INL/MIS-19-53473-Revision-0

AGR-5/6/7 Irradiation Summary as of the End of Cycle 164B

Joe Palmer

April 2019

The INL is a U.S. Department of Energy National Laboratory
operated by Battelle Energy Alliance

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AGR-5/6/7 Irradiation Summary as of the End of Cycle 164B

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AGR-5/6/7 Irradiation Summary as of the End of Cycle 164B

Technical Coordination Team

April 9, 2019

Joe Palmer

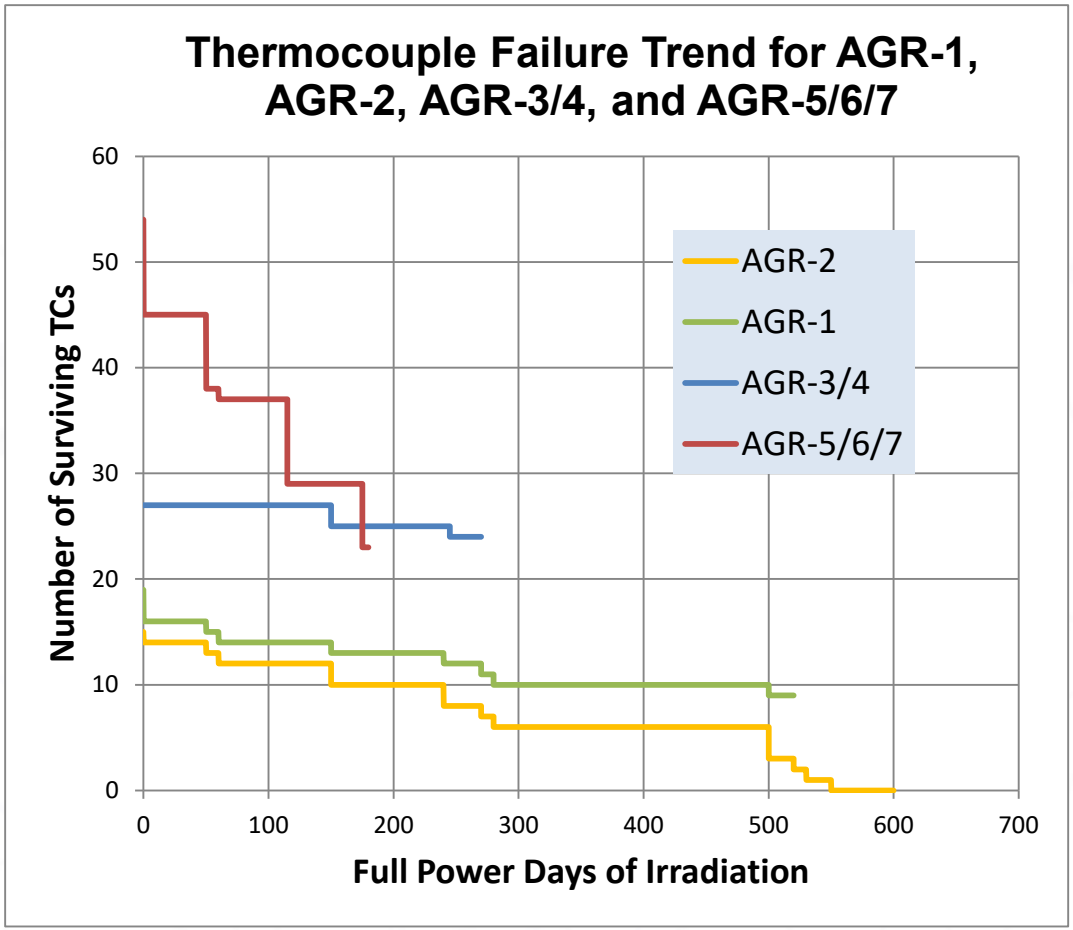
Mechanical Engineer, PE

ADVANCED REACTOR TECHNOLOGIES

Thermocouple Performance

Survivors by Capsule	End of Assem	End of Install	End of 162B	End of 163A	End of 164A	End of 164B
Cap 5	4	3	3	3	3	3
Cap 4	5	4	4	4	4	4
Cap 3	15	13	12	12	9	9
Cap 2	8	8	8	8	6	3
Cap 1	17	17	11	10	7	4
Total Surviving	49	45	38	37	29	23

