

ENCLOSURE

SAFETY EVALUATION REPORT
ALTERNATIVE PLAN FOR THE PRESERVICE EXAMINATION OF CLASS 2 PIPING

DUQUESNE LIGHT COMPANY (DLC)
BEAVER VALLEY UNIT 2
DOCKET NO. 50-412

MATERIALS ENGINEERING BRANCH
INSERVICE INSPECTION SECTION

I. INTRODUCTION

This report was prepared with the technical assistance of DOE Contractors from the Idaho National Engineering Laboratory.

In a letter dated October 19, 1984, the Applicant requested staff approval to utilize the ASME Code Section XI 1983 Edition, Winter 1983 Addenda (83W83) for the selection and examination of Class 2 piping welds at Beaver Valley Unit 2. Since this document is not referenced in 10 CFR 50.55a(b), specific staff approval is required. The subject was discussed during a public meeting in Bethesda, MD on December 12, 1984. Based on additional evaluations, DLC withdrew the request for use of the 83W83 Addenda and submitted a revised Class 2 piping examination plan in a letter dated January 31, 1985. This revised plan (the Plan) incorporates the ASME Code Section XI 1980 Edition, Winter 1980 Addenda (80W80) and 1974 Edition, Summer 1975 (74S75) requirements as referenced in 10 CFR 50.55a(b) and includes additional welds for examination based on the 83W83 Code for compatibility with anticipated ISI requirements.

A technical evaluation of the concepts described in this revised plan follows. When the complete PSI Program, including isometric drawings, is submitted for review, an evaluation of the entire program will be performed by the staff, including confirmation that a representative sample

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of welds has been selected for volumetric examination and the Applicant was able to distribute the total number of volumetric examinations among the various diameters of pipe within a system.

II. CODE REQUIREMENTS

The construction permit for Beaver Valley Unit 2 was issued on May 3, 1974. Paragraph 10 CFR 50.55a(g)(2) requires the use of Section XI of the ASME Boiler and Pressure Vessel Code and Addenda in effect six months prior to the date of issuance of the construction permit. In the partial PSI Program submitted June 29, 1984, the Applicant stated that in accordance with these requirements, the Beaver Valley Unit 2 Program must comply with the requirements of the 1971 Edition of ASME Code Section XI with Addenda through Winter 1972. However, as permitted by the 10 CFR 50.55a(g), the Applicant had elected to voluntarily update the Code requirements to the 1980 Edition of Section XI with Addenda through Winter 1980 and, as required by 10 CFR 50.55a(b)(2)(iv) for Class 2 piping welds, apply the 1974 Edition with Addenda through Summer 1975 for selection of welds to be examined in the Residual Heat Removal (RHR) systems, Emergency Core Cooling systems (ECCS), and Containment Heat Removal (CHR) systems. The sampling criteria, locations of welds to be examined and method of examination are different in the 74S75, 80W80 and 83W83 Addenda of Section XI.

III. SUMMARY OF JANUARY 31, 1985 SUBMITTAL

The Plan utilizes the 80W80 Code for volumetric and surface examinations along with the 74S75 Code to select the welds in the Residual Heat Removal System, Emergency Core Cooling System, and Containment Heat Removal Systems. The Applicant provided the attached Table to summarize the concepts used in the Plan for the preservice examination by comparing the required examinations with the proposed alternative plan.

The 83W83 Code is used for guidance to select additional welds for examination to provide compatibility with anticipated ISI requirements. A 10 percent sample criteria for stainless steel systems is utilized in lieu of the 7.5 percent sample criteria defined in the 83W83.

The Plan includes preservice ultrasonic examination of welds in high energy fluid systems subject to augmented ISI. These welds are located in the identified Break Exclusion Zone for the main steam system (MSS), feedwater system (FWS), and steam vent system (SVS), located outside containment.

The Plan increases the total number of volumetric examinations as compared with the 80W80 Code (with 74S75) and results in a total number of examinations which exceed the 80W80 Code total number of examinations, even when examinations are deleted for welds which would receive only a surface examination per the 80W80 Code. Deletion of the 80W80 Code "unique", "surface only" examinations (399 welds) is requested as examination of these welds may not be required by future Code edition and addenda.

