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SACRAMENTO MUNICIPAL UTILITY DISTRICT □ 6201 S Street, Box 15830, Sacramento, California 95813; (916) 452-3211

August 3, 1982

DIRECTOR OF NUCLEAR REACTOR REGULATION
ATTENTION JOHN F STOLZ CHIEF
OPERATING REACTORS BRANCH 4
U S NUCLEAR REGULATORY COMMISSION
WASHINGTON D C 20555

DOCKET 50-312
RANCHO SECO NUCLEAR GENERATING STATION UNIT NO. 1
AUXILIARY FEEDWATER HEADER REPAIR--ADDITIONAL INFORMATION

Your comments during the NRC/B&W Owners Task Group Meeting in Bethesda on June 24, 1982 indicated that the B&W presentation and associated comments and discussions during that meeting adequately addressed the eleven questions posed in the T. M. Novak to J. J. Mattimoe letter dated June 23, 1982.

Pursuant to 10CFR50.54f, as required by the above referenced letter, the Sacramento Municipal Utility District hereby submits the enclosed Evaluation Repair and Replacement of Damaged Internal Auxiliary Feedwater Header at Davis Besse 1, Oconee 3 and Rancho Seco (BAW-1732), which provides answers which are both adequate and consistent with the proceedings of the June 24, 1982 Bethesda meeting. The following question by question summary is provided.

Question 1. Provide a detailed description of the repairs and modifications to the Auxiliary Feedwater System. Describe how the modified system compares to the Auxiliary Feedwater design used previously in other operating B&W plants. Compare the expected performance of the modified design to that of the original design and of earlier B&W units.

Response: This is addressed by Sections 4.0, 4.1, 4.2, 4.3.1, 4.3.2 and 4.3.3 of BAW-1732.

It should be noted that the general considerations described in Section 4.0 have been complied with up to this date. Corrective actions for out-of-specification Steam Generator chemistry conditions have been quick and effective. The ALARA program has been involved extensively in the repair and inspections. All machining has been done in such a way that cleanliness has been maintained or restored except as noted in this Response and the

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Response to Question 2. Some Steam Generator tubes were inadvertently hit by welding "spatter." This has been evaluated as an acceptable imperfection and these tubes will be reexamined using Eddy Current Inspection Techniques whenever Eddy Current Testing is done in the affected Steam Generator during the next two fuel cycles.
The Internal Header Repairs described in Section 4.2 have been accomplished.

The External Auxiliary Feedwater Headers at Rancho Seco use six injection points per Steam Generator.

Question 2. Describe the program to identify and recover loose parts resulting from previous damage and those that may be produced during repair. Describe your loose parts monitoring system(s) and discuss detection capability particularly with reference to any known or potential loose parts. If loose parts will exist after operation, evaluate the safety consequences.

Response: This is addressed by Sections 4.0, 4.1, 4.2 and 4.4 of BAW-1732.

It should be noted that the areas between the Upper Cylindrical Baffle (Steam Shroud) and the Tube Bundle have been inspected whenever machining or stabilization work could have caused parts or pieces to be left in that area. All parts and pieces large enough to damage Steam Generator Tubes have been removed. Some small machining chips will be left in this area. These small carbon steel chips pose no threat to Steam Generator Tube integrity. Any parts or pieces in the Steam Annulus pose, at worst, a threat to the secondary system and are not of safety significance. Much effort was put into cleaning out the Steam Annulus following machining and stabilization work; however, this is not as critical as parts or pieces left between the Upper Cylindrical Baffle (Steam Shroud) and the Tube Bundle.

All missing pins in both Steam Generators at Rancho Seco have been located and removed.

At this point in time, the stabilization of the Internal Header is complete.

The Loose Parts Monitoring System at Rancho Seco has sensors located on the Steam Generator Upper Heads. These sensors essentially monitor the Steam Generator tube sheet region on the Primary side.

Question 3. Describe the types of pre-repair inspections performed on the Steam Generator Shell, Shroud and Header and discuss the results.

Supply a drawing or drawings which show the limits of each inspection performed. Identify the criteria used to evaluate the soundness of the Header and discuss, where applicable, the ability of the remote visual inspections to detect flaws with respect to the acceptance criteria.

Response: Sections 1.3, 2.0 and 2.2 of BAW-1732 address this question.