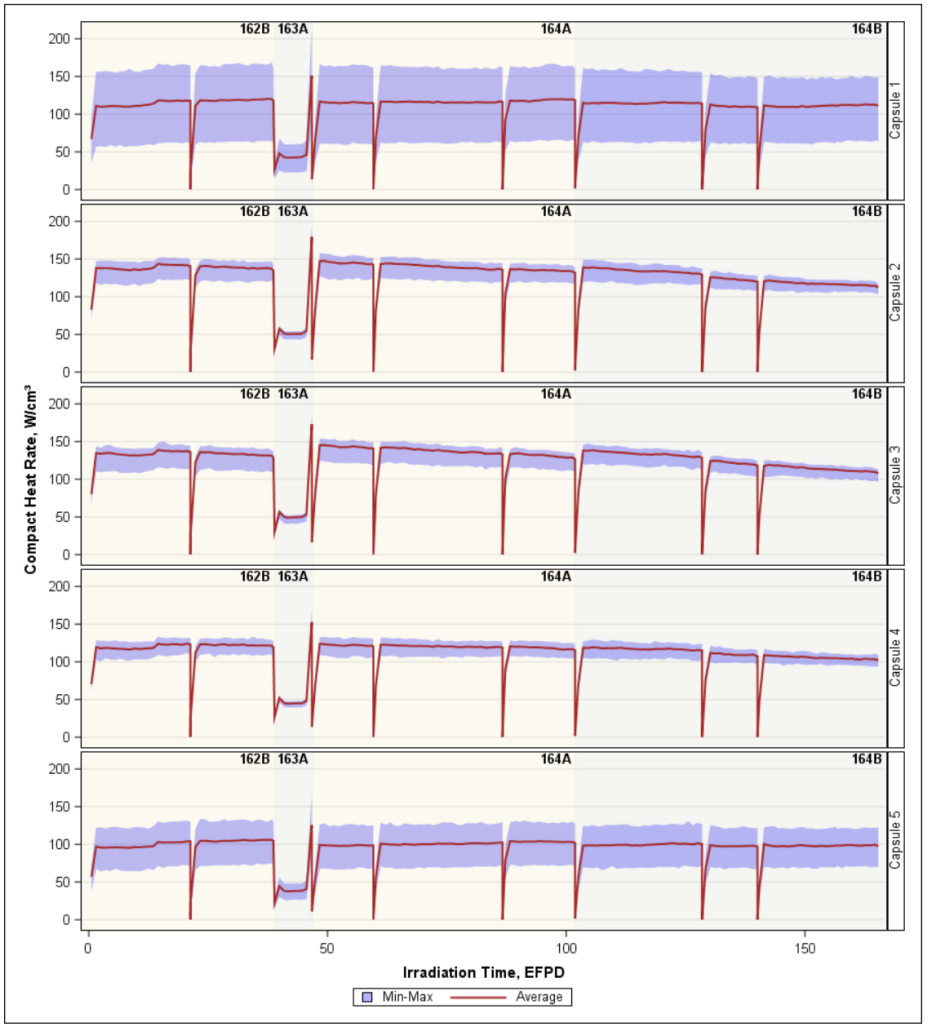
AGR-5/6/7 TC Performance Compared to Past AGR Tests



