

LaSalle Unit 2 Source Term Reduction L2R16 and L2C17

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Strategy for Elimination of Source Term

- Remove source term from piping/components
 - Immediate reduction
 - Chemical decontamination of RR, RWCU, RHR
- Eliminate sources of recontamination
 - Low flow areas, crud inventory on fuel
 - Suppression pool vacuuming
 - High efficiency ultrasonic fuel cleaning
 - Guide tube vacuuming
 - Bottom head drain cleaning

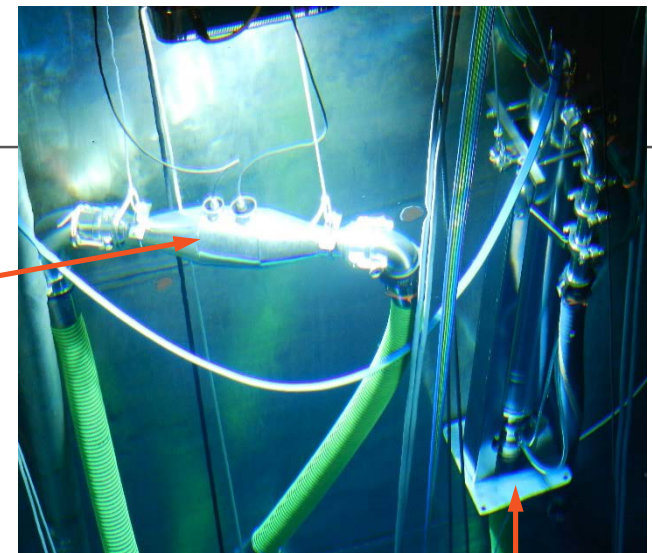
High Efficiency –Ultrasonic Fuel Cleaning

- 260 assemblies fully cleaned
 - 32 1st burns
 - 228 2nd burns
- Foreign objects from the lower tie plate / debris filter of these remaining 236 1st burn bundles

