

# MEMORANDUM

Form 847

DATE 3-17-83

TO K. VAN DOORN  
NRC FIELD REPRESENTATIVE  
ADDRESS CATAWBA PROJECT

WELDING INSPECTOR CONCERNS

FROM J.M. McONAGHY, DPE DESIGN ENGR'S SUBJECT NCI 9092 - DOME PITTING

Don DeMart has asked me to put together an information package for your review concerning NCI 9092 (Unit 2 Containment Dome Pitting). This binder contains a copy of the NCI, evaluation calculations, and a set of reference correspondence. I hope this is adequate for your purposes.

As Don pointed out, the inspector concerns were based mostly on the length of time required to arrive at a workable resolution. This is reflected in the Technical Evaluation for concern K-2, dated 3-22-82.

The decision was made to continue construction while the NCI was evaluated. The original description of the problem apparently did not alert design representatives to the scope of the problem. As a result, the first resolution was not made until one year after initiation of the NCI. To avoid grinding large areas of plate, an alternate resolution was made 4 months later in an attempt to define a well-faired surface. The variety of surface defects present made implementation of the second resolution difficult. The third and final resolution provided detailed inspection and acceptance standards.

8308040632 830519  
PDR FOIA  
GARDE83-200 PDR

If you have any further questions on this matter, please call me at 373-4243.

J.M. McConaghy

# TECHNICAL EVALUATION-INDIVIDUAL CONCERN

## STATEMENT OF CONCERN

FILE NO. K-2

Mr. Kelly states several concerns about the problems associated with the resolution of NKIR 9092 as follows: (1) the NKIR is 1 1/2 yrs. old without an acceptable resolution, (2) the defects in the unit 2 dome containment plate were originally judged insignificant by design without visually inspecting the defects, (3) how did the defects pass through QA surveillance of vendor supply unnoticed? (4) proper attention wasn't given to the problem (1-12-82 before design representative went down to investigate), (5) questionable competence of NKIR resolution (several attempts without an acceptable solution), (6) why wasn't NKIR resolved while the plate was still on the ground?

## TECHNICAL RESPONSE

### SPECIFIC BASIS OF CONCERN:

☒ YES - IDENTIFY: NKIR 9092

☐ NO

### SPECIFIC CRITERIA VIOLATED OR MISUSED:

☒ ACTUAL — IDENTIFY: Procedure Q-1 & P-1

☐ POTENTIAL - IDENTIFY: \_\_\_\_\_

☐ NONE

### TECHNICAL INADEQUACY:

### REASONS

☐ ACTUAL

☒ POTENTIAL

☐ NONE

The technical adequacy of the plate is still undetermined. Since the pitting is so extensive, repair methods may be ruled out as impractical. The defects are on both sides of the plate. This problem will probably need reanalysis to determine adequacy of plate thickness and surface defects. Design Engineering didn't give this problem proper and expeditious attention for an item of such consequence. If this problem had been quickly addressed, the plate could have been easily shipped back to the vendor. QA receiving inspection procedure P-1B-W-3 appears inadequate since the defects went unnoticed during receiving inspection. The handling of procedure Q-1 is also technically inadequate. This item has been installed violating paragraph 4.3 which states that a nonconform item will not be permanently installed. The extent of the problem was not clearly stated in the description of nonconformance. Paragraph 5.1.1.4 states "a complete and accurate description of nonconformance shall be given sufficient detail so that the deficiency may be clearly understood." Paragraph 5.1.9 regards about the accuracy of individuals' disposition on NKIRs. There has been a couple unsuccessful attempts to provide an acceptable resolution to this NKIR. The last attempt referenced a quality standard for castings instead of containment plate, which is questionable.

### OTHER COMMENTS:

Handling of procedure Q-1 is also technically inadequate. This item has been installed violating paragraph 4.3 which states that a nonconform item will not be permanently installed. The extent of the problem was not clearly stated in the description of nonconformance. Paragraph 5.1.1.4 states "a complete and accurate description of nonconformance shall be given sufficient detail so that the deficiency may be clearly understood." Paragraph 5.1.9 regards about the accuracy of individuals' disposition on NKIRs. There has been a couple unsuccessful attempts to provide an acceptable resolution to this NKIR. The last attempt referenced a quality standard for castings instead of containment plate, which is questionable.

## RECOMMENDATIONS

A. Specific: Determine a workable resolution to NKIR 9092 immediately.  
B. Programmatic: (1) Upper time limit for resolution of all NKIR's is adequately defined and enforced. (2) Adequate site inspection before resolution is issued. (3) Workable repairs are issued for craft implementation. (4) Returned NKIR's which have resolutions that are problems are tracked in the same manner as NKIR's which are received for the first time. (5) Emphasize to affected parties the importance of giving detailed, accurate description of nonconformance and technically accurate resolutions that do not invite obvious questions. (6) QA site receiving inspection should check to make sure these procedures are adequate to identify future similar defects.

## SIGN-OFF

## EVALUATION

PERFORMED BY:

Robert W. McQuinn II

# VERIFICATION - INDIVIDUAL CONCERN

Page ①

FILE NO. K-2

Generally Concur with Evaluation. Would summarize findings and recommendations as follows:

- 1) Technical adequacy of the plate is still an open question, based on review with Design Engr. personnel. This should receive immediate mgmt attention and expeditious technical evaluation to ascertain adequacy of plate thickness and surface conditions. Any necessary repairs should be carefully reviewed with Construction beforehand to insure that they can be implemented.
- 2) Time frame for resolution of the NCI was unacceptable. (one year for first resolution, 3-4 months after that for second input, still not resolved as of 3/82) Recommend Design review tracking mechanisms and ~~criteria~~ time frame requirements to insure that returned NCI's are tracked and that all NCIs are resolved within some stated maximum time frame (maybe 6 months unless high mgmt approval is obtained).
- 3) Work to install the plate should not have been allowed to proceed. Some work ~~time~~ can be allowed but this exceeded intent of procedure, due to irreversible nature (w/o extreme cost/time penalty) and inaccessibility for needed repair. More timely input from Design to Construction could have prevented problem. Recommend also consider revising Q-1, Para. 5.1.2 to provide more specific guidance.

(continued)

SIGN-OFF

VERIFICATION

PERFORMED BY:

DATE:

NYLANTA

3/7/82 3/26/82 AOC

# VERIFICATION - INDIVIDUAL CONCERN

Continued from Page ①

FILE NO. R-2

- 4) QA inspection and receiving criteria should be reviewed after final technical resolution is issued for possible revision if repairs are required. Defects are apparently, especially, sufficiently significant that should have been picked up at vendor facility.
- 5) Design Engr. mgmt should review resolution process that occurred for this item and take appropriate steps to insure future adequacy of
  - a) Technical resolution thoroughness - this item was resolved based on judgement without analysis when analysis was apparently required.
  - b) Resolution was developed apparently without site inspection by DE personnel - should not be permitted on items of such consequence.
  - c) Resolution was not issued for 1 year
  - d) Standard for surface conditions is for <sup>castings</sup> forgings, not plate. Adequacy is questionable.

SIGN-OFF

VERIFICATION

PERFORMED BY:

ADLANTA

W  
H  
O  
r



Richard Irby Item #2

Mr. Irby is concerned with pits in the Unit II containment plate. He first raised the question in early 1980 but was told that if a Duke Power Representative in New Port News, Va had accepted these plates then they are satisfactory. ~~He Irby~~ He was given verbal directions to follow CP-64. He did not feel CP-64 <sup>attached</sup> applied in full to this case because of the large area and high concentration of the pits, and the fact that he felt this to be an obvious vendor problem.

Mr. Irby later contacted Rich Rouse of the site AT staff who looked at the plate and gave Mr. Irby the go ahead on writing the NCI (Ref. NCI 9092 attached). Mr. Irby did not feel the resolution to this NCI to be sufficient for two reasons.

- 1) No one had visually examined the plates before resolving the NCI
- 2) Why were the pits to be repaired if they were judged to be ~~and~~ insignificant by design. (Ref. Attachment I to NCI 9092)

Generally Mr. Irby didn't feel the proper attention had been given to the problem. He felt no one was concerned enough to address

the problem.

Attachment III of NCI 9092 provides further guidance to the original resolution but Mr. Irby was still unsatisfied in that MSS SP-55, to be used for a guide, is for castings rather than containment plate. Mr. Irby also felt that without visually inspecting the plates before resolution, that design may be prescribing repair that may be more detrimental to the plate than if left alone.

In January 1982, design engineering looked at the plate for the first time, according to Mr. Irby. He said they found more than what they had expected and could not make a decision until further evaluation was performed.

In general Mr. Irby's main concern is why he had to ask for re-evaluation and why ~~the~~ the large time frame before looking at the plate.

(I have a copy of MSS SP-55 in my office)

K-3  
7. no concerns re. to NCI

- . verbal instructions were to follow criteria of CP-64 which does not apply in full to this problem
- . const. tech. supp. welding (David Ladd) told us that if Duke Power representative in New Port News accepted the plates they were ok as far as he was concerned.

\* Attachment 1. to NCI judged surface defects not to be significant — to my knowledge no one has ever visually inspected the plates he said Rick Lause (1-12-82 representative from Charlotte office)

Attachment 2. relates to engineering judgment based on prior experience and Duke Power QA surveillance of vendor supply. Minor or extremely small irregularities can go unnoticed and shipping damages & normal oxidation are factors to consider.

\* Everyone writes something in response to NCI 9092 but does not address the specific problem.

- make decisions to correct the defects not in be questionable.
- all defect removal to sound metal & well faired conditions may be detrimental to plate as far as required thickness.
- procedure 1755 SP55 was issued only after NC1 was sent back for further evaluation.
- present surface conditions of some plates exceed the acceptable criterion shown in photographs in SP55

## Questions of Support

Why did this issue have to be found?

Why an over extended time frame (16 mos) with a questionable resolution 7-31-80 — 12-2-81 ?

Why so much correspondence & explanation & no one addresses the problem?

Why did the proper initiative in research & solution not be put forth at the introduction of NC1 9092?

★ Why or how were all decisions made without some one in authority physically making an examination of the plate in question. (2)



... on the ground?

Knowing these questions cannot be answered but what  
I want to point out is the

pass it around  
write something about it  
and say it is ok

attitude

This needs to be checked



PROBLEM STATEMENT	Requisition No. <u>N/A</u>	Vendor/Location <u>Newport News</u>	Documents Violated <u>CNS 1144.09-1</u>	DUKE POWER COMPANY STATION/PROJECT <u>CATAWBA</u> UNIT <u>1, X2, 3</u> NONCONFORMING ITEM REPORT USE BLACK BALL POINT PEN ONLY		
	MPS P.O. No. <u>N/A</u>	Mech/Elec System <u>N/A</u>				
	QA Required <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Condition <u>1</u>	Class <input type="checkbox"/> Q-1B'S <input type="checkbox"/> NCITape <input checked="" type="checkbox"/> Other <input type="checkbox"/> Not Practical				
	Location of Item <u>R.B. 2 (DOME)</u>			Serial No. <u>9092</u>		
EVALUATION	Description of Item and Statement of Problem <u>See Sheet 1 for description of problem</u>					
Evaluation/Disposition Responsibility <input type="checkbox"/> Const <input type="checkbox"/> Design <input type="checkbox"/> QA <input type="checkbox"/> Steam <input type="checkbox"/> Group						
Originated		Date	Technical Review	Date	QA Review	
Potentially Reportable Under 10CFR21.50.55e <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes, use Form 290.1						
Disposition/Justification <u>See Attachment (3) for additional clarification of the repair procedure for surface defects with a depth of less than or equal to 1/8".</u>						
Spec/Calc./Dwg Revised As Below						
PR-202 Applicable (Design Only) <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No						
By <u>Richard H. Benoit</u>		Date <u>11/4/81</u>	Technical Approval <u>DE. DeWitt</u>		Date <u>11/4/81</u>	
				QA Approval <u>SEE final page for approval</u>		
CORRECTIVE ACTION	CORRECTIVE ACTION/INSPECTION REQUIRED			Assigned	Performed	Date
	<u>Originate Construction Procedure to aid in repair of Dome Plate</u>			<u>CEWL</u>	<u>RG JAKSON</u>	<u>8/4/82</u>
By <u>[Signature]</u>		Date <u>7/12/82</u>	QA Approval <u>RG Rouse</u>		Date <u>7/13/82</u>	
Action/Inspection Exceptions or Remarks <u>Note: In CP-667 Design has finished a table that may be used in lieu of the graph in this resolution. The original copy from Design has been added to this NCI for information purposes. RTH 7/13/82</u>						
Distribution		GEN. <input type="checkbox"/> Sr. Const <input type="checkbox"/> Const Eng <input type="checkbox"/> Const Eng Project <input type="checkbox"/> QC Supv <input type="checkbox"/> QA Eng <input type="checkbox"/> WHSE <input type="checkbox"/> DESIGN <input type="checkbox"/> QA Div <input type="checkbox"/> ANI <input type="checkbox"/> NEC				
Number <input type="checkbox"/> Initial		SUPV <input type="checkbox"/> QA Eng <input type="checkbox"/> SUPV <input type="checkbox"/> ANI <input type="checkbox"/> NEC				
Of Copies <input type="checkbox"/> Final						
Trend Info.			Final QA Review <input type="checkbox"/> Date <input type="checkbox"/>			

25679 (12-81)

USE BLACK BALL POINT PEN ONLY

FORM Q-1A

Revision 13

Regulation No. <b>N7A</b>	Vendor/Location <b>NEWPORT NEWS</b>	Documents Violated <b>CNS-1144.09-1</b>	DUKE POWER COMPANY STATION/PROJECT CATAWBA UNIT 1 (2) 3 NONCONFORMING ITEM REPORT
NPS P. B. No. <b>N7A</b>	Arch/Elec System		
QA Required <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Condition <b>1</b>	Class	Identification Method <input type="checkbox"/> Q-18'S <input type="checkbox"/> NCI Type <input type="checkbox"/> Other <input checked="" type="checkbox"/> Not Practical	

Location of Item **RB 2 (DOME)**Serial No.  
**9092**

DESCRIPTION OF NONCONFORMANCE:

**SEE SHEET 1 FOR DESCRIPTION OF PROBLEM**Responsibility for Nonconformance Disposition: ☐ Const. ☒ Design ☐ QA ☐ Steam ☐ Ground  
Form Q-1D sent to \_\_\_\_\_ Department for Determination of Reportability

Originated \_\_\_\_\_ Date \_\_\_\_\_ Technical Review \_\_\_\_\_ Date \_\_\_\_\_ Site QA Review \_\_\_\_\_ Date \_\_\_\_\_

DISPOSITION OF NONCONFORMANCE:

IMPLEMENTATION OF PREVIOUS RESOLUTIONS HAS  
PROVEN TO BE VERY DIFFICULT WITHOUT DAMAGING  
AREAS OF CONTAINMENT DOME PLATE. THE PROCEDURE  
OUTLINED IN ATTACHMENT (A) SHALL BE FOLLOWED TO  
DETERMINE WHICH DEFECTS REQUIRE REPAIR.  
THE REQUIREMENTS OF ATTACHMENT (B) AND THE  
ORIGINAL RESOLUTION ARE SUPERSEDED.

DMC (PA-202) Applicable (Design Engr  
only) ☐ Yes ☐ NoAssigned to **SEE ATTACH. 2 (9/1/81)** Dept.  
for 10CFR50 App B Criterion XVI  
EvaluationSpec/Calc/Dwg Revised as Below  
**CNC-1144.09-01-0003 (R1)**

By **JMMcConaghy** Date **4-30-82** Technical Approval **D.E. Doherty** Date **4/30/82** QA Approval **W. Henry** Date **4/30/82**  
WORK MAY PROCEED AFTER QA APPROVAL OF DISPOSITION.

REWORK/INSPECTION/REPLACEMENT TO IMPLEMENT DISPOSITION

ASSIGNED TO \_\_\_\_\_ PERFORMED BY \_\_\_\_\_ DATE \_\_\_\_\_

Cv \_\_\_\_\_ Date \_\_\_\_\_ QA Approval \_\_\_\_\_ Date \_\_\_\_\_

Action/Inspection Exceptions or Remarks

10CFR50 APPENDIX B CRITERION XVI EVALUATION

**SEE ATTACHMENT 2 (9/1/81)**

I hereby certify the required Regulatory Evaluation  
has been performed and documented as appropriate  
CRITERION XVI CORRECTIVE ACTION COMPLETE

By **W. Henry**Date **4/30/82**

All Done To \_\_\_\_\_ Performed By \_\_\_\_\_ Date \_\_\_\_\_

**N/A**

By **W. Henry** Date **4/30/82** QA Approval **H.A. K. Rom** Date **7/13/82**  
Action/Inspection Exceptions or Remarks

Distribution

Number \_\_\_\_\_ Initial \_\_\_\_\_  
Of Copies \_\_\_\_\_ Final \_\_\_\_\_

Trend Info.

Final QA Review

Date



Attachment (1) to NCI 9092

Surface defects are judged not to be significant based on engineering judgement gained by prior experience in containment vessel and pressure vessel design.

Site QA and QA Vendor surveillance shall address and evaluate why defects were not discovered during shop inspection and receiving inspection.

Repairs to be done in accordance with Section III, Subsection NE, of the ASME Code.

D.E. DeKort 8-24-81

R.F. Vause/DED 8-24-81

Attachment (2) to NCI 9092

Response to Attachment (1) to NCI 9092

Vendors supplying safety-related materials or components have an approved QA Program. This program includes QC and inspection that we are confident is satisfactory. Duke Power QA performs surveillance on their program to maintain a good confidence level. The surveillance does not include 100% inspection of the material or component. Minor or extremely small irregularities can go unnoticed depending on inspection or NDE requirements. Shipping damages and normal oxidation are factors to consider in reviewing the containment plate.

JM Linter 9-1-81

AB # W1-3 DESCRIBES THE REQUIRED RECEIVING INSPECTION FOR CONTAINMENT PLATE. THE INSTRUCTIONS state: "IF there is ANY damage or ANY QUESTION of damage... contact The Const. ENGINEER Welding." These INSTRUCTIONS seem adequate. IT appears that these defects were missed due to the small nature of the indications. This does NOT appear to be a GENERAL or recurrent problem. No TRAINING or PROGRAM REVISIONS are required.

H. L. Atkins 9/21/81  
SITE QA

gc Ashpshire 9/21/81

H. Mason 9-21-81

Attachment (3) to NCI 9092

This attachment provides additional guidance to the resolution of original NCI dated 7-28-81.

Surface defects have already been judged not to be significant based on engineering judgement (see attachment (1)). This attachment provides additional criteria for the surface preparation and inspection of pitting and surface roughness less than or equal to 1/8 inch in depth.

The containment dome plate ~~shall be~~ sand blasted to a "white metal surface" in accordance with Surface Preparation Procedure DPSP5-I. This process ~~will~~ <sup>has been</sup> remove all surface foreign debris, scaling, rusting, etc. to sound metal. ASTM A20, paragraph 9.2.1.1, requires all imperfections to be removed to sound metal and to be well faired. Procedure MSS SP-55 shall be used as a guide to determine well faired conditions. Type II, Type VII and Type VIII photographs shall be used for representative acceptable surfaces.

removed

RHB 11/7/81 DED 11/17/81 TR 11/17/81

has

RHB 11/7/81

DED 11/17/81

TR 11/17/81

All pits greater than 1/8 inch in depth shall be weld repaired in accordance with ASTM A20, paragraph 9.4.

By:

Richard H. Bengel 11/4/81

RHB 11/18/81

Technical Approval:

D.E. DeHart 11/4/81

QA Approval:

TC Roberts 11-7-81

Previous resolutions have proven to be very difficult to implement without damaging the containment plate. The following procedure shall be followed to determine which defects are acceptable and which require repair. Details concerning the development of these criteria are contained in calculation file CNC-1144.09-01-0003.

1. Surface flaws with a depth of  $1/8$ " or greater shall be weld repaired according to ASME procedures.
2. Surface flaws with depth less than or equal to  $1/32$ " are acceptable if they do not interfere with other flaws as outlined below.
3. The remaining flaws shall be inspected to determine their acceptability using the attached Figure 9092.1. The acceptability of a given flaw will be determined by the size of the surface which it covers, the depth of the flaw, and the proximity of the flaw to other flaws. Surface defects failing this criteria shall be weld repaired according to ASME procedures.
4. The following definitions apply to the variables used in Figure 9092.1:
  - a.  $\underline{d}$  (flaw diameter): The dimension of the surface flaw in the direction of the next adjacent flaw. For circular pits surrounded by a circular pattern of smaller pits,  $\underline{d}$  shall be taken as the distance across the circular pattern.
  - b.  $\underline{D}$  (spacing between flaws): The minimum clear distance of unflawed surface between adjacent flaws. If  $\underline{D}$  is greater than  $1\ 3/8$ ",  $\underline{D}$  is to be taken to be equal to  $1\ 3/8$ ".
  - c.  $\underline{t}_f$  (flaw depth): The maximum penetration of the flaw measured from the unflawed surface.
5. In applying Figure 9092.1, the two surface measurements  $\underline{D}$  and  $\underline{d}$  should be made first. With these two measurements, one point on the figure is determined. This point will lie between two flaw depth lines. The flaw depth indicated by the line immediately below the point given by  $\underline{D}$  and  $\underline{d}$  is acceptable, while the flaw depth given by the line immediately above the point is unacceptable. For points lying on a given flaw depth line, the flaw depth given by that line is acceptable. For example, a flaw with  $\underline{D}=1/2$ " and  $\underline{d}=5/8$ " is acceptable for a flaw depth of  $5/64$ " and is unacceptable for a flaw depth of  $3/32$ ". The actual flaw depth should be compared to the acceptable value to determine whether repair is required. Repairs may be made either to the flaw in question or to an adjacent flaw to arrive at a combination meeting this criteria.
6. Figure 9092.1 assumes an identical flaw on the opposite face of the dome plate. If it can be verified that in the area of a given flaw no surface flaws are present on the opposite face, the allowable depth given by Figure 9092.1 may be multiplied by two.
7. Surface flaws with a maximum dimension  $\underline{d}$  greater than  $1\ 3/8$ " shall be weld repaired according to ASME procedures except as noted in 2. above.
8. Surface flaws with a maximum dimension  $\underline{d}$  less than  $1/8$ " are not required to be repaired except as noted in 1. above.
9. Repairs are to be done in accordance with Section III, Subsection NE, of the ASME Code.

