Task V Radiographic Confirmation Report 1/31/83
3/24/83 Rev. 1

This report outlines the method used to fulfill the requirements of "The Quality Confirmation Program" concerning the re-review of Pullman Power Product pipe welds and the reradiography of selected samples of those welds.

The evaluation of this program by CG&E has demonstrated that the absence of shims has a negligible effect upon the required radiographic sensitivity when the film density in the area of interest is maintained within Code requirements. For the broad range of pipe sizes and thickness included within the program, the results confirm that radiographs with properly shimmed penetrameters do exhibit the Code required images of the penetrameter outline and essential hole or slits when the radiography is performed using the same technique as the original but unshimmed radiograph. For those cases where it was not possible to utilize the same technique as the original and an alternate Code acceptable but less favorable radiographic technique was used, the program still demonstrated essentially equivalent sensitivity as the original radiography.

The results of the QCP Task V program indicate that the existing radiographs of those welds which were not re-radiographed as part of this program can be relied upon to have sufficient radiographic sensitivity to evaluate and interpret the weld quality even though the penetrameters on these radiographs were inadequately shimmed.

Concerning Radiographs

Problem (as stated by the NRC)

Radiographic technique did not meet the ASME code in that the penetrameters were not adequately shimmed in approximately 180 out of 600 radiographs reviewed by the NRC.

Action

1. Demonstrate that the existing radiographs of large bore piping supplied by the CG&E piping fabricator are adequate to identify weld deficiencies by:

    a) Review the shop radiographs to identify those radiographs that are either unshimmed or inadequately shimmed to determine, for each pipe size and thickness, the films which contain the least sensitive penetrameter images (essential hole or slit) where the density of the penetrameter is the same or greater than the density of the area of interest.

Resolution

Method Used to Compile List of Pipe Diameters and Wall Thickness

A review was performed of all Pullman Power Product pipe weld radiographs (18003) to determine the density of the weld and the density of the penetrameter. Only film where the density of the penetrameter was greater than the lightest area of the weld became subject to final review (Reference QCP Procedure 19-QA-01, para. 6.5). In the final review, the Level III determined and recorded the sensitivity levels of each radiograph by noting the most sensitive penetrameter characteristic that could be clearly detected.

In addition, he noted the least sensitive penetrameter characteristic (Reference QCP Procedure 19-QA-01, para. 6.9) and also noted whether or not a shim was used (Reference QCP Procedure 19-QA-01, para. 6.3). All of the above information was listed in the computer. When all weld radiographs had been reviewed as indicated above, utilizing the computer they were grouped by pipe size and wall thickness. This formed the list of pipe size and wall thickness of which there were 62 categories listed. These categories are listed on Attachment #1.

NOTE: The category thickness is based upon the nominal pipe size. The actual pipe wall thickness and weld thickness may be greater than the nominal pipe size.

The initial review revealed that a group of 153 film relating to 19 welds did not fall within the scope of the program but needed further review to determine acceptability to all aspects of the Code. This subsequent review found eleven welds to be code acceptable and eight welds that did not meet the requirements of IX 3334.5 of the Code. These eight welds are identified on Nonconformance Report #Q-QAD-83-0586-N.

Action (CG&E)

b) Reradiograph the weld identified above, if accessible, using, as nearly as possible, the original technique plus the penetrameter shimmed to at least the total weld thickness including reinforcement, all in accordance with the code.

Resolution

Selection of Welds to be Reradiographed

After the list of pipe size and wall thickness was formulated one weld of each pipe size and wall thickness was selected, from each group of those radiographs judged to be least sensitive, and was reradiographed. Attachment #5 delineates the sensitivity classification and the number of Radiographs falling within those classifications.

Deletions of Categories From The Original 62

After additional input from Pullman Power Products and upon further investigation sixteen (16) of the 62 categories were deleted from the confirmation program. See Attachment #2.

1. Twelve (12) categories were penetration plates or flued head plates which meet requirements of ASME Section III Article IX sub-paragraph IX 3110 and paragraph NB-5277 special exceptions, Summer of '72 addenda. See Attachment #3

2. Two (2) categories (10" .719 and 4" .531) were re-reviewed and were found to meet all shimming and density requirements therefore are not required to be part of the program.