During the course of an inspection, a crack was noted in the lower inside weld of the Internal Header in the "A" Steam Generator. The crack is approximately 20 inches long and is centered at one of the new Auxiliary Feedwater Penetrations. The crack runs along the lower inside weld which joins the inner plate to the bottom of the Internal Header.

Babcock and Wilcox has evaluated this flaw and has found it to be acceptable based on calculations done previously. In addition, B&W will perform an analysis of this flawed Header using a finite element analysis model to assure that the Header will be capable of withstanding any anticipated loads. This analysis will assume the highest anticipated loads would result from a steam line break.

Additional inspections have been performed through all of the new Steam Generator Auxiliary Feedwater Penetrations in both Steam Generators. These inspections have specifically looked for cracking in the upper and lower inside welds in the Internal Header. One additional crack was found. This crack was in the lower inside weld in the "B" Steam Generator and was found to extend for approximately 15 inches. The consequences of this imperfection are bounded by the analysis done on the 20-inch crack in the "A" Steam Generator.

The inspections which would have revealed cracking in the Internal Header welds are documented on the attached drawings. In addition, the specific Penetrations which have shown cracking are delineated. An additional sketch shows the weld area which has shown cracking.

Question 4. Describe the original criteria for minimum acceptable clearances between the AFW Header and supports and the peripheral tubes, and relate this to the clearances that will exist after repairs are completed. If clearances after repair are less than the minimum acceptable for the original design, provide the necessary analyses to justify operation under normal, transient and accident conditions.

Response: This question is addressed by Fig. 1-2 and in Section 4.1 of BAW-1732.

Question 5. Discuss your criteria and procedures for plugging and stabilizing of peripheral tubes.

Response: This is discussed in Sections 4.1, 4.5 and 7.0 of BAW-1732.

It should be added that Eddy Current examinations have been performed and ten tubes have been plugged in the "A" Steam Generator and nine tubes have been plugged in the "B" Steam Generator. Six tubes in the "A" Steam Generator were plugged due to a lack of clearance (<¼") between the affected tube and the nearest bracket. Four tubes in the "A" Steam Generator were plugged due to through-wall indications. Only three of these tubes showed greater than 40% through-wall indications. These three tubes showed 54%, 67%, and 58% through-wall indications individually. Five tubes were plugged in the "B" Steam Generator due to a lack of clearance (<¼") between the affected tube and the nearest bracket. Four tubes were plugged in the "B" Steam Generator due to through-wall indications. Only three of these tubes showed greater than 40% through-wall indications. These three tubes showed 52%, 48%, and 44% through-wall indications individually. Two of the tubes that were described above as plugged due to through-wall indications were lane tubes and were not on the periphery.

Question 6. Provide an analysis which demonstrates acceptable results when maximum expected forces are applied to the stabilized Header considering normal, transient and accident conditions.

Response: This question is addressed by Sections 4.1 and 4.2 of BAW-1732.

Question 7. Describe your acceptance criteria for all welds used to stabilize or reinforce the Header. Describe in detail the inspection program to be followed.

Response: This is addressed by Sections 4.1 and 7.0 of BAW-1732. All welds were visually inspected in accordance with the A.S.M.E. B&PV Code Section III, NG-5360 and App. XVI, 3700.

Question 8. What inspections will be performed following the stabilization of the Header to ensure that distortion from welding does not reduce clearances between tubes and the Header below the minimum acceptable?

Response: Section 7.0 of BAW-1732 addresses this. At this point in time, all post-stabilization inspections have been performed.

Question 9. Provide an analysis of AFW flow induced tube vibration for the modified AFW design.

Response: Sections 4.3.2 and 4.3.3 of BAW-1732 discuss this concern.

Question 10. Describe your plans for revision to the ISI/IST program to include Steam Generator internals on the steam side.

Response: This is addressed by Section 6.0 of BAW-1732.

Question 11. Describe the post-repair startup test and inspection program, including water hammer tests, to be conducted prior to the resumption of power operations.

Response: This is discussed in Sections 4.3.3 and 5.0 of BAW-1732.

Our intention is to restart Rancho Seco as soon as possible. Since the repairs to the Auxiliary Feedwater System are rapidly reacing completion, we would appreciate your prompt response and approval for power operation.

