



FRAMATOME
TECHNOLOGIES

June 19, 1997
INS-97-2450

Integrated Nuclear Services

Mr. Barry J. Elliot, Senior Materials Engineer
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Re: Docket No. 99901300

Dear Mr. Elliot:

In accordance with your request at the exit meeting for the NRC Inspection of Cu/Ni composition of ASA copper-bearing Linde 80 weld metals, held at our facilities on May 21, 1997, we are providing the available data for the non-copper-coated weld wire heats used with Linde 80 flux. In addition, as agreed to in the exit meeting, FTI will notify the owners of the information provided to you and of the assessment results using the additional chemistry data by June 30, 1997.

This information, in addition to the information provided to you with my June 6, 1997 letter (Re: Docket No. 99901300), fulfills FTI's agreement to provide the information requested by the staff during the Exit Meeting.

Very truly yours,

Matthew J. DeVan

cc: w/o enclosure:
K. E. Moore, OF50
R. L. Pawlings, OF55
J. H. Taylor, OF56
D. L. Howell, OF57
L. B. Gross, OF50
S. Fyitch, OF50

020048

IDGR-13 vendor
Inspection

(99901300)

IE-209
||

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**Copper and Nickel Content Best-Estimate Values (Total Population Including All Credible Data)
for Low Copper Weld Wires Fabricated With Linde 80 Flux**

Weld Wire Heat Number	No. of Observ. Cu / Ni					Best-Estimate Evaluation
		Cu		Ni		
		x	σ	x	σ	
Low Copper Weld Wires						
442002	79 / 81	0.029	0.019	0.680	0.053	Best-estimate copper and nickel contents obtained from mean of available data.
442011	65 / 65	0.033	0.003	0.688	0.039	Best-estimate copper and nickel contents obtained from mean of available data.
H4498	2 / 2	0.042	0.012	0.460	0.057	Best-estimate copper and nickel contents obtained from mean of available data.
31401	5 / 5	0.193	0.024	0.576	0.060	Best-estimate copper and nickel contents obtained from mean of available data.
1084-18	1 / 1	0.038	-----	0.600	-----	Best-estimate copper and nickel contents obtained from mean of available data.

Coil-to-Coil Weighted Average

Weld Wire Heat Number	Weld Number	Flux Lot No.	Source of Weldment	No. of Observ.	Cu wt% Mean	No. of Coils (Weight)	Cu*Wt	Weighted Mean Cu
442002	WF-336	8873	WQ BY1 - RVSP Rnd Robin	4	0.027	1	0.027	0.059
				21	0.022	1	0.022	
				19	0.031	1	0.031	
	WF-407	8938	WQ	2	0.049	1	0.049	
	WF-421	8968	WQ	1	0.114	1	0.114	
	WF-446	8064	WQ	1	0.148	1	0.148	
	WF-447	8064	WQ BY2 - RVSP	2	0.056	1	0.056	
				31	0.023	1	0.023	
					Sum	8	0.470	
442011	WF-501	8086	WQ	1	0.028	1	0.028	0.032
	WF-562	8061	WQ BR1 - RVSP BR2 - RVSP	2	0.035	1	0.035	
				30	0.033	1	0.033	
				32	0.033	1	0.033	
					Sum	4	0.128	
H4498	WF-610	0852	WQ	1	0.050	1	0.050	0.042
	WF-645	0261	WQ	1	0.033	1	0.033	
					Sum	2	0.083	
31401	WF-389	8968	WQ	1	0.166	1	0.166	0.193
	WF-449	8064	WQ	1	0.200	1	0.200	
	WF-472	8086	WQ	1	0.230	1	0.230	
	WF-614	0852	WQ	1	0.180	1	0.180	
	WF-653	0261	WQ	1	0.190	1	0.190	
					Sum	5	0.966	
1084-18	WF-696	0261	WQ	1	0.038	1	0.038	0.038

Mean and Standard Deviation of Weld Wire Sources

Weld Wire Heat Number	Weld Number	Flux Lot No.	Source of Weldment	No. of Observ.	Source Mean		Source Std. Dev.			Mean of Means	
					Cu	Ni	Cu	Ni		Cu	Ni
442002	WF-336	8873	WQ	4	0.027	0.628	0.004	0.114		0.059	0.631
			BY1 - RVSP	21	0.022	0.690	0.002	0.023			
			Rnd Robin	19 / 21	0.031	0.658	0.010	0.036			
	WF-407	8968	WQ	2	0.049	0.600	0.027	0.170			
	WF-421	8968	WQ	1	0.114	0.540	-----	-----			
	WF-446	8064	WQ	1	0.148	0.600	-----	-----			
	WF-447	8064	WQ	2	0.056	0.620	0.004	0.000			
			BY2 - RVSP	31	0.023	0.712	0.002	0.028			
442011	WF-501	8086	WQ	1	0.028	0.630	-----	-----		0.032	0.667
	WF-562	8061	WQ	2	0.035	0.660	0.007	0.014			
			BR1 - RVSP	30	0.033	0.671	0.003	0.029			
			BR2 - RVSP	32	0.033	0.708	0.003	0.038			
H4498	WF-610	0852	WQ	1	0.050	0.420	-----	-----		0.042	0.460
	WF-645	0261	WQ	1	0.033	0.500	-----	-----			
31401	WF-389	8968	WQ	1	0.166	0.530	-----	-----		0.193	0.576
	WF-449	8064	WQ	1	0.200	0.680	-----	-----			
	WF-472	8086	WQ	1	0.230	0.570	-----	-----			
	WF-614	0852	WQ	1	0.180	0.540	-----	-----			
	WF-653	0261	WQ	1	0.190	0.560	-----	-----			
1084-18	WF-696	0261	WQ	1	0.038	0.600	-----	-----		0.038	0.600

Data Point	Loc.	Plant Source	Weld ID	Flux Lot	Source	Source Reference	Cu	Ni	Source Mean		Source Std. Dev.		Notes
									Cu	NI	Cu	NI	
1	---	----	WF-336	8873	Weld Qualification	Mt. Vernon WQ - Lab No. 13762	0.031	0.460					
1	---	----	WF-336	8873	Weld Qualification	Mt. Vernon WQ - Lab No. 13762	0.024	0.700					Revised WQ
1	---	----	WF-336	8873	Weld Qualification	Sample	0.029	0.650	0.027	0.675	0.004	0.035	
2	---	----	WF-336	8873	Weld Qualification	Sample	0.024	0.700					
1	---	----	WF-407	8968	Weld Qualification	Mt. Vernon WQ - Lab No. 16115	0.068	0.480					
1	---	----	WF-407	8968	Weld Qualification	Mt. Vernon WQ - Lab No. 24923	0.030	0.720					Revised WQ
1	---	----	WF-421	8968	Weld Qualification	Mt. Vernon WQ - Lab No. 16348	0.114	0.540					
1	---	----	WF-446	8064	Weld Qualification	Mt. Vernon WQ - Lab No. 17543	0.148	0.600					
1	---	----	WF-447	8064	Weld Qualification	Mt. Vernon WQ - Lab No. 17544	0.059	0.620					
1	---	----	WF-447	8064	Weld Qualification	Mt. Vernon WQ - Lab No. 20369	0.053	0.620					Revised WQ
1	---	BY1	WF-336	8873	Surv. Weld Block	RVSP Baseline Chemistry	0.026	0.710					Reference: WCAP-9517
1a	---	BY1	WF-336	8873	Surv. Weld Block	CVN Specimen ID - AW-1	0.023	0.670	0.021	0.689	0.001	0.025	Reference: WCAP-11651
1b	---	BY1	WF-336	8873	Surv. Weld Block	CVN Specimen ID - AW-1	0.021	0.714					
2	---	TMI1	WF-25	8650	Surv. Weld Block	CVN Specimen ID - AW-2	0.021	0.741					
3	---	TMI1	WF-25	8650	Surv. Weld Block	CVN Specimen ID - AW-3	0.022	0.713					
4	---	TMI1	WF-25	8650	Surv. Weld Block	CVN Specimen ID - AW-4	0.021	0.714					
5	---	TMI1	WF-25	8650	Surv. Weld Block	CVN Specimen ID - AW-5	0.020	0.704					
6	---	BY1	WF-336	8873	Surv. Weld Block	CVN Specimen ID - AW-6	0.020	0.694					

Data Point	Loc.	Plant Source	Weld ID	Flux Lot	Source	Source Reference	Cu	Ni	Source Mean		Source Std. Dev.		Notes
									Cu	NI	Cu	Ni	
7	---	BY1	WF-336	8873	Surv. Weld Block	CVN Specimen ID - AW-7	0.020	0.706					
8	---	BY1	WF-336	8873	Surv. Weld Block	CVN Specimen ID - AW-8	0.021	0.677					
9a	---	BY1	WF-336	8873	Surv. Weld Block	CVN Specimen ID - AW-9	0.022	0.665					
9b	---	BY1	WF-336	8873	Surv. Weld Block	CVN Specimen ID - AW-9	0.023	0.677					
10	---	BY1	WF-336	8873	Surv. Weld Block	CVN Specimen ID - AW-10	0.021	0.680					
11	---	BY1	WF-336	8873	Surv. Weld Block	CVN Specimen ID - AW-11	0.021	0.680					
12	---	BY1	WF-336	8873	Surv. Weld Block	CVN Specimen ID - AW-12	0.021	0.667					
13	---	BY1	WF-336	8873	Surv. Weld Block	CVN Specimen ID - AW-13	0.024	0.677					
14	---	BY1	WF-336	8873	Surv. Weld Block	CVN Specimen ID - AW-14	0.022	0.697					
15	---	BY1	WF-336	8873	Surv. Weld Block	CVN Specimen ID - AW-15	0.021	0.634					
1	---	BY1	WF-336	8873	Surv. Weld Block	CVN Specimen ID - AW-48	0.024	0.682	0.024	0.683	0.002	0.015	Reference: WCAP- 13860
2	---	BY1	WF-336	8873	Surv. Weld Block	CVN Specimen ID - AW-50	0.022	0.678					
3	---	BY1	WF-336	8873	Surv. Weld Block	CVN Specimen ID - AW-57	0.025	0.705					
1	---	BY2	WF-447	8064	Surv. Weld Block	RVSP Baseline Chemistry	0.030	0.850					Reference: WCAP-10398
1	---	BY2	WF-447	8064	Surv. Weld Block	CVN Specimen ID - YW-1	0.022	0.704	0.021	0.718	0.002	0.036	Reference: WCAP-12431
2	---	BY2	WF-447	8064	Surv. Weld Block	CVN Specimen ID - YW-2	0.020	0.681					
3	---	BY2	WF-447	8064	Surv. Weld Block	CVN Specimen ID - YW-3	0.021	0.706					

Data Point	Loc.	Plant Source	Weld ID	Flux Lot	Source	Source Reference	Cu	Ni	Source Mean		Source Std. Dev.		Notes
									Cu	Ni	Cu	Ni	
4	---	BY2	WF-447	8064	Surv. Weld Block	CVN Specimen ID - YW-4	0.020	0.697					
5	---	BY2	WF-447	8064	Surv. Weld Block	CVN Specimen ID - YW-5	0.019	0.668					
6	---	BY2	WF-447	8064	Surv. Weld Block	CVN Specimen ID - YW-6	0.024	0.740					
7	---	BY2	WF-447	8064	Surv. Weld Block	CVN Specimen ID - YW-7	0.022	0.759					
8	---	BY2	WF-447	8064	Surv. Weld Block	CVN Specimen ID - YW-8	0.021	0.714					
9	---	BY2	WF-447	8064	Surv. Weld Block	CVN Specimen ID - YW-9	0.020	0.678					
10	---	BY2	WF-447	8064	Surv. Weld Block	CVN Specimen ID - YW-10	0.020	0.695					
11	---	BY2	WF-447	8064	Surv. Weld Block	CVN Specimen ID - YW-11	0.019	0.689					
12	---	BY2	WF-447	8064	Surv. Weld Block	CVN Specimen ID - YW-12	0.021	0.744					
13	---	BY2	WF-447	8064	Surv. Weld Block	CVN Specimen ID - YW-13	0.022	0.738					
14	---	BY2	WF-447	8064	Surv. Weld Block	CVN Specimen ID - YW-14	0.022	0.771					
15	---	BY2	WF-447	8064	Surv. Weld Block	CVN Specimen ID - YW-15	0.024	0.785					
1	---	BY2	WF-447	8064	Surv. Weld Block	CVN Specimen ID - YW-31	0.024	0.705	0.024	0.709	0.001	0.007	Reference: WCAP-14064
2	---	BY2	WF-447	8064	Surv. Weld Block	CVN Specimen ID - YW-32	0.023	0.706					
3	---	BY2	WF-447	8064	Surv. Weld Block	CVN Specimen ID - YW-33	0.023	0.698					
4	---	BY2	WF-447	8064	Surv. Weld Block	CVN Specimen ID - YW-34	0.024	0.696					
5	---	BY2	WF-447	8064	Surv. Weld Block	CVN Specimen ID - YW-35	0.023	0.711					

Data Point	Loc.	Plant Source	Weld ID	Flux Lot	Source	Source Reference	Cu	Ni	Source Mean		Source Std. Dev.		Notes
									Cu	Ni	Cu	Ni	
6	---	BY2	WF-447	8064	Surv. Weld Block	CVN Specimen ID - YW-36	0.024	0.708					
7	---	BY2	WF-447	8064	Surv. Weld Block	CVN Specimen ID - YW-37	0.024	0.716					
8	---	BY2	WF-447	8064	Surv. Weld Block	CVN Specimen ID - YW-38	0.024	0.715					
9	---	BY2	WF-447	8064	Surv. Weld Block	CVN Specimen ID - YW-39	0.024	0.707					
10	---	BY2	WF-447	8064	Surv. Weld Block	CVN Specimen ID - YW-40	0.024	0.720					
11	---	BY2	WF-447	8064	Surv. Weld Block	CVN Specimen ID - YW-41	0.024	0.717					
12	---	BY2	WF-447	8064	Surv. Weld Block	CVN Specimen ID - YW-42	0.024	0.711					
13	---	BY2	WF-447	8064	Surv. Weld Block	CVN Specimen ID - YW-43	0.024	0.706					
14	---	BY2	WF-447	8064	Surv. Weld Block	CVN Specimen ID - YW-44	0.024	0.707					
15	---	BY2	WF-447	8064	Surv. Weld Block	CVN Specimen ID - YW-45	0.025	0.717					
1	Top	----	WF-336	8873	----	Round Robin Sample Mt. Vernon analysis - Lab No. 28770	0.026	0.680	0.029	0.678	0.004	0.013	
2	Top	----	WF-336	8873	----	Round Robin Sample Mt. Vernon analysis	0.031	0.660					
3	Btm	----	WF-336	8873	----	Round Robin Sample Mt. Vernon analysis - Lab No. 28771	0.026	0.690					
4	Btm	----	WF-336	8873	----	Round Robin Sample Mt. Vernon analysis	0.033	0.680					
1	Top	----	WF-336	8873	----	Round Robin Sample Barberton analysis	0.030	0.660	0.030	0.655	0.001	0.007	
2	Btm	----	WF-336	8873	----	Round Robin Sample Barberton analysis	0.029	0.650					

Data Point	Loc.	Plant Source	Weld ID	Flux Lot	Source	Source Reference	Cu	Ni	Source Mean		Source Std. Dev.		Notes
									Cu	NI	Cu	Ni	
1	Top	-----	WF-336	8873	-----	Round Robin Sample LRC analysis	0.020	0.620	0.030	0.645	0.014	0.035	
2	Btm	-----	WF-336	8873	-----	Round Robin Sample LRC analysis	0.040	0.670					
1	---	-----	WF-336	8873	-----	Round Robin Sample LRC analysis	0.026	0.590	0.027	0.585	0.000	0.010	
2	---	-----	WF-336	8873	-----	Round Robin Sample LRC analysis	0.027	0.573					
3	---	-----	WF-336	8873	-----	Round Robin Sample LRC analysis	0.027	0.591					
1	Top	-----	WF-336	8873	-----	Round Robin Sample LRC analysis	0.030	0.700	0.030	0.705	0.000	0.007	
2	Btm	-----	WF-336	8873	-----	Round Robin Sample LRC analysis	0.030	0.710					
1	---	-----	WF-336	8873	-----	Round Robin Sample J&L Steel Co analysis	0.036	0.668					
1	---	-----	WF-336	8873	-----	Round Robin Sample ORNL analysis	0.070	0.640	0.070	0.657	-----	0.015	
2	Top	-----	WF-336	8873	-----	Round Robin Sample Y-12 analysis	<0.10	0.670					
3	Btm	-----	WF-336	8873	-----	Round Robin Sample Y-12 analysis	<0.10	0.660					
1	---	-----	WF-336	8873	-----	Round Robin Sample NBS analysis-WF336	0.028	0.673	0.028	0.674	0.001	0.005	Cu & Ni mean of 4 analyses
2	---	-----	WF-336	8873	-----	NBS analysis - WF336	0.029	0.667					Cu & Ni mean of 4 analyses
3	---	-----	WF-336	8873	-----	Round Robin Sample NBS analysis-WF336	0.028	0.677					Cu & Ni mean of 4 analyses
4	---	-----	WF-336	8873	-----	Round Robin Sample NBS analysis-WF336	0.028	0.679					Cu & Ni mean of 4 analyses

THE BARCOCK & WILCOX COMPANY
POWER GENERATION GROUP
MT. VERNON, INDIANA

ORD OF FILLER WIRE QUALIFICATION TEST

TEST NO. WF 336

DIAMETER	WIRE IDENTIFICATION	FILLER WIRE IDENTIFICATION	CORE WIRE HEAT NO.
5/32"	12-2-WQI-32 AUTO SUB ARC	LINDE MnMoNi (LOW Cu&P) LINDE GR. 80 LOT 8873	442002
VOLTS 33	TRAVEL SPEED (IPM) 12	TYPE OF CURRENT 450-500-600	PURCHASE ORDER NO. 642040AK

CHEMICAL ANALYSIS

LAB NO.	PAD	C.	CR.	NI	MN	SI	P	S	MO	CU	V	CO	AL
13762		120	.09	.46	1.20	.32	.004	.016	.30	.031	.031		*
* A REVISED CERTIFICATE INCLUDING AN ALUMINUM ANALYSIS WILL BE DISTRIBUTED SHORTLY.													

DROP WEIGHTS

HEAT TREATMENT	TEST NO.	TEMP. (°F.)	RESULTS	INDT
1100-1150°F. FOR 50 HRS.	WF 336	-30°F	F	-30°F
FURNACE COOLED TO 600°F AT 10°F/HR.	CENTER	-20°F	NF,NF	

TENSILE PROPERTIES

TEST NO.	HEAT TREATMENT	ULTIMATE STR. PSI	YIELD PT. PSI	% ELONG.	% RED. OF AREA
336	(ABOVE)	80,500	63,000	27.5	63.0

CHARPY V-NOTCH IMPACT TEST 240FT./LB. ENERGY LOAD

HEAT TREATMENT	TEST NO.	FT./LBS.	LAT. EXP.	% SHEAR	TEST NO.	FT./LBS.	LAT. EXP.	% SHEAR
(ABOVE)	WF336	54	.043	75	WF336	67	.049	95
	SURFACE	49	.042	70	CENTER	71	.053	90
	+10°F	49	.043	60	+30°F	51	.044	60
RT								
NDT is -30°F	WF336	72	.064	100	WF336	59	.053	80
	CENTER	79	.076	100	CENTER	59	.051	80
	+200°F	81	.075	100	+10°F	60	.054	85

GUIDED BEND TESTS

FACE	ROOT	SIDE

MICRO OR MACRO
FINISH ANALYSIS

MATERIAL APPROVAL

APPROVED	REJECTED
X	

GROOVE WELD TEST

RADIOGRAPHIC EXAMINATION

H. H. KING

JUL 31 1973

WE HEREBY CERTIFY THAT THE ABOVE MATERIAL HAS BEEN
TESTED IN ACCORDANCE WITH THE ABOVE LISTED SPECIFICA-
TION AND IS IN CONFORMANCE WITH ALL REQUIREMENTS.

WIRE FOLIO NO. 464-221
FLUX FOLIO NO. 559-063
WORKS MT. VERNON
CONTRACT NO.

DATE JULY 31, 1973

SIGNED

INSPECTION AGENCY

INSPECTOR

J. TOON

01 1973

WORD OF FILLER WIRE QUALIFICATION TEST

TEST NO. WF 336

DIAMETER	ELCOSPOTTING/RECALIBRATION	FILLER WIRE IDENTIFICATION	CORE WIRE HEAT NO.
5/32"	12-2-WQI-32	LINDE MnMoNi (LOW Cu&P)	
	AUTO SUB ARC	LINDE GR.80 LOT 8873	442002
VOLTS:	TRAVEL SPEED (IPM)	TYPE OF CURRENT	PURCHASE ORDER NO.
33	12	450-500-600	642040AK

CHEMICAL ANALYSIS

LAB NO.	PAD	C.	CR.	NI.	MN.	SI.	P.	S.	MO.	CU.	V.	CO.	AL.	
13762		120	09	46	1.20	32	.004	.016	.30	.031	.031		.024	

DROP WEIGHTS

HEAT TREATMENT	TEST NO.	TEMP. (°F.)	RESULTS	TNDT
1100-1150°F. FOR 50 HRS.	WF 336	-30°F	F	-30°F
FURNACE COOLED TO 600°F	CENTER	-20°F	NF,NF	
AT 10°F/HR.				

TENSILE PROPERTIES

TEST NO.	HEAT TREATMENT	ULTIMATE STR. PSI	YIELD PT. PSI	WELONG.	% RED. OF AREA
336	(ABOVE)	80,500	63,000	27.5	63.0

CHARPY V-NOTCH IMPACT TEST 240FT./LB. ENERGY LOAD

HEAT TREATMENT	TEST NO.	FT./LBS.	LAT.EXP.	% SHEAR	TEST NO.	FT./LBS.	LAT.EXP.	% SHEAR
(ABOVE)	WF336	54	.043	75	WF336	67	.049	95
	SURFACE	49	.042	70	CENTER	71	.053	90
	+10°F	49	.043	60	+30°F	51	.044	60
RT								
NDT is -30°F	WF336	72	.064	100	WF336	59	.053	80
	CENTER	79	.076	100	CENTER	59	.051	80
	+200°F	81	.075	100	+10°F	60	.054	85

GUIDED BEND TESTS

FACE	ROOT	SIDE

MICRO OR MACRO
FINISH ANALYSIS.

