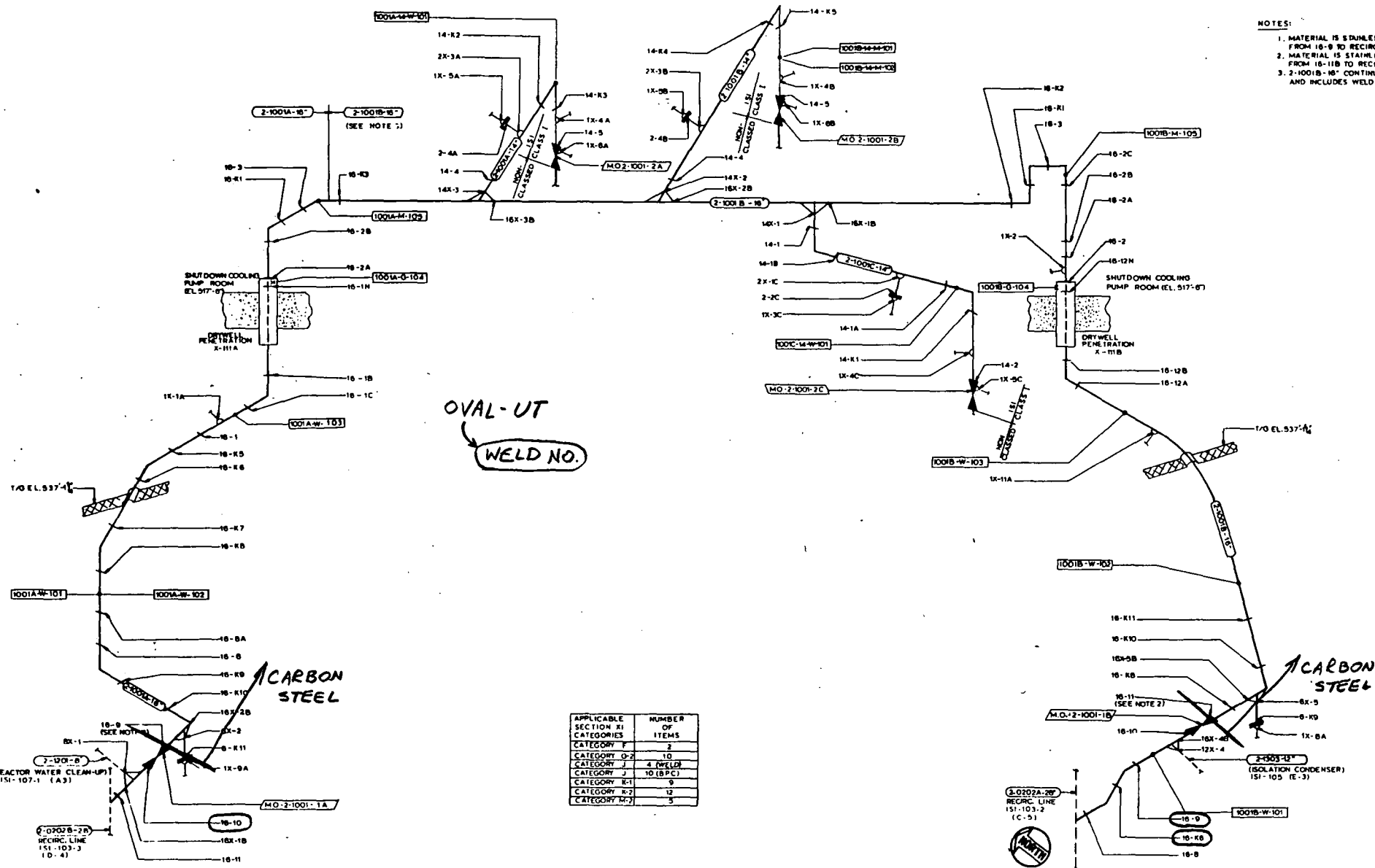
SCALE: NONE  
 PROJECT NUMBER: 3665-15

INSERVICE INSPECTION CLASS I  
 REACTOR WATER CLEAN-UP PIPING  
 DRESDEN NUCLEAR POWER  
 STATION UNIT 2  
 COMMONWEALTH EDISON CO.  
 CHICAGO, ILLINOIS

**SARGENT & LUNDY**  
 ENGINEERS

DRAWING NO: 151-107  
 SHEET 1 OF 2

- NOTES:
1. MATERIAL IS STAINLESS STEEL FROM 10-9 TO RECIRC. LINE
  2. MATERIAL IS STAINLESS STEEL FROM 10-11B TO RECIRC. LINE
  3. 2-1001B-10\* CONTINUES TO AND INCLUDES WELD 10-K3.