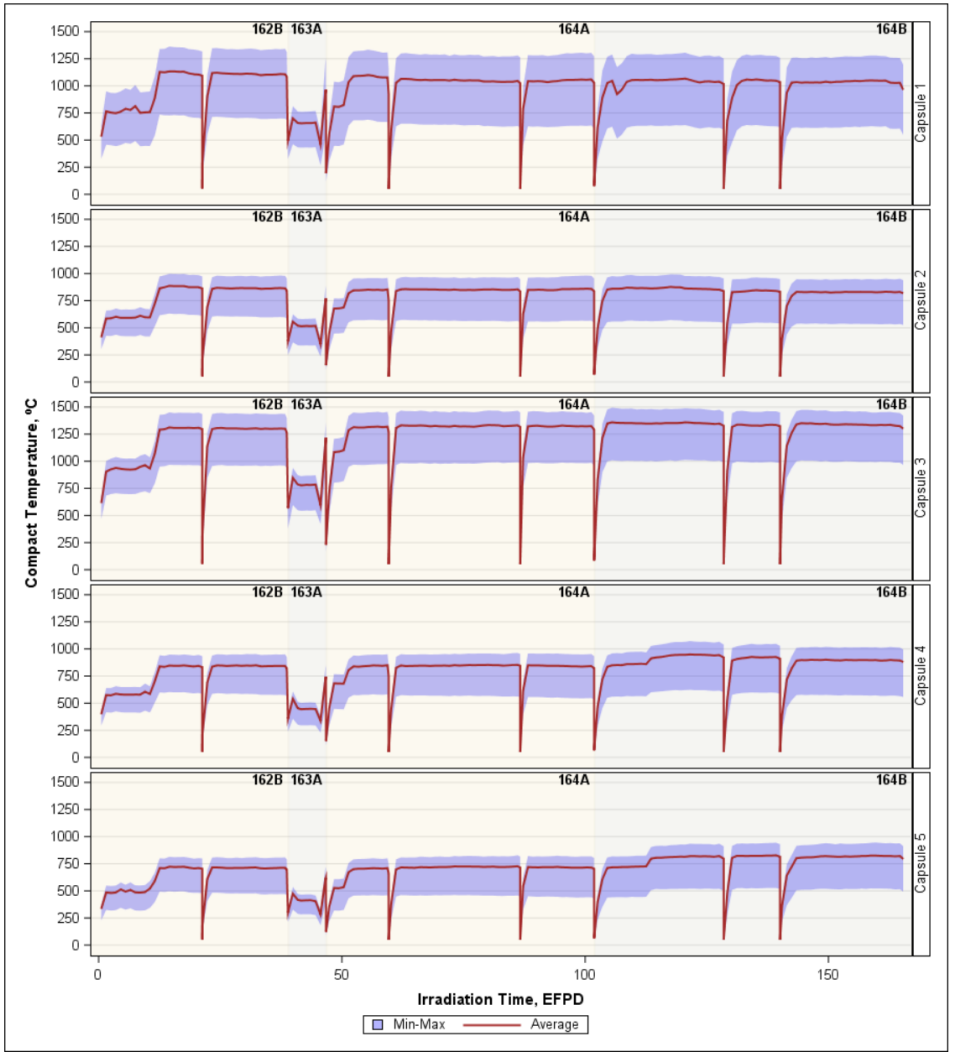
Thermocouple Performance (cont)

- The AGR-5/6/7 thermocouple failure rate has been high
- Project that all thermocouples in Capsules 1 and 2 will fail prior to completion of irradiation
- AGR-1 and AGR-2 also experienced high failure rates with 3 of the 6 capsules in each experiment having no functioning thermocouples for more than half of the irradiation period.