3. One (1) category (18" . 438) included only one weld. This weld had been cut out and replaced by a HJK field weld. Reference HJK Equipment Trouble Report 397-9931-9397.

4. One (1) category is 1.500 Plate. The program is designated for pipe welds not plate welds.

Changes In Pipe Sizes/Thickness Categories

Prior to each category being reradiographed the original film was re-reviewed for correct pipe size/wall thickness designation. After this review nine (9) categories were changed to reflect the correct size or wall thickness. These are listed as #5 on Attachment #2.

Final List of Pipe Size/Wall Thickness

After all changes and/or deletions, a list of forty six (46) different pipe sizes and wall thicknesses was formulated. These categories are listed on Attachment #4. Along with each pipe size and wall thickness, the PSK line number and weld number that identified the welds that were reradiographed, are also listed.

Inaccessible Weld Categories and Reasons For Inaccessibility

After a thorough field walkdown of the original 62 categories four (4) categories were determined to be inaccessible. They are:

1. 14"STD/WT X 8" SCH/40 weldolet to 14" STD pipe weld. The installed configuration does not permit radiography.

2. 18" .375. All welds are on service water lines that cannot be properly radiographed due to silt settling in the lines when drained.

3. 27".875. (rolled plate) This category is the longitudinal weld on downcomer support sleeves. The installed condition does not permit radiography due to concrete interference. (See Dwg. S401).

4. 30" .375. All welds are on service water lines that cannot be properly radiographed due to silt settling in the lines when drained.

Mock-up of Inaccessible Categories

Mock-ups have been fabricated, per paragraph 6.16 of CG&E Procedure 19-QA-01, which states: The original technique may be qualified by use of a mock-up weld sample of nearly identical diameter and wall thickness.

The four mock-ups were constructed using existing approved weld procedures, employing TIG root and first pass and SMAW completion. These weld mock-ups were subjected to normal inspection prior to being serialized and stamped.

Note: After the final review, 85 welds were identified as not meeting the minimum density requirements of 2.0 H.D. as stated in ASME Section III Appendix IX, Article IX 3000 sub paragraph IX 3334.3. These welds were subsequently identified on 20 Nonconformance Reports and are in the NR system for disposition.

ATTACHMENT #1

ORIGINAL LISTING OF PIPE SIZE/WALL THICKNESS CATEGORIES

Pipe Size	Wall Thickness	Pipe Size	Wall Thickness
*WR	.625	20"	.375
* 2 1/2	.120	20"	1.031
2 1/2	.203	20"	1.500
2 1/2	.276	*20"	1.969
* 3 1/2	.120	22"	.375
3 1/2	.226	*22"	.969
3 1/2	.318	24"	.375
* 4"	.120	24"	.969
4"	.237	24"	1.812
4"	.337	28"	.375
4"	.438	28"	.625
* 4"	.531	30"	.375
* 6"	.134	36"	.750
6"	.280		
6"	.432		
6"	.562		
* 8"	.148		
* 8"	.322		
8"	.406		
8"	.500		
* 8"	.719		
8"	.875		
*10"	.165		
*10"	.365		
10"	.594		
*10"	.719		
10"	.844		
*12"	.180		
12"	.375		
12"	.406		
12"	.500		
*12"	.562		
12"	.688		
12"	1.00		
*14"	.188		
14"	.375		
14"	.438		
14"	.750		
14"	.938		
14"	1.094		
16"	.375		
16"	1.031		
16"	1.219		
18"	.375		
*18"	.438		
18"	.938		
18"	1.156		
18"	1.375		
*18"	1.781		

*These categories changed as reflected on Attachment #2.

ATTACHMENT #2

CATEGORIES DELETED FROM ORIGINAL LIST

	Pipe Size	Wall Thickness	
(1)	*WR	.625	Penetration Plate or Flued Head Plate
	2 1/2"	.120	Penetration Plate or Flued Head Plate
	3 1/2"	.120	Penetration Plate or Flued Head Plate
	4"	.120	Penetration Plate or Flued Head Plate
	6"	.134	Penetration Plate or Flued Head Plate
	8"	.148	Penetration Plate or Flued Head Plate
	*10"	.165	Penetration Plate or Flued Head Plate
	*10"	.365	Penetration Plate or Flued Head Plate
	*12"	.180	Penetration Plate or Flued Head Plate
	*14"	.188	Penetration Plate or Flued Head Plate
	18"	1.781	Penetration Plate or Flued Head Plate
	20"	1.969	Penetration Plate or Flued Head Plate

After film review changes were made to the following categories and the category were deleted.

