TRANSNUCLEAR
AN AREVA COMPANY

December 27, 2007
E-25967

U. S. Nuclear Regulatory Commission
Director of the Office of Nuclear Material Safety and Safeguards
Attn: Document Control Desk
One White Flint North
11555 Rockville Pike
Rockville, MD 20852

Subject: ASME Code Alternative Request, Temporary Welded Attachment Records
Docket 72-1030

To Whom It May Concern:

In accordance with NUHOMS® HD Technical Specifications 4.4.4, Transnuclear requests an alternative to the requirements of the ASME B&PV Code, Section III, Subsection NB, paragraph NB-4435 for Temporary Welded Attachments. The alternative is sought for Temporary Welded Attachments made to the Confinement Boundary of certain NUHOMS® HD 32PTH Dry Shielded Canisters (DSCs) on the shell near the Inner Bottom Cover "T" joint to control distortion and on the Inner Bottom Cover to facilitate machining. This request applies only to the following NUHOMS® HD 32PTH DSCs: Serial Numbers DOM-32PTH-001-C; DOM-32PTH-002-C; DOM-32PTH-003-C; DOM-32PTH-004-C; DOM-32PTH-005-C; DOM-32PTH-006-C and DOM-32PTH-007-C. Two (2) DSCs are currently loaded at Surry Power Station, two (2) DSCs have been delivered to Surry Power Station, one (1) DSC has been delivered to North Anna Power Station and the remaining two (2) DSCs are currently at the fabricator's shop with fabrication essentially complete.

The alternative requested provides an acceptable level of quality and safety and is described in Attachment I.

An affidavit regarding the proprietary nature of this submittal is included in Attachment IV. A non-proprietary version will be submitted to the Document Control Desk within 30 days.

As previously discussed with NRC staff, in order to support our client's immediate loading needs, your approval is requested by January 9, 2007. If the NRC staff has any questions regarding this submittal, please do not hesitate to contact Mr. Peter Quinlan at 410-910-6895 for technical questions or Mr. Jack Boshoven at 410-910-6851 for other inquiries.

Sincerely,

Tara Neider

Tara Neider
President – Transnuclear, Inc.

7135 Minstrel Way, Suite 300 Columbia, Maryland 21045
Phone: 410-910-6900 Fax: 410-910-6902

NMSS01

cc: Ms. Jennifer Davis (NRC SFST Office)

Attachments:

Attachment I – Justification for Code Alternative to NB-4435

Attachment II – Matco Associates, Inc. – Metallurgical Reports

Attachment III – TN Calculation 10494-162, Rev. 0, Effect of Reduced Shell Thickness on the Stresses for the NUHOMS® 32PTH DSC

Attachment IV – Affidavit Pursuant to 10 CFR 2.390

1. Scope

Transnuclear proposes an alternative to the requirement in the 1998 Edition with Addenda through 2000 of the ASME B&PV Code Section III, Paragraph NB-4435. The alternative is sought regarding lack of documentation for use of qualified welders, approved weld procedures, approved weld filler material, compatible Temporary Weld Attachment (TWA) base material, as well as lack of liquid penetrant surface examination subsequent to TWA removal. This limited request only applies to the following seven (7) NUHOMS® HD 32PTH DSCs, with the specific TWA applications identified for each DSC by serial number (S/N):

<u>DSCs Affected by Shell Distortion Control Tab TWAs</u>
S/N DOM-32PTH-001-C (Loaded at Surry Power Station);
S/N DOM-32PTH-002-C;
S/N DOM-32PTH-004-C;
S/N DOM-32PTH-005-C; and
S/N DOM-32PTH-007-C

<u>DSCs Affected by Inner Bottom Cover Fixturing Lug TWAs</u>
S/N DOM-32PTH-001-C (Loaded at Surry Power Station);
S/N DOM-32PTH-002-C;
S/N DOM-32PTH-003-C (Loaded at Surry Power Station);
S/N DOM-32PTH-005-C;
S/N DOM-32PTH-006-C; and
S/N DOM-32PTH-007-C;

The proposed alternative shall be that documentation for use of qualified welders, approved weld procedures, approved weld filler material, compatible TWA base material, as well as documentation of liquid penetrant surface examination subsequent to TWA removal, shall not be required for the specific TWA applications identified above under the following conditions:

a) The affected DSC is fabricated from SA-240 type 304 stainless steel plate
b) The affected DSC is subsequently pressure tested in accordance with NB-6000 requirements and demonstrated to satisfy Leak Tight Criteria as defined in ANSI N14.5-1997.
c) Stress analysis demonstrates that the affected DSC can perform its structural design function within the UFSAR design basis stress limits with a worse than credible defect.

2. Statement of Need

Transnuclear (TN) identified a deficiency at its fabricator (GE-Hitachi) regarding inadequate fabrication records resulting in a nonconforming condition relative to the possibility of undocumented TWAs made to the confinement boundary of the NUHOMS® HD 32PTH DSCs identified above. These temporary attachments are routinely used in fabrication to control distortion during welding operations or to fixture components during machining operations.

TN has determined that during the fabrication process undocumented temporary attachments were welded to the shell OD both above and below the DSC inner bottom cover location to control shell wall distortion during welding of the inner bottom cover plate to the shell ID. Additionally, undocumented temporary attachments were welded to the inner bottom cover

plate in support of machining operations.

Prior to this determination, TN had identified several instances of missing NDE reports associated with TWAs which had documented weld maps and control records. TN's fabricator performed an investigation and extent of condition for all TWAs utilized in 32PTH DSC fabrication and determined through collective interviews with their Production staff that the fabrication process consistently utilized distortion control tabs on the shell for all shells fabricated to date and fixturing lugs on the inner bottom cover for all covers machined to date as a standard practice, even for cases where no weld documentation was evident. This conclusion is supported by specialized NDE which has confirmed the existence of a residual weld pool (i.e., mix of weld filler material and base material) as a result of the TWA applications described above, for those components which were accessible for confirmatory examination (refer to Attachment II for details). Therefore, this condition results in the need for this additional Code Alternative.

The affected DSCs are either loaded or are scheduled to be loaded by TN's client Dominion in early 2008. Those DSCs not yet loaded are required to retain full core off-load reserve in the spent fuel pools at Dominion's Surry and North Anna Power Stations. Since the current status of the subject DSCs is loaded, delivered or fabrication essentially complete (i.e., basket inserted and top closure support ring weld complete), replacement of the affected components would result in hardship, unusual difficulty and for the loaded units, unnecessary cask handling and radiation exposure to workers. As discussed herein, the proposed alternative provides an acceptable level of quality and safety.

3. Evaluation

3.1 Discussion of Situation

For the undocumented TWA applications on the NUHOMS® HD 32PTH DSCs identified above, a nonconformance exists regarding lack of documentation for use of qualified welders, approved weld procedures, approved weld filler material, compatible TWA base material, as well as lack of liquid penetrant surface examination subsequent to TWA removal. The above documentation is required per Article NB-4435 of the ASME Section III B&PV Code, which is a design feature embedded in the Technical Specifications for the NUHOMS® HD license. Therefore, the assumed nonconformance constitutes a Code violation and therefore the subject DSCs are not compliant with the NUHOMS® HD Technical Specifications.

Regarding acceptability of the nonconforming DSCs, during interviews conducted with the Production personnel at the fabricator that supported the conclusion that distortion control tabs were utilized on the DSC shells, the following statements were provided. The welders all insisted that they understood the TWA process and that weld maps and weld control records were consistently generated for all TWAs. They concluded that the documentation of such was most likely lost sometime after removal of the TWA or otherwise discarded. Although no documentary evidence exists, the fabricator's welding program including weld filler material control has been continually in place during the timeframe of interest such that there exists high confidence that the welders available to perform the TWA work were qualified to the applicable procedures, would have utilized appropriate approved welding procedures, would have drawn out the approved weld wire specified by the welding procedures, and would have

utilized compatible attachment material. Experience to date for documented welding activities indicates that the fabricator's welding program is consistently satisfactory regarding these attributes. The weld procedures and materials typical for these TWAs are commonplace in the shop (Type 304 stainless steel to stainless steel welding) with no historical indication of any inferior welding or unsatisfactory NDE results associated with previously documented TWAs.