WE HEREBY CERTIFY THAT THE ABOVE MATERIAL HAS BEEN
TESTED IN ACCORDANCE WITH THE ABOVE LISTED SPECIFICA-
TION AND IS IN CONFORMANCE WITH ALL REQUIREMENTS.

MATERIAL APPROVAL

APPROVED	REJECTED
NAVSHIPS - 250/1500.1	
ASME - COMM'L NUCLEAR	
STEAM GENERATORS	

GROOVE WELD TEST

RADIOGRAPHIC EXAMINATION

JL FEARING

JUL 31 1973

WIRE FOLIO NO. 464-221

FLUX FOLIO NO. 559-063

WORKS MT. VERNON

CONTRACT NO.

DATE JULY 31, 1973

SIGNED

INSPECTION AGENCY

INSPECTOR

J. TOON AUG 20 1973
JUL 31 1973

WORD OF FILLER WIRE QUALIFICATION TEST

TEST NO. WF 336

WIRE DIAMETER	ELECTRODE SPECIFICATION AND WELDING PROCESS	FILLER WIRE IDENTIFICATION AND/OR LOT	CORE WIRE HEAT NO.
5/32"	12-2-WQI-32 AUTO SUB ARC	LINDE MnMoNi (LOW Cu&P) LINDE GR. 80 LOT 8873	442002
VOLTS: 33	TRAVEL SPEED (IPM) 12	TYPE OF CURRENT 450-500-600	PURCHASE ORDER NO. 642040AK

CHEMICAL ANALYSIS

LAB NO.	PAD	C.	CR.	NI.	MN.	SI.	P.	S.	ME.	CU.	V.	CO.	AL.
13762		120	.09	.46	1.20	.32	.004	.016	.30	.031	.031		.024

DROP WEIGHTS

HEAT TREATMENT	TEST NO.	TEMP. (°F.)	RESULTS	NOTE
1100-1150°F. FOR 50 HRS. FURNACE COOLED TO 600°F AT 10°F/HR.	WF 336 CENTER	-30°F -20°F	F NF, NF	-30°F

TENSILE PROPERTIES

TEST NO.	HEAT TREATMENT	ULTIMATE STR. PSI	YIELD PT. PSI	% ELONG.	% RED. OF AREA
WF 336	(ABOVE)	80,500	63,000	27.5	63.0

CHARPY V-NOTCH IMPACT TEST 240FT./LB. ENERGY LOAD

HEAT TREATMENT	TEST NO.	FT./LBS.	LAT. EXP.	% SHEAR	TEST NO.	FT./LBS.	LAT. EXP.	% SHEAR
(ABOVE)	WF336	54	.043	75	WF336	67	.049	95
	SURFACE	49	.042	70	CENTER	71	.053	90
	+10°F	49	.043	60	+30°F	51	.044	60
RT								
NDT 1s -30°F	WF336	72	.064	100	WF336	59	.053	80
	CENTER	79	.076	100	CENTER	59	.051	80
	+200°F	81	.075	100	+10°F	60	.054	85

GUIDED BEND TESTS

FACE	ROOT	SIDE

MICRO OR MACRO
FRACTURE ANALYSIS

WE HEREBY CERTIFY THAT THE ABOVE MATERIAL HAS BEEN
TESTED IN ACCORDANCE WITH THE ABOVE LISTED SPECIFICA-
TION AND IS IN CONFORMANCE WITH ALL REQUIREMENTS.

MATERIAL APPROVAL

NAVSHIPS - 250/1500-1
ASME - COMM'L NUCLEAR
STEAM GENERATORS

R. FEARING
AUG 20 1973

GROOVE WELD TEST

RADIOGRAPHIC EXAMINATION

R. FEARING
JUL 31 1973

WIRE FOLIO NO. 464-221
FLUX FOLIO NO. 559-063
WORKS MT. VERNON
CONTRACT NO. _____

MAY 6 1974
R. FEARING

DATE JULY 31, 1973

SIGNED _____

INSPECTION AGENCY _____

INSPECTOR _____

J. TOON
AUG 20 1973
JUL 31 1973

THE BABCOCK & WILCOX COMPANY
POWER GENERATION GROUP
MT. VERNON, INDIANA

REVISED 6/11/75
REVISED 8/20/73
REVISED 5/6/74

WORD-OF FILLER WIRE QUALIFICATION TEST

TEST NO. WF 336

DIAMETER	ELECTRODE SPECIFICATION AND WELDING PROCESS	FILLER WIRE OR FLOW	CORE WIRE HEAT NO.
5/32"	12-2-WQ1-32 AUTO SUB ARC	LINDE MnMoNi (LOW Cu&P) LINDE GR.80 LOT 8873	442002
VOLTS: 33	TRAVEL SPEED (IPM) 12	TYPE OF CURRENT AC	AMPERES 450-500-600
		PURCHASE ORDER NO. 642040AK	

CHEMICAL ANALYSIS

LAB NO.	PAD	C.	CR.	NI.	MN.	SI.	P.	S.	MO.	CU.	V.	CO.	AL.	Nb
13762		.099	.12	.70	1.40	.44	.010	.011	.52	.024	.002	.009	N.D.	.008
						W	NSn	Ti	Pb	BA	Zr	As	N ₂	
						N.D.	.002	.015	.002	N.D.	.004	N.D.	.0106	

DROP WEIGHTS

HEAT TREATMENT	TEST NO.	TEMP. (°F.)	RESULTS	TNDT
1100-1150°F. FOR 50 HRS. FURNACE COOLED TO 600°F AT 10°F/HR.	WF 336 CENTER	-30°F -20°F	F NF,NF	-30°F

TENSILE PROPERTIES

TEST NO.	HEAT TREATMENT	ULTIMATE STR. PSI	YIELD PT. PSI	% ELONG.	% RED. OF AREA
WF 336	(ABOVE)	80,500	63,000	27.5	63.0

CHARPY V-NOTCH IMPACT TEST 240FT./LB. ENERGY LOAD

HEAT TREATMENT	TEST NO.	FT./LBS.	LAT. EXP.	% SHEAR	TEST NO.	FT./LBS.	LAT. EXP.	% SHEAR
(ABOVE)	WF336	54	.043	75	WF336	67	.049	95
	SURFACE	49	.042	70	CENTER	71	.053	90
	+10°F	49	.043	60	+30°F	51	.044	60
RT	WF336	72	.064	100	WF336	59	.053	80
NDT is -30°F	CENTER	79	.076	100	CENTER	59	.051	80
	+200°F	81	.075	100	+10°F	60	.054	85

GUIDED BEND TESTS

FACE	ROOT	SIDE

MICRO OR MACRO
FRACTURE ANALYSIS.

MATERIAL APPROVAL

NAVSHIPS - 250/1500-1
ASME - COMM'L NUCLEAR
STEAM GENERATORS
R. FEARING
AUG 20 1973

GROOVE WELD TEST

RADIOGRAPHIC EXAMINATION

WE HEREBY CERTIFY THAT THE ABOVE MATERIAL HAS BEEN
TESTED IN ACCORDANCE WITH THE ABOVE LISTED SPECIFICATION
AND IS IN CONFORMANCE WITH ALL REQUIREMENTS.

JUN 11 1975

R. FEARING

R. FEARING

JUL 31 1975

WIRE FOLIO NO. 464-221

FLUX FOLIO NO. 559-063

MAY 6 1974

R. FEARING

DATE JULY 31, 1973

SIGNED

J. TCO.

CHARPY-V TRANSITION CURVES

CONTRACT SPL 336

DATE MAY 6, 1974

CUSTOMER _____

COMPONENT _____

SERIAL NO. _____

HEAT NO. 442002/8873

TEST SPEC. _____

TEST LOCATION CENTER

ATTACHMENT TO WF336

TEMP. (°F)	FT. LBS.			LATERAL EXPANSION			% SHEAR		
+200	72	79	81	.064	.076	.075	100	100	100
+150									
+100	75	79	78	.062	.065	.064	100	100	100
+70	66	78	71	.052	.068	.060	90	95	90
+40	71	55	56	.058	.037	.041	90	65	65
+10	43	48	43	.029	.035	.034	45	55	50
-20	43	42	41	.028	.032	.029	45	45	45
-50	37	28	40	.022	.017	.025	25	20	25
-100	18	23	17	.012	.013	.009	5	5	5

TESTED BY R.E. Nobles
MAY 6 1974
R. NOBLES

Ja Ew:-

NO SAMPLES

UNIT NO.

2.1

LOT NO 8873

DATE REPORTED

QUALIFY TO:

[illegible]

THE BABCOCK & WILCOX COMPANY
POWER GENERATION GROUP
MT. VERNON, INDIANA

RECORD OF FILLER WIRE QUALIFICATION TEST

TEST NO. WF 407

DIAMETER	ELECTRODE SPECIFICATION AND WELDING PROCESS	FILLER WIRE IDENTIFICATION AND/OR FLUX	CORE WIRE HEAT NO.
5/32"	12-2-WQ1-32 AUTO SUB ARC	LINDE MnMoNi LOW Cu P LINDE GR.80 LOT 8968	442002
VOLTS: 34	TRAVEL SPEED (IPM) 12	TYPE OF CURRENT <i>AC</i>	AMPERES 450 THRU 650
			PURCHASE ORDER NO. 642040

CHEMICAL ANALYSIS

LAB NO.	C	CR	NI	MN	SI	P	S	MO	CU	V	FE	AL
16115	.090	.056	.48	1.30	.38	.003	.020	.30	.068	.019		

DROP WEIGHTS

HEAT TREATMENT	TEST NO.	TEMP. (°F)	RESULTS	NOTE
1100-1150°F FOR 50 HRS. FURNACE COOLED AT 10°F/HR.	WF407	+20	NB, NB	

TENSILE PROPERTIES

TEST NO.	HEAT TREATMENT	ULTIMATE STR. PSI	YIELD PT. PSI	%ELONG. #.2% OFFSET	% RED. OF AREA
WF407	ABOVE	84,500	66,000	26.0	60.0

CHARPY V-NOTCH IMPACT TEST 240FT./LB. ENERGY LOAD

HEAT TREATMENT	TEST NO.	FT./LBS.	LAT. EXP.	% SHEAR	TEST NO.	FT./LBS.	LAT. EXP.	% SHEAR
ABOVE L.W.S. MAY 2, 1974	SEE ATTACHED SHEET							

GUIDED BEND TESTS

FACE	ROOT	SIDE

MICRO OR MACRO
FESSURE ANALYSIS

MATERIAL APPROVAL

NAVSHIPS - 250/1500-1
ASME - COMM'L NUCLEAR
STEAM GENERATORS

APPROVED REJECTED

X

CORROSION RESISTANCE

RADIOGRAPHIC EXAMINATION

WE HEREBY CERTIFY THAT THE ABOVE MATERIAL HAS BEEN
TESTED IN ACCORDANCE WITH THE ABOVE LISTED SPECIFICA-
TION AND IS IN CONFORMANCE WITH ALL REQUIREMENTS.

WIRE FOLIO NO. 564-221FLUX FOLIO NO. 559-063WORKS MT. VERNON

CONTRACT NO. _____

MAY 1 1974 DATE MAY 1, 1974
SIGNED R. E. FEARING
INSPECTION AGENCY MAY 1 1974
INSPECTOR R. NOBLES

CHARPY-V TRANSITION CURVES

CONTRACT WF407

DATE MAY 1, 1974

CUSTOMER _____

COMPONENT _____

SERIAL NO. _____

HEAT NO. 442002/8968

TEST SPEC. _____

TEST LOCATION _____

TEMP. (°F)	FT. LBS.			LATERAL EXPANSION			% SHEAR		
+200									
+150	75	85	75	.063	.068	.067	100	100	100
+100	70	68	73	.066	.061	.068	95	95	95
+70	68	56	60	.058	.052	.057	90	80	80
+40	36	57	39	.028	.053	.031	55	75	65
+10	35	36	50	.034	.034	.043	50	50	65
-20	28	33	31	.023	.026	.027	25	25	25
-50	21	37	28	.020	.028	.021	15	20	15
-100	6	13	9	.003	.009	.006	0	0	0

TESTED BY RE Nobles

MAY 1 1974

R. NOBLES

CORD OF FILLER WIRE QUALIFICATION TEST

TEST NO. WF 407

DIAMETER	ELECTRODE SPECIFICATION	FILLER WIRE IDENTIFICATION	CORE WIRE HEAT NO.
5/32"	12-2-WQI-32 AUTO SUB ARC	LINDE MnMoNi LOW Cu P LINDE GR.80 LOT 8968	442002
VOLTS: 34	TRAVEL SPEED (IPM) 12	TYPE OF CURRENT	AMPERES 450 THRU 650
			PURCHASE ORDER NO. 642040

CHEMICAL ANALYSIS

LAB NO.	PAD	C.	CR.	NI.	MN.	SI.	P.	S.	MO.	CU.	V.	CO.	AL.	Ti
24923		.090	.14	.72	1.50	.49	.011	.013	.47	.03	.004	.01	.010	.01
			CB	SN	Pb	Zn	Fe	W						
			.01	.011	.002	.002	.01							
			.03	.000	.005		.012							

DROP WEIGHTS

HEAT TREATMENT	TEST NO.	TEMP. (°F.)	RESULTS	TNDT
1100-1150°F FOR 50 HRS. FURNACE COOLED AT 10°F/HR.	WF407	+20°	NB, NB	

TENSILE PROPERTIES

TEST NO.	HEAT TREATMENT	ULTIMATE STR. PSI	YIELD PT. PSI	%ELONG. @.2%OFFSET	% RED. OF AREA
WF407	ABOVE	84,500	66,000	26.0	60.0

CHARPY V-NOTCH IMPACT TEST 240FT./LB. ENERGY LOAD

HEAT TREATMENT	TEST NO.	FT./LBS.	LAT. EXP.	% SHEAR	TEST NO.	FT./LBS.	LAT. EXP.	% SHEAR
ABOVE	SEE ATTACHED SHEET							

GUIDED BEND TESTS

FACE	ROOT	SIDE

MICRO OR MACRO
FISSURE ANALYSIS.

WE HEREBY CERTIFY THAT THE ABOVE MATERIAL HAS BEEN
TESTED IN ACCORDANCE WITH THE ABOVE LISTED SPECIFICA-
TION AND IS IN CONFORMANCE WITH ALL REQUIREMENTS.

MATERIAL APPROVAL

APPROVED	REJECTED
X	

GROOVE WELD TEST

RADIOGRAPHIC EXAMINATION

IRE FOLIO NO. 564-221FLUX FOLIO NO. 559-063WORKS MT. VERNON

CONTRACT NO. _____

MAY 1 1974

DATE MAY 1, 1974

R. FEARING

SIGNED

INSPECTION AGENCY

INSPECTOR

MAY 1 1974

R. NOBLES

THE BABCOCK & WILCOX COMPANY
POWER GENERATION GROUP
MT. VERNON, INDIANA

WORD OF FILLER WIRE QUALIFICATION TEST

TEST NO. **WF421**

DIAMETER	ELECTRODE SPECIFICATION AND WELDING PROCESS	FILLER WIRE IDENTIFICATION AND OR FLUX	CORE WIRE HEAT NO.
5/32	12-2-WQI-32 AUTO SUB ARC	LINDE MnMoNi LINDE 80 LOT 8968	442002
VOLTS: 34	TRAVEL SPEED (IPM) 12	TYPE OF CURRENT A.C?	AMPERES 400 thru 800
			PURCHASE ORDER NO. 623538

CHEMICAL ANALYSIS

LAB NO.	PAD	C.	CR.	NI.	MN.	SI.	P.	S.	MO.	CU.	V.	CO.	AL.
16348		.106	.07	.54	1.25	.32	.007	.019	.36	.114	.021		

DROP WEIGHTS

HEAT TREATMENT	TEST NO.	TEMP. (°F.)	RESULTS	TNDT
1100-1150°F FOR 50 HRS. FURNACE COOLED TO 600°F AT 10°F/HR.	WF421	+20	NB, NB	

TENSILE PROPERTIES

TEST NO.	HEAT TREATMENT	ULTIMATE STR. PSI	YIELD PT. PSI	% ELONG.	% RED. OF AREA
WF421	ABOVE	83,000	65,500	26.5	63.0

CHARPY V-NOTCH IMPACT TEST 240FT./LB. ENERGY LOAD

HEAT TREATMENT	TEST NO.	FT./LBS.	LAT. EXP.	% SHEAR	TEST NO.	FT./LBS.	LAT. EXP.	% SHEAR
ABOVE	F421	74	.055	90	F421	73	.058	100
	@+70°F	59	.046	80	@+200°F	73	.061	100
		72	.049	90		69	.056	100

GUIDED BEND TESTS

FACE	ROOT	SIDE

MICRO OR MACRO
FISSURE ANALYSIS.

WE HEREBY CERTIFY THAT THE ABOVE MATERIAL HAS BEEN
TESTED IN ACCORDANCE WITH THE ABOVE LISTED SPECIFICA-
TION AND IS IN CONFORMANCE WITH ALL REQUIREMENTS.

MATERIAL APPROVAL

APPROVED REJECTED

NAVSHIPS - 250/1500-1
ASME - COMM'L NUCLEAR
STEAM GENERATORS

X

GROOVE WELD TEST

RADIOGRAPHIC EXAMINATION

IRE FOLIO NO. 564-220

FLUX FOLIO NO. 559-063

WORKS MT. VERNON

CONTRACT NO. _____

MAR 5 1974

DATE MARCH 5, 1974

R. FEARING SIGNED

INSPECTION AGENCY _____

INSPECTOR _____

MAR 5 1974

R. NOBLES

THE BABCOCK & WILCOX COMPANY
POWER GENERATION GROUP
MT. VERNON, INDIANA

ORD OF FILLER WIRE QUALIFICATION TEST

TEST NO. WF446

WIRE IDENTIFICATION	ELECTRODE IDENTIFICATION	FILLER WIRE IDENTIFICATION	CORE WIRE HEAT NO.
5/32"	12-2-WQ1-32 AUTO SUB ARC	LINDE MnMoNi LINDE #80 LOT 8064	442002
34	TRAVEL SPEED (IPM) 12	TYPE OF CURRENT	AMPERES 450 thru 700
PURCHASE ORDER NO.			

CHEMICAL ANALYSIS

TEST NO.	C	CP	NI	MN	SI	P	S	MO	CU	V	CO	AL
17543	.101	.049	.60	1.30	.41	.011	.010	.33	.148	.049		

DROP WEIGHTS

HEAT TREATMENT	TEST NO.	TEMP. (°F.)	RESULTS	TNOT
1100-1150°F FOR 50 HRS. FURNACE COOLED TO 600°F AT 10°F/HR.	WF 446	+20	NB, NB	

TENSILE PROPERTIES

TEST NO.	HEAT TREATMENT	ULTIMATE STR. PSI	YIELD PT. PSI	% ELONG. @ .2% OFFSET	% RED. OF AREA
WF446	ABOVE	82,500	63,750	26.5	63.5

CHARPY V-NOTCH IMPACT TEST 240FT./LB. ENERGY LOAD

HEAT TREATMENT	TEST NO.	FT./LBS.	LAT. EXP.	% SHEAR	TEST NO.	FT./LBS.	LAT. EXP.	% SHEAR
ABOVE		SEE ATTACHED SHEET						

GUIDED BEND TESTS

FACE	ROOT	SIDE

MATERIAL APPROVAL

APPROVED REJECTED

NAVSHIPS - 250/1500-1
ASME - COMM'L NUCLEAR
STEAM GENERATORS

X

GROOVE WELD TEST

RADIOGRAPHIC EXAMINATION

WE HEREBY CERTIFY THAT THE ABOVE MATERIAL HAS BEEN
TESTED IN ACCORDANCE WITH THE ABOVE LISTED SPECIFICA-
TIONS AND IS IN CONFORMANCE WITH ALL REQUIREMENTS.

WIRE FOLIO NO. 564-221

WIRE FOLIO NO. 559-061

WIRE NO. MT. VERNON

WIRE NO.

AUG 7 1974

DATE AUGUST 7, 1974

P. FEARING

SIGNED

INSPECTOR

AUG 7 1974

CHARPY-V TRANSITION CURVES

CONTRACT _____

DATE _____

CUSTOMER _____

COMPONENT _____

SERIAL NO. _____

HEAT NO. _____

TEST SPEC. WF 446

TEST LOCATION _____

TEMP. (°F)	FT. LBS.			LATERAL EXPANSION			% SHEAR		
+100	77	83	80	.070	.072	.071	100	100	100
+70	74	74	72	.062	.060	.058	90	90	95
+40	58	71	63	.052	.058	.054	75	90	75
+10	51	54	51	.044	.047	.036	60	65	55
-20	35	16		.022	.011		25	10	
-50	14	25		.012	.020		5	10	
-100	17	9		.008	.004		0	0	

J. TOON
AUG 7 1974

TESTED BY _____

THE BABCOCK & WILCOX COMPANY
POWER GENERATION GROUP
MT. VERNON, INDIANA

CORD OF FILLER WIRE QUALIFICATION TEST

TEST NO. WF447

DIAMETER	ELECTRODE SPECIFICATION AND WELDING PROCESS	FILLER WIRE IDENTIFICATION AND/OR FLUX	CORE WIRE HEAT NO.
5/32"	12-2-WOI-32 AUTO SUB ARC	LINDE MnMoNi (Low Cu-P) LINDE #80 LOT 8064	442002
VOLTS: 34	TRAVEL SPEED (IPM) 12	TYPE OF CURRENT	AMPERES 450 thru 700
PURCHASE ORDER NO.			

CHEMICAL ANALYSIS

LAB NO.	PAD	C.	CR.	NI.	MN.	SI.	P.	S.	MO.	CU.	V.	CO.	AL.
17544		.075	.076	.62	1.30	.37	.009	.010	.31	.059	.050		

DROP WEIGHTS

HEAT TREATMENT	TEST NO.	TEMP. (°F.)	RESULTS	TNDT
1100-1150°F FOR 50 HRS. FURNACE COOLED TO 600°F AT 10°F/HR.	WF 447	+20	NB, NB	

TENSILE PROPERTIES

TEST NO.	HEAT TREATMENT	ULTIMATE STR. PSI	YIELD PT. PSI	%ELONG. @.2%OFFSET	% RED. OF AREA
WF447	ABOVE	83,250	64,500	27.5	62.0

CHARPY V-NOTCH IMPACT TEST 240FT./LB. ENERGY LOAD

HEAT TREATMENT	TEST NO.	FT./LBS.	LAT. EXP.	% SHEAR	TEST NO.	FT./LBS.	LAT. EXP.	% SHEAR
ABOVE		SEE ATTACHED SHEET						

GUIDED BEND TESTS

FACE	ROOT	SIDE

MICRO OR MACRO
FISSURE ANALYSIS.