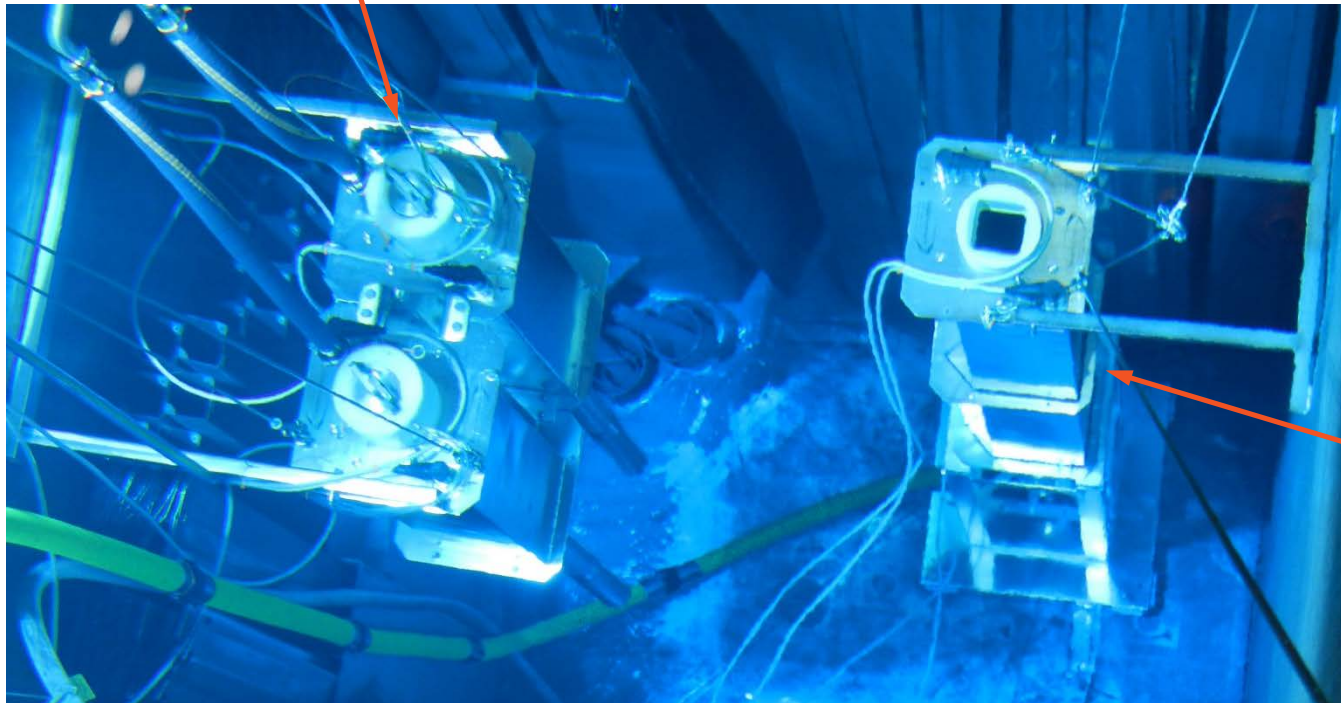
BWR HE-UFC Equipment

LaSalle 2R16 HE-UFC Installation (Cask Pit)

Inline gamma detector



All-metal filter modules (AMFMs) x2
in ultrasonic backwash station

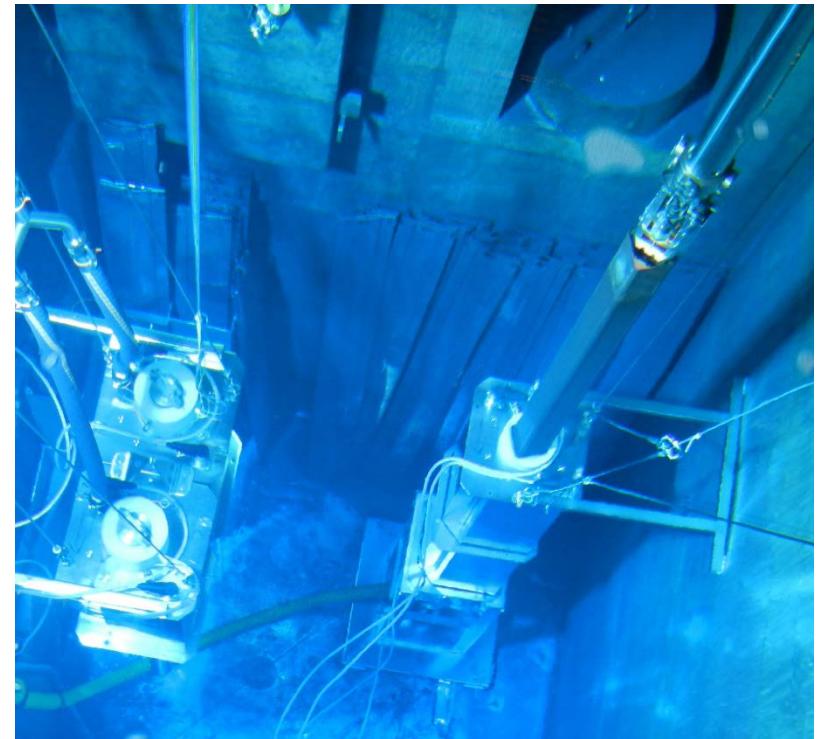


Pump

HE-UFC
Cleaning
Chamber

Fuel Cleaning Basics

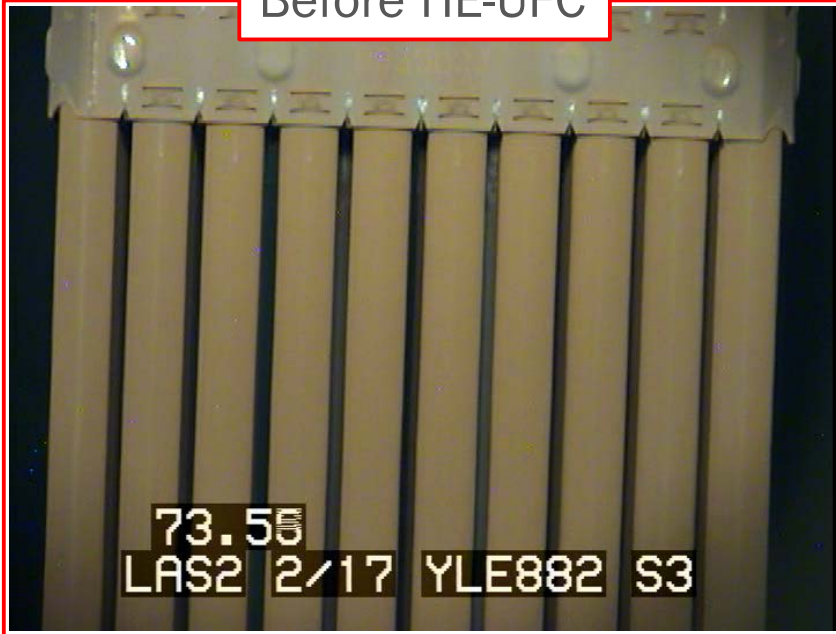
- Fuel cleaned during insertion/removal from cleaner
- Fuel remains on fuel handling tool throughout cleaning process
- Liberated crud is swept away and collected on an integrated filtration system
- AMFM filters are shaped like a fuel assembly (same form factor and interfaces)
 - Can be handled using plant equipment
 - Suitable for long term storage in racks (all metal construction)
 - Very high capacity