The extent of condition performed by the fabricator also identified inconsistent documentation for use of braces utilized during fitup and fixturing lugs utilized during machining of the inner top cover/shield plug. However, these were limited to attachments to the rough weldment which are subsequently removed and the part final machined, thereby removing the affected base material to which the TWA was attached (approximately 0.25 inches below the surface of the attachment, well beyond the weld heat affected zone), and mitigating any potentially detrimental effects of the TWA. Therefore, these TWAs are not included in the scope of the Code alternative request.

As part of the corrective action plan for this issue, specialized NDE was performed for undocumented TWAs which were accessible for inspection, confirming their existence and demonstrating that compatible TWA material and proper weld filler material had been utilized in all areas examined. In summary, a total of five affected shells were examined in the area of the distortion control tabs and four affected inner bottom covers in the area of the fixturing lugs (refer to Attachment II for details). Although not all TWA areas examined are associated with DSCs included within the scope of the Code alternative request, the results of the examinations are representative of the specific undocumented applications and therefore provide additional confidence that proper welding was performed for those TWAs which remain inaccessible for re-examination.

Likewise, where accessible, rework of the undocumented PT and UT thickness examinations yielded satisfactory results with one exception where the PT surface examination identified unacceptable indications requiring removal via grinding. Based on the unacceptable indications, it is apparent the initial PT examination most likely had not been performed for the affected shell. Therefore, it is concluded that the undocumented TWAs, if in fact utilized, would have been acceptable regarding TWA base material, weld filler material and weld procedure utilized, but due to the lack of a documented PT report, defects are assumed to have remained subsequent to TWA removal for the areas inaccessible for re-examination.

3.2 Flaw Evaluation

For the purpose of evaluation, defects are conservatively assumed to exist at TWA removal locations in the DSC shell and/or inner bottom cover as applicable. Since the defects would most likely be due to porosity in the weld pool or weld shrinkage, the depth of the assumed defect may be characterized based on the extent of the heat affected zone (HAZ) created by the welding process (i.e., defect would not extend below HAZ into unaffected base material). Metallurgical investigation of weld coupons representative of surface welds utilized to install temporary attachments indicates the typical combined depth of the weld puddle and heat affected zone measured from the initial plane of the base metal is no greater than .060" (refer to Report No. 1 in Attachment II). A defect depth of .060" in the shell wall at the areas of TWA removal is below the minimum design value of .490". However, the effect would be localized and sufficient margin exists for the nominal DSC shell thickness of .500".

The minimum wall thickness for design pressure is only a fraction of the nominal thickness and an evaluation for localized wall thinning of .060" resulting in a minimum shell thickness of .440" demonstrates that DSC component stresses are maintained below ASME Code allowable design values, such that there is no adverse effect on the confinement boundary structure for design loading (refer to Attachment III for details). Similarly, a defect depth of .060" in the inner bottom cover at the areas of TWA removal is below the minimum design value of 1.69". However, the effect would be localized and significant margin exists for the nominal inner bottom cover thickness of 1.75". In fact, the 1/4" deep counterbore for the siphon pipe in the top surface of the inner bottom cover represents a local reduction in thickness which clearly bounds the assumed defect depth at the TWA removal areas. Such defects would not be expected to enlarge due to the toughness of the austenitic stainless steel base material. Notch effects are also not a concern due to the lack of any significant cyclic design loading.

3.3 Confinement Boundary Integrity

Regarding confinement boundary leak tight integrity, the TWA removal would have occurred prior to the ASME NB-6000 pressure test and helium leak test performed during fabrication. Therefore, the leak tight aspect of the confinement boundary is assured simply due to the sequence of fabrication and testing.

4. Conclusion

Based on the above evaluation, it is concluded the subject DSCs remain capable of performing their design function involving the structural integrity of the confinement boundary. Hence, suitable technical justification is provided for the requested Code alternative.

Matco Associates, Inc. – Metallurgical Reports

1. Matco Associates, Inc., Report of Dry Fuel Storage Canister Weld Evaluation, Project No. 907-50759, dated October 31, 2007 (12 pages). Report addresses specialized NDE performed at GE-Hitachi facility for temporary welded attachments to shells (distortion control tabs) and lab work performed at Matco for representative TWA coupons.

2. Matco Associates, Inc., Report of Dry Fuel Storage Canister Weld Evaluations at North Anna and Surry, Project No. 907-50759, dated October 31, 2007 (4 pages). Report addresses specialized NDE performed in field at Dominion North Anna and Surry Power Stations for temporary welded attachments to shells (distortion control tabs).

3. Matco Associates, Inc., Report of Dry Fuel Storage Canister Weld Evaluations, Project No. 907-50957, dated December 24, 2007 (5 pages). Report addresses specialized NDE performed at GE-Hitachi facility for temporary welded attachments to inner bottom covers (fixturing lugs).

Report of: **Dry Fuel Storage Canister Weld Evaluation**

Report to: **GE Energy**
30 Curry Avenue
Canonsburg, Pa. 15317

October 31, 2007

Attention: **Mr. Roy Milliren**

Summary

Three dry fuel storage canisters were evaluated to determine the location of assembly tack welds that were ground flush with the canister surface. Chemical analysis was performed on all identified weld beads to determine the weld filler metal alloy. A Ferrite Indicator (Severn Gage) was utilized to identify the weld locations, with a portable NITON XRF analyzer used to determine the weld bead chemical compositions. The chemical analysis results established that all tack welds were higher in alloy (chromium and nickel) than the Type 304 base metal, consistent with the use of Type 308 weld filler metal. Additionally, weld mockups reportedly fabricated by the same process as the subject tack welds were characterized to determine the maximum weld penetration and base metal heat affected zone (HAZ) depth. The maximum observed depth of affected base metal (weld penetration plus HAZ) was 51 mils from the plate outer surface.

Experimental Procedure

The tack weld locations were identified on the bottom 12 inches of surface from each canister using a Ferrite Indicator, as outlined in procedure 907-50759-01 (see Attachment 1). The elemental compositions of the weld beads were determined on all of the identified welds using a NITON (Model # XLT898HE) portable XRF analyzer. All analysis were performed at 20 kev accelerating voltage with a 15 second acquisition time. NIST traceable calibration standards for Type 304 (ID# AC622) and Type 309 (ID# L518) stainless steels were run before and after the test welds to verify calibration of the NITON analyzer.

Characterization of weld depths were performed on mockups fabricated to the tack weld procedure reportedly specified for the current application. Metallurgical sections were obtained from the approximate mid-length of each weld bead, as seen in Figure 1. Metallurgical specimens were evaluated in the etched condition using Image Pro image analysis software. Weld penetration measurements were referenced from a line drawn at the base plate surface from each end of the weld to simulate the ground canister surfaces.

Results

Tables 1, 2 and 3 show the weld composition results obtained from Canisters 5, 7 and 8, respectively. The analysis numbers are listed sequentially around the canister, with a spatial relationship to the primary canister locations (ie. 0°, 90°, 180°,and 270°). All weld areas coinciding with the expected tack weld locations exhibited elevated alloy (chromium and nickel) content as compared to the base plate composition, consistent with the use of Type 308 weld filler metal. Areas identified with the Ferrite Indicator that were located at the canister edge and midway between expected tack welds also showed the same or elevated alloy (chromium and nickel) content as compared to the base plate composition. All chemical analysis results were consistent with austenitic stainless steels of Types 304 or 308. The observed variation in alloy levels is attributed to dilution of the filler metal with the base metal during welding. Table 4 shows the NITON results obtained on Type 304 & 309 calibration standards and Type 308 test welds, substantiating that the weld analyses were accurate.