WE HEREBY CERTIFY THAT THE ABOVE MATERIAL HAS BEEN
TESTED IN ACCORDANCE WITH THE ABOVE LISTED SPECIFICA-
TION AND IS IN CONFORMANCE WITH ALL REQUIREMENTS.

MATERIAL APPROVAL

APPROVED	REJECTED
X	

GROOVE WELD TEST

RADIOGRAPHIC EXAMINATION

RE FOLIO NO. 564-221FLUX FOLIO NO. 559-063WORKS MT. VERNON

CONTRACT NO. _____

AUG 8 1974

R. FEARING

DATE AUGUST 8, 1974

SIGNED

INSPECTION AGENCY

INSPECTOR

J. TOON
AUG 8 1974

CHARPY-V TRANSITION CURVES

CONTRACT _____

DATE SEPTEMBER 26, 1974

CUSTOMER _____

COMPONENT _____

SERIAL NO. _____

HEAT NO. 442002/8064

TEST SPEC. WF452 (WF447)

TEST LOCATION _____

TEMP. (°F)	FT. LBS.			LATERAL EXPANSION			% SHEAR		
+200	76	78	79	.068	.069	.071	100	100	100
+150	70	70	72	.055	.060	.060	100	100	100
+100	70	64	53	.058	.056	.041	100	95	90
+70	50	51	56	.040	.041	.048	75	75	80
+40	46	46	45	.040	.039	.035	65	65	60
+10	40	41	42	.031	.029	.030	35	35	35
-20	30	28	29	.024	.021	.019	20	20	20
-50	30	27	11	.020	.022	.007	15	10	5
-100	8	4	8	.005	.003	.005	0	0	0

TESTED BY _____

THE BABCOCK & WILCOX COMPANY
POWER GENERATION GROUP
MT. VERNON, INDIANA

REVISED: 2-4-75

RECORD OF FILLER WIRE QUALIFICATION TEST

TEST NO. WF 447

DIAMETER	ELECTRODE PREPARATION	FILLER WIRE IDENTIFICATION	CORE WIRE HEAT NO.
5/32"	12-2-WQI-32 AUTO SUB ARC	LINDE MNMONI (LOW CU-P) LINDE #80 LOT 8064	442002
VOLTS: 34	TRAVEL SPEED (IPM) 12	TYPE OF CURRENT	AMPERES 450 thru 700
PURCHASE ORDER NO.			

CHEMICAL ANALYSIS

LAB NO.	PAD	C.	CR.	NI.	MN.	SI.	P.	S.	MO.	CU.	V.	CO.	AL.	TI
20369		.075	.097	.62	1.37	.45	.010	.013	.41	.053	.001	.01	.01	.007
		CB	SN	B	PB	AS	Zr	N	W					
		.003	.011	.0003	.002	.009	.003	.0012	.009					

DROP WEIGHTS

HEAT TREATMENT	TEST NO.	TEMP. (°F.)	RESULTS	TNDT
1100 - 1150° F for 50 HRS FURNACE COOLED TO 600° F AT 10° F/HR.	WF 447	+20	NB,NB	

TENSILE PROPERTIES

TEST NO.	HEAT TREATMENT	ULTIMATE STR. PSI	YIELD PT. PSI	%ELONG. @.2%OFFSET	% RED. OF AREA
447	ABOVE	83,250	64,500	27.5	62.0

CHARPY V-NOTCH IMPACT TEST 240FT./LB. ENERGY LOAD

HEAT TREATMENT	TEST NO.	FT./LBS.	LAT.EXP.	% SHEAR	TEST NO.	FT./LBS.	LAT.EXP.	% SHEAR
ABOVE	SEE ATTACHED SHEET							

GUIDED BEND TESTS

FACE	ROOT	SIDE

MICRO OR MACRO
FISSURE ANALYSIS.

WE HEREBY CERTIFY THAT THE ABOVE MATERIAL HAS BEEN
TESTED IN ACCORDANCE WITH THE ABOVE LISTED SPECIFICA-
TION AND IS IN CONFORMANCE WITH ALL REQUIREMENTS.

MATERIAL APPROVAL

APPROVED	REJECTED
X	

GROOVE WELD TEST

RADIOGRAPHIC EXAMINATION

FIRE FOLIO NO. 564-221

FLUX FOLIO NO. 559-063

WORKS

CONTRACT NO.

FEB 1975

R. FEARING

AUG 1974

R. FEARING

DATE

SIGNED

INSPECTION AGENCY

INSPECTOR

AUGUST 8, 1974


WCAP 9517

COMMONWEALTH EDISON CO. BYRON STATION
UNIT NO. 1 REACTOR VESSEL RADIATION
SURVEILLANCE PROGRAM

J. A. Davidson

July 1979

APPROVED:



J. N. Chirigos, Manager
Structural Materials Engineering

Work performed under Shop Order CVA-106

WESTINGHOUSE ELECTRIC CORPORATION
Nuclear Energy Systems
P. O. Box 355
Pittsburgh, Pennsylvania 15230

TABLE A-2
CHEMICAL COMPOSITION (WEIGHT PERCENT)

Element	Ladish Co. Check Analysis of Intermediate Shell Forging 5P-5933.	Babcock and Wilcox Co. Analysis of Weld Metal ^(a)
C	0.21	0.08
S	0.009	0.010
P	0.010	0.011
Co	0.01	0.011
Cu	0.05	0.026
Si	0.27	0.57
Mo	0.56	0.44
Ni	0.73	0.71
Mn	0.69	1.48
Cr	0.36	0.11
V	0.003	0.006
Sn	< 0.002 ^(b)	0.008
Al	0.010 ^(b)	0.013 ^(b)
N ₂	0.005	0.011 ^(b)
B	< 0.0005	< 0.003 ^(b)
Ti	0.001 ^(b)	0.002 ^(b)
W	< 0.002 ^(b)	< 0.002 ^(b)
As	0.005 ^(b)	0.004 ^(b)
Zr	< 0.002 ^(b)	< 0.002 ^(b)
Cb	< 0.002 ^(b)	< 0.002 ^(b)
Sb	< 0.002 ^(b)	< 0.002 ^(b)

- a. The surveillance weld is identical to that used in the core region girth seam. The weld wire is type Linde MnMoNi, Heat Number 442002, with a Linde 80 type flux, Lot Number 8873.
- b. Supplemental chemical analysis performed by Westinghouse.

WESTINGHOUSE CLASS 3
CUSTOMER DESIGNATED DISTRIBUTION

ANALYSIS OF CAPSULE U FROM THE
COMMONWEALTH EDISON CO.
BYRON UNIT 1 REACTOR VESSEL
RADIATION SURVEILLANCE PROGRAM

S. E. Yanichko
E. P. Lippincott
L. Albertin

November 1987

APPROVED:

T. A. Meyer
T. A. Meyer, Manager
Structural Materials and Reliability Technology

Work performed under Shop Order No. BE0J-106

Prepared by Westinghouse Electric Corporation for the
Commonwealth Edison Company

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no distribution shall be made outside Westinghouse or its licensees
without the customer's approval

WESTINGHOUSE ELECTRIC CORPORATION
Power Systems Division
P. O. Box 2728
Pittsburgh, Pennsylvania 15230

8804290266 880426
PDR ADOCK 05000454
P DCD

Table 4-2

CHEMICAL COMPOSITION FOR BYRON UNIT 1 CAPSULE U IRRADIATED CHARPY IMPACT SPECIMENS

		Chemical Composition (wt.%) ^(a)									
Weld Metal:											
Specimen No.		Cu	Ni	C	Mn	P	S	Si	Cr	Mo	V
AW-1		0.023	0.670	0.084	1.40	0.0085	0.016	0.523	0.091	0.419	0.025
AW-9		0.022	0.665	0.075	1.45	0.0091	0.015	0.513	0.096	0.393	0.025
AW-1		0.021	0.714								
AW-2		0.021	0.741								
AW-3		0.022	0.713								
AW-4		0.021	0.714								
AW-5		0.020	0.704								
AW-6		0.020	0.694								
AW-7		0.020	0.706								
AW-8		0.021	0.677								
AW-9		0.023	0.677								
AW-10		0.021	0.680								
AW-11		0.021	0.680								
AW-12		0.021	0.667								
AW-13		0.024	0.677								
AW-14		0.022	0.697								
AW-15		0.021	0.634								
Forging 5P-5933											
Specimen No.		Cu	Ni	C	Mn	P	S	Si	Cr	Mo	V
AL-13		0.034	0.730	0.185	0.679	0.0054	0.012	0.241	0.34	0.564	0.059
AL-13		0.032	0.791								

(a) Method of analysis--Inductively Coupled Plasma Spectrometry (ICPS) for all elements except C, S and Si.

WCAP-13880

Westinghouse Class 3 (Non-Proprietary)

R.B. BORSUM
LICENSING

MAR 18 1994

ROCKVILLE, MD
301-230-2100

ANALYSIS OF CAPSULE X FROM THE
COMMONWEALTH EDISON COMPANY
BYRON UNIT 1 REACTOR VESSEL
RADIATION SURVEILLANCE PROGRAM

P. A. Peter
S. S. Zawalick
A. Madeyski

January 1994

Work Performed Under Shop Order BPPP-106

Prepared by Westinghouse Electric Corporation
for the Commonwealth Edison Company

Approved by: T. A. Meyer (T/L)
T. A. Meyer, Manager
Structural Reliability and Plant Life Optimization

WESTINGHOUSE ELECTRIC CORPORATION
Nuclear and Advanced Technology Division
P.O. Box 355
Pittsburgh, Pennsylvania 15230-0355

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9403040277 940223
PDR ADDCK 05000434

TABLE 4-3
Chemical Composition of Four Byron Unit 1 Charpy Specimens
Removed from Surveillance Capsule X

Element	Weld Metal			Base Metal
	AW-48	AW-50	AW-57	AL-46
Fe	96.127	96.158	96.102	96.286
Co	0.007	0.007	0.007	0.011
Cr	0.108	0.102	0.113	0.387
Cu	0.024	0.022	0.025	0.036
Mn	1.449	1.439	1.420	0.724
Mo	0.454	0.451	0.472	0.629
Ni	0.682	0.678	0.705	0.735
P	0.012	0.013	0.014	<0.011
Ti	0.007	0.006	0.006	0.007
V	0.001	0.001	0.002	0.048
Al	<0.022	<0.021	<0.023	<0.024
As	<0.017	<0.016	<0.017	<0.018
B	0.004	0.003	0.003	0.005
Nb	0.013	0.013	0.014	0.018
Sn	<0.024	<0.023	<0.025	<0.027
W	<0.039	<0.038	<0.041	<0.043
Zr	<0.010	<0.010	<0.010	<0.011
C	0.071	0.075	0.076	0.182
S	0.0083	0.0071	0.0090	0.0051
Si	0.551	0.537	0.558	0.253

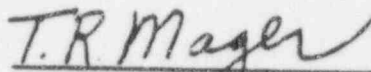
WCAP-10398

COMMONWEALTH EDISON COMPANY
BYRON STATION UNIT NO. 2
REACTOR VESSEL RADIATION
SURVEILLANCE PROGRAM

L. R. Singer

December 1983

APPROVED:



T. R. Mager, Manager
Metallurgical and NDE Analysis

Work for Byron Station Unit No. 2
Project was Performed Under Shop Order CBE-106

WESTINGHOUSE ELECTRIC CORPORATION
Nuclear Energy Systems
P.O. Box 355
Pittsburgh, Pennsylvania 15230

TABLE A-3
CHEMICAL ANALYSIS OF THE WELD METAL USED
IN THE CORE REGION CLOSING BELTLINE GIRTH WELD SEAM
OF THE BYRON STATION UNIT NO. 2 REACTOR VESSEL

Element	Chemical Composition (weight %)	
	Weld Filler Wire Heat Number 442002, Linde No. 80 flux, Lot Number 8064	
C	.08 [a]	.09 [b]
Mn	1.30	1.34
P	.009	.01
S	.01	.013
Si	.37	.55
Ni	.62	.65
Mo	.31	.45
Cr	.08	.08
Cu	.06	.03
Al	— —	.003
Co	— —	<.01
Pb	— —	<.001
W	— —	<.02
Ti	— —	<.005
Zr	— —	<.002
V	.05	<.001
Sn	— —	<.005
As	— —	.005
Cb	— —	<.003
N ₂	— —	.006
B	— —	.005

a. Chemical Analyses of "Filler Wire Qualification Test" by Babcock and Wilcox, Company.

b. Westinghouse Analyses from the Surveillance Program Test Weldment.

WESTINGHOUSE CLASS 3

AL Lowe

WCAP-12431

IS

R. B. BORSUM
LICENSING

MAR 06 1990

ROCKVILLE, MD
301-230-2100

ANALYSIS OF CAPSULE U FROM THE
COMMONWEALTH EDISON COMPANY
BYRON UNIT 2 REACTOR VESSEL
RADIATION SURVEILLANCE PROGRAM

E. Terek
E. P. Lippincott
L. Albertin

October 1989

Work Performed Under Shop Order BFHP-106

Prepared by Westinghouse Electric Corporation
for the Commonwealth Edison Company

Approved by:

T. A. Meyer
T. A. Meyer, Manager
Structural Materials and Reliability Technology

WESTINGHOUSE ELECTRIC CORPORATION
Nuclear and Advanced Technology Division
P.O. Box 2728
Pittsburgh, Pennsylvania 15230-2728

TABLE 4-2
CHEMICAL COMPOSITION FOR BYRON UNIT 2 CAPSULE U IRRADIATED CHARPY IMPACT SPECIMENS

		Chemical Composition (wt.%) ^(a)										
Weld Metal:		Cu	Ni	C	Mn	P	S	Si	Cr	Mo	V	Co
Specimen No.												
4-4	YW-6	0.024	0.740	0.080	1.401	0.008	0.013	0.496	0.085	0.397	<0.005	<0.010
	YW-15	0.024	0.785	0.078	1.509	0.016	0.013	0.513	0.093	0.452	<0.005	<0.010
	YW-1	0.022	0.704									
	YW-2	0.020	0.681									
	YW-3	0.021	0.706									
	YW-4	0.020	0.697									
	YW-5	0.019	0.668									
	YW-7	0.022	0.759									
	YW-8	0.021	0.714									
	YW-9	0.020	0.678									
	YW-10	0.020	0.695									
	YW-11	0.019	0.689									
	YW-12	0.021	0.744									
	YW-13	0.022	0.738									
	YW-14	0.022	0.771									
Forging MK24-3												
Specimen No.		Cu	Ni	C	Mn	P	S	Si	Cr	Mo	V	Co
YT-1		0.022	0.689	0.068	1.353	0.014	0.017	0.493	0.083	0.405	<0.005	<0.010

(a) Method of analysis -- Inductively Coupled Plasma Spectrometry (ICPS) for all elements except C, S, and Si.

50-455
9/21/94
P

ANALYSIS OF CAPSULE W FROM THE
COMMONWEALTH EDISON COMPANY
BYRON UNIT 2 REACTOR VESSEL
RADIATION SURVEILLANCE PROGRAM


M. J. Malone
S. S. Zawalick
A. Madeyski

July 1994

Work Performed Under Shop Order BPPP-106A

Prepared by Westinghouse Electric Corporation
for the Commonwealth Edison Company

Approved by:



R. D. Rishel, Manager
Metallurgical and NDE Analysis

WESTINGHOUSE ELECTRIC CORPORATION
Nuclear and Advanced Technology Division
P.O. Box 355
Pittsburgh, Pennsylvania 15230-0355

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TABLE 4-3
Chemical Composition of Sixteen Byron Unit 2 Charpy Specimens
Removed from Surveillance Capsule W

Element	Weld Metal			
	YW-31	YW-32	YW-33	YW-34
Fe	96.612	96.602	96.624	96.623
Co	0.007	0.007	0.007	0.007
Cr	0.094	0.093	0.092	0.093
Cu	0.024	0.023	0.023	0.024
Mn	1.440	1.449	1.440	1.441
Mo	0.457	0.458	0.454	0.454
Ni	0.705	0.706	0.692	0.696
P	0.014	0.014	0.013	0.012
Ti	<0.003	<0.003	<0.003	<0.004
V	0.001	0.001	0.001	0.001
Al	<0.020	<0.019	<0.019	-
As	<0.010	<0.010	<0.010	-
B	0.006	0.005	0.007	-
Nb	0.010	0.010	0.010	-
Sn	<0.014	<0.014	<0.014	-
W	<0.077	<0.077	<0.076	-
Zr	<0.007	<0.008	<0.008	-
C	0.065	0.068	0.066	-
S	0.009	0.0064	0.0085	-
Si	0.564	0.566	0.539	-

TABLE 4-3 (cont.)
Chemical Composition of Sixteen Byron Unit 2 Charpy Specimens
Removed from Surveillance Capsule W

Element	Weld Metal			
	YW-35	YW-36	YW-37	YW-38
Fe	96.604	96.574	96.557	96.580
Co	0.007	0.007	0.007	0.007
Cr	0.093	0.095	0.095	0.095
Cu	0.023	0.024	0.024	0.024
Mn	1.439	1.466	1.475	1.451
Mo	0.464	0.461	0.466	0.463
Ni	0.711	0.708	0.716	0.715
P	0.012	0.012	0.012	0.013
Ti	<0.003	0.006	<0.004	<0.004
V	0.001	0.001	0.001	0.001
Al	-	-	-	-
As	-	-	-	-
B	-	-	-	-
Nb	-	-	-	-
Sn	-	-	-	-
W	-	-	-	-
Zr	-	-	-	-
C	-	-	-	-
S	-	-	-	-
Si	-	-	-	-

TABLE 4-3 (cont.)
Chemical Composition of Sixteen Byron Unit 2 Charpy Specimens
Removed from Surveillance Capsule W

Element	Weld Metal			
	YW-39	YW-40	YW-41	YW-42
Fe	96.592	96.567	96.564	96.566
Co	0.007	0.007	0.007	0.007
Cr	0.095	0.095	0.095	0.093
Cu	0.024	0.024	0.024	0.024
Mn	1.450	1.457	1.464	1.468
Mo	0.459	0.465	0.467	0.464
Ni	0.707	0.720	0.717	0.711
P	0.014	0.014	0.012	0.014
Ti	0.006	<0.004	<0.004	0.006
V	0.001	0.001	0.001	0.001
Al	-	-	-	-
As	-	-	-	-
B	-	-	-	-
Nb	-	-	-	-
Sn	-	-	-	-
W	-	-	-	-
Zr	-	-	-	-
C	-	-	-	-
S	-	-	-	-
Si	-	-	-	-

TABLE 4-3 (cont.)
Chemical Composition of Sixteen Byron Unit 2 Charpy Specimens
Removed from Surveillance Capsule W

Element	Weld Metal			Base Metal
	YW-43	YW-44	YW-45	YT-43
Fe	96.568	96.563	96.549	96.589
Co	0.007	0.007	0.007	0.009
Cr	0.095	0.095	0.094	0.057
Cu	0.024	0.024	0.025	0.067
Mn	1.474	1.477	1.465	1.296
Mo	0.461	0.461	0.465	0.551
Ni	0.706	0.707	0.717	0.772
P	0.012	0.012	0.012	<0.009
Ti	<0.004	0.006	<0.004	0.005
V	0.001	0.001	0.001	0.001
Al	-	-	-	0.019
As	-	-	-	<0.010
B	-	-	-	0.007
Nb	-	-	-	0.010
Sn	-	-	-	<0.014
W	-	-	-	<0.077
Zr	-	-	-	<0.008
C	-	-	-	0.212
S	-	-	-	0.0046
Si	-	-	-	0.234

THE BABCOCK & WILCOX COMPANY CHEMISTRY LABORATORY WORK REQUEST

TO: MT. V. CHEMISTRY LAB.

FROM: DEPT. _____

SUPERVISOR _____

LEAD PERFORM CHEMICAL ANALYSIS OF ELEMENTS IDENTIFIED BELOW.

CONTRACT NO. _____ S/N _____ MK NO. _____ UNIT NO. _____

PRE-TYPE _____ SIZE _____ HEAT NO. _____

LUX-TYPE _____ LOT NO. _____

DATE RECEIVED _____ 9-22-61 DATE REPORTED _____ 10-8-61

DESCRIPTION OF AREA FROM WHICH SAMPLES WERE TAKEN _____

WF 336 (337)

QUALIFY TO: _____

DATE 8-9-76

SHIFT 1st

SHOP _____

NO SAMPLES 1

SEQ. NO. _____

W.F. NO. 337

P.O. NO. _____

ELECTRODE NO. _____

DEV. NO. _____

WELD NO. _____

HEAD NO.	HEAD	C	ML	F/S	SI	Cr	NI	Mo	Cu	V	Al	TI	Co	Fe	Sn/B	Pb/Ac	Zr/Fo	W/S	LAB NO.
	TOP	.07	1.42	.011	.51	.11	.68	.43	.026	.006	.006	.007	.011	.016	.007	.004	.003	.013	28770
	Ground	.05	1.43	.011	.50	.11	.66	.42	.031	.006	.005	.006	.010	.010	.007	.004	.003	.013	
	Bottom	.07	1.44	.011	.50	.12	.69	.44	.026	.006	.005	.007	.011	.013	.007	.006	.003	.013	28771
	Ground	.06	1.43	.011	.51	.11	.68	.43	.023	.006	.005	.007	.011	.010	.007	.005	.003	.013	

THE BABCOCK & WILCOX COMPANY
POWER GENERATION GROUP

To K. E. MOORE - NPG - TECHNICAL STAFF - LYNCHBURG

From L. G. KLEIN - NE - MNC MATERIALS LAB - BARBERTON (1278)

Cust.

Subj. "ROUND ROBIN" SPECTROGRAPHIC ANALYSES
CARBON AND LOW ALLOY STEEL

File No.
or Ref.

F-10361

Date

NOV. 23, 1976

This letter to cover one customer and one subject only.

