INL/MIS-24-77288-Revision-0



01-22 HFEF-15 Cask

April 2024

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HFEF-15 Cask Modifications

Enabling the Large Experiment Capability at TREAT

Greg Core, TPM/WPM Jeanie Hernandez, INL Project Manager James Angell, INL System/Project Engineer

April 23, 2024

HFEF-15 Cask Upgrade Project Overview

- **Technical Description** Upgrading the HFEF-15 shipping cask to allow larger format experiments includes designing, fabricating, and installing new components, updating procedures, and performing an INL-internal informal readiness assessment.
- Location INL: Materials and Fuels Complex (TREAT & HFEF)

Benefits to the Mission

"inspire stakeholders and the public, <u>empower</u> <u>innovators</u>, and deliver successful outcomes through efficient coordination of partners and resources"

Larger format experiments will enable no less than five unique testing vehicles supporting sodium fast reactor, microreactor, molten salt reactor, and advanced light water reactor technology Comparison of existing (right) and LEC-enabled diameter available for experimentation







HFEF-15 within the Large Experiment Capability

- The TREAT Large Experiment Capability (LEC) involves inter and intrafacility infrastructure to support larger format experiments, expanding the capabilities of transient testing to prototypic mechanical and thermal-hydraulic conditions.
- **Core Upgrades** Specially-designed moderator assemblies that accommodate large format experiment vehicles
- Cask Modifications Changes to existing casks that allow efficient and safe transfer of experiments inside and between INL facilities
- Hot Cell Upgrades Various systems and equipment enabling post-irradiation examination and loading of pre-irradiated specimens
- Non-nuclear Support Systems providing operator training, vehicle preparations and check-out testing, and instrument testing

Supported Environments

- Flowing Liquid Sodium (Mk-IIIR NLC)
 - Flowing Hydrogen (SIRIUS-4 +)
 - Flowing Water (TWERL)
 - > Water LOCA Blowdown (TWIST)
- Microreactor System Scale (NIMBLE)



Concept of Operations





FEF-15 Cask Project Overview (2)

Core INL Team Members







Jeanie Hernandez Project Manager



James Angell Lead Design Engineer

16-month duration // \$2M funding provided in FY 23

- APR. 2023: Project Started
- SEP. 2023: Draft Drawings Completed
- FEB. 2024: Procurements Issued
- JUL. 2024: Fabrications Complete
- MAY 2024: Installations Begin
- JUL. 2024: Readiness Reviews Complete
- JUL. 2024: Project Complete