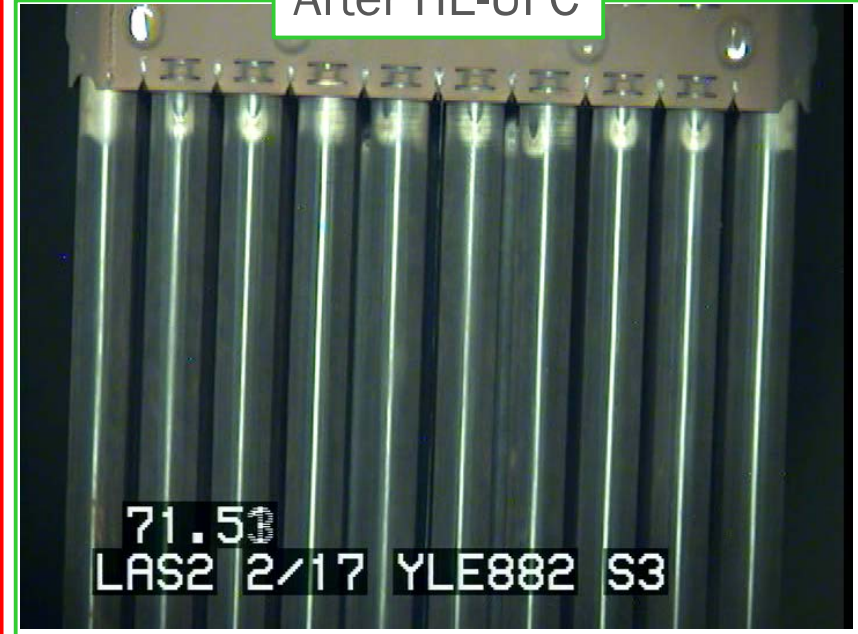
HE-UFC operations at LaSalle

High Efficiency – Ultrasonic Fuel Cleaning

Before HE-UFC



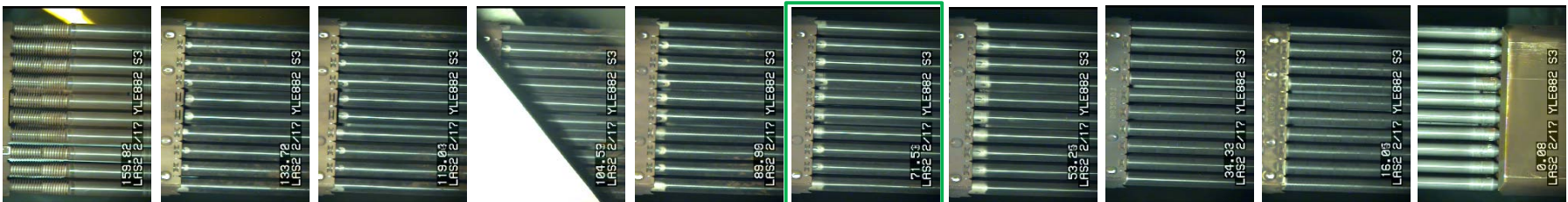
After HE-UFC



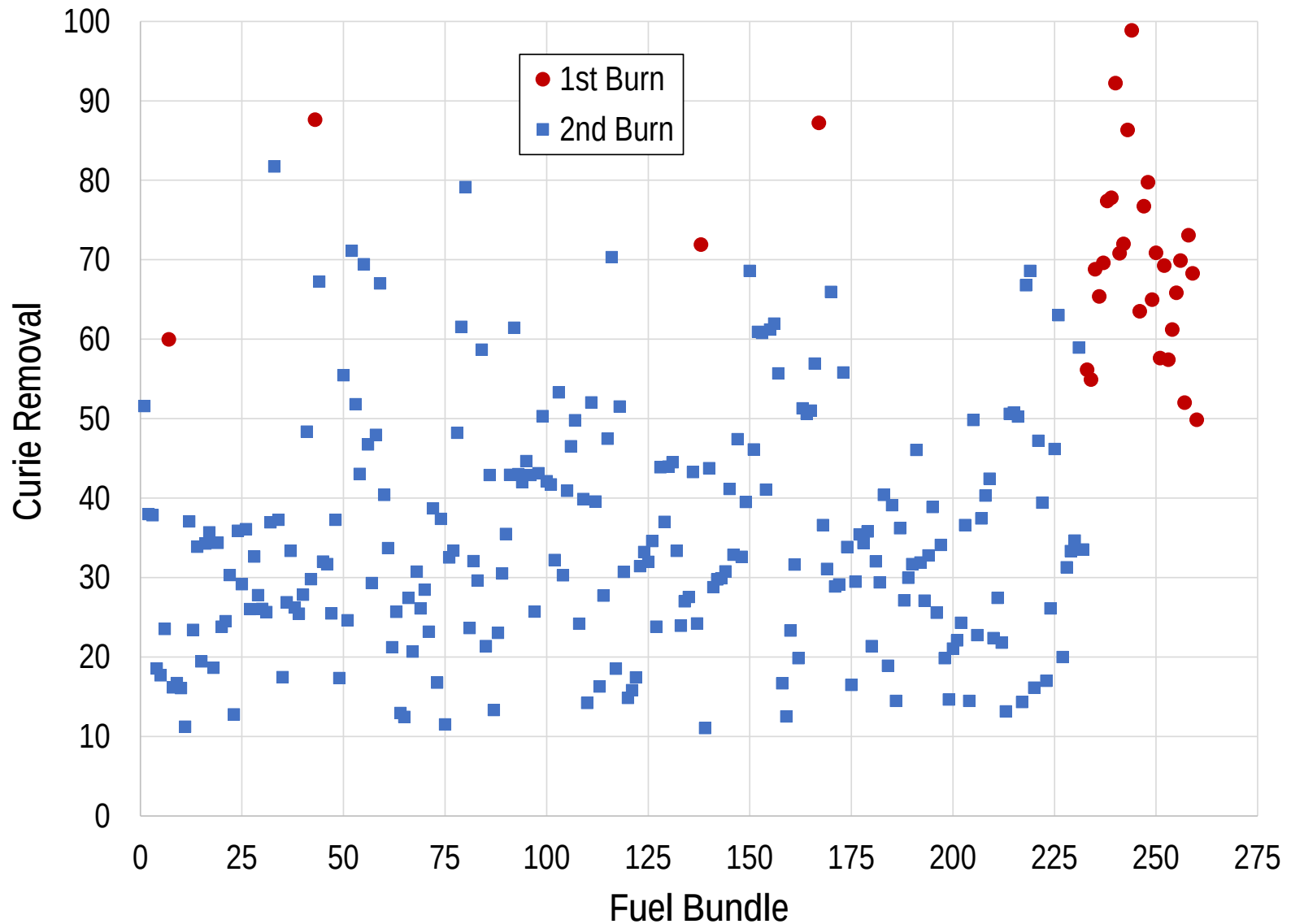
Before



After



HE-UFC - Activity Removal (by bundle)