By:

4243  
*Jim McConaghy* 4/30/82  
JD

Technical Approval:

4665  
*D.E. Dehn* 4/30/82

QA Approval:

*W. J. Henry* 4/30/82



BY: JMM 4-29-82

CHECKED: RHB 4/30/82

DED 4/30/82

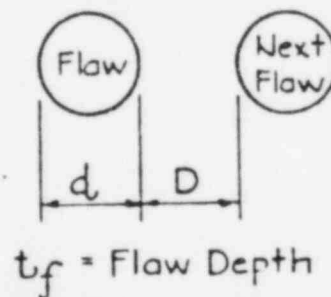
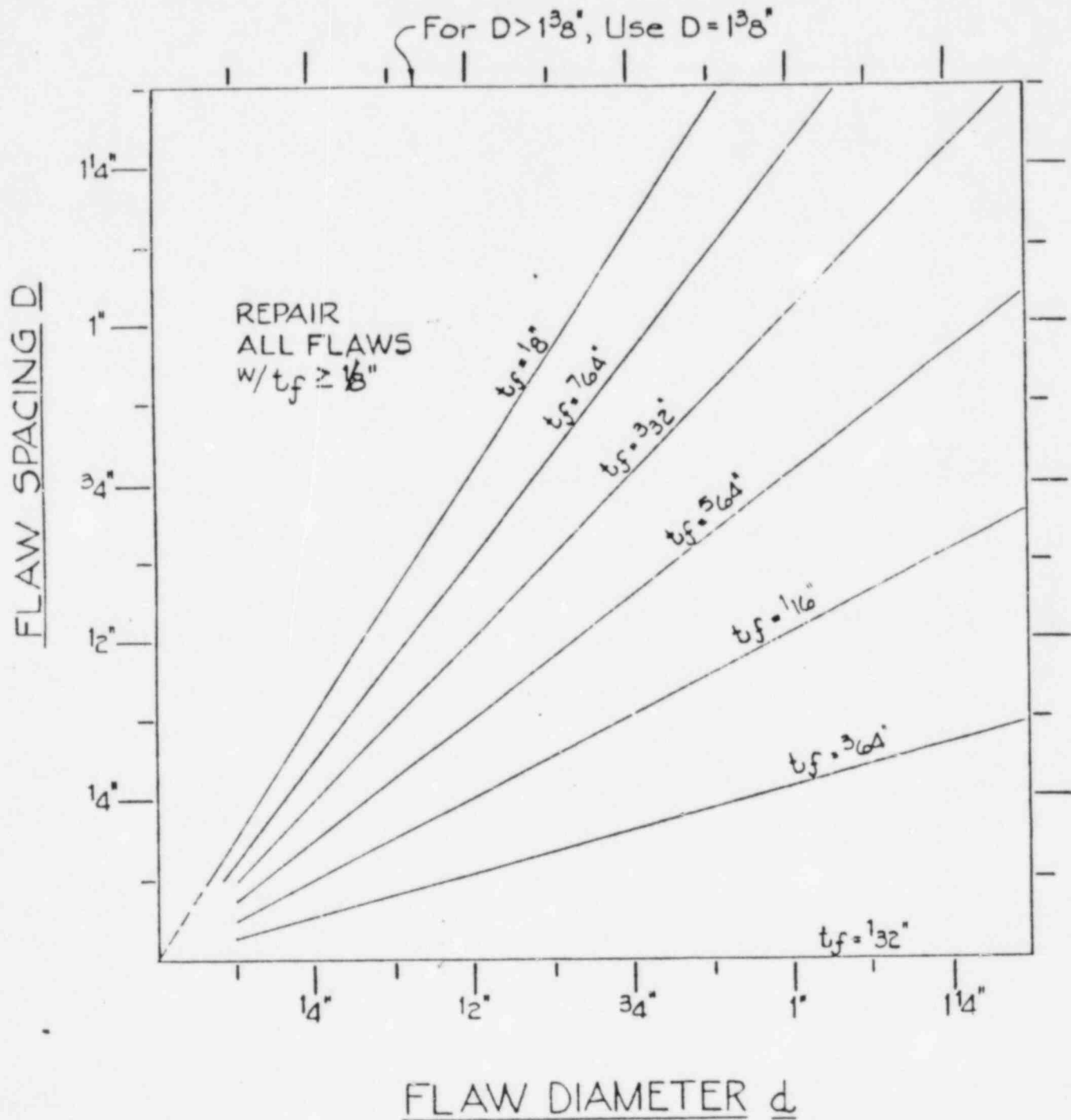


FIGURE 9092.1  
DOME PLATE SURFACE  
FLAW ACCEPTANCE  
CRITERIA

REV. 0

MA 7/12/82

Draw/Station CATAWBA  
 Subject DOME PLATE FITTING NCI 9092  
 ALLOWABLE FLAW DEPTH (MILS)

Unit 2

TO:

DAVE LLEWELLEN  
 WELDING TECH SPT

Sheet No. \_\_\_\_\_ of \_\_\_\_\_ Problem No. \_\_\_\_\_ Checked By \_\_\_\_\_

WOULD YOU RATHER USE A CHART  
 INSTEAD OF A GRAPH?

	FLAW SPACING (IN) D																		
	1/16"	1/8"	3/16"	1/4"	5/16"	3/8"	7/16"	1/2"	9/16"	5/8"	11/16"	3/4"	13/16"	7/8"	15/16"	1"	1 1/16"	1 1/8"	1 1/4"
1/16"	92	124	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1/8"	62	92	124	124	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3/16"	51	72	92	103	124	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1/4"	46	62	77	92	103	124	-	-	-	-	-	-	-	-	-	-	-	-	-
5/16"	43	55	68	80	92	105	117	124	-	-	-	-	-	-	-	-	-	-	-
3/8"	41	51	62	72	82	92	103	113	124	-	-	-	-	-	-	-	-	-	-
7/16"	40	48	57	66	75	83	92	101	110	119	124	-	-	-	-	-	-	-	-
1/2"	38	46	54	62	69	77	85	92	100	108	115	123	124	-	-	-	-	-	-
9/16"	38	44	51	58	65	72	79	85	92	99	106	113	120	124	-	-	-	-	-
5/8"	37	43	49	55	62	68	74	80	86	92	98	105	111	117	123	124	-	-	-
11/16"	36	42	48	53	59	64	70	75	81	87	92	98	103	109	115	120	124	-	-
3/4"	36	41	46	51	56	62	67	72	77	82	87	92	97	103	108	113	118	123	124
13/16"	35	40	45	50	54	59	64	69	73	78	83	88	92	97	102	106	111	116	121
7/8"	35	40	44	48	53	57	62	66	70	75	79	83	88	92	97	101	105	110	114
15/16"	35	39	43	47	51	55	59	64	68	72	76	80	84	88	92	96	100	105	109
1"	35	38	42	46	50	54	58	62	66	70	74	78	81	85	89	92	96	100	104
1 1/16"	34	39	42	45	49	52	56	60	63	67	71	74	78	81	85	89	92	96	99
1 1/8"	34	38	41	44	48	51	55	58	62	65	68	72	75	79	82	85	89	92	96
1 1/4"	34	37	40	43	46	49	52	55	58	62	65	69	71	74	77	80	83	86	89
1 1/2"	34	37	40	42	45	48	51	54	57	60	63	66	69	72	75	78	81	83	86
1 3/4"	34	36	39	42	45	48	50	53	56	59	62	64	67	70	73	75	78	81	84

NOTES: 1) WHERE VALUE IS NOT SHOWN, ALLOWABLE  
 FLAW DEPTH = 124 MILS

2) FIELD MAY INTERPOLATE BETWEEN VALUES

3) THIS CHART IS FOR USE WITH

FLAWS WITH

JOHN McCONAGHY X4243

2. Requisition No. <u>NA</u>	3. Vendor/Location <u>NEWPORT NEWS</u>	4. Documents Violated <u>CNS 1144.09-1</u>
5. MPS. PO No. <u>NA</u>	6. Mech/Elec System <u>NA</u>	
7. QA Required <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Condition <u>1</u>	8. Identification Method <input type="checkbox"/> O-1B's <input type="checkbox"/> NCI Tape <input type="checkbox"/> Other <input checked="" type="checkbox"/> Not Practical	

**RECORD COPY**  
**DUKE POWER COMPANY**  
**CONSTRUCTION DEPARTMENT**  
**PROJECT CATAWBA 1**  
**NONCONFORMING ITEM REPORT**  
**USE BLACK BALL POINT PEN ONLY**

9. Location of Item <u>RB 2 (DOME)</u>	16. Serial Number <u>9092</u>
10. Description of Item and Statement of Problem <u>ROUTINE INSPECTIONS OF CONTAINMENT PLATE (DOME) RB.2 REVEAL A NUMBER OF PLATES TO BE PITTED AND HAVING A ROOR SURFACE FINISH. IN GENERAL THE DEFECTS RANGE FROM SMALL SCATTERED PITS (WITH A DEPTH OF 5/32" X 3/8" IN DIA) TO LARGE CONCENTRATIONS.</u>	

NOTE: DEFECTS ARE APPARENTLY MANUFACTURING DEFECTS  
 WORK CAN CONTINUE DURING EVALUATION OF DEFECTS.

14. Evaluation/Disposition Responsibility <input type="checkbox"/> Const. <input checked="" type="checkbox"/> Design <input type="checkbox"/> QA <input type="checkbox"/> MSS Div. <u>Other</u>	11. Originated <u>R. F. Vance</u> Date <u>7-31-80</u>	13. Senior Engr. Review <u>W. L. Hume</u> Date <u>7-31-80</u>	15. QA Review <u>W. L. Hume</u> Date <u>8-4-80</u>
17. Disposition: <u>AS STATED BELOW</u>		18. Report to Management <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

Evaluation/Justification  
ALL PITS LESS THAN OR EQUAL TO 1/8 INCH IN DEPTH SHALL BE GROUND SMOOTH AND BLENDED INTO ADJACENT MATERIAL. PITS WITH A DEPTH GREATER THAN 1/8 INCH SHALL BE WELD REPAIRED ACCORDING TO ASME PROCEDURE MT OR PT GROUND AREAS AND WELD REPAIR AREAS. FOR ADDITIONAL EVALUATION SEE ATTACHMENT (1).  
(SEE ATTACHMENT (2) FOR EVALUATION OF VENDOR QA. MTR 9/13/81) - ALSO SEE

19. By <u>R. F. Vance</u> Date <u>7-28-81</u>	20. Technical Approval <u>D. E. LeMay</u> Date <u>8-24-81</u>	21. QA Approval <u>W. L. Hume</u> Date <u>9/13/81</u>
22. Action/Inspection Required <u>(1) INSPECTORS SHALL CHECK PLATES PER CRITERIA OF</u> <u>MARK AREAS THAT REQUIRE WELD REPAIR.</u> <u>(2) STEELWORKERS ARE TO GRIND DEFECTS AS NECESSARY. STST.</u> <u>(3) WELDERS ARE TO BUILD UP AREAS THAT GREATER</u> <u>THAN 1/8 INCH IN DEPTH (GRIND FLAT).</u> <u>PERFORM MT OR PT ON WELDED AREAS</u> <u>(5) TRAIN INSPECTORS ON ACCEPTANCE CRITERIA OF MSS SP. 55</u> <u>DOCUMENT ON QA/IB Program 12/1/81</u>		23. Assigned To <u>SVTW</u>
25. By <u>John H. Williams</u> Date <u>9-12-81</u>		26. QA Approval <u>W. L. Hume</u> Date <u>9/21/81</u>

29. Action/Inspection Exceptions or Remarks

Distribution	Project Engr	Gen. Supt	Sr Const Engr	Const Engr	Sr QC Engr	QC Supv	Sr QA Engr	QA Engr	Whse. Supv	Design	QA Div	ANI	NFC	CHAPMAN
12. Initial		2		1			1				1			
24. Final		2		1							1		1	

29. Final QA Review \_\_\_\_\_ Date \_\_\_\_\_

PROBLEM STATEMENT

N/A	Newport News	CNS 1144-09-1	DUKE POWER COMPANY
WPS F.O. No.	Medi/Elec System		STATION/PROJECT CATAWBA
N/A	N/A		UNIT <input type="checkbox"/> 1, <input checked="" type="checkbox"/> 2, <input type="checkbox"/> 3
CA Required <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	CA#	Identification Method <input type="checkbox"/> O.I.B.'S <input type="checkbox"/> N.C.I.Tape <input type="checkbox"/> Other <input checked="" type="checkbox"/> Not Practicable	NONCONFORMING ITEM REPORT
Condition 1			USE BLACK BALL POINT PEN ONLY

Location of Item R.B. 2 (DOME)

Serial No.

9092

Description of Item and Statement of Problem

See Sheet 1 for description of problemEvaluation/Disposition Responsibility ☐ Const ☐ Design ☐ CA ☐ Steam ☐ Group

Originated

Date

Technical Review

Date

CA Review

Date

Potentially Reportable Under 10CFR21.50.55e ☐ Yes ☒ No If yes, use Form 250.1Disposition/Justification See Attachment (3) for additional clarification of the repair procedure for surface defects with a depth of less than or equal to 1/8".

EVALUATION

Spec/Calc./Dwg Revised As Below

10CFR21.50.55e Addressee Design Check ☐ Yes ☒ NoBy Richard H. Benit Date 11/4/81 Technical Approval D.E. DeWitt Date 11/4/81 CA Approval SEE final page for approval. Date

CORRECTIVE ACTION/INSPECTION REQUIRED

Assigned  
ICPerformed  
EV

Date

CORRECTION ACTION

By

Date

CA Approval

Date

Action/Inspection Exceptions or Remarks

Distribution

GEN.  
SUPVSr. Const  
EngrConst. Eng  
CA EngConst. Eng  
CA Eng100%  
SUPVQA Eng  
SUPVDESIGN  
CA EngANI  
NEC

Number Initial

Of Copies Final

Trend Info.

Final CA Review

Date



Resolution No. <b>N/A</b>		Vendor/Location <b>NEWPORT NEWS</b>		Documents Violated <b>CNS-1144.09-1</b>		DUKE POWER COMPANY STATION/PROJECT <b>CATWATER</b>	
NPS P. O. No. <b>N/A</b>		Access/Elec System				UNIT 1 (2) 3	
QA Required <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Condition <b>1</b>		Class		Identification Method <input type="checkbox"/> Q-18'S <input type="checkbox"/> Other <input checked="" type="checkbox"/> Not Practical		NONCONFORMING ITEM REPORT	
Location of Item <b>RD. 2 (DOME)</b>						Serial No. <b>9092</b>	
DESCRIPTION OF NONCONFORMANCE: <b>SEE SHEET 1 FOR DESCRIPTION OF PROBLEM</b>							
Responsibility for Nonconformance Disposition: <input type="checkbox"/> Const. <input checked="" type="checkbox"/> Design <input type="checkbox"/> Mfg. <input type="checkbox"/> Storage <input type="checkbox"/> Other							
Form O-10 1971 IS Department for Determination of Responsibility							
Originated		Date		Technical Review		Date	
						Site QA Review	
						Date	
DISPOSITION OF NONCONFORMANCE:						<input checked="" type="checkbox"/> Inc (PA-222) Applicable (Design Engr only) <input type="checkbox"/> Yes <input type="checkbox"/> No	
IMPLEMENTATION OF PREVIOUS RESOLUTIONS HAS PROVEN TO BE VERY DIFFICULT WITHOUT DAMAGING AREAS OF CONTAINMENT DOME PLATE. THE PRECEDENT OUTLINED IN ATTACHMENT (A) SHALL BE FOLLOWED TO DETERMINE WHICH DEFECTS REQUIRE REPAIR. THE REQUIREMENTS OF ATTACHMENT (B) AND THE ORIGINAL RESOLUTION ARE SUPERSEDED.						Assigned to <b>SEERACH.2 (9/11/81)</b> for 100% QC App & Criterion 211 Evaluation	
						Sequencing revised as below <b>CNC-1144.09-01-0003 (R1)</b>	
By <b>JM McCowley</b> 4-30-82 Technical Approval <b>N/A</b> Date <b>4/30/82</b> QA Approval <b>7/5/82</b> WORK MAY PROCEED AFTER QA APPROVAL OF DISPOSITION.							
NEW/RE/INSPECTION/REPLACEMENT TO IMPLEMENT DISPOSITION						ASSIGNED **	
						PERFORMED **	
By		Date		QA Approval		Date	
Action/Inspection Locations or Remarks							
IDCRSC APPENDIX I CRITERION XVI EVALUATION							
<b>SEE ATTACHMENT 2 (9/11/81)</b>							
I hereby certify the required Regulatory Evaluation has been performed and documented as appropriate.						By <b>W. J. Henry</b> Date <b>4/30/82</b>	
CRITERION XVI CORRECTIVE ACTION COMPLETE						ASSESSED TO <b>10</b> PERFORMED BY <b>10</b> DATE <b>4/30/82</b>	
<b>N/A</b>							
By <b>W. J. Henry</b> Date <b>4/30/82</b>						QA Approval <b>N/A</b> Date	
Action/Inspection Locations or Remarks							
Distribution							
Number		Initial					
Of Copies		Final					
Trend Info.				Final QA Review Date			

Attachment (1) to NCI 9092

Surface defects are judged not to be significant based on engineering judgement gained by prior experience in containment vessel and pressure vessel design.

Site QA and QA Vendor surveillance shall address and evaluate why defects were not discovered during shop inspection and receiving inspection.

Repairs to be done in accordance with Section III, Subsection NE, of the ASME Code.

D.E. De Kant 8-24-81

R.F. Vause/DED 8-24-91

Attachment (2) to NCI 9092

Response to Attachment (1) to NCI 9092

Vendors supplying safety-related materials or components have an approved QA Program. This program includes QC and inspection that we are confident is satisfactory. Duke Power QA performs surveillance on their program to maintain a good confidence level. The surveillance does not include 100% inspection of the material or component. Minor or extremely small irregularities can go unnoticed depending on inspection or NDE requirements. Shipping damages and normal oxidation are factors to consider in reviewing the containment plate.

JM Carter 9-1-81

AB # W1-3 DESCRIBES THE REQUIRED RECEIVING INSPECTION FOR CONTAINMENT PLATE. THE INSTRUCTIONS state: "IF there is any damage or ANY QUESTION of damage... contact The Const. ENGINEER WELDING." These instructions seem adequate. It appears that these defects were missed due to the small nature of the indications. This does NOT appear to be a GENERAL or recurrent problem. No TRAINING or PROGRAM REVISIONS are required.

H. Atkins 9/21/81  
SITE QA

GC Shopshire 9/21/81

Hornston 9-21-81

Attachment (3) to NCI 9092

This attachment provides additional guidance to the resolution of original NCI dated 7-28-81.

Surface defects have already been judged not to be significant based on engineering judgement (see attachment (1)). This attachment provides additional criteria for the surface preparation and inspection of pitting and surface roughness less than or equal to 1/8 inch in depth.

The containment dome plate ~~shall be~~ sand blasted to a "white metal surface" in accordance with Surface Preparation Procedure DPSP5-1. This process ~~will~~ *has been RHB 11/17/81 DED 11/17/81 TR 11/17/81* *has* removed ~~remove~~ all surface foreign debris, scaling, rusting, etc. to sound metal. ASTM A20, paragraph 9.2.1.1, requires all imperfections to be removed to sound metal and to be well faired. Procedure MSS SP-55 shall be used as a guide to determine well faired conditions. Type II, Type VII and Type VIII *RHB 11/17/81 DED 11/17/81 TR 11/17/81* photographs shall be used for representative acceptable surfaces.

All pits greater than 1/8 inch in depth shall be weld repaired in accordance with ASTM A20, paragraph 9.4.

By:

Richard H. Benoit 11/4/81 RHB 11/9/81

Technical Approval:

D.E. Dehart 11/4/81

QA Approval:

TC Roberts 11-7-81

Previous resolutions have proven to be very difficult the containment plate. The following procedure shall which defects are acceptable and which require repair development of these criteria are contained in calcul.

was within  
Ultimate  
analysis but  
not case ground  
ne  
11-0003.  
Reg's. according

1. Surface flaws with a depth of  $1/8"$  or greater shall to ASME procedures.
2. Surface flaws with depth less than or equal to  $1/32"$  are acceptable if they do not interfere with other flaws as outlined below.
3. The remaining flaws shall be inspected to determine their acceptability using the attached Figure 9092.1. The acceptability of a given flaw will be determined by the size of the surface which it covers, the depth of the flaw, and the proximity of the flaw to other flaws. Surface defects failing this criteria shall be weld repaired according to ASME procedures.
4. The following definitions apply to the variables used in Figure 9092.1:
  - a.  $\underline{d}$  (flaw diameter): The dimension of the surface flaw in the direction of the next adjacent flaw. For circular pits surrounded by a circular pattern of smaller pits,  $\underline{d}$  shall be taken as the distance across the circular pattern.
  - b.  $\underline{D}$  (spacing between flaws): The minimum clear distance of unflawed surface between adjacent flaws. If  $\underline{D}$  is greater than  $1\ 3/8"$ ,  $\underline{D}$  is to be taken to be equal to  $1\ 3/8"$ .
  - c.  $\underline{t}_f$  (flaw depth): The maximum penetration of the flaw measured from the unflawed surface.
5. In applying Figure 9092.1, the two surface measurements  $\underline{D}$  and  $\underline{d}$  should be made first. With these two measurements, one point on the figure is determined. This point will lie between two flaw depth lines. The flaw depth indicated by the line immediately below the point given by  $\underline{D}$  and  $\underline{d}$  is acceptable, while the flaw depth given by the line immediately above the point is unacceptable. For points lying on a given flaw depth line, the flaw depth given by that line is acceptable. For example; a flaw with  $\underline{D}=1/2"$  and  $\underline{d}=5/8"$  is acceptable for a flaw depth of  $5/64"$  and is unacceptable for a flaw depth of  $3/32"$ . The actual flaw depth should be compared to the acceptable value to determine whether repair is required. Repairs may be made either to the flaw in question or to an adjacent flaw to arrive at a combination meeting this criteria.
6. Figure 9092.1 assumes an identical flaw on the opposite face of the dome plate. If it can be verified that in the area of a given flaw no surface flaws are present on the opposite face, the allowable depth given by Figure 9092.1 may be multiplied by two.
7. Surface flaws with a maximum dimension  $\underline{d}$  greater than  $1\ 3/8"$  shall be weld repaired according to ASME procedures except as noted in 2. above.
8. Surface flaws with a maximum dimension  $\underline{d}$  less than  $1/8"$  are not required to be repaired except as noted in 1. above.
9. Repairs are to be done in accordance with Section III, Subsection NE, of the ASME Code.