Wm. C. Walbridge

Wm. C. Walbridge
General Manager

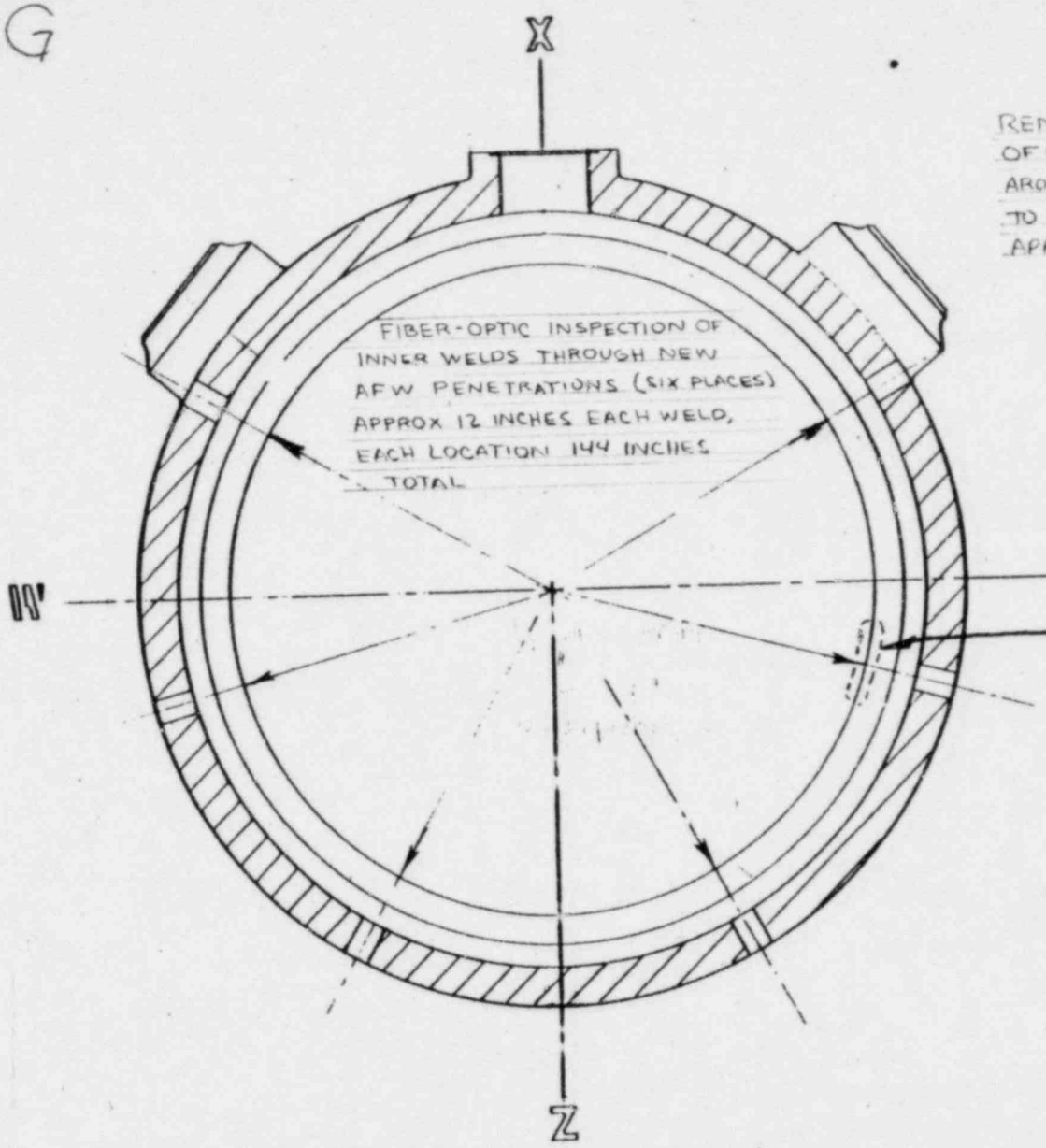
Attachments

Sworn to me and subscribed before me this 4th day of August, 1982.