Figure 1 shows an overall view of the weld mockups used to determine the maximum depth of affected base metal, with Table 5 showing the maximum observed affected base metal depth to be approximately 51 mils. The total affected depth consists of the actual weld penetration combined with the depth of underlying HAZ associated with each weld. Figures 2 through 9 show the actual data obtained from each mockup that were used to determine the maximum affected depth.

Prepared by:

Joseph M. Turek
Manager,
Materials Engineering Group

Approved by:

Mehrooz Zamanzadeh, Ph.D., FASM
NACE Certified Materials Selection/
Design/Corrosion/Coatings/Cathodic
Protection Specialist

**IMPORTANT NOTICE: It is the policy of MATCO Associates that samples submitted as part of contracted investigations are the responsibility of MATCO for only one month after final reports on those samples have been issued. They may then be discarded or otherwise disposed of. If you would like samples returned or safeguarded for longer than one month, please make such arrangements with this office in writing (include shipping provider and account number). If the submitted samples are part of a claim or potential lawsuit it is the client's responsibility to make arrangements to have the samples returned. Any testing not performed in MATCO's facility has been performed by established laboratories used by MATCO Associates.*

Matco Associates, Inc.

	Canister 5								
	Analysis Number	**Ni**	**Fe**	**Cr**		**Analysis Number**	**Ni**	**Fe**	**Cr**
	5	9.17	69.1	19.21		38	8.51	70.33	18.2
	7	8.31	70.13	18.59	180° →	39	8.85	69.18	19.31
	6	8.59	70.01	18.55		40	9.5	68.85	19.16
	8	9.46	69.37	18.67		41	9.39	68.82	19.13
	9	9.28	69	19		42	9.33	68.74	18.98
	10	8.49	70.32	18.35		43	9.19	68.65	19.1
	12	9.13	68.95	19.08		45	8.9	69.02	18.78
	14	8.35	70.26	18.54		280 5-3	9.34	68.76	19.02
	283 5-4	8.52	69.95	18.35		285 5-6	9.31	68.98	18.92
	15	8.95	68.95	19.27		46	9.26	68.98	18.55
	284 5-5	9.38	68.96	19.11		47	9.43	68.97	18.77
	16	9.57	68.42	19.16	90° →	279 5-2*	8.23	70.52	18.01
270° →	17	9.1	68.98	18.82		278 5-1	9.55	68.89	18.91
	18	8.96	69.57	18.89		48	9.09	69.31	18.69
	19	9.3	68.63	19		49	9.64	69.09	18.57
	20	9.1	69.07	19.11		286 5-7	9.35	68.58	19.27
	21	9.41	68.43	19.13		50***	8.56	69.87	18.69
	22**	8.81	69.85	18.72		51	9.27	68.94	18.92
	23	9.14	69.24	19.17		52	9.52	68.74	18.96
	24	8.83	69.51	18.7		53***	8.71	69.91	18.63
	25***	8.66	69.55	18.65		54	9.32	68.52	19.26
	26	9.17	69.11	19.08		56	8.51	69.85	18.72
	27***	8.96	69.44	18.78		57**	9.33	68.48	19.17
	29	9.44	68.63	19.27		59**	8.11	70.54	18.29
	31	8.28	70.37	18.46		60	9.65	68.68	19
	32	9.2	69.58	18.75		61**	8.27	70.19	18.45
	33	9.38	69.04	19.16		62	9.29	69.21	18.83
	34	9.67	68.6	19.1	0° →	63	9.47	68.81	19.11
	35	9.25	68.86	19.06		288 5-8	9.19	69	18.95
	36	9.43	68.76	19.41		64	8.57	70.04	18.39

* Base metal composition
** Midway between top and bottom row
*** At bottom edge

Table 1 Primary alloy composition results for tack welds identified on Canister 5.

Canister 7

	Analysis Number	Ni	Fe	Cr		Analysis Number	Ni	Fe	Cr
	65	9.17	69.29	18.75		83	9.86	68.15	19.14
	66	9.08	68.97	19.25		84	8.62	69.75	18.61
	293 7-4	9.47	69.19	18.88		85	8.97	69.29	18.93
	294 7-5	9.32	68.82	19.12		86	9.21	69.18	18.89
	297 7-7	9.65	68.18	19.52		87	9.33	69.02	19.04
270°	296 7-6	9.53	68.87	19.03	90°	300 7-9	9.18	69.2	19.07
→	67	9.14	69.58	18.3		292 7-3	9.27	69.04	19.12
	68	9.57	68.63	19.1	→	290 7-1*	8.2	70.61	18.23
	69	9.27	69.26	18.72		291 7-2	9.54	68.52	19.24
	70	9.02	69.11	19.14		88	9.75	69.06	18.75
	71	9.24	68.72	19.08		95	9.76	68.78	19.23
	72	8.9	69.41	18.89		299 7-8	9.04	68.77	19.12
	73	8.98	69.57	18.8		89	9.55	68.76	19.3
	74	8.43	70.22	18.08		90	9.13	69.61	18.78
	75	8.97	69.31	18.77		91	8.59	69.92	18.66
	76	9.11	69	18.97		92	8.58	70.18	18.79
	77	9.3	69.07	18.86		93	9.23	69.32	18.89
	78	9.11	69.12	19.06	0°	94	8.68	69.93	18.65
	79	8.91	69.73	18.78	→	97	8.47	69.91	18.83
180°	80	9.19	69.22	18.88		98	9.31	69.47	18.68
→	81	8.98	69.15	19.04		99	8.98	69.57	19
	82	9.53	68.79	19.06		100	9.41	69.09	18.98
						101	9.38	69.03	18.97

* Base metal composition
** Midway between top and bottom row
*** At bottom edge

Table 2 Primary alloy composition results for tack welds identified on Canister 7.

Canister 8									
	Analysis Number	Ni	Fe	Cr		Analysis Number	Ni	Fe	Cr
	102	8.72	70.08	18.74	180°	129	9.37	68.38	19.29
	103	8.8	69.33	18.9	→	130	9.16	68.66	19.05
0°	104**	8.39	70.35	18.4		131	9.6	68.52	19.05
→	105	9.51	68.83	19.01		132	9.06	69.01	19.15
	106	8.95	69.9	18.7		133	9.35	68.5	19.06
	107	9.09	69.2	18.7		134	9.24	68.64	19.19
	108	8.73	69.48	19.03		135	9.15	69.34	18.57
	109	9.29	68.77	19.17		136	8.93	68.98	18.86
	110	9	69.28	19.02		137	9.19	69.3	18.94
	111	9.13	69.67	18.68		138	9.29	68.53	19.49
	112	8.99	69.53	18.69		139	8.96	69.71	18.64
	113	9.49	68.73	19.3		140	9.28	68.92	18.81
270°	115***	8.24	70.27	18.46	90°	141***	8.55	69.87	18.55
→	117	8.62	69.71	18.54	→	142	9.42	69.18	18.77
	118	8.59	70.29	18.27		143	9.58	68.74	19.02
	119	8.5	70.12	18.54		144	9.46	68.89	18.8
	120	9.28	69.14	19.04		145	9.32	68.76	19.28
	121	8.42	70.5	18.35		146	9.59	68.37	19.19
	122	9.48	68.78	19.02		147	9.48	68.62	19.25
	123	9.37	68.94	18.97		148	9.17	69.06	19.16
	124	9.11	69.3	18.74		149	9.27	68.89	19.04
	125	8.87	68.75	19.33		150	8.23	70.71	18.16
	126	9.58	68.94	18.95		151	8.67	69.6	18.84
	302 8-2*	8.13	70.97	18.25		152	9.39	69.15	18.82

* Base metal composition
** Midway between top and bottom row
*** At bottom edge

Table 3 Primary alloy composition results for tack welds identified on Canister 8.