By:

Jim McConaghy 4/30/82

Technical Approval:

D.E. DeMuth 4/30/82

QA Approval:

ART Henry 4/30/82



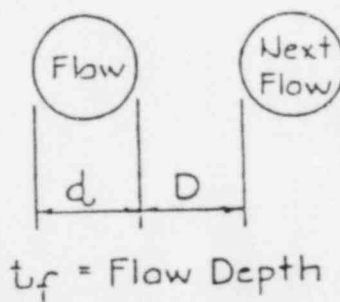
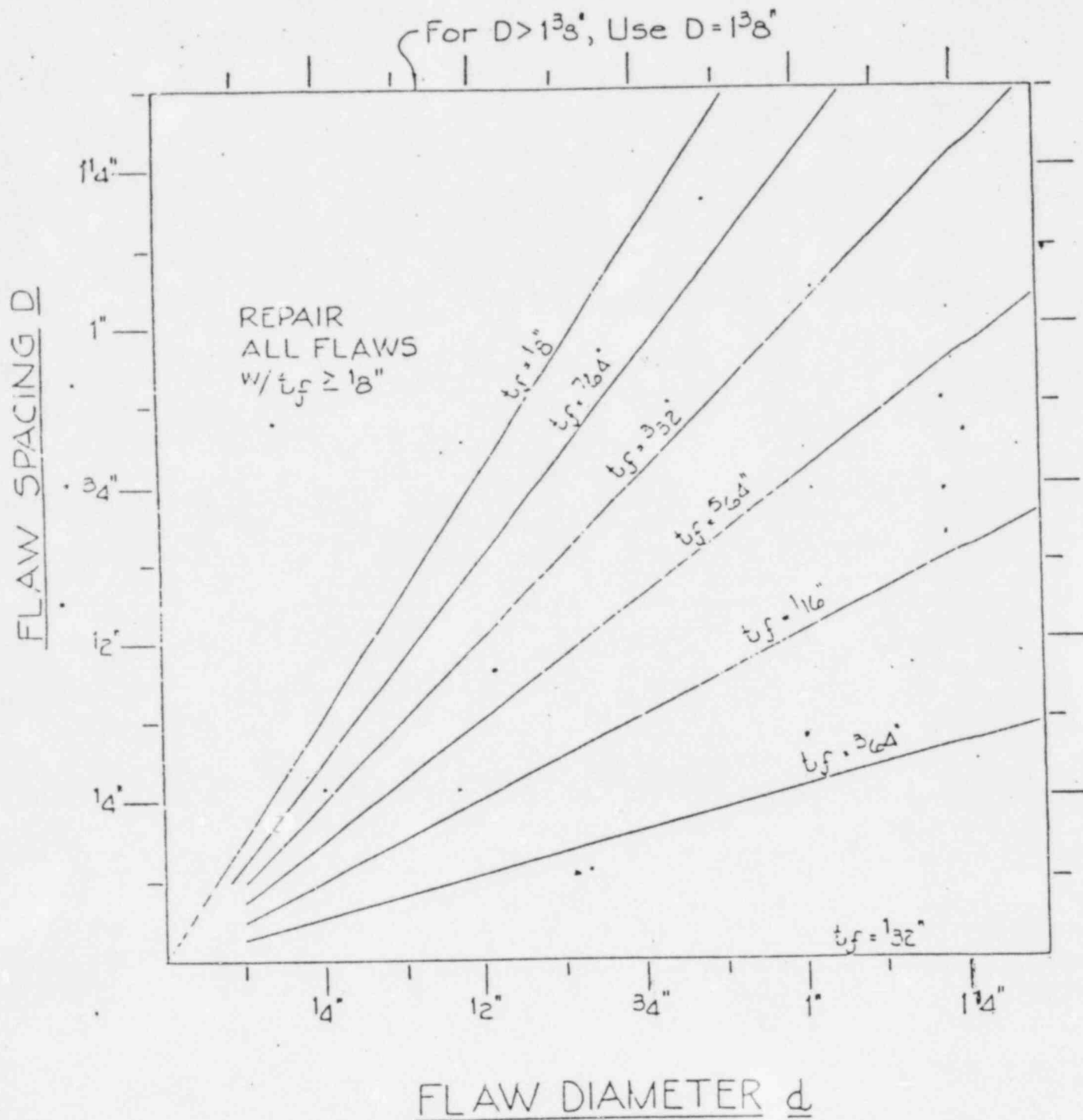


FIGURE 9092.1  
DOME PLATE SURFACE  
FLAW ACCEPTANCE  
CRITERIA

Dev./Station: CATAWBA Unit 2 File No. CNC-1144.09-01-000  
Subject: DOME PLATE PITTING  
By JMM Date 4-29-82  
Sheet No. 99 of Problem No. Rev 1 Checked By RHB Date 4-30-82

STATEMENT OF PROBLEM:

PREVIOUS ATTEMPTS TO RESOLVE NCI REPORT #909Z HAVE BEEN UNSUCCESSFUL, SINCE FIELD REPRESENTATIVES HAVE RESERVATIONS ABOUT WHOLESALE REPAIR/GRINDING OF LARGE AREAS OF CONTAINMENT PLATE. THE AREA IN QUESTION IS A LARGE PORTION OF THE UNIT 2 DOME, WHICH HAS BEEN NOTED TO HAVE A POOR SURFACE QUALITY. THESE AREAS WERE REVIEWED IN THE FIELD ON 3/18/82 BY DE DEMART AND JM MCNAGHY. THE SURFACE EXHIBITED FOUR OR FIVE CHARACTERISTIC CONDITIONS, RANGING FROM GENERAL AREA THINNING TO LOCALIZED PITTING. SAMPLES OF THESE CONDITIONS ARE SHOWN IN PHOTOGRAPHS IN THE INFO SECTION. AFTER INSPECTION, DESIGN REPRESENTATIVES AGREED THAT OVERALL GRINDING OF THE SHELL WOULD NOT BE ADVISABLE. SOME FLAWS SHOULD BE REPAIRED, WHILE OTHERS WOULD BE BEST LEFT ALONE. THE OBJECT OF THIS CALCULATION IS TO ESTABLISH A CRITERIA BY WHICH THE UNACCEPTABLE SURFACE FLAWS MAY BE IDENTIFIED.

QA CONDITION 1 APPLIES

APPLICABLE CODES : ASME '71 W/ ADDENDA THRU S'72

FSAR CRITERIA : SECTION 3.8.2

ASSUMPTIONS AND COMMENTS STATED AS MADE

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Dev./Station:

CAPA00BA

Unit 2 File No. CNC-1144.09-01-0003

Subject:

DOME PITTING

By

JMM

Date

4-29-82

Sheet No 100 of

Problem No

Rev1

Checked By

RHB

Date

4/30/82

INVESTIGATE SURFACE IMPERFECTIONS (PITS) ON DOME  
PLATE IAW NE-4223 ASME S'72 (see info section)

## REFERENCE DATA:

From CNC-1144.09-01-0003

 $t_r = .314''$  internal pressure (sh 9) $t_r = .6375''$  external pressure (sh 9A)

From CNC-1144.09-01-0012

 $t_{avg} = .699''$ 

LOCAL THIN AREAS ARE PERMITTED IF REINFORCED  
ACCORDING TO RULES OF AREA REPLACEMENT

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Dev./Station

CATAWBA

Unit

File No.

CNC-1144.09-01-0003

## Subjects

### Dome Pitting

By Jmm

Date 4-29-82

Sheet No 01 of

Problem No

Rev 1

Checked By \_\_\_\_\_

RHB

Date 4/30/82

PARAGRAPH NE-4223 OF ASME B31V CODE (71 EDITION W/  
ADDENDA THRU SUMMER '72) PERMITS LOCALIZED THIN  
AREAS IF REINFORCEMENT BY AREA REPLACEMENT  
IS PROVIDED.

\* NE-4223 Localized Thin Areas

\*ASME B5 PV CODE (7ZADDER

Localized thin areas are permitted if the adjacent areas surrounding each has sufficient thickness to provide the necessary reinforcement according to the rules for reinforcement in NE-3330.

**FOR INFORMATION ONLY**

ANY FLAW WHICH IMPINGES ON REQUIRED THICKNESS MUST BE INVESTIGATED. AREA TO BE REPLACED IS THAT WHICH IS REMOVED FROM THE REQUIRED THICKNESS.

Per NE-3332.2 All AREA REMOVED FROM THICKNESS  
REQUIRED FOR INTERNAL PRESSURE MUST BE REPLACED

PER NE-3332.4 ONE HALF THE AREA REMOVED FROM THICKNESS REQUIRED FOR EXTERNAL PRESSURE MUST BE REPLACED

LIMITS OF SUCH REINFORCING ALONG THE VESSEL WALL  
MUST CONFORM TO NE-3334.1

\*

**NE-3334.1 Limit of Reinforcement Along the Vessel Wall.** The limits of reinforcement, measured along the midsurface of the nominal wall thickness, shall be at a distance on each side of the axis of the opening equal to the greater of the following:

- (a) The diameter of the finished opening in the corroded condition;
- (b) The radius of the finished opening in the corroded condition plus the thickness of the vessel wall plus the thickness of the nozzle wall.

THESE LIMITS ARE  
PICTORIALLY SHOWN  
ON THE FOLLOWING  
SHEET

Dev./Station **CATAWBA**  
Subject **Dome Pitting**

Unit **2** File No. **CAC-1144,09-01-0003**

Sheet No. **10201**

Problem No.

Rev **1**

Checked By

**RHB**

By **JMM**

Date

**4-29-82**

Date

**4/30/82**

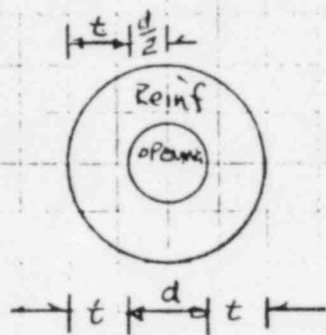
NE-3334.1a



ELEV. OF OPENING

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NE-3334.1b ( $t_{nozzle} = 0$ )  $t$  = wall thickness



GREATER OF TWO AREAS IS TO BE COUNTED AS REINFORCEMENT.

NOTE THAT IF  $t > d/2$  [ie  $d < 2t$ ], NE3334.1b ALWAYS GIVES GREATER REINFORCING AREA.



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Dev./Station: CATAWBA  
Subject: Dome Pitting

Unit: Z File No: CNC-1144.09-01-0003

Sheet No 103 of

Problem No.

Rev 1

By JMM  
Checked By RHB

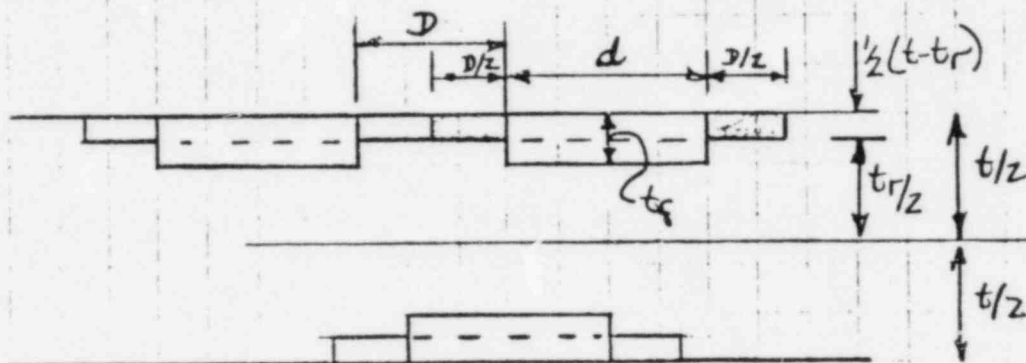
Date 4-29-82  
Date 4/30/82

FORMULATE FLAW CRITERIA FOR VARIABLES, ASSUMING EQUAL FLAWS ON EACH FACE.

$t_f$  = flaw depth

$d$  = flaw diameter

$D$  = edge to edge distance between flaws



FOR INFORMATION ONLY

LIMITS ON AREA FOR CONSIDERATION AS REINFORCEMENT

$$\left. \begin{array}{l} D/2 \leq t \\ D/t \leq 2 \end{array} \right\} \text{ for } d < 2t \quad (\text{NE3334.1b})$$

$$\left. \begin{array}{l} D/2 \leq d/2 \\ D \leq d \end{array} \right\} \text{ for } d > 2t \quad (\text{NE3334.1c})$$

$$\text{Since } 2t = 2(1.699") = 1.398" \approx 1\frac{3}{8}" = 2t_{\text{nom}}$$

AND MOST FLAWS ARE SMALLER THAN THIS,  
FIRST AREA IS OF MOST INTEREST

$$A_{\text{ref int. press}} = d \left( t_f + \frac{t_r}{2} - \frac{t}{2} \right) = t^2 \left( \frac{d}{t} \left( \frac{t_f}{t} + \frac{t_r}{2t} - \frac{1}{2} \right) \right)$$

$$A_{\text{ref ext. press}} = t^2 \left( \frac{d}{t} \left( \frac{t_f}{2t} + \frac{t_r}{4t} - \frac{1}{4} \right) \right)$$

$$A = \frac{1}{2} (D \sqrt{1 - \frac{t_f}{t}} + \frac{1}{2} (D \sqrt{1 - \frac{t_r}{t}}))$$

D.../Station

CATAWBA  
Dome pitting

Unit 2 File 12

CNC-1144.09-01-0003

Subject

By Jmm

Date 4-29-82

Sheet No 104 of

Problem No.

Rev 1

Checked By

RHB

Date 4/30/82

EXTERNAL PRESSURE CONTROLS SINCE  $t_r = .314"$  AND  $t_f = .6375"$   
 look at flaws with  $d < 1.398"$  ( $d/t < 2$ )  
 $A_{prov} \geq A_{reqd}$

$$\frac{1}{2} t^2 \left( \frac{D}{t} \right) \left( 1 - \frac{t_r}{t} \right) \geq t^2 \left( \frac{d}{t} \right) \left( \frac{t_f}{2t} + \frac{t_r}{4t} - \frac{1}{4} \right)$$

$$\frac{\frac{1}{2} \left( \frac{D}{t} \right) \left( 1 - \frac{t_r}{t} \right)}{(d/t)} \geq \frac{t_f}{2t} + \frac{t_r}{4t} - \frac{1}{4}$$

$$\frac{\frac{1}{2} \left( \frac{D}{t} \right) \left( 1 - \frac{t_r}{t} \right)}{d/t} + \frac{1}{4} \left( 1 - \frac{t_r}{t} \right) \geq \frac{t_f}{2t}$$

$$\left( 1 - \frac{t_r}{t} \right) \left[ \frac{D/t}{d/t} + \frac{1}{2} \right] \geq \frac{t_f}{t}$$

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030247 (J122

Dev./Station

CATAWB  
Dome Pitting

Unit 2

File No. CNC-1144.09-01-0003

Subject

By Jmm

Date 4-29-82

Sheet No. 105 of

Problem No.

Row 1

Checked By

RHB

Date

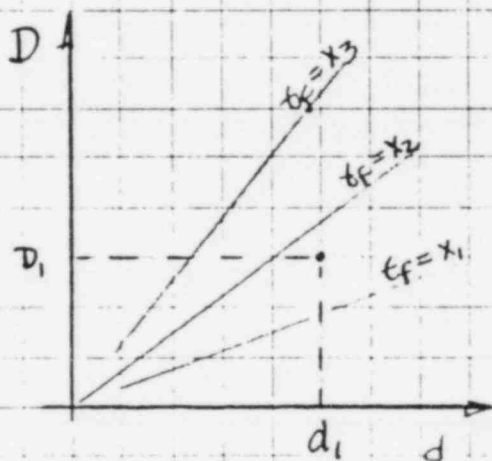
4/30/82

RESTATING THE BASIC RELATIONSHIP FOR EXTERNAL PRESSURE,

$$(t - t_{re}) \left[ \frac{D}{d} + \frac{1}{2} \right] \geq t_f \rightarrow \frac{D}{d} \geq \frac{t_f}{t - t_{re}} - \frac{1}{2}$$

$$D \geq k_e d \quad \text{where} \quad k_e = \frac{t_f}{t - t_{re}} - \frac{1}{2}$$

THIS IS A FAMILY OF STRAIGHT LINES ON  $D$  vs  $d$  plot for different flaw depths  $t_f$



EXAMPLE: flaw w/ diameter  $d_1$  and spacing  $D_1$  is acceptable if it is  $x_1$  deep and unacceptable if it is  $x_2$  deep.

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Day/Station

CATAWBA

Unit 2 File No. CNC-1A4.09-01-0003

Subject

Dome Pitting

By

Jmm

Date

4-29-82

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Problem No.

Rev 1

Checked By

RHB

Date

4/30/82

If  $d > 2t$ ,  $D_{max} = d$ , formulation is same for curves, but

$$t^2 \left( \frac{d}{t} \right) \left( \frac{t_f}{2t} + \frac{t_r}{4t} - \frac{1}{4} \right) \leq \frac{1}{2} t^2 \left( \frac{d}{t} \right) \left( 1 - \frac{t_r}{t} \right)$$

$$\frac{t_f}{2t} + \frac{t_r}{4t} - \frac{1}{4} \leq \left( 1 - \frac{t_r}{t} \right) \frac{1}{2}$$

$$\frac{t_f}{2t} \leq \frac{3}{4} \left( 1 - \frac{t_r}{t} \right) \rightarrow \frac{t_f}{t} \leq \frac{3}{2} \left( 1 - \frac{t_r}{t} \right)$$

→ same acceptance curves apply, but with limit that if  $D > d$  use  $D = d$

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## FOR INFORMATION ONLY

030241  
J124



Div./Station

CATAWBA  
Dome Pitting

Unit 2

File No. CNC-1144.09-01-0003

Subject

by Jmm

Date 9-29-82

Sheet No 107 of

Problem No.

Rev 1

Checked By

RHB

Date 4/30/82

for internal pressure,

$$A_{req} \leq A_{prov}$$

$$t^2 \left( \frac{d}{t} \right) \left( \frac{t_f}{t} + \frac{t_{ri}}{2t} - \frac{1}{2} \right) \leq \frac{1}{2} t^2 \frac{D}{t} \left( 1 - \frac{t_{ri}}{t} \right)$$

$$\left( \frac{t_f}{t} + \frac{t_{ri}}{2t} - \frac{1}{2} \right) \leq \frac{D}{d} \left( \frac{1}{2} \right) \left( 1 - \frac{t_{ri}}{t} \right)$$

$$\left( \frac{t_f}{t} - \frac{1}{2} \left( 1 - \frac{t_{ri}}{t} \right) - \frac{D}{d} \left( \frac{1}{2} \right) \left( 1 - \frac{t_{ri}}{t} \right) \right) \leq 0$$

$$\frac{t_f}{t} - \frac{1}{2} \left( 1 - \frac{t_{ri}}{t} \right) \left( 1 + \frac{D}{d} \right) \leq 0$$

$$\frac{t_f}{t} \leq \frac{1}{2} \left( 1 - \frac{t_{ri}}{t} \right) \left( 1 + \frac{D}{d} \right)$$

$$\frac{2 \frac{t_f}{t}}{\frac{t - t_{ri}}{t}} \leq 1 + \frac{D}{d} \quad \rightarrow \quad \frac{D}{d} \geq \frac{2 \frac{t_f}{t}}{t - t_{ri}} - 1$$

$$D > k_d \quad \text{where} \quad k_d = \frac{2 \frac{t_f}{t}}{t - t_{ri}} - 1$$

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Dev./Station

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Unit 2

File No. CNC-1144.09-01-0003

Subject

Dome Pitting

By

JMM

Date

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DEFINITION OF  $t_r = .6375$  in CNC-1144.09-01-0003 shows only that this  $t_r$  is conservative. EVALUATE  $t_r$  by USE OF NE-3133.4 (ASME '1980) WHICH BYPASSES CHARTS FOR SPHERES OF THIS TYPE, WHILE MAINTAINING IDENTICAL FORMULATION.

$$A = \frac{T}{8R} = \frac{.699''}{8(690'')} = 1.266 \times 10^{-4}, \text{ WHICH IS OFF MAT'L CHARTS}$$

$$\rightarrow \text{NE 3133.4(a) step 5} \rightarrow P_{a_{\text{ext}}} = \frac{E t^2}{16 R^2}$$

$$t_{r_{\text{ext}}}^2 = \frac{16 P R^2}{E} \rightarrow t_{r_{\text{ext}}} = 4 R \sqrt{\frac{P}{E}} = 4(690'') \sqrt{\frac{1.5 \text{ psi}}{29 \times 10^6 \text{ psi}}}$$

$$\underline{t_{r_{\text{ext}}} = .6277''}$$

If external pressure for design is reduced,  $t_r$  can be computed directly as above.

