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Omaha Public Power District
444 South 16th Street Mail
Omaha, Nebraska 68102-2247
402/636-2000

May 14, 1992
LIC-92-182R

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Mail Station P1-137
Washington, DC 20555

Reference: Docket No. 50-285

Gentlemen:

SUBJECT: Fort Calhoun Station Reactor Vessel Surveillance Program Reports

Enclosed are the two reports which Mr. Steve Bloom of the NRC requested from Mr. Ron Short of my staff on April 22, 1992. The reports are titled:

- Recommended Program for Irradiation Surveillance of the Fort Calhoun Reactor Vessel Materials
- Evaluation of Baseline Specimens, Reactor Vessel Materials Irradiation Surveillance Program

If you should have any questions, please contact me.

Sincerely,

W. G. Gates

W. G. Gates
Division Manager
Nuclear Operations

WGG/sel

Enclosures (2)

- c: LeBoeuf, Lamb, Leiby & MacRae (w/o Enclosures)
 R. D. Martin, NRC Regional Administrator, Region IV (w/o Enclosures)
 R. P. Mullikin, NRC Senior Resident Inspector (w/o Enclosures)
 D. L. Wigginton, NRC Senior Project Manager (w/o Enclosures)
 S. D. Bloom, NRC Project Engineer (with Enclosures)

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COMBUSTION ENGINEERING, INC.

WINDSOR, CONNECTICUT 06095

March 26, 1969
CE-750-2011,00

GHDR Project 11405
Omaha Public Power District
Unit No. 2 - Fort Calhoun Station
Contract No. 250, 000 2284



Mr. H.M. Heidenreich
Gibbs, Hill, Durbin & Richardson, Inc.
200 Kiewit Plaza
Omaha, Nebraska 68131

DRW#:	100	REEL#	
<input type="checkbox"/>	QA CONST. REC.		
<input checked="" type="checkbox"/>	DB REF.		
<input type="checkbox"/>	N/A		
INITIAL:	MS		

FILE NO	750-145
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Subject: Irradiation Surveillance Program

Reference: Letter WY-750-389, dated December 10, 1968

Enclosure (1): Recommended Program for Irradiation Surveillance of the Fort Calhoun Reactor Vessel Materials.

Dear Mr. Heidenreich:

We are forwarding Enclosure (1) which describes in detail the program for irradiation surveillance of the Fort Calhoun reactor vessel materials.

This program meets or exceeds all the requirements of ASTM E-185-66, "Recommended Practice for Surveillance Tests on Structural Materials in Nuclear Reactors". The attached Table I presents a comparison of the provisions of the Fort Calhoun surveillance program and the requirements of Recommended Practice E-185-66.

Six irradiation capsules containing test specimens will be provided. Each capsule will contain Charpy impact, and tensile specimens from base metal, weld metal, and heat affected zone test materials. The base metal and heat affected zone test materials will be prepared from sections of that plate in the core region of the vessel having the highest unirradiated HPT temperature as determined by drop weight tests. In addition to the above specimens, each capsule will also contain either transverse base metal Charpy impact specimens or Charpy impact specimen correlation monitors. The correlation monitors are fabricated from a standard heat of A533-B material provided by the USAEC-ORNL Program.

Each irradiation capsule will contain flux monitors to measure the incident flux spectrum and the attenuation through the specimen thickness. Temperature monitors will also be placed within each capsule to indicate the highest exposure temperature.

The six irradiation capsules will be placed near the reactor vessel wall in order to minimize differences in the irradiation and temperature conditions between the test specimens and the reactor vessel. The placement of the specimens will be

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of Page 1

March 26, 1969
CE-750-1011

GHD&R Project 11405
Omaha Public Power District
Unit No.1 - Fort Calhoun Station
Contract No. 750; CEND 23866

Mr. R.M. Heidenreich
Gibbs, Hill, Durham & Richardson, Inc.
200 Kiewit Plaza
Omaha, Nebraska 68131

Subject: Irradiation Surveillance Program

Reference: Letter NY-750-389, dated December 10, 1968

Enclosure (1): Recommended Program for Irradiation Surveillance of the
Fort Calhoun Reactor Vessel Materials.

Dear Mr. Heidenreich:

We are forwarding Enclosure (1) which describes in detail the program for irradiation surveillance of the Fort Calhoun reactor vessel materials.

This program meets or exceeds all the requirements of ASTM E-185-66, "Recommended Practice for Surveillance Tests on Structural Materials in Nuclear Reactors". The attached Table I presents a comparison of the provisions of the Fort Calhoun surveillance program and the requirements of Recommended Practice E-185-66.