(2)	10"	.719	All welds met density requirements.
	4"	.531	All welds met density requirements
(3)	18"	.438	Weld was replaced by HJK field weld
(4)	Plate	1.500	Program is for pipe welds not plate welds

NOTE: The pipe size and thickness categories listed above have resulted in elimination of 16 categories from the original 62. See Attachment #4 of the Task V Radiography Confirmation Report for a corrected list of categories.

Attachment #2 cont'd

After review changes were made to the following categories:

(5) A. 28" Changed to 27" .875 wall

Reason for Change: Computer entry error 27" is special order but was originally entered as 28"

B. 3 1/2" Changed to 3" .120 wall

3 1/2" Changed to 3" .226 wall

3 1/2" Changed to 3" .318 wall

Reason for Change: O.D. Dimensions were entered in computer in error
I.D. dimension are correct entry

C. 36" Changed to 1.336 wall

Reason for Change: Computer entry error was entered as .750
Re-entered correct 1.336

D. 12" .562 Changed to 10" .594 wall

8" .406 Changed to 8" .322 wall

Reason for Change: Computer entry error actual size or wall thickness reflects
(for the 8" counter bore)
(for the 12" 12"x8" reducer.)

E. 22" .969 Changed to 24" .894 wall

Reason for Change: The I.D. Dimension was entered in computer in error.

The O.D. Dimension is the correct entry for pipe size.

.969 Dimension = Wall Thickness (.894) + Shim Thickness

.894 is correct entry for wall thickness.

F. 8" .719 Changed to 14 STD/WT x 8" SCH/40 weldolet to 14".375 pipe

Reason for Change: The weld in this category is a branch line connection of a 14" x 8" weldolet to 14" pipe. Not 8" pipe to weldolet.

ATTACHMENT #3

JUSTIFICATION FOR ELIMINATION OF PENETRATION PLATES AND FLUED HEAD PLATES FROM LIST OF CATEGORIES

(Includes Exerpts from ASME Section III Article IX-3000)

It was determined that the welds within 12 categories received a volumetric examination according to ASME Appendix IX Article IX-3110. Article IX-3110 states in part: (a)"..... The methods as described are applicable to most geometric configurations and materials encountered in fabrication and shall be applied for normal conditions. However, special configurations and materials may be encountered that require modified methods and techniques....." and

"(b) Such special procedures may be modifications or combinations of methods described in IX 3000 and shall be proven by demonstration to result in an examination capable of detecting discontinuities to the same extent that applicable normal techniques, as included in IX 3000, would result in detection of discontinuities under normal conditions....." and

Summer of 1972 Addenda NB-5277 Special Execeptions

When the joint detail does not permit radiographic examination to be performed in accordance with procedures of this Section of the Code for joints attaching penetrations assemblies, which are fabricated as appurtenances or of the closing seam within an electrical penetration assembly, not necessarily fabricated as an appurtenances, ultrasonic examination plus liquid penetrant or magnetic particle of the completed weld may be substituted for the radiographic examination. The absence of suitable radiographic equipment shall not be justification for such substitution. The substitution of ultrasonic examination can be made provided the examination is performed using a detailed written procedure which has been proven by actual demonstration to the satisfaction of the Inspector as capable of detecting and locating discontinuities described in this Code. The nondestructive examination shall be in accordance with Appendix IX and meet the acceptance standards of NB-5530 for the ultrasonic examination, NB-5340 for the magnetic particle examination and NB-5350 for the liquid penetrant examination.

These welds have received radiographic, ultrasonic and magnetic particle, and/or liquid penetrant examinations. Therefore, these welds were deleted from the program.