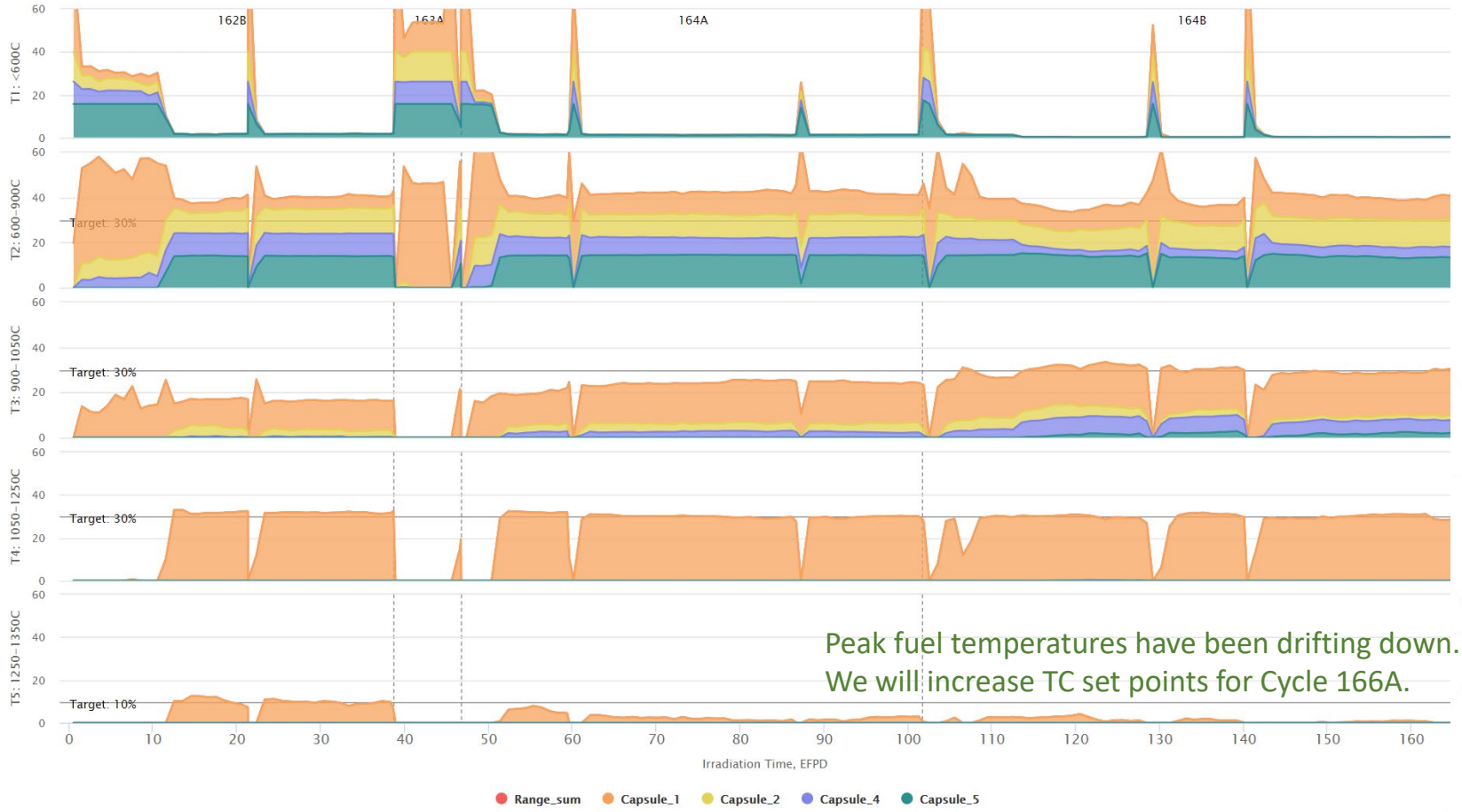
AGR-5/6/7 Compacts Daily Heat Rate



AGR-5/6/7 Fuel Particle Temperatures

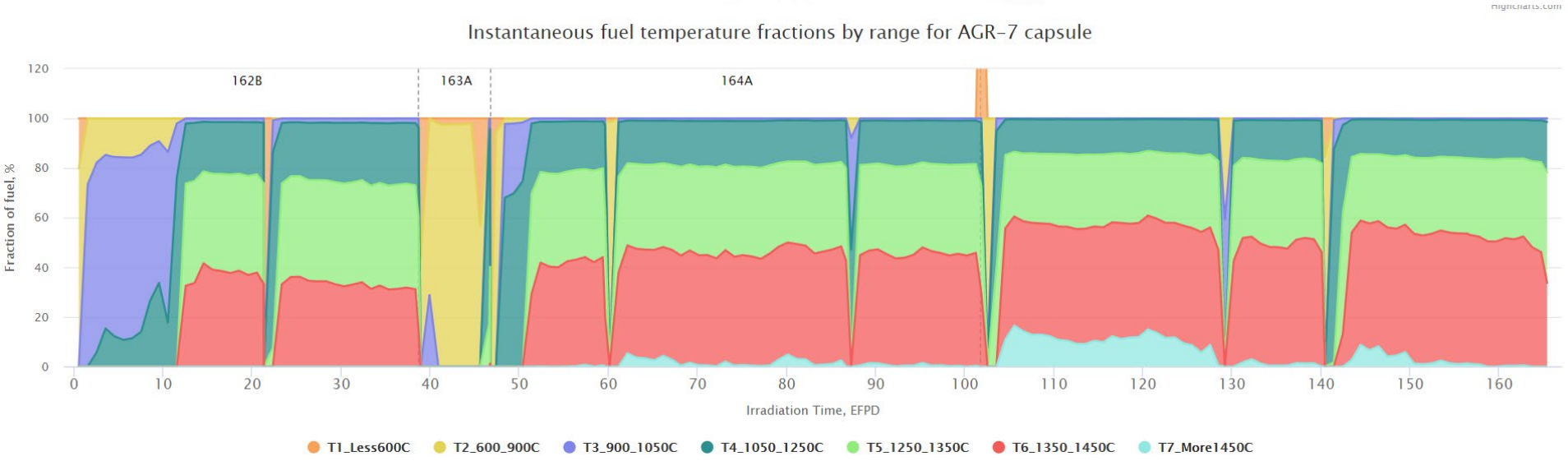


