Attachment 2

Response to a Question Raised During the Audit (Nonproprietary)

This Report Does Not Contain CDI Proprietary Information

CDI Technical Note. 16-03NP

Nine Mile Point Steam Dryer Inspection Recommendations Based on Flow-Induced Vibratory Stresses

Revision 1

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April 2016

Executive Summary

A previous stress evaluation of the Nine Mile Point steam dryer[1] showed that the limiting alternating stress ratio under baseline EPU operation is SR-a=2.0 thus meeting the stress margin recommended by the NRC. The evaluation conservatively accounted for [[(3)]] on the dryer. In preparation for the April 2016 refueling outage it has been requested to calculate the dryer stresses without this effect and identify the resulting locations with stress ratio below 2.0. The purpose of this evaluation is to determine whether the existing scope of inspections for dryer flaws encompasses these locations or needs to be expanded to include them.

The evaluation is performed by selecting locations from the previous full steam dryer stress assessment (those with SR-a<4.5) and re-evaluating the stresses at those locations with [[(3)]]. The analysis shows that none of the non-weld locations experience alternating stress ratios below 2.0. For the nodes on welds, all have stress ratios above 1.0 (the limiting value is SR-a=1.22), but several of these nodes have SR-a<2.0. Most of these identified nodes, including the limiting location, are already included in the inspection scope. These include the welds involving the outer hood end plate, the ends of tie bars, the lower runs of the hood support welds, and the lower runs of the vertical drain channel/skirt welds. In order to facilitate assessment of whether other locations are already included in the inspection plan or, if not, specify where auxiliary inspections are required, the nodes are grouped into a total of 15 groups (Table 2 and Figure 7). One of the groups has a limiting alternating stress of 2.0 and could be removed from the list. Stresses in another group are believed fictitious, resulting from finite element analysis approximation.

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Nomenclature

ACM	acoustic circuit model
ASME	American Society of Mechanical Engineers
CDI	Continuum Dynamics, Inc.
CLTP	current licensed thermal power
DOF	degree of freedom
EPU	extended power uprate
FEA	finite element analysis
FIV	flow-induced vibration
IGSCC	inter-granular stress corrosion cracking
MSL	main steam line
NRC	Nuclear Regulatory Commission
RFO	refueling outage
RPS	reduced point set (described in Section 3)
RPV	reactor pressure vessel
SR-a	alternating stress ratio
SR-P	peak stress ratio
SRF	stress reduction factor
NMP2	Nine Mile Point Unit 2
USR	upper support ring
[[	(3)]]

1. Introduction and Purpose

Prelude

During the spring 2016 refueling outage at the Nine Mile Point Unit 2 nuclear power generation plant inspections of the steam dryer will be carried out to identify any indications that may have developed during operation and to determine whether such indications, if present, are due to IGSCC inter-granular stress crack corrosion, flow-induced vibration (FIV), installation stresses, or other origin. In order to assist in the inspection planning and identify where FIV-induced stresses are likely to be highest, a computational analysis has been developed by Continuum Dynamics, Inc. that calculates the acoustic field pressures acting on the steam dryer and the resulting peak and alternating stresses. The overall methodology and prior stress evaluations based on this approach are available in [1-3].

In the original EPU steam dryer assessment (CDI Report 12-18, [2]) the minimum alternating stress ratio anywhere on the dryer under normal loading conditions was shown to be SR-a=2.49, thus satisfying SR-a≥2.0 recommended by the NRC for stress evaluations that use main steam line (MSL) data to estimate steam dryer loads. Subsequent to that evaluation, an inconsistency in the acoustics loads prediction was identified [4] and corrected [3] resulting in a new set of loads requiring stress analysis. The re-evaluation [1] produced a new stress state that required a more detailed examination of the stress state at a limited number of locations and, for one location, necessitated installation of a modification (a U-channel stiffener) to limit vibration of the inner side plate connecting the inner vane banks. With this modification in place, the limiting alternating stress ratio was SR-a=2.0 under normal operating condition, thus again meeting the SR-a≥2.0 recommendation.

In CDI Stress Report 14-08[1], a full stress analysis was carried out with the [[

(3)]] it has recently maintained [1] that the [[

(3)]]

Stress Assessment [[(3)]]

[[

(3)]]

[1] Disclosed during a technical review held at CDI office on 02-18-2016.

2. Methodology & Evaluation Procedures

Selection of Node Set

A stress evaluation of the entire dryer using the updated Helmholtz solutions was reported in CDI Report 14-08[1]. This evaluation omitted the U-channel stiffeners and [[

(3)]]

Plots of these nodes are shown in Figure 1 (off weld) and Figure 2 (on a weld). Note that in all of the results herein the spatial coordinates used to describe the geometry and identify limiting stress locations are expressed in a reference frame whose origin is located at the intersection of the steam dryer centerline and the plane containing the base plates (this plane also contains the top of the upper support ring and the bottom edges of the hoods). The y-axis is parallel to the hoods, the x-axis is normal to the hoods pointing from MSL C/D to MSL A/B, and the z-axis is vertical, positive up. Equivalently, the x-axis points from 270° to 90° and the y axis points from 180° to 0°. Vane banks are labeled A-F in the negative x direction (i.e., from the 90° point to the 270° location) so that bank F lies nearest the manway plate at 270°. There are a total of 57 off-weld nodes with SR-a≤4.5 [[

(3)]]

There are 957 nodes on welds that have SR-a≤4.5 [[(3)]]. Note that this list does not compensate for the addition of the U-channel stiffener since no complete (i.e., entire 0-250 Hz frequency range) set of unit solutions with the U-channel stiffener included was requested. Instead, all of the nodes identified without the U-channel stiffener are processed and, if needed, adjusted on a per-node basis at locations near the inner plate. The weld nodes in the list generally lie at one of the following locations: (i) the inner plate attachment weld (Figure 2a, c), though, as noted, the U-channel stiffener attenuates the stresses at these nodes; (ii) welds involving the outer hood side plate (Figure 2a, d); (iii) attachment welds at the ends of tie bars (Figure 2a); (iv) the bottoms of hood support/hood and hood support/vane bank welds (Figure 2b); (v) the lower portions of skirt/drain channel attachment welds

(Figure 2a, e); (vi) lifting rod brace welds (Figure 2a, d); and (vii) miscellaneous locations with stress ratios generally above 4.25. When [[

(3)]]

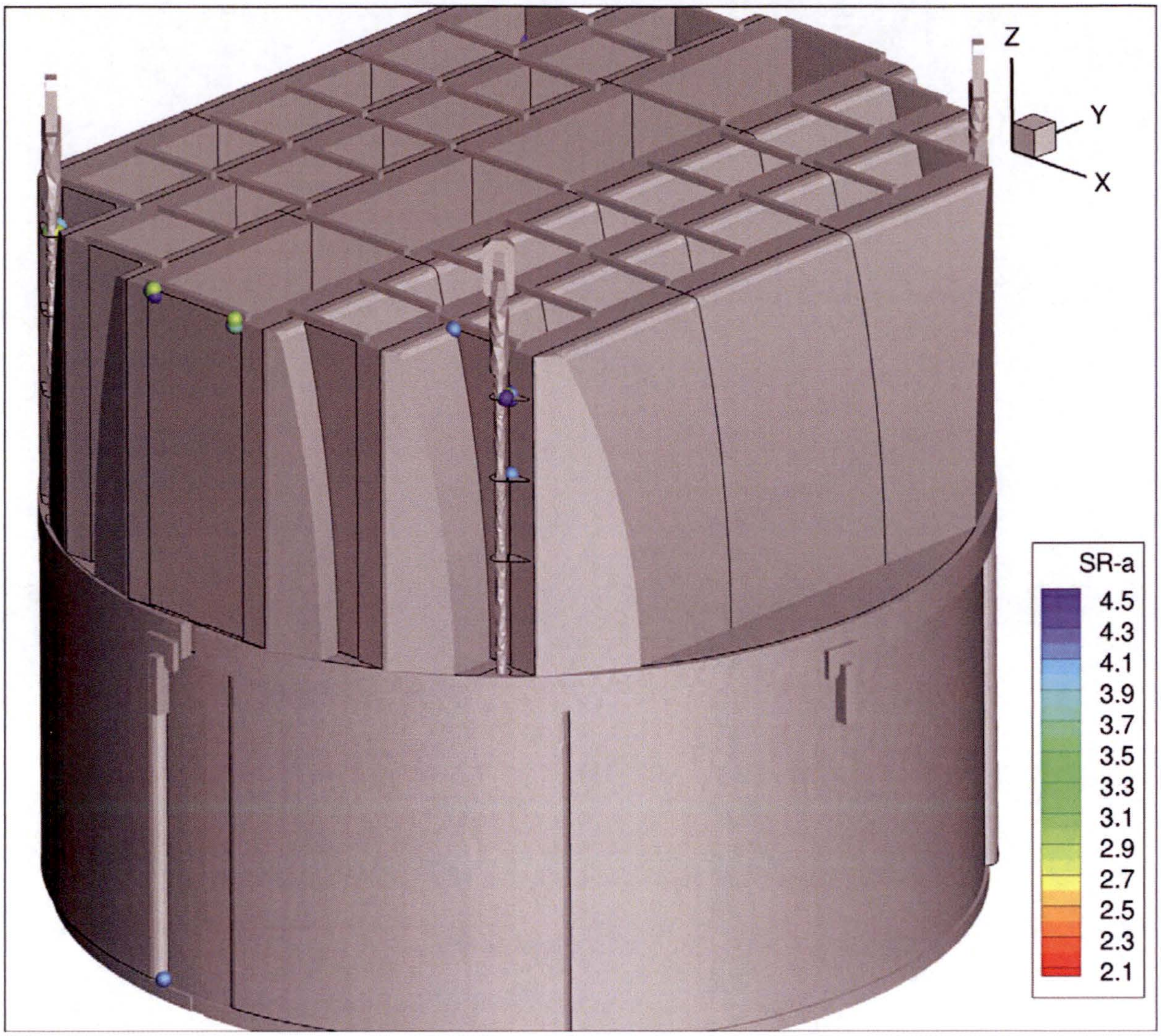


Figure 1a. Non-weld locations with alternating stress ratios below 4.5 on the NMP2 steam dryer [[(3)]]. View 1 from side.

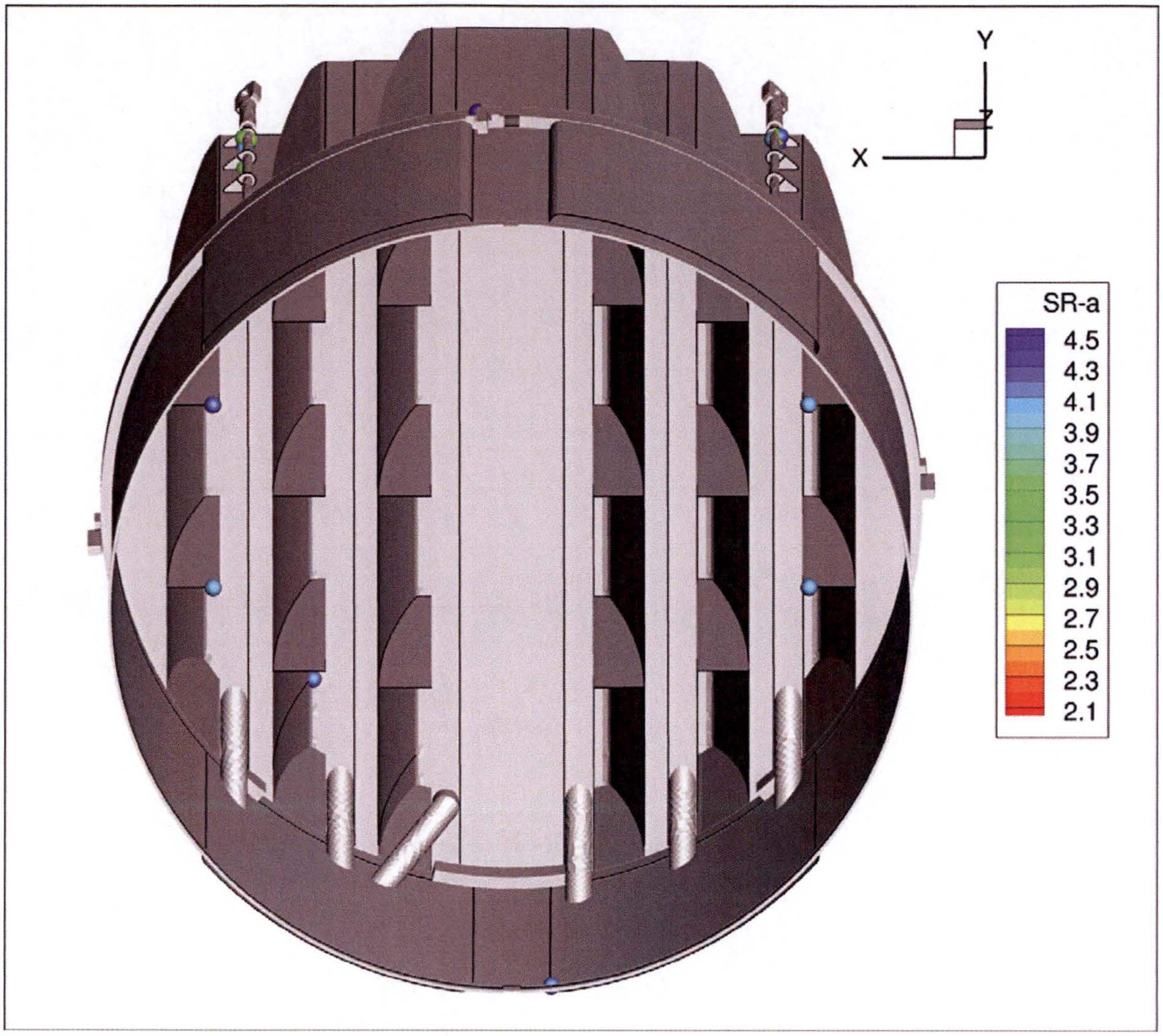


Figure 1b. Non-weld locations with alternating stress ratios below 4.5 on the NMP2 steam dryer [[(3)]]. View 2 from underneath the dryer.

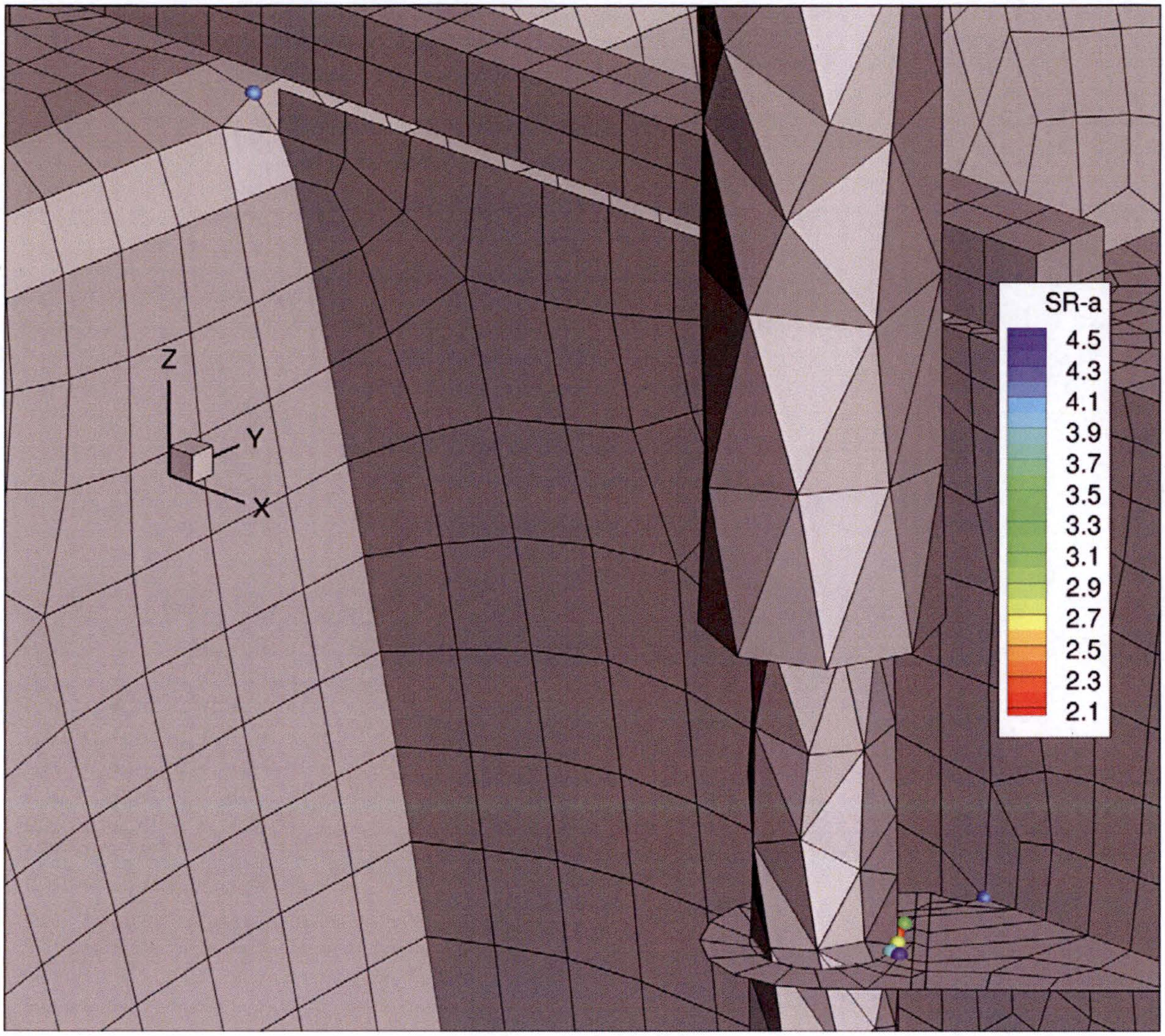


Figure 1c. Non-weld locations with alternating stress ratios below 4.5 on the NMP2 steam dryer [[(3)]]. Close-up view 3 showing nodes involved in lifting rod and middle hood.