FOR LEGEND & SYMBOL SEE 151-100

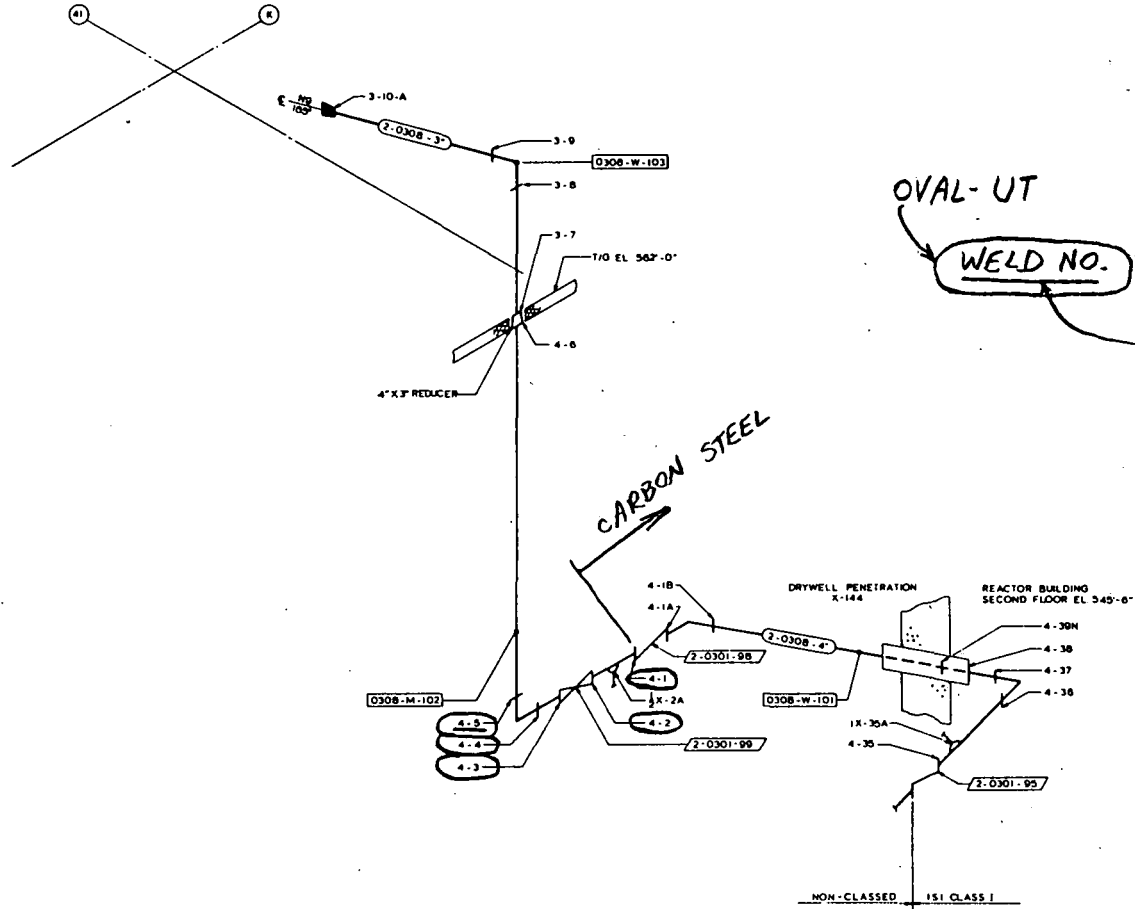
DRAWING RELEASE RECORD					DRAWING RELEASE RECORD				
REV	DATE	BY	APPROVED	PURPOSE	REV	DATE	BY	APPROVED	PURPOSE

SCALE: NONE  
 PROJECT NUMBER: 5805-15

INSERVICE INSPECTION CLASS 1  
 REACTOR SHUTDOWN COOLING PIPING  
 DRESDEN NUCLEAR POWER STATION UNIT 2  
 COMMONWEALTH EDISON CO. CHICAGO, ILLINOIS

DATE: 10/15/58  
 DRAWING NO: 151-108  
 SHEET: 01 OF 01

**SARGENT & LORRY**  
 CONSULTING ENGINEERS



OVAL-UT  
WELD NO.