Instantaneous AGR-5/6 Fuel Temperature Range Distribution

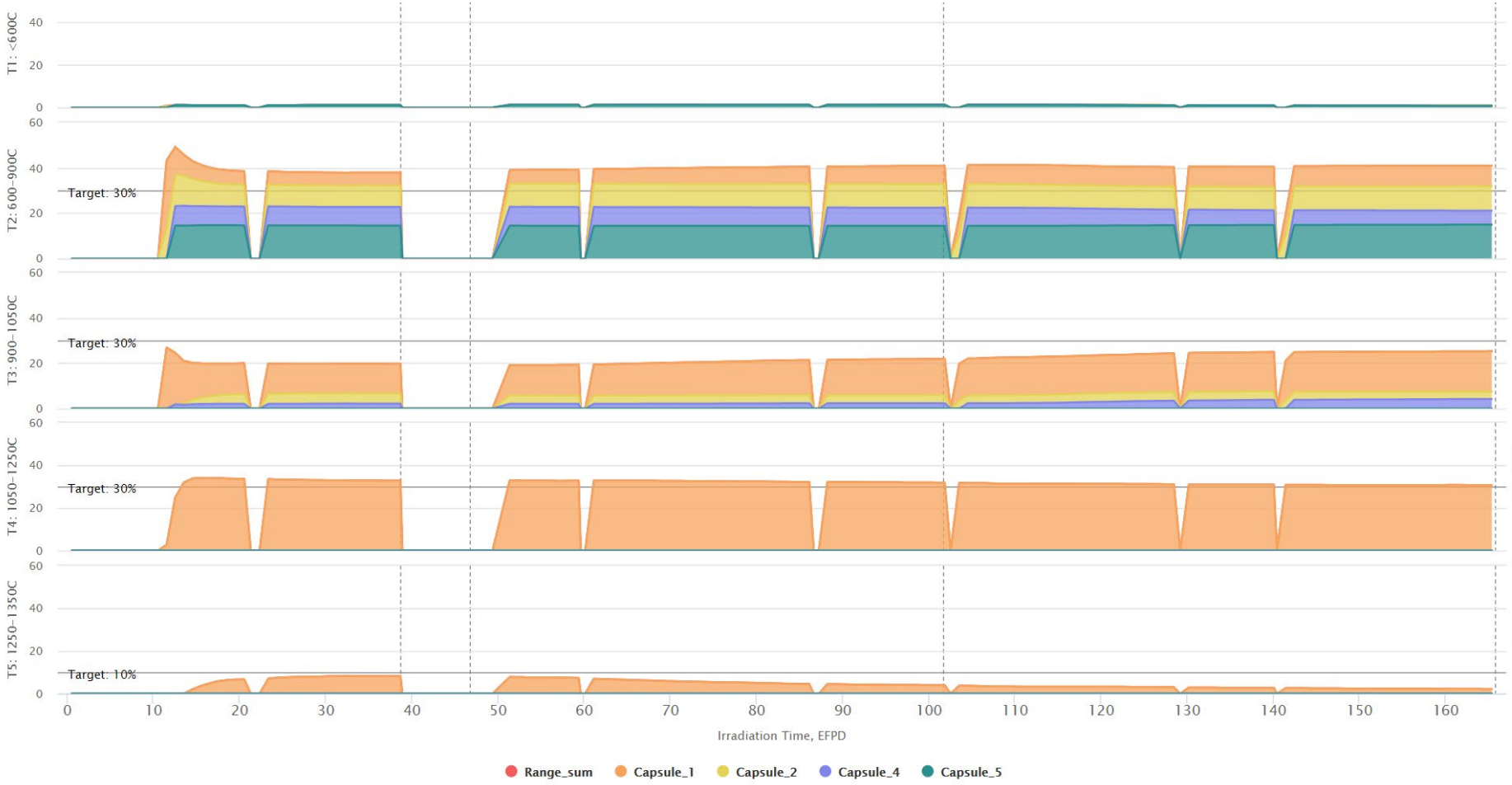


Peak fuel temperatures have been drifting down.
We will increase TC set points for Cycle 166A.