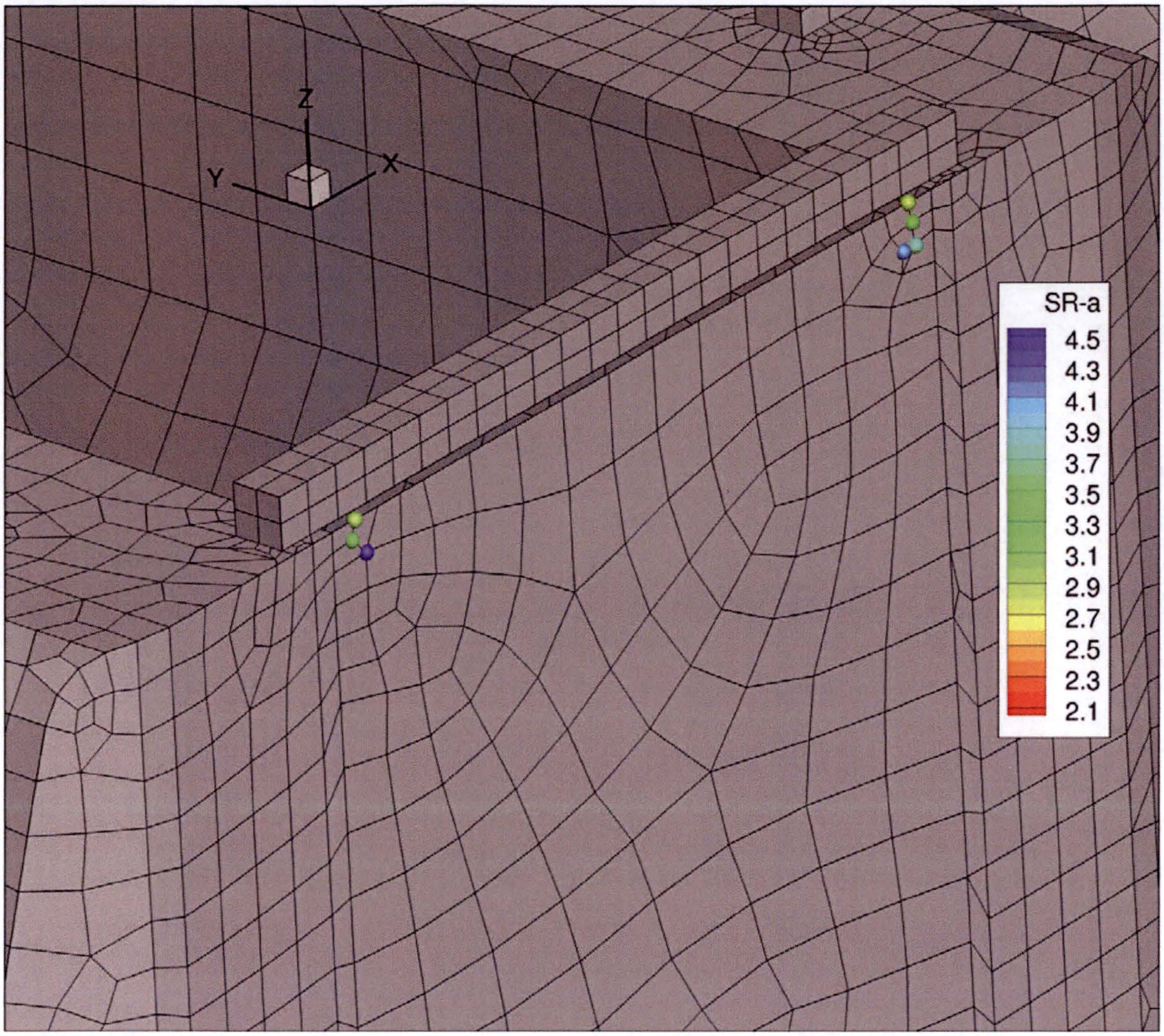


Figure 1d. Non-weld locations with alternating stress ratios below 4.5 on the NMP2 steam dryer [[(3)]]. Close-up view 4 of inner plate.

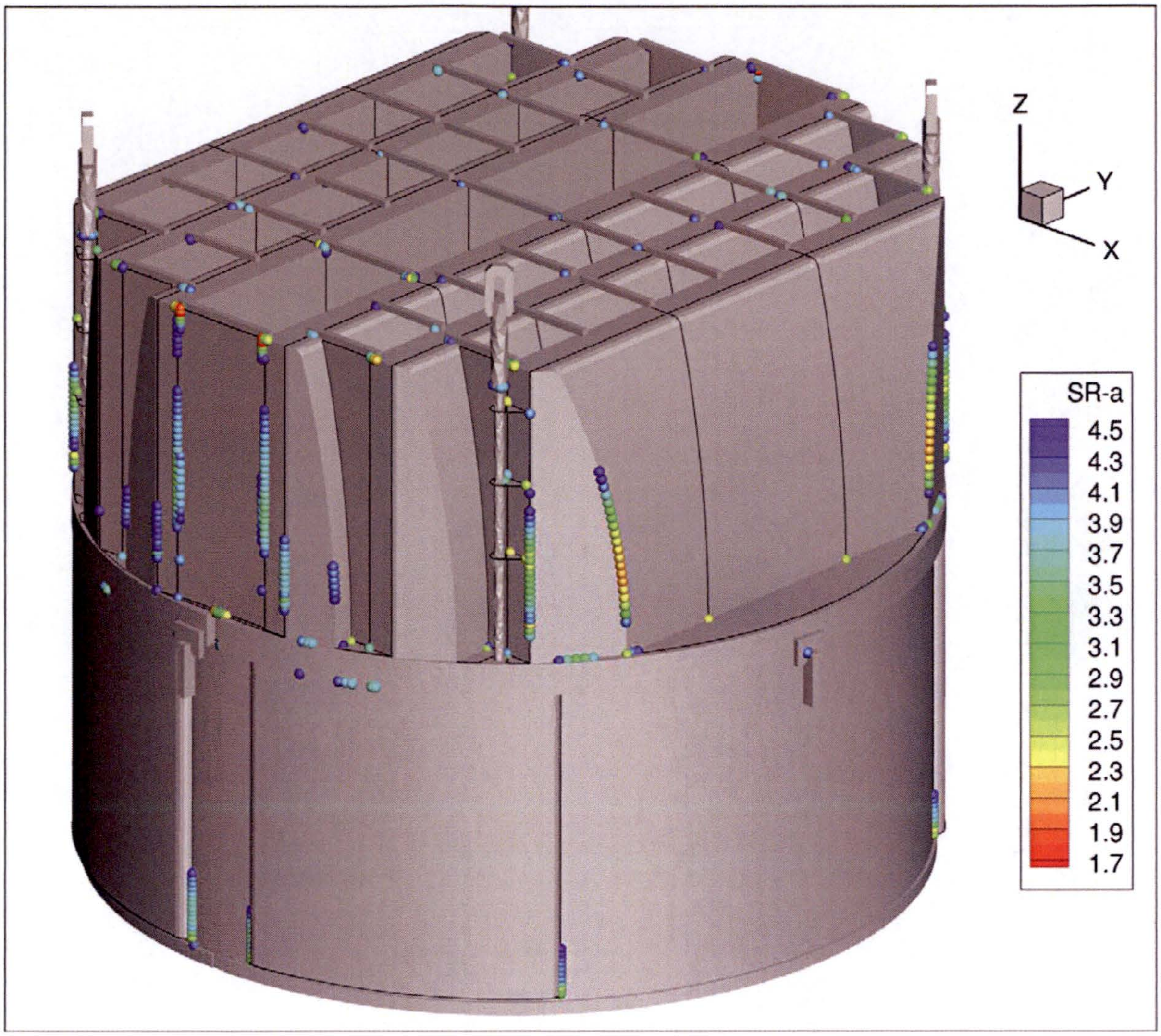


Figure 2a. Nodes on welds with alternating stress ratios below 4.5 on the NMP2 steam dryer with [[(3)]]. View 1 from side.

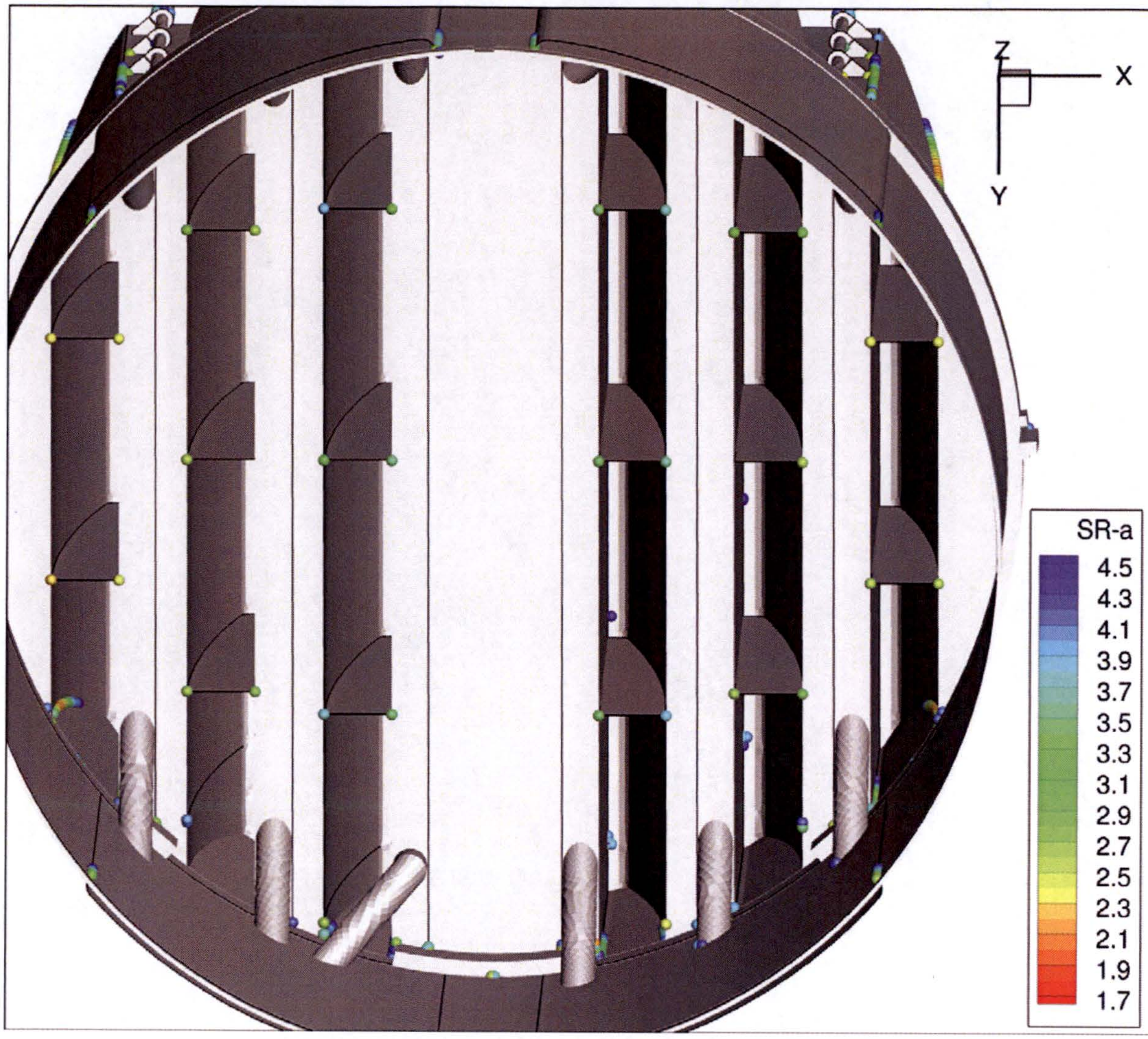


Figure 2b. Nodes on welds with alternating stress ratios below 4.5 on the NMP2 steam dryer with [[(3)]]. View 2 from underneath the dryer.

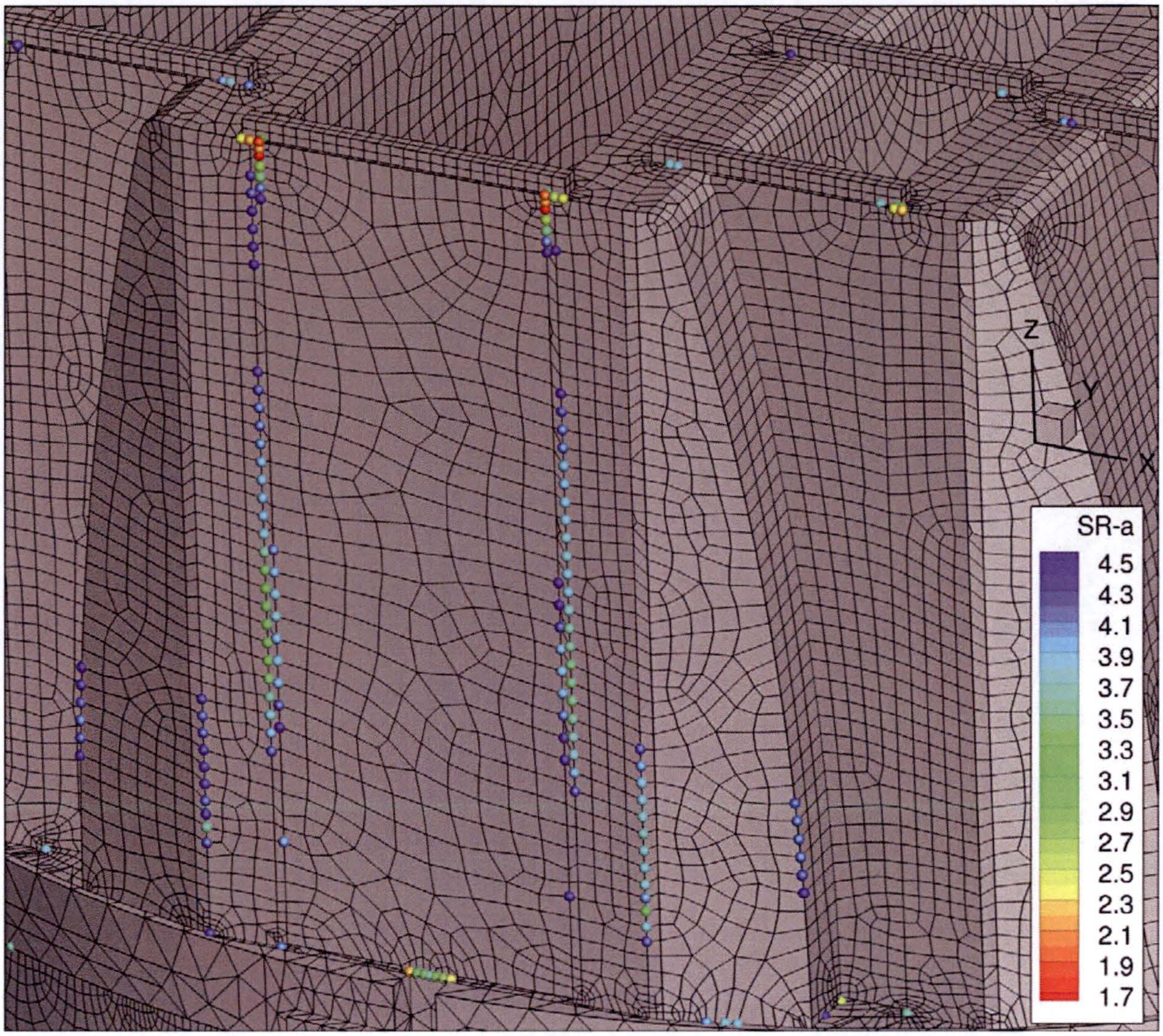


Figure 2c. Nodes on welds with alternating stress ratios below 4.5 on the NMP2 steam dryer with [[(3)]]. Close-up view 3 of inner plate.

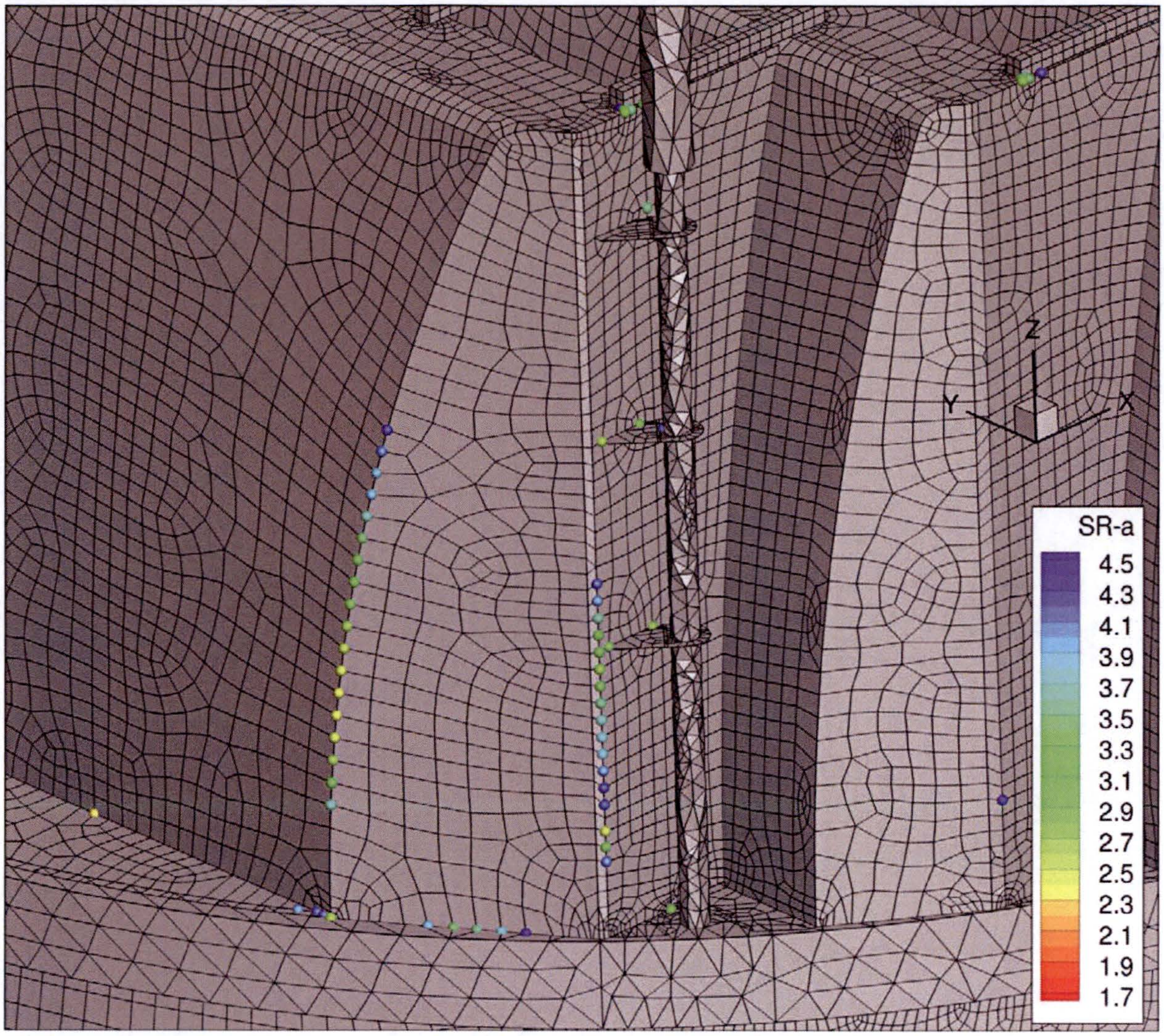


Figure 2d. Nodes on welds with alternating stress ratios below 4.5 on the NMP2 steam dryer with [[(3)]]. Close-up view 4 of outer hood/side plate welds.

