

50-315

NRC DISTRIBUTION FOR PART 50 DOCKET MATERIAL

FILE NUMBER

TO: Mr. Edson G. Case

FROM: Indiana & Michigan Pwr. Co.
New York, N. Y.
John Tillinghast

DATE OF DOCUMENT
11/7/77

DATE RECEIVED
11/14/77

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DESCRIPTION
Re our 5-20-77 ltr &
their 7-25-77 ltr
Notorized 11/7/77...trans the following:

DISTRIBUTION FOR MATERIAL ON REACTOR VESSEL
DATA PER R. INGRAM 5-26-77

PLANT NAME: Cook Unit No. 1
RJL 11/14/77

ENCLOSURE

Consists of response to requested info.
in the form of a document entitled "D. G.
Cook Unit No. 1 Reactor Vessel Material
Surveillance Program".....

(2-P) (7-P) 3 ENCL*/ REPRO BALANCE

SAFETY		FOR ACTION/INFORMATION	
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PROJECT MANAGER:			
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INDIANA & MICHIGAN POWER COMPANY

P. O. BOX 18
BOWLING GREEN STATION
NEW YORK, N. Y. 10004

November 7, 1977

Donald C. Cook Nuclear Plant Unit No. 1
Docket No. 50-315
DPR No. 58



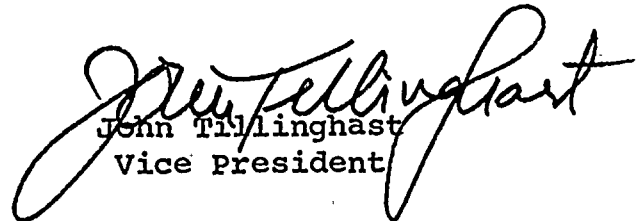
Mr. Edson G. Case, Acting Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Case:

This letter responds to Mr. Don K. Davis' letter of May 20, 1977 requesting reactor vessel material property information for the Donald C. Cook Nuclear Plant. In our letter dated July 25, 1977, we informed you that we would need additional time to provide the requested information.


Enclosed herewith are three (3) copies of a document entitled, "D. C. Cook Unit No. 1 Reactor Vessel Material Surveillance Program" which supplies the information requested.

Very truly yours,


John Tillinghast
Vice President

JT:mam

Sworn and subscribed to before me
on this 7th day of November 1977
in New York County, New York


Notary Public

GREGORY M. GURICAN
Notary Public, State of New York
No. 31-4643431
Qualified in New York County
Commission Expires March 30, 1979

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November 7, 1977

cc: G. Charnoff
P. W. Steketee
R. J. Vollen
R. C. Callen
R. Walsh
D. V. Shaller - Bridgman
R. W. Jurgensen

1977 NOV 14 AM 11 21

[illegible]

D. C. COOK UNIT NO. 1

REACTOR VESSEL MATERIAL SURVEILLANCE PROGRAM

- 1.) The estimated maximum fluence ($E > 1 \text{ Mev}$) at the inner surface of the reactor vessel as of March 31, 1977 is $8.38 \times 10^{17} \text{ n/cm}^2$.
- 2.) The effective full power years (EFPY) of operation accumulated as of March 31, 1977 is 1.34 EFPY.
- 3.) Fabrication of the reactor vessel was performed by Combustion Engineering, Inc.
- 4.)
 - a.) Sketch of the reactor vessel showing materials in the beltline region is shown in Figure 1.
 - b.) Information on each of the welds in the beltline region is shown in Tables 1 through 4.
 - c.) Information on each of the plates in the beltline region is shown in Tables 4 through 8.
- 5.) Information relative to the weld and plate material in the material surveillance program is shown in Tables 1 through 3 and 5 through 8.