	Specimen ID	Analysis Number	Ni	Fe	Cr
Type 308 Filler Metal	Test Weld	311	9.61	68.26	19.41
	Certified Composition	N/A	10.08	Bal	20.31
Certified Composition	304 STD	N/A	8.36	Bal	18.46
	309 STD	N/A	12.67	Bal	22.61
Before	304 STD	281	8.42	70.28	18.27
	309 STD	282	12.74	61.78	22.33
After	304 STD	153	8.06	70.59	18.15
	309 STD	154	12.75	61.72	22.41

Table 4 NITON analyzer calibration standard results (before and after tack weld analysis) along with test weld bead results and associated certified material compositions.

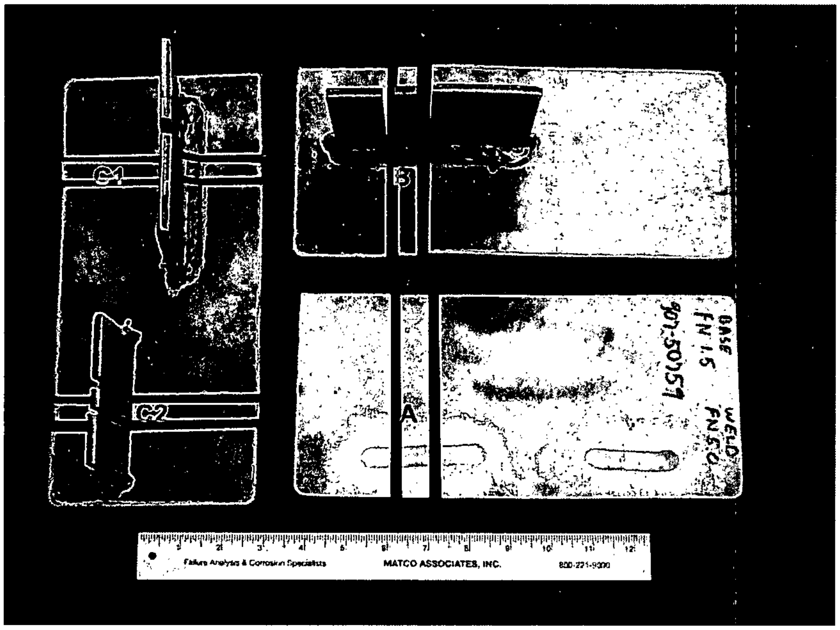
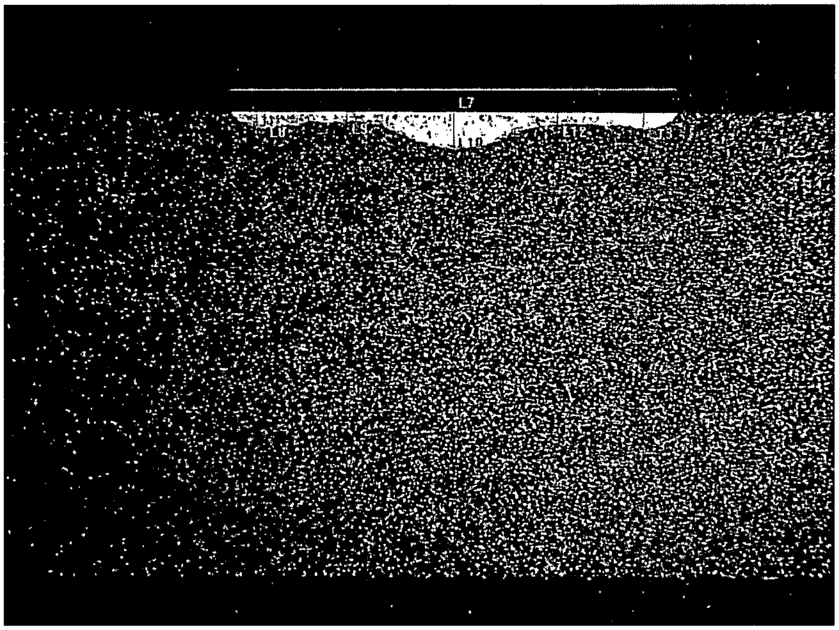


Figure 1 Overall view of the tack weld mockups showing metallurgical specimen locations.

	Specimen A	Specimen B	Specimen C1	Specimen C2
Weld Penetration (mils)	21	18	18	17
HAZ Depth (mils)	24.5	20.9	32.9	25.9
Total Affected Depth (mils)	45.5	38.9	**50.9**	42.9

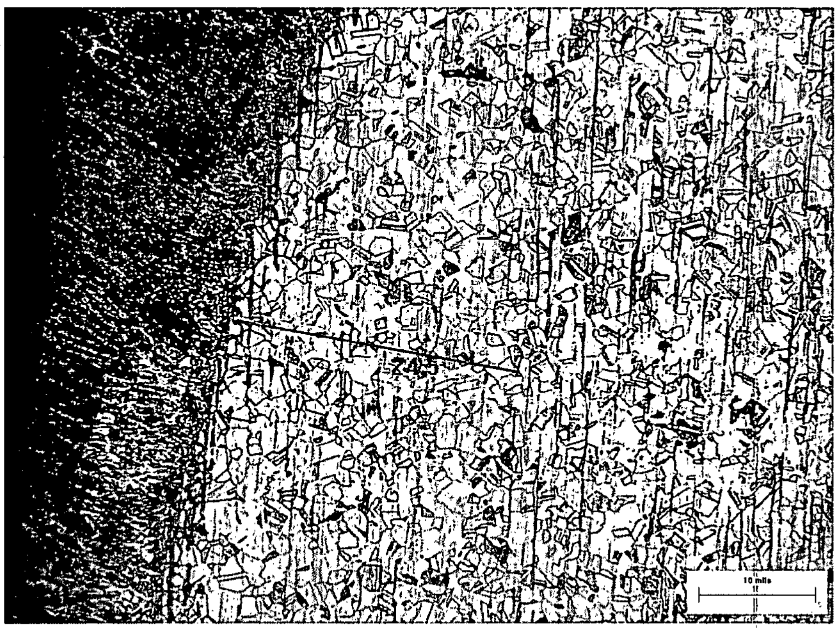
Table 5 Maximum observed affected base metal depth from tack weld mockups.



A Location	Weld Penetration Depth (inch)
L7	0.257
L8	0.009
L9	0.005
L10	**0.021**
L12	0.007
L13	0.008

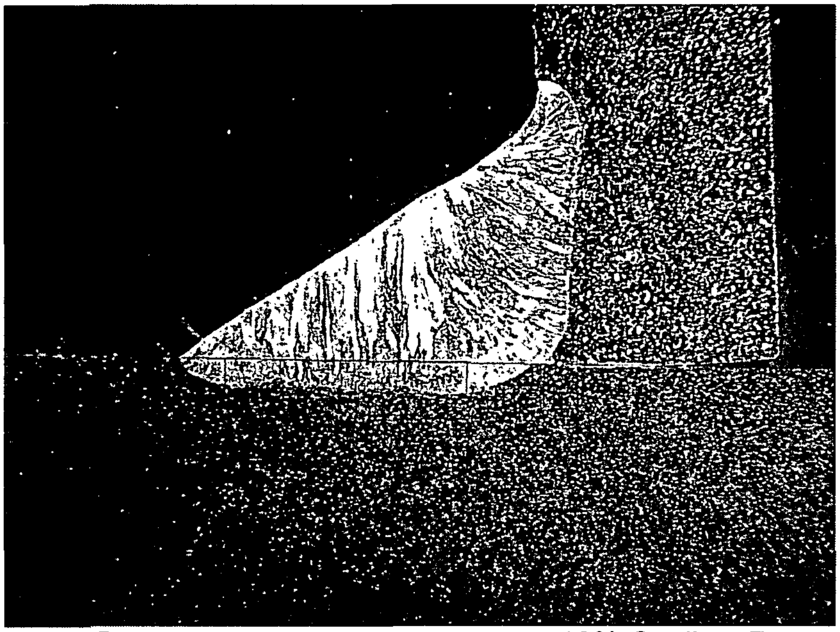
A 10% Oxalic 7x

Figure 2 Macro photograph of the etched cross section specimen A showing the weld penetration depth measurements.