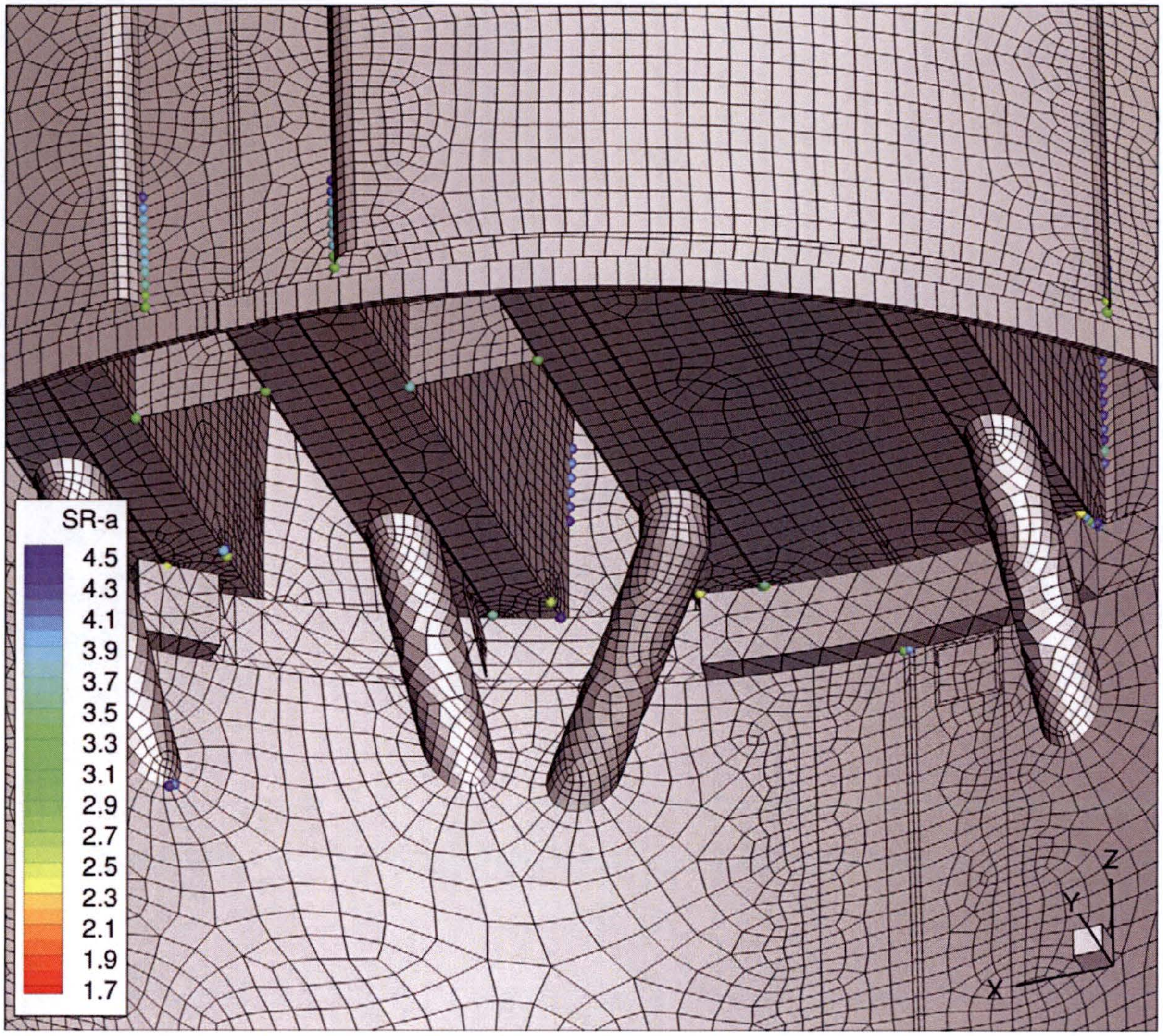


Figure 2e. Nodes on welds with alternating stress ratios below 4.5 on the NMP2 steam dryer with [[(3)]]. Close-up view 5 of drain channel/skirt welds and various welds underneath dryer.

Evaluation of Stresses [[(3)]]

The 57 off weld nodes and 957 nodes on welds [[(3)]]. The same baseline EPU operating load is used as in [1]; specifically, this is the 'N55' load as defined in Section 5.7 and Table 16 of this CDI 14-08 report and uses signal files 20120721142636 as documented in [3]. Also the same stress calculation procedure is applied and all results reported here use frequency shifting over the range in 2.5% increments (see Sections 2.1 and 2.3 of [1] for additional details). [[

(3)]]

Adjustment for U-Channel Stiffener

The application of stress adjustment factors is straightforward and involves simple multiplication (for stresses) or division (for stress ratios). Other adjustments are more involved and invoked only where necessary or desirable for improved margin. Of these, the main adjustment is accounting for the U-channel stiffener attached to the inner side plate, which is not explicitly represented in the unit solutions. This stiffener reduces the response amplitudes and stresses in the inner side plate and the welds that attach it to the adjoining structural elements (base plates and inner vane bank assemblies). From Table 18 of [1] addition of the U-channel stiffener increased the minimum alternating stress ratio by at least a factor of 1.5 for any of the 6 loads considered therein. [[

(3)]]

Adjustment at Node 87784

As discussed above, this particular node has an artificially high stress due to poor local grid quality. The alternating stress ratios [[

(3)]].

Note on Static Pressure

The tables below present results for the peak stress ratio (SR-P) also, which includes the effects of deadweight. Since unit solutions for static pressure are not available in the model [[

(3)]] Note that the general effect of static pressure is to relieve the stresses in the vicinity of the dryer support lugs. This is expected since static pressure tends to lift the dryer upward thus countering the stresses due to deadweight. Since the main emphasis here is on alternating stresses and static pressure generally alleviates peak stresses, the results herein are developed with static pressure assumed zero.

3. Results

Non-Weld Nodes

None of the non-weld node locations achieve a stress ratio below 2.0 [[(3)]]. Hence these nodes are not tabulated. The stress ratios for the locations are depicted in Figure 4. The limiting alternating stress ratio is SR-a=2.09 (node 94911) and occurs on the lifting rod where it is restrained by the upper brace.

Nodes on Welds

When [[(3)]]. The limiting alternating stress ratio is determined to be SR-a=1.22 and occurs at the bottom of the outer hood/hood support weld. The locations are depicted in Figure 5 which shows only the locations with stress ratios SR-a<2.1 and in Figure 6 which shows the stress ratios at all locations. A reduced point set of the locations with stress ratios below 2.1 is tabulated in Table 1. The table entries are generated using the procedure described in Section 5 of [1]. Briefly, the node with the lowest alternating stress ratio is identified and recorded. Next, all nodes within 10" of this location or one of its 3 image locations obtained by reflecting across the x=0 and/or y=0 planes are identified and removed from the set of nodes. Of the remaining set, the node with the lowest alternating stress ratio is identified and a similar exclusion process applied. The process is repeated until all points in the original set have been processed either by retaining or excluding the node. This process produces a smaller list of representative high stress locations while ensuring that each of the tabulated entries captures the lowest stress ratio location within a 10" neighborhood.

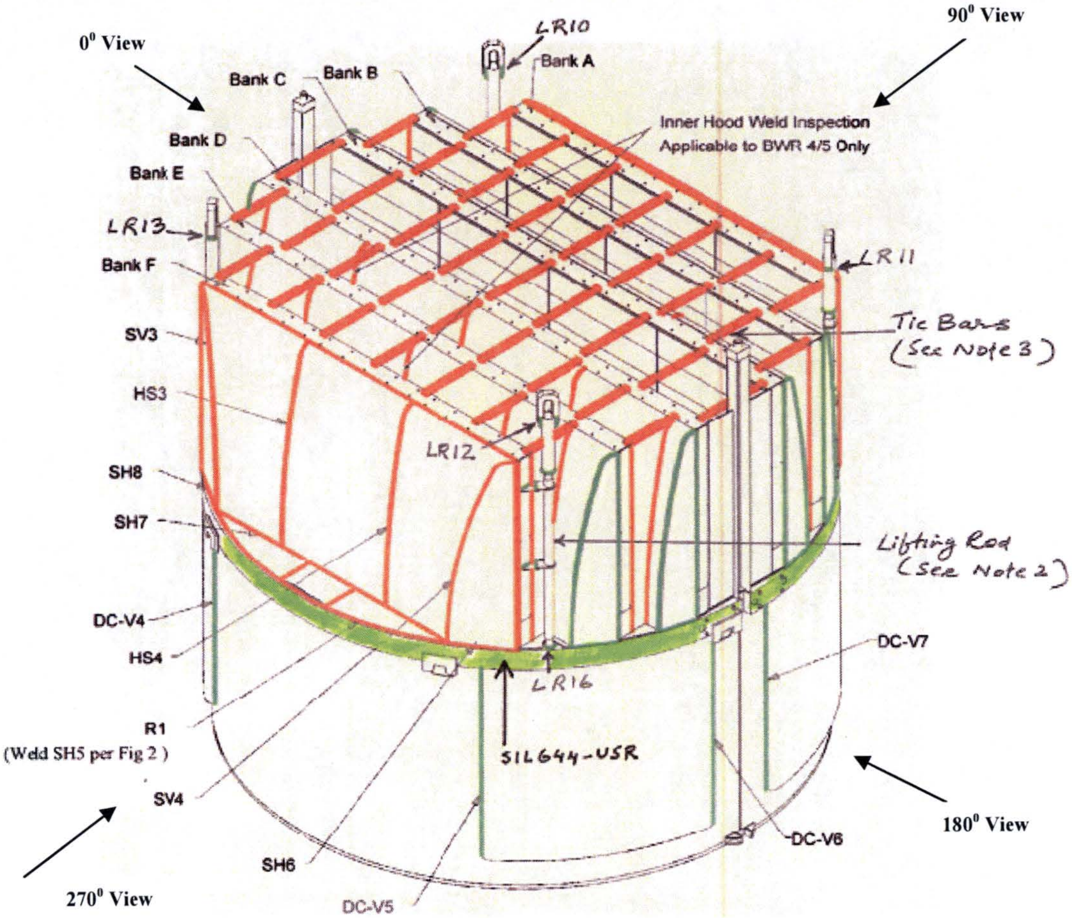


Figure 7 : Curved Steam Dryer Outer Hood Regions.

Notes:
1. This sketch provides generic BWR 4/5 steam dryer details with respect to inspection requirements, and has been extracted from the BWRVIP Steam Dryer Inspection and Evaluation Guidelines. Supplemental details are being provided if variation exists between this generic sketch and NMP2 as-built configuration .
2. For other lifting rod inspections see drawing OE-8.
3. For tie bar inspections see Figure 6.
4. For hood inspections see Figures 1 and 2. For other vertical weld inspections see Figures 4 and 5.
5. Welds DC-V1 through DC-V3; DC-V8; LR14; LR15; and LR17 are not shown (Far Side). Reference GE drawing 795E257.
6. Inspection areas are identified in Red and Green colors. Red colored areas depict high stress locations.

Figure 3. List of welds inspected during RFO (from E-mail: "RE: NMP2 outer hood locations" transmitted from George Inch (Exelon Corporation) at 09:24 on 02-23-2016). Note that the x-axis herein points from bank F to bank A; the y-axis is parallel to the line pointing from LR12 to LR13.

Table 1a. Reduced list of nodes on welds with SR-a<2.1 [[

(3)]] RPS Entries 1-13.

Location	RPS Entry	Coordinate [in.]			Node	[[(3)]]				[[(3)]]			
		x	y	z	index	SR-P	SR-a	FS	Freq. [Hz]	SR-P	SR-a	FS	Freq. [Hz]
034. Hood Support/Outer Cover Plate/Outer Hood	1	-102.8	28.4	0.0	95267	1.62	2.29	10	13.7	1.17	1.22	10	13.32
827. Top Thick Plate/Middle Hood/Top Plate	2	-55.6	-28.9	88.0	99246	5.71	4.31	10	82.6	2.60	1.30	-2.5	63.69
037. Side Plate/Brace	3	79.7	-85.2	31.3	87633	3.20	2.31	10	96.3	1.85	1.34	10	97.35
071. Middle Base Plate/Inner Backing Bar Out/Inner Backing Bar/Inner Hood	4	39.9	108.6	0.0	85631	1.63	2.50	10	82.6	1.32	1.37	-7.5	61.66
038. Thick Vane Bank Plate/Thin Vane Bank Plate/Side Plate/Side Plate Ext/Outer End Plate	5	87.0	-85.2	11.6	90786	3.09	2.34	10	82.0	2.29	1.40	10	97.35
569. Double Side Plate/Top Plate	6	-49.3	0.0	88.0	97693	4.67	3.90	10	61.7	2.27	1.43	-10	79.59
294. Thin Vane Bank Plate/Hood Support/Inner Base Plate	7	24.1	0.0	0.0	92995	1.99	3.36	10	13.7	1.21	1.46	10	13.32
060. Thin Vane Bank Plate/Hood Support/Outer Base Plate	8	-87.0	28.4	0.0	98956	2.14	2.46	10	13.7	1.51	1.48	10	13.32
111. Hood Support/Outer Base Plate/Middle Backing Bar	9	71.3	0.0	0.0	98067	1.87	2.69	10	13.7	1.30	1.48	10	13.32
304. Thick Vane Bank Plate/Thin Vane Bank Plate/Side Plate/Side Plate Ext/End Plate	10	-24.1	119.0	11.6	90170	5.62	3.38	10	123.5	2.83	1.48	10	137.60
012. Outer End Plate/Outer Hood	11	101.9	-63.3	24.6	94509	3.76	2.12	10	82.0	2.76	1.50	10	96.25
114. Thin Vane Bank Plate/Hood Support/Middle Base Plate	12	55.6	54.3	0.0	99451	2.55	2.70	10	82.0	1.65	1.50	10	82.00
199. Double Side Plate/Top Plate	13	17.6	0.0	88.0	95617	4.40	3.08	10	61.7	2.50	1.52	-10	79.59

Table 1b. Reduced list of nodes on welds with SR-a<2.1 [[

(3)]] RPS Entries 14-26.

Location	RPS Entry	Coordinate [in.]			Node	[[(3)]]				[[(3)]]			
		x	y	z	index	SR-P	SR-a	FS	Freq. [Hz]	SR-P	SR-a	FS	Freq. [Hz]
376. Hood Support/Middle Base Plate/Inner Backing Bar/Inner Hood	14	39.9	0.0	0.0	88639	1.95	3.58	10	69.5	1.25	1.53	10	27.2
519. Entry Bottom Perf/Side Plate/End Plate	15	-24.1	119.0	23.7	90231	7.01	3.82	10	123.5	3.09	1.55	10	137.6
084. Side Plate/Top Plate	16	-81.1	85.2	88.0	99456	2.37	2.57	10	82.6	1.87	1.57	-10	80.2
098. Outer Cover Plate/Outer End Plate/Outer Hood/Outer End Plate Ext	17	102.8	-62.0	0.0	84090	2.00	2.63	7.5	82.0	1.70	1.58	10	27.2
103. Skirt/Skirt Backing Bar/Skirt U S Roverlap	18	-0.6	119.0	-9.5	89329	1.84	2.66	10	82.6	1.50	1.62	10	82.6
211. Thin Vane Bank Plate/Hood Support/Inner Base Plate	19	-24.1	-59.5	0.0	96883	3.01	3.14	10	13.7	1.89	1.65	7.5	13.5
042. Inner Base Plate	20	-23.1	-113.2	0.0	49608	1.77	2.38	5	19.3	1.54	1.67	-5	18.5
253. Outer End Plate/Outer End Plate Ext	21	94.6	-74.4	0.0	90280	5.92	3.27	5	82.0	3.21	1.67	10	97.4
074. Thin Vane Bank Plate/Side Plate Ext/Outer Base Plate	22	78.5	85.2	0.0	98624	2.75	2.51	10	82.6	2.22	1.67	10	82.6
233. Entry Bottom Perf/Side Plate/Outer End Plate	23	87.0	-85.2	23.7	97726	6.08	3.22	10	82.0	3.28	1.68	10	96.3
176. Hood Support/Outer Base Plate/Middle Backing Bar	24	71.3	54.3	0.0	100204	3.10	2.99	7.5	82.0	2.09	1.69	10	82.6
239. Submeged Drain Channel/Submerged Skirt	25	-11.5	-118.4	-100.0	93452	4.53	3.24	5	17.6	2.86	1.74	10	82.0
625. End Plate/Inner Hood	26	-39.2	115.2	22.5	95778	4.54	4.00	10	123.5	3.31	1.81	10	137.6

Table 1c. Reduced list of nodes on welds with SR-a<2.1 [[

(3)]] RPS Entries 27-39.