FIGURE 1

IDENTIFICATION AND LOCATION OF D. C. COOK UNIT NO. 1 REACTOR VESSEL
BELTLINE REGION WELD AND PLATE MATERIAL

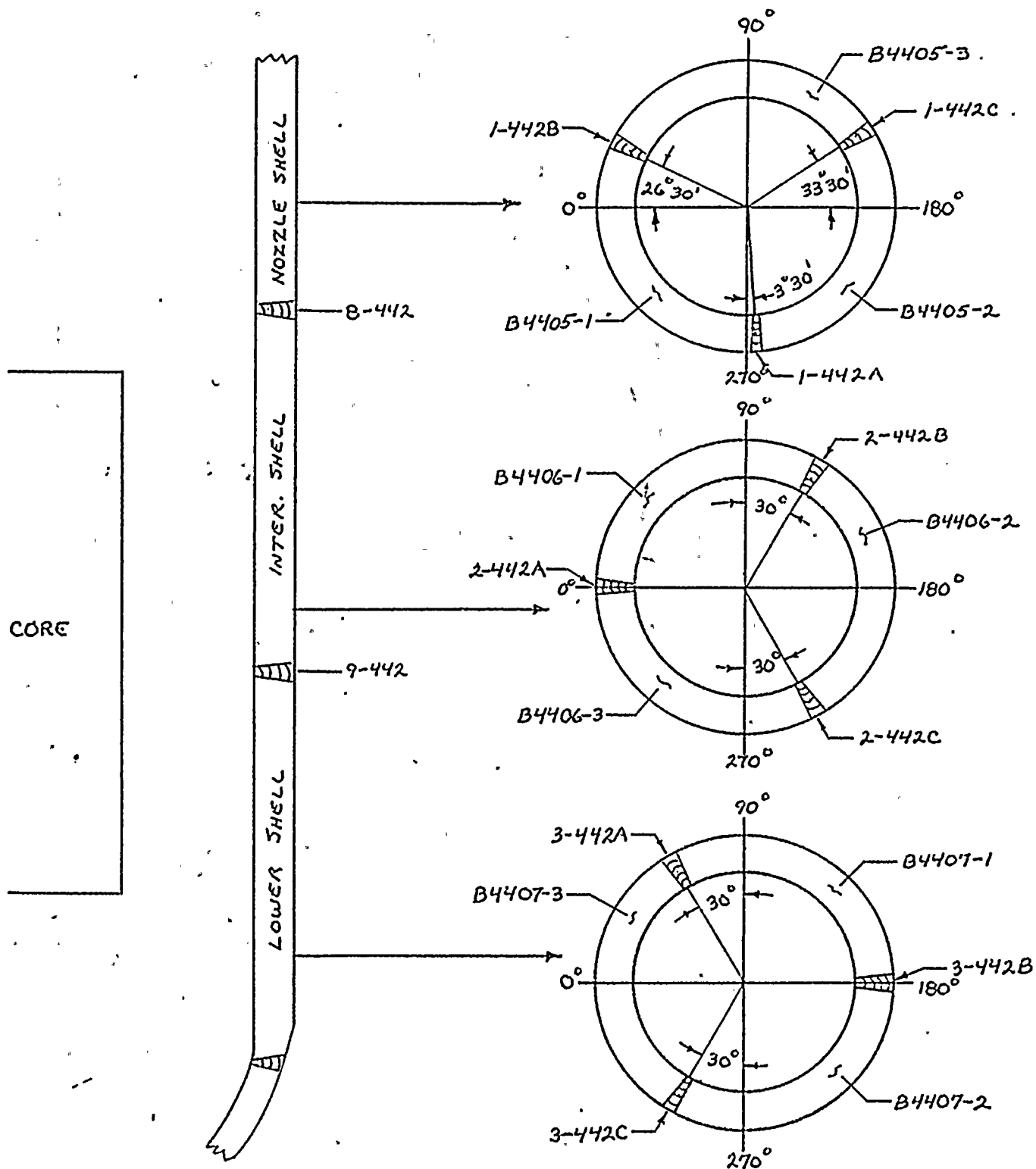


TABLE 1

IDENTIFICATION AND LOCATION OF D. C. COOK UNIT NO. 1 VESSEL BELTLINE REGION WELD METAL

<u>Weld Location</u>	<u>Welding Process</u>	<u>Weld Control No.</u>	<u>Weld Wire</u>		<u>Flux</u>		<u>Post-Weld Heat Treatment</u>
			<u>Type</u>	<u>Heat No.</u>	<u>Type</u>	<u>Lot No.</u>	
Nozzle Shell Vertical Seams 1-442 A, B & C	Submerged Arc (Tandem Wire)	M1.14	B-4 Mod. B-4 Mod.	13253 12008	Linde 1092	3791	1125-1175°F-40HR-FC
Nozzle Shell to Inter Shell Circle Seam 8-442	Submerged Arc	M1.18	B-4 Mod.	20291	Linde 1092	3833	1125-1175°F-40HR-FC
Inter. Shell Vertical Seams 2-442 A, B & C	Submerged Arc (Tandem Wire)	M1.14	B-4 Mod. B-4 Mod.	13253 12008	Linde 1092	3791	1125-1175°F-40HR-FC
Inter. to Lower Shell Circle Seam 9-442	Submerged Arc	M1.42	B-4 Mod.	IP3571	Linde 1092	3958	1125-1175°F-40HR-FC
Lower Shell Vertical Seams 3-442 A, B & C	Submerged Arc (Tandem Wire)	M1.14	B-4 Mod. B-4 Mod.	13253 12008	Linde 1092	3791	1125-1175°F-40HR-FC
Surveillance Weld	Submerged Arc		B-4 Mod.	13253	Linde 1092	3791	1125-1175°F-40HR-FC