A 10% Oxalic 50x

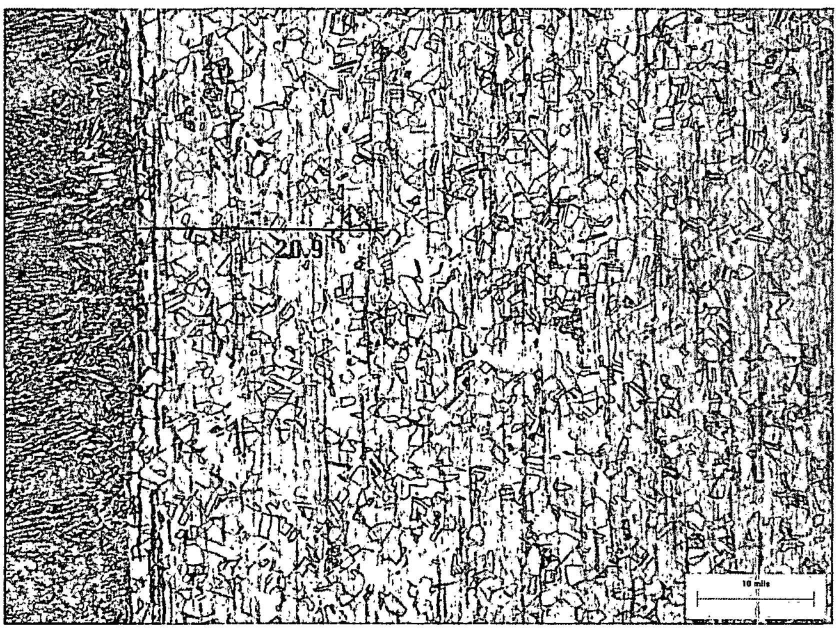
Figure 3 High magnification view of specimen A showing HAZ depth of 24.5 mils.



B Location	Weld Penetration Depth (inch)
L8	0.211
L9	0.014
L10	0.010
L11	0.015
L12	0.014
L13	**0.018**

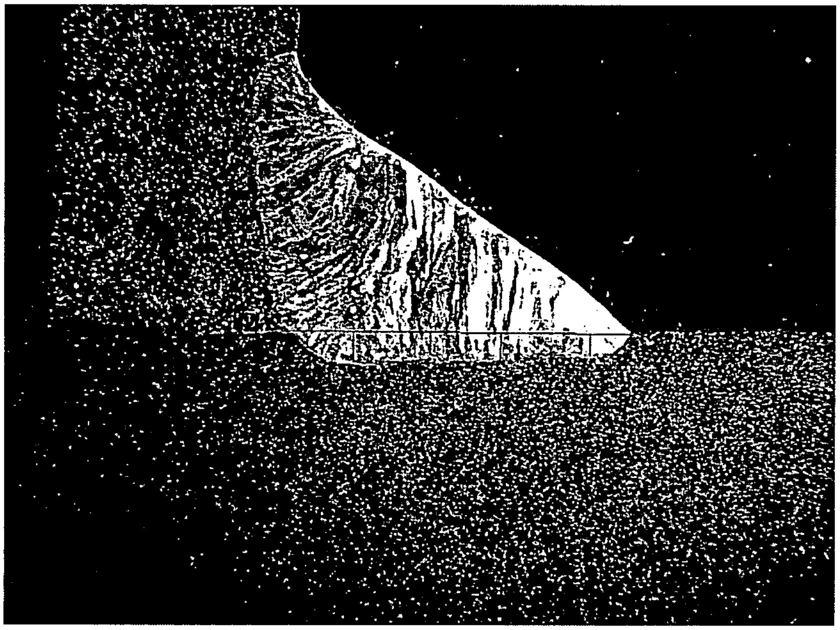
B 10% Oxalic 7x

Figure 4 Macro photograph of the etched cross section specimen B showing the weld penetration measurements, with a maximum depth of 18 mils.



B 10% Oxalic 50x

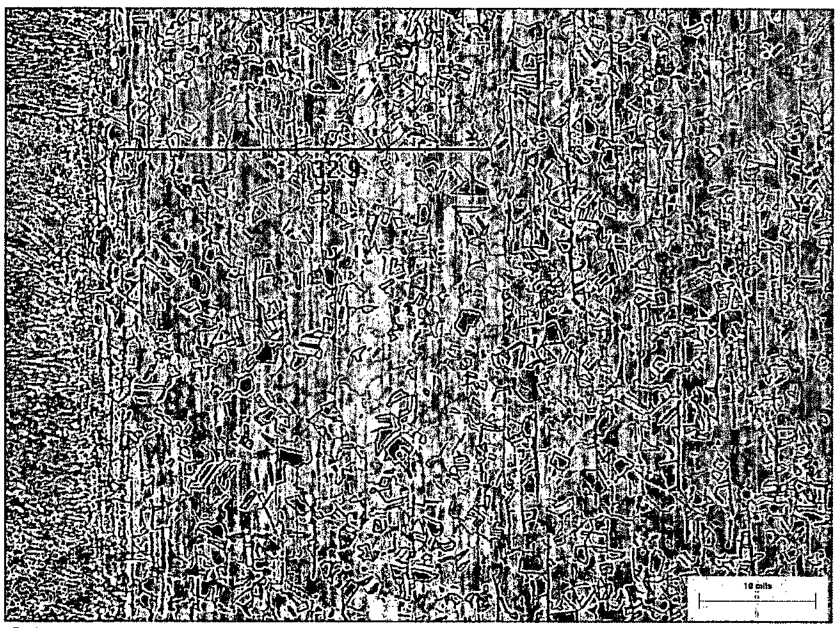
Figure 5 High magnification view of specimen B showing HAZ depth of 20.9 mils.



C1 10% Oxalic 7x

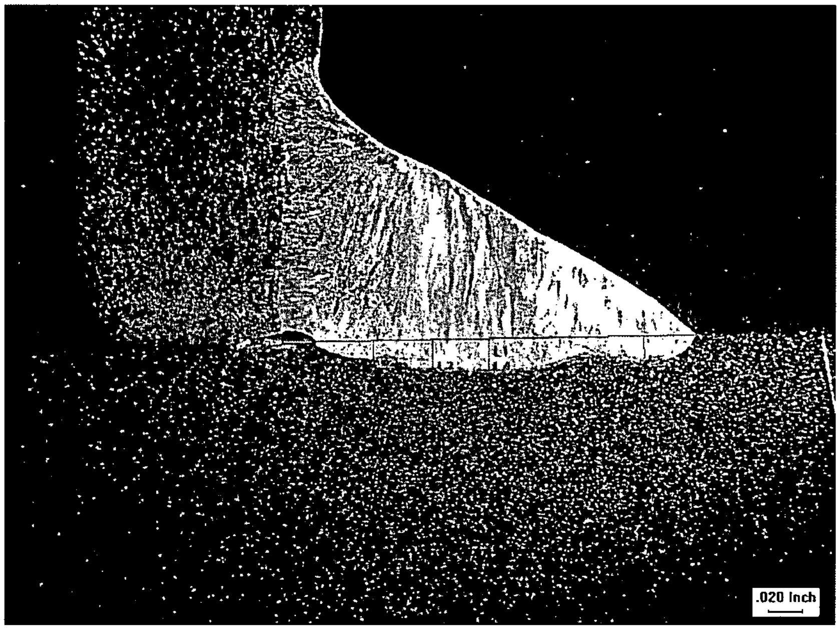
C1 Location	Weld Penetration Depth (inch)
L1	0.199
L2	**0.018**
L3	0.013
L4	0.016
L5	0.013

Figure 6 Macro photograph of the etched cross section specimen C1 showing the weld penetration measurements, with a maximum depth of 18 mils.