Location	RPS Entry	Coordinate [in.]			Node index	[[(3)]]				[[(3)]]			
		x	y	z		SR-P	SR-a	FS	Freq. [Hz]	SR-P	SR-a	FS	Freq. [Hz]
512. End Plate/End Plate Ext	27	-32.7	116.9	0.0	96111	7.03	3.81	10	123.5	3.62	1.84	10	137.60
056. Side Plate/Closure Plate/Exit Top Perf	28	78.5	-85.2	76.5	87592	4.93	2.45	2.5	19.7	3.70	1.85	7.5	123.48
413. Upper Support Ring/Support/Seismic Block	29	10.2	122.1	-9.5	113680	1.92	3.66	5	13.7	1.41	1.87	5	13.69
120. Submeged Drain Channel/Submerged Skirt	30	-91.0	76.7	-100.0	93431	2.38	2.73	10	123.5	2.07	1.87	10	45.47
496. Double Side Plate/Top Plate	31	-53.2	54.3	88.0	101412	4.06	3.79	10	82.6	2.51	1.88	-10	79.59
109. Side Plate/Top Plate	32	49.6	108.6	88.0	93256	1.71	2.68	10	82.6	1.47	1.88	10	12.99
083. Outer End Plate/Outer Hood	33	100.8	-64.9	36.8	94514	4.30	2.57	10	82.0	3.39	1.91	10	96.25
603. Top Plate	34	-17.6	57.8	88.0	75015	5.20	3.97	10	81.5	3.02	1.96	-10	79.59
419. Hood Support/Middle Base Plate/Inner Backing Bar/Inner Hood	35	39.9	-59.5	0.0	101435	1.89	3.66	10	27.2	1.47	1.98	5	9.59
628. Outer End Plate/Outer Hood	36	-99.0	67.7	51.3	95301	6.89	4.00	7.5	60.6	3.94	2.01	-10	79.59
374. Entry Bottom Perf/Side Plate/Entry Mid Perf/Outer End Plate	37	87.0	-85.2	38.5	97711	6.64	3.57	10	82.0	3.87	2.03	10	96.25
397. Thin Vane Bank Plate/Middle Base Plate	38	55.6	105.2	0.0	100704	5.17	3.62	10	82.6	3.10	2.03	-7.5	61.66
316. Outer End Plate/Outer Hood	39	-102.5	62.3	12.3	99305	6.02	3.43	10	82.6	3.87	2.04	10	97.35

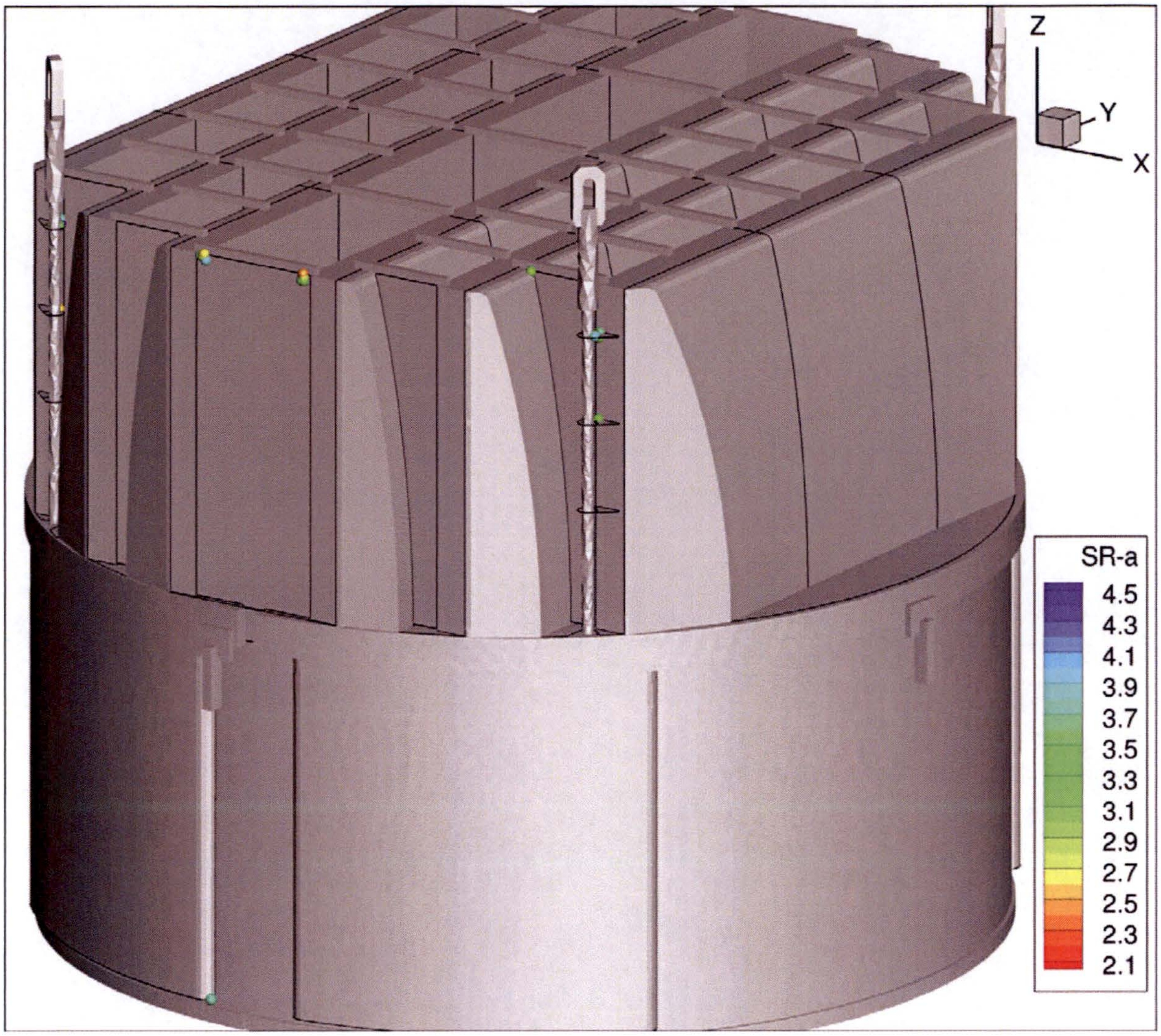


Figure 4a. Alternating stress ratios on non-weld locations [[(3)]]. View 1 from side.

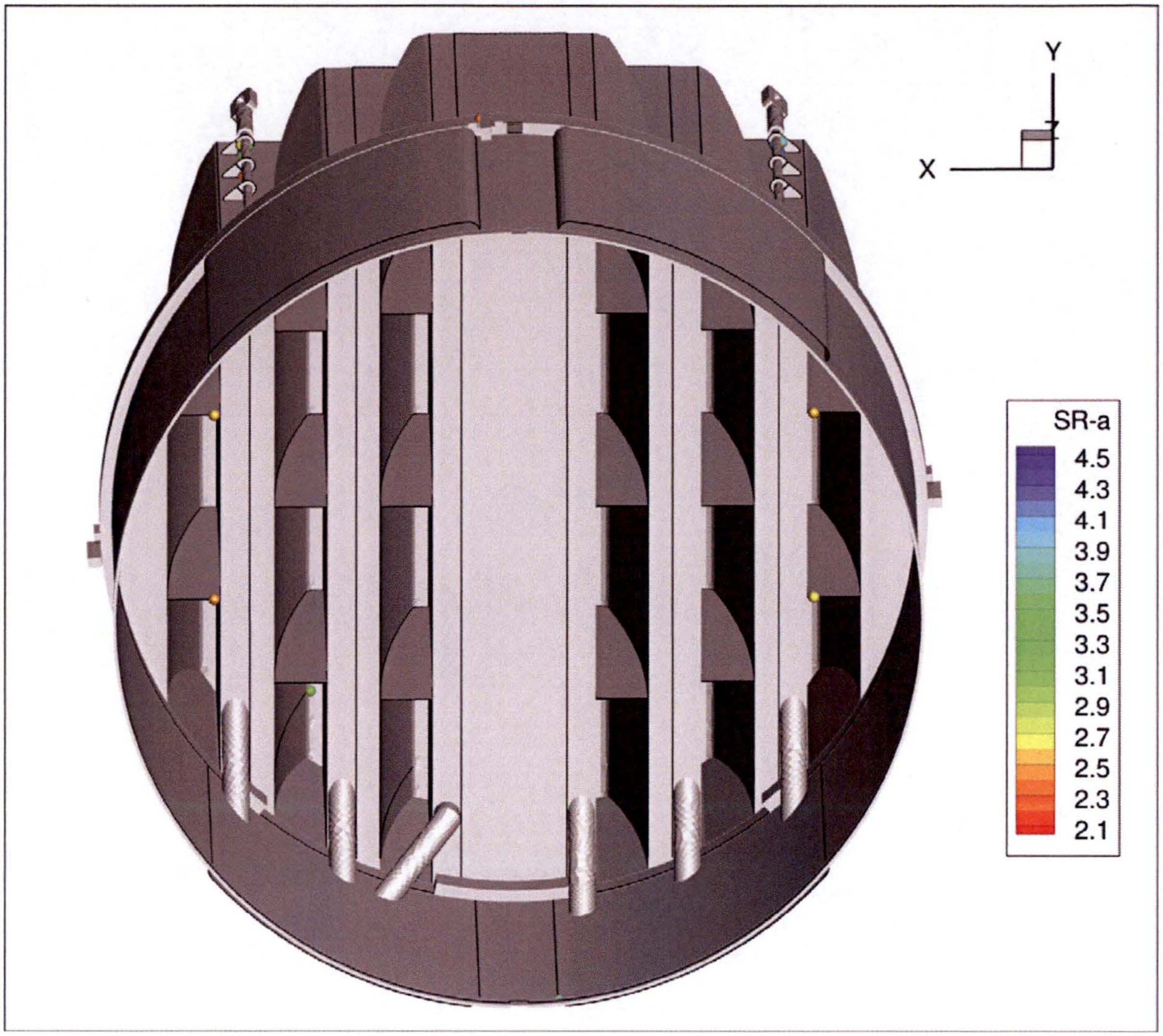


Figure 4b. Alternating stress ratios on non-weld locations [[(3)]]. View 2 from underneath the dryer.

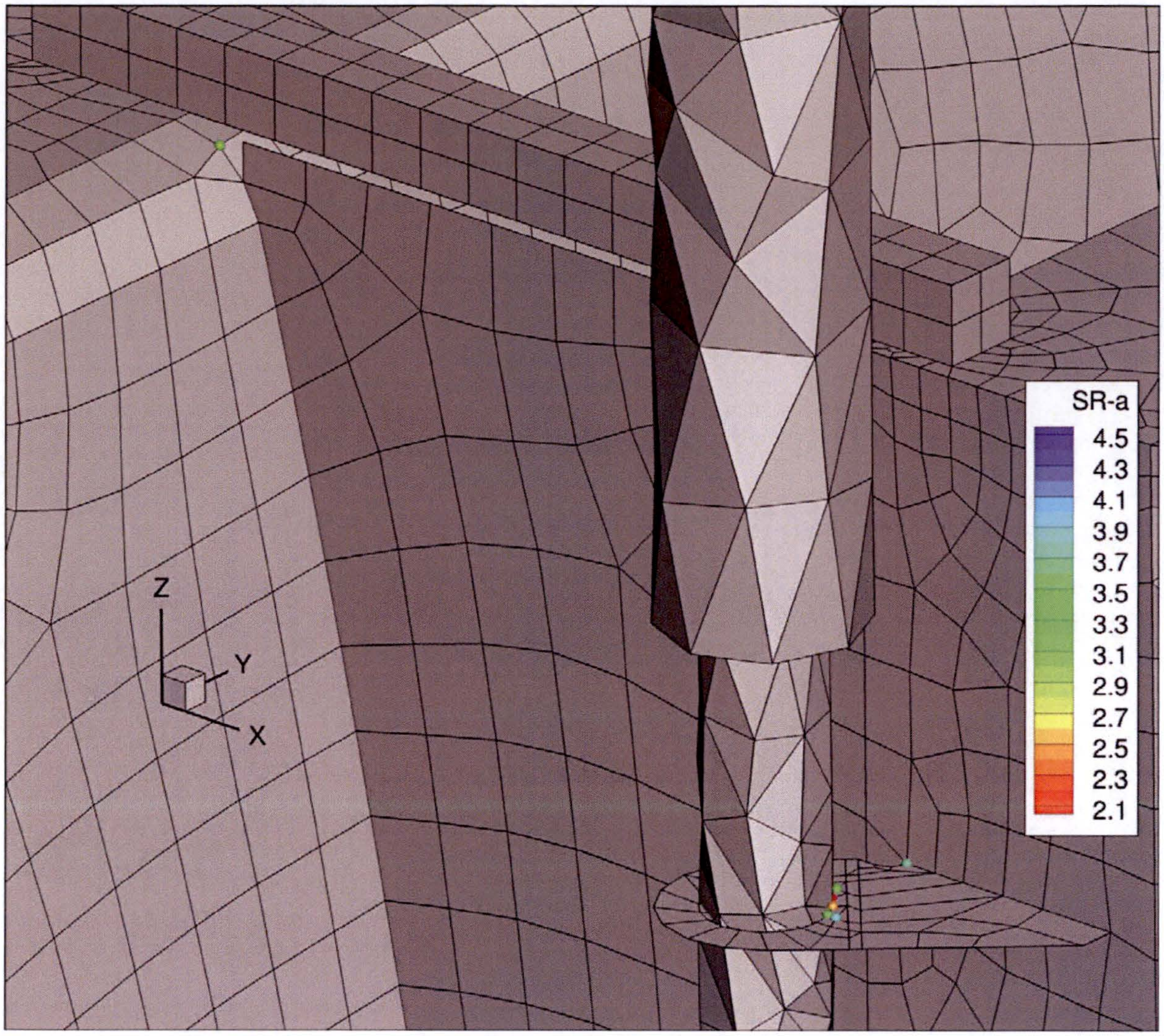


Figure 4c. Alternating stress ratios on non-weld locations [[(3)]]. Close-up view 3 showing nodes involved in lifting rod and middle hood.

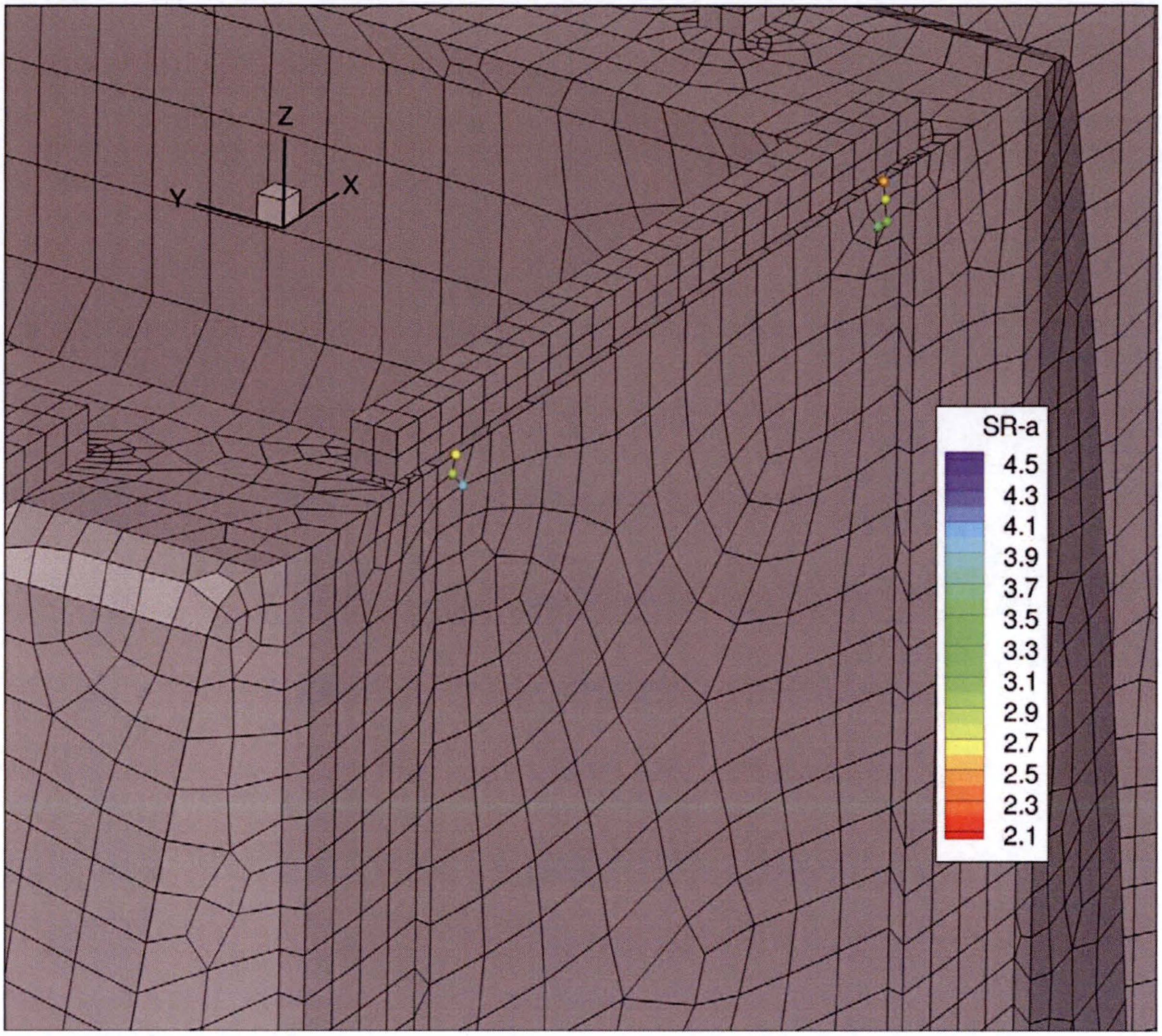


Figure 4d. Alternating stress ratios on non-weld locations [[(3)]]. Close-up view 4 of inner plate.