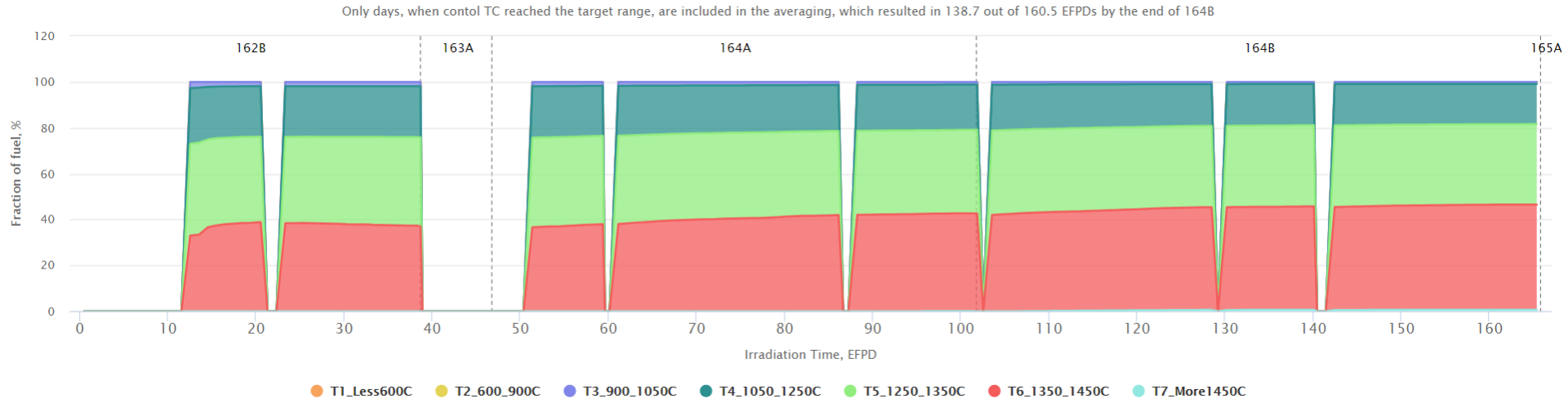
Instantaneous AGR-7 Fuel Temperature Range Distribution



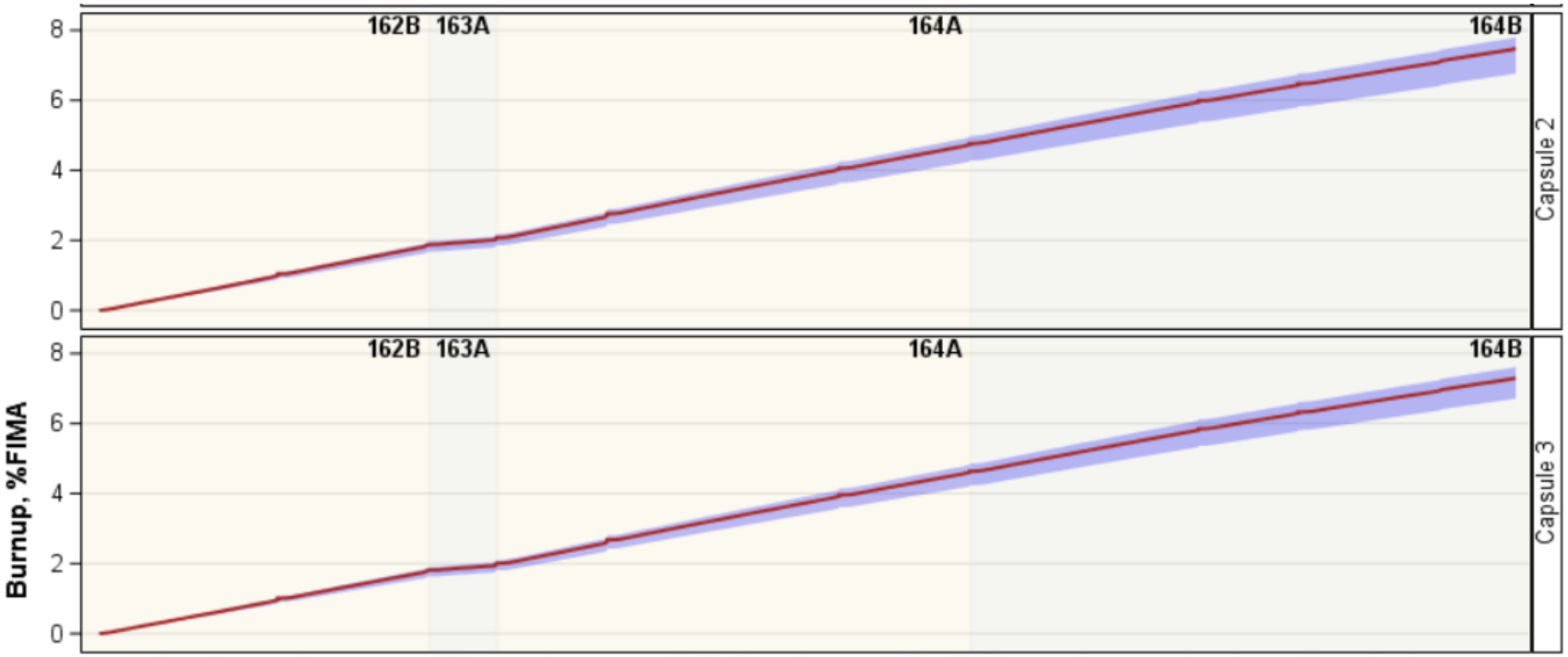
T-Avg V-Avg AGR-5/6 Fuel Temperature Range Distribution