C1 10% Oxalic 50x

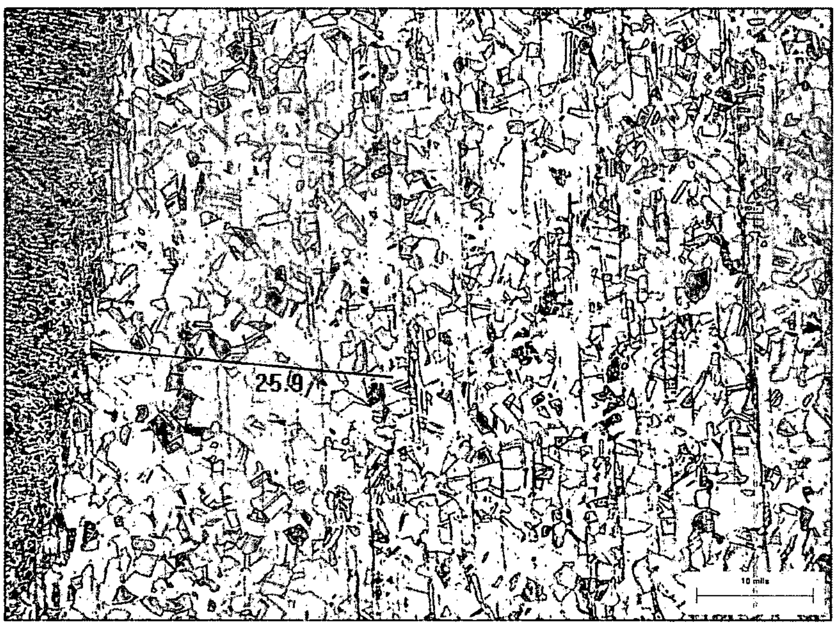
Figure 7 High magnification view of specimen C1 showing HAZ depth of 32.9 mils.



C2 10% Oxalic 7x

C2 Location	Weld Penetration Depth (inch)
L1	0.238
L2	0.011
L3	0.016
L4	**0.017**
L5	0.013

Figure 8 Macro photograph of the etched cross section specimen C2 showing the weld penetration measurements, with a maximum depth of 17 mils.



C2 50x

Figure 9 High magnification view of specimen C2 showing HAZ depth of 25.9 mils.

Matco Associates, Inc.

PROCEDURE FOR IDENTIFICATION OF WELD METAL IN AUSTENITIC STAINLESS STEELS

Scope

This procedure utilizes a ferrite indicator to determine the locations of weld metal by identifying the amount of the magnetic ferrite phase present in the non-magnetic austenite phase. Annealed wrought austenitic stainless steels typically contain up to 1.5 % ferrite, as compared to weld metal that can contain 10 % or more ferrite, depending on weld practice.

Qualification

This procedure was qualified on an annealed 304 SS plate with localized 308 SS filler metal welds that were surface ground flush with the plate surface. The measured base plate ferrite number (FN) was determined to be 1.5 and the FN in the weld bead was determined to be 5.0. The accuracy of the Ferrite Indicator is reportedly +/- 0.5 FN in the range of 0 to 3.5 FN, and was able to definitively identify all weld metal present. The weld bead locations were subsequently verified by macroetching with electrolytic 10% Oxalic Acid.

Equipment

Ferrite Indicator #7006, manufactured by Severn Engineering Co., Annapolis, MD.

Procedure

1. Determine the base metal FN at a location known to be void of weld metal.
2. Select a ferrite standard ½ FN greater than the highest measured base metal FN and verify no deflection in the base metal.
3. Scan suspect areas at approximately ¼ inch intervals in parallel lines approximately 1 inch apart.
4. Record any areas indicating a FN higher than base metal readings.
5. Perform close interval survey to determine the perimeter of high ferrite areas and identify location with High Purity Fine Line 33® permanent marker.

Prepared by:

Joseph M. Turek
Manager,
Materials Engineering Group

Approved by:

Mehrooz Zamanzadeh, Ph.D., FASM
NACE Certified Materials Selection/
Design/Corrosion/Coatings/Cathodic
Protection Specialist

4640 Campbells Run Road · Pittsburgh, PA 15205 · Tel: (412) 788-1263 · Fax: (412) 788-1283

Matco Associates, Inc.

Report of: **Dry Fuel Storage Canister Weld Evaluations at North Anna and Surry**

Report to: **GE Energy**
30 Curry Avenue
Canonsburg, Pa. 15317

October 31, 2007

Attention: **Mr. Roy Milliren**

Summary

Two dry fuel storage canisters were evaluated to determine the location of assembly tack welds that were ground flush with the canister surface. Chemical analysis was performed on all identified weld beads to determine the weld filler metal alloy. A Ferrite Indicator (Severn Gage) was utilized to identify the weld locations, with a portable NITON XRF analyzer used to determine the weld bead chemical compositions. The chemical analysis results established that all tack welds in both the North Anna and Surry canisters were higher in alloy (chromium and nickel) than the Type 304 base metal, consistent with the use of Type 308 weld filler metal.

Experimental Procedure

The tack weld locations were identified on the bottom 12 inches of circumferential surface from each canister using a Ferrite Indicator, as outlined in procedure 907-50759-01. The elemental composition was determined on all identified weld beads using a NITON portable XRF analyzer using qualified operators provided by North Anna and Surry. All analysis were performed at 20 kev accelerating voltage with an approximate 15 second acquisition time. NIST traceable calibration standards for Type 304 and Type 309 stainless steels were run before the subject welds to verify calibration of the NITON analyzer. A test weld representing certified Type 308 filler metal was also evaluated for comparison purposes.

Results

Tables 1 and 3 show the weld composition results obtained from the North Anna and Surry Canisters, respectively, with Tables 2 and 4 showing the certified compositions and NITON analysis results from the test weld and alloy standards. The NITON results obtained on the Type 304 & 309 calibration standards along with the Type 308 test weld verify the Niton results were accurate. The analysis numbers are listed sequentially around the canister, with a spatial relationship to the primary canister locations (ie. 0°, 90°, 180°,and 270°). All identified weld areas representing tack weld locations exhibited elevated alloy (chromium and nickel) content as compared to the base plate composition, consistent with the use of Type 308 weld filler metal. The observed

variation in alloy levels is attributed to dilution of the filler metal with the base metal during welding.

Prepared by:

Joseph M. Turek
Manager,
Materials Engineering Group

Approved by:

Mehrooz Zamanzadeh, Ph.D., FASM
NACE Certified Materials Selection/ Design/Corrosion/Coatings/Cathodic Protection Specialist

**IMPORTANT NOTICE: It is the policy of MATCO Associates that samples submitted as part of contracted investigations are the responsibility of MATCO for only one month after final reports on those samples have been issued. They may then be discarded or otherwise disposed of. If you would like samples returned or safeguarded for longer than one month, please make such arrangements with this office in writing (include shipping provider and account number). If the submitted samples are part of a claim or potential lawsuit it is the client's responsibility to make arrangements to have the samples returned. Any testing not performed in MATCO's facility has been performed by established laboratories used by MATCO Associates.*

Matco Associates, Inc.