Reported are the results of our spectrographic analyses performed on the top and bottom of five samples submitted on 11/15/76:

Weight %

Sample No.	C	Mn	P	S	Si	Cr	Ni	Mo	Cu	Sn	V	Al*
62W Top	.085	1.57	.016	.007	.48	.17	.60	.37	.162	.009	.008	.020
62W Bottom	.076	1.54	.016	.008	.49	.17	.61	.38	.161	.009	.006	.021
63W Top	.090	1.56	.015	.010	.54	.09	.67	.41	.274	.019	.007	.000
63W Bottom	.094	1.58	.017	.012	.60	.09	.68	.43	.293	.020	.007	.003
MM Top	.240	1.34	.008	.021	.20	.09	.60	.56	.098	.013	.004	.030
MM Bottom	.242	1.36	.008	.026	.20	.09	.59	.56	.100	.014	.005	.040
SS Top	.214	.62	.011	.009	.25	.32	.77	.59	.035	.008	.028	.001
SS Bottom	.228	.63	.012	.014	.27	.32	.77	.59	.037	.007	.031	.024
WF336 Top	.094	1.43	.010	.009	.50	.11	.66	.43	.030	.014	.007	.000
WF336 Bottom	.096	1.43	.010	.009	.51	.11	.65	.43	.029	.014	.007	.001

*Minimum limits of detection .001.

L. G. Klein

L. G. Klein

LGK:kw

cc: V. J. Hudacko

RC-124

CHEMISTRY LABORATORY
ANALYSIS REQUEST

THE BABCOCK & WILCOX COMPANY

Lynchburg Research Center

REQUESTER R. F. Phillips	CHARGE NUMBER 2195-04	DATE 7/22/76	DUE DATE 7/30/76
PRIORITY (SEE REVERSE OF LAST COPY)			

A NUMBER OF SAMPLES	B RADIOACTIVE _____ NON-RADIOACTIVE _____	C TEST NUMBER	D
------------------------	---	------------------	---

SAMPLE NUMBERS

62W - 63W - WF337 - 121 - SS

SPECIAL HANDLING AND DISPOSAL PROCEDURES

Return samples with analysis report to CFZ.

DESCRIPTION OF SAMPLES AND DESIRED ANALYSIS (INCLUDE MAXIMUM DESIRED ERROR LIMITS)

INCP Base Metals and Weld Metals.

RESULTS

SAMPLE	% Cu \pm .01	% Ni \pm .02
121 (T)	.13	.62
62W	.29	.67
63W (E)	.29	.66
62W	.30	.69
121 (T)	.12	.60
121	.12	.58
SS (T)	.06	.78
SS	.06	.79
WF337 (T)	.02	.62
WF337	.04	.67

(3)

The samples were analyzed using XR-2 analytical procedure. The sample mask used has a 1/2" diameter hole, which gives an area for analysis of .156 sq. inches. The error bars given equal 1 sigma limits.

ANALYZED BY <i>[Signature]</i>	DATE 7-27-76	APPROVED BY <i>[Signature]</i>	DATE 7-27-76
REQUEST NUMBER 443	LABORATORY BOOK NUMBER 1	PAGE	

This form consists of

- Original - Laboratory copy
- Canary - Results copy
- Pink - Inter-Laboratory copy
- Goldenrod - Requester copy

LRC-124

CHEMISTRY LABORATORY
ANALYSIS REQUEST

THE BABCOCK & WILCOX COMPANY

Lynchburg Research Center

REQUESTER W 4 DAVIDICH	CHARGE NUMBER 5090-01	DATE 4/24/85	DUE DATE
PRIORITY (SEE REVERSE OF LAST COPY)			

A	B	C	D
NUMBER OF SAMPLES 3	RADIOACTIVE NON-RADIOACTIVE	TEST NUMBER	

SAMPLE NUMBERS
62W, 63W, WF 336

SPECIAL HANDLING AND DISPOSAL PROCEDURES

RETURN SAMPLES

DESCRIPTION OF SAMPLES AND DESIRED ANALYSIS (INCLUDE MAXIMUM DESIRED ERROR LIMITS)

LOW ALLOY STEELS FOR COMPOSITION

RESULTS

SEE ATTACHED

ANALYZED BY EM	DATE	APPROVED BY G. Morgan	DATE 5/20/85
REQUEST NUMBER 1051	LABORATORY BOOK NUMBER FILE 5090		PAGE

This form consists of:
Original — Laboratory copy
Canary — Results copy
Pink — Inter-Laboratory copy
Goldenrod — Requester copy

62W

63W

WF 336

C	.080	$\pm .01$	.05	.089	$\pm .01$	.04 ⁺	.004	.081	$\pm .003$
Mn	1.55	$\pm .1$	1.57	1.56	$\pm .1$	1.61	1.43	1.45	$\pm .1$
P	.018	$\pm .001$	.014	.016	$\pm .001$	.045	.009	.011	$\pm .001$
S	.014	$\pm .004$	.011	.017	$\pm .006$	.0125	.011	.014	$\pm .003$
Al	.54	$\pm .01$	.62 ^{$\Delta 08$}	.59	$\pm .02$	.69 ^{$\Delta 10$}	.68 ^{$\Delta 10$}	.58	$\pm .02$
Cr	.169	$\pm .003$	.17	.1093	$\pm .004$	.09	.11	.114	$\pm .003$
Mo	.382	$\pm .004$	.38	.41	$\pm .01$	.42	.43	.43	$\pm .01$
Si	.47	$\pm .04$	.50	.54	$\pm .03$	.59	.505	.49	$\pm .04$
V	.0043	$\pm .0005$	.005	.0048	$\pm .0005$	.004	.004	.0047	$\pm .0005$
Cu	.185	$\pm .005$	.04	.34	$\pm .01$	.345	.029	.027	$\pm .001$
Ti	.002	$\pm .001$	.007	.002	$\pm .0003$	.007	.007	.002	$\pm .001$
B	.0003	$\pm .0003$	.00055	.0004	$\pm .0004$	.0004	.0005	.0006	$\pm .0006$
Co	.015	$\pm .002$	.014	.021	$\pm .002$	.0225	.011	.009	$\pm .002$
Sn	.0032	$\pm .0006$	.0025	.013	$\pm .002$	.0105	.0075	.009	$\pm .001$
Pb	.0008	$\pm .0004$		.0014	$\pm .0008$		.0002		$\pm .0002$
b	<.01			<.01			<.01		
z	<.007			<.007			<.007		

	62W	4/24/85	5/06/85	5/17/85	Average	Std Dev	% ERR
C		0.0745	0.0843	0.0813	0.0800	0.0050	12.5
MN		1.5100	1.6100	1.5400	1.5533	0.0513	6.6
P		0.0175	0.0181	0.0174	0.0177	0.0004	4.3
S		0.0150	0.0154	0.0118	0.0141	0.0020	28.1
NI		0.5420	0.5330	0.5360	0.5370	0.0046	1.7
CR		0.1660	0.1710	0.1700	0.1690	0.0026	3.1
MO		0.3840	0.3800	0.3810	0.3817	0.0021	1.1
SI		0.4860	0.4810	0.4520	0.4730	0.0184	7.8
V		0.0042	0.0043	0.0045	0.0043	0.0002	7.0
CU		0.1830	0.1880	0.1840	0.1850	0.0026	2.9
TI		0.0026	0.0020	0.0019	0.0022	0.0004	34.9
AL		0.0546	0.0131	0.0426	0.0401	0.0258	128.9
B		0.0002	0.0005	0.0001	0.0003	0.0002	156.0
CO		0.0141	0.0142	0.0154	0.0146	0.0007	9.9
SN		0.0035	0.0031	0.0030	0.0032	0.0003	16.5
NB	<.01	<.01	<.01	<.01			
PB	0.0010	0.0009	0.0006	0.0008	0.0002		49.9
ZR	<.007	<.007	<.007	<.007			

	63W	4/27/85	5/06/85	5/17/85	Average	Std Dev	% ERR
C		0.0900	0.0831	0.0945	0.0892	0.0057	12.9
MN		1.5100	1.6200	1.5600	1.5633	0.0551	7.0
P		0.0159	0.0163	0.0158	0.0160	0.0003	3.3
S		0.0202	0.0173	0.0141	0.0172	0.0031	35.5
NI		0.5920	0.5810	0.5900	0.5877	0.0059	2.0
CR		0.0944	0.0938	0.0907	0.0930	0.0020	4.3
MO		0.4190	0.4100	0.4150	0.4147	0.0045	2.2
SI		0.5490	0.5360	0.5200	0.5350	0.0145	5.4
V		0.0047	0.0048	0.0048	0.0048	0.0001	2.4
CU		0.3280	0.3450	0.3370	0.3367	0.0085	5.1
TI		0.0021	0.0019	0.0019	0.0020	0.0001	11.7
AL	0.0286<.001		0.0098	0.0192	ERROR	ERROR	
B	0.0004	0.0006	0.0002	0.0004	0.0002		100.0
CO	0.0204	0.0212	0.0227	0.0214	0.0012		10.9
SN	0.0134	0.0126	0.0139	0.0133	0.0007		9.8
NB	<.01	<.01	<.01	<.01			
PB	0.0017	0.0014	0.0010	0.0014	0.0004		51.4
ZR	<.007	<.007	<.007	<.007			

	WF336	4/24/85	5/06/85	5/17/85	Average	Std Dev	% ERR
C		0.0806	0.0815	0.0837	0.0819	0.0016	3.9
MN		1.4100	1.4900	1.4500	1.4500	0.0400	5.5
P		0.0106	0.0106	0.0108	0.0107	0.0001	2.2
S		0.0140	0.0156	0.0126	0.0141	0.0015	21.3
NI		0.5900	0.5730	0.5910	0.5847	0.0101	3.5
CR		0.1130	0.1140	0.1160	0.1143	0.0015	2.7
MO		0.4350	0.4260	0.4330	0.4313	0.0047	2.2
SI		0.5140	0.4900	0.4670	0.4903	0.0235	9.6
V		0.0046	0.0047	0.0048	0.0047	0.0001	4.3
CU		0.0262	0.0267	0.0270	0.0266	0.0004	3.0
TI		0.0024	0.0018	0.0018	0.0020	0.0003	34.6

AL	0.0343	<.001	0.0148	0.0246	ERROR	ERROR
B	0.0004	0.0009	0.0005	0.0006	0.0003	88.0
CO	0.0087	0.0091	0.0101	0.0093	0.0007	15.5
SN	0.0091	0.0088	0.0097	0.0092	0.0005	10.0
NB	<.01	<.01	<.01	<.01		
PB	0.0007	0.0006	0.0004	0.0006	0.0002	53.6

L.F.C-124

CHEMISTRY LABORATORY
ANALYSIS REQUEST

THE BABCOCK & WILCOX COMPANY

Lynchburg Research Center

REQUESTER <i>C. F. Zurlippe</i>	CHARGE NUMBER <i>2185-01</i>	DATE <i>8-24-76</i>	DUE DATE
PRIORITY (SEE REVERSE OF LAST COPY)			

A	B	C	D
NUMBER OF SAMPLES <i>11</i>	RADIOACTIVE _____ NON-RADIOACTIVE _____	TEST NUMBER	
SAMPLE NUMBERS			

SPECIAL HANDLING AND DISPOSAL PROCEDURES

DESCRIPTION OF SAMPLES AND DESIRED ANALYSIS (INCLUDE MAXIMUM DESIRED ERROR LIMITS)

*Sample to be run as before with mask used on
slayer specimen.*

RESULTS	Copper		Nickel	
	Top	Bottom	Top	Bottom
<i>Sample</i>				
<i>62 W</i>	<i>.23</i>	<i>.23</i>	<i>.64</i>	<i>.65</i>
<i>63 W</i>	<i>.34</i>	<i>.33</i>	<i>.70</i>	<i>.68</i>
<i>MM</i>	<i>.13</i>	<i>.15</i>	<i>.64</i>	<i>.64</i>
<i>WF 336</i>	<i>.03</i>	<i>.03</i>	<i>.70</i>	<i>.71</i>
<i>SS</i>	<i>.09</i>	<i>.10</i>	<i>.81</i>	<i>.82</i>
<i>EE 016</i>	<i>.34</i>		<i>.60</i>	
<i>EE 620</i>	<i>.07</i>		<i>.78</i>	
<i>EE 706</i>	<i>.05</i>		<i>.80</i>	
<i>CC 738</i>	<i>.10</i>		<i>.58</i>	
<i>CC 018</i>	<i>.33</i>		<i>.57</i>	
<i>DD 731</i>	<i>.13</i>		<i>.58</i>	

N+U Same (VN) 1/2's
Cu *Ni*

002

CVS *56* *C-2789-2*
TWI-1 *.35* *.71* *WF25*
.12 *.59* *C3307-1*

ANALYZED BY <i>RB/RLH</i>	DATE <i>9-22-76</i>	APPROVED BY <i>[Signature]</i>	DATE <i>9-22-76</i>
REQUEST NUMBER <i>77B</i>	LABORATORY BOOK NUMBER <i>729</i>	PAGE	

This form consists of

- Original - Laboratory copy
- Carbon - Results copy
- Pink - Inter-Laboratory copy
- Goldendred - Requester copy

Research and Development Division

LYNCHBURG RESEARCH CENTER
LYNCHBURG, VIRGINIA**P-bcock & Wilcox**

To K. E. MOORE, TECH. STAFF

From R. L. HOFFMANN, ANALYTICAL CHEMISTRY

Cust.

File No.
or Ref. 2385-01

Subj.

Cu & Ni Analysis on Round Robin

Date

October 26, 1976

This letter to cover one customer and one subject only.

As I mentioned to you, I sent the Round Robin Specimens to J & L Steel in Aliquippa, Pa. for copper and nickel analysis. Dr. W. Wysochansky of J. & L Steel performed the analysis and reported these results:

	% Cu $\pm .005$	% Ni $\pm .002$
62W	.174	.615
63W	.327	.683
MM	.113	.604
SS	.032	.793
WF-36	.036	.668

WF 336

The analyses were performed on the "bottom" of the specimens only. Dr. Wysochansky did this analysis on a weekend as a favor to me and I expressed B & W's appreciation to him. If you have any questions, give me a call.

R. L. Hoffmann
R. L. Hoffmann

RLH:rwd

cc: C. F. Zurlippe
E. Morgan

Table 1. Chemical Analyses of "Round Robin" Weld Samples^a

Weld Sample	Analyzed by	Composition in Weight Percent										Remarks
		C	Cu	P	S	Si	Cr	Ni	Mn	Mo	V	
62W	B&W, Barberton	0.08	0.18	0.017	-	0.51	0.17	0.62	1.56	0.38	0.015	
	B&W, Mt. Vernon	0.05	0.19	0.015	-	0.50	0.17	0.61	1.57	0.37	0.005	
	J&L	-	0.18	-	-	-	-	0.66	-	-	-	
	Range ^b - High	0.07	0.23	0.017	-	0.51	0.17	0.66	1.57	0.38	0.015	
	- Low	0.05	0.16	0.015	-	0.48	0.17	0.60	1.57	0.37	0.005	
	ORNL	-	0.18	-	-	0.49	0.17	0.61	1.45	0.40	0.007	July 1978
	Y-12: Top Surface	-	0.18	-	-	0.47	0.17	0.65	1.63	0.40	-	August 7, 1978
	Y-12: Bottom Surface	-	0.13	-	-	0.43	0.17	0.63	1.64	0.31	-	August 3, 1978
63W	B&W Range ^b - High	0.09	0.34	0.016	-	0.62	0.09	0.70	1.60	0.42	0.016	
	- Low	0.05	0.27	0.010	-	0.54	0.08	0.66	1.56	0.41	0.006	
	ORNL	-	0.28	-	-	0.51	0.094	0.65	1.47	0.41	0.005	July 1978
	Y-12: Top Surface	-	0.24	-	-	0.55	<0.10	0.72	1.64	0.42	-	August 7, 1978
	Y-12: Bottom Surface	-	0.24	-	-	0.47	0.12	0.66	1.64	0.37	-	August 3, 1978
WF336	B&W Range ^b - High	0.09	0.04	0.010	-	0.50	0.11	0.70	1.43	0.43	0.007	
	- Low	0.05	0.02	0.008	-	0.50	0.11	0.62	1.43	0.42	0.006	
	ORNL	-	0.07	-	-	0.49	0.12	0.64	1.35	0.44	0.005	July 1978
	Y-12: Top Surface	-	<0.10	-	-	0.60	0.10	0.67	1.45	0.50	-	August 7, 1978
	Y-12: Bottom Surface	-	<0.10	-	-	0.46	0.11	0.66	1.46	0.37	-	August 3, 1978

^aSamples supplied by Babcock and Wilcox Company.^bRange of results reported by Babcock and Wilcox Company.

Summary prepared by R. G. Berggren 3/29/78

24JUL85

Mr Evan Morgan
Research Specialist
Babcock & Wilcox
Research and Development Division
Lynchburg Research Center
P.O. Box 11165
Lynchburg VA 24506-1165

Dear Mr. Morgan:

The samples have been returned in a separate package. You will note numbers marked on the three pieces. These numbers correlate with the output data and show up as the number after the decimal point: .X. In analyzing metal samples we normally will look within the piece to assure ourselves we have homogeneity at some level. As you will note, on a number of elements you show problems on sample 63; C,P,S,Mn,Si etc. This within sample problem can obviously have an effect on between laboratory numbers.

The enclosed sheet gives my averaged values for the three samples. For some elements the values do not agree with the computer printout sheets. This is due to the way we calibrate and the computer sheets are not corrected for spectral interferences whereas the table is corrected.

For round robin testing, probably the greatest problem is the different calibration of each instrument used. This is a very difficult problem to solve. Even when the calibrating standards are furnished with the samples, you can and will get differing values due to the human drawing the curves or the computer equation fitting the points. Variations of 5% are not unusual and many times are much larger at low values. When you compound the problem with non-homogeneous samples the errors can seem large indeed. Based on the tests we made, I am certain that sample 63 has problems both horizontally and vertically.

Outside of a few lab values, it appears to me that the agreement is good.

After you have studied the data and have any questions give me a call and I will add anything I can.

We looked at Ca to determine the possible presence of flux trapped in the sample but it seems very clean.

Sincerely


John A Norris

Analytical Values

Element	62	63	336
C	.068	.073	.074
P	.016	.015	.0097
S	.011	.013	.012
Mn	1.570	1.575	1.413
Si	.474	.556	.496
Ni	.616	.685	.674
Cr	.168	.0814	.108
V	.0040	.0045	.0040 ^H
Ti	.0019	.0016	.0017
Mo	.375	.411	.426
Cu	.170	.305	.0262
Co	.0117	.0204	.0062
Al	.0196	.0030	.0042
Mg	.00029	.00030	.00026
Nb	.003	.004	.003
Zr	.002	.002	.002

OMNITAB 19J AWS 80:30 B&W ROUND ROBIN WELDS

ONEWAY ANALYSIS OF 48 MEASUREMENTS IN CON(JACO)
CLASSIFIED INTO 12 GROUPS WITH NUMBERS IN COLUMN 35

I ANALYSIS OF VARIANCE I Cu 2135

SOURCE	D.F.	SUMS OF SQUARES	MEAN SQUARES	F RATIO	PROB.
BETWEEN GROUPS	11	.62195801	.056541637	*****	.000
SLOPE	1	.14793604	.14793604	14.354	.001
ABOUT LINE	10	.47402197	.047402197	*****	.000
WITHIN GROUPS	36	.000081065898	.000022518305		
TOTAL	47	.62203909			

KRUSKAL-WALLIS RANK TEST FOR DIFFERENCE BETWEEN MEANS
SIGNIFICANCE LEVEL IS APPROXIMATELY .000

I ESTIMATES I

GROUP	NO.	MEAN	MINIMUM	MAXIMUM	SUM RANKS
62.1	4	.17340442	.17217623	.17499609	101.0
62.2	4	.16632634	.16469043	.16819545	74.0
62.3	4	.17221775	.16854053	.17445323	96.0
62.4	4	.17517671	.17456650	.17580448	121.0
63.1	4	.30678838	.30242434	.30864460	163.0
63.2	4	.31142406	.30976433	.31406879	186.0H
63.3	4	.30648055	.30424728	.30761620	158.0
63.4	4	.30306838	.30227887	.30361409	141.0
336.1	4	.027703195	.026901707	.028410288	24.0
336.2	4	.029468971	.029443651	.029500802	58.0
336.3	4	.027743398	.027457109	.028078219	22.0L
336.4	4	.027996992	.027655948	.028314750	32.0
TOTAL	48	.16898324	.026901707	.31406879	

GROUP	WITHIN S.D.	S.D. OF MEAN	95 PCT CONF INT FOR MEAN
62.1	.0012158268	6.0791340-04	.17146979 TO .17533904
62.2	.0015140668	7.5703341-04	.16391716 TO .16873552
62.3	.0027777796	.0013888698	.16779774 TO .17663775
62.4	.00876780-04	2.5438390-04	.17436716 TO .17598626
63.1	.0029233311H	.0014616655H	.30213678 TO .31143998
63.2	.0018488932	9.2444662-04	.30848210 TO .31436602
63.3	.0015470694	7.7353472-04	.30401886 TO .30894224
63.4	.5.6298596-04	2.8149298-04	.30217256 TO .30396420
336.1	6.3273047-04	3.1636523-04	.026696394 TO .028709995
336.2	2.5513792-05L	1.2756896-05L	.029428373 TO .029509568
336.3	3.1599526-04	1.5799763-04	.027240587 TO .028246210
336.4	3.1769315-04	1.5884657-04	.027491479 TO .028502506
MODEL	-----	-----	-----
FIXED	.0015006100	2.1659440-04	.16854397 TO .16942251
RANDOM	.11889243	.034321287	.093442626 TO .24452388
UNGROUPED	.11504292	.016605016	.13557626 TO .20238822

OMNITAB 19: AWS 60:30 B&W ROUND ROBIN WELDS

--- BOX PLOTS --- Cu

GROUP NO. 025901707 .17048525 .31406879

62.1	4	XX	
62.2	4	XX	
62.3	4	XX	
62.4	4	X	
63.1	4	XX	
63.2	4	XX	
63.3	4	XX	
63.4	4	X	
336.1	4	X	
336.2	4	X	
336.3	4	X	
336.4	4	X	