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INSURE THAT REINFORCEMENT REQUIREMENTS FOR  
INTERNAL PRESSURE DO NOT CONTROL

i.e. guarantee that  $k_{int} > k_{ext}$  (see figure below).

$$\frac{2t_f}{t-t_{ri}} - 1 > \frac{t_f}{t-t_{re}} - \frac{1}{2} \rightarrow t_f \left( \frac{2}{t-t_{ri}} - \frac{1}{t-t_{re}} \right) > \frac{1}{2}$$

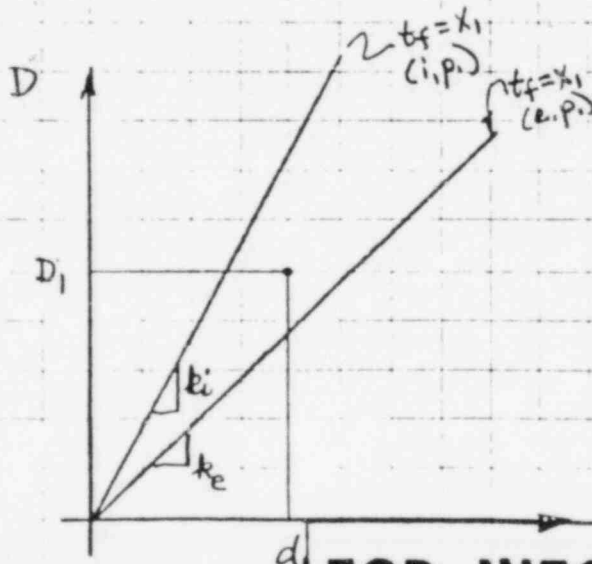
$$t = .699''$$

$$t_{ri} = .314''$$

$$t_{re} = .6277''$$

$$t_f > \frac{\frac{1}{2}}{\frac{2}{.699-.314} - \frac{1}{.699-.6277}} = -.0566$$

$\therefore$  For  $\left. \begin{array}{l} P_{ext} = 1.5 \text{ psi} \\ P_{int} = 15 \text{ psi} \\ t = .699'' \end{array} \right\}$ , external pressure always controls the acceptability of surface flaws.



Flaw  $\phi d_1$ , spacing  $D_1$ ,  
depth  $t_f = x_1$ , is OK FOR  
internal pressure, NOT FOR  
external pressure as  
long as  $k_i > k_e$ .

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EVALUATE ACCEPTANCE CURVES for external pressure

$$D \geq k_e d$$

$$k_e = \frac{t_f}{t - t_{re}} - \frac{1}{2}$$

$$\text{FOR } t = .699" \text{ , } t_{re} = .6375$$

$$k_e = 0 \text{ at } t_f = \frac{1}{2}(t - t_{re}) = .0308" \approx 1/32"$$

$t_f$
$1/32" = .0313$
$3/64" = .0469$
$1/16" = .0625$
$5/64" = .0781$
$3/32" = .0938$
$7/64" = .1094$
$1/8" = .125$
$9/64" = .1406$

$k_e$
.0081 $\approx 0$
.2622
.5163
.7703
1.0244
1.2785
1.5325
1.7866

$$k_e = \frac{t_f}{.0615} - \frac{1}{2}$$

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Dome Pitting

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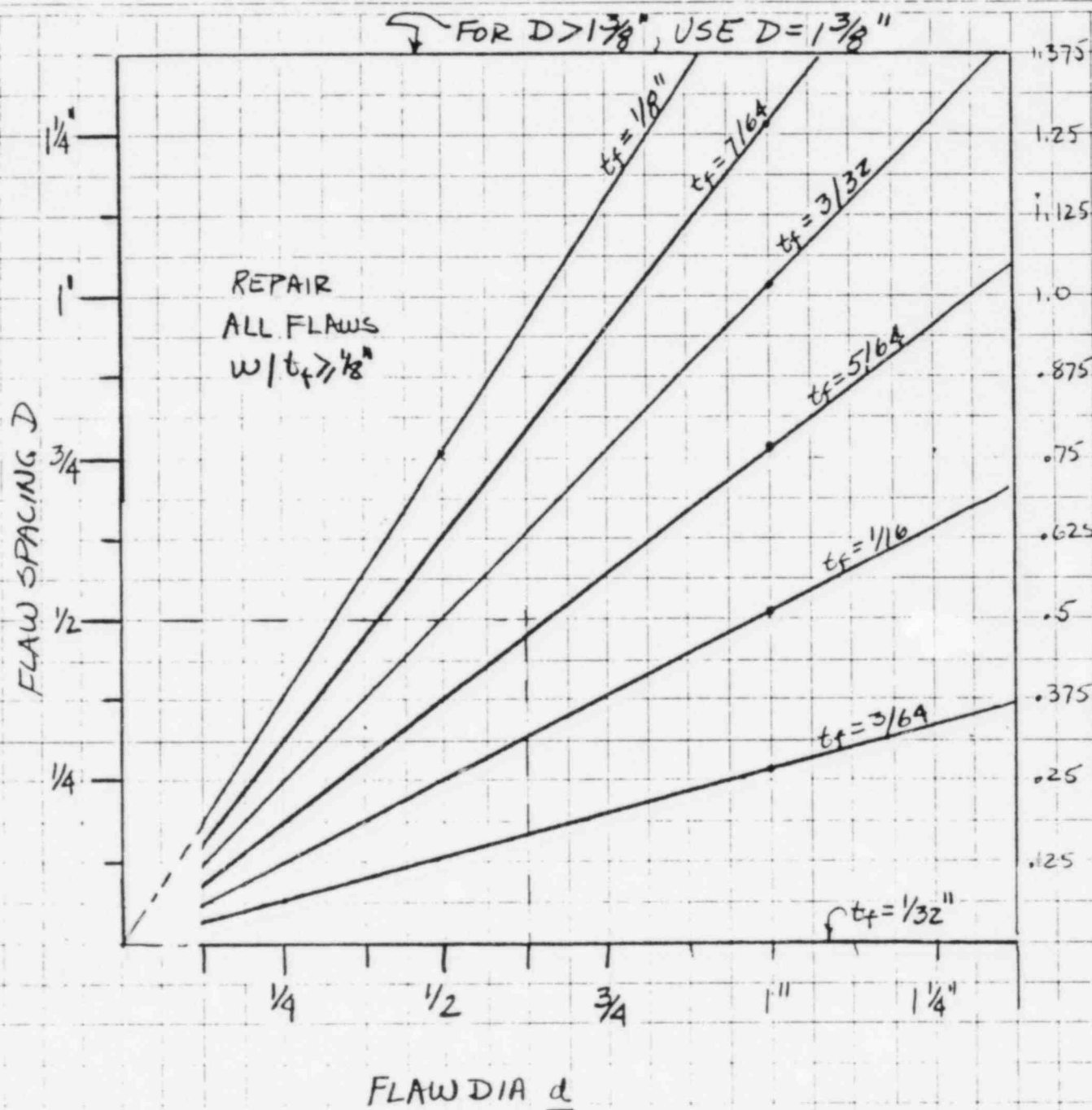
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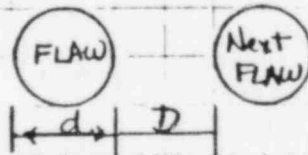
4/30/82



SAMPLE:

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FLAW  $5/8"$  DIA  
 $1/2"$  TO NEXT FLAW



$5/64"$  FLAW OK  
 $3/32"$  FLAW NG

$t_f$  = flaw depth

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Subject **Dome Pitting** By **Jmm** Date **4-29-82**  
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NOTE THAT THE PRECEDING FORMULATION ASSUMES  
AN IDENTICAL FLAW ON THE OPPOSITE FACE

∴ If it can be verified that in the area of a given  
flaw, no surface flaws are present on the  
opposite face, the allowable depth given by  
the chart may be doubled.

INQUIRIES TO METALLURGISTS AT THE VENDOR  
INDICATE THAT THE SURFACE PITTING CONDITION  
IS STABLE IN ITS PRESENT CONDITION AND  
THERE WILL BE NO WORSENING. SEE MEMO TO  
FILE DATED 4/23/82 IN INFORMATION SECTION.

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IF THESE CONDITIONS ARE SATISFIED, DETERMINE THE EFFECTIVE THICKNESS WHICH CAN BE CONSIDERED FULLY REINFORCED FOR INTERNAL PRESSURE.  
(MAY INFLUENCE ULTIMATE CAPACITY ANALYSIS)

$$k_{ext} = k_{int} = \frac{2t_f}{t - t_{r_{int}}} - 1 \rightarrow 1 + k_{ext} = \frac{2t_f}{t - t_{r_{int}}}$$

$$t_{r_{int \text{ effective}}} = t - \frac{2t_f}{1 + k_{ext}}$$

FOR EACH FLAW SIZE, AND  $t = .699"$

$t_f$	$k_{ext}$	$t_{r_{int}} \text{ (effective)}$	$t_f$ $k_{ext}$
1/32	.0081	.637"	
3/64	.2622	.6247"	
1/16	.5163	.6166"	
5/64	.7703	.6107	
3/32	1.0244	.6064	
7/64	1.2795	.6030	
1/8	1.5325	.6003	
9/64	1.7866	.5981	

→ TO AVOID REDUCING EFFECTIVE THICKNESS FOR INTERNAL PRESSURE BELOW 0.6", REPAIR ALL DEFECTS 1/8" AND DEEPER

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Dev./Station **CATAWBA**  
 Subject **Dome Pitting**

Unit **2** File No. **CNC-1144.09-01-0003**

Sheet No. **1A** of **1** Problem No. **Rev 1**

By **JMM** Date **4-29-82**

Checked By **AHB** Date **4/30/82**

COMPARE STRESSES IN SPHERICAL DOME AT ULTIMATE CAPACITY  
 TO THOSE GIVEN BY CLASSICAL MEMBRANE THEORY

REF: CNC-1144.0901-0007

LOOK AT PRESSURE STEP **71.5psi**

MATERIAL PROPERTIES:  $S_y = 45.901 \text{ Ksi}$

VONMISES STRESS  $\bar{\sigma} = (\sigma_\theta^2 + \sigma_\phi^2 - \sigma_\theta \sigma_\phi)^{1/2}$

FOR CLASSICAL MEMBRANE STRESS STATE IN SPHERICAL SHELL

$$\sigma_\phi = \sigma_\theta = Pr/2t \rightarrow \bar{\sigma} = \sigma_\theta = \sigma_\phi$$

for  $t = .6875$  in ultimate capacity analysis

$$Pr/2t = (71.5\text{psi} \times 690") / 2(.6875) = \underline{35.88\text{Ksi}}$$

FOR DOME REGION, FROM ULTIMATE CAPACITY ANALYSIS,  
 COMPARE  $\sigma_\theta$  and  $\sigma_\phi$  TO CLASSICAL MEMBRANE STRESS.

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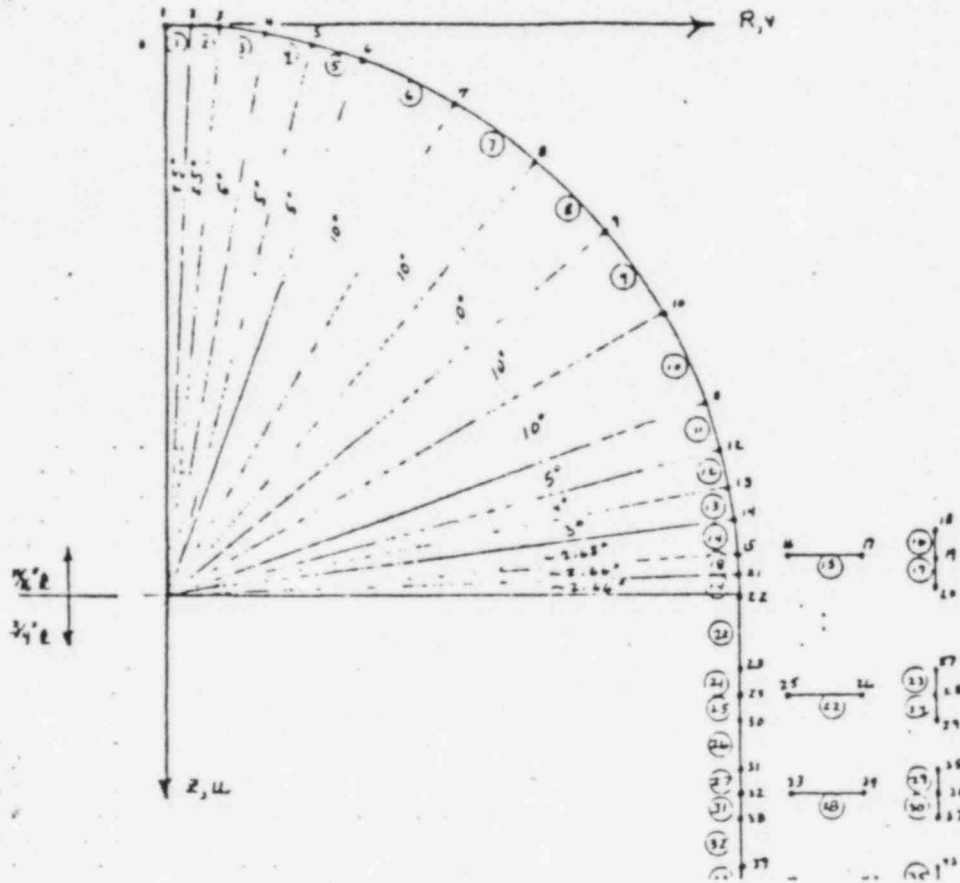
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ULTIMATE CAPACITY MODEL OF DOME AREA  
(REF CNC-1144.09-01-0007)



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Unit 2 File No. CNC-1144.09-01-0003

Subject COMPARISON OF 71.5 PSI STRESS RESULTS TO CLASSICAL ANALYSIS

PT/zt = 35.88 Ksi (CNC-1144.09-01-0007) By JMM Date 4-29-82

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ELEM	PT	$f_t$ (Ksi)	% diff	$f_\theta$ (Ksi)	% diff	$f_z$ (Ksi)	% diff	REMARKS
10	1 to 3	max 35.92 min 35.89	max 11% +0.03%	max 35.92 min 35.89	max 11% +0.03%	max 35.92 min 35.89	max 11% +0.03%	DOME
11	1	35.92	+11%	35.90	+0.06%	35.91	+0.08%	
	2	35.91	+0.08%	35.88	—	35.90	+0.06%	
	3	35.89	+0.03%	35.82	-0.17%	35.89	+0.03%	
12	1	35.93	+0.14%	35.79	-0.25%	35.86	-0.06%	
	2	35.89	+0.03%	35.63	-0.70%	35.76	-0.33%	
	3	35.93	+0.14%	35.29	-1.64%	35.62	-0.72%	
13	1	35.92	+11%	34.98	-2.51%	35.46	-1.17%	
	2	35.78	-0.28%	34.18	-4.74%	35.01	-2.42%	
	3	36.33	+1.25%	33.10	-7.75%	34.83	-2.93%	
14	1	35.40	-1.34%	31.75	-11.51%	33.72	-6.02%	
	2	35.98	+0.28%	28.65	-20.15%	32.93	-8.22%	
	3	35.86	-0.06%	26.15	-27.12%	32.13	-10.45%	
15	1	0		15.00		15.42		RING STIFF
	2			14.74		15.02		
	3			14.49		14.65		
16	1			14.20		14.20		
	2			14.34		14.34		
	3			14.46		14.46		
17	1			14.51		14.51		
	2			14.58		14.58		
	3			14.63		14.63		
18	1	35.79	-0.25%	26.46	-26.25%	32.15	-10.40%	DOME
	2	36.08	+0.56%	30.21	-15.80%	33.53	-6.55%	
	3	35.42	-1.28%	34.92	-2.68%	35.17	-1.98%	
19	1	36.33	+1.25%	37.53	+4.60%	36.94	+2.95%	
	2	36.01	+0.36%	42.05	+17.20%	39.38	+9.75%	
	3	35.24	-1.78%	47.61	+32.69%	42.79	+19.26%	DOME/CYL JUNK
20	1					yield		cylinder
	2							"
	3							"

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Dev./Station CATOWBA,  
Subject Dome pitting

Unit 2 File No. CNC-1144-04-01-0003

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### ANALYSIS OF RESULTS

FOR THE MAJORITY OF THE DOME, BEHAVIOR AT ULTIMATE CAPACITY IS IDENTICAL TO THAT PREDICTED BY CLASSICAL MEMBRANE THEORY (ELEMENTS 1 TO 12). ELEMENTS 13 AND 14 SHOW THE DISCONTINUITY EFFECTS OF THE TOP RING STIFFENER. HOOP STRESSES DROP AS THE RING STIFFENER BEGINS TO ABSORB HOOP FORCES. MERIDIONAL STRESSES CONTINUE TO BE AS PREDICTED BY MEMBRANE THEORY. THE TOP RING STIFFENER (ELEMENTS 15, 16 AND 17) IS ELASTIC AT ULTIMATE PRESSURE.

BELOW THE TOP RING STIFFENER, MERIDIONAL STRESSES CONTINUE TO BE CLASSICAL MEMBRANE STRESSES. HOWEVER, HOOP STRESSES INCREASE AS DISTANCE FROM RING STIFFENER BECOMES GREATER. IN THIS REGION, THE DOME PLATE BEHAVIOR BECOMES MORE LIKE THE CYLINDRICAL SHELL. THIS IS REASONABLE BASED UPON REVIEW OF THE GEOMETRY. NEAR THE DOME-CYLINDER JUNCTION, THE DOME PLATE IS ELASTIC, WHILE THE CYLINDER HAS YIELDED.

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Unit Z File No. CNC-1144

Subject

Dome Pitting

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CONCLUSIONS:

ABOVE RING STIFFENER, DOME MAY BE TREATED AS A CLASSICAL SPHERE UP TO CONTAINMENT ULTIMATE CAPACITY.

$$\sigma_{\phi} = \sigma_{\theta} = \bar{\sigma} = \text{STRESS INTENSITY} = \frac{PR}{2t}$$

$$\frac{72 \text{ psi} (640'')}{2(0.6'')} = 41.4 \text{ Ksi} \quad \text{for } t = 0.6''$$

$$41.4 \text{ Ksi} \ll S_y = 45.901 \text{ Ksi}$$

→ DOME DEFECTS DO NOT AFFECT ULTIMATE CAPACITY IF REPAIRED SUCH THAT  $t_{\text{eff}} = 0.6''$  (ABOVE RING)

BELOW RING STIFFENER, ONLY ONE PLATE HAS BEEN REPORTED TO HAVE POOR SURFACE QUALITY (SEE FIELD SURVEILLANCE RESULTS IN INFO SECTION - PLATE IN QUESTION IS 1-15). OF 36 PLATES IN THIS COURSE, REDUCTION IN THICKNESS FOR ONE PLATE IS INSIGNIFICANT IN OVERALL ANALYSIS.

IF DOME DEFECTS ARE REPAIRED / INSPECTED AS REQUIRED ABOVE, NO DECREASE IN CONTAINMENT ULTIMATE CAPACITY WILL RESULT.

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Unit

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File No.

CNC-144.09-01-0003

Subject

Dome Pitting

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SUMMARIZE CONSERVATISMS INHERENT IN THIS APPROACH:

1) FLAW IS CHARACTERIZED BY ITS MAXIMUM DEPTH, WHICH WILL NOT BE GENERALLY TRUE (REPLACING MORE AREA THAN REQUIRED FOR ROUND BOTTOM FLAWS)

2) IN CALCULATING ALLOWABLE UNDERTOLERANCES, NE-2125 (ASME S'72) AND NE-2124 (ASME W'81) ALLOW FOLLOWING:

PURCHASE REQ. SPECIFICATION ALLOWS UNDERTOLERANCE OF MORE THAN .01" → PLATE FURNISHED MUST BE NO MORE THAN .01" UNDER DESIGN THICKNESS.

∴ NEED ONLY INSURE REINFORCING TO MAKE UP TO  $t_r - .01"$  AT ALL LOCATIONS.

3) IN USING  $t_{eff} = .6"$  for internal pressure, it is assumed that all flaws are borderline acceptable. AND THAT ENTIRE PLATE IS REDUCED (FLAWS AS CLOSE TOGETHER AS IS ACCEPTABLE AND 1/8" DEEP)

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RESOLUTION TO BE PUBLISHED.

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by: JMM 4/29/82  
ckd: RHB 4/30/82

## Attachment (4) to NCI 90 2

Previous resolutions have proven to be very difficult to implement without damaging the containment plate. The following procedure shall be followed to determine which defects are acceptable and which require repair. Details concerning the development of these criteria are contained in calculation file CNC-1144.09-01-0003.

1. Surface flaws with a depth of  $1/8"$  or greater shall be weld repaired according to ASME procedures.
2. Surface flaws with depth less than or equal to  $1/32"$  are acceptable if they do not interfere with other flaws as outlined below.
3. The remaining flaws shall be inspected to determine their acceptability using the attached Figure 9092.1. The acceptability of a given flaw will be determined by the size of the surface which it covers, the depth of the flaw, and the proximity of the flaw to other flaws. Surface defects failing this criteria shall be weld repaired according to ASME procedures.
4. The following definitions apply to the variables used in Figure 9092.1:
  - a.  $\underline{d}$  (flaw diameter): The dimension of the surface flaw in the direction of the next adjacent flaw. For circular pits surrounded by a circular pattern of smaller pits,  $\underline{d}$  shall be taken as the distance across the circular pattern.
  - b.  $\underline{D}$  (spacing between flaws): The minimum clear distance of unflawed surface between adjacent flaws. If  $\underline{D}$  is greater than  $1\ 3/8"$ ,  $\underline{D}$  is to be taken to be equal to  $1\ 3/8"$ .
  - c.  $\underline{t}_f$  (flaw depth): The maximum penetration of the flaw measured from the unflawed surface.
5. In applying Figure 9092.1, the two surface measurements  $\underline{D}$  and  $\underline{d}$  should be made first. With these two measurements, one point on the figure is determined. This point will lie between two flaw depth lines. The flaw depth indicated by the line immediately below the point given by  $\underline{D}$  and  $\underline{d}$  is acceptable, while the flaw depth given by the line immediately above the point is unacceptable. For points lying on a given flaw depth line, the flaw depth given by that line is acceptable. For example, a flaw with  $\underline{D}=1/2"$  and  $\underline{d}=5/8"$  is acceptable for a flaw depth of  $5/64"$  and is unacceptable for a flaw depth of  $3/32"$ . The actual flaw depth should be compared to the acceptable value to determine whether repair is required. Repairs may be made either to the flaw in question or to an adjacent flaw to arrive at a combination meeting this criteria.
6. Figure 9092.1 assumes an identical flaw on the opposite face of the dome plate. If it can be verified that in the area of a given flaw no surface flaws are present on the opposite face, the allowable depth given by Figure 9092.1 may be multiplied by two.
7. Surface flaws with a maximum dimension  $\underline{d}$  greater than  $1\ 3/8"$  shall be weld repaired according to ASME procedures except as noted in 2. above.
8. Surface flaws with a maximum dimension  $\underline{d}$  less than  $1/8"$  are not required to be repaired except as noted in 1. above.
9. Repairs are to be done in accordance with Section III, Subsection NE, of the ASME Code.