Patricia K. Geisler
Notary Public

OFFICIAL SEAL
PATRICIA K. GEISLER
NOTARY PUBLIC CALIFORNIA
PRINCIPAL OFFICE IN
SACRAMENTO COUNTY
My Commission Expires November 22, 1983

"A" OTSG



REMOTE VIDEO INSPECTION OF OUTER WELDS 360° AROUND HEADER (100%) PRIOR TO STABILIZATION
APPROX 806 INCHES TOTAL

FIBER-OPTIC INSPECTION OF INNER WELDS THROUGH NEW AFW PENETRATIONS (SIX PLACES)
APPROX 12 INCHES EACH WELD,
EACH LOCATION 144 INCHES
TOTAL

20" crack location

TOTAL INSPECTIONS
950 INCHES

FRACTION INSPECTION

$\frac{950}{1542} \doteq 62\%$

OTSG CUTAWAY
(VIEW OF AUX FEED RING)

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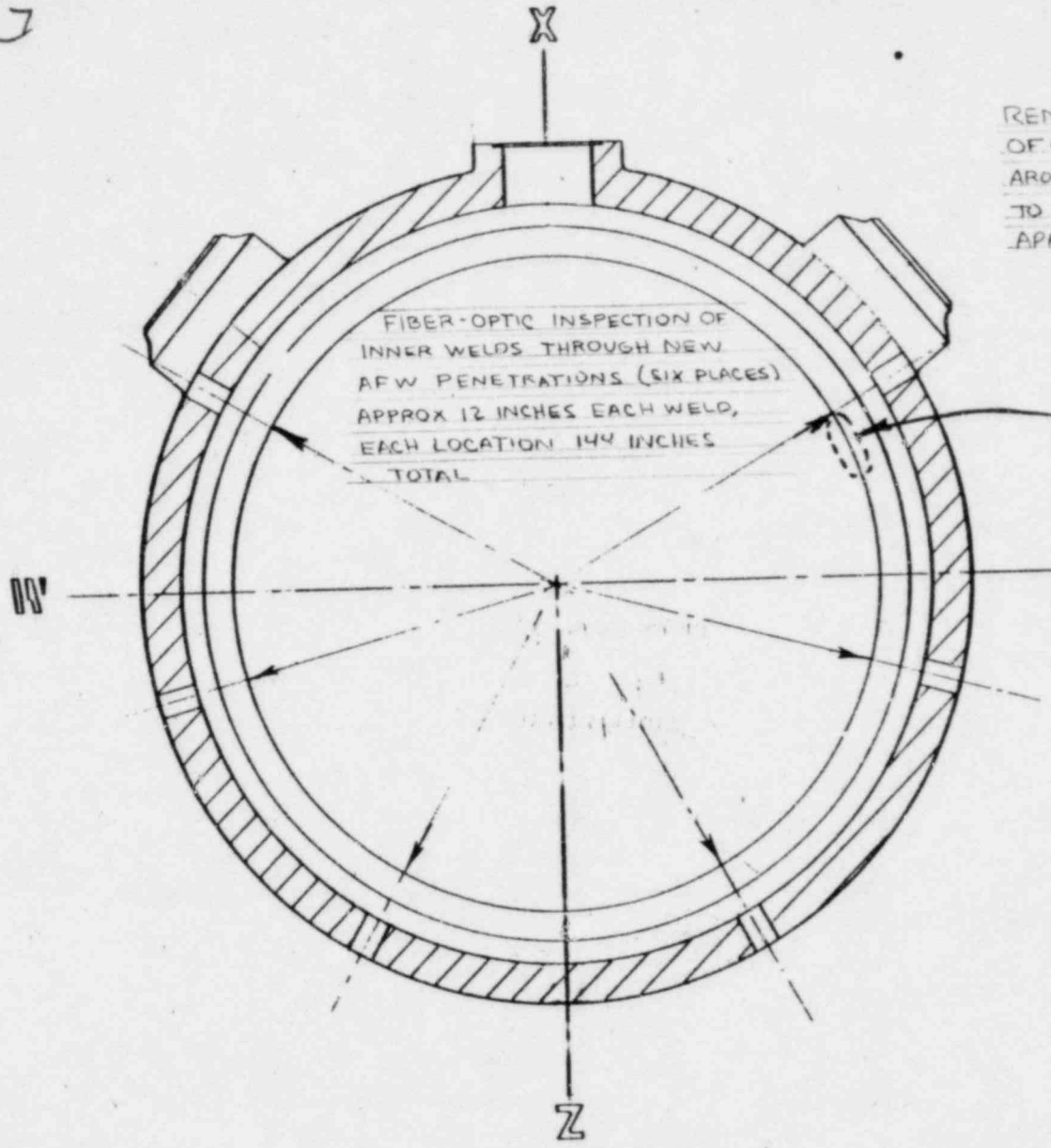
"B" OTSG