OMNITAB 19J AVS 60:30 B&W ROUND ROBIN WELDS

ONEWAY ANALYSIS OF 48 MEASUREMENTS IN CON(JACO)
CLASSIFIED INTO 3 GROUPS WITH NUMBERS IN COLUMN 35

ANALYSIS OF VARIANCE 1 *Cu*

SOURCE	D.F.	SUMS OF SQUARES	MEAN SQUARES	F RATIO	PROB.
BETWEEN GROUPS	2	.52163179	.31081599	*****	.000
SLOPE	1	.16486008	.16486008	16.588	.000
ABOUT LINE	1	.45677171	.45677171	*****	.000
WITHIN GROUPS	45	.00040724331	.0000090498512		
TOTAL	47	.62203909			

KRUSKAL-WALLIS RANK TEST FOR DIFFERENCE BETWEEN MEANS
SIGNIFICANCE LEVEL IS APPROXIMATELY .000

ESTIMATES 1

GROUP	NO.	MEAN	MINIMUM	MAXIMUM	SUM RANKS
62	16	.17178130	.16469043	.17580448	392.0
63	16	.30694033	.30227887	.31406879	648.0H
336	16	.028228138	.026901707	.029500802	136.0L
TOTAL	48	.16898324	.026901707	.31406879	

GROUP	WITHIN S.D.	S.D. OF MEAN	95 PCT CONF INT FOR MEAN
62	.0037555772	.00093914430H	.16977956 TO .17378304
63	.0035151609	.00087879023	.30506724 TO .30881343
336	.00082542394L	.00020635598L	.027788301 TO .028667975
MODEL			
FIXED	.0030082971	.00043421028	.16810870 TO .16985778
RANDOM	.13937716	.080469442	.17725261 TO .51521911
UNGROUPED	.11504292	.016505016	.13557826 TO .20238822

OMNITAB 19J AWS 80:30 B&W ROUND ROBIN WELDS

PAGE 180

--- BOX PLOTS I Cu ---

GROUP NO. 026901707 .17048525 .31406879

62 16

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336 16 M

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ONEWAY ANALYSIS OF 48 MEASUREMENTS IN CON(JACO)
CLASSIFIED INTO 12 GROUPS WITH NUMBERS IN COLUMN 35

ANALYSIS OF VARIANCE I N_i

SOURCE	D.F.	SUMS OF SQUARES	MEAN SQUARES	F RATIO	PROB.
BETWEEN GROUPS	11	.044272923	.0040248112	315.783	.000
SLOPE	1	.025399251	.025399251	60.435	.000
ABOUT LINE	10	.018873672	.0018873672	148.081	.000
WITHIN GROUPS	36	.00045883856	.000012745516		
TOTAL	47	.044731767			

KRUSKAL-WALLIS RANK TEST FOR DIFFERENCE BETWEEN MEANS
SIGNIFICANCE LEVEL IS APPROXIMATELY .000

I ESTIMATES I

GROUP	NO.	MEAN	MINIMUM	MAXIMUM	SUM RANKS
62.1	4	.61577651	.61240362	.62137304	33.0
62.2	4	.61339492	.61011667	.62200747	21.0L
62.3	4	.61524483	.61171595	.61687430	L
62.4	4	.62007999	.61690100	.62325516	30.0
63.1	4	.67739906	.67068586	.68070643	52.0
63.2	4	.68973982	.68505632	.69701039	122.0
63.3	4	.69092234	.68585898	.69337688	H
63.4	4	.68202592	.67906596	.68379512	178.OH
336.1	4	.67340416	.67220454	.67460220	150.0
336.2	4	.66694412	.66264143	.67069758	96.0
336.3	4	.67656147	.67354033	.67949616	74.0
336.4	4	.67900661	.67559317	.68310454	113.0
TOTAL	48	.65822166	.61011667	.69701039	129.0

GROUP	WITHIN S.D.	S.D. OF MEAN	95 PCT CONF INT FOR MEAN
62.1	.0041541517	.0020770738	.60916653 TO .62238669
62.2	.0057542035	.0028771017	H .60423683 TO .62255100
62.3	.0024116021	.0012058010	.61140749 TO .61908217
62.4	.0026054162	.0013027084	.61593425 TO .62422572
63.1	.0046179669	.0023089834	.67004196 TO .68473817
63.2	.0051217151	.0025608375	.68159015 TO .69788948
63.3	.0031736556	.0015868278	.68404242 TO .69414225
63.4	.0018301023	.00091505113	.67911387 TO .68493798
336.1	.0011163902	.00055819510L	.67162777 TO .67518056
336.2	.0033909495	.0016954747	.66154844 TO .67233979
336.3	.0024418133	.0012209067	.67267606 TO .68044689
336.4	.0032075018	.0016037509	.67390283 TO .68411038
MODEL			
FIXED	.0035700862	.00031329756	.65717659 TO .65926673
RANDOM	.031720699	.0091569771	.63806736 TO .67837609
UNGROUPEd	.030850279	.0044528542	.64926368 TO .66717964

OMNITAB 19J AWS 80:30 B&W ROUND ROBIN WELDS

ONEWAY ANALYSIS OF 48 MEASUREMENTS IN CON(JACO)
CLASSIFIED INTO 3 GROUPS WITH NUMBERS IN COLUMN 35

ANALYSIS OF VARIANCE I N:

SOURCE	D.F.	SUMS OF SQUARES	MEAN SQUARES	F RATIO	PROB.
BETWEEN GROUPS	2	.043429072	.021714536	750.112	.000
SLOPE	1	.026777604	.026777604	68.606	.000
ABOUT LINE	1	.016651468	.016651468	575.212	.000
WITHIN GROUPS	45	.0013026772	.000028948382		
TOTAL	47	.044731767			

KRUSKAL-WALLIS RANK TEST FOR DIFFERENCE BETWEEN MEANS
SIGNIFICANCE LEVEL IS APPROXIMATELY .000

ESTIMATES I

GROUP	NO.	MEAN	MINIMUM	MAXIMUM	SUM RANKS
62	16	.61612406	.61011667	.62325516	L 136.0L
63	16	.68456201	.67088586	.69701039	H 626.0H
336	16	.67397906	.66264143	.68310454	412.0
TOTAL	48	.65822166	.61011667	.69701039	

GROUP	WITHIN S.D.	S.D. OF MEAN	95 PCT CONF INT FOR MEAN
62	.0043579895	.0010894974	.61380166 TO .61844527
63	.0063442668	.0015860667	.68118139 TO .68794262
336	.0052538892	.0013134723	.67117947 TO .67677865
MODEL			
FIXED	.0053803701	.00077658952	.65665753 TO .65978579
RANDOM	.036839632	.021269371	.56670599 TO .74973743
UNGROUPED	.030850279	.0044528542	.64926368 TO .66717964

OMNITAB 19J AWS 80:30 B&W ROUND ROBIN WELDS

I BOX PLOTS I

GROUP NO. 0 61011667 65356353 69701039

62 16 *H M H-*

63 16

336 16

Data Point	Loc.	Plant Source	Weld ID	Flux Lot	Source	Source Reference	Cu	Ni	Source Mean		Source Std. Dev.		Notes
									Cu	Ni	Cu	Ni	
1	---	----	WF-501	8086	Weld Qualification	Mt. Vernon WQ - Lab No. 20419	0.028	0.630					
1	---	----	WF-562	8061	Weld Qualification	Mt. Vernon WQ - Lab No. 22544	0.030	0.650					
1	---	----	WF-562	8061	Weld Qualification	Mt. Vernon WQ - Lab No. 22541	0.040	0.670					
1	---	BR1	WF-562	8061	Surv. Weld Block	RVSP Baseline Chemistry	0.040	0.670					Reference: WCAP-9807
1	---	BR1	WF-562	8061	Surv. Weld Block	CVN Specimen ID - EW-1	0.034	0.723	0.033	0.685	0.002	0.034	Reference: WCAP-12685
2	---	BR1	WF-562	8061	Surv. Weld Block	CVN Specimen ID - EW-2	0.035	0.709					
3	---	BR1	WF-562	8061	Surv. Weld Block	CVN Specimen ID - EW-3	0.034	0.728					
4	---	BR1	WF-562	8061	Surv. Weld Block	CVN Specimen ID - EW-4	0.035	0.666					
5	---	BR1	WF-562	8061	Surv. Weld Block	CVN Specimen ID - EW-5	0.035	0.699					
6	---	BR1	WF-562	8061	Surv. Weld Block	CVN Specimen ID - EW-6	0.035	0.751					
7	---	BR1	WF-562	8061	Surv. Weld Block	CVN Specimen ID - EW-7	0.031	0.683					
8	---	BR1	WF-562	8061	Surv. Weld Block	CVN Specimen ID - EW-8	0.032	0.673					
9	---	BR1	WF-562	8061	Surv. Weld Block	CVN Specimen ID - EW-9	0.029	0.668					
10	---	BR1	WF-562	8061	Surv. Weld Block	CVN Specimen ID - EW-10	0.029	0.686					
11	---	BR1	WF-562	8061	Surv. Weld Block	CVN Specimen ID - EW-11	0.034	0.616					
12	---	BR1	WF-562	8061	Surv. Weld Block	CVN Specimen ID - EW-12	0.033	0.651					
13	---	BR1	WF-562	8061	Surv. Weld Block	CVN Specimen ID - EW-13	0.033	0.698					

Data Point	Loc.	Plant Source	Weld ID	Flux Lot	Source	Source Reference	Cu	Ni	Source Mean		Source Std. Dev.		Notes
									Cu	Ni	Cu	Ni	
14	---	BR1	WF-562	8061	Surv. Weld Block	CVN Specimen ID - EW-14	0.031	0.656					
15	---	BR1	WF-562	8061	Surv. Weld Block	CVN Specimen ID - EW-15	0.033	0.666					
1	---	BR1	WF-562	8061	Surv. Weld Block	CVN Specimen ID - EW-46	0.031	0.655	0.032	0.656	0.003	0.010	Reference: WCAP-14241
2	---	BR1	WF-562	8061	Surv. Weld Block	CVN Specimen ID - EW-52	0.029	0.647					
3	---	BR1	WF-562	8061	Surv. Weld Block	CVN Specimen ID - EW-55	0.028	0.638					
4	---	BR1	WF-562	8061	Surv. Weld Block	CVN Specimen ID - EW-48	0.031	0.655					
5	---	BR1	WF-562	8061	Surv. Weld Block	CVN Specimen ID - EW-49	0.031	0.650					
6	---	BR1	WF-562	8061	Surv. Weld Block	CVN Specimen ID - EW-50	0.032	0.661					
7	---	BR1	WF-562	8061	Surv. Weld Block	CVN Specimen ID - EW-51	0.033	0.667					
8	---	BR1	WF-562	8061	Surv. Weld Block	CVN Specimen ID - EW-53	0.028	0.648					
9	---	BR1	WF-562	8061	Surv. Weld Block	CVN Specimen ID - EW-54	0.027	0.644					
10	---	BR1	WF-562	8061	Surv. Weld Block	CVN Specimen ID - EW-56	0.034	0.668					
11	---	BR1	WF-562	8061	Surv. Weld Block	CVN Specimen ID - EW-57	0.033	0.656					
12	---	BR1	WF-562	8061	Surv. Weld Block	CVN Specimen ID - EW-58	0.036	0.658					
13	---	BR1	WF-562	8061	Surv. Weld Block	CVN Specimen ID - EW-59	0.036	0.671					
14	---	BR1	WF-562	8061	Surv. Weld Block	CVN Specimen ID - EW-60	0.036	0.667					
1	---	BR2	WF-562	8061	Surv. Weld Block	RVSP Baseline Chemistry	0.040	0.640					Reference: WCAP-11188
1	---	BR2	WF-562	8061	Surv. Weld Block	CVN Specimen ID - FW-1	0.032	0.704	0.032	0.699	0.003	0.043	Reference: WCAP-12845

Data Point	Loc.	Plant Source	Weld ID	Flux Lot	Source	Source Reference	Cu	Ni	Source Mean		Source Std. Dev.		Notes
									Cu	Ni	Cu	Ni	
2a	---	BR2	WF-562	8061	Surv. Weld Block	CVN Specimen ID - FW-2	0.026	0.623					
2b	---	BR2	WF-562	8061	Surv. Weld Block	CVN Specimen ID - FW-2	0.028	0.635					
3	---	BR2	WF-182-1	8754	Surv. Weld Block	CVN Specimen ID - FW-3	0.031	0.679					
4	---	BR2	WF-182-1	8754	Surv. Weld Block	CVN Specimen ID - FW-4	0.029	0.644					
5	---	BR2	WF-562	8061	Surv. Weld Block	CVN Specimen ID - FW-5	0.032	0.699					
6	---	BR2	WF-562	8061	Surv. Weld Block	CVN Specimen ID - FW-6	0.034	0.765					
7	---	BR2	WF-562	8061	Surv. Weld Block	CVN Specimen ID - FW-7	0.034	0.754					
8	---	BR2	WF-562	8061	Surv. Weld Block	CVN Specimen ID - FW-8	0.031	0.673					
9	---	BR2	WF-562	8061	Surv. Weld Block	CVN Specimen ID - FW-9	0.034	0.724					
10	---	BR2	WF-562	8061	Surv. Weld Block	CVN Specimen ID - FW-10	0.035	0.747					
11	---	BR2	WF-562	8061	Surv. Weld Block	CVN Specimen ID - FW-11	0.033	0.711					
12	---	BR2	WF-562	8061	Surv. Weld Block	CVN Specimen ID - FW-12	0.031	0.688					
13	---	BR2	WF-562	8061	Surv. Weld Block	CVN Specimen ID - FW-13	0.035	0.750					
14	---	BR2	WF-562	8061	Surv. Weld Block	CVN Specimen ID - FW-14	0.032	0.698					
15	---	BR2	WF-562	8061	Surv. Weld Block	CVN Specimen ID - FW-15	0.031	0.685					
1	---	BR2	WF-562	8061	Surv. Weld Block	CVN Specimen ID - FW-51	0.033	0.724	0.033	0.723	0.002	0.024	Reference: WCAP-14228
2	---	BR2	WF-562	8061	Surv. Weld Block	CVN Specimen ID - FW-54	0.034	0.711					
3	---	BR2	WF-562	8061	Surv. Weld Block	CVN Specimen ID - FW-57	0.033	0.714					
4	---	BR2	WF-562	8061	Surv. Weld Block	CVN Specimen ID - FW-53	0.038	0.780					

Data Point	Loc.	Plant Source	Weld ID	Flux Lot	Source	Source Reference	Cu	Ni	Source Mean		Source Std. Dev.		Notes
									Cu	NI	Cu	Ni	
5	---	BR2	WF-562	8061	Surv. Weld Block	CVN Specimen ID - FW-55	0.035	0.737					
6	---	BR2	WF-562	8061	Surv. Weld Block	CVN Specimen ID - FW-56	0.033	0.728					
7	---	BR2	WF-562	8061	Surv. Weld Block	CVN Specimen ID - FW-58	0.032	0.752					
8	---	BR2	WF-562	8061	Surv. Weld Block	CVN Specimen ID - FW-59	0.032	0.743					
9	---	BR2	WF-562	8061	Surv. Weld Block	CVN Specimen ID - FW-60	0.031	0.730					
10	---	BR2	WF-562	8061	Surv. Weld Block	CVN Specimen ID - FW-46	0.032	0.711					
11	---	BR2	WF-562	8061	Surv. Weld Block	CVN Specimen ID - FW-47	0.032	0.728					
12	---	BR2	WF-562	8061	Surv. Weld Block	CVN Specimen ID - FW-48	0.031	0.703					
13	---	BR2	WF-562	8061	Surv. Weld Block	CVN Specimen ID - FW-49	0.032	0.687					
14	---	BR2	WF-562	8061	Surv. Weld Block	CVN Specimen ID - FW-50	0.033	0.703					
15	---	BR2	WF-562	8061	Surv. Weld Block	CVN Specimen ID - FW-52	0.033	0.695					

THE BABCOCK & WILCOX COMPANY
POWER GENERATION GROUP
MT. VERNON, INDIANA

WORD OF FILLER WIRE QUALIFICATION TEST

TEST NO. WF 501

DIAMETER	ELECTRODE SPECIFICATION AND WELDING PROCESS	FILLER WIRE IDENTIFICATION	CORE WIRE HEAT NO.
3/16"	12-2-WQI-32 SFA-5.17-69 Auto Sub Arc	Linde 44B MnMoNi Linde #80 Lot 8086	442011
VOLTS: 34-37	TRAVEL SPEED (IPM) 14	TYPE OF CURRENT AC	AMPERES 450-800
			PURCHASE ORDER NO. 675608 JR

CHEMICAL ANALYSIS

LAB NO.	PAD	C.	CR.	NI.	MN.	SI.	P.	S.	MO.	CU.	V.	CO.	AL.
Vendor	BareWire												
20419	Groove Weld	.039	.09	.63	1.55	.52	.012	.015	.46	.028	.003		

DROP WEIGHTS

HEAT TREATMENT	TEST NO.	TEMP. (°F.)	RESULTS	TNDT
1100 - 1150°F for 50 HRS FURNACE COOLED TO 600°F @ 15°F/HR.	WF 501	+20	NB,NB	

TENSILE PROPERTIES

TEST NO.	HEAT TREATMENT	ULTIMATE STR. PSI	YIELD PT. PSI	%ELONG. @.2%OFFSET	% RED. OF AREA
501	ABOVE	93,750	68,000	25.0	62.0

CHARPY V-NOTCH IMPACT TEST 240FT./LB. ENERGY LOAD

HEAT TREATMENT	TEST NO.	FT./LBS.	LAT.EXP.	% SHEAR	TEST NO.	FT./LBS.	LAT.EXP.	% SHEAR
	WF501	51	.037	80	WF 501	71	.057	100
ABOVE	1/4T	50	.037	75	1/4T	69	.057	100
	+70	64	.051	95	+150	69	.057	100
	WF 501	70	.056	100	WF 501	78	.062	100
	1/4T	63	.048	90	1/4T	79	.065	100
	+100	73	.058	100	+200	74	.061	100

GUIDED BEND TESTS

FACE	ROOT	SIDE

MICRO OR MACRO
FISSURE ANALYSIS.

WE HEREBY CERTIFY THAT THE ABOVE MATERIAL HAS BEEN TESTED IN ACCORDANCE WITH THE ABOVE LISTED SPECIFICATION AND IS IN CONFORMANCE WITH ALL REQUIREMENTS.

*GROOVE WELD LOW CU LOWP

MATERIAL APPROVAL

APPROVED	REJECTED
NAVSHIPS - 250/1500-1	
ASME - COMM'L NUCLEAR	X*
STEAM GENERATORS	

GROOVE WELD TEST

RADIOGRAPHIC EXAMINATION

ACCEPTABLE

WIRE FOLIO NO. 564-222

FLUX FOLIO NO. 559-063

WORKS MT. VERNON

CONTRACT NO.

FEB 13 1974

DATE

FEBRUARY 13, 1975

R. FEARING

SIGNED

R. E. Nobles

INSPECTION AGENCY

INSPECTOR

FEB 13 1975

R. NOBLES

RECORD OF FILLER WIRE QUALIFICATION TEST

TEST NO. WF 501

DIAMETER -		ELECTRODE IDENTIFICATION		FILLER METAL IDENTIFICATION		CORE WIRE IDENT. NO.	
3/16"		12-2-WQI-32 SFA-5.17 Auto Sub Arc		Linde 44B MnMoNi Low Cu - P Linde #80 Lot 8086		447011	
VOLTS: 34-37		TRAVEL SPEED (IPM) 14		TYPE OF CURRENT AC		AMPERES 450-800	
						PURCHASE ORDER NO. 675608 JR	

CHEMICAL ANALYSIS

[illegible]

DROP WEIGHTS

HEAT TREATMENT	TEST NO.	TEMP. (°F.)	RESULTS	INDI
1100 - 1150°F for 50 HRS FURNACE COOLED TO 600°F @ 15°F/HR.	WF 501	+20	NB,NB	

TENSILE PROPERTIES

TEST NO.	HEAT TREATMENT	ULTIMATE STR. PSI	YIELD PT. PSI	% ELONG. @ .2% OFFSET	% RED. OF AREA
WF 501	ABOVE	93,750	68,000	25.0	62.0

CHARPY V-NOTCH IMPACT TEST 240FT./LB. ENERGY LOAD

HEAT TREATMENT	TEST NO.	FT./LBS.	LAT. EXP.	% SHEAR	TEST NO.	FT./LBS.	LAT. EXP.	% SHEAR
ABOVE	WF501	51	.037	80	WF 501	71	.057	100
	1/4T	50	.037	75	1/4T	60	.057	100
	+70	64	.051	95	+150	60	.057	100
	WF 501	70	.056	100	WF 501	78	.062	100
	1/4T	63	.048	90	1/4T	79	.065	100
	+100	73	.058	100	+200	74	.061	100

GUIDED BEND TESTS

FACE	ROOT	SIDE

MICRO OR MACRO
FISSURE ANALYSIS

APR 18 1975

WE HEREBY CERTIFY THAT THE ABOVE MATERIAL HAS BEEN
TESTED IN ACCORDANCE WITH THE ABOVE LISTED SPECIFICATION
AND IS IN CONFORMANCE WITH ALL REQUIREMENTS.

*GROOVE WELD LOW CU LOWP

MATERIAL APPROVAL

APPROVED	REJECTED
----------	----------

NAVSHIPS . 250/1500.1

ASME - COMM'L NUCLEAR

STEAM GENERATORS

* GROOVE WELD TEST

* RADIOGRAPHIC EXAMINATION

ACCEPTABLE Low Cu - P UP TO ASME
CODE 1974 WINTER ADDENDA

WIRE FOLIO NO. 564-222

FLUX FOLIO NO. 559-063

WORKS MT. VERNON

CONTRACT NO.