UNDERLINE - ALSO EXAMINED  
 IN 1983

APPLICABLE SECTION XI CATEGORIES	NUMBER OF ITEMS
CATEGORY F	2
CATEGORY G-2	3
CATEGORY J	16 (WELD)
CATEGORY J	0 (BPC)
CATEGORY K-1	2
CATEGORY K-2	3
CATEGORY M-2	0

**NOTES:**

- 1 SAFE END REPLACED IN FALL 1977
- 2 MATERIAL CHANGES FROM CARBON STEEL TO STAINLESS STEEL AT WELD NO. 4-1 THE MATERIAL IS STAINLESS GOING INTO THE VESSEL.



FOR LEGEND & SYMBOL SEE 1S1-100

DRAWING RELEASE RECORD						DRAWING RELEASE RECORD					
REV	DATE	BY	REASON	APPROVED	PURPOSE	REV	DATE	BY	REASON	APPROVED	PURPOSE

SCALE: NONE  
 PROJECT NUMBER: 5665-15

INSERVICE INSPECTION CLASS I  
 CONTROL ROD DRIVE  
 HYDRAULIC PIPING  
 DRESDEN NUCLEAR POWER  
 STATION UNIT 2  
 COMMONWEALTH EDISON CO.  
 CHICAGO, ILLINOIS

**SARGENT & LUNDY**  
 COMPANY  
 DRAWING NO. 1S1-110  
 SHEET 01 OF 01

ATTACHMENT 2

Flaw Indication Summary

Dresden Unit 2

Fall 1984 Outage

FLAW LOCATION AND DESCRIPTION  
ORIGINAL SCOPE OF EXAMINATION  
DRESDEN UNIT 2 FALL 1984 OUTAGE

<u>Weld ID</u>	<u>Orientation</u>	<u>Location</u>	<u>Description</u>
8-K1	Axial	Elbow side	1/2" x 60% wall
	Axial	Pipe side	3/4" x 35% wall
	Circumferential	Pipe side	4" x 35% wall
8-K5	Axial	Reducer side	1/2" x 30% wall
10-K2	Axial	Pipe side	1/4" x 23% wall
	Circumferential	Pipe side	5" x 30% wall
	Circumferential	Pipe side	1" x 25% wall
	Circumferential	Pipe side	1-3/4" x 35% wall
10-K3	Axial	Elbow side	1/16" x 13% wall
	Circumferential	Elbow side	7" x 27% wall
	Circumferential	Elbow side	1/2" x 28% wall
PDIA-D14	Circumferentially oriented linear indication 7/8" long x 4% wall		

FLAW LOCATION AND DESCRIPTION  
RWCU SYSTEM-EXPANDED SCOPE OF EXAMINATION (100%)  
DRESDEN UNIT 2 FALL 1984 OUTAGE  
(INSIDE CONTAINMENT)

<u>Weld ID</u>	<u>Orientation</u>	<u>Location</u>	<u>Description</u>
8-K8	Circumferential	Pipe side	3" x 40% wall
8-K9	Circumferential	Pipe side	5" x 16% wall
	Circumferential	Pipe side	2" x 20% wall
8-K10	Circumferential	Pipe side	1" x 39% wall
	Circumferential	Pipe side	4-1/2" x 43% wall
	Circumferential	Pipe side	7" x 40% wall
8-K11	Circumferential	All indi- cations on	1-1/2" x 25% wall
	Circumferential		1-1/4" x 34% wall
	Circumferential	Pipe side	3/4" x 35% wall
	Circumferential		1-1/8" x 35% wall
	Circumferential		1-3/8" x 16% wall
	Circumferential		1-3/8" x 25% wall
	Axial		1/16" x 19% wall
	Axial		1/16" x 13% wall
8-K13	Circumferential	Pipe side	3/8" x 31% wall
	Circumferential	Pipe side	3" x 40% wall
	Circumferential	Pipe side	1" x 39% wall
	Circumferential	Pipe side	4-3/4" x 40% wall
	Circumferential	Elbow side	1-1/2" x 10% wall
	Axial*	Pipe side	7/16" x 50% wall
	Axial*	Elbow side	.3" x 17% wall

\* Associated with circumferential flaw.



FLAW LOCATION AND DESCRIPTION  
RWCU SYSTEM-EXPANDED SCOPE OF EXAMINATION (100%)  
DRESDEN UNIT 2 FALL 1984 OUTAGE  
(OUTSIDE CONTAINMENT)

<u>Weld ID</u>	<u>Orientation</u>	<u>Location</u>	<u>Description</u>
8-10A	Circumferential	Pipe side	3" x 16% wall
	Axial*	Pipe side	1/2" x 12% wall
	Axial*	Pipe side	1/2" x 12-1/2% wall
10-8A	Circumferential	All indications on Pipe side	4" x 65% wall
	Axial*		3/8" x 11% wall
	Circumferential	Pipe side	3" x 18% wall
	Axial*		3/8" x 22% wall
10-8B	Axial	Pipe side	.5 to .8 max. x 11% wall (length obstructed by weld crown)
8-5	Circumferential	Pipe side	1-3/4" x 32% wall
	Axial*	Pipe side	.5 - .6 x 14% wall
8-5A	Axial	Pipe side	3/8" x 37% wall
8-8	Axial	Reducer side	3/8" x 22% wall

\* Associated with circumferential flaw.