ATTACHMENT #4

FINAL PIPE SIZE/WALL THICKNESS CATEGORIES

Pipe Size	Wall Thickness	Line Number	Weld Radiographed
2 1/2"	.203	1-RE-40A2 1/2-1277	B
2 1/2"	.276	1-MS-29AB2 1/2-198	F
3"	.226	1-RH-04AA14-137	E
3"	.318	1-MS-49A3-85A	B
4"	.237	1-RH-04AB14-152	D
4"	.337	1-RI-20C4-3	A
4"	.438	1-HP-06B4-20	A
6"	.280	1-FC-39CA6-21	B
6"	.432	1-MS-33A6-78	C
6"	.562	1-MS-33A6-282	L
8"	.322	1-RI-02A8-37	L
8"	.500	1-HP-05A10-24	C
8"	.875	DB-15	J
10"	.365	1-MS-08AC10-304R	B
10"	.594	1-RD-28CA10-10	B
10"	.844	1-FW-04AA11-00-66	B
12"	.375	1-RI-02B12-43	A
12"	.406	1-FC-14CA8-48	C
12"	.500	1-MS-07BC12-3AH	A
12"	.688	1-MS-08BB12-6B	A
12"	1.00	1-FW-02FA12-43A	C
14"	.375	1-RH-09A14-161	E
14"	.438	1-WR-07A14-195	C
14"	.750	1-HD-02AA8-39	ZZ
14"	.938	1-HP-03A14-9	B
14"	1.056	1-FW-05A13-94-74	B
16"	.375	1-RH-02BB20-19	DE
16"	1.031	1-FW-01B23-83-4	F
16"	1.250	1-FW-02DB16-95-45	A
18"	.375	Mock-up WS-17A18-53	E
18"	.938	1-RH-01B18-34	D
18"	1.156	1-FW-02GA18-39	D
18"	1.375	1-FW-02GB18-49	C
20"	.375	1-LP-01A20-21	G
20"	1.031	1-HD-12AA20-63-PC2	ILS
20"	1.411	1-FW-01AA19-30-17	A
22"	.375	1-DG-09AA22-9	D
24"	.894	1-MS-01BD24-24	B
24"	.375	1-WS-02LA24-29	C
24"	.969	1-MS-01BB24-8	A
24"	1.812	1-FW-02C23-83-28	C
27"	.875	Mock-up J-7936-20A	A
28"	.375	1-DG-10AC28-13	C
30"	.375	Mock-up WS-02KB30-556	A
36"	1.336	1-MS-01CA36-33	J
14" std/wt x 8" sch/40 to 14".375 pipe		Mock-up WR54D14-54	D

Attachment #5

RADIOGRAPHIC SENSITIVITY
CLASSIFICATION AND PERCENTAGES

	Description		Views	Percent of Total	Views Reshot	Percent of Category
Sensitivity	4 Grade 2	Shimmed	392	2.1	83	21.1
Sensitivity	4 Grade 2	Not Shimmed	226	1.2	25	11.0
Sensitivity	4 Grade 1	Shimmed	1,447	8.1	8	.5
Sensitivity	4 Grade 1	Not Shimmed	322	1.8	22	5.8
Sensitivity	S Grade 2	Shimmed	939	5.2		.0
Sensitivity	S Grade 2	Not Shimmed	1,067	5.9		.0
Sensitivity	S Grade 1	Shimmed	1,204	6.7		.0
Sensitivity	S Grade 1	Not Shimmed	1,257	7.0		.0
Sensitivity	2 Grade 2	Shimmed	4,176	23.3	23	.5
Sensitivity	2 Grade 2	Not Shimmed	1,509	8.4	26	1.7
Sensitivity	2 Grade 1	Shimmed	3,872	21.6	8	.2
Sensitivity	2 Grade 1	Not Shimmed	1,137	6.3	6	.5
Sensitivity	1 Grade 2	Shimmed	189	1.0		.0
Sensitivity	1 Grade 2	Not Shimmed	31	.1		.0
Sensitivity	1 Grade 1	Shimmed	62	.3		.0
Sensitivity	1 Grade 1	Not Shimmed	20	.1		.0
Sensitivity not evaluated (ref: Pg 2)			153			
Total film reviewed			18,003			

(Film within Program)

Under Shimmed	9,440
Unshimmed	4,753
Total	14,193
Film Code Acceptable	+3,810
Total Film	18,003