FEB 18 1974

DATE _____

FEBRUARY 13, 1975

R. FEARING

SIGNED

R. E. Nobles

INSPECTION AGENCY

INSPECTOR

FEB 13 1975

R. NOBLES

WELD FILLER WIRE QUALIFICATION TEST

TEST NO. WF 501

DIAMETER	ELECTRODE SPECIFICATION	FILLER WIRE IDENTIFICATION	CORE WIRE HEAT NO.
3/16"	12-2-WQI-32 SFA-5.17 Auto Sub Arc	Linde 44B MnMoNi Low Cu - P Linde #80 Lot 8086	442011
VOLTS: 34-37	TRAVEL SPEED (IPM) 14	TYPE OF CURRENT AC	AMPERES 450-800
PURCHASE ORDER NO. 675608 JR			

CHEMICAL ANALYSIS

LAB NO.	PAD	C.	CR.	NI.	MN.	SI.	P.	S.	MO.	CU.	V.	CO.	AL.
Vendor	BareWire	.10	.11	.64	2.00	.08	.010	.012	.43	.03	.002		.021
20419	Groove Weld	.039	.09	.63	1.55	.52	.012	.015	.46	.028	.003		

DROP WEIGHTS

HEAT TREATMENT	TEST NO.	TEMP. (°F.)	RESULTS	TNDT
1100 - 1150°F for 50 HRS FURNACE COOLED TO 600°F @ 15°F/HR.	WF 501	X200	XBXBX	
		-30°F	NB,NB	
		-40°F	NB,B	

TENSILE PROPERTIES

TEST NO.	HEAT TREATMENT	ULTIMATE STR. PSI	YIELD PT. PSI	%ELONG. 2% OFFSET	% RED. OF AREA
501	ABOVE	93,750	68,000	25.0	62.0

CHARPY V-NOTCH IMPACT TEST 240FT./LB. ENERGY LOAD

HEAT TREATMENT	TEST NO.	FT./LBS.	LAT.EXP.	% SHEAR	TEST NO.	FT./LBS.	LAT.EXP.	% SHEAR
ABOVE	WF501	51	.037	80	WF 501	71	.057	100
	1/4T	50	.037	75	1/4T	69	.057	100
	+70	64	.051	95	+150	69	.057	100
	WF 501	70	.056	100	WF 501	78	.062	100
	1/4T	63	.048	90	1/4T	79	.065	100
	+100	73	.058	100	+200	74	.061	100

GUIDED BEND TESTS

FACE	ROOT	SIDE

MICRO OR MACRO FISSURE ANALYSIS.

APR 18 1975

R. FEARING

WE HEREBY CERTIFY THAT THE ABOVE MATERIAL HAS BEEN TESTED IN ACCORDANCE WITH THE ABOVE LISTED SPECIFICATION AND IS IN CONFORMANCE WITH ALL REQUIREMENTS.
*GROOVE WELD LOW CU LOWP

MATERIAL APPROVAL	APPROVED	REJECTED
NAVSHIPS - 250/1500-1	X*	
ASME - COMM'L NUCLEAR		
STEAM GENERATORS		
* GROOVE WELD TEST		
* RADIOGRAPHIC EXAMINATION		
ACCEPTABLE Low Cu - P UP TO ASME		
CODE 1974 WINTER ADDENDA		

RE FOLIO NO. 564-222
FLUX FOLIO NO. 559-063
WORKS MT. VERNON
CONTRACT NO.

FEB 13 1974 DATE FEBRUARY 13, 1975
R. FEARING SIGNED R.E. Nobles
JAN 6 1976 INSPECTION AGENCY
R. FEARING INSPECTOR
FEB 13 1975 R. NOBLES

THE BABCOCK & WILCOX COMPANY
POWER GENERATION GROUP
MT. VERNON, INDIANA

CORD OF FILLER WIRE QUALIFICATION TEST

TEST NO. WF 562

DIAMETER	ELECTRODE PREPARATION AND WELDING PROCESS	FILLER WIRE IDENTIFICATION	CORE WIRE HEAT NO.
3/16"	12-2-WGT-32 SFA 5.17 Auto Sub Arc	American Chain & Cable-Low Cu, Low P, MnMoNi Linde 80 20x D Lot No. 8061	442011
VOLTS: 34-40	TRAVEL SPEED (IPM) 12-18	TYPE OF CURRENT AC	AMPERES 500-850
			PURCHASE ORDER NO. 675608 JR

CHEMICAL ANALYSIS

LAB NO.	PAD	C.	CR.	NI.	MN.	SI.	P.	S.	MO.	CU.	V.	CO.	AL.
Vendor	Bare Wire	.10	.11	.64	2.00	.08	.010	.012	.43	.03	.002		
22544	Groove	.066	.10	.65	1.44	.47	.012	.010	.48	.03	<.01		
Spec. Required		.035-	Info	.45-	1.20-	.30-.60	.012max	.015max	.30-	.10max	.05max		
		.12-	Only	.80	1.70								
						DROP WEIGHTS			.60				

HEAT TREATMENT	TEST NO.	TEMP. (°F.)	RESULTS	TNDT
1100-1150F FOR 50 HRS FURNACE COOLED TO 600F @ 15F/HR	WF 562 1/4 T	+50F	NB, NB	

TENSILE PROPERTIES

TEST NO.	HEAT TREATMENT	ULTIMATE STR. PSI	YIELD PT. PSI	%ELONG. @.2%OFFSET	% RED. OF AREA
562	ABOVE	81,000	64,000	28.0	62.0

CHARPY V-NOTCH IMPACT TEST 240FT./LB. ENERGY LOAD

HEAT TREATMENT	TEST NO.	FT./LBS.	LAT. EXP.	% SHEAR	TEST NO.	FT./LBS.	LAT. EXP.	% SHEAR
ABOVE		SEE ATTACHED SHEET						

GUIDED BEND TESTS

FACE	ROOT	SIDE

MATERIAL APPROVAL

APPROVED REJECTED

NAVSHIPS - 250/1500-1
ASME - COMM'L NUCLEAR
STEAM GENERATORS

X*

MICRO OR MACRO
FISSURE ANALYSIS.

WE HEREBY CERTIFY THAT THE ABOVE MATERIAL HAS BEEN
TESTED IN ACCORDANCE WITH THE ABOVE LISTED SPECIFICA-
TION AND IS IN CONFORMANCE WITH ALL REQUIREMENTS.

*Up to ASME Code 1974 Winter Addenda (Low Cu, Low P)

GROOVE WELD TEST

RADIOGRAPHIC EXAMINATION

ACCEPTABLE

WIRE FOLIO NO. 564-222
FLUX FOLIO NO. 559-061
WORKS Mt. Vernon
CONTRACT NO. Folio Items

AUG 11 1975

DATE July 18, 1975

SIGNED R. E. Nobles

INSPECTION AGENCY

INSPECTOR

I. TOON

AUG 15 1975

AUG 13 1975

R. NOBLES

IMPACT TEST RESULTS

JOB IDENTIFICATION WF 562

DATE August 11, 1975

TEST LOCATION 1/4 T

AUG 11 1975

11-3

TEMP. (°F.)	FT. LB. VALUES			AVG.	LATERAL EXPANSION			% SHEAR FRACTURE		
-250	82	81	76	80	.077	.074	.074	100	100	100
-150	72	81	77	77	.064	.068	.071	100	100	100
-100	70	65	73	69	.066	.061	.065	85	80	90
+ 70	67	66	48	60	.057	.054	.042	80	75	50
+ 40	56	36	56	49	.045	.028	.046	65	30	65
+ 10	44	44	39	42	.033	.032	.030	30	30	25
- 20	28	32	31	30	.021	.026	.022	10	15	10
- 50	14	21	26	20	.012	.018	.020	5	5	5
-100	21	14	5		.014	.007	.003	5	0	0

Revised 10/18/76

TEST NO. WF 562

RECORD OF FILLER WIRE QUALIFICATION TEST

O.C. TECHNICAL PROCEDURE	WELDING PROCESS	ELECTRODE							
		SFA SPEC.	CLASSIFICATION	DIA. (IN)	PURCHASED FOR CONTRACT	FOLIO NO.	VENDOR	PURCHASE ORDER NO.	HEAT OR LOT NO.
12-2-WQI-32	Auto Sub Arc	SFA 5.17	MnMoNi Low Cu, Low P	5/32"		564-201	American Chain and Cable	675608 JR	442011
		FLUX							
		SFA SPEC.	CLASSIFICATION	PARTICLE SIZE	PURCHASED FOR CONTRACT	FOLIO NO.	VENDOR		LOT NO.
		SFA 5.17		20XD		559-061	Linde	80	8061

[illegible]

CHEMICAL ANALYSIS

[illegible]

FERRITE ANALYSIS

[illegible]

APPLICATION APPROVED

CODES	ACCEPT	REJECT
NAVSHIPS 250/1500		
ASME CODE COMM'L. NUCLEAR	1975 Summer Addenda	
ASME CODE FOSSIL		
CONTRACT NO.		
APPLICATION		

WE HEREBY CERTIFY THAT THE ABOVE MATERIAL HAS BEEN TESTED IN ACCORDANCE WITH THE ABOVE LISTED SPECIFICATION AND IS IN CONFORMANCE WITH ALL REQUIREMENTS.

MATERIAL APPROVAL

DATE October 18, 1976
SIGNED Richard A. Haring
INSP. _____
AGENCY _____
INSPECTOR _____

SIGNED

RECORD G. FILLER WIRE QUALIFICATION TEST

TEST NO. WF 762-2

Q.C. TECHNICAL PROCEDURE	WELDING PROCESS	ELECTRODE							
		SFA SPEC.	CLASSIFICATION	DIA. (IN)	PURCHASED FOR CONTRACT	FOLIO NO.	VENDOR	PURCHASE ORDER NO.	HEAT OR LOT NO.
12-2-WQI-32	Auto Sub Arc	SFA 5.17	MnMoNi Low Cu, Low P	5/32"		564-201	American Chain and Cable	675608 JR	442011
		FLUX							
		SFA SPEC.	CLASSIFICATION	PARTICLE SIZE	PURCHASED FOR CONTRACT	FOLIO NO.	VENDOR		LOT NO.
		SFA 5.17		20XD		559-061	Linde	80	8061

[illegible]

CHEMICAL ANALYSIS

[illegible]

FERRITE ANALYSIS

[illegible]

APPLICATION APPROVED

CODES	ACCEPT	REJECT
NAVSHIPS 250/1500		
ASME CODE COMM'L. NUCLEAR	1975 Summer Addenda	
ASME CODE FOSSIL		
CONTRACT NO.		
APPLICATION		

WE HEREBY CERTIFY THAT THE ABOVE MATERIAL HAS BEEN TESTED IN ACCORDANCE WITH THE ABOVE LISTED SPECIFICATION AND IS IN CONFORMANCE WITH ALL REQUIREMENTS.

MATERIAL APPROVAL

DATE October 18, 1976

SIGNED Richard C. Fanning

INSP.
AGENCY
INSPEC

POWER GENERATION GROUP
MT. VERNON, INDIANA

RECORD OF FILLER WIRE QUALIFICATION TEST

TEST NO. WF 562

DIAMETER	ELECTRODE SPECIFICATION AND WELDING PROCESS	FILLER WIRE IDENTIFICATION	CORE WIRE HEAT NO.
5/32"	12-2-WQI-32 SFA 5.17 Auto Sub Arc	American Chain & Cable-Low Cu, Low P, MnMoNi Tinde 80 20x D Lot No. 8061	442011
VOLTS: 34-40	TRAVEL SPEED (IPM) 12-18	TYPE OF CURRENT AC	AMPERES 500-850
			PURCHASE ORDER NO. 675608 JR

CHEMICAL ANALYSIS

LAB NO.	PAD IN	C.	CR.	NI.	MN.	SI.	P.	S.	MO.	CU.	V.	CO.	AL.	TI
Vendor	Bare Wire	.10	.11	.64	2.00	.08	.010	.012	.43	.03	.002			
22	Groove	.066	.10	.65	1.44	.47	.012	.010	.48	.03	.01			
Undiluted Pad		.057	.090	.63	1.49	.49	.014	.012	.42	.19	.004	.010	.004	.00
28729	1/4" Cb	.004	Sn	.005	Fe	.001	Pb	.001	As	.006	Zr	.002	W	.010

HEAT TREATMENT	TEST NO.	TEMP. (°F.)	RESULTS	TNDT
1100-1150F FOR 50 HRS FURNACE COOLED TO 600F @ 15F/HR	WF 562	+50F	NB, NB	
	1/4 T			

TENSILE PROPERTIES

TEST NO.	HEAT TREATMENT	ULTIMATE STR. PSI	YIELD PT. PSI	%ELONG. @.2%OFFSET	% RED. OF AREA
WF 562	ABOVE	81,000	64,000	28.0	62.0

CHARPY V-NOTCH IMPACT TEST 240FT./LB. ENERGY LOAD

HEAT TREATMENT	TEST NO.	FT./LBS.	LAT. EXP.	% SHEAR	TEST NO.	FT./LBS.	LAT. EXP.	% SHEAR
ABOVE		SEE ATTACHED SHEET						

GUIDED BEND TESTS

FACE	ROOT	SIDE

MICRO OR MACRO
FISSURE ANALYSIS

MATERIAL APPROVAL

APPROVED	REJECT
NAVSHIPS - 250/1500-1	
ASME - COMM'L NUCLEAR	X*
STEAM GENERATORS	

GROOVE WELD TEST

RADIOGRAPHIC EXAMINATION

ACCEPTABLE

WE HEREBY CERTIFY THAT THE ABOVE MATERIAL HAS BEEN TESTED IN ACCORDANCE WITH THE ABOVE LISTED SPECIFICATION AND IS IN CONFORMANCE WITH ALL REQUIREMENTS.

*Up to ASME Code 1974 Winter Addenda (Low Cu, Low P)

WIRE FOLIO NO. 564-201
FLUX FOLIO NO. 559-061
WORKS Mt. Vernon
CONTRACT NO. Folio Items

AUG 11 1975

DATE July 18, 1975

J. TOON

R. F. FEARING SIGNED

R. E. Nobles

AUG 13 1975

NOV 8 1976 AGENCY

AUG 13 1975

R. F. FEARING INSPECTOR

R. NOBLES

RECORD FILLER WIRE QUALIFICATION TEST

POWER GENERATOR GROUP
MT. VERNON, INDIANA

REVISED 7/11/77
REVISED 5'2 70 REVISED 10/26/77

TEST NO. WP-562, 562-1 & 562-2

Q.C. TECHNICAL PROCEDURE	WELDING PROCESS	ELECTRODE							
		SFA SPEC.	CLASSIFICATION	DIA. (IN)	PURCHASED FOR CONTRACT	FOLIO NO.	VENDOR	PURCHASE ORDER NO.	HEAT OR LOT NO.
12-2-WQT-32	Single Wire Automatic Submerged Arc	SFA-5-23	EF2N Low Cu P&V MnMoNi	5/32 3/16		564-201 564-222	Linde	675608JB	442011
		FLUX							
		SFA SPEC.	CLASSIFICATION	PARTICLE SIZE	PURCHASED FOR CONTRACT	FOLIO NO.	VENDOR	Grade	LOT NO.
		SFA-5-23	F84-EF2-FZN	20XD		559-061	Linde	80	0344 Control 8061, 8064 8060

APPLICATION	AMPERAGE			VOLTAGE			TRAVEL SPEED (IPM)	WIRE FEED SPEED (IPM)	CONTACT TO WORK (IN)	SHIELDING GAS	
	DCSP	DCRP	AC	DCSP	DCRP	AC				TYPE	FLOW RATE (CFH)
Joint Welds			500-800			34-40	12-18				

CHEMICAL ANALYSIS

LOCATION	LAB NO.	C	Mn	P	S	SI	Cr	NI	Mo	Cu	Cb	Ta	Co	N	Ti	V	AL
Vendor-Bare Wire		.10	2.00	.010	.012	.08	.11	.64	.43	.03						.002	.021
Top Surface-Groove Weld	22541	.066	1.44	.015	.012	.48	.10	.67	.44	.04	.004		.011	.013	.007	.005	.004
		SN	B	Pb	AS	Zr	W										
		.005	.0007	.0006	.004	.003	.010										
Top Surface-Undiluted	28844	.061	1.35	.013	.010	.46	.095	.65	.42	.034	.004		.010	.013	.008	.005	.004
		SN	B	Pb	As	Zr	W										
		.005	.0004	.001	.005	.003	.010										

FERRITE ANALYSIS

LOCATION	PERCENT		FERRITE NUMBER	
	D.O.	F.S.	D.O.	F.S.

APPLICATION APPROVED

CODES	ACCEPT	REJECT
NAVSHIPS 250/1500		
ASME CODE COMM'L. NUCLEAR	Up to 1976 Winter Addenda	
ASME CODE FOSSIL		
CONTRACT NO.		
APPLICATION	8 JOUTS Low Cu, P&V Joint Welds	

WE HEREBY CERTIFY THAT THE ABOVE MATERIAL HAS BEEN TESTED IN ACCORDANCE WITH THE ABOVE LISTED SPECIFICATION AND IS IN CONFORMANCE WITH ALL REQUIREMENTS
JUL 13 1977

R. NOBLE
MATERIALS REPORT

DATE	7/11/77
SIGNED	R.E. Noble
INSP. AGENCY	
INSPECTOR	

RECORD OF MECHANICAL TEST RESULTS

HEAT TREATMENT

TEST NO. WF-562, 562-1 & 562-2

100° F/Hr. rate of heating above 600° F. 50 Hrs. at 1100 ± 50° F. 150 F/Hr. rate of cooling to 600° F

DROP WEIGHTS

TEMP.	RESULTS	TEMP.	RESULTS	TEMP.	RESULTS	TEMP.	RESULTS	TEMP.	RESULTS	TEMP.	RESULTS
+50°	NR NR										

TENSILE PROPERTIES

TEST NO.	TEST TEMPERATURE	ULTIMATE STR. PSI	YIELD PT. PSI	ELONG. @ 2% OFF SET	% REDUCED AREA
WF-562	70° F	81,000	64,000	28.0	52.0

CHARPY V-NOTCH IMPACT TEST 240 FT./LB. ENERGY LOAD

TEMP.	FT./LBS.	LAT. EXP.	% SHEAR	TEMP.	FT./LBS.	LAT. EXP.	% SHEAR	TEMP.	FT./LBS.	LAT. EXP.	% SHEAR
+ 250	82	.077	100	+ 40	56	.046	65				
	81	.074	100	+ 10	44	.033	30				
	76	.074	100		44	.032	30				
+ 150	72	.064	100		39	.030	25				
	81	.068	100	- 20	28	.021	10				
	77	.071	100		32	.026	15				
+ 100	70	.066	85		31	.022	10				
	65	.061	80	- 50	14	.012	5				
	73	.065	90		21	.018	5				
+ 70	67	.057	80		26	.020	5				
	66	.054	75	- 100	21	.014	5				
	48	.042	50		14	.007	0				
+ 40	56	.045	65		5	.003	0				
	36	.028	30								

GUIDED BEND TESTS

FACE	ROOT	SIDE

MICRO OR MACRO FISSURE ANALYSIS

COMMENTS OR MISCELLANEOUS RESULTS

The 5/32" Dia. material was redrawn by combustion Engineering and Page from 3/16" Dia. material

MAY 2 1977

R. FEARING

NON DESTRUCTIVE EXAMINATION

TYPE	ACCEPT	REJECT
P.T.		
M.T.	Final Surfaces	
R.T.	Final Weld	
H.T.		
VISUAL	All Layers	

OCT 26 1977

R. FEARING

JUL 11 1977

R. FEARING

JUL 13 1977

R. NOBLES

DATE 7/13/77

SIGNED

R. NOBLES

WCAP-9807

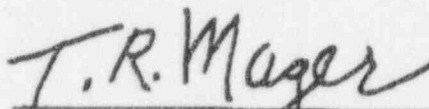
WESTINGHOUSE CLASS 3

COMMONWEALTH EDISON COMPANY
BRAIDWOOD STATION UNIT NO. 1
REACTOR VESSEL RADIATION
SURVEILLANCE PROGRAM

S. E. Yanichko
L. R. Singer

February 1981

APPROVED:



T. R. Mager, Manager
Metallurgical and NDE Analysis

Work Performed Under Shop Order CCE-106

WESTINGHOUSE ELECTRIC CORPORATION
Nuclear Energy Systems
P. O. Box 855
Pittsburgh, Pennsylvania 15230

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TABLE 4-1
CHEMICAL COMPOSITION AND HEAT TREATMENT OF THE
BRAIDWOOD UNIT 1 REACTOR VESSEL SURVEILLANCE MATERIALS [1]

Element	Chemical Composition (wt%)	
	Lower Shell Forging 49D867-1/49C813-1	Weld Metal WF-102
C	.20	.066
Mn	1.33	1.44
P	.007	.015
S	.006	.012
Si	.28	.48
Ni	.73	.67
Mo	.52	.44
Cr	.11	.10
Cu	.03	.04
Al	.018	.004
Co	.011	.011
Pb	.0003	.0006
W	.005	.010
Ti	.005	.007
Zr	.005	.003
V	.01	.005
Sn	.008	.005
As	.008	.004
Cb	.005	.004
N ₂	.0096	.013
B	.0001	.0007

HEAT TREATMENT HISTORY

Material	Temperature (° F)	Time (hr)	Cooling
Lower Shell Forging 49D867-1/ 49C813-1	Austenitizing: 1600 - 1652	8½	Water-quenched
	Tempered: 1202 - 1229	7½	Air-cooled
	Stress Relief: 1100 - 1150	12¼	Furnace-cooled
Weldment	1100 - 1150	12¼	Furnace-cooled

WESTINGHOUSE CLASS 3

WCAP-12685

ANALYSIS OF CAPSULE U FROM THE
COMMONWEALTH EDISON COMPANY
BRAIDWOOD UNIT 1 REACTOR VESSEL
RADIATION SURVEILLANCE PROGRAM

E. Terek
S. L. Anderson
L. Albertin

August 1990

Work Performed Under Shop Order BMVP-106

Prepared by Westinghouse Electric Corporation
for the Commonwealth Edison Company

Approved by: T. A. Meyer
T. A. Meyer, Manager
Structural Materials and Reliability Technology

WESTINGHOUSE ELECTRIC CORPORATION
Nuclear and Advanced Technology Division
P.O. Box 2728
Pittsburgh, Pennsylvania 15230-2728

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TABLE 4-2
CHEMICAL COMPOSITION OF BRAIDWOOD UNIT 1 CAPSULE U IRRADIATED CHARPY IMPACT SPECIMENS