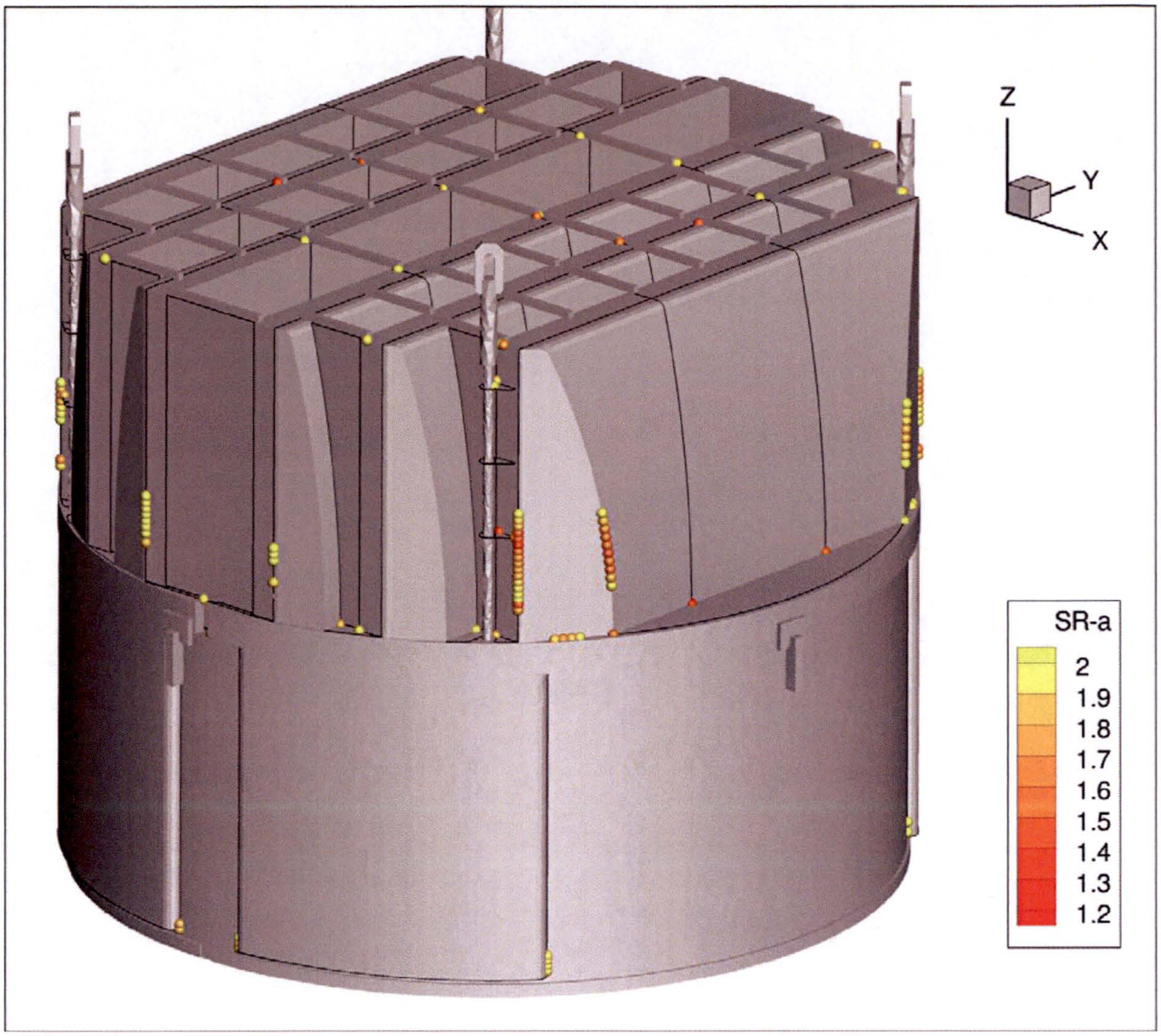


Figure 5a. Nodes on welds with alternating stress ratios below 2.1 on the NMP2 steam dryer [[(3)]]. View 1 from side.

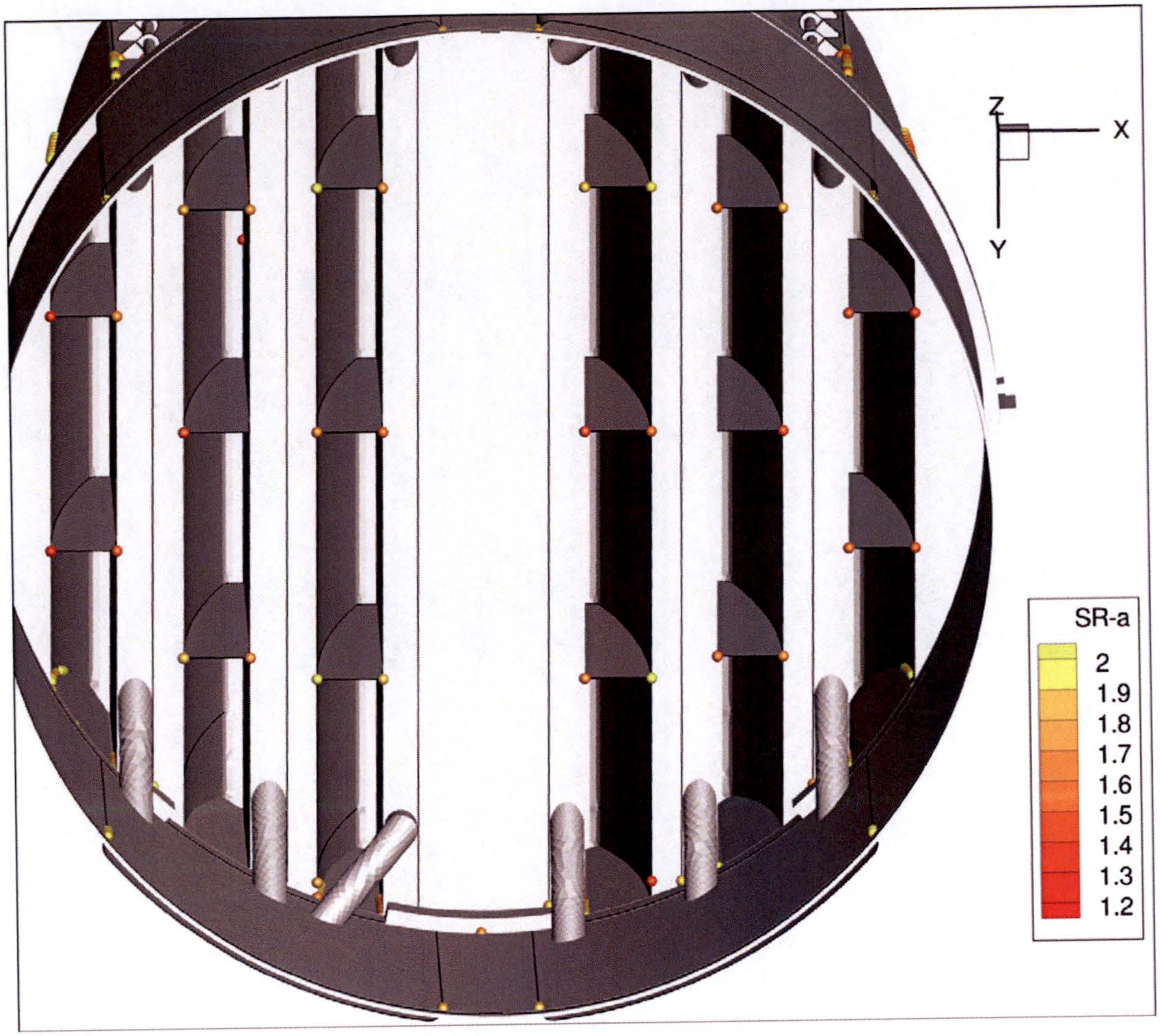


Figure 5b. Nodes on welds with alternating stress ratios below 2.1 on the NMP2 steam dryer [[(3)]]. View 2 from underneath the dryer.

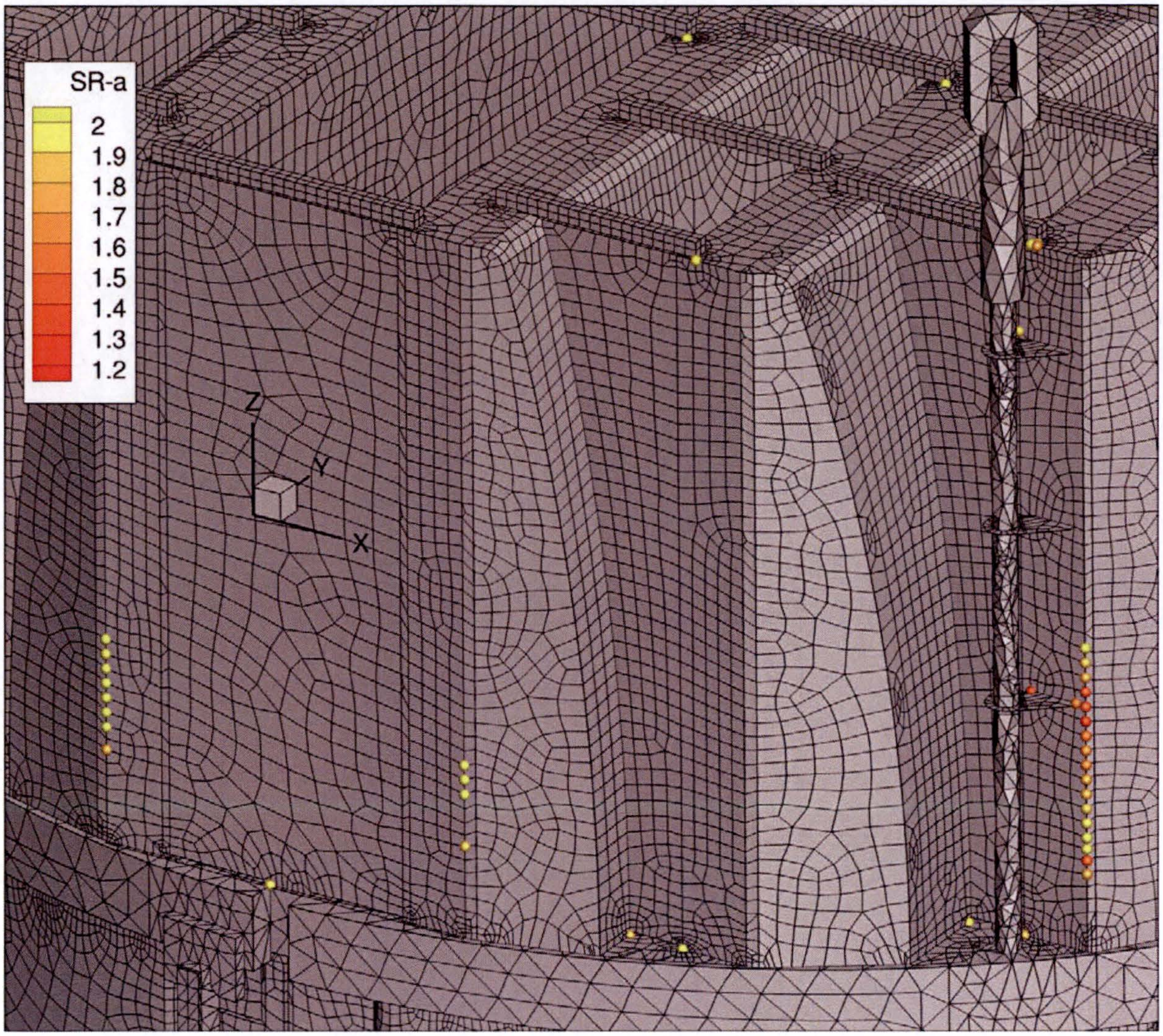


Figure 5c. Nodes on welds with alternating stress ratios below 2.1 on the NMP2 steam dryer [[(3)]]. Close-up view 3 of inner plate.

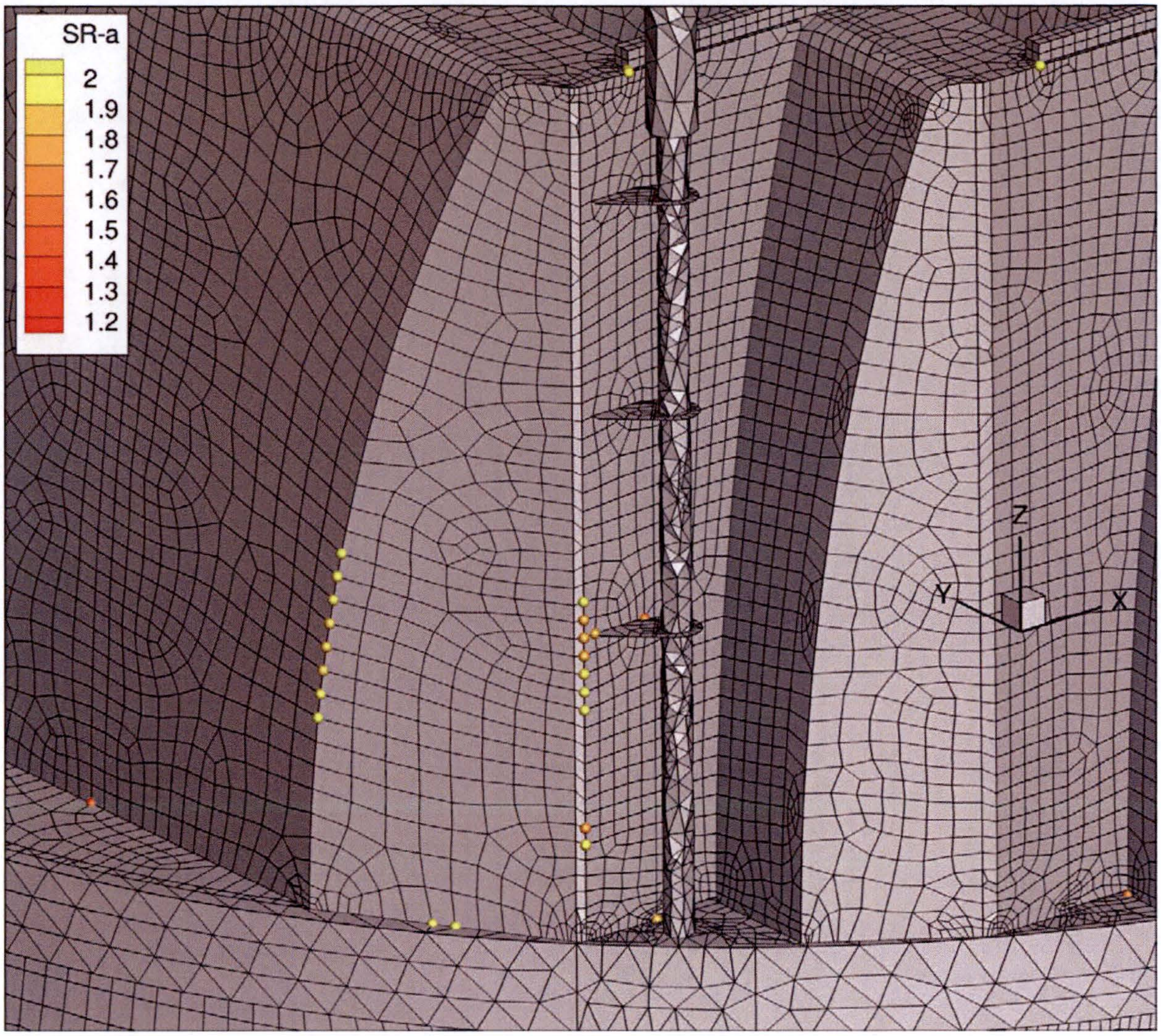


Figure 5d. Nodes on welds with alternating stress ratios below 2.1 on the NMP2 steam dryer [[(3)]]. Close-up view 4 of outer hood/side plate welds.

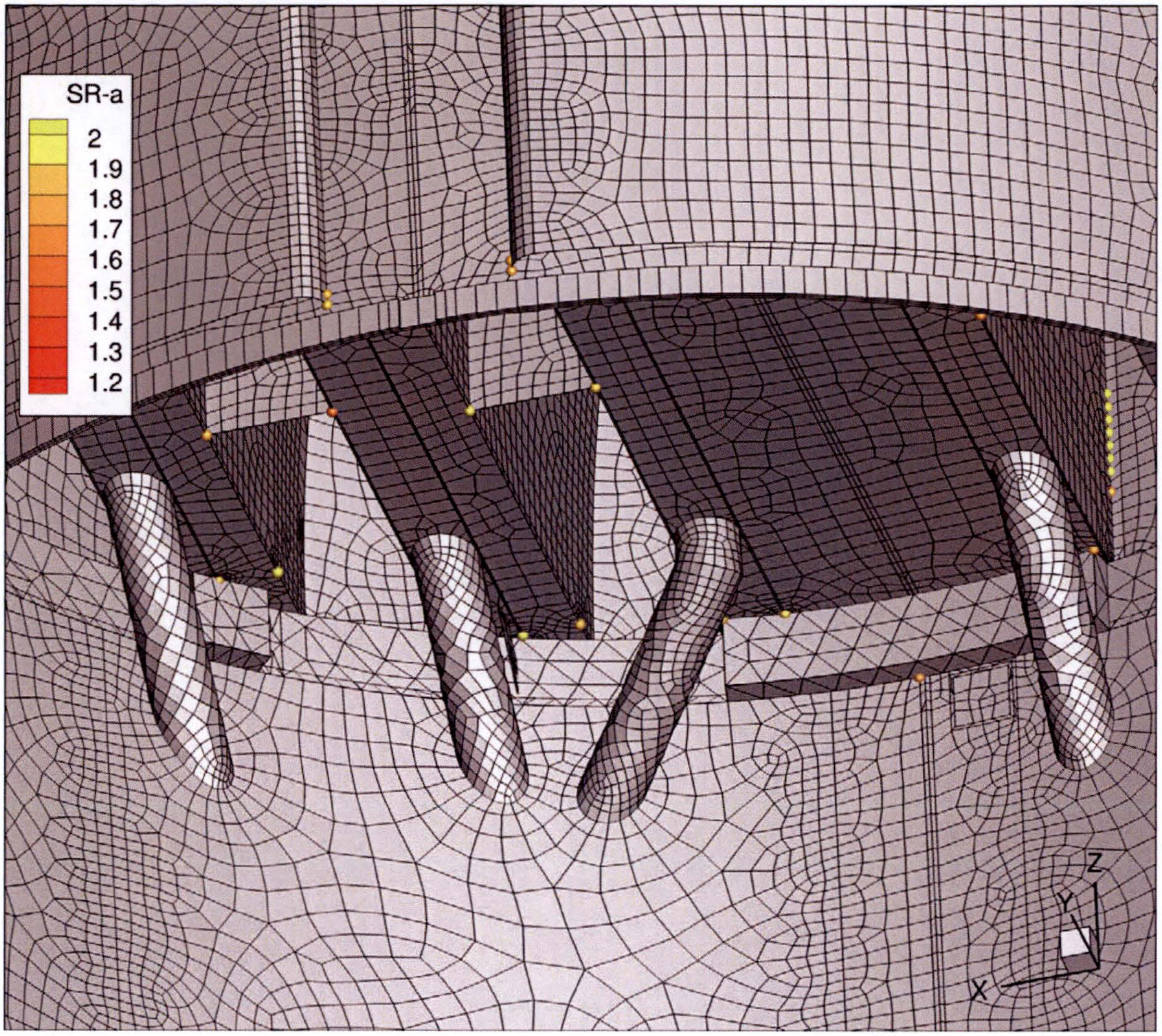


Figure 5e. Nodes on welds with alternating stress ratios below 2.1 on the NMP2 steam dryer [[(3)]]. Close-up view 5 of drain channel/skirt welds and various welds underneath dryer.

