2. To: (Receiving Organization) FFTF Planning/Scheduling Integration	3. From: (Originating Organization) Criticality and Shielding	4. Related EDT No.: 620286
5. Proj./Prog./Dept./Div.: FFTF	6. Design Authority/ Design Agent/Cog. Engr.: S. F. Kessler	7. Purchase Order No.: NA
8. Originator Remarks: These calculations were done to support the FFTF fuel offload.		9. Equip./Component No.: NA
		10. System/Bldg./Facility: FFTF
11. Receiver Remarks: 11A. Design Baseline Document? ☐ Yes ☒ No		12. Major Assm. Dwg. No.: NA
		13. Permit/Permit Application No.: NA
		14. Required Response Date: 1/24/97

15. DATA TRANSMITTED					(F)	(G)	(H)	(I)
(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev. No.	(E) Title or Description of Data Transmitted	Approval Designator	Reason for Trans- mittal	Originator Dispo- sition	Receiver Dispo- sition
1	HNF-SD-FF-CN-006		0	Decay Heat Fractions for DFA 8213 and 4192	NA	3	1	

16. KEY					
Approval Designator (F)		Reason for Transmittal (G)		Disposition (H) & (I)	
E, S, Q, D or N/A (see WHC-CM-3-5, Sec.12.7)		1. Approval 2. Release 3. Information	4. Review 5. Post-Review 6. Dist. (Receipt Acknow. Required)	1. Approved 2. Approved w/comment 3. Disapproved w/comment	4. Reviewed no/comment 5. Reviewed w/comment 6. Receipt acknowledged

17. SIGNATURE/DISTRIBUTION (See Approval Designator for required signatures)											
(G) Reason	(H) Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN	(G) Reason	(H) Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN
		Design Authority									
		Design Agent									
1	1	Cog.Eng. S. F. Kessler		1/27/97	40-35						
1	1	Cog. Mgr. J. Greenberg		1/27/97	40-35						
		QA									
		Safety									
		Env.									

18. S. F. Kessler Signature of EDT Originator	19. J. Greenberg Authorized Representative for Receiving Organization	20. J. Greenberg Design Authority/ Cognizant Manager	21. DOE APPROVAL (if required) Ctrl. No. ☐ Approved ☐ Approved w/comments ☐ Disapproved w/comments
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Decay Heat Fractions for DFA 8213 and 4192

S. F. Kessler

Fluor Daniel Northwest, Richland, WA 99352

U.S. Department of Energy Contract DE-AC06-96RL13200

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Key Words: Decay Heat Driver Fuel, FFTF, Interim Storage Cask

Abstract: Decay heat fractions for FFTF driver fuel assemblies 8213 and 4192 were calculated to allow the assembly nozzles to be cut. Cutting the nozzles is required to allow the assemblies to fit in the center location of a core component container in an Interim Storage Cask.

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Release Approval

Date

Karen H. Holand 2/7/97

Approved for Public Release

DECAY HEAT FRACTIONS FOR DFA 8213 and 4192

1.0 PURPOSE

When Fast Flux Test Facility (FFTF) driver fuel assemblies (DFA) are disassembled, the decay heat of each component must be calculated to ensure that decay heat limits for the storage vessels and handling machines will not be exceeded. Additionally, as DFA's are put in core component containers (CCC) inside interim storage casks (ISC), the assembly in the center location will have approximately one-half of its nozzle removed so it will fit. The purpose of this calc note is to provide the decay heat fractions for DFA 8213 and 4192 which will be placed in the center positions of CCCs in ISCs.

2.0 METHODOLOGY

Calculation of the decay heat fractions is performed by the codes DKH1-4FRAC¹ and SDKHEAT². The references contain the specific procedures used to generate the decay heat fractions.

3.0 ASSUMPTIONS

The only assumptions made for this calculation is that half of the decay heat is removed with the cut portion of the nozzle and the remainder is added to the decay heat of the duct.

4.0 INPUT DATA

The input data for the DKH1-4FRAC code are the assembly type, serial number, and core location. SDKHEAT requires only the assembly serial number. DFA 8213 is an outer driver fuel assembly and was last irradiated in cycle 8C in core location 3506. DFA 4192 is also an outer driver fuel assembly and was last irradiated in cycle 10C3 in core location 1607.