By:

Technical Approval:

QA Approval:

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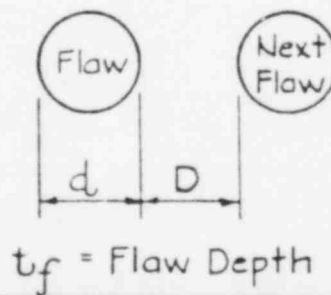
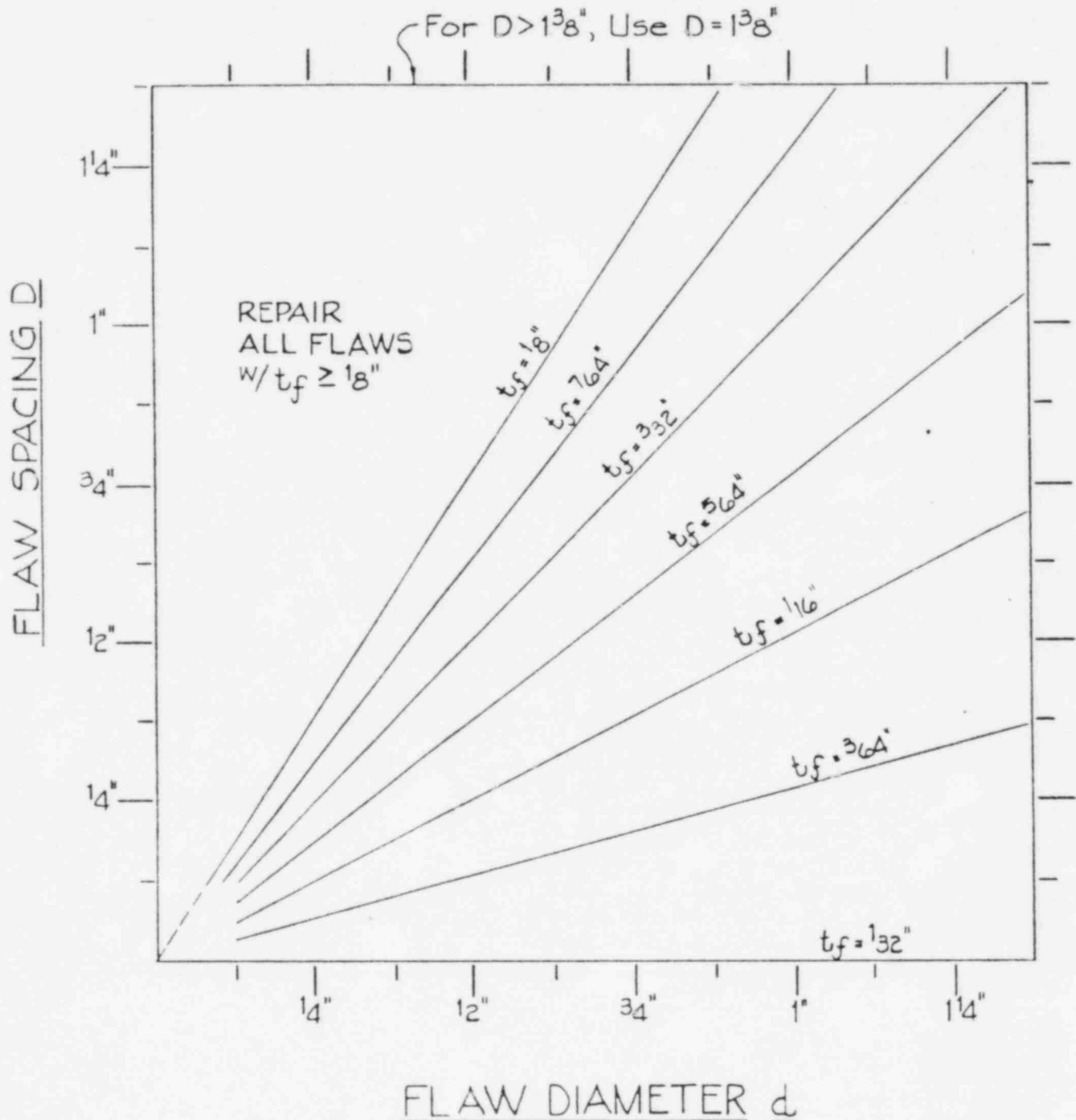


FIGURE 9092.1  
DOME PLATE SURFACE  
FLAW ACCEPTANCE  
CRITERIA

Div./Station CATAWBAUnit 2 File No. CNC-1144.09-01-0003Subject DOME PLATE PITTINGBy JMMDate 7/6/82Sheet No. 122 ofProblem No. REV 2

Checked By

RHBDate 7/8/82STATEMENT OF REVISION:

IN DEVELOPING CONSTRUCTION PROCEDURE FOR INSPECTION OF DOME PLATE PITTING, THE FIELD HAS REQUESTED THAT THE ACCEPTANCE CRITERIA OF FIGURE 9092.1 BE RESTATED IN TABULAR FORMAT TO REDUCE THE POTENTIAL FOR ERRORS AND DISAGREEMENTS IN READING THE CHART. THIS DOES NOT CONSTITUTE A CHANGE IN THE RESOLUTION OF NCI 9092, BUT IS MERELY A RESTATEMENT OF THE CRITERIA IN A DIFFERENT FORM.

QA CONDITION 1 APPLIESAPPLICABLE CODES AND STANDARDS: ASME '71 W/ADDENDA THRU 54FSAR CRITERIA: SECTION 3.8.2ASSUMPTIONS AND COMMENTS: STATED AS MADE.**FOR INFORMATION ONLY****UNCONTROLLED**

Dev./Station CATAWBA  
 Subject DOME PITTING

Unit 2 File No. CNC 1144,09-01-0003

By JMM Date 7/6/82

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DEVELOP TABULAR FORMAT FOR ACCEPTANCE CRITERIA

FROM sh 105

$$\frac{D}{d} \geq \frac{t_f}{t - t_{re}} - \frac{1}{2} \rightarrow t_f \leq (t - t_{re}) \left( \frac{D}{d} + \frac{1}{2} \right)$$

for  $t = .699$   
 $t_{re} = .6375$

$$t_f \leq (.0615") \left( \frac{D}{d} + \frac{1}{2} \right)$$

INVESTIGATE DIFFERENT COMBINATIONS OF D AND d  
 TO DETERMINE ACCEPTABLE FLAW DEPTHS  
 IN MILS (MEASUREMENTS TO BE MADE W/PICK GAUGE)

$$t_f \leq 61.5 \left( \frac{D}{d} + \frac{1}{2} \right)$$

UPPER LIMIT =  $\frac{1}{8}" = 125 \mu$

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Dev./Station CATAWBA Unit 2 File No. CXC-1144,09-01-0003  
 Subject DOME PLATE PITTING NCI 9092  
ALLOWABLE FLAW DEPTH (MILS) By JMM Date 7/6/82  
 Sheet No. 124 of      Problem No. REV 2 Checked By RHB Date 7/8/82

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	FLAW SPACING (IN) D																		
	1/16"	1/8"	3/16"	1/4"	5/16"	3/8"	7/16"	1/2"	9/16"	5/8"	11/16"	3/4"	13/16"	7/8"	15/16"	1"	1 1/16"	1 1/8"	1 3/16"
1/16"	92	124	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1/8"	62	92	123	124	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3/16"	51	72	92	113	124	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1/4"	46	62	77	92	108	123	124	-	-	-	-	-	-	-	-	-	-	-	-
5/16"	43	55	68	80	92	105	117	124	-	-	-	-	-	-	-	-	-	-	-
3/8"	41	51	62	72	82	92	103	113	123	124	-	-	-	-	-	-	-	-	-
7/16"	40	48	57	66	75	83	92	101	110	119	124	-	-	-	-	-	-	-	-
1/2"	38	46	54	62	69	77	85	92	100	108	115	123	124	-	-	-	-	-	-
9/16"	38	44	51	58	65	72	79	85	92	99	106	113	120	124	-	-	-	-	-
5/8"	37	43	49	55	62	68	74	80	86	92	98	105	111	117	123	124	-	-	-
11/16"	36	42	48	53	59	64	70	75	81	87	92	98	103	109	115	120	124	-	-
3/4"	36	41	46	51	56	62	67	72	77	82	87	92	97	103	108	113	118	123	124
13/16"	35	40	45	50	54	59	64	69	73	78	83	88	92	97	102	106	111	116	121
7/8"	35	40	44	48	53	57	62	66	70	75	79	83	88	92	97	101	105	110	114
15/16"	35	39	43	47	51	55	59	64	68	72	76	80	84	88	92	96	100	105	109
1"	35	38	42	46	50	54	58	62	66	69	73	77	81	85	88	92	96	100	104
1 1/16"	34	38	42	45	49	52	56	60	63	67	71	74	78	81	85	89	92	96	99
1 1/8"	34	38	41	44	48	51	55	58	62	65	68	72	75	79	82	85	89	92	96
1 3/16"	34	37	40	44	47	50	53	57	60	63	66	70	73	76	79	83	86	89	92
1 1/4"	34	37	40	43	46	49	52	55	58	62	65	68	71	74	77	80	83	86	89
1 5/16"	34	37	40	42	45	48	51	54	57	60	63	66	69	72	75	78	81	83	86
1 3/8"	34	36	39	42	45	48	50	53	56	59	62	64	67	70	73	75	78	81	84

- NOTES: 1) WHERE VALUE IS NOT SHOWN, ALLOWABLE FLAW DEPTH = 124 MILS  
 2) FIELD MAY INTERPOLATE BETWEEN VALUES SHOWN  
 3) VALUES FOR  $d = 1/16"$  ARE GIVEN FOR INTERPOLATION PURPOSES ONLY - FLAWS WITH  $d < 1/8"$  ARE NOT REQUIRED TO BE REPAIRED UNLESS DEPTH IS GREATER THAN 124 MILS

UNCONTROLLED

03024 (J142)



Dev./Station CATAWBA Unit 2 File No. CAC-1144.09-01-0003  
Subject DOME PLATE PITTING  
By Jmin Date 7/6/82  
Sheet No. 125 of      Problem No. REV 2 Checked By RHB Date 7/8/82

CONCLUSION:

INSPECTION BASED UPON THE TABULAR FORMAT ON  
SHEET 124 IS IDENTICAL TO INSPECTION BY  
FIGURE 9092-1 (SH. 121).

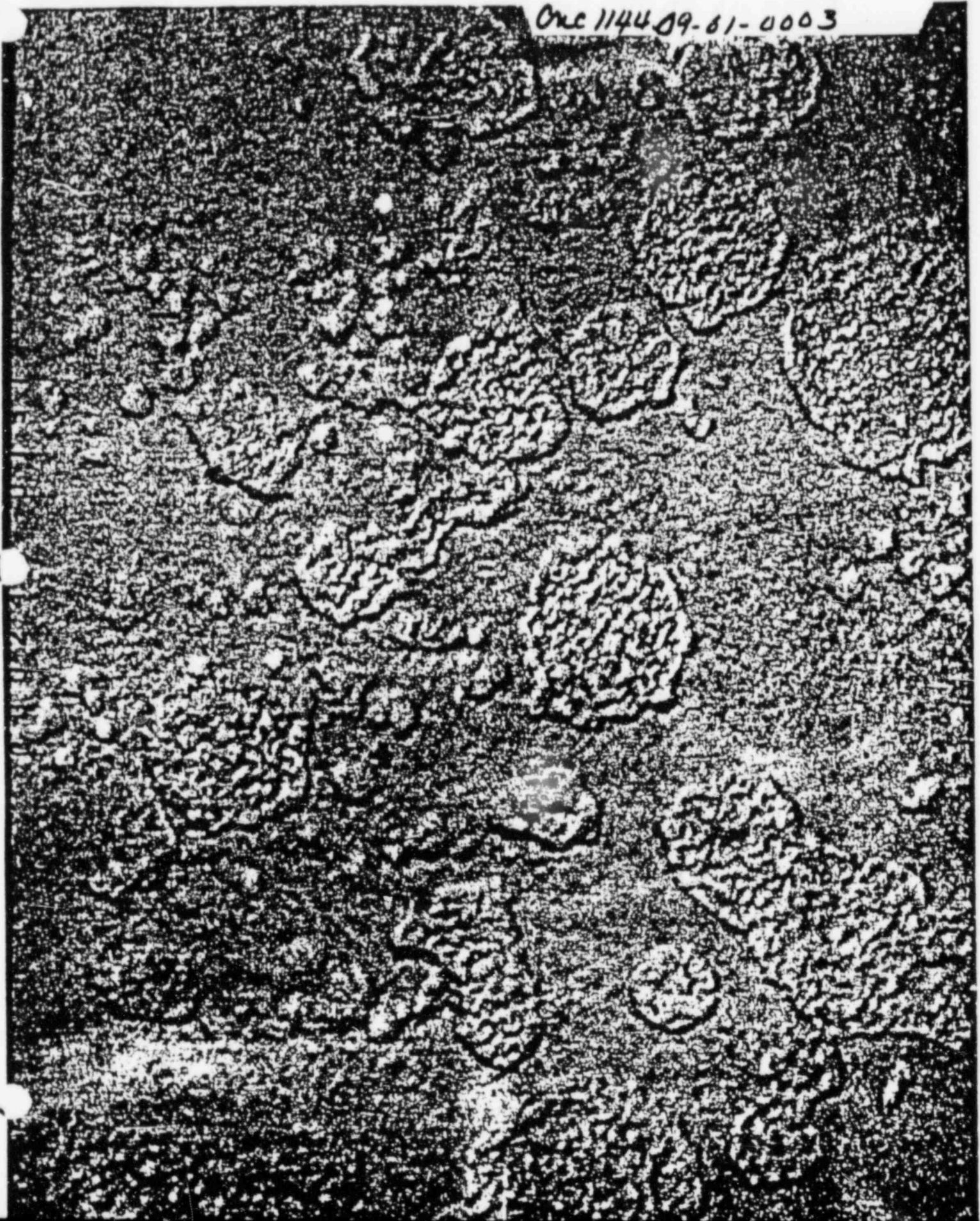
UNCONTROLLED

FOR INFORMATION ONLY

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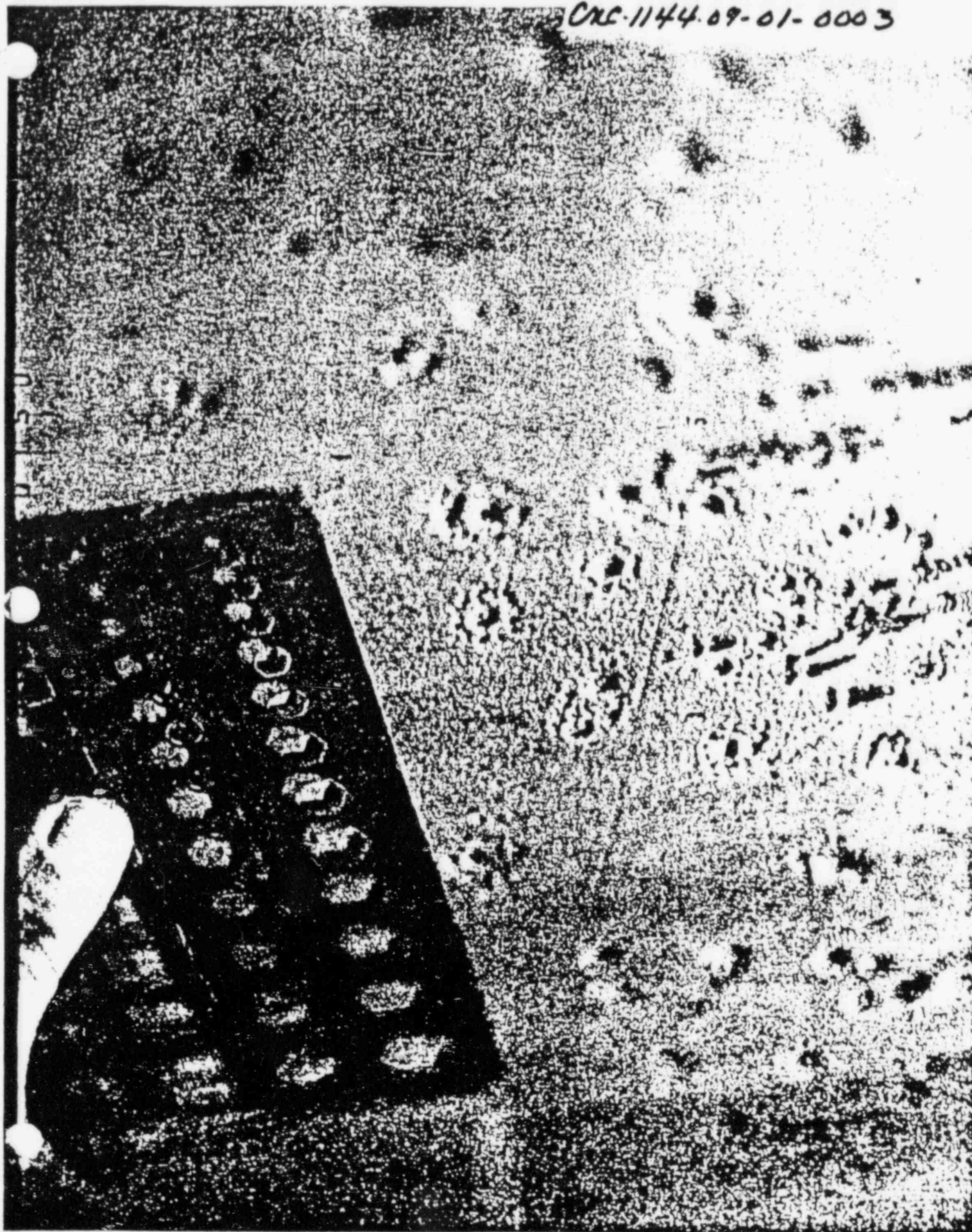