Six irradiation capsules containing test specimens will be provided. Each capsule will contain Charpy impact, and tensile specimens from base metal, weld metal, and heat affected zone test materials. The base metal and heat affected zone test materials will be prepared from sections of that plate in the core region of the vessel having the highest unirradiated NDT temperature as determined by drop weight tests. In addition to the above specimens, each capsule will also contain either transverse base metal Charpy impact specimens or Charpy impact specimen correlation monitors. The correlation monitors are fabricated from a standard heat of A533-B material provided by the USAEC-HSST Program.

Each irradiation capsule will contain flux monitors to measure the incident flux spectrum and the attenuation through the specimen thickness. Temperature monitors will also be placed within each capsule to indicate the highest exposure temperature.

The six irradiation capsules will be placed near the reactor vessel wall in order to minimize differences in the irradiation and temperature conditions between the test specimens and the reactor vessel. The fluence of the specimens will be

greater than the fluence of the reactor vessel at any given time due to the radial position of the capsules. Four of the six capsules will be placed circumferentially near the core flats and the remaining two capsules will be placed circumferentially near the core diagonals. Such an arrangement will permit a comparison between the peak fluences which could occur at either the core flat or core diagonals. The removal of the capsules is scheduled so that the test specimens in at least one of the capsules will be irradiated to the peak lifetime fluence of the reactor vessel.

The information obtained from the Fort Calhoun irradiation surveillance program will be supplemented by irradiation data for A533-B material from other sources among which are:

1. A comprehensive irradiation surveillance program conducted in the C-E built Palisades reactor. This program includes thermal control specimens and accelerated specimens in addition to the vessel specimens.
2. Data from experimental irradiations conducted as part of the HSST Program.
3. Available information from other irradiations of A533B.
4. Information from other surveillance programs at C-E elsewhere.

The scope of the program has been selected with the objective of meeting AEC licensing requirements, and providing adequate numbers of specimens for determining irradiation effects. Since our proposal was not based on a specified number of specimens, we do not consider that a change in the C-E plan presented to the AEC as the design of the program progresses involves any change in contract obligations.

Very truly yours,

W. T. Withers
W.T. Withers
CFPD Project Manager

WTW:JJK:AES:ms

Enclosure - 3 copies

cc: T.E. Short, CFPD (3), w/3 copies
E.J. Cosgrove, G&H, Inc., (2), w/3 copies
J.A. Lacerenza, CENY
W.C. Novick, CEKC

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TABLE I

	<u>ASTM E-185-66 Requirements</u>	<u>Fort Calhoun Surveillance Program</u>
1. Test material	Base metal from plate with highest NDT, weld metal and HAZ representative of plates in core region.	Base metal and HAZ from plate with highest NDT in core region. Weld metal representative of welds in core region.
2. Type of specimens	Tensile and impact	Tensile and impact
3. Number of specimens (Irradiated)	8 impact } 2 tensile } for BM, WM and HAZ	12 impact } 3 tensile } BM, WM and HAZ Plus 6 or 12 impact for transverse BM in each removal.
4. Number of specimens (Unirradiated)	15 impact } 2 tensile } for BM, WM and HAZ	30 impact } for BM, BM (transverse), 18 tensile } WM and HAZ Plus 16 DW } BM 5 or 12 impact for each removal.
5. Correlation monitors	Desirable	Installed in holder attached to vessel.
6. Irradiation locations	As close to the vessel as possible.	None
7. Thermal controls	Desirable	6 sets in 4 removals.
8. Specimen removal	3 minimum	3 sets of 4 monitors in each capsule
9. Temperature monitors	Desirable	3 sets of 7 flux monitors and 5 attenuation monitors in each capsule.
10. Flux monitors	Recommended	BM, WM and HAZ from same test material as that used for specimens.
11. Archive samples	Recommended	
12. Summary:		
Number of capsules	3	6
Number of removals	3	4

TABLE I (Continued)

	<u>ASTM E-185-66 Requirements</u>			<u>Fort Calhoun Surveillance Program</u>		
Unirradiated specimens:	<u>Impact</u>	<u>Tensile</u>	<u>DW</u>	<u>Impact</u>	<u>Tensile</u>	<u>DW</u>
Base metal (long.)	15	3	—	30	18	16
Base metal (transverse)	—	—	—	30	18	—
Weld metal	15	3	—	30	18	—
Heat affected zone	15	3	—	30	18	—
Total	45	9	—	120	72	16
Irradiated specimens (each capsule):						
Base metal (long.)	8	2	—	12	3	—
Base metal (transverse) or correlation monitors	—	—	—	12	—	—
Weld metal	8	2	—	12	3	—
Heat affected zone	8	2	—	12	3	—
Total	24	6	—	48	9	—
Total required/provided by program;						
Unirradiated	45	9	—	120	72	16
Irradiated	72	18	—	288	54	—
Grand Total	117	27	—	308	126	16

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