North Anna Canister									
	Analysis Number	Ni	Fe	Cr		Analysis Number	Ni	Fe	Cr
0° →	5*	7.93	70.47	18.49	180° →	36	9.09	68.96	19.21
	8	8.89	69.82	18.72		35	8.92	68.85	19.08
	9	9.14	68.56	19.04		34	9.09	69.44	18.83
	10	9.27	68.41	19.06		33	9.07	69.44	18.71
	11	9.61	69	18.94		32	9.17	69.37	18.88
	12	8.97	68.84	19.04		31	9.4	69.06	18.87
	13	9.21	69.23	18.75		30	9.07	69.01	19.17
	14	9.28	69.08	18.97		29	9.13	69.2	19.2
	50	8.92	69.6	18.53		28	9.12	69.36	18.89
	49	8.52	69.6	18.73		27	9.22	68.95	18.99
	48	9.19	69.95	19.13	270° →	26	8.94	69.49	18.66
90° →	47	9.24	68.78	18.79		25	9.44	68.63	19.16
	46	9.31	68.95	19.01		24	9.33	69.09	19.02
	45	9.22	69.24	18.85		23	9.31	68.89	19.03
	44	9.01	69.37	18.8		22	9.41	68.54	18.99
	43	9.47	68.87	18.82		21	9.42	69.03	18.9
	42	9.2	68.78	19.2		20	8.4	70.04	18.93
	41	9.19	68.72	19.33		19	9.12	68.91	19.07
	40	8.71	69.45	18.67		18	9.08	69.51	18087
	39	9.37	68.72	19.4		17	9.41	69.2	19.11
	38	9.55	68.42	19.19		16	9.36	69.24	18.89
	37	9.38	68.91	19.15		15	9.19	68.75	19.11

* Base metal composition

Table 1 Alloy composition results for tack welds on North Anna Canister.

	Specimen ID	Analysis Number	Ni	Fe	Cr
Type 308 Filler Metal	Test Weld	3	9.34	67.64	19.57
	Certified Composition	N/A	10.08	Bal	20.31
Certified Composition	304 STD # 81F	N/A	8.67	Bal	18.35
	309 STD # 82D	N/A	14.11	Bal	22.39
Before	304 STD # 81F	1	8.52	70.02	18.37
	309 STD # 82D	2	14.38	60.51	22.37

Table 2 NITON analyzer calibration standard results (before tack weld analysis) along with test weld bead results and associated certified material standard compositions.

Surry Canister

Position	Analysis Number	Ni	Fe	Cr	Position	Analysis Number	Ni	Fe	Cr
0° →	5*	8.3	70.42	17.94	180° →	27	9.12	69.05	18.83
	6	8.86	69.32	18.86		28	9.36	68.27	19.12
	7	9.49	68.89	18.82		29	8.69	69.15	18.9
	8	9.59	69.1	18.58		30	8.95	68.92	18.8
	9	9.54	68.35	19.35		31	8.96	69.12	18.57
	10	9.07	69.19	18.6		32	9.12	68.8	18.78
	11	9.19	69.44	18.72		33	9.42	68.83	18.81
	12	8.87	69.23	18.53		34	9.5	68.6	19.08
	13	8.62	69.85	18.27		35	8.8	69.39	18.79
90° →	14	9.09	69.46	18.82	270° →	36	9.18	68.45	18.59
	15	8.62	69.4	18.8		37	9.03	68.05	19.15
	16	9.3	68.64	19.16		38	9.09	68.9	18.95
	17	9.17	68.59	18.8		39	9.29	68.9	18.39
	18	8.72	69.77	18.56		40	8.81	69.64	18.41
	19	9.51	68.64	19.08		41	9.13	68.81	19.09
	20	8.69	69.28	19.22		42	9.12	69.6	18.53
	21	9.12	69.41	18.35		43	8.65	69.53	18.81
	22	9.11	68.68	19.07		52	9.03	69.46	19.04
	23	8.93	68.72	19.57		45	9.3	68.6	19.17
	24	9.72	68.31	19.02		46	9.03	68.72	19.17
	25	8.9	68.63	19.2		47	8.84	69	18.84
	26	9.19	69.55	18.49		50	9.02	69.23	18.75
						51	9.09	69.3	18.68

* Base metal composition

Table 3 Alloy composition results for tack welds on Surry Canister.

	Specimen ID	Analysis Number	Ni	Fe	Cr
Type 308 Filler Metal	Test Weld	53	9.41	68.5	19.0
	Certified Composition	N/A	10.08	Bal	20.31
Certified Composition	304 STD # IARM-2A	N/A	8.21	Bal	18.41
	309 STD # IARM-3A	N/A	12.48	Bal	22.54
Before	304 STD # IARM-2A	2	8.3	71.2	18.2
	309 STD # IARM-3A	4	12.5	61.7	22.4

Table 4 NITON analyzer calibration standard results (before tack weld analysis) along with test weld bead results and associated certified material standard compositions.

Matco Associates, Inc.

Report of: **Dry Fuel Storage Canister Weld Evaluations**

Report to: **GE Energy**
30 Curry Avenue
Canonsburg, Pa. 15317

December 24, 2007

Attention: **Mr. Roy Milliren**

Summary

Five dry fuel storage canisters were evaluated to determine the location of assembly tack welds that were ground flush with the canister surface. Non-destructive chemical analysis was performed on all identified weld beads to determine the weld filler metal alloy. A Ferrite Indicator (Severn Gage) was utilized to identify the weld locations, with a portable NITON XRF analyzer used to determine the weld bead chemical compositions. The chemical analysis results established that all tack welds were higher in alloy (chromium and nickel) than the Type 304 base metal, consistent with the use of Type 308 weld filler metal.

Experimental Procedure

The tack weld locations were identified on the subject surfaces from each canister using a Ferrite Indicator, in accordance with procedure 907-50759-01. The elemental composition was determined on the base metal and all identified weld beads with a NITON portable XRF analyzer using qualified Matco operator. All analysis were performed at 20 keV accelerating voltage with a 15 second acquisition time. NIST traceable calibration standards for Type 304 and Type 309 stainless steels were run before and after the subject welds to verify calibration of the NITON analyzer.

Results

Tables 1-5 show the weld composition results obtained from canisters 2-11 through 2-15, respectively, with Table 6 showing the certified compositions and NITON analysis results on the alloy standards. The NITON results obtained on the Type 304 & 309 calibration standards verify the NITON results were accurate. The tack welds were found on the top face of the inner bottom plate of each canister at 4 discrete locations. With the exception of canister 2-11, 3 tack welds were identified at each location. Only 2 tack welds were identified at the Canister 2-11 locations. The analysis numbers are listed sequentially around the canister, with a spatial relationship to the primary canister locations (i.e. 0°, 90°, 180°, and 270° or 45°, 135°, 225°, and 315°). All identified weld areas representing tack weld locations exhibited elevated alloy (chromium and nickel) content as compared to the base plate composition, consistent with the use of Type 308

weld filler metal. The observed variation in alloy levels is attributed to dilution of the filler metal with the base metal during welding.