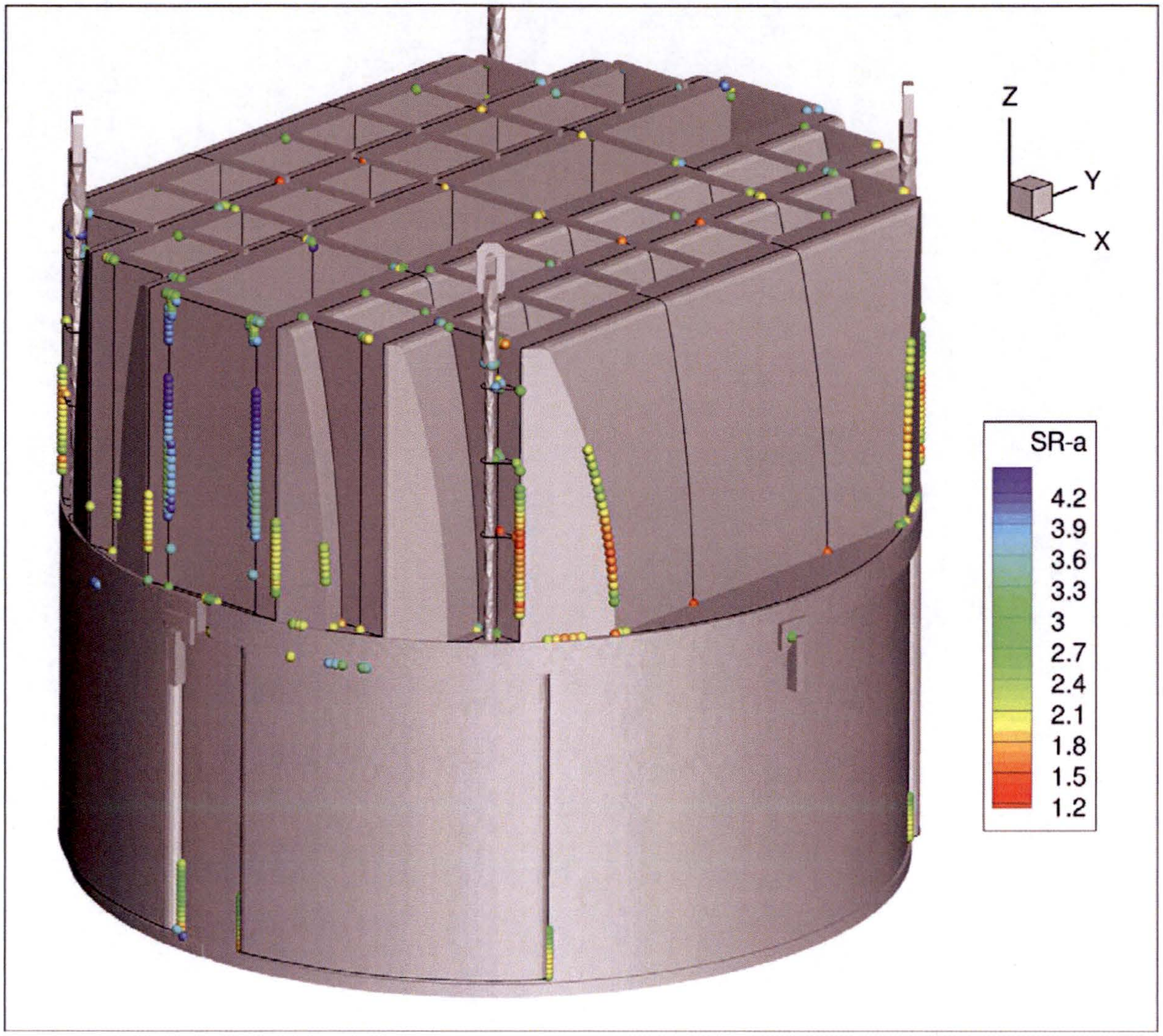


Figure 6a. Alternating stress ratios on welds [[(3)]]. View 1 from side.

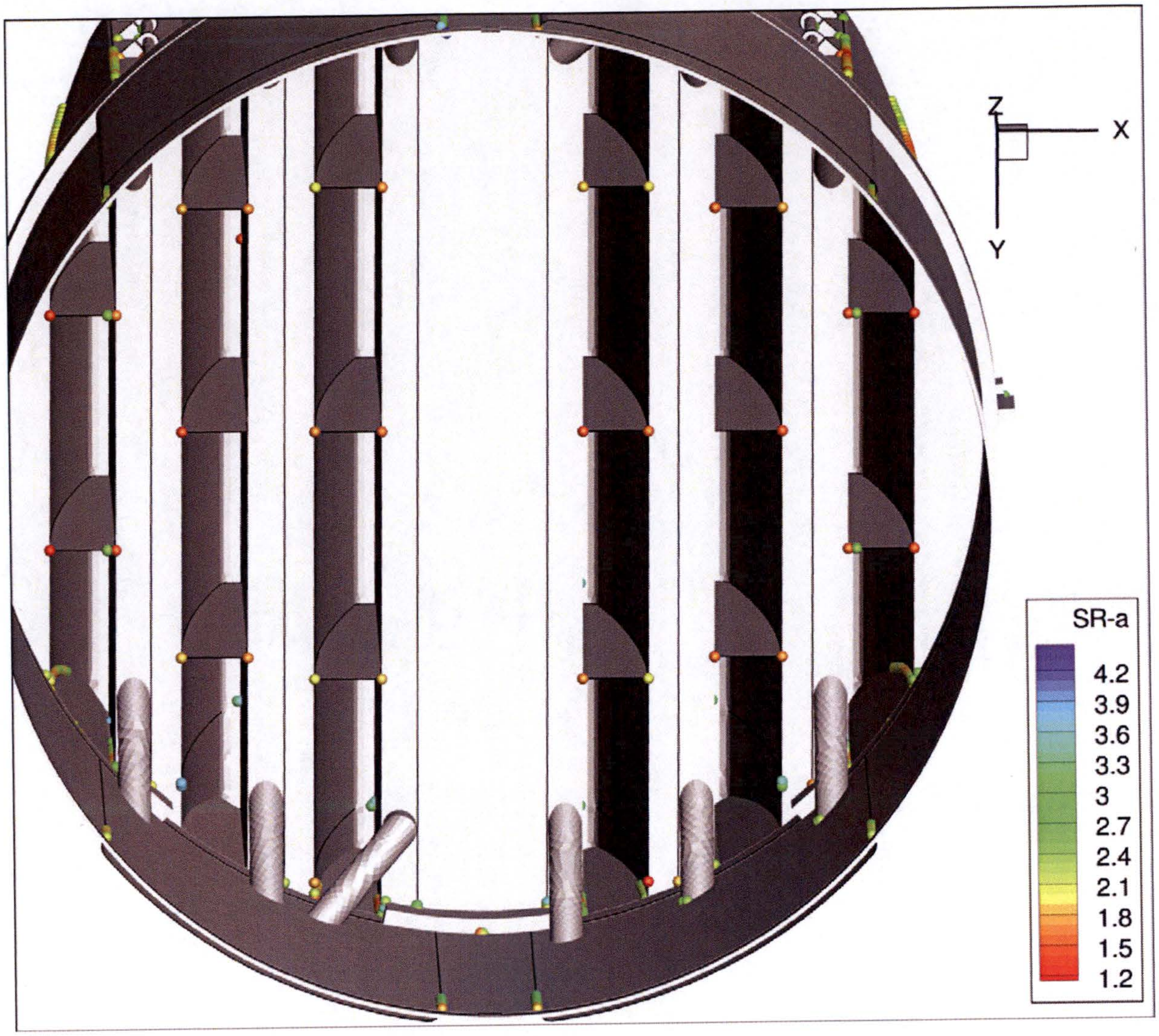


Figure 6b. Alternating stress ratios on welds [[(3)]] . View 2 from underneath the dryer.

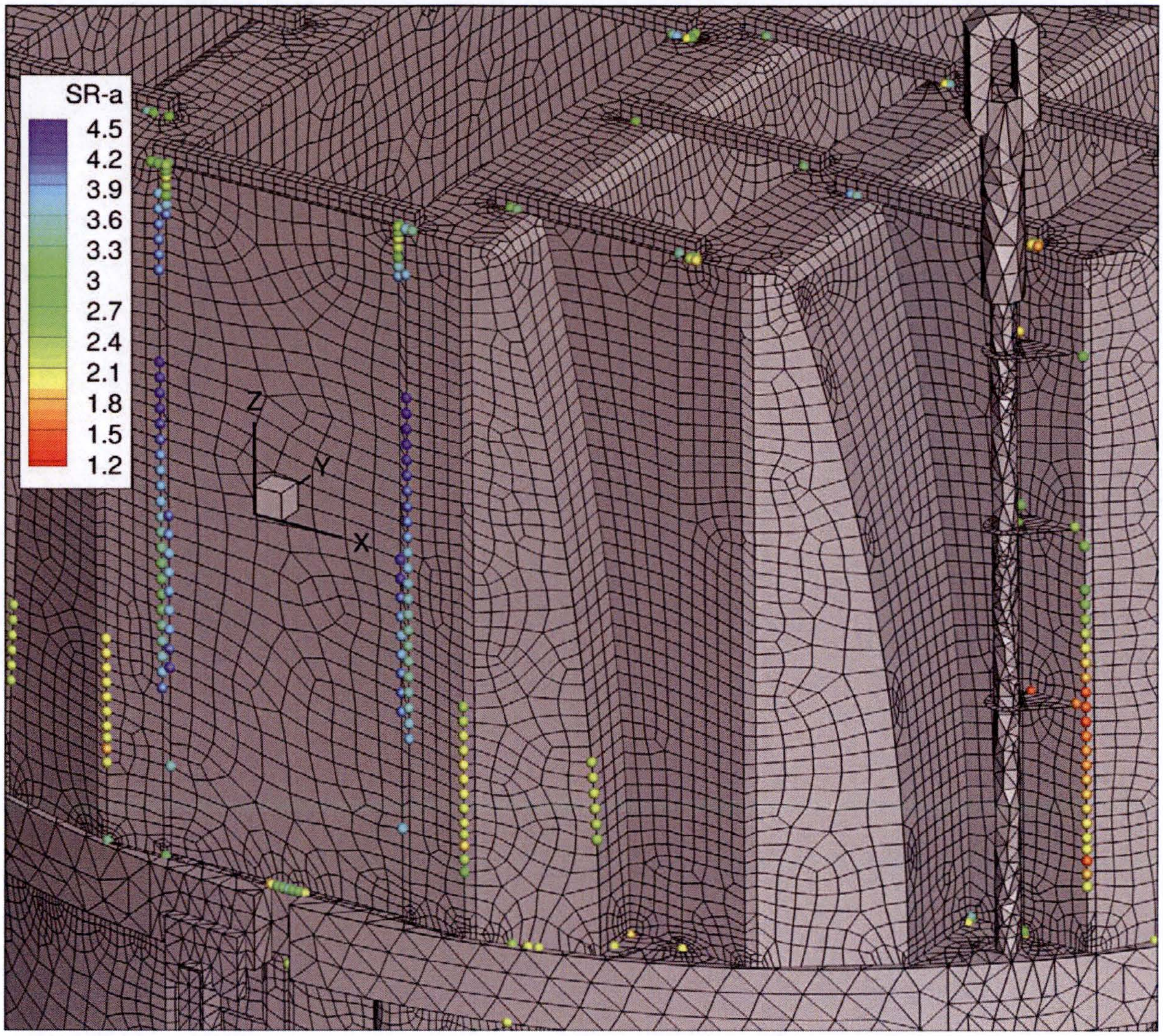


Figure 6c. Alternating stress ratios on welds [[(3)]]. Close-up view 3 of inner plate.

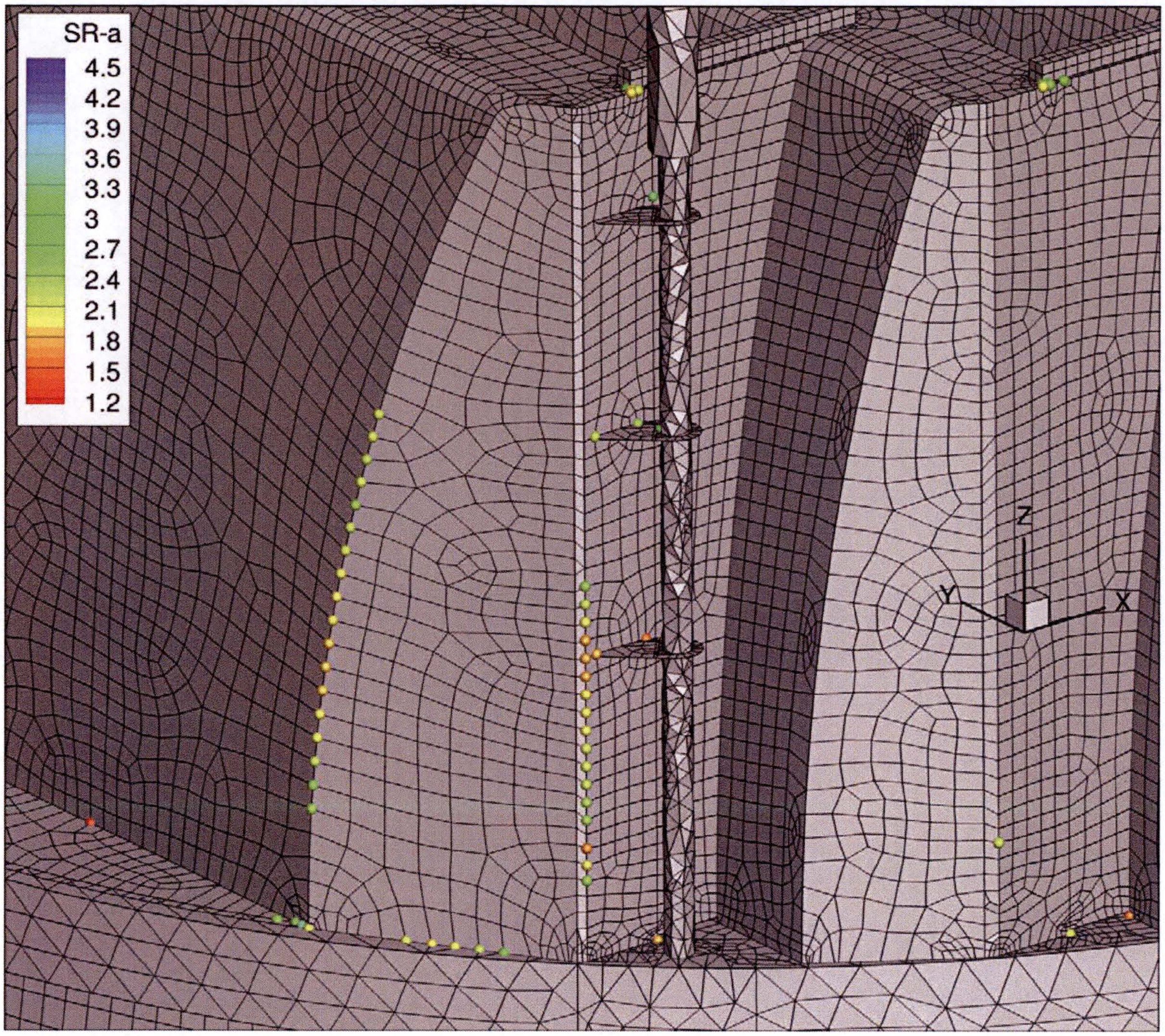


Figure 6d. Alternating stress ratios on welds [[(3)]]. Close-up view 4 of outer hood/side plate welds.