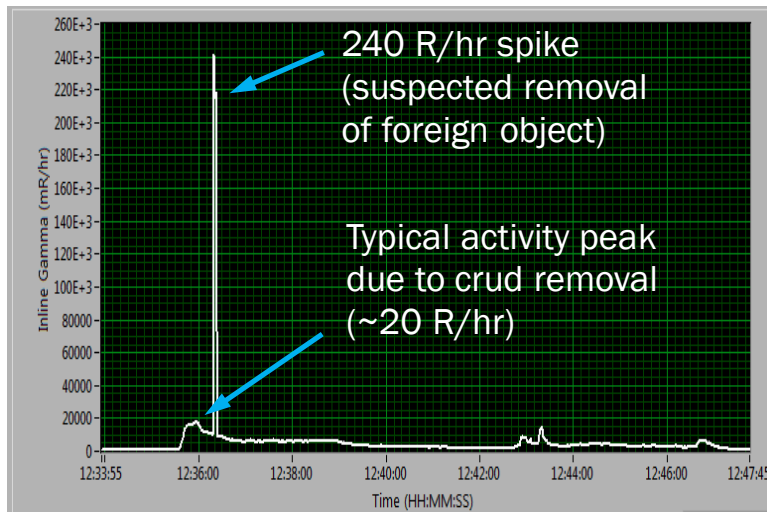
HE-UFC - Activity Removal Summary

Avg. Removal from 2 nd Burns	35 Ci per bundle
Avg. Removal from 1 st Burns	77 Ci per bundle
Total Activity Removed (228 2 nd Burns, 32 1 st Burns)	10,418 Ci (2.1E7 R/hr at 1")

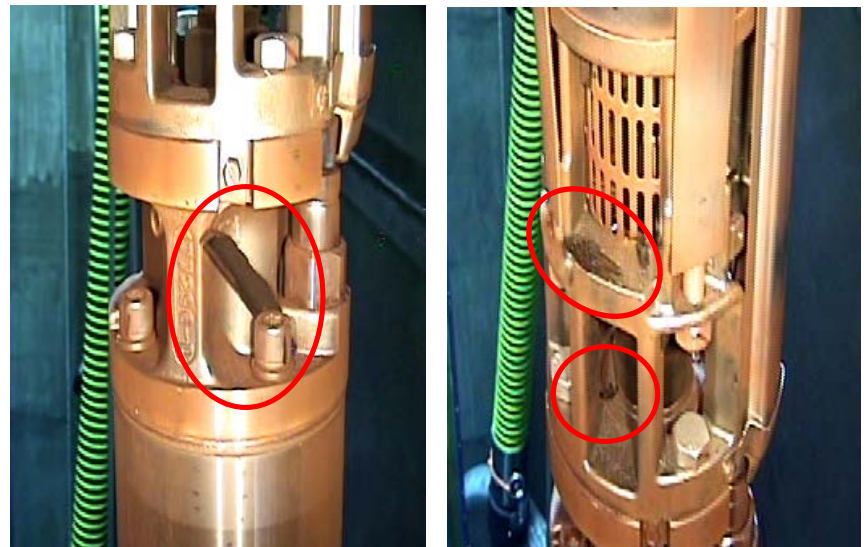
Higher activity on 1st burns (as compared to 2nd burns) possibly due to preferential release from peripheral bundles and deposition on high power bundles.

HE-UFC – Foreign Material Removal

- Large activity spikes observed on inline gamma detector during HE-UFC for about 15-20% of bundles cleaned (suspected foreign object removal)
- After cleaning 260 bundles, HE-UFC pump was inspected
 - Large, foreign objects found in the HE-UFC pump / strainer (confirming foreign object removal during HE-UFC)
 - Objects suspected to be Stellite fragments (>15,000 R/hr contact dose rates)