IV. STAFF EVALUATION

The regulations provide the Applicant with several options regarding the choice of the ASME Code edition. The Applicant recognized that following these requirements during the preservice inspection could result in the selection of welds and methods of examination that may be significantly different from possible requirements for the inservice inspection. In this event, a baseline examination would not exist and the outside surface of the weld would not be profiled for volumetric inservice examination. Therefore, the Applicant formulated an alternative plan that is intended to be equivalent or superior to the applicable Code requirements referenced in 10 CFR 50.55a(b).

The ASME Code published revisions to the requirements for the examination of Class 2 piping in the Winter 1983 Addenda to address discussions with the NRC management that started in 1977. However, this Addenda has not yet been referenced in 10 CFR 50.55a(b). The 83W83 Code reduces the number of exclusions, eliminates most of the "surface only" examinations that are not effective and provides a better distribution of examinations among welds. One objective was to provide comprehensive Code rules that may be substituted for the variety of composite-Code approaches illustrated in the attached Table.

The staff has evaluated the Applicant's revised Class 2 piping examination plan dated January 31, 1985. The submitted information was conceptual and did not include isometric drawings that would permit an independent review. Thus, the following evaluation is based on Applicant's interpretation of the Code requirements and his analysis of lines and welds. Objectives of the staff's review are to assure that a representative sample of welds is selected and appropriate examination techniques are used.

1. The Plan includes all welds which are required to receive both volumetric and surface examinations per the 80W80 and 74S75 Code requirements. This includes 89 stainless steel and 29 carbon steel welds.
2. Additional stainless steel welds for both volumetric and surface examinations are included by applying the 83W83 Code rules with an augmented 10 percent sampling criteria in lieu of the specified 7.5 percent sample. This adds 155 more stainless steel and 10 more carbon steel welds. Previous Code editions and addenda often resulted in exempting entire engineered safety systems from

volumetric examinations as illustrated on sheet 1 of the Table. This was the subject of staff Question 250.1 which states in part: "Paragraph 50.55a(b)(2)(iv) requires that ASME Code Class 2 piping welds in the Residual Heat Removal Systems, Emergency Core Cooling Systems and Containment Heat Removal Systems shall be examined. These systems should not be completely exempted from preservice volumetric examination based on Section XI exclusion criteria contained in IWC-1220". The proposed 83W83 Code additions satisfy this question.

3. The Plan adds 195 volumetric-only examinations for carbon steel systems subject to augmented ISI and states that the ultrasonic method will be used.
4. The Plan requests dropping all surface-only examinations that would be required uniquely by the 80W80 Code requirements and deletes 375 stainless steel and 24 carbon steel welds. The additional volumetric examinations covered in paragraphs 2 and 3 above, which are better suited for detection of inservice degradation, compensate for this requested deletion of surface-only examinations.
5. The Plan significantly increases the number of volumetric examinations when compared with the 80W80 Code rules. By adding the 83W83 Code sampling criteria, the volumetric examinations better distributed among systems of interest. For example, welds in the High Pressure Injection System that are 2 inch through 4 inch NPS and with wall thickness greater than 1/5 inch are included for examination whereas the earlier Code editions and addenda exempted these welds.
6. The additional 83W83 Code examinations provide for better compatibility between the PSI baseline and anticipated ISI requirements.

IV. CONCLUSION

The staff has determined that methodology in the alternative plan for the preservice examination of Class 2 piping, as described in the Applicant's letter of January 31, 1985, is equivalent or superior to the requirements of the applicable Codes referenced in 10 CFR 50.55a(b) and therefore meet the provisions of 10 CFR 50.55a(a)(3). The Applicant's Plan includes the following features:

1. A preservice volumetric examination will be performed on engineered safety systems that could be excluded from volumetric and surface examinations based on paragraph IWC-1220 of Section XI, 74S75 Code.
2. A preservice volumetric examination will be performed on high energy fluid system subject to augmented inservice inspection.
3. A large number of Code-required "surface only" examinations will be eliminated. Surface examination techniques alone are not normally effective in the early detection of inside diameter service-induced degradation of welds in the pressure boundary.
4. A greater number of preservice volumetric examinations will be performed and the distribution of welds should be superior to the requirements of the 80W80 Addenda.