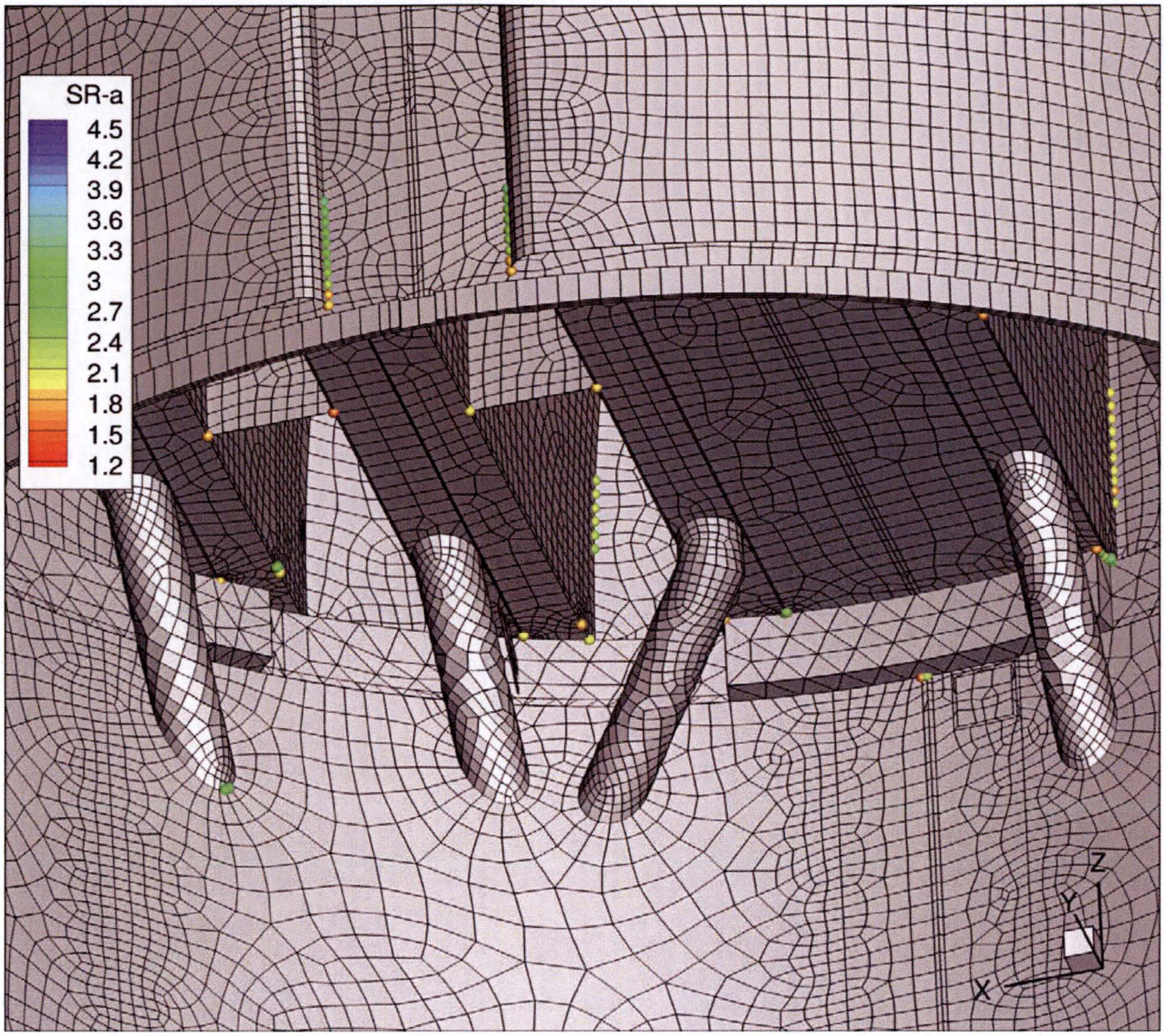


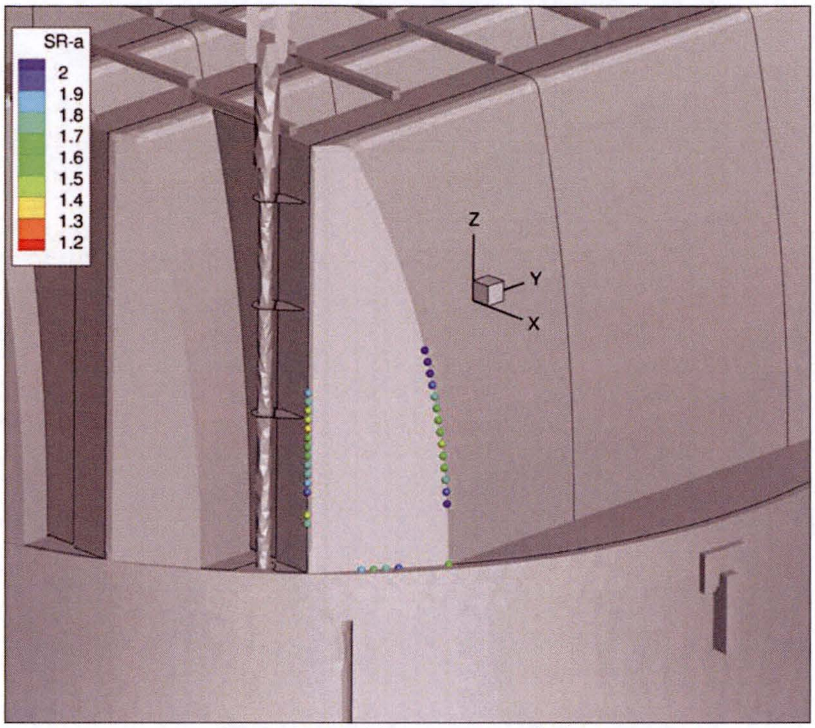
Figure 6e. Alternating stress ratios on welds [[(3)]]. Close-up view 5 of drain channel/skirt welds and various welds underneath dryer.

Recommendations for Inspection

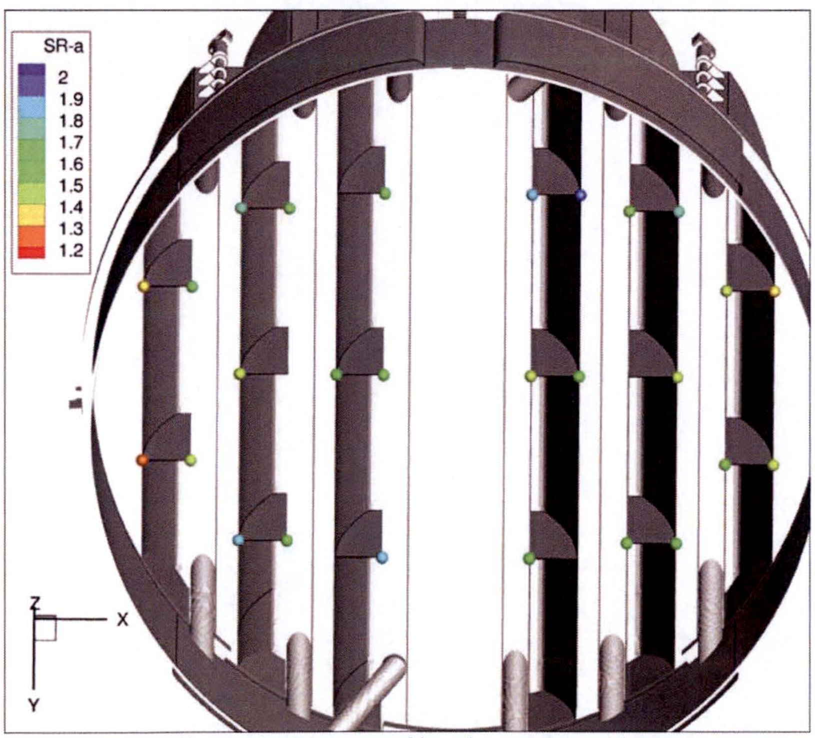
The locations with alternating stress ratios below 2.0 can be grouped as in Table 2. Where possible, connection with the welds in Figure 3 is made. The various groups are depicted in Figure 7 to indicate where inspections should be made. Note that Group 12 can be omitted from examination since its stress ratio SR-a=2 and, with the various bias and uncertainties already imposed, is unlikely to be susceptible to FIV. Also, Group 14 involves a localized stress concentration that is believed fictitious. The node lies on a location where the shell elements of the skirt overlap with the solid elements of the upper support ring. Such overlap regions are prone to numerical error in the ANSYS FEA calculation due to the manner in which the connection is effected. Thus, these locations can be omitted unless the local welds are already subject to inspection.

Table 2. Nodes on welds with SR-a<2 [[(3)]], assembled into representative groups.

Group	Description	No. of Nodes	Limiting SR-a	Welds in Figure 3	Comments
1	Welds involving outer end plate	78	1.39	e.g., SV4, SH6 + vertical welds	Limiting location on SV4.
2	Bottom 3 inches of hood support welds	27	1.22		Limiting – group 2
	Vane banks A & F (outer): hood support / outer hood		1.22		
	Vane banks A & F (outer): hood support / vane bank		1.48		Limiting values for individual hood support welds
	Vane banks B & E (middle): hood support / middle hood		1.48		
	Vane banks B & E (middle): hood support / vane bank		1.50		
	Vane banks C & D (inner): hood support / inner hood		1.53		
	Vane banks C & D (inner): hood support / vane bank		1.46		
3	Bottom 10 inches of drain channel attachment welds	17	1.74	e.g., DC-V5, DV-V6	
4	Tie bar attachment welds	24	1.30		
5	Bottom lifting rod brace	8	1.34	Green colored welds	
6	Attachment welds of inner vane bank end plate	34	1.48	Green colored welds	
7	Bottom of inner hood underneath or outboard of closure plate.	5	1.37	Not in Figure 3	
8	Outer closure plate weld near upper lifting rod brace	2	1.85	Not in Figure 3	
9	Inner base plate/USR welds (underneath dryer)	8	1.67	Not visible in Figure 3	
10	Horizontal weld at bottom of inner side plate	1	1.97	Not visible (obscured by guide rail).	Not credited for attachment of U-channel stiffener.
11	Bottom of outer vane bank end plate (near base of lifting rod)	3	1.67	Not in Figure 3	
12	Bottom of middle hood, near closure plate	1	2.00	Not visible (obscured by lifting rod)	Limiting SR-a=2.00
13	Bottom horizontal weld of middle vane bank end plate.	1	1.86		
14	USR/skirt attachment weld, near support lugs.	2	1.62		Likely fictitious stress (skirt/USR overlap).
15	USR/support/earthquake block weld	1	1.87		

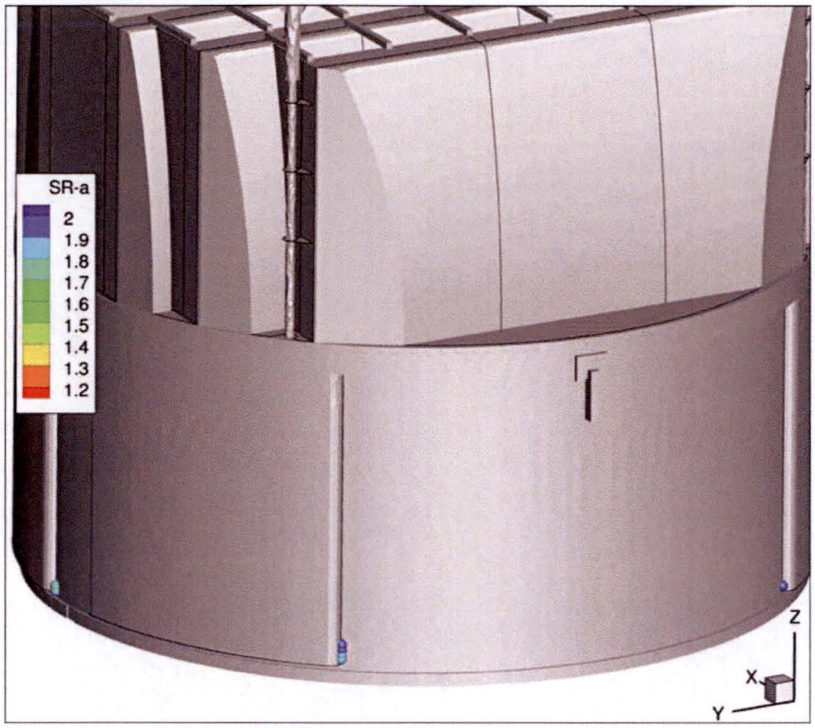


Group 1 – welds on outer end plate

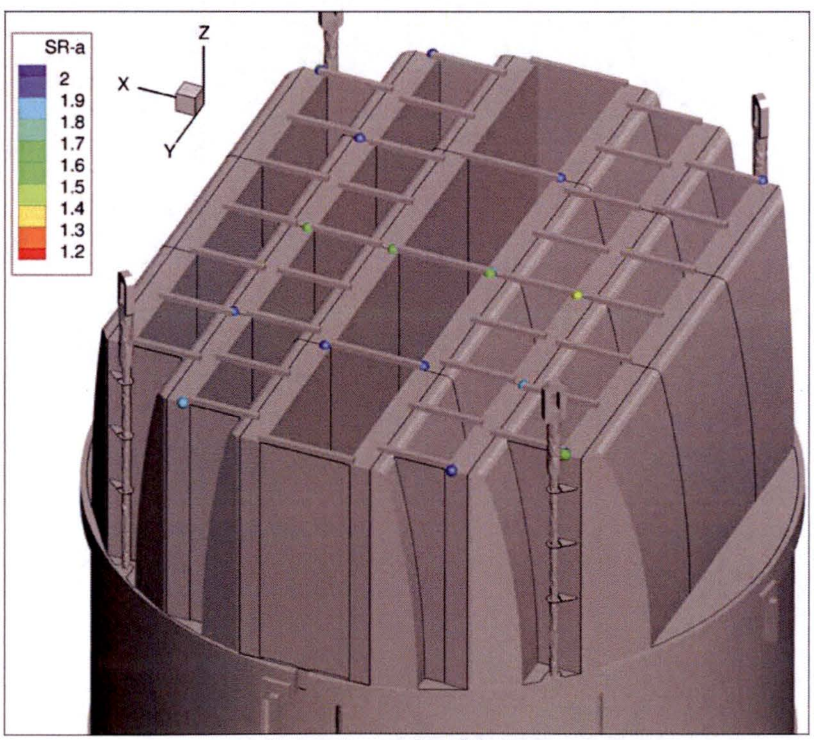


Group 2 – Bottom of hood support welds

Figure 7a. Depictions of weld groups 1 and 2.

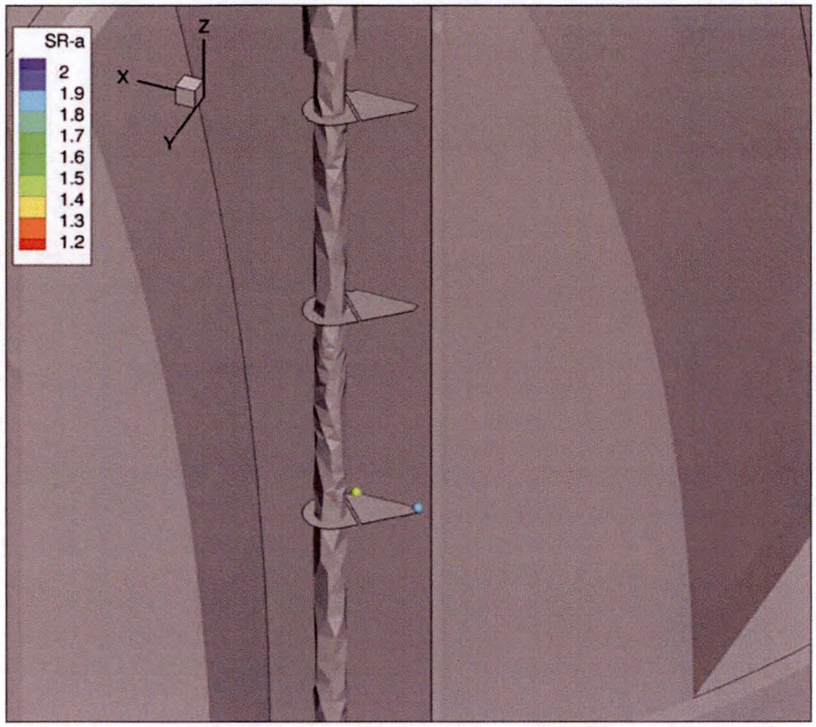


Group 3 – Bottom of drain channel welds

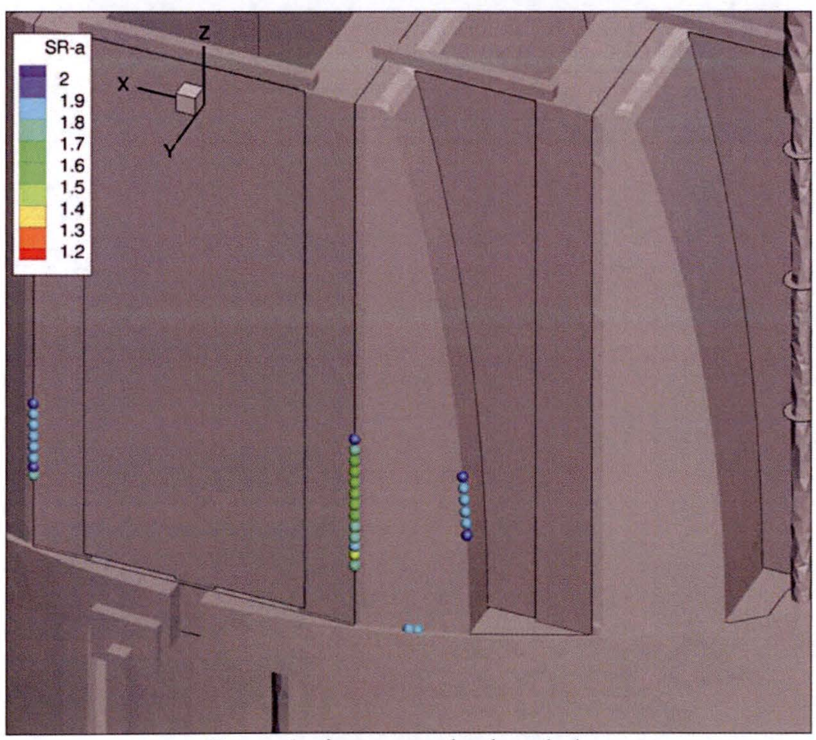


Group 4 – ends of tie bars

Figure 7b. Depictions of weld groups 3 and 4.