TABLE 2

CHEMICAL COMPOSITION OF VESSEL BELTLINE REGION WELD METAL

<u>Weld Wire</u>		<u>Flux</u>		<u>Weight Percent</u>									
<u>Type</u>	<u>Heat No.</u>	<u>Type</u>	<u>Lot No.</u>	<u>C</u>	<u>Mn</u>	<u>P</u>	<u>S</u>	<u>Si</u>	<u>Ni</u>	<u>Mo</u>	<u>Cr</u>	<u>Cu</u>	<u>V</u>
B4 Mod.	13253	Linde 1092	3791	.15	1.83	.013	.015	.06	.72	.45	.04	.07	-- *
B4 Mod.	12008	Linde 1092	3791	.13	1.92	.010	.015	.05	.99	.51	.06	.13	-- *
B4 Mod.	20291	Linde 1092	3833	.16	1.92	.008	.009	.03	.74	.51	--	--	-- *
B4 Mod.	IP3571	Linde 1092	3958	.12	1.38	.017	.009	.21	.82	.54	--	.40	--
Surveillance Weld				.26	1.33	.023	.014	.18	.74	.44	.02	.27	.001

* Wire Analysis - No As Deposited Weld Analysis was Performed

TABLE 3

MECHANICAL PROPERTIES OF VESSEL BELTLINE REGION WELD METAL

<u>Weld Wire</u>		<u>Flux</u>		<u>T_{NDT}</u>	<u>Energy</u>	<u>RT_{NDT}</u>	<u>Shelf</u>	<u>YS</u>	<u>UTS</u>	<u>Elong.</u>	<u>RA</u>
<u>Type</u>	<u>Heat No.</u>	<u>Type</u>	<u>Lot No.</u>	<u>°F</u>	<u>at 10°F</u>	<u>°F</u>	<u>Energy</u>	<u>KSI</u>	<u>KSI</u>	<u>%</u>	<u>%</u>
B4 Mod.	13253	Linde 1092	3791	0*	84,74,70	0*	--	63.3	80.1	27.5	69.7
B4 Mod.	12008										
B4 Mod.	20291	Linde 1092	3833	0*	35,50,48	0*	--	70.5	88.0	25.5	67.1
B4 Mod.	IP3571	Linde 1092	3958	0*	40,46,46	0*	--	69.0	84.0	28.0	69.4
Surveillance Weld		CE Tests		-70	54,54,73	-56	115.5	--	--	--	--
Surveillance Weld		W Tests		--	83,84,92	-70	111	67.1	81.9	26.8	69.2

* Estimated per NRC Standard Review Plan Section 5.3.2

TABLE 4

MAXIMUM END-OF-LIFE FLUENCE AT VESSEL INNER WALL LOCATIONS

<u>Plate or Weld Seam Location</u>	<u>Plate or Seam No.</u>	<u>Fluence N/CM²</u>
Nozzle Shell Vertical Seam	1-442A	2.4×10^{17}
" " " "	1-442B	3.9×10^{17}
" " " "	1-442C	4.9×10^{17}
Nozzle Shell to Inter. Shell Circle Seam	8-442	7.3×10^{17}
Inter. Shell Vertical Seam	2-442A	6.2×10^{18}
" " " "	2-442B	1.1×10^{19}
" " " "	2-442C	1.1×10^{19}
Inter. Shell to Lower Shell Circle Seam	9-442	2.0×10^{19}
Lower Shell Vertical Seam	3-442A	1.1×10^{19}
" " " "	3-442B	6.2×10^{18}
" " " "	3-442C	1.1×10^{19}
Nozzle Shell Plate	B4405-1	7.3×10^{17}
" " "	B4405-2	7.3×10^{17}
" " "	B4405-3	7.3×10^{17}
Inter. Shell Plate	B4406-1	2.0×10^{19}
" " "	B4406-2	2.0×10^{19}
" " "	B4406-3	2.0×10^{19}
Lower Shell Plate	B4407-1	2.0×10^{19}
" " "	B4407-2	2.0×10^{19}
" " "	B4407-3	2.0×10^{19}