ONE 114409-61-0003

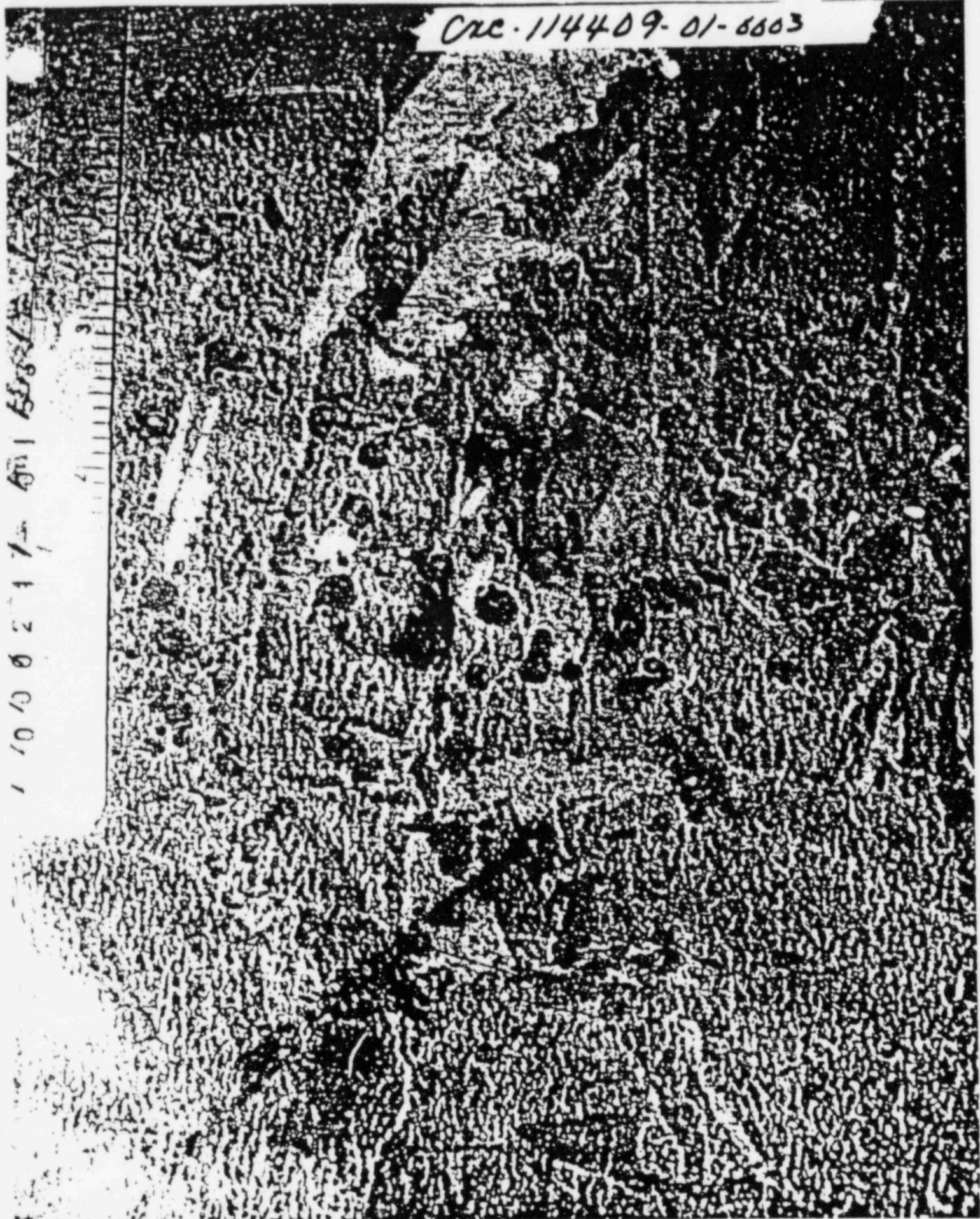




CNC-1144.09-01-0003

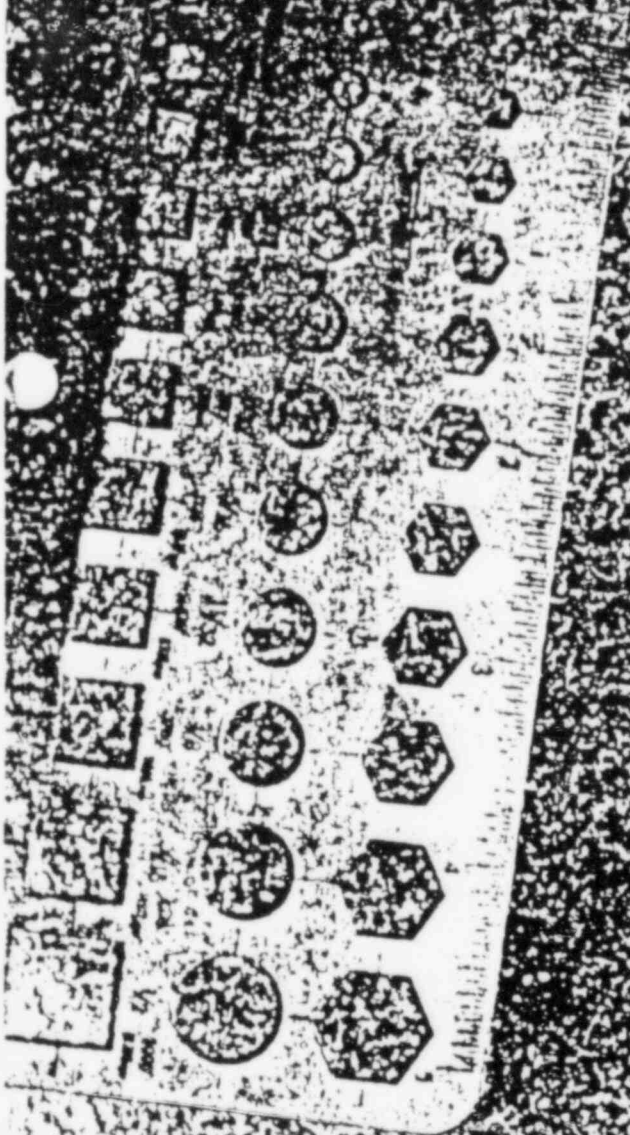


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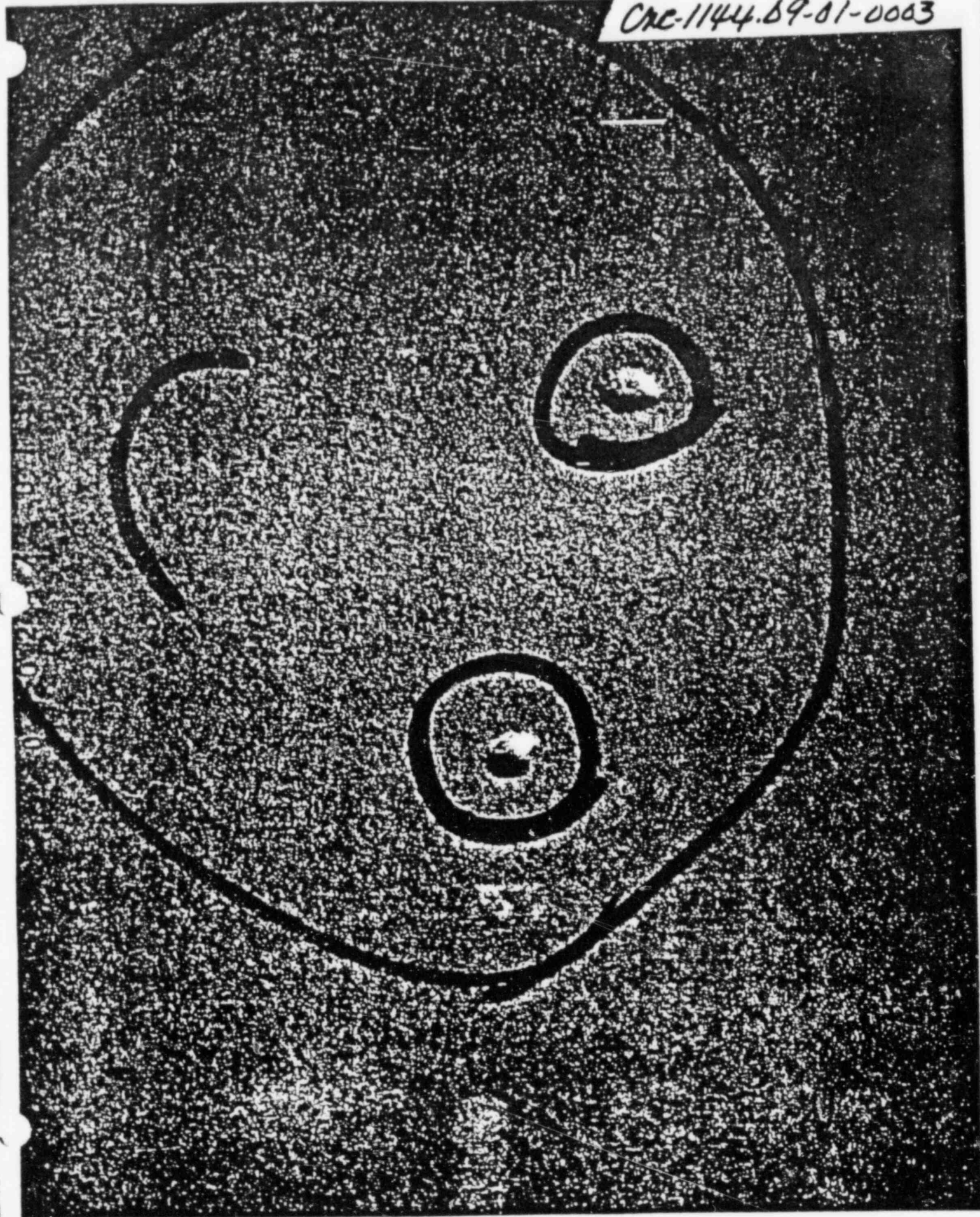


CNC-1144.07 4-6003





CRC-1144.69-01-0003





April 1, 1982

L. C. Dail  
S. K. Blackley, Jr.  
~~S. B. Hager~~  
C. J. Wylie

RECEIVED  
CIVIL-ENVIRONMENTAL DIV.  
CIVIL PROJECTS SECTION  
APR 02 1982  
CENTRAL RECORDS  
NO ATTACHMENT  
FILE NO. \_\_\_\_\_

XC: APC  
IWP

Re: Catawba Welding Inspector Task Force  
Design Engineering Response Scope  
File: ELD-0201

A. P. Cobb's letter to W. H. Owen dated March 30, 1982, transmitted Vol. I, Rev. 1 of the Task Force Effort to Evaluate Technical Concerns of Catawba Welding Inspectors. A review of Vol. I has been conducted and the list of resolution items requiring a response from Design Engineering is included as Attachment I. W. H. Bradley, Management Implementation Coordinator, agrees the list defines our scope for responses.

I will be working with the appropriate folks in the line divisions over the next few days to review response needs. The Specific Concerns (I) in Att. 1 require a responsible individual and a completion date and the Implementation Objectives (II) require a date by which actions will be defined and a date by which actions will be complete. These responsible individuals and dates should be defined by April 6, 1982 for response to W. H. Bradley.

After assignments and schedules are defined, a response to each item will be made and any required action will be followed to completion.

R. B. Priory, Principal Engineer  
Project Management Division

*David F. Mitchell*

By: D. F. Mitchell  
Engineer Associate

DFM/lmr

Attachment

cc w/atta: W. H. Bradley

RECEIVED  
CIVIL-ENVIRONMENTAL DIVISION  
CHIEF ENGINEER'S OFFICE  
APR 02 1982  
CENTRAL RECORDS/DIVISION  
NO ATTACHMENT TO  
FILE NO. \_\_\_\_\_

CONCERNS WITH DESIGN ENGINEERING DEPARTMENT  
RESOLUTION INVOLVEMENT

I. Specific Concerns

- A. Table II, 8) Revise Design Specification and CP432 to define acceptability for overlapping fillets. (R-9)
- B. Table II, 9) Evaluate "weld on edge of plate" question. (R-34)
- C. Table II, 16) The disposition of weld IN1162-27 is dependent on the resolution of NCIR 13955. (D-30)
- D. Table III, 3) Determine a workable resolution to NCIR 9092 immediately. (K-2)
- E. Table I, 18) Follow through on completion of NCIR 14033. (R-64)
- F. Table IV, 1) Identify the specific weld in question and document problem to Design Engineering for evaluation. (R-24)

II. Implementation Objectives

- A. Sec. 9.0, (3)e. Continue emphasis in training on proper method of NCI resolutions.

This speaks to NCIR Resolution Recommendations no. 1 and no. 3.

- no. 1 - Review adequacy of present requirements and controls for documenting technical resolutions, especially those by Design Engineering and Construction, insure that written resolutions are concisely stated, cite specific documentation as basis, and answer obvious questions.
- no. 3 - Review process for NCIR resolution by Construction and Design Engineering to insure adequacy of the following:
  - a) Resolution documentation
  - b) Adequate site inspection before resolution is issued.
  - c) Workable repairs are issued for craft implementation.
  - d) Any significant level of NCIR occurrences in specific areas is factored into procedure and performance reviews appropriately.
  - e) Any significant level of acceptance of "as is" conditions which do not meet Design or Construction original requirements are reviewed for procedure changes and personnel performance evaluation by appropriate management.
  - f) Upper time limit for resolution of all NCIR's is adequately defined and enforced.

- B. Sec. 9.0, (3) g. Clarify method of handling NCI's that have resolutions that are questioned.

This speaks to NCIR Resolution Recommendation no. 3g.

no. 3g - Returned NCIR's which have resolutions that are problems are tracked in the same manner as normal NCIR's received for the first time. Also insure that such returns are trended for procedure and performance evaluation purposes.

- C. Sec. 9.0, (3)m. Standardize welding symbols in design documents.

This speaks to Design Drawing Recommendation no. 1.

no. 1 - Review clarity of present standards used for weld callouts on drawings. Consider using more general specification vs. providing extensive joint geometry.

### III. Addition Items Used for Inputs in Addressing Items I. and II. above.

- A. Sec. 5.3.2, (7) Design Specifications, QA procedures, or Construction procedures are not always revised to clarify certain practices accepted by supervision.
- B. Sec. 5.3.3, (1) NCIR evaluators do not always provide a complete and obviously substantiated resolution to the NCIR's.
- C. Sec. 5.3.3, (8) Standardized methods for presenting weld requirements on drawings for individual weld joints may be needed.
- D. Sec. 5.3.3, (9) Some NCIR's are not being resolved in a reasonable time frame.
- E. Sec. 5.3.4, (1) Questions have arisen in the field concerning the validity and clarity of certain weld symbols.
- F. Sec. 5.3.4, (2) Additional emphasis may be needed in Design Engineering to emphasize importance of good drafting to eliminate drawing clarity problems.
- G. Sec. 5.3.5, Discussion Non-Standard procurement and specification of materials by various organizations in Design Engineering leads to many degrees of material segregation at sites.
- H. Sec. 5.3.8, (6) NCIR evaluations are sometimes not being adequately written. Sufficient detail concerning acceptability or rejectability of the item is not included in the evaluation text.
- I. Sec. 5.4, (4)(i) Poor documentation of discrepancies and resolutions on NCIR's by QA, Construction and Design.

- J. Sec. 6.0, (3)(d) Guidance within each Department for proper NCIR processing including such areas as documentation of problem, description and evaluation, adequacy of resolutions, and timing of resolutions.
- K. Sec. 7.1, (2) More specific administrative guidance appears needed to insure completeness and consistency in work performance but such guidance does not belong in a QA manual.



XC JBC  
DED  
Late design AS-7P  
1 KIP  
4/6

April 2, 1982

S. S. Hager

Attn: I. W. Pearce

Re: Catawba Welding Inspector Task Force  
Design Engineering Response Scope  
File: ELD-0201

DMD 82 002

<b>RECEIVED</b> CIVIL-ENVIRONMENTAL DIVISION CIVIL PROJECTS SECTION  APR 05 1982  CENTRAL RECORDS/DIVISION USE NO ATTACHMENT TO FILE  FILE NO. _____
---

A task force headed by A. P. Cobb has recently completed an effort to evaluate technical concerns expressed by Catawba welding inspectors. A portion of the Design Engineering response falls under your scope of responsibility.

A. Specific Concerns

- JBC 1. Item 9 from Table II - Welding Inspection, of Volume 1 of the report recommends -

Evaluate "weld on edge of plate" question.  
(Inspector concern R-34)

Please review R-34 (attached) and determine what actions are required to respond to the recommendations as stated in R-34. NCI 11486 was cleared by Construction in 5/81 but a copy is being sent to me and I will forward it to you upon receipt.

- DED 2. Item 3 from Table III - NCIR Resolution, of Volume 1 of the report recommends -

Determine a workable resolution to NCI 9092 immediately.  
(Inspector concern K-2)

Please review K-2 (attached) and work toward a rapid, workable completion of this NCI. I believe NCIR9092 has previously been cleared but requires additional action.

Since these are Specific Concerns, please advise me by April 9, 1982 a schedule date for completion of all action for each concern. The schedule dates and a confirmation that these are within your scope is all I need by April 9. All further action to resolve NCI's, define criteria, coordinate with others and revise appropriate design documents will be required as of the schedule dates you provide me.

S. B. Hager  
Attn: I. W. Pearce  
April 2, 1982  
Page Two -

B. Implementation Objectives

*JB*

Item 1 of Table IV - Design Drawing, of Volume 1 of the report recommends -

....Consider using more general specification vs. providing extensive joint geometry.

A. P. Cobb has indicated this item deals with not providing detailed joint preparations on design drawings and leaving preparation up to Construction and their procedures.

Please review this recommendation for impact on Design practices and possible actions required if changes are needed. You may need to review this item with D. M. Collings and others.

Since this is an Implementation Objective, please advise me by April 9, 1982 a schedule date to complete the impact review and, if actions are fully identified, a schedule date to complete the actions (an action completion date might not be possible until after the review is complete).

These concerns requiring action all directly affect on-going site work. As such, they should be resolved as expeditiously as possible. In addition, these concerns and their resolutions will be reviewed by the NRC for complete and prompt responses.

If you have any questions, please call me at extension 2892.

R. B. Priory, Principal Engineer  
Project Management Division

*David F. Mitchell*

By: D. F. Mitchell  
Engineer Associate

DFM/lmr

Attachment

cc w/o atta: D. M. Collings

# TECHNICAL EVALUATION-INDIVIDUAL CONCERN

STATEMENT OF CONCERN

FILE NO. R-34

A  $\frac{1}{4}$ " equal leg fillet cannot be made to  $\frac{1}{4}$ " nominally thick material when material is undersized but still within the tolerance for plate thickness. The specific plate in question was  $\frac{1}{16}$ " less. The inspector said his supervisor told it was O.K. for the weld to be  $\frac{1}{16}$ " less than  $\frac{1}{4}$ ". The inspector feels such permission should be in a written guideline. This problem was later nonconformed.

TECHNICAL RESPONSE

**UNCONTROLLED**

SPECIFIC BASIS OF CONCERN:

☒ YES - IDENTIFY: NCIR 11486

☐ NO

SPECIFIC CRITERIA VIOLATED OR MISUSED:

☒ ACTUAL — IDENTIFY: QA Procedure L-80 & CP 432

☐ POTENTIAL - IDENTIFY: \_\_\_\_\_

☐ NONE

TECHNICAL INADEQUACY:

REASONS

☐ ACTUAL

☒ POTENTIAL

☐ NONE

This particular problem is structurally adequate. The material in question is the rear bracket for a size A strut. A rated capacity is 650# for normal and upset condition and 1200# for the faulted condition. Assuming the bracket was welded on its short sides, it would provide three inches of weld length. In the normal or upset condition, the allowable load for a  $\frac{1}{4}$ " fillet weld three inches long is 11,136#. The faulted condition allowable is even higher from a strength standpoint a  $\frac{1}{16}$ " fillet weld size would carry the load. However, the weld would have to be larger than  $\frac{1}{16}$ " to satisfy the minimum weld size requirements in AISC paragraph 1.17.2. The weld size was called out as  $\frac{1}{4}$ " to meet this requirement. However, since this is a requirement to help control the amount of heat input into a joint and not a strength requirement, slight underrun is acceptable.

Regardless of the fact the supervisor acted improperly, it is not his job to make engineering decisions. The existing procedures do not allow any underrun on weld size. Therefore, the problem should have been nonconformed when first brought to his attention.

RECOMMENDATIONS

Specific Design Engineering should review the practice of specifying weld on size of plate of equal size as the nominal plate size. In cases where the plate is undersized within min tolerance, is the weld size acceptable as long as its weld size matches the actual material thickness? If not, how should this be handled? Design Engineering should respond to these questions in applicable procedures.

SIGN-OFF

EVALUATION

PERFORMED BY:

W. M. McQuinn, Jr.

DATE:

3-22-82

- Specific: (2) Design Engineering should review the acceptance of NCIR 11,486 attachment A item 4.
- (3) <sup>Applicable</sup> QA personnel should be instructed that they are not allowed to make engineering decisions similar to the decision made on NCIR 11,486 Attachment A item 4.

Robert W. McHale  
3-22-82

See verification for additional recommendations.

UNCONTROLLED



# VERIFICATION-INDIVIDUAL CONCERN

FILE NO. R-34

I concur with the statement that the weld is adequate, and offer the following additional recommendations.

Recommendations: Specific

**UNCONTROLLED**

① In reviewing the practice of specifying welds on edge of plates equal to plate thickness, Design Engineering should consider the following alternatives.

- a. Discontinue practice of specifying same weld size as plate thickness, since this design cannot always actually be constructed. (i.e., when plate is under size)
- b. Show unequal leg fillets where effective throat is required and mill tolerances and fabrication methods may result in material being "thin".
- c. Always allow enough margin in design for potential "thinness" of plate.

② Revise Design Specifications to clearly state what is acceptable field practice (e.g. substitute unequal leg fillet)

SIGN-OFF

VERIFICATION

PERFORMED BY:

DATE:

LPT Coggins  
3-24-82

Sept. 23, 1960

(30)

crackpot changer "A too thin"  
suppose to be 1/4 but is not. Out.  
CRIS.

UNCONTROLLED

# TECHNICAL EVALUATION-INDIVIDUAL CONCERN

## STATEMENT OF CONCERN

FILE NO. K-2

Mr. [redacted] states several concerns about the problems associated with the resolution of NCIR 9092 as follows: (1) The NCIR is 1 1/2 yrs. old without an acceptable resolution, (2) the defects in the unit 2 door containment plate were originally judged insignificant by design without visually inspecting the defect, (3) how did the defects pass through QA surveillance of vendor supply unnoticed?, (4) proper attention wasn't given to the problem (1-12-82 before design representative went down to investigate), (5) question competence of NCIR resolutions (several attempts without an acceptable solution), (6) why wasn't NC reached while the plate was still on the ground?

## TECHNICAL RESPONSE

**UNCONTROLLED**

### SPECIFIC BASIS OF CONCERN:

☒ YES - IDENTIFY: NCIR 9092

☐ NO

### SPECIFIC CRITERIA VIOLATED OR MISUSED:

☒ ACTUAL — IDENTIFY: Procedure Q-1 & P-1

☐ POTENTIAL - IDENTIFY: \_\_\_\_\_

☐ NONE

### TECHNICAL INADEQUACY:

### REASONS

☐ ACTUAL  
☒ POTENTIAL  
☐ NONE

The technical adequacy of the plate is still undetermined since the pitting is so extensive, repair methods may be ruled out as ineffectual. The defects are on both sides of the plate. This problem will probably need reanalysis to determine adequacy of plate thickness and surface defect. Design Engineering didn't give this problem proper and expedient attention for an item of such consequence. If this problem had quickly addressed, the plate could have been easily shipped back to the vendor. QA receiving inspection procedure P-13 & W-3 appears in since the defects went unnoticed during receiving inspection. The handling of procedure P-1 is also technically inadequate. This item has been installed violating paragraph 4.3 which states that a nonconforming item will not be permanently installed. The extent of the problem was not clearly stated in the description of nonconformance. Paragraph 5.1.1 states "a complete and accurate description of nonconformance shall be given sufficient detail so that the defect may be clearly understood." Paragraph 5.1.9 requires that the accuracy of individuals' descriptions on NCIRs. There have been a couple unsuccessful attempts to provide an acceptable resolution to this NCIR. The last attempt referenced a quality standard for forgings instead of containment plate.

### OTHER COMMENTS:

Handling of procedure P-1 is also technically inadequate. This item has been installed violating paragraph 4.3 which states that a nonconforming item will not be permanently installed. The extent of the problem was not clearly stated in the description of nonconformance. Paragraph 5.1.1 states "a complete and accurate description of nonconformance shall be given sufficient detail so that the defect may be clearly understood." Paragraph 5.1.9 requires that the accuracy of individuals' descriptions on NCIRs. There have been a couple unsuccessful attempts to provide an acceptable resolution to this NCIR. The last attempt referenced a quality standard for forgings instead of containment plate.

## RECOMMENDATIONS

A. Specific: Determine a workable resolution to NCIR 9092 in B. Programmatic: (1) Upper time limit for resolution of all NCIR's is adequately defined and enforced, (2) Adequate site inspection before resolution is issued, (3) Workable repairs are in for craft implementation, (4) Returned NCIR's which have resolutions that are problems are to in the same manner as NCIR's which are received for the first time, (5) Emphasis to affected parties the importance of giving detailed, accurate description of nonconformance and technically accurate resolution that do not invite obvious questions, (6) QA site receiving must should take to make sure these problems are adequate to identify future similar defects.