Prepared by:

Richard Scott
Materials Engineer
NACE Certified Corrosion Technician

Approved by:

Joseph M. Turek
Manager,
Materials Engineering Group

**IMPORTANT NOTICE: It is the policy of MATCO Associates that samples submitted as part of contracted investigations are the responsibility of MATCO for only one month after final reports on those samples have been issued. They may then be discarded or otherwise disposed of. If you would like samples returned or safeguarded for longer than one month, please make such arrangements with this office in writing (include shipping provider and account number). If the submitted samples are part of a claim or potential lawsuit it is the client's responsibility to make arrangements to have the samples returned. Any testing not performed in MATCO's facility has been performed by established laboratories used by MATCO Associates.*

Canister 2-11				
Location	**Analysis Number**	**Ni**	**Fe**	**Cr**
Base Metal	401	8.18	70.26	18.37
45°-1	418	8.64	69.28	18.84
45°-3	417	8.50	69.37	18.67
135°-1	402	9.10	68.64	19.29
135°-3	405	8.95	69.01	18.98
225°-1	420	8.68	69.79	18.50
225°-3	422	8.41	70.02	18.39
315°-1	416	8.38	69.99	18.49
315°-3	414	8.28	69.84	18.75

Table 1 Alloy composition results for tack welds on Canister 2-11.

Canister 2-12				
Location	**Analysis Number**	**Ni**	**Fe**	**Cr**
Base Metal	375	7.91	70.08	18.36
45°-1	378	8.45	69.41	19.01
45°-2	379	8.70	68.88	19.08
45°-3	380	8.38	69.67	18.70
135°-1	382	8.90	69.05	18.58
135°-2	383	8.66	69.41	18.64
135°-3	384	8.66	69.39	19.06
225°-1	387	8.91	68.95	18.65
225°-2	388	8.62	69.13	18.86
225°-3	395	8.49	69.61	18.41
315°-1	396	9.04	68.78	18.92
315°-2	397	8.67	69.05	18.60
315°-3	398	8.53	69.80	18.58

Table 2 Alloy composition results for tack welds on Canister 2-12.

Canister 2-13				
Location	**Analysis Number**	**Ni**	**Fe**	**Cr**
Base Metal	432	8.14	70.62	18.07
45°-1	449	8.53	69.66	18.54
45°-2	450	8.75	69.56	18.43
45°-3	451	8.41	70.12	18.36
135°-1	453	8.58	70.02	18.39
135°-2	454	8.49	69.24	18.64
135°-3	455	8.47	69.71	18.39
225°-1	436	8.65	69.94	18.21
225°-2	433	8.59	70.02	18.58
225°-3	439	8.76	69.40	18.74
315°-1	446	8.95	69.11	18.79
315°-2	441	9.19	68.98	18.66
315°-3	445	8.56	70.20	18.39

Table 3 Alloy composition results for tack welds on Canister 2-13.

Canister 2-14				
Location	**Analysis Number**	**Ni**	**Fe**	**Cr**
Base Metal	351	8.05	70.56	18.24
0°-1	368	8.62	69.16	18.97
0°-2	366	8.39	69.90	18.58
0°-3	364	8.67	69.34	18.82
90°-1	359	8.56	69.92	18.68
90°-2	360	8.61	69.25	18.71
90°-3	361	8.94	68.94	19.02
180°-1	357	8.71	69.62	18.35
180°-2	354	8.62	69.55	18.59
180°-3	356	8.39	70.34	18.41
270°-1	370	8.69	69.52	18.95
270°-2	374	8.25	70.27	18.34
270°-3	369	9.08	68.96	18.76

Table 4 Alloy composition results for tack welds on Canister 2-14.

Canister 2-15				
Location	Analysis Number	Ni	Fe	Cr
Base Metal	316	8.07	70.70	18.12
45°-1	319	8.99	69.03	18.74
45°-2	322	9.11	68.89	18.90
45°-3	317	8.77	68.99	18.93
135°-1	347	9.08	68.58	18.99
135°-2	348	8.70	69.02	18.77
135°-3	345	8.92	68.78	19.03
225°-1	337	8.90	69.02	18.96
225°-2	335	8.68	69.56	18.60
225°-3	334	8.79	68.85	19.05
315°-1	328	8.62	69.43	18.61
315°-2	349	8.32	70.02	18.61
315°-3	324	8.61	69.91	18.68

Table 5 Alloy composition results for tack welds on Canister 2-15.

	Specimen ID	Analysis Number	Ni	Fe	Cr
Certified Composition	304 STD # AC622	N/A	8.37	Bal	18.46
	309 STD # HT L518	N/A	12.67	Bal	22.61
After	304 STD # AC622	456	8.32	70.14	18.35
	309 STD # HT L518	457	12.66	62.01	22.47

Table 6 NITON analyzer calibration standard results (after tack weld analysis) and associated certified material standard compositions.

Affidavit Pursuant to 10 CFR 2.390
(2 pages)

AFFIDAVIT PURSUANT TO 10 CFR 2.390

Transnuclear, Inc.)
State of Maryland) SS.
County of Howard)

I, Tara Neider, depose and say that I am the President of Transnuclear, Inc., duly authorized to make this affidavit, and have reviewed or caused to have reviewed the information which is identified as proprietary and referenced in the paragraph immediately below. I am submitting this affidavit in conformance with the provisions of 10 CFR 2.390 of the Commission's regulations for withholding this information.

The information for which proprietary treatment is sought is contained in Attachment III and is listed below:

1. Transnuclear, Inc. calculation 10494-162, "Effect of Reduced Shell Thickness on the Stresses for the NUHOMS® 32PTH DSC," Revision 0

This document has been appropriately designated as proprietary.

I have personal knowledge of the criteria and procedures utilized by Transnuclear, Inc. in designating information as a trade secret, privileged or as confidential commercial or financial information.

Pursuant to the provisions of paragraph (b) (4) of Section 2.390 of the Commission's regulations, the following is furnished for consideration by the Commission in determining whether the information sought to be withheld from public disclosure, included in the above referenced document, should be withheld.

1) The information sought to be withheld from public disclosure involves the details of the structural analysis of the NUHOMS® 32PTH DSC with reduced shell thickness, which are owned and have been held in confidence by Transnuclear, Inc.

2) The information is of a type customarily held in confidence by Transnuclear, Inc. and not customarily disclosed to the public. Transnuclear, Inc. has a rational basis for determining the types of information customarily held in confidence by it.

3) The information is being transmitted to the Commission in confidence under the provisions of 10 CFR 2.390 with the understanding that it is to be received in confidence by the Commission.

4) The information, to the best of my knowledge and belief, is not available in public sources, and any disclosure to third parties has been made pursuant to regulatory provisions or proprietary agreements which provide for maintenance of the information in confidence.

5) Public disclosure of the information is likely to cause substantial harm to the competitive position of Transnuclear, Inc. because:

a) A similar product is manufactured and sold by competitors of Transnuclear, Inc.

b) Development of this information by Transnuclear, Inc. required expenditure of considerable resources. To the best of my knowledge and belief, a competitor would have to undergo similar expense in generating equivalent information.

c) In order to acquire such information, a competitor would also require considerable time and inconvenience related to the development of a design and analysis of a dry spent fuel storage system.

d) The information required significant effort and expense to obtain the licensing approvals necessary for application of the information. Avoidance of this expense would decrease a competitor's cost in applying the information and marketing the product to which the information is applicable.

e) The information consists of descriptions of the design and analysis of dry spent fuel storage systems, the application of which provide a competitive economic advantage. The availability of such information to competitors would enable them to modify their product to better compete with Transnuclear, Inc., take marketing or other actions to improve their product's position or impair the position of Transnuclear, Inc.'s product, and avoid developing similar data and analyses in support of their processes, methods or apparatus.

f) In pricing Transnuclear, Inc.'s products and services, significant research, development, engineering, analytical, licensing, quality assurance and other costs and expenses must be included. The ability of Transnuclear, Inc.'s competitors to utilize such information without similar expenditure of resources may enable them to sell at prices reflecting significantly lower costs.

Further the deponent sayeth not.

Tara Neider
President, Transnuclear, Inc.

Subscribed and sworn to me before this 27th day of December, 2007.

Notary Public

My Commission Expires 06/01/2011