Chemical Composition (wt.%)																
Specimen No.																
Metal	EL-6	EW-4	EW-15	EW-1	EW-2	EW-3	EW-5	EW-6	EW-7	EW-8	EW-9	EW-10	EW-11	EW-12	EW-13	EW-14
Fe	{Matrix Element: Remainder by Difference}															
Mn	1.300	1.470	1.490													
Cr	0.118	0.084	0.086													
Ni	0.746	0.666	0.666	0.723	0.709	0.728	0.699	0.751	0.683	0.673	0.668	0.686	0.616	0.651	0.698	0.656
Mo	0.574	0.444	0.444													
Co	<0.01	<0.01	<0.01													
Cu	0.052	0.035	0.033	0.034	0.035	0.034	0.035	0.035	0.031	0.032	0.029	0.029	0.034	0.033	0.033	0.031
P	<0.01	<0.01	<0.01													
V	<0.01	<0.01	<0.01													
C	0.207	0.065	0.063													
S	0.005	0.013	0.013													
Si	0.298	0.495	0.488													

Analyses	Method of Analysis
Metals	ICPS, Inductively Coupled Plasma Spectrometry
Carbon	EC-12, LECO Carbon Analyzer
Sulfur	Combustion/titration
Silicon	Dissolution/gravimetric

WCAP-14241

Westinghouse Class 3 (Non-Proprietary)

m.g. Kuran
OF 50

ANALYSIS OF CAPSULE X FROM THE
COMMONWEALTH EDISON COMPANY
BRAIDWOOD UNIT 1 REACTOR VESSEL
RADIATION SURVEILLANCE PROGRAM

P. A. Peter
S. S. Zawalick
J. F. Williams

March 1995

Work Performed Under Shop Order BWSP-106

Prepared by Westinghouse Electric Corporation
for the Commonwealth Edison Company

Approved by: *R. D. Rishel*
R. D. Rishel, Manager
Metallurgical & NDE Analysis

WESTINGHOUSE ELECTRIC CORPORATION
Nuclear Technology Division
P.O. Box 355
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TABLE 4-3
Chemical Composition of Braidwood Unit 1 Charpy Specimens
Removed from Surveillance Capsule X

Element	Weld Metal				
	EW-46	EW-52	EW-55	EW-48	EW-49
Fe	96.428	96.513	96.598	96.459	96.443
Co	0.006	0.006	0.006	0.006	0.006
Cr	0.091	0.090	0.089	0.091	0.091
Cu	0.031	0.029	0.028	0.031	0.031
Mn	1.649	1.604	1.544	1.622	1.639
Mo	0.464	0.455	0.453	0.465	0.464
Ni	0.655	0.647	0.638	0.655	0.650
P	0.017	0.017	0.017	0.017	0.017
Ti	0.001	0.001	0.001	0.001	0.001
V	0.002	0.002	0.002	0.002	0.002
Al	0.009	0.009	0.009	0.009	0.009
As	<0.013	<0.011	<0.009	<0.012	<0.013
B	0.014	0.013	0.012	0.012	0.013
Nb	0.012	0.011	0.011	0.010	0.011
Ta	NA	NA	NA	NA	NA
Pb	NA	NA	NA	NA	NA
Sn	<0.016	<0.013	<0.012	<0.015	<0.016
W	<0.092	<0.079	<0.069	<0.091	<0.095
Zr	0.001	0.001	0.001	0.001	0.001

NA represents elements not requested for analysis

TABLE 4-3 (CONTINUED)
Chemical Composition of Braidwood Unit 1 Charpy Specimens
Removed from Surveillance Capsule X

Element	Weld Metal				
	EW-50	EW-51	EW-53	EW-54	EW-56
Fe	96.427	96.403	96.505	96.551	96.475
Co	0.006	0.006	0.006	0.005	0.007
Cr	0.092	0.093	0.091	0.090	0.094
Cu	0.032	0.033	0.028	0.027	0.034
Mn	1.638	1.649	1.615	1.581	1.602
Mo	0.471	0.473	0.456	0.455	0.476
Ni	0.661	0.667	0.648	0.644	0.668
P	0.018	0.019	0.017	0.018	0.016
Ti	0.001	0.001	0.001	0.001	0.001
V	0.002	0.002	0.002	0.002	0.002
Al	0.009	0.009	0.009	0.009	0.009
As	<0.012	<0.013	<0.010	<0.010	<0.010
B	0.012	0.013	0.012	0.012	0.012
Nb	0.010	0.011	0.010	0.012	0.012
Ta	NA	NA	NA	NA	NA
Pb	NA	NA	NA	NA	NA
Sn	<0.015	<0.016	<0.013	<0.012	<0.012
W	<0.091	<0.093	<0.076	<0.070	<0.071
Zr	0.001	0.001	0.001	0.001	0.001

NA represents elements not requested for analysis

TABLE 4-3 (CONTINUED)
Chemical Composition of Braidwood Unit 1 Charpy Specimens
Removed from Surveillance Capsule X

Element	Weld Metal				Base Metal
	EW-57	EW-58	EW-59	EW-60	ET-57
Fe	96.521	96.546	96.589	95.856	95.979
Co	0.007	0.007	0.007	0.007	0.014
Cr	0.092	0.090	0.095	0.094	0.129
Cu	0.033	0.036	0.036	0.036	0.046
Mn	1.583	1.551	1.578	1.720	1.403
Mo	0.467	0.471	0.479	0.478	0.553
Ni	0.656	0.658	0.671	0.667	0.736
P	0.016	0.015	0.016	0.016	0.009
Ti	0.001	0.001	0.001	0.001	0.001
V	0.002	0.002	0.002	0.002	0.002
Al	0.009	0.010	0.010	0.010	0.020
As	<0.009	<0.009	<0.010	<0.009	<0.009
B	0.012	0.011	0.012	0.012	0.013
Nb	0.011	0.011	0.011	0.010	0.011
Ta	NA	NA	NA	NA	NA
Pb	NA	NA	NA	NA	NA
Sn	<0.012	<0.012	<0.012	<0.012	<0.011
W	<0.069	<0.069	<0.071	<0.070	<0.065
Zr	0.001	0.001	0.001	0.001	0.001

NA represents elements not requested for analysis

COMMONWEALTH EDISON COMPANY
BRAIDWOOD STATION UNIT NO. 2
REACTOR VESSEL RADIATION
SURVEILLANCE PROGRAM

L. R. Singer

December 1986

APPROVED: _____

T. A. Meyer

T. A. Meyer, Manager
Structural Materials and Reliability Technology

Work Performed Under CDEJ-106

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WESTINGHOUSE ELECTRIC CORPORATION
Generation Technology Systems Division
P. O. Box 2728
Pittsburgh, Pennsylvania 15230

WESTINGHOUSE PROPRIETARY CLASS 2

TABLE A-3
CHEMICAL ANALYSIS OF THE WELD METAL USED
FOR THE UPPER TO LOWER SHELL CLOSING GIRTH SEAM
OF THE BRAIDWOOD STATION UNIT NO. 2 REACTOR PRESSURE VESSEL

Element	Chemical Composition (weight %)	
	Weld Filler Wire Heat Number 442011 Linde No. 80 flux, Lot Number 0344	
C	.066 ^(a)	.069 ^(b)
Mn	1.44	1.45
P	.015	.011
S	.012	.013
Si	.48	.53
Ni	.67	.64
Mo	.44	.46
Cr	.10	.082
Cu	.04	.040
Al	.004	.007
Co	.011	.004
Pb	.0006	< .001
W	.010	< .01
Ti	.007	.003
Zr	.003	< .002
V	.005	< .002
Sn	.005	.004
As	.004	.004
Cb	.004	< .002
N ₂	.013	.012
B	.0007	< .001

a. Chemical Analysis of "Filler Wire Qualification Test" by Babcock and Wilcox, Company, Test No. WF-562

b. Westinghouse Analyses from the Surveillance Program Test Weldment.

WESTINGHOUSE CLASS 3

AL Lowe

R. B. BORSUM
LICENSING

MAY 07 1991

ROCKVILLE, MD
301-230-2100

ANALYSIS OF CAPSULE U FROM THE
COMMONWEALTH EDISON COMPANY
BRAIDWOOD UNIT 2 REACTOR VESSEL
RADIATION SURVEILLANCE PROGRAM

E. Terek
S. L. Anderson
L. Albertin

March 1991

Work Performed Under Shop Order BMVP-106

Prepared by Westinghouse Electric Corporation
for the Commonwealth Edison Company

Approved by:

T. A. Meyer
T. A. Meyer, Manager
Structural Reliability and
Plant Life Optimization

WESTINGHOUSE ELECTRIC CORPORATION
Nuclear and Advanced Technology Division
P.O. Box 2728
Pittsburgh, Pennsylvania 15230-2728

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CHEMICAL COMPOSITION OF BRAIDWOOD UNIT 2 CAPSULE U
IRRADIATED CHARPY IMPACT SPECIMENS

Specimen No.	Chemical Composition (wt.%)										
	Cu	Ni	C	Mn	P	S	Si	Cr	Mo	V	Co
FL-6	0.049	0.745	0.229	1.261	<.005	<.003	0.294	0.083	0.483	<.002	<.002
FW-1	0.032	0.704	0.070	1.628	0.011		0.467	0.090	0.466	0.006	<.002
FW-7	0.034	0.754		1.687	0.013	0.009	0.450	0.092	0.503	0.007	<.002
FW-14	0.032	0.698	0.068	1.583	0.009	0.009		0.088	0.458	0.006	<.002
FW-2	0.026	0.623									
FW-2*	0.028	0.635									
FW-3	0.031	0.679									
FW-4	0.029	0.644									
FW-5	0.032	0.699									
FW-6	0.034	0.765									
FW-8	0.031	0.673	0.038								
FW-9	0.034	0.724				0.010					
FW-10	0.035	0.747									
FW-11	0.033	0.711									
FW-12	0.031	0.688									
FW-13	0.035	0.750					0.010				
FW-15	0.031	0.685									

Analyses	Method of Analysis
Metals	ICPS, Inductively Coupled Plasma Spectrometry
Carbon	EC-12, LECO Carbon Analyzer
Sulfur	Combustion/titration
Silicon	Dissolution/gravimetric
Iron	(Matrix Element: Remainder by Difference)

* Second run to show duplication of results


ANALYSIS OF CAPSULE X FROM THE
COMMONWEALTH EDISON COMPANY
BRAIDWOOD UNIT 2 REACTOR VESSEL
RADIATION SURVEILLANCE PROGRAM

P. A. Peter
S. S. Zawalick
A. H. Fero
J. F. Williams

March 1995

Work Performed Under Shop Order BWSP-106A

Prepared by Westinghouse Electric Corporation
for the Commonwealth Edison Company

Approved by: 
R. D. Rishel, Manager
Metallurgical & NDE Analysis

WESTINGHOUSE ELECTRIC CORPORATION
Nuclear Technology Division
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TABLE 4-3
Chemical Composition of Braidwood Unit 2 Charpy Specimens
Removed from Surveillance Capsule X

Element	Weld Metal				
	FW-51	FW-54	FW-57	FW-53	FW-55
Fe	96.411	96.425	96.469	96.199	96.354
Co	<0.009	<0.009	<0.009	<0.011	<0.009
Cr	0.094	0.093	0.095	0.104	0.097
Cu	0.033	0.034	0.033	0.038	0.035
Mn	1.634	1.642	1.591	1.731	1.663
Mo	0.481	0.474	0.479	0.520	0.491
Ni	0.724	0.711	0.714	0.780	0.737
P	0.017	0.015	0.017	NA	NA
Ti	<0.007	<0.007	<0.007	NA	NA
V	<0.003	0.003	0.006	NA	NA
Al	<0.015	<0.016	<0.015	NA	NA
As	<0.022	<0.023	<0.021	NA	NA
B	0.006	<0.005	0.006	NA	NA
Nb	<0.008	<0.006	<0.004	NA	NA
Ta	NA	NA	NA	NA	NA
Pb	NA	NA	NA	NA	NA
Sn	<0.034	<0.035	<0.033	NA	NA
W	<0.001	<0.001	<0.001	NA	NA
Zr	0.001	0.001	0.001	NA	NA
Carbon	0.064	0.069	0.069	NA	NA
Sulfur	0.0080	0.0096	0.0090	NA	NA
Silicon	0.517	0.492	0.509	NA	NA

NA represents elements not requested for analysis

TABLE 4-3 (CONTINUED)
Chemical Composition of Braidwood Unit 2 Charpy Specimens
Removed from Surveillance Capsule X

Element	Weld Metal				
	FW-56	FW-58	FW-59	FW-60	FW-46
Fe	96.380	96.330	96.336	96.412	96.425
Co	<0.009	<0.009	<0.009	<0.008	<0.009
Cr	0.092	0.097	0.095	0.096	0.095
Cu	0.033	0.032	0.032	0.031	0.032
Mn	1.669	1.678	1.682	1.630	1.643
Mo	0.483	0.488	0.492	0.482	0.474
Ni	0.728	0.752	0.743	0.730	0.711
P	NA	NA	NA	NA	NA
Ti	NA	NA	NA	NA	NA
V	NA	NA	NA	NA	NA
Al	NA	NA	NA	NA	NA
As	NA	NA	NA	NA	NA
B	NA	NA	NA	NA	NA
Nb	NA	NA	NA	NA	NA
Ta	NA	NA	NA	NA	NA
Pb	NA	NA	NA	NA	NA
Sn	NA	NA	NA	NA	NA
W	NA	NA	NA	NA	NA
Zr	NA	NA	NA	NA	NA
Carbon	NA	NA	NA	NA	NA
Silicon	NA	NA	NA	NA	NA
Sulfur	NA	NA	NA	NA	NA

NA represents elements not requested for analysis

TABLE 4-3 (CONTINUED)
Chemical Composition of Braidwood Unit 2 Charpy Specimens
Removed from Surveillance Capsule X

Element	Weld Metal					Base Metal
	FW-47	FW-48	FW-49	FW-50	FW-52	FL-47
Fe	96.338	96.461	96.610	96.406	96.515	95.964
Co	<0.008	<0.008	<0.011	<0.009	<0.009	<0.010
Cr	0.097	0.091	0.089	0.093	0.091	0.099
Cu	0.032	0.031	0.032	0.033	0.033	0.056
Mn	1.701	1.633	1.476	1.674	1.595	1.411
Mo	0.480	0.468	0.457	0.471	0.454	0.539
Ni	0.728	0.703	0.687	0.703	0.695	0.804
P	NA	NA	NA	NA	NA	0.010
Ti	NA	NA	NA	NA	NA	<0.007
V	NA	NA	NA	NA	NA	<0.003
Al	NA	NA	NA	NA	NA	0.029
As	NA	NA	NA	NA	NA	<0.020
B	NA	NA	NA	NA	NA	0.007
Nb	NA	NA	NA	NA	NA	<0.007
Ta	NA	NA	NA	NA	NA	NA
Pb	NA	NA	NA	NA	NA	NA
Sn	NA	NA	NA	NA	NA	<0.031
W	NA	NA	NA	NA	NA	<0.001
Zr	NA	NA	NA	NA	NA	0.001
Carbon	NA	NA	NA	NA	NA	0.223
Sulfur	NA	NA	NA	NA	NA	0.0034
Silicon	NA	NA	NA	NA	NA	0.280

NA represents elements not requested for analysis

Weld Wire Heat H4498

6/9/97

Data Point	Loc.	Plant Source	Weld ID	Flux Lot	Source	Source Reference	Cu	Ni	Source Mean		Source Std. Dev.		Notes
									Cu	NI	Cu	Ni	
1	---	-----	WF-610	0852	Weld Qualification	Mt. Vernon WQ - Lab No. 2552	0.050	0.420					
1	---	-----	WF-645	0261	Weld Qualification	Mt. Vernon WQ - Lab No. 28119	0.033	0.500					

THE BABCOCK & WILCOX COMPANY
POWER GENERATION GROUP
MT. VERNON, INDIANA

RECORD OF FILLER WIRE QUALIFICATION TEST

TEST NO. WF 610

DIAMETER	CLASSIFICATION	FILLER *15P/08-2L04	CORE WIRE HEAT NO.
2"	12-2-MQI-32 SFA 5.17	WASA Low Cu LowP MnMoNi	H-1408
	Auto Sub ARC EH14	Linde 80 20 x D Lot No. 0852	
VOLTS:	TRAVEL SPEED (IPM)	TYPE OF CURRENT	AMPERES
34-35	15	AC	500-700
			PURCHASE ORDER NO.
			678025AK

CHEMICAL ANALYSIS

LAB NO.	PAD	C.	CR.	NI.	MN.	SI.	P.✓	S.	MO.	CU.	V.	CO.	AL.	CL Ta
Vendor	Bare Wire	.11	.018	.6	1.00	.08	.005	.007	.35	.02			.007	.003
25522	Groove	.110	.07	.42	1.45	.51	.013	.012	.42	.05	.006	.012	.010	.04
25716	Undiluted						.019	.015		.020	.007			

DROP WEIGHTS

HEAT TREATMENT	TEST NO.	TEMP. (°F.)	RESULTS	TNDT
1100-1150F for 50 hrs. furnace cooled to 600F	WF 610	-40	NB, NB	
@ 15F/hr.	1/4T	-50	NB, N	

TENSILE PROPERTIES

TEST NO.	HEAT TREATMENT	ULTIMATE STR. PSI	YIELD PT. PSI	%ELONG. @.2%OFFSET	% RED. OF AREA
WF 610	ABOVE	83,500	65,000	27.5	65.0

CHARPY V-NOTCH IMPACT TEST 240FT./LB. ENERGY LOAD

HEAT TREATMENT	TEST NO.	FT./LBS.	LAT.EXP.	% SHEAR	TEST NO.	FT./LBS.	LAT.EXP.	% SHEAR
ABOVE	SEE ATTACHED SHEET.							

GUIDED BEND TESTS

FACE	ROOT	SIDE

MICRO OR MACRO
FISSURE ANALYSIS.

WE HEREBY CERTIFY THAT THE ABOVE MATERIAL HAS BEEN
TESTED IN ACCORDANCE WITH THE ABOVE LISTED SPECIFICA-
TION AND IS IN CONFORMANCE WITH ALL REQUIREMENTS.

*For all contracts except Westing-

house. JAN 26 1976

MATERIAL APPROVAL

APPROVED REJECTED

NAVSHIPS - 250/1500-1
ASME - COMM'L NUCLEAR
STEAM GENERATORS

X*

GROOVE WELD TEST

RADIOGRAPHIC EXAMINATION ACCEPT

*UP TO ASME 74 Code & Winter 75

Addenda

RE FOLIO NO. 564-221

FLUX FOLIO NO. 550-061

WORKS Mt. Vernon

CONTRACT NO.

R. FEARING

DATE January 23, 1976

SIGNED

R.E. Nibbles

INSPECTION AGENCY

INSPECTOR

IMPACT TEST RESULTS

JOB IDENTIFICATION WF 610

DATE January 23, 1976

TEST LOCATION 1T

TEMP. (°F.)	FT. LB. VALUES			AVG.	LATERAL (Mils) EXPANSION			% SHEAR FRACTURE		
+200	85	89	91	88	60	69	69	100	100	100
+100	79	81	81	80	65	68	65	100	100	100
+70	65	67	73	65	47	52	58	65	85	90
+40	43	60	46	50	30	43	31	60	70	55
+10	44	49	48	47	33	34	34	45	50	40
-20	34	37	36	36	23	24	26	35	35	35
-50	22	21	21	21	16	15	16	15	15	15
								JAN 26 1976		
								R. NOBLES		

JAN 26 1976
R. BEARING

RECORD OF FILLER WIRE QUALIFICATION TEST

THE BABCOCK & WILCOX COMPANY
POWER GENERATION GROUP
MT. VERNON, INDIANA

TEST NO. WF 645

O.C. TECHNICAL PROCEDURE	WELDING PROCESS	ELECTRODE							HEAT OR LOT NO.
		SFA SPEC.	CLASSIFICATION	DIA. (IN)	PURCHASED FOR CONTRACT	FOLIO NO.	VENDOR	PURCHASE ORDER NO.	
12-2-WQI-32	Single Wire Automatic Submerged Arc	SFA-5.17	EH14 Mod. Low Cu, P & V MnMoNi	5/32		564-221	WASA	678025AK	H4498
		FLUX							LOT NO.
		SFA SPEC.	CLASSIFICATION	PARTICLE SIZE	PURCHASED FOR CONTRACT	FOLIO NO.	VENDOR		
		SFA-5.17	F72-EH14	20 X D		559-061	Linde	80	0261

APPLICATION	AMPERAGE			VOLTAGE			TRAVEL SPEED (IPM)	WIRE FEED SPEED (IPM)	CONTACT TO WORK (IN)	SHIELDING GAS	
	DCSP	DCRP	AC	DCSP	DCRP	AC				TYPE	FLOW RATE (CFH)
Joint Welds			500-			34-36	12-14		"		
Pad Build Up			850			"	"		"		
			"								

CHEMICAL ANALYSIS

LOCATION	LAB NO.	C	Mn	P	S	Si	Cr	Ni	Mo	Cu	Cb	Ta	Co	N	Ti	V	Al
Vendor Bare Wire	Vendor	.11	1.90	.005	.007	.08	.018	.61	.35	.02	--	--	--	--	--	0	.007
Undiluted Weld Pad	28118	.052	1.28	.013	.008	.49	.015	.56	.32	.017						.005	
Top Joint Weld	28119	.070	1.35	.010	.007	.41	.026	.50	.37	.033						.004	

FERRITE ANALYSIS

LOCATION	PERCENT			FERRITE NUMBER	
	S.D.	D.D.	F.S.	D.D.	F.S.

MAY 18 1976
R. FEABING

APPLICATION APPROVED

CODES	ACCEPT	REJECT
NAVSHIPS 250/1500		
ASME CODE COMM'L. NUCLEAR	1975 Summer Addenda	
ASME CODE FOSSIL		
CONTRACT NO.		
APPLICATION	80 UTS Joint Weld Low Cu, P & V	

WE HEREBY CERTIFY THAT THE ABOVE MATERIAL HAS BEEN TESTED IN ACCORDANCE WITH THE ABOVE LISTED SPECIFICATION AND IS IN CONFORMANCE WITH ALL REQUIREMENTS.