Therefore, the staff has concluded that the Applicant's proposed plan is acceptable for the preservice examination. The staff intends to review the complete Preservice Inspection Program when the document is submitted and confirm that the Applicant was able to distribute the total number of volumetric examinations among the various diameter of pipe within a system. The requirements for inservice inspections are established by the regulation based on the date of issuance of the operating license. The staff assumes that the Applicant will be permitted to select Class 2 piping welds during the initial 10-year inspection interval at locations with a preservice baseline. The staff review of the Applicant's proposed preservice inspection methodology is not intended to modify the staff review of high energy fluid systems described in FSAR Section 3.6.

TABLE 1
CLASS 2 PIPING WELD EXAMINATION SUMMARY SHEET
Sect. XI, Table IWC-2500-1, Exam. Cat. C-F-1
(Sheet 1 of 2)

STAINLESS STEEL SYSTEMS:

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	74S75 Sect. XI Rules						83W83 Sect. XI Guidance Using 10% Selection							
	Nonexempt Welds			ISI Req'd Exams			Nonexempt Welds				ISI Req'd Exams			
System	Vol Surf + and = Total Only Surf			Vol Surf + and = Total Only Surf			Vol Surf + and + Exam = Total Only Surf N/A				As % of SS Welds	10.0% Prorata = Surf + and Share Only Surf		
CHS	108	0	108	52	0	52	526	431	108	1065	41.009	107	59	48
QSS	----- Exempt IWC - 1220 (b) -----						0	47	125	172	6.623	17	0	17
RHS	212	2	214	107	1	108	0	64	203	267	10.281	27	0	27
RSS	----- Exempt IWC - 1220 (b) -----						0	126	28	154	5.930	15	0	15
SIS	342	151	493	217	88	305	176	494	269	939	36.157	94	26	68
Subtotal SS	662	153	815	376	89	465	702	1162	733	2597	100	260	85	175

- NOTES: A. 10CFR50.55a(b)(2)(iv) invokes requirements to use the 74S75 Code for the above systems to determine only exemption criteria (IWC-1220) and selection criteria (IWC-2411 and Table IWC-2520, Cat. C-F and C-G). The preservice requirement and the specific required examination method remain in accordance with the Code of choice, namely 80W80.
- B. The high number of welds in the CHS and SIS Systems which are candidates for surface and not volumetric examinations under the 83W83 Code is due largely to the fact that 2" NPS lines in these systems are of socket weld construction.
- C. Exemption IWC-1220(b): Components in systems or portions of systems, other than emergency core cooling systems, which do not function during normal reactor operation.

TABLE 1
CLASS 2 PIPING WELD EXAMINATION SUMMARY SHEET
Sect. XI, Table IWC-2500-1, Exam. Cat. C-F-2
(Sheet 2 of 2)

CARBON STEEL SYSTEMS:

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	80W80 Sect. XI Rules						83W83 Sect. XI Rules							
	Nonexempt Welds			ISI Req'd Exams			Nonexempt Welds				ISI Req'd Exams			
System	Vol Surf + and Only	Vol Surf	= Total	Vol Surf + and Only	Vol Surf	= Total	Vol Surf + and Only	Vol Surf	+ Exam N/A	= Total	As % of CS Welds	7.5% Prorata = Share	Vol Surf + and Only	Vol Surf
FWS	0	52	52	0	13	13	0	52	0	52	27.660	8	0	8
MSS	3	71	74	1	16	17	3	71	0	74	39.361	11	1	10
SVS	96	0	96	24	0	24	0	62	0	62	32.979	9	0	9
Subtotal CS	99	123	222	25	29	54	3	185	0	188	100	28	1	27
Subtotal SS	662	153	815	376	89	465	702	1162	733	2597	---	260	85	175
Total	761	276	1037	401	118	519	705	1347	733	2785	---	288	86	202

NOTE: A decrease of one weld which is required to be volumetrically examined is realized by moving to the 83W83 Code (columns 5 and 14). However this is offset by the fact that the major portion of the nonexempt weld candidates are located in the "break exclusion zone" which is subject to an augmented volumetric examination program during the operating phase of the plant. Therefore, additional welds will be volumetrically examined during each inservice inspection interval.

Advantage of Utilizing the 83W83 Code for CS Systems:

- SVS is now included in the population subject to volumetric examination due to inclusion of 3/8" through 1/2" wall under this examination requirement.
- PSI compatability with the ISI Program.