HFEF-15 Cask Project Schedule & Critical Path

	TREAT - Weekly Update				HFEF-15 Cask Upgrade - Supporting Infrastructure to Support TREAT NLC														04-Mar-24 11:20				
	# A0	DIVITVID	ACTIVITY DESCRIPTION I	NST-KEY	ACTIVITYLEAD	PERFORMER	OD I	TOT OF	AL %COM	P SCHEDULED	SCHEDULED	PREDECESSORS	SUCCESSORS	Doo#	February 2024	March 2024	April 2024	May 2024	June 2024	July 2024	August2024	September 2024	October 2024
-	1		Cook Hogrado - Supporting Infrastructure to Supp	EVENT			402-4 4	FLO	AI	SIARI	FINSH				05 12 19 2	5 04 11 18	25 01 08 15	22 29 06 13 20	27 03 10 17 24	4 01 08 15 22	29 05 12 19 26	02 09 16 23 3	30 07 14 21 8
	2	HEEF15CU-P HEEF-15 Cask Opgrade - Supporting Intrastructure to Suppo			AINLU		4030 I	214 04		16-Jan-22.0	20 Sep-24												
H	3	HEEF15CULP01.01. Project Milestones					4050 I	ла 00 1. 37	4	31_Jul-24	31-Jul-24												
	4	HEEF 15-10	HFEF15 - Project Complete				0d)d 37	d 0%	or our Ev	31-Jul-24	HFEF15-65									•		
									-			HFEF15-95, HFEF15-MS10											
	5	HFEF15-MS10	HFEF15 - M2- Complete Readiness for HFEF-15 Cask Modifications (07.31.24)				0d)d Od	I 0%		31-Jul-24*	HFEF15-65	HFEF15-10, NATNaL-3090								f		
	6	HFEF15CU-P.01.02 C	pordination and Management				483d 1	31d 0o		16-Jan-23 A	30-Sep-24												
	7	HFEF15-70	HFEF15 - Project Management Support				483d 1	31d 0o	60%	16-Jan-23 A	30-Sep-24	HFEF15-05											
	8	HFEF15CU-P.03 Procurement					89d 8	0d 51	d	19-Feb-24 A	09-Jul-24												
	9	HFEF15CU-P.03.1 Net	w Top Ring and Shield Ring				62d {	3d 78	8	19-Feb-24 A	24-May-24												
1	10	HFEF15-25	HFEF15 - Order Materials and Fabricate New Top Ring and Shield Ring				62d 5	3d 78	d 10%	19-Feb-24A	24-May-24	HFEF15-20	HFEF15-85										
1	1	HFEF15CU-P.03.2 Security Cans					48d 4	0d 92	8	19-Feb-24 A	02-May-24												
1	2	HFEF15-50	HFEF15 - Procure Fabrication Services to Fabricate Security Cans				48d 4	0d 92	d 10%	19-Feb-24A	02-May-24	HFEF15-45											
1	3	HFEF15CU-P.03.3 Net	w Interface Ring				80d 8	0d 60		04-Mar-24	09-Jul-24												
1	4	HFEF15-80	HFEF15 - Complete redline drawings and modify Interface Ring at TREAT				80d 8	0d 60	I 0%	04-Mar-24*	09-Jul-24	HFEF15-75	HFEF15-65										
1	15	HFEF15CU-P.03.4 Net	w Top Hat Spacer				62d (2d 69	8	19-Feb-24 A	10-Jun-24												
1	6	HFEF15-90	HFEF15 - Order Materials and Fabricate New Top Hat Spacer				62d 6	2d 69	d 10%	19-Feb-24A	10-Jun-24	HFEF15-85					1						
1	7	HFEF15CU-P.03.5 J-H	ook Spreader Bar				80d 8	0d 51	8	04-Mar-24	09-Jul-24												
	8	HFEF15-105	HFEF15 - J-Hook Spreader Bar Procurement and Stand Fabrication				80d 8	0d 51	d 0%	04-Mar-24*	09-Jul-24						1						
	9	HFEF15CU-P.04 Update Procedures at HFEF and TREAT for HFEF-15 Modifi		ed Cask	Operations		80d 6	7d 64	d	12-Feb-24 A	18-Jun-24												
1	20	HFEF15-30	HFEF15 - Update Procedures at HFEF and TREAT for HFEF-15 Cask Modifications				40d 4	0d 65	d 0%	15-Apr-24*	18-Jun-24							<u></u>					
-	21	HFEF15-37	HFEF15 -Perform and Archive Drop Analysis				58d 4	4d 87	d 0%	12-Feb-24A	10-May-24												
1	2	HFEF15-55	HFEF15 - Update Procedures at HFEF and TREAT for SecurityCans				40d 4	0d 19	d 0%	15-Apr-24*	18-Jun-24		HFEF15-65							+			
- 2	23	HFEF15CU-P.05 Perform Work - Modification					69d 6	9d 13	d	11-Mar-24	27-Jun-24							_					
	-	HFEF15-35	HFEF15 - Install New Top Ring & security Cans				25d 2	5d 13	d 0%	20-May-24	27-Jun-24	HFEF15-95	HFEF15-65		-								
1	8	HFEF15-95	HFEF15 - Remove existing Top Ring & security Cans				44d 4	4d 13	d 0%	11-Mar-24*	16-May-24		HFEF15-10, HFEF15-35								ļ		
-	20	HFEF15CU-P.06 Complete Readiness for HFEF-15 Cask Modifications					8d	Sd 60		10-Jul-24	22-Jul-24										44		
1		HFEF15-65	HFEF15 - Complete Readiness for HFEF-15 Cask Modifications				8d	3d 60	0%	10-Jul-24	22-Jul-24	HFEF15-35, HFEF15-55, HFEF15-80	HFEF15-10, HFEF15-MS10							-			

Currently cask interface ring represents the critical path with two weeks of total float to M2 final milestone

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Project Status (March 2024)

- Completed Design and Issued Procurements for all safety-related items
- Drop analysis in progress
- Project team engaging in a TREAT Sodium Loop Integrated Product Team to ensure interface requirements are met and issues addressed



HFEF-15 Cask EVMS Performance

Tracked Risks

Cask Contamination

Missed Design Requirements

Fabrication Delays

Unavailable Human Resources

MFC Priorities

Readiness Requirements





5/1/2024 www.nric.inl.gov