REMOTE VIDEO INSPECTION OF OUTER WELDS 360° AROUND HEADER (100%) PRIOR TO STABILIZATION APPROX 806 INCHES TOTAL

TOTAL INSPECTIONS
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FRACTION INSPECTION

$\frac{950}{1542} \doteq 62\%$

OTSG CUTAWAY
(VIEW OF AUX FEED RING)

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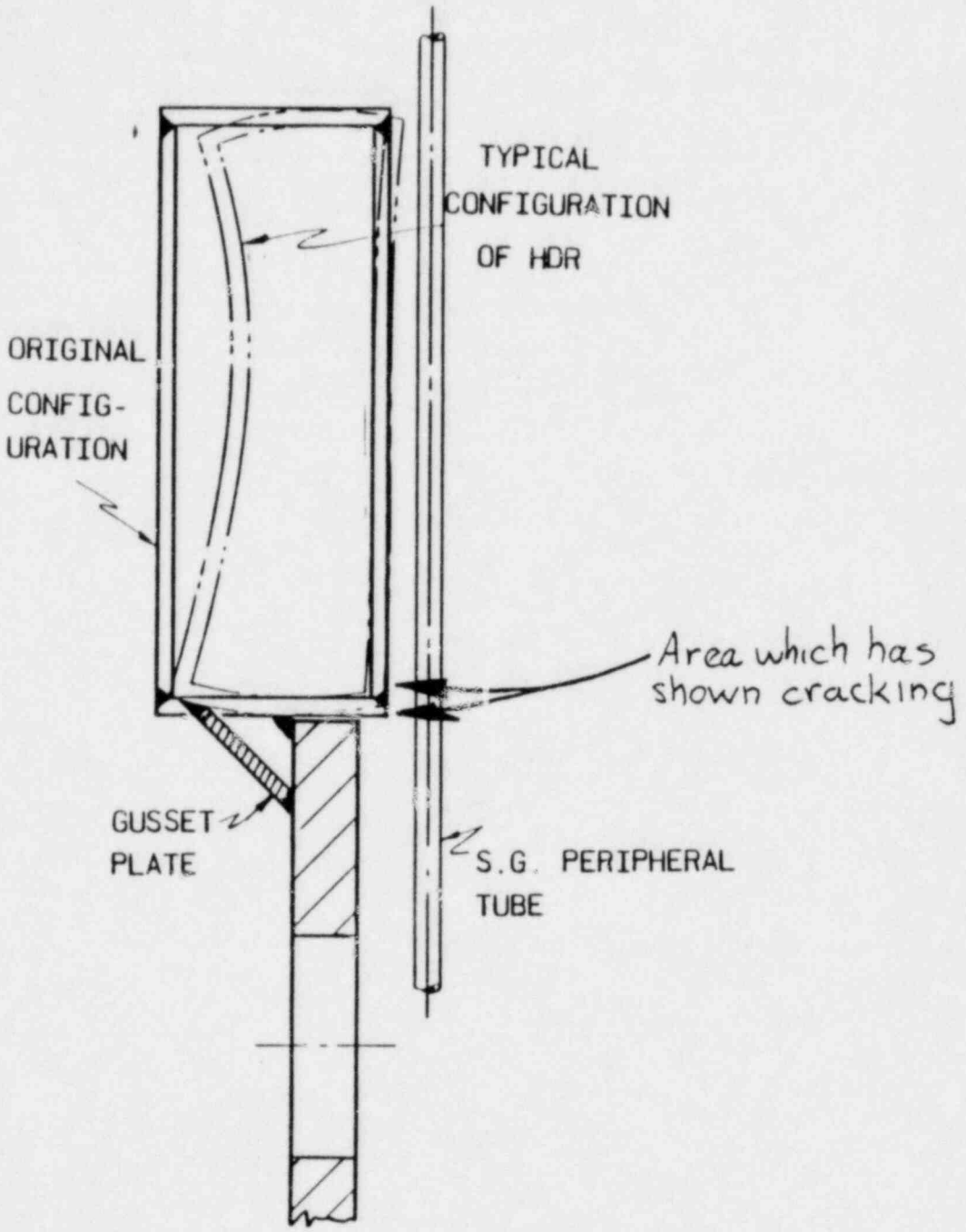
6-003



CROSS SECTION OF INTERNAL HEADER