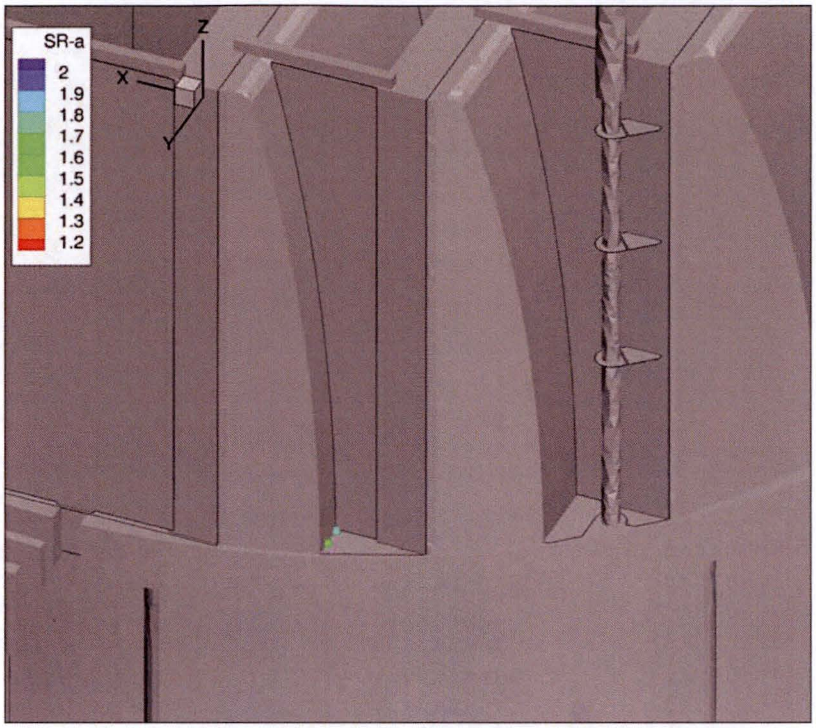


Group 5 – bottom lifting rod brace

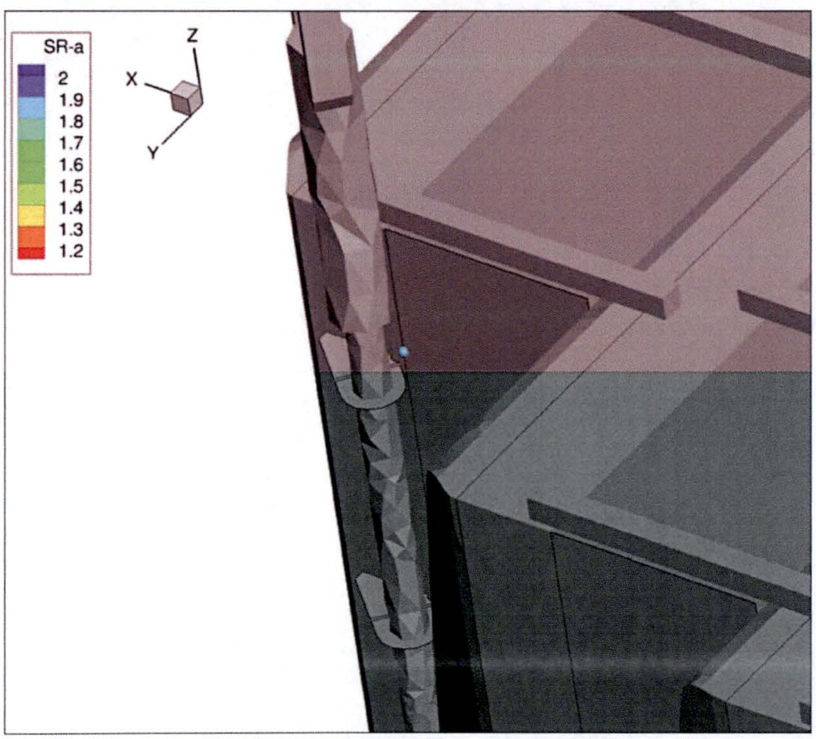


Group 6 – inner vane bank end plate

Figure 7c. Depictions of weld groups 5 and 6.

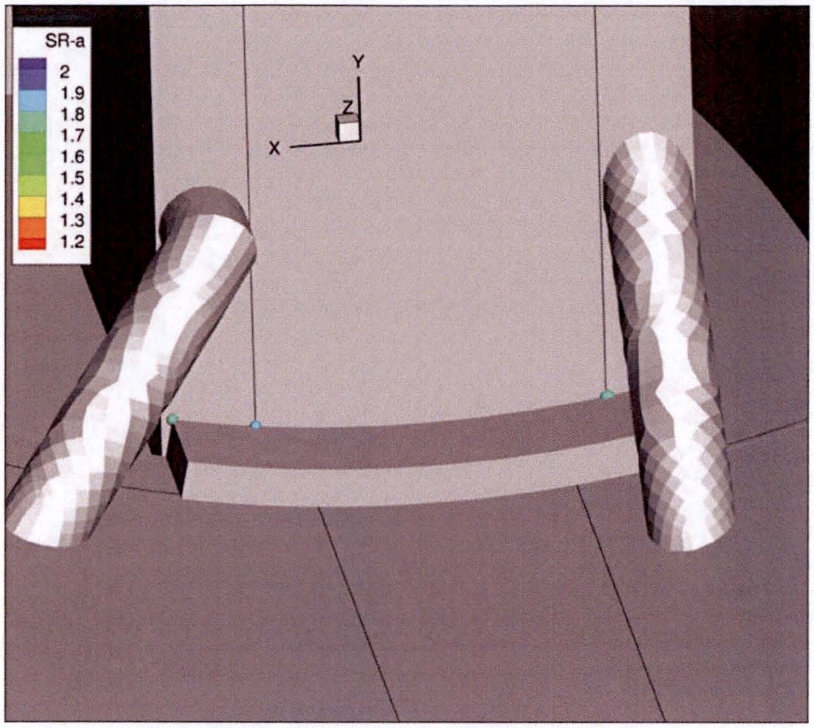


Group 7 – bottom of inner hood near closure plate

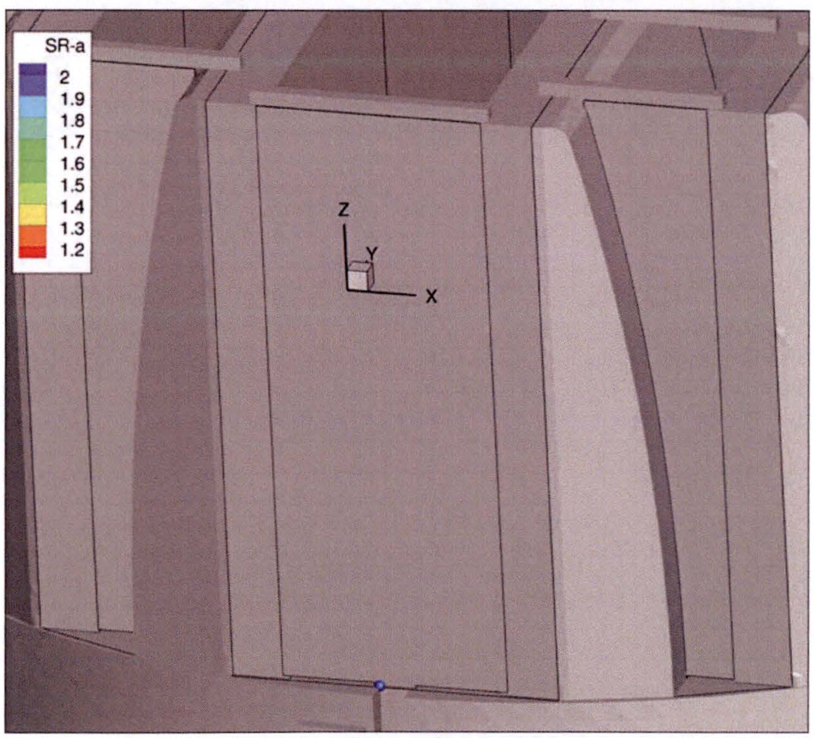


Group 8 – outer closure plate weld near upper lifting rod brace

Figure 7d. Depictions of weld groups 7 and 8.

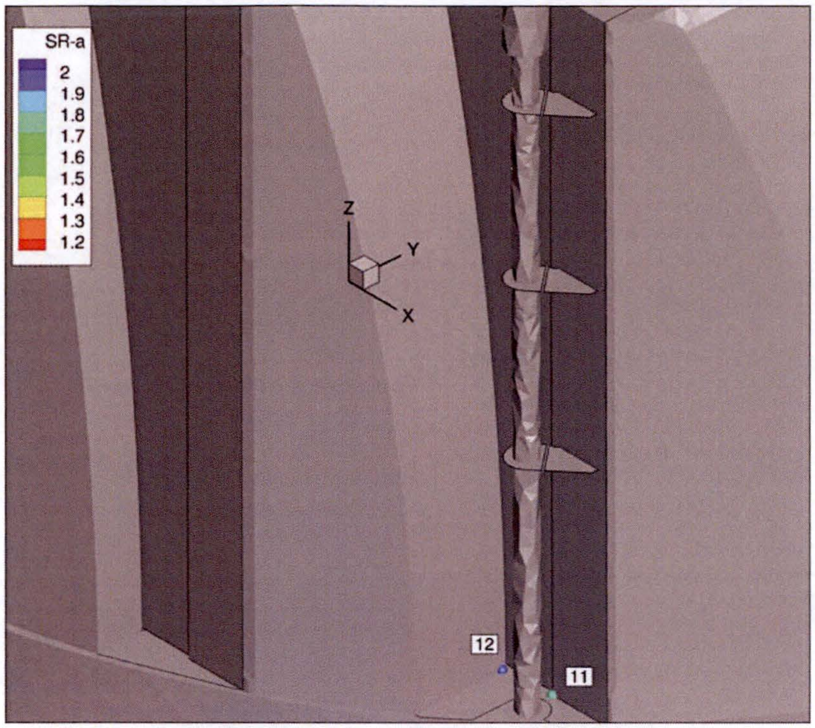


Group 9 – Inner base plates / USR

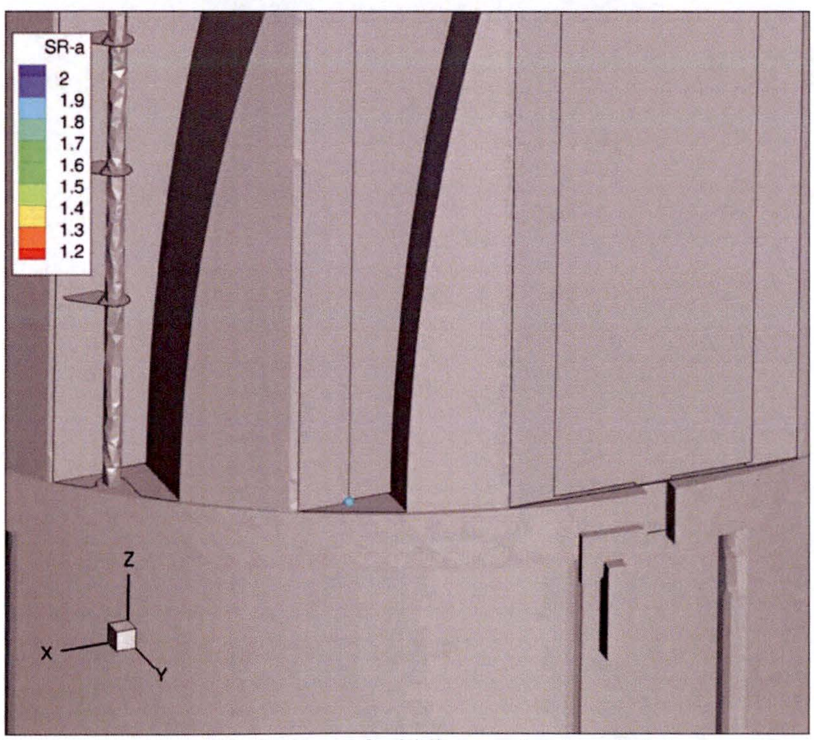


Group 10 – bottom of inner side plate

Figure 7e. Depictions of weld groups 9 and 10.

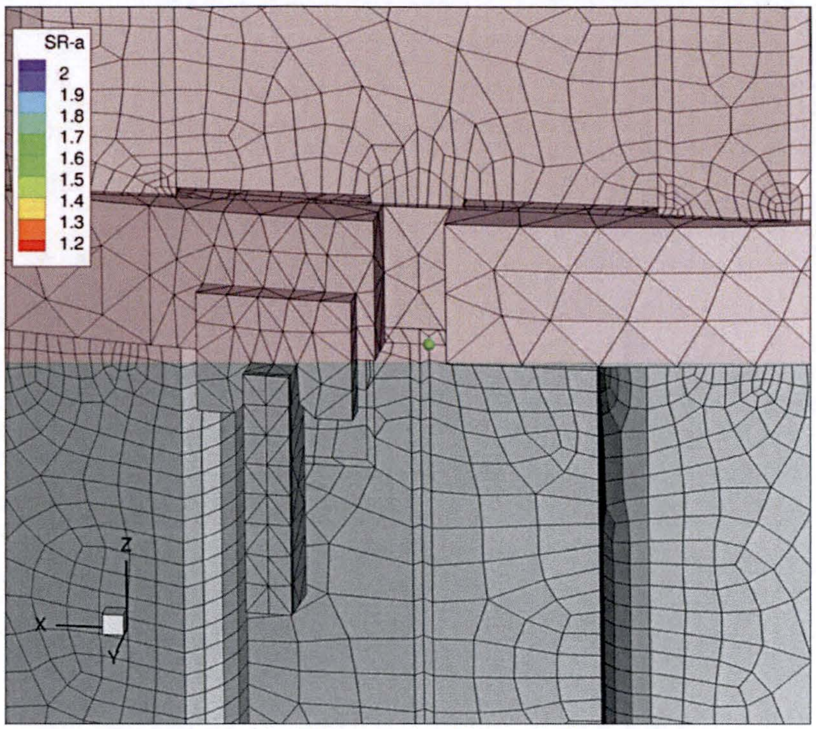


Groups 11 & 12 – near base of lifting rod

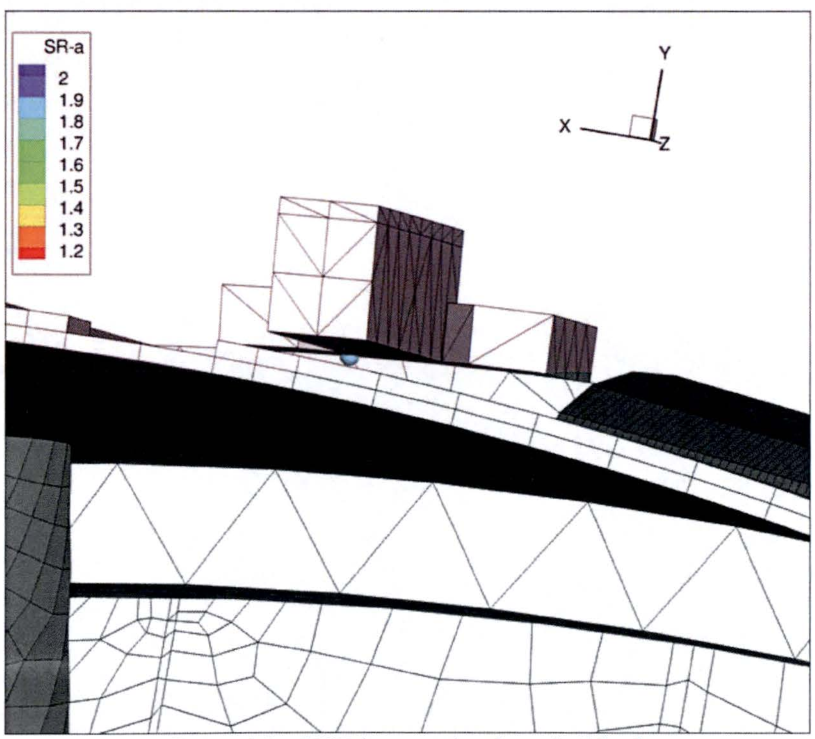


Group 13 - bottom of middle vane bank end plate

Figure 7f. Depictions of weld groups 11, 12 and 13.



Group 14 – skirt/USR overlap (likely fictitious stress)



Group 15 – USR/support/earthquake block

Figure 7g. Depictions of weld groups 14 and 15.

4. Summary

A stress assessment of the Nine Mile Point Unit 2 steam dryer was performed with the [[

(3)]] for all non-weld locations, the alternating stress ratio SR-a>2 with a limiting value of SR-a=2.09. For all weld nodes, SR-a>1 with a limiting value of SR-a=1.22 occurring on the bottom of the outer hood/hood support weld. The weld locations with stress ratios below 2.0 are aggregated into 15 groups (Table 2) that can be compared with existing inspection schedules to determine whether an expanded inspection scope is required. Most of the groups and nodes are already confirmed within the inspection scope. Of the remaining nodes some may yet be determined to be within the existing inspection plan or else can be omitted since their stress ratios are very close to 2.0 (e.g., Groups 12 and 10) or the stresses are believed fictitious (e.g., Group 14).

5. References

1. Continuum Dynamics, Inc. (2014) Stress Re-Evaluation of Nine Mile Point Unit 2 Steam Dryer at 115% CLTP. C.D.I. Report No. 14-08P (Proprietary), July.
2. Continuum Dynamics, Inc. (2012) Stress Evaluation of Nine Mile Point Unit 2 Steam Dryer at 115% CLTP. C.D.I. Report No. 12-18P (Proprietary), Rev. 0, Oct.
3. Continuum Dynamics, Inc. (2014) Acoustic and Low Frequency Hydrodynamic Loads at 115% CLTP Target Power Level on Nine Mile Point Unit 2 Steam Dryer to 250 Hz Using ACM Rev. 4.1R. C.D.I. Report No. 14-09P (Proprietary), December.
4. Continuum Dynamics, Inc. (2013) Non-Conformance Report (NCR) 03-43. 23 September.