## SIGN-OFF

## EVALUATION

PERFORMED BY:

Robert W. McRae, Jr.

DATE:

3-22-82



# VERIFICATION - INDIVIDUAL CONCERN

Page ①

**UNCONTROLLED**

FILE NO. K-2

Generally concur with Evaluation. Would summarize findings and recommendations as follows:

- 1) Technical adequacy of the plate is still an open question, based on review with Design Engr. personnel. This should receive immediate mgmt attention and expeditious technical evaluation to ascertain adequacy of plate thickness and surface conditions. Any necessary repairs should be carefully reviewed with Construction beforehand to insure that they can be implemented.
- 2) Time frame for resolution of the NCI was unacceptable. (one year for first resolution, 3-4 months after that for second input, still not resolved as of 3/82) Recommend Design review tracking mechanisms and ~~entire~~ time frame requirements to insure that returned NCI's are tracked and that all NCI are resolved within some stated maximum time frame (maybe 6mo unless final mgmt approval is obtained.
- 3) Work to install the plate should not have been allowed to proceed. Some work ~~time~~ can be allowed but this exceeded intent of procedure, due to irreversible nature (w/o extreme cost/time penalty, and inaccessibility for needed repair. More timely input from Design to Construction could have prevented problem. Recommend also consider revising Q-1, Para. 5.1.2 to provide more specific guidance.

(continued)

SIGN-OFF

VERIFICATION

PERFORMED BY:

DATE:

ADL/MSA

3/2/82

3/2/82

ADD



# VERIFICATION - INDIVIDUAL CONCERN

Continued from Page ①

FILE NO. R-2

4) QA inspection and receiving criteria should be reviewed after final technical resolution is issued for possible revision if repairs are required. Defects are apparently, especially, sufficiently significant that should have been picked up at vendor facility.

5) Design Engr. mgmt should review resolution process that occurred for this item and take appropriate steps to insure future adequacy of

a) Technical resolution thoroughness - this item was resolved based on judgment without analysis when analysis was apparently required.

b) Resolution was developed apparently without site inspection by DE personnel - should not be permitted on items of such consequence.

c) Resolution was not issued for 1 year

d) Standard for surface condition is for forgings, not plate. Adequacy is questionable.

UNCONTROLLED

SIGN-OFF

PERFORMED BY:

DATE:

VERIFICATION

ADULTER

3/9/82 3/11/82 ADN

UNCONTROLLED

Richard Irby Item #2

Mr. Irby is concerned with pits in the unit II containment plate. He first raised the question in early 1980 but was told that if a Duke Power Representative in New Port News, Va had accepted these plates then they are satisfactory. ~~He~~ He was given verbal directions to follow CP-64. He did not feel CP-64<sup>attached</sup> applied in full to this case because of the large area and high concentration of the pits, and the fact that he felt this to be an obvious vendor problem.

Mr. Irby later contacted Rich Rouse of the site CR staff who looked at the plate and gave Mr. Irby the go ahead on writing the NCI (Ref. NCI 9092 attached). Mr. Irby did not feel the resolution to this NCI to be sufficient for two reasons.

- 1) No one had visually examined the plates before resolving the NCI
- 2) Why were the pits to be repaired if they were judged to be ~~non~~ insignificant by design. (Ref. Attachment I to NCI 9092)

Generally Mr. Irby didn't feel the proper attention had been given to the problem. He felt no one was concerned enough to address

UNCONTROLLED

the problem.

Attachment III of NCI 9092 provides further guidance to the original resolution but Mr. Irby was still unsatisfied in that MSS SP-55 to be used for a guide, is for castings rather than containment plate. Mr. Irby also felt that without visually inspecting the plates before resolution, that design may be prescribing repair that may be more detrimental to the plate than if left alone.

In January 1982, design engineering looked at the plate for the first time, according to Mr. Irby. He said they found more than what they had expected and could not make a decision until further evaluation was performed.

In general Mr. Irby's main concern is why he had to ask for re-evaluation and why ~~they~~ the large time frame before looking at the plate.

(I have a copy of MSS SP-55 in my office)

4/19/82

April 5, 1982

Mr. Gary W. Chenault  
Newport News Industrial Corporation  
230 41st Street  
Newport News, VA 23607

Subject: Catawba Nuclear Station, Unit 2  
Containment Vessel Dome  
File No: CN-1144.09

Dear Gary,

Enclosed are five (5) photos which are representative of the surface conditions which I described in our phone conversation last Thursday. As I mentioned, we are most hopeful that your staff will be able to assist us in determining the nature and origin of these surface conditions. Your efforts to solicit input from Phoenix Steel are also appreciated.

Please contact me concerning any assistance you can provide in this matter.

Yours truly,

S. B. Hager, Chief Engineer  
Civil/Environmental Division

By: D. E. DeMart, Supervising Design Engineer

DED/ks  
Attachment

xc: I. W. Pearce  
J. M. McConaghy  
R. H. Benoit  
R. F. Smith

DIVISION COPY



4/23/82

April 9, 1982

R. B. Priory

Attention: D. F. Mitchell

Re: Catawba Welding Inspector Task Force  
Design Engineering Response Scope  
File: ELD-0201

Please reference your letter of April 2, 1982 regarding our response to the Catawba welding inspector task force evaluation of technical concerns expressed by welding inspectors.

1. Specific concern item 9 from Table II - Welding Inspection, of report Volume 1 (Inspector concern R-34). A response to this concern has already been sent to you in a separate letter.
2. Specific concern item 3 from Table III - NCIR Resolution, of report Volume 1 regarding an expeditious, workable resolution to NCI 9092 (Inspector concern K-2). We expect to complete work required to support our resolution and release by April 30, 1982. This has required a review of the containment stress and ultimate capacity analyses to determine the influence of various degrees of repair.
3. Implementation objective item 1 of Table IV - Design Drawing, of report Volume 1 recommending consideration for more general specifications for welded joints on drawings. Per our telephone discussion today, we will review the response you have prepared based on input from us and others when it is received.

S. B. Hager, Chief Engineer  
Civil/Environmental Division

By: I. W. Pearce, Principal Engineer

IWP/ks

xc: D. E. DeMart  
J. B. Reeves  
C. L. Ray  
A. P. Cobb

Dev./Station

Subject

Sheet No.

61

Project No.

D&amp;D -

attached in comparison of ASME S'72  
VS ASME W'81 with regard to surface  
flaws. S'72 does not mention repair  
of plate (just forgings) (NE-2500). Section  
on localized thin areas did apply  
to shells and heads. Now applies  
only to shells.

JMM

## NE-2121.5 Minimum Thickness of Materials.

(a) *Mill Undertolerance.* Plate material shall be ordered not thinner than the design thickness. Vessels made of plate furnished with an undertolerance of not more than the smaller value of 0.01 in. or 6 percent of the ordered thickness may be used at the full design pressure for the thickness ordered. If the specification to which the plate is ordered allows a greater undertolerance, the ordered thickness of the material shall be sufficiently greater than the design thickness so that the thickness of the material furnished is not more than the smaller of 0.01 in. or 6 percent under the design thickness.

(b) *Pipe Undertolerance.* If pipe or tube is ordered by its nominal wall thickness, the manufacturing undertolerance on wall thickness shall be taken into account. The next heavier commercial wall thickness may then be used. The manufacturing undertolerances are given in the several pipe and tube specifications listed in the applicable tables in Appendix I. After the minimum wall thickness is determined, it shall be increased by an amount sufficient to provide the manufacturing undertolerance allowed in the pipe or tube specification.

## NE-2124 Size Ranges

Materials outside the limits of size or thickness given in any specification in Section II of this Code may be used if the material is in compliance with the other requirements of the specification and no size limitation is given in this Subsection. In those specifications in which chemical composition and/or mechanical properties are indicated to vary with size or thickness, any material outside the specification range shall be required to conform to the composition and mechanical properties shown for the nearest specified range.

## NE-2124 Material Size Ranges and Tolerances

(a) Material outside the limits of size or thickness given in any specification in Section II may be used if the material is in compliance with the other requirements of the specification and no size limitation is given in this Subsection. In those specifications in which chemical composition or mechanical properties are indicated to vary with size or thickness, any material outside the specification range shall be required to conform to the composition and mechanical properties shown for the nearest specified range [NCA-3866.6(a)(1)].

(b) Plate material shall be ordered not thinner than the design thickness. Vessels, except for piping, made of plate furnished with an undertolerance of not more than the lesser value of 0.01 in. (0.25 mm) or 6% of the ordered thickness may be used at the full design pressure for the thickness ordered. If the specification to which the plate is ordered allows a greater undertolerance, the ordered thickness of the material shall be sufficiently greater than the design thickness so that the thickness of the material furnished is not more than the lesser of 0.01 in. (0.25 mm) or 6% under the design thickness.

(c) If pipe or tube is ordered by its nominal wall thickness, the manufacturing undertolerance on wall thickness shall be taken into account. The manufacturing undertolerances are given in the several pipe and tube specifications listed in the applicable Tables in Appendix I. After the minimum wall thickness is determined, it shall be increased by an amount sufficient to provide for the manufacturing undertolerance allowed in the pipe or tube specification.

virtually identical

S'72  
ASMEW'81  
ASME

Dev./Station

Subject

S '72

Sheet 15

Date

W '81

By

Date

By

## NE-2500 MATERIALS REPAIRS

## NE-2510 GENERAL REQUIREMENTS

Defects in material may be repaired provided approval of the Inspector is first obtained for the method and extent of repairs (see NE-4621.1). Defective material that cannot be satisfactorily repaired shall be rejected.

## NE-2540 REPAIR OF DEFECTS IN FORGINGS

## NE-2548 Elimination of Defects

(a) Surface imperfections such as chip marks, blemishes or other irregularities shall be removed by grinding or machining and the surface exposed shall be blended smoothly into the adjacent area where sufficient wall thickness permits thin areas in compliance with the requirements of NE-4223 (thin areas).

(b) Thinning to remove defects beyond those permitted in NE-4223 may be repaired by welding, only after approval by the Inspector.

## NE-2549 Repair by Welding

## NE-2500 EXAMINATION AND REPAIR OF PRESSURE RETAINING MATERIAL

## NE-2510 PRESSURE RETAINING MATERIAL

Pressure retaining material shall be examined and repaired in accordance with the material specification and as otherwise required by this Subarticle.

## NE-2530 EXAMINATION AND REPAIR OF PLATE

## NE-2531 Required Examination

Plates shall be examined in accordance with the requirements of the material specification.

## NE-2537 Time of Examination

Acceptance examinations shall be performed at the time of manufacture as required in (a), (b), and (c) below.

(a) Examinations required by the material specification shall be performed at the time of manufacture as specified in the material specification.

(b) Radiographic examination of repair welds, when required, may be performed prior to any required postweld heat treatment.

(c) Magnetic particle or liquid penetrant examination of repair welds shall be performed after any required postweld heat treatment, except for P-No. 1 material which may be examined before or after any required postweld heat treatment.

## NE-2538 Elimination of Surface Defects

(a) Unacceptable surface defects may be removed by grinding or machining provided the requirements of (1) and (2) below are met:

(1) the remaining thickness of the section is not reduced below the minimum required by the design;

(2) the depression, after defect elimination, is blended uniformly into the surrounding surface.

(b) When the elimination of the defect reduces the thickness of the section below the minimum required by NE-3000, the material shall be repaired in accordance with NE-2539.

note FOR FORGINGS (NE-2540)  
W'81 refers back to NE2538

Dev./Station

Date

File No.

Subject

S'72

W'81

Date

Sheet No.

Checked By

Date

NE-4130 ELIMINATION AND REPAIR OF DEFECTS

NE-4131 Rules Governing Elimination and Repair

Defects in materials which were accepted on delivery or which are discovered during the process of fabrication or installation may be eliminated or repaired by welding, provided the defects are removed, repaired and examined in accordance with the requirements of NE-2500 for the applicable product form, except that the limitation on the depth of repair does not apply.

NE-4130 REPAIR OF MATERIAL

W81

NE-4131 Elimination and Repair of Defects

W81

Material originally accepted on delivery in which defects exceeding the limits of NE-2500 are known or discovered during the process of fabrication or installation is unacceptable. The material may be used

37 provided the condition is corrected in accordance with the requirements of NE-2500 for the applicable product form, except: (1) the limitation on the depth of the weld repair does not apply; and (2) the time of examination of the weld repairs to weld edge preparations shall be in accordance with NE-5130.

W'81  
more emphatic



Dev./Sta.

Subject

Sheet No.

S'72

## NE-4220 FORMING TOLERANCES

## NE-4221 Tolerance for Vessel Shells

NE-4221.1 Maximum Difference in Cross-Sectional Diameters.

NE-4221.2 Maximum Deviation from True Theoretical Form

NE-4221.3 Deviations from Tolerances.

NE-4221.4 Tolerance Deviations for Vessel Parts Fabricated from Pipe. <sup>v</sup>

## NE-4222 Tolerances for Formed Vessel Heads

The tolerance for formed vessel heads shall be as set forth in the following subparagraphs.

## NE-4222.1 Deviation for Specified Shape.

(a) The inner surface of a head shall not deviate from the specified shape by more than 1 1/4 percent of the inside diameter of the head skirt. Such deviations shall not be abrupt changes, shall be outside of the design shape and shall be measured perpendicular to the specified shape.

(b) The skirts of heads shall be sufficiently true to round so that the difference between the maximum and minimum diameters shall not exceed 1 percent of the nominal diameter (see Fig. NE-4221.1-1).

NE-4222.2 Tolerance on Forged Heads. Forged heads shall be as true as is practicable to make them to the shape shown on the design drawings. Any deviations therefrom shall merge smoothly into the general shape of the head and shall not evidence a decrease of strength for the sections as required by the formulas for design.

## NE-4223 Localized Thin Areas

Localized thin areas are permitted if the adjacent areas surrounding each has sufficient thickness to provide the necessary reinforcement according to the rules for reinforcement in NE-3330.

*applies to both*

Date

Page

W'81

## NE-4220 FORMING TOLERANCES

## NE-4221 Tolerance for Vessel Shells

NE-4221.1 Maximum Difference in Cross-Sectional Diameters.

NE-4221.2 Maximum Deviation From True Theoretical Form for External Pressure. <sup>v</sup>

NE-4221.3 Deviations From Tolerances. <sup>1</sup>

NE-4221.4 Tolerance Deviations for Vessel Parts Fabricated From Pipe. <sup>v</sup>

NE-4221.5 Localized Thin Areas. Localized thin areas are permitted if the adjacent areas surrounding each has sufficient thickness to provide the necessary reinforcement according to the rules for reinforcement in NE-3330.

*Applies to shells*

## NE-4222 Tolerances for Formed Vessel Heads

The tolerance for formed vessel heads shall be as set forth in the following subparagraphs.

NE-4222.1 Maximum Difference in Cross-Sectional Diameters. The skirt or cylindrical end of a formed head shall be circular to the extent that the difference in inches between the maximum and minimum diameters does not exceed the lesser of  $(D + 50)/200$  or  $(D + 12)/100$ , where  $D$  is the nominal inside diameter in inches and shall match the cylindrical edge of the adjoining part within the alignment tolerance specified in NE-4232.

## NE-4222.2 Deviation From Specified Shape

*no mention of thin areas in formed heads*

W'81

April 23, 1982

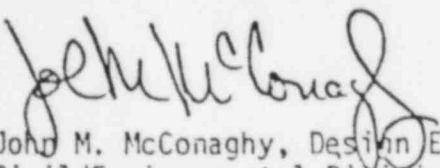
Memo To File

Re: Catawba Nuclear Station, Units 1 & 2  
Steel Containment Vessel Dome Pitting, Unit 2  
NCI 9092  
File No: CN-1144.13

On April 23, 1982, I received a call from Mr. Jim West, Quality Assurance Manager at Newport News Industrial Corporation. NNI's technical staff has reviewed photographs of the surface conditions observed on the dome plate, and Mr. West wanted to advise us of what they believe is the source of these conditions.

Mr. Jerry Cobb, a metallurgist for NNI stated that they have experienced similar surface conditions as a result of exposure of plate to the environment. Near the Chesapeake Bay, where the atmosphere is considerably more brackish than this area, up to 25 mils of corrosion pitting can be experienced in one year. These conditions are aggravated by standing water on the plate. Localized effects are generated by dirt spots on the surface allowing the formation of oxygen pockets which accelerate the effect. NNI does not believe that this would be caused by inclusions, since these would be more elongated and indicative of rolling directions. Mill scale would probably not be the source of these problems, but the presence of scale could accelerate formation of localized oxygen pockets. In summary, NNI does not believe the conditions existed when the plate left NNI, since an inspector would have to be totally negligent to miss the conditions.

Mr. Cobb stated that if the plate were sandblasted to white metal prior to coating, the condition would be stable.

  
John M. McConaghy, Design Engineer I  
Civil/Environmental Division

JMM/ks

xc: I. W. Pearce  
D. E. DeMart

# MEMORANDUM

Form 847

DATE 4-29-82

FILE 10

ADDRESS \_\_\_\_\_

FROM JMMcCONAGHY

SUBJECT Reportability - NCI 9092

Ref: 10CFR 50.55 (e)

Conditions, if uncorrected, must have been capable of adversely affecting safety of operation at any time in the plant lifetime and represent:

- a) breakdown in QA Program - Does not apply - Based upon findings of metallurgists at NNI, conditions were probably brought about by exposure to environment and did not exist when received at site. Conditions were discovered during subsequent regularly scheduled inspection in preparation for erection. Therefore, no breakdown in QA present.
- b) deficiency in design: N/A
- c) significant deficiency in construction or significant damage to structure, system or component which requires extensive evaluation, redesign or repair to meet criteria and bases of SAR - Thickness of plate is required for external pressure to preclude buckling of dome. No available evidence suggests that very small localized thin areas would adversely affect buckling strength of SCV. Repairs of plate are being made to insure that localized thin areas are properly reinforced as required by the arbitrary ASME code requirements.

CONCLUSION: Not Reportable

JMM 4-29-82

May 7, 1982

RECEIVED  
CIVIL-ENVIRONMENTAL DIVISION  
CIVIL PROJECTS SECTION

PMD-82-017

MAY 10 1982

W. H. Bradley

CENTRAL RECORDS/DIVISION USE  
NO ATTACHMENT TO FILE

Re: Catawba Welding Inspector Task Force  
Design Engineering Response  
File: ELD-0201

Attached are the Design Engineering responses to Specific Concerns DD-1 and NCIR-3. NCIR-3 is complete but the specific weld in question in DD-1 cannot be identified by QA for evaluation by Design as agreed in our 5/6/82 meeting. Design considers DD-1 closed unless further instruction is provided by the Task Force.

As identified in Volume 1, Revision 2 of the Task Force report and our agreements in the 5/6/82 meeting, Design accepts responsibility for review of WP-10 and WP-11.

<u>Item</u>	<u>Assigned Individual</u>	<u>Scheduled Action Completion Date</u>
WP-10	C L Ray	6-15-82.
WP-11	D M Collings	6-15-82

Please provide documentation sheets for these items.

To update our current status, with the attached responses and excluding WP-10 and WP-11, our only outstanding item is PC-18. The NCI involved was partially resolved by 4-30-82 but requires additional information for completion. PC-18 will be resolved by 7-1-82 as outlined in my 4/14/82 letter to you.

Please advise if you have any questions.

R. B. Priory, Principal Engineer  
Project Management Division

*David F. Mitchell*

By: D. F. Mitchell  
Engineer Associate

DFM/lmr

Attachment

cc: I. W. Pearce (w/NCIR-3)



Specific Recommendation No. NCIR-3

Assigned to R. PRIORY

Determine a workable resolution to NCIR 9092 immediately.

Discussion/Analysis/Additional information:

PREVIOUS RESOLUTIONS TO NCI 9092 HAVE PROVEN TO BE DIFFICULT TO IMPLEMENT WITHOUT DAMAGING THE CONTAINMENT PLATE.

Action to be taken:

- 1) CRITERIA SHALL BE APPLIED TO DETERMINE WHICH DEFECTS ARE ACCEPTABLE AND WHICH REQUIRE REPAIR. CRITERIA IS PROVIDED WITH RESOLUTION TO NCI 9092.
- 2) REPAIRS SHALL BE PERFORMED FOR THOSE FLAWS EXCEEDING THE SPECIFIED CRITERIA.

Documentation of action (attach any necessary supporting documentation):

NCI 9092

Action Completed Date 4-30-82

Signature David F. Mitchell

2. Requisition No. <i>NA</i>	3. Vendor/Location <i>NEWPORT NEWS</i>	4. Documents Violated <i>CNS 1144.09-1</i>
5. MPS. PO No. <i>NA</i>	6. Mech/Elec System <i>NA</i>	
7. QA Required <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Condition <i>1</i>	8. Identification Method <input type="checkbox"/> Q-1B's <input type="checkbox"/> NCI Tape <input type="checkbox"/> Other <input checked="" type="checkbox"/> Not Practical	

**RECORD COPY**  
DUKE POWER COMPANY  
CONSTRUCTION DEPARTMENT  
PROJECT *CATAWBA 1*  
NONCONFORMING ITEM REPORT  
USE BLACK BALL POINT PEN ONLY

9. Location of Item <i>RB 2 (DOME)</i>	16. Serial Number <i>9092</i>
---	----------------------------------

10. Description of Item and Statement of Problem *ROUTINE INSPECTIONS OF CONTAINMENT PLATE (DOME) RB.2 REVEAL A NUMBER OF PLATES TO BE ATTEN AND HAVING A POOR SURFACE FINISH. IN GENERAL THE DEFECTS RANGE FROM SMALL SCATTERED PITS (WITH A DEPTH OF  $\frac{1}{32}$ " X  $\frac{3}{8}$ " IN DIA) TO LARGE CONCENTRATIONS.*

NOTE: DEFECTS ARE APPARENTLY MANUFACTURING DEFECTS  
WORK MAY CONTINUE DURING EVALUATION & REPAIRS SHED

14. Evaluation/Disposition Responsibility <input type="checkbox"/> Const. <input checked="" type="checkbox"/> Design <input type="checkbox"/> QA <input type="checkbox"/> INSS Div. <i>Ch...</i>	11. Originated <i>R. F. Vance</i> Date <i>7-31-80</i>	13. Senior Engr. Review <i>M. F...</i> Date <i>7-31-80</i>	15. QA Review <i>W. H...</i> Date <i>8-4-80</i>
---	--	---	--

17. Disposition <i>AS STATED BELOW</i>	18. Report to Management <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
---	--

Evaluation/Justification  
*ALL PITS LESS THAN OR EQUAL TO  $\frac{1}{8}$  INCH IN DEPTH SHALL BE GRIND SMOOTH AND BLENDED INTO ADJACENT MATERIAL. PITS WITH A DEPTH GREATER THAN  $\frac{1}{8}$  INCH SHALL BE WELD REPAIRED ACCORDING TO ASME PROCEDURE MT OR PT GROUND AREAS AND WELD REPAIR AREAS. FOR ADDITIONAL EVALUATION SEE ATTACHMENT (1).*

(SEE ATTACHMENT (2) FOR EVALUATION OF VENDOR QA. *MTX 9/13/81*) - ALSO PER...