T-Avg V-Avg AGR-7 Fuel Temperature Range Distribution



Percent Burnup for Capsules 2 and 3



AGR-5/6/7 Irradiation Look Ahead

AGR-5/6/7 peak burnup by cycle and cumulative

Original Estimate from ECAR-2961								*Actual Followed by Projected*								
Cycle No.	Cycle Type	Cycle Length (EFPD)	Lobe Power (MW)	Lobe Output (MWD)	Cum Lobe Output (MWD)	Filter	Peak Burnup (%)	Cycle	Cycle Length (EFPD)	Lobe Power (MW)	Lobe Output (MWD)	Cumulativ Lobe Output (MWD)	Filter	Proj Cycle Burnup (%)	Peak Burnup (%)	
1	Regular	50	14	700	**700**	**M**	**2.5**	Reg 162B	43	14.25	**613**	**613**	**M**		**1.95**	
2	Regular	50	14	700	**1400**	**M**	**4.9**	PALM 163A	9	7.2	**65**	**678**	**M**		**2.0**	ACTUAL
3	PALM	15	20	300	**1700**	**H**	**5.6**	Reg 164A	57	15.44	**880**	**1558**	**M**		**5.0**	
4	Regular	50	14	700	**2400**	**M**	**7.5**	Reg 164B	65	16.11	**1047**	**2605**	**M**		**7.8**	
5	Regular	50	14	700	**3100**	**M**	**9.3**	PALM 165A	14	19	**266**	**2871**	**M**	**0.62**	**8.4**	
6	PALM	15	20	300	**3400**	**M**	**10.0**	Reg 166A	59	17	**1003**	**3874**	**L**	**2.44**	**10.9**	
7	Regular	50	14	700	**4100**	**L**	**11.7**	Reg 166B	60	17	**1020**	**4894**	**L**	**2.04**	**12.9**	PROJECTED
8	Regular	50	16	800	**4900**	**L**	**13.3**	PALM 167A	6	20	**120**	**5014**	**L**	**0.24**	**13.1**	
9	PALM	15	20	300	**5200**	**L**	**13.9**	Reg 168A	60	21	**1260**	**6274**	**L**	**2.24**	**15.4**	**Cycle end**
10	Regular	50	18	900	**6100**	**L**	**15.5**	Reg 168B	60	21	**1260**	**7534**	**L**	**1.96**	**17.3**	July 2020
11	Regular	50	18	900	**7000**	**L**	**16.9**	PALM 169A	14	21	**294**	**7828**	**L**	**0.37**	**17.7**	Nov 2020
12	PALM	15	20	300	**7300**	**L**	**17.3**	Reg 170A	60	21	**1260**	**9088**	**L**	**1.58**	**19.3**	Feb 2021
13	Regular	50	18	900	**8200**	**L**	**18.5**	Total	507							
Total		510		8,200	**8200**											

21 MW lobe powers are not currently in the ISOP.
Would need to be requested.

AGR-5/6/7 Irradiation Look Ahead

Actual Followed by Projected

Cycle	Cycle Length (EFPD)	Lobe Power (MW)	Lobe Output (MWD)	Cumulativ Lobe Output (MWD)	Filter	Proj Cycle Burnup (%)	Peak Burnup (%)	
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Total	507							

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