TABLE 5

IDENTIFICATION AND LOCATION OF VESSEL BELTLINE REGION PLATE MATERIAL

<u>Component</u>	<u>Plate No.</u>	<u>Heat No.</u>	<u>Mat'l. Spec. No.</u>	<u>Supplier</u>	<u>Heat Treatment</u>		
					<u>Austenitize</u>	<u>Temper</u>	<u>Stress Relief</u>
Nozzle Shell	B4405-1	C3594	A533B Cl. 1	Lukens	1600°F±50°F-4HR-WQ	1225°F±25°F-4HR-AC	1150°F±25°F-40HR-FC
" "	B4405-2	C3594	A533B Cl. 1	Lukens	"	"	"
" "	B4405-3	C3872	A533B Cl. 1	Lukens	"	"	"
Inter. Shell	B4406-1	C1260	A533B Cl. 1	Lukens	"	"	"
" "	B4406-2	C3506	A533B Cl. 1	Lukens	"	"	"
" "	B4406-3*	C3506	A533B Cl. 1	Lukens	"	"	"
Lower Shell	B4407-1	C3929	A533B Cl. 1	Lukens	"	"	"
" "	B4407-2	C3932	A553B Cl. 1	Lukens	"	"	"
" "	B4407-3	C3929	A553B Cl. 1	Lukens	"	"	"

* Surveillance Material same as Inter. Shell Plate B4406-3

TABLE 6

CHEMICAL COMPOSITION OF VESSEL BELTLINE REGION PLATE MATERIAL

<u>Plate No.</u>	<u>Weight Percent</u>							
	<u>C</u>	<u>Mn</u>	<u>P</u>	<u>S</u>	<u>Si</u>	<u>Ni</u>	<u>Mo</u>	<u>Cu</u>
B4405-1	.21	1.42	.007	.018	.26	.46	.47	.14
B4405-2	.20	1.41	.006	.018	.25	.45	.47	.14
B4405-3	.24	1.30	.008	.013	.30	.48	.46	.14
B4406-1	.25	1.17	.016	.025	.29	.52	.49	.12
B4406-2	.24	1.41	.008	.015	.28	.50	.47	.15
B4406-3	.21	1.40	.009	.015	.25	.49	.46	.15
B4407-1	.21	1.35	.010	.014	.29	.55	.53	.14
B4407-2	.20	1.25	.012	.014	.22	.59	.54	.12
B4407-3	.22	1.32	.010	.014	.24	.50	.55	.14
B4406-3*	.24	1.40	.009	.015	.25	.49	.46	.14

* Surveillance Plate Analysis Performed by Westinghouse

TABLE 7

MECHANICAL PROPERTIES OF VESSEL BELTLINE REGION PLATE MATERIAL

<u>Plate No.</u>	<u>T_{NDT}</u> <u>°F</u>	<u>RT_{NDT}* <u>°F</u></u>	<u>Shelf Energy</u> <u>Ft-Lbs</u>		<u>YS</u> <u>KSI</u>	<u>UTS</u> <u>KSI</u>	<u>Elong.</u> <u>%</u>	<u>RA</u> <u>%</u>
			<u>MWD</u>	<u>NMWD*</u>				
B4405-1	10	2	134	87	56.3	81.3	29.5	68.1
B4405-2	0	34	142	92	62.9	85.8	28.5	66.8
B4405-3	0	40	123.5	80	64.4	86.4	25.5	66.5
B4406-1	-10	-8	123	80	63.3	86.3	27.0	67.1
B4406-2	-10	17	124	80.5	67.2	89.7	26.2	68.0
B4406-3	-10	27	121	78.5	66.8	88.8	26.2	68.0
B4407-1	-20	5	133	85.5	64.1	86.7	28.0	69.6
B4407-2	-20	-15	149	97	62.1	84.1	27.2	70.6
B4407-3	0	0	139	90.5	63.7	86.4	27.2	69.7

* Estimated from Data in the Major Working Direction (MWD) per NRC Standard Review Plan Section 5.3.2

TABLE 8

MECHANICAL PROPERTIES OF SURVEILLANCE PLATE & OTHER BELTLINE PLATES PERFORMED BY WESTINGHOUSE

<u>Plate No.</u>	<u>T_{NDT}</u> <u>°F</u>	<u>RT_{NDT}</u> <u>°F</u>	<u>Shelf Energy</u> <u>Ft-Lbs</u>		<u>YS</u> <u>KSI</u>	<u>UTS</u> <u>KSI</u>	<u>Elong.</u> <u>%</u>	<u>RA</u> <u>%</u>
			<u>MWD</u>	<u>NMWD</u>				
B4406-1	---	5	---	83	---	---	---	---
B4406-2	---	33	---	96	---	---	---	---
B4406-3	---	40	130	98	68.4	90.4	27.5	70.0
B4407-1	---	28	---	103	---	---	---	---
B4407-2	---	-12	---	126	---	---	---	---
B4407-3	---	38	---	108	---	---	---	---