Inline Gamma Trace during HE-UFC



Foreign Objects in Pump / Strainer After HE-UFC

HE-UFC – Foreign Material Removal

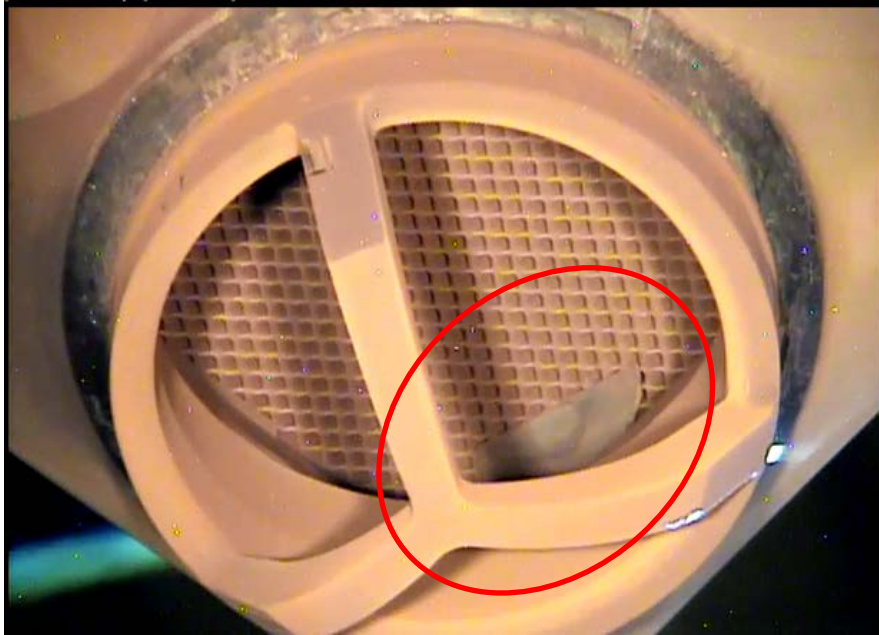
L2R16 Maint] [Dis-1001] 2017-02-21 00:28:56

5100 R/hr

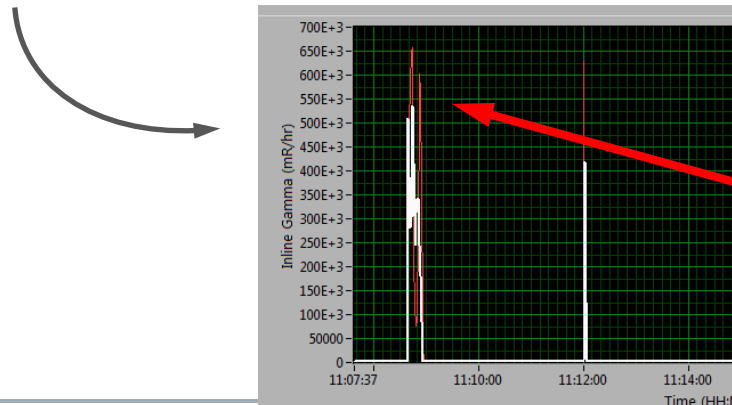
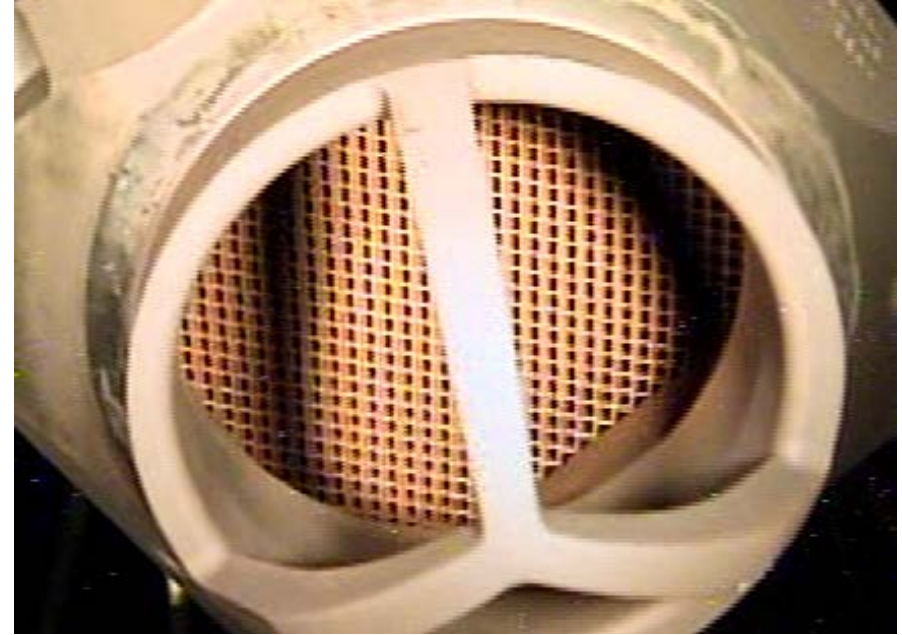


FME Removal from GNF3 LUA (YLE900)

Before HE-UFC