19. By <i>R.F. Vance</i> Date <i>7-28-81</i>	20. Technical Approval <i>D.E. DeMark</i> Date <i>8-24-81</i>	21. QA Approval <i>W. H...</i> Date <i>9/13/81</i>
---	--	---

22. Action/Inspection Required	23. Assigned To	27. Performed By	Date
<i>(1) INSPECTORS SHALL CHECK PLATES PER CRITERIA OF MSS SP. 55 &amp; MARK AREAS THAT REQUIRE WELD REPAIR.</i>	<i>SVTW</i>		
<i>(2) STEELWORKERS ARE TO GRIND DEFECTS AS NECESSARY. STST.</i>			
<i>(3) WELDERS ARE TO BUILD UP AREAS THAT GREATER THAN <math>\frac{1}{8}</math>" IN DEPTH (GRIND FLAT).</i>			
<i>(4) PERFORM MT OR PT ON WELDED AREAS</i>	<i>SVTN.</i>		
<i>(5) TRAIN INSPECTORS ON ACCEPTANCE CRITERIA OF MSS SP. 55</i>	<i>SVTW</i>		
<i>DOCUMENT IN QA 13/B PROGRAM 12/1/81</i>			

25. By <i>Stephen H. Williams</i> Date <i>9-12-81</i>	26. QA Approval <i>W. H...</i> Date <i>9/12/81</i>
--	---

28. Action/Inspection Exceptions or Remarks

Distribution	Project Engr	Gen. Supt	Sr Const Engr	Const Engr	Sr QC Engr	QC Supt	Sr QA Engr	QA Engr	Whse. Supt	Design	QA Div	ANI	WRC	CHANCE
Number of Copies	12. Initial	2		1			1				1			
	24. Final	2		1			1				1		1	1

29. Final QA Review	Date
---------------------	------

Requisition No. <u>N/A</u>	Vendor/Location <u>Newport News</u>	Doc. # <u>CNS 1144-09-1</u>	DUKE POWER COMPANY STATION/PROJECT <u>CATAWBA</u> UNIT <input type="checkbox"/> 1, <input checked="" type="checkbox"/> 2, <input type="checkbox"/> 3 <b>NONCONFORMING ITEM REPORT</b> <b>USE BLACK BALL POINT PEN ONLY</b>
MPS P.O. No. <u>N/A</u>	Mech/Elec System <u>N/A</u>		
CA Required <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	CA#	Identification Method <input type="checkbox"/> O-IB'S <input type="checkbox"/> NCITape <input type="checkbox"/> Other <input checked="" type="checkbox"/> Not Fractional	

Location of Item R.B. 2 (DOME) Serial No. 9092

Description of Item and Statement of Problem  
See Sheet 1 for description of problem

Evaluation/Disposition Responsibility	<input type="checkbox"/> Const	<input type="checkbox"/> Design	<input type="checkbox"/> CA	<input type="checkbox"/> Steam	<input type="checkbox"/> Group
Originated	Date	Technical Review	Date	CA Review	Date

Potentially Responsible Under 10CFR21.50.55e ☐ Yes ☒ No If yes, use Form 250.1

Disposition/Justification See Attachment (3) for additional clarification of the repair procedure for surface defects with a depth of less than or equal to 1/8".

Spec/Calc./Dwg Revised As Below

By Richard H. Benit Date 11/4/81 Technical Approval DE. DeWitt Date 11/4/81 CA Approval SEE final page for approval.

CORRECTIVE ACTION/INSPECTION REQUIRED	Assigned C	Performed EV	Date

By   Date   CA Approval   Date  

Action/Inspection Exceptions or Remarks

Distribution	GEN. MGR.	Sr. Const. Eng.	Const. Eng. Asst.	100 SUPV. CA Engr.	CA Engr. WSE	DESIGN CA Engr.	ANL	REC
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Trend Info									Final QA Review			Date



Attachment (1) to NCI 9092

Surface defects are judged not to be significant based on engineering judgement gained by prior experience in containment vessel and pressure vessel design.

Site QA and QA Vendor surveillance shall address and evaluate why defects were not discovered during shop inspection and receiving inspection.

Repairs to be done in accordance with Section III, Subsection NE, of the ASME Code.

D.E. De Kant 8-24-81

R.F. Vause/DED 8-24-91

Attachment (2) to NCI 9092

Response to Attachment (1) to NCI 9092

Vendors supplying safety-related materials or components have an approved QA Program. This program includes QC and inspection that we are confident is satisfactory. Duke Power QA performs surveillance on their program to maintain a good confidence level. The surveillance does not include 100% inspection of the material or component. Minor or extremely small irregularities can go unnoticed depending on inspection or NDE requirements. Shipping damages and normal oxidation are factors to consider in reviewing the containment plate.

JM Liner 9-1-81

AB # W-3 DESCRIBES THE REQUIRED RECEIVING INSPECTION FOR CONTAINMENT PLATE. THE INSTRUCTIONS state: "IF there is any damage or ANY QUESTION of damage... contact The Const. ENGINEER Welding." That instruction seems adequate. It appears that these defects were missed due to the small nature of the indications. This does NOT appear to be a GENERAL or recurrent problem. No TRAINING or PROGRAM REVISIONS are required.

H. L. Atkins 9/21/81  
SITE QA

QC Shopshire 9/21/81

Harrison 9-21-81

Attachment (3) to NCI 9092

This attachment provides additional guidance to the resolution of original NCI dated 7-28-81.

Surface defects have already been judged not to be significant based on engineering judgement (see attachment (1)). This attachment provides additional criteria for the surface preparation and inspection of pitting and surface roughness less than or equal to 1/8 inch in depth.

The containment dome plate ~~shall be~~ sand blasted to a "white metal surface" in accordance with Surface Preparation Procedure DPSP5-1. This process ~~will~~ <sup>has been</sup> ~~remove~~ all surface foreign debris, scaling, rusting, etc. to sound metal. <sup>RHB 11/17/81 DED 11/17/81 TR 11/17/81</sup> ASTM A20, paragraph 9.2.1.1, requires all imperfections to be removed to sound metal and to be well faired. Procedure MSS SP-55 shall be used as a guide to determine well faired conditions. Type II, Type VII and Type VIII photographs shall be used for representative acceptable surfaces. <sup>RHB 11/17/81 DED 11/17/81 TR 11/17/81</sup>

All pits greater than 1/8 inch in depth shall be weld repaired in accordance with ASTM A20, paragraph 9.4.

By:

Richard H. Benoit 11/4/81 RHB 11/19/81

Technical Approval:

D.E. Schmitt 11/4/81

QA Approval:

TC Roberts 11-7-81

Previous resolutions have proven to be very difficult to implement without damaging the containment plate. The following procedure shall be followed to determine which defects are acceptable and which require repair. Details concerning the development of these criteria are contained in calculation file CNC-1144.09-01-0003.

1. Surface flaws with a depth of  $1/8"$  or greater shall be weld repaired according to ASME procedures.
2. Surface flaws with depth less than or equal to  $1/32"$  are acceptable if they do not interfere with other flaws as outlined below.
3. The remaining flaws shall be inspected to determine their acceptability using the attached Figure 9092.1. The acceptability of a given flaw will be determined by the size of the surface which it covers, the depth of the flaw, and the proximity of the flaw to other flaws. Surface defects failing this criteria shall be weld repaired according to ASME procedures.
4. The following definitions apply to the variables used in Figure 9092.1:
  - a.  $\underline{d}$  (flaw diameter): The dimension of the surface flaw in the direction of the next adjacent flaw. For circular pits surrounded by a circular pattern of smaller pits,  $\underline{d}$  shall be taken as the distance across the circular pattern.
  - b.  $\underline{D}$  (spacing between flaws): The minimum clear distance of unflawed surface between adjacent flaws. If  $\underline{D}$  is greater than  $1\ 3/8"$ ,  $\underline{D}$  is to be taken to be equal to  $1\ 3/8"$ .
  - c.  $\underline{t}_f$  (flaw depth): The maximum penetration of the flaw measured from the unflawed surface.
5. In applying Figure 9092.1, the two surface measurements  $\underline{D}$  and  $\underline{d}$  should be made first. With these two measurements, one point on the figure is determined. This point will lie between two flaw depth lines. The flaw depth indicated by the line immediately below the point given by  $\underline{D}$  and  $\underline{d}$  is acceptable, while the flaw depth given by the line immediately above the point is unacceptable. For points lying on a given flaw depth line, the flaw depth given by that line is acceptable. For example; a flaw with  $\underline{D}=1/2"$  and  $\underline{d}=5/8"$  is acceptable for a flaw depth of  $5/64"$  and is unacceptable for a flaw depth of  $3/32"$ . The actual flaw depth should be compared to the acceptable value to determine whether repair is required. Repairs may be made either to the flaw in question or to an adjacent flaw to arrive at a combination meeting this criteria.
6. Figure 9092.1 assumes an identical flaw on the opposite face of the dome plate. If it can be verified that in the area of a given flaw no surface flaws are present on the opposite face, the allowable depth given by Figure 9092.1 may be multiplied by two.
7. Surface flaws with a maximum dimension  $\underline{d}$  greater than  $1\ 3/8"$  shall be weld repaired according to ASME procedures except as noted in 2. above.
8. Surface flaws with a maximum dimension  $\underline{d}$  less than  $1/8"$  are not required to be repaired except as noted in 1. above.
9. Repairs are to be done in accordance with Section III, Subsection NE, of the ASME Code.

By:

Joe McNamara 4/30/82

Technical Approval:

D.E. Delmar 4/30/82

QA Approval:

W.D. Henry 4/30/82



CHECKED: RHB 4/30/8

DED 4/30/8

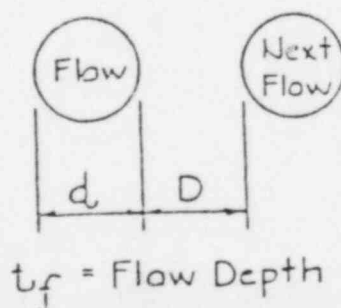
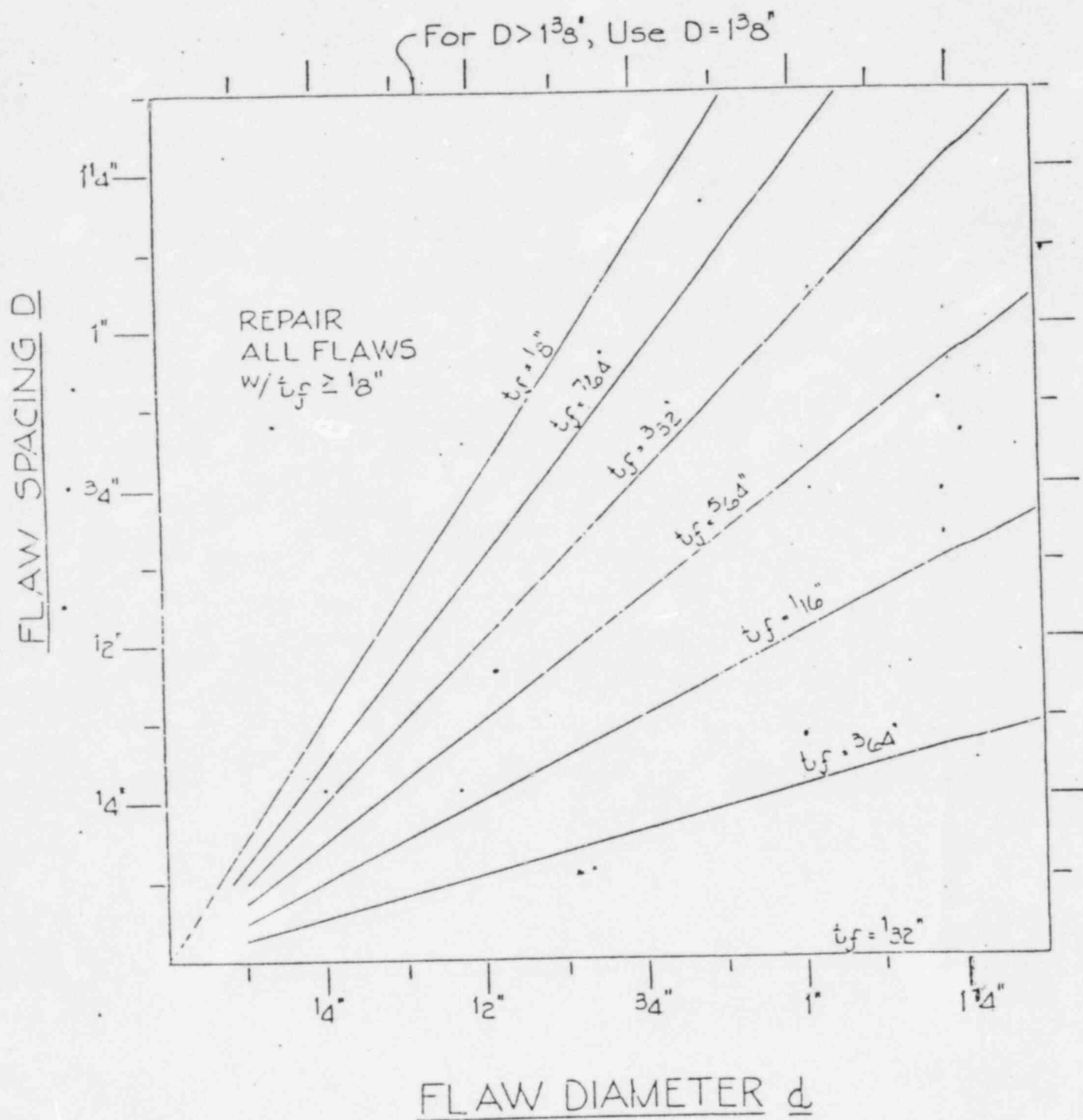


FIGURE 9092.1  
DOME PLATE SURFACE  
FLAW ACCEPTANCE  
CRITERIA

REV A

# MEMORANDUM

Form 847

DATE 3-17-83

TO File

ADDRESS \_\_\_\_\_

FROM JM McConaghy

SUBJECT NCI 9092

Spoke w / Reggie Jackson, welding tech support, Catawba construction today.

Work on inspection / repair of dome pits is complete.  
Actual work required 2-3 months  $\pm$

Construction procedure used was CP-667.

John McConaghy 3-17-83

Palmetto Alliance Press Release

Amid recently discovered NRC documents showing Duke Power Company quality assurance employee complaints of harassment, orders to falsify records and a "Duke whitewash", Palmetto Alliance and Carolina Environmental Study Group have gained the assistance of the Government Accountability Project in their challenge to the Catawba Nuclear Station operating license.

GAP is a Washington, D. C. based organization which monitors government and industry practice through the use of whistle blowers - workers who expose fraud, waste and improper practices. GAP has helped expose widespread quality control problems at the Zimmer nuclear plant in Ohio, where the NRC has halted construction. Mr. Billie Garde, GAP staff investigator, will be present at the April 21 press conference. GAP agreed to assist in investigation and monitoring of the QA-QC programs at Catawba based on evidence of serious, systematic and widespread problems at the plant and indications that NRC efforts in correcting the problem have been ineffective.

In the NRC licensing case, ... based on information provided by two former Catawba workers - including a Q/C inspector - Palmetto Alliance charged that company pressure on inspectors to approve faulty workmanship and subvert the NRC required Q/A program produced systematic deficiencies in plant construction...

~~XXXXXXXXXXXXXXXXXXXX~~

During prehearing preparation, Palmetto Alliance found Q/A-Q/C problems had caused Duke Power Company to conduct its own investigation from December, 1981 to March, 1982.

Recently released documents show that Q/C inspectors had complained as early as February 1, 1982, to the NRC that Duke Power Company would attempt to "whitewash" investigation that the QC personnel had been "harassed on the job" and that they had been "told to falsify records".

~~OFFICIAL USE ONLY~~

## CASE CHRONOLOGY

FILE NUMBER <b>26022</b>	DATE OPENED	OPENED BY
-----------------------------	-------------	-----------

DATE	ACTIVITY
3-15-82	L/M VanDoorn to Alderson
3-15-82	L/M VanDoorn to Alderson
5-14-82	Case Review - Alderson
5-18-82	L/M Alderson to Bryant
9-26-82	MTG Alderson/Vorse Discussed Tobin's memo - R2 to proceed on 4 specific concerns - refer to OT if appropriate
9-30-82	L/M Alderson to Bryant
<del>10-27-82</del>	<del>L/M VanDoorn to Alderson</del>
<del>12-30-82</del>	<del>Reviewed case file - no further action required</del>
	<del>Case Closed CE Alderson</del>
	<del>Case still open</del>
	<del>Case Reviewed No further action required</del>
2-1-83	L/M VanDoorn to Alderson, re: Review of DPC Jink force; interviews w/ GA-AC personnel. Case Reviewed and Closed. No further action required By J.C. Judd
2-15-83	T/C Judd to VanDoorn, requesting L/M relative to intervenor request for alleged documents. Referred to George Johnson (F.O.D) for format.
2-23-83	L/M Alderson to Johnson (F.O.D) forwarding case chronology for hearing.
3-3-83	FAX - Johnson to Alderson, document receipt and certification of Confidential Informant Privilege withholding.
4-21-83	Mtg. w/ Regional Administrator and Public Affairs regarding press release (see case file) Palmetto Alliance and CAP.

ACTIVITY CODES

L/M = LETTER OR MEMO  
MTG = MEETING

TC = TELEPHONE CALL  
INV = INVESTIGATION

INSP = INSPECTION  
REP = REPORT ISSUED

**A16**

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# Group Alleges Duke Records 'Falsified' At Nuclear Plant

By JACK HOBAN  
Baltimore and writer

An S.C. group fighting the Catawba nuclear plant will charge today that federal records show the Power Co. told workers to "falsify records" during an investigation of welding in section at the plant.

Further, the Palmetto Alliance said in a press release made public yesterday that the documents show Duke quality control inspectors were "harassed on the job" and Duke "would attempt to and Duke 'would attempt to whitewash' the investigation. The group said the charges by Duke employees date to February 1982.

Catawba is under construction 15 miles southwest of Charlotte in York County, S.C. About 3,900 people work at the site. A Duke spokeswoman rejected the charges, contending the company's internal investigation of welding inspection complaints at Catawba in 1981-82 found no faulty workmanship but did recommend changes in procedures. The investigation was triggered by employee complaints.

"Absolutely not," said spokeswoman Mary Cartwright when asked if Duke told workers to falsify records. She added, "There's been absolutely no recourse against the employees involved." But The Observer learned Wednesday a Nuclear Regulatory Commission (NRC) inquiry into the charges disclosed Duke supervisors did require some welding inspectors to approve welds they didn't think should pass inspection.

"However, they did so at the direction of a supervisor who had made an honest judgment that the item was acceptable," wrote NRC Inspector F.K. Van Dorn in a memo Feb. 15. "Duke Power Co. has now implemented policy preventing someone signing for a item which he/she does not sign as acceptable." Van Dorn, who is stationed at Catawba, interviewed nine supervisors and 18 welding inspectors and concluded "harassment is a legitimate concern at Catawba.... My recommendation we consider the case closed." Ken Clark of the NRC's Atlanta See GROUP Page 7A

Observer  
Apr. 21

Ken Clark - original  
NRC

ATTN: REGIONAL ADMINISTRATOR  
DEPUTY ADMINISTRATOR  
ASS'T TO ADMINISTRATOR  
DIRECTOR, PRP  
DIRECTOR, EOP  
DIRECTOR, EPMSP  
DIRECTOR, RMA

## Group To Accuse Duke In Nuclear Plant Records

Continued From Page 1A

regional office said the Catawba case is closed and NRC policy is not to reveal the names of people who complain against a utility.

"We have thoroughly reviewed Duke's investigation of these allegations and we conclude it was a sound investigation and we do not believe there are any major quality assurance or quality control problems at Catawba. We do not believe there was a whitewash," he said.

The Palmetto Alliance and the Charlotte-based Carolina Environmental Study Group contend there are "serious systematic and widespread problems at the plant" and "NRC efforts in correcting the problems have been ineffective."

Michael Lowe, Palmetto Alli-

ance director, said the NRC "didn't do much if anything" about the worker complaints of falsification and harassment.

The groups plan to hold an 11 a.m. press conference in Charlotte to reveal NRC documents they say will support their charges. They will also announce that an organization that aids government and industry whistle blowers, the Government Accountability Project, has joined their fight.

The eight-year-old, Washington-based accountability project forced the NRC to reopen its inquiry into construction problems at the Zimmer nuclear plant in Ohio. Last November, the NRC ordered work on the plant halted pending a federal safety review.

5/20/83

Send this set to ① DCS

② LPDR

Re: FOIA - 83-200  
(CARDE/ YOUNG)

Appendix A Document 18

Appendix A Document 19

From: F.W. KARAS

DRR

MNBB-4210

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