MATERIAL APPROVAL

DATE May 17, 1976
SIGNED R.E. Nobles
INSP. AGENCY MAY 18 1976
INSPECTOR R. NOBLES

TEST NO. WF-645

7. rate of heating above 600F, 50 hrs. at 1100-1150E 15F/hr. rate of cooling to 600F

DROP WEIGHTS

RESULTS		TEMP.	RESULTS		TEMP.	RESULTS		TEMP.	RESULTS	INDT
NB,NB		-50F	B							-50F

TENSILE PROPERTIES

TENSILE PROPERTIES					
T NO.	TEST TEMPERATURE	ULTIMATE STR. PSI	YIELD PT. PSI	%ELONG. .2% OFFSET	% RED. OF AREA
45	ROOM	82,250	65,000	26.5	64.5

CHARPY V-NOTCH IMPACT TEST 240 FT./LB. ENERGY LOAD

Mill's				Mill's				Mill's			
S.	FT./LBS.	LAT. EXP.	% SHEAR	TEMP.	FT./LBS.	LAT. EXP.	% SHEAR	TEMP.	FT./LBS.	LAT. EXP.	% SHEAR
F	88	80	100	+40F	72	58	75	-50F	10	12	15
	92	81	100		62	52	70		16	16	15
	91	80	100		54	43	55		26	21	20
F	85	78	100	+10F	57	55	55	-100F	3	2	0
	82	75	100		54	49	50		4	3	0
	84	77	100		40	40	45		4	3	0
	77	62	85	-20F	40	30	30				
	74	61	85		40	30	30				
	72	62	85		34	27	25				

GUIDED BEND TESTS

FACE	ROOT	SIDE

MICRO OR MACRO
FISSURE ANALYSIS

COMMENTS OR MISCELLANEOUS RESULTS

NON DESTRUCTIVE EXAMINATION

TYPE	ACCEPT	REJECT
P.T.		
	Final Surfaces	
R.T.	Final Weld	
U.T.		
VISUAL	Final Surfaces	

MAY 18 1976
R. FEARING

MAY 18 1976
R. NOBLES

DATE May 17, 1976

S I G N E D

Data Point	Loc.	Plant Source	Weld ID	Flux Lot	Source	Source Reference	Cu	Ni	Source Mean		Source Std. Dev.		Notes
									Cu	NI	Cu	Ni	
1	---	-----	WF-389	8968	Weld Qualification	Mt. Vernon WQ - Lab No. 15177	0.166	0.530					
1	---	-----	WF-449	8064	Weld Qualification	Mt. Vernon WQ - Lab No. 17598	0.200	0.680					
1	---	-----	WF-472	8086	Weld Qualification	Mt. Vernon WQ - Lab No. 19124	0.230	0.570					
1	---	-----	WF-614	0852	Weld Qualification	Mt. Vernon WQ - Lab No. 25933	0.180	0.540					
1	---	-----	WF-653	0261	Weld Qualification	Mt. Vernon WQ - Lab No. 28085	0.190	0.560					

F FILLER WIRE QUALIFICATION TEST

TEST 17389

12-2-WOT-32	PAGE 1	McMORIS
ACIO SUB ARC	LINDE GR.80	LOT 8968
32-34	12	450-600
		642043

CHEMICAL ANALYSIS

LAB NO.	PAD	C.	CR.	NI.	MN.	SI.	P.	S.	MO.	CU.	V.	CO.	AL.
15177		.082	.07	.53	1.45	.41	.007	.018	.34	.166	.029		

DROP WEIGHTS

HEAT TREATMENT	TEST NO.	TEMP. (°F.)	RESULTS	TNDT
1100-1150°F FOR 50 HRS./FURNACE COOLED TO 600°F AT 10°F/HR.	WF389	+20	NB,NB	

TENSILE PROPERTIES

TEST NO.	HEAT TREATMENT	ULTIMATE STR. PSI	YIELD PT. PSI	%ELONG. #.2"OFFSET	% RED. OF AREA
WF389	ABOVE	84,000	66,250	25.5	64.0

CHARPY V-NOTCH IMPACT TEST 240FT./LB. ENERGY LOAD

HEAT TREATMENT	TEST NO.	FT./LBS.	LAT.EXP.	% SHEAR	TEST NO.	FT./LBS.	LAT.EXP.	% SHEAR
ABOVE	WF389	37	.040	40	WF389	80	.079	100
	+10	43	.046	55	+200	82	.081	100
		44	.042	50		81	.079	100
	WF389	65	.067	80				
	+70	61	.058	75				
		65	.063	75				

GUIDED BEND TESTS

FACE	ROOT	SIDE

MICRO OR MACRO
FINISH ANALYSIS

WE HEREBY CERTIFY THAT THE ABOVE MATERIAL HAS BEEN
TESTED IN ACCORDANCE WITH THE ABOVE LISTED SPECIFICA-
TION AND IS IN CONFORMANCE WITH ALL REQUIREMENTS.

MATERIAL APPROVAL

APPROVED REJECTED

NAVSHIPS - 250/1500-1
ASME - COMM'L NUCLEAR
STEAM GENERATORS

X

GROOVE WLLD TEST

RADIOGRAPHIC EXAMINATION

WIRE FOLIO NO. 564-220

FOLIO NO. 559-063

MT. VERNON

FEB 12 1974

DATE FEBRUARY 12, 1974

R. FEARING

SIGNED

INSPECTION AGENCY

INSPECTOR

FEB 12 1974

R. NOBLES

THE BABCOCK & WILCOX COMPANY
POWER GENERATION GROUP
MT. VERNON, INDIANA

CORD OF FILLER WIRE QUALIFICATION TEST

TEST NO. WF449

5/32"	ELECTRODE PRECIPITATION AND APPLIED PRESSURE	FILLER WIRE IDENTIFICATION AND/OR PLUX		CORE WIRE HEAT NO. 31401
	12-2-WQI-32 AUTO SUB ARC	PAGE MnMoNi LINDE #80 LOT 8064		
3%	TRAVEL SPEED (IPM) 12	TYPE OF CURRENT	AMPERES 450 thru 700	PURCHASE ORDER NO.

CHEMICAL ANALYSIS

TEST NO.	C	CR	NI	MN	SI	P	S	MO	CU	V	CO	AL
17598	.089	Ni1	.68	1.40	.39	.012	.009	.31	.200	.015		

DROP WEIGHTS

HEAT TREATMENT	TEST NO.	TEMP. (°F.)	RESULTS	TNDT
1100-1150°F FOR 50 HRS. FURNACE COOLED TO 600°F AT 10°F/HR.	WF449	+20	NB, NB	

TENSILE PROPERTIES

TEST NO.	HEAT TREATMENT	ULTIMATE STR. PSI	YIELD PT. PSI	% ELONG. #.2% OFFSET	% RED. OF AREA
WF449	ABOVE	80,500	61,500	26.5	62.0

CHARPY V-NOTCH IMPACT TEST 240FT./LB. ENERGY LOAD

HEAT TREATMENT	TEST NO.	FT./LBS.	LAT. EXP.	% SHEAR	TEST NO.	FT./LBS.	LAT. EXP.	% SHEAR
ABOVE		SEE ATTACHED SHEET						

GUIDED BEND TESTS

ROOT	SIDE

MT. VERNON	ANALYSIS
------------	----------

ANALYST CERTIFY THAT THE ABOVE MATERIAL HAS BEEN TESTED IN ACCORDANCE WITH THE ABOVE LISTED SPECIFICATIONS AND IS IN CONFORMANCE WITH ALL REQUIREMENTS.

MATERIAL APPROVAL	APPROVED	REJECTED
NAVSHIPS - 250/1500-1	X	
ASME - COMM'L NUCLEAR		
STEAM GENERATORS		
GROOVE WELD TEST		
RADIOGRAPHIC EXAMINATION		

WELDING NO.	564-220
WELDING NO.	559-063
WELDING NO.	MT. VERNON
CONTRACT NO.	

AUG 13 1974	DATE	AUGUST 13, 1974
R. FEARING	SIGNED	R.E. Nobles
INSPECTION AGENCY		AUG 13 1974
INSPECTOR		R. NOBLES

CHARPY-V TRANSITION CURVES

CONTRACT

DATE _____

CUSTOMER _____

COMPONENT _____

SERIAL NO. _____

HEAT NO. _____

TEST SPEC. WF449

TEST LOCATION _____

[illegible]

TESTED BY

R. E. Noltes

THE BABCOCK & WILCOX COMPANY
POWER GENERATION GROUP
MT. VERNON, INDIANA

RECORD OF FILLER WIRE QUALIFICATION TEST

TEST NO. WF 472

DIAMETER	ELECTRODE PREPARATION	FILLER WIRE IDENTIFICATION	CORE WIRE HEAT NO.
5/32"	12-2-WQI-32	MN-MO-NI	
	AUTO SUB ARC SFA 5.17	Linde #80 Lot 8086	31401
VOLTS:	TRAVEL SPEED (IPM)	TYPE OF CURRENT	AMPERES
PURCHASE ORDER NO.			

CHEMICAL ANALYSIS

LAB NO.	PAD	C.	CR.	NI.	MN.	SI.	P.	S.	MO.	CU.	V.	CO.	AL.
19124		.069	.099	.57	1.43	.48	.011	.019	.48	.23	.002		

DROP WEIGHTS

HEAT TREATMENT	TEST NO.	TEMP. (°F.)	RESULTS	TNDT
1100 - 1150°F for 50 Hrs. Furnace cooled to 600 F at 10 F/Hr.	WF 472	+20	NB, NB	

TENSILE PROPERTIES

TEST NO.	HEAT TREATMENT	ULTIMATE STR. PSI	YIELD PT. PSI	%ELONG. .2% OFFSET	% RED. OF AREA
WF 472	ABOVE	83,250	64,500	26.5	61.0

CHARPY V-NOTCH IMPACT TEST 240FT./LB. ENERGY LOAD

HEAT TREATMENT	TEST NO.	FT./LBS.	LAT. EXP.	% SHEAR	TEST NO.	FT./LBS.	LAT. EXP.	% SHEAR
ABOVE	SEE ATTACHED SHEET							

GUIDED BEND TESTS

FACE	ROOT	SIDE

MICRO OR MACRO
FISSURE ANALYSIS.

WE HEREBY CERTIFY THAT THE ABOVE MATERIAL HAS BEEN
TESTED IN ACCORDANCE WITH THE ABOVE LISTED SPECIFICA-
TION AND IS IN CONFORMANCE WITH ALL REQUIREMENTS.

*GROOVE WELD

MATERIAL APPROVAL

APPROVED	REJECTED
NAVSHIPS - 250/1500.1	
ASME - COMM'L NUCLEAR	X*
STEAM GENERATORS	

GROOVE WELD TEST

RADIOGRAPHIC EXAMINATION

ACCEPTABLE

WIRE FOLIO NO. 564-220

FLUX FOLIO NO. 559-063

WORKS MT. VERNON

CONTRACT NO.

JAN 9 1975

R. FEARING

INSPECTION AGENCY

INSPECTOR

DATE JANUARY 8, 1975

SIGNED

R.E. Nobles

JAN 9 1975

R. NOBLES

CHARPY-V TRANSITION CURVES

CONTRACT _____

DATE 1-7-75

CUSTOMER WF 472

COMPONENT _____

SERIAL NO. _____

HEAT NO. _____

TEST SPEC. _____

TEST LOCATION 1/4T

TEMP. (°F)	FT. LBS.			LATERAL EXPANSION			% SHEAR		
+200	75	75	77	.064	.072	.073	100	100	100
+150	70	67	65	.057	.057	.056	95	95	95
+110	59	58	59	.053	.054	.053	85	90	90
+ 70	50	53	57	.044	.050	.049	75	85	80
+ 40	47	43	44	.040	.036	.039	60	55	60
+ 10	28	27	27	.033	.030	.031	35	30	25
- 20	10	12	20	.012	.015	.019	10	15	20
- 50	8	6	12	.006	.006	.012	5	5	15
-100	2	3	4	.005	.007	.007	0	0	0

JAN 9 1975 TESTED BY R.E. Nobles
R. NOBLES

RECORD OF FILLER WIRE QUALIFICATION TEST

TEST NO. WF614

DIAMETER	ELECTRODE SPECIFICATION	FILLER WIRE IDENTIFICATION	CORE WIRE HEAT NO.
5/32"	12-2-WQI-32 SFA 5.17	American Chain & Cable MnMoNi	31401
	Auto Sub ARC EHL	Linde 80 20 X D Lot No. 0852	
VOLTS	TRAVEL SPEED (IPM)	TYPE OF CURRENT	AMPERES
32-36	12-16	AC	500-750
			PURCHASE ORDER NO.
			692043AK

CHEMICAL ANALYSIS

LAB NO.	PAD	C	CR	NI	MN	SI	P	S	MO	CU	V	CO	AL
Vendor	Bare Wire	.11	.08	.60	1.99	.08	.007	.016	.42	.03			.018
25933	Groove	.07	.13	.54	1.41	.49	.015	.015	.44	.18	.005		

DROP WEIGHTS

HEAT TREATMENT	TEST NO.	TEMP. (°F.)	RESULTS	TNDT
1100-1150° F for 50 hrs.	WF614	+50° F	NB, NB	
Furnace Cooled to 600° F @ 15 F/hr	WT			

TENSILE PROPERTIES

TEST NO.	HEAT TREATMENT	ULTIMATE STR. PSI	YIELD PT. PSI	% ELONG. @ .2% OFFSET	% RED. OF AREA
WF614	ABOVE	85,000	67,500	25.0	61.0

CHARPY V-NOTCH IMPACT TEST 240FT./LB. ENERGY LOAD

HEAT TREATMENT	TEST NO.	FT./LBS.	LAT. EXP.	% SHEAR	TEST NO.	FT./LBS.	LAT. EXP.	% SHEAR
ABOVE	SEE ATTACHED SHEET							

GUIDED BEND TESTS

FACE	ROOT	SIDE

MICRO OR MACRO
FISSURE ANALYSIS

MATERIAL APPROVAL

 NAVSHIPS - 250/1500-1
 ASME - COMM'L NUCLEAR
 STEAM GENERATORS

X*

GROOVE WELD TEST

RADIOGRAPHIC EXAMINATION ACCEPT

 *UP TO 1974 ASME Code & Summer
 1975 Addenda

 WE HEREBY CERTIFY THAT THE ABOVE MATERIAL HAS BEEN
 TESTED IN ACCORDANCE WITH THE ABOVE LISTED SPECIFICA-
 TION AND IS IN CONFORMANCE WITH ALL REQUIREMENTS.
WIRE FOLIO NO. 564-220FLUX FOLIO NO. 559-061WORKS Mt. Vernon

CONTRACT NO. _____

 JAN 7 1976
 R. FEARING
DATE January 6, 1976

SIGNED

 R. E. Nobles
 JAN 7 1976

INSPECTION AGENCY

INSPECTOR

R. NOBLES

 J. TOON
 JAN 7 1976

IMPACT TEST RESULTS

JOB IDENTIFICATION WF614

DATE January 6, 1976

TEST LOCATION 1/4T

TEMP. ° (F.)	FT. LB. VALUES			AVG.	LATERAL EXPANSION MIL'S			% SHEAR FRACTURE		
+250	77	80	78		71	76	72	100	100	100
+100	77	68	71		70	61	65	100	100	100
+70	72	71	69		62	66	60	95	95	95
+40	58	58	59		54	53	56	80	75	80
+10	40	52	51		30	42	40	50	55	55
			JAN 7 1976		JAN 7 1976					
			R. NOBLES		R. FEARING					

RECORD OF FILLER WIRE QUALIFICATION TEST

TEST NO. WF 653

Q.C. TECHNICAL PROCEDURE	WELDING PROCESS	ELECTRODE							
		SFA SPEC.	CLASSIFICATION	DIA. (IN)	PURCHASED FOR CONTRACT	FOLIO NO.	VENDOR	PURCHASE ORDER NO.	HEAT OR LOT NO.
12-2-WQI-32	Single Wire Automatic Submerged Arc	SFA-5.17	MnMoNi EH14 Mod.	5/32"		564-220	American Chain & Cable	642043AK	31401
		FLUX							
		SFA SPEC.	CLASSIFICATION	PARTICLE SIZE	PURCHASED FOR CONTRACT	FOLIO NO.	VENDOR		LOT NO.
		SFA-5.17	F72-EH14	20 X D		559-061	Linde	80	0261

[illegible]

CHEMICAL ANALYSIS

[illegible]

FERRITE ANALYSIS

[illegible]

APPLICATION APPROVED

CODES	ACCEPT	REJECT
NAVSHIPS 250/1500		
ASME CODE COMM'L. NUCLEAR	1975 Summer Addenda	
ASME CODE FOSSIL		
CONTRACT NO.		
APPLICATION	80 UTS Joint Welds	

WE HEREBY CERTIFY THAT THE ABOVE MATERIAL HAS BEEN TESTED IN ACCORDANCE WITH THE ABOVE LISTED SPECIFICATION AND IS IN CONFORMANCE WITH ALL REQUIREMENTS.

MATERIAL APPROVAL

DATE May 17, 1976
SIGNED R.E. Nobles
INS. MAY 17 1976
AGENCY _____
INSPECTOR R. NOBLES

RECORD OF MECHANICAL TEST RESULTS

HEAT TREATMENT

TEST NO. WF-653

100F/hr. rate of heating above 600F, 1100-1150F for 50 hrs., 15F/hr. cooling rate to 600F

DROP WEIGHTS

TEMP.	RESULTS	TEMP.	RESULTS	TEMP.	RESULTS	TEMP.	RESULTS	TNDT
-40F	NB.NB	-50F	B					-50F

TENSILE PROPERTIES

TEST NO.	TEST TEMPERATURE	ULTIMATE STR. PSI	YIELD PT. PSI	%ELONG. @ .2%OFFSET	% RED. OF AREA
F 653	ROOM	83,000	66,000	26.5	63.0

CHARPY V-NOTCH IMPACT TEST 240 FT./LB. ENERGY LOAD

Mil's				Mil's				Mil's			
TEMP.	FT./LBS.	LAT. EXP.	% SHEAR	TEMP.	FT./LBS.	LAT. EXP.	% SHEAR	TEMP.	FT./LBS.	LAT. EXP.	% SHEAR
+200	84	76	100	+40F	62	51	75	-50F	28	18	15
	79	71	100		68	56	80		28	16	15
	82	73	100		60	50	70		29	18	15
+100	75	63	100	+10F	49	36	40	-100F	4	5	0
	75	61	100		48	35	40		14	9	5
	79	68	100		44	30	35		17	10	5
+70	72	61	90	-20F	34	25	25				
	72	64	90		26	18	15				
	65	50	85		29	23	25				

GUIDED BEND TESTS

FACE	ROOT	SIDE

MICRO OR MACRO
FISSURE ANALYSIS

COMMENTS OR MISCELLANEOUS RESULTS

NON DESTRUCTIVE EXAMINATION

TYPE	ACCEPT	REJECT
P.T.		
M.T.	Final Surfaces	
R.T.	Final Weld	
U.T.		
VISUAL	Final Surfaces	

MAY 17 1976
R. FEARINGMAY 17 1976
R. NORLES

DATE May 17, 1976

SIGNED R.E. Nobles

Weld Wire Heat 1084-18

6/9/97

Data Point	Loc.	Plant Source	Weld ID	Flux Input	Source	Source Reference	Cu	Ni	Source Mean		Source Std. Dev.		Notes
									Cu	NI	Cu	Ni	
1	---	-----	WF-696	0261	Weld Qualification	Mt. Vernon WQ - Lab No. 29485	0.038	0.600					

RECORD OF FILLER WIRE QUALIFICATION TEST

TEST NO. WF-696

Q.C. TECHNICAL PROCEDURE	WELDING PROCESS	ELECTRODE							
		SFA SPEC.	CLASSIFICATION	DIA. (IN)	PURCHASED FOR CONTRACT	FOLIO NO.	VENDOR	PURCHASE ORDER NO.	HEAT OR LOT NO.
12-2-WGT-32	Single Wire Automatic Submerged Arc	SFA-5.23	MnMoNi EF2	5/32"		664-220	Nasa	776532AK	1084-18
		FLUX							
		SFA SPEC.	CLASSIFICATION	PARTICLE SIZE	PURCHASED FOR CONTRACT	FOLIO NO.	VENDOR	Grade	LOT NO.
		SFA-5.23	F80-EF2-F2	48XD 20XD		559-063 559-061	Linde	80	0261

APPLICATION	AMPERAGE			VOLTAGE			TRAVEL SPEED (IPM)	WIRE FEED SPEED (IPM)	CONTACT TO WORK (IN)	SHIELDING GAS	
	DCSP	DCRP	AC	DCSP	DCRP	AC				TYPE	FLOW RATE (CFH)
Joint Welds			500- 800			34	14				

CHEMICAL ANALYSIS

LOCATION	LAB NO.	C	Mn	P	S	Si	Cr	Ni	Mo	Cu	Cb	Ta	Co	N	Ti	V	Al
Vendor-Bare Wire	Vendor	.12	1.85	.004	.006	.03	.02	.65	.43	.023	--	--	--	--	--	.000	.047
Joint Weld	29485	.084	1.25	.011	.011	.49	.035	.60	.46	.038	.004	.017	.015	.006	.001	.005	.006
		Sn	B	Pb	As	Zr	W										
		.004	<.001	<.001	.007	.004	.011										
Undiluted Pad	29518	.064	1.24	.010	.011	.54	.028	.58	.44	.027						.005	

FERRITE ANALYSIS

LOCATION	PERCENT			FERRITE NUMBER	
	S.D.	D.D.	F.S.	D.D.	F.S.

MAR 2 1977
R. FEARING

APPLICATION APPROVED

CODES	ACCEPT	REJECT
NAVSHIPS 250/1500		
ASME CODE COMM'L. NUCLEAR	Thru 1976 Summer Addenda	
ASME CODE FOSSIL		
CONTRACT NO.		
APPLICATION	80 UTS Joint Welds	

WE HEREBY CERTIFY THAT THE ABOVE
MATERIAL HAS BEEN TESTED IN ACCOR-
DANCE WITH THE ABOVE LISTED SPECI-
FICATION AND IS IN CONFORMANCE
WITH ALL REQUIREMENTS.

MATERIAL APPROVAL

DATE March 1, 1977
 SIGNED L.E. Nobles
 INSP. AGENCY MAR 2 1977
 INSPECTOR R. NOBLES

DROP WEIGHTS

TENSILE PROPERTIES

(mil's) CHARPY V-NOTCH IMPACT TEST 240 FT.-LB. ENERGY LOAD (mil's) (mil's)

GUIDED BEND TESTS

MICRO OR MACRO FISSURE ANALYSIS

COMMENTS OR MISCELLANEOUS RESULTS

NON DESTRUCTIVE EXAMINATION

MAR 2 1977
R. FEARING

MAR 2 1977

R. NOBLES

DATE March 1, 1977

SIGNED