ATTACHMENT 3

Supporting Data

9543N

In order to support a review by the NRC Staff of the stainless steel piping inspection on Dresden Unit 2 during its Fall 1984 outage, additional information is normally requested. Supporting information is therefore provided on the following topics:

1. Summary of stresses for the flawed RWCW Welds - Table I
2. Weld Overlay Dimensions - Table II
3. Comparison of 1983 vs 1984 inspection results for the unrepaired 1983 welds - Table III.

The summary of stresses for the flawed RWCW welds includes the ten welds located outside of the containment, even though it is our intent to replace the piping. However, Table II, the weld overlay design dimensions reflect our decision to replace pipe and lists only the five welds inside containment.

Three welds were left unrepaired after the 1983 inspection - PS2-201-1, PD5-D20 and PD2-D5. Using the same contractor, equipment and procedures these welds were re-rexamined. The results are shown on Table III.

The results, given the accuracy of the UT measurements strongly suggests that the flaws did not grow during the last cycle.

A total of 31 welds were examined during both the 1983 and 1984 outages. Inspections summaries for each of the 31 welds were compared for both outages. Where differences were found a detailed review of the UT data was performed. Anomalies were reviewed and resolved by CECO NDE personnel in all cases except for weld 8-K13. In that one weld, the 1983 inspection results considered the indications found as ID geometry; the 1984 inspection now considers the previous indications in those areas as cracks. All in all, although flaw indications were found in one weld, the results of the comparison is considered very consistent between the 1983 and 1984 outages.

SUMMARY OF STRESSES  
FLAWED RWCU SYSTEM PIPE WELDS  
DRESDEN UNIT 2 FALL 1984 OUTAGE

<u>Weld ID</u>	<u>Dead Weight</u>	<u>Maximum Stress (psi)</u>		<u>Pressure (Axial)</u>	<u>Pressure (Hoop)</u>
		<u>Thermal</u>	<u>Seismic</u>		
Outside Containment:					
8-5	307	1551	1541*	2936	6642
8-5A	868	1535	1635*	3148	7121
8-K1	44	1701	1459*	2893	6818
8-8	849	2652	1635*	3148	7121
10-8A	288	1031	1481*	3069	7170
10-8B	321	1149	1661*	3451	7905
10-K2	181	1096	1481*	3069	7170
10-K3	160	1354	1481*	3069	7170
8-K5	164	4025	4798	3148	7327
8-10A	99	6657	9835	3504	8258
Inside Containment:					
8-K8	582	1981	1459*	3504	8258
8-K9	494	2181	1459*	3504	8258
8-K10	754	1741	1459*	3504	8258
8-K11	984	1161	1459*	3504	8258
8-K13	694	1839	1541*	3556	8363

\* Bounding Stresses

WELD OVERLAY DIMENSIONS  
DRESDEN UNIT 2 FALL 1984 OUTAGE  
( INSIDE CONTAINMENT )

Overlay Dimensions for  
Thru-Wall X Measured Length

<u>Weld ID</u>	<u>t</u>	<u>L/2</u>
8-K8	0.17	1.5
8-K9	0.17	1.5
8-K10	0.17	1.5
8-K11	0.17	1.5
8-K13	0.17	1.5

COMPARISON AND DESCRIPTION OF FLAWS NOT REPAIRED  
DRESDEN UNIT 2

<u>Weld ID</u>	<u>Orientation</u>	<u>Location</u>	<u>Spring 19#3 Outage Description</u>	<u>Fall 1984 Outage Description</u>
PS2/201-1 (28")	Circumferential	Safe End Side	1" x 16% wall	1" x 17% wall
PD5-D20 (12")	Circumferential	Pipe Side	1/4" x 17% wall	1/4" x 16% wall
	Circumferential	Pipe Side	1/4" x 19% wall	1/4" x 16% wall
PD2-D5 (12")	Circumferential	Pipe Side	1/2" x 19% wall	1/2" x 17% wall
	Circumferential	Pipe Side	1/4" x 14% wall	1/4" x 17% wall