5.0 CALCULATION

The 4-factor output of the DKH1-4FRAC code is listed for the assembly in table 5.1. From the calculations, the nozzle fraction is reduced by one-half to account for the portion of the nozzle that is removed. This same value is added to the duct fraction to account for the portion of the nozzle that remains attached to the duct, as shown in Section 6.0.

TABLE 5.1: DECAY HEAT FRACTIONS FROM DKH1-4FRAC

4FRAC.WR1 VER 1.0
Decay Heat Fractions

Assembly	8213	4192
NOZ=====>	0.36434	0.32733
PIN=====>	0.30469	0.32248
DUCT=====>	0.33009	0.34935
HS=====>	0.00088	0.00084

6.0 RESULTS

The results are shown in table 6.1 for each assembly. This information cannot be obtained from the SDKHEAT diskettes; therefore, it should be placed in the decay heat notebook for use in handling and disposal of these components.

TABLE 6.1: CORRECTED DECAY HEAT FRACTIONS

Assembly	8213	4192
NOZ=====>	0.182	0.164
PIN=====>	0.305	0.322
DUCT=====>	0.512	0.513
HS=====>	0.001	0.001

7.0 REFERENCES

1. R. A. Schwarz, "Certification of the DKH1-4FRAC Program", WHC-SD-FF-SWD-046, Rev. 0, Westinghouse Hanford Company, Richland, Washington, October 30, 1990.
2. R. A. Schwarz, "SDKHEAT Symphony Decay Heat Program", WHC-SD-FF-SWD-033, Rev. 0-C, Westinghouse Hanford Company, Richland, Washington, October 17, 1995.

CHECKLIST FOR INDEPENDENT TECHNICAL REVIEW

NUMBER: HNF-SD-FF-CN-006, Rev. 0DOCUMENT REVIEWED: DECAY HEAT FRACTIONS FOR DFA 8213 AND 4192AUTHOR(s): SF Kessler

I. Method(s) of Review

- (✓) Input data checked for accuracy
- (NA) Independent calculation performed
 - () Hand calculation
 - () Alternate computer code: _____
- (NA) Comparison to experiment or previous results
- (NA) Alternate method (define) _____

II. Checklist (either check or enter NA if not applied)

- (✓) Task completely defined
- (✓) Activity consistent with task specification
- (✓) Necessary assumptions explicitly stated and supported
- (✓) Resources properly identified and referenced
- (✓) Resource documentation appropriate for this application
- (✓) Input data explicitly stated
- (✓) Input data verified to be consistent with original source
- (✓) Geometric model adequate representation of actual geometry
- (✓) Material properties appropriate and reasonable
- (NA) Mathematical derivations checked including dimensional consistency
- (NA) Hand calculations checked for errors
- (✓) Assumptions explicitly stated and justified
- (✓) Computer software appropriate for task and used within range of validity
- (NA) Use of resource outside range of established validity is justified
- (✓) Software runstreams correct and consistent with results
- (✓) Software output consistent with input
- (✓) Results consistent with applicable previous experimental or analytical findings
- (✓) Results and conclusions address all points and are consistent with task requirements and/or established limits or criteria
- (✓) Conclusions consistent with analytical results and established limits
- (NA) Uncertainty assessment appropriate and reasonable
- (NA) Other (define) _____

III. Comments:

IV. REVIEWER: KD Dollin DATE: 1-23-97

DISTRIBUTION SHEET

To Distribution	From Criticality and Shielding	Page 1 of 1
		Date January 24, 1997
Project Title/Work Order Decay Heat Fractions for DFA 8213 and 4192		EDT No. 620286
		ECN No.

Name	MSIN	Text With All Attach.	Text Only	Attach./ Appendix Only	EDT/ECN Only
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K. D. Dobbin	H0-35	X			
J. Greenborg	H0-35	X			
B. K. Howard	N2-13	X			
S. F. Kessler	H0-35	X			
J. R. Vincent	N2-02	X			
W. V. Witherspoon	N2-13	X			
Central Files (Original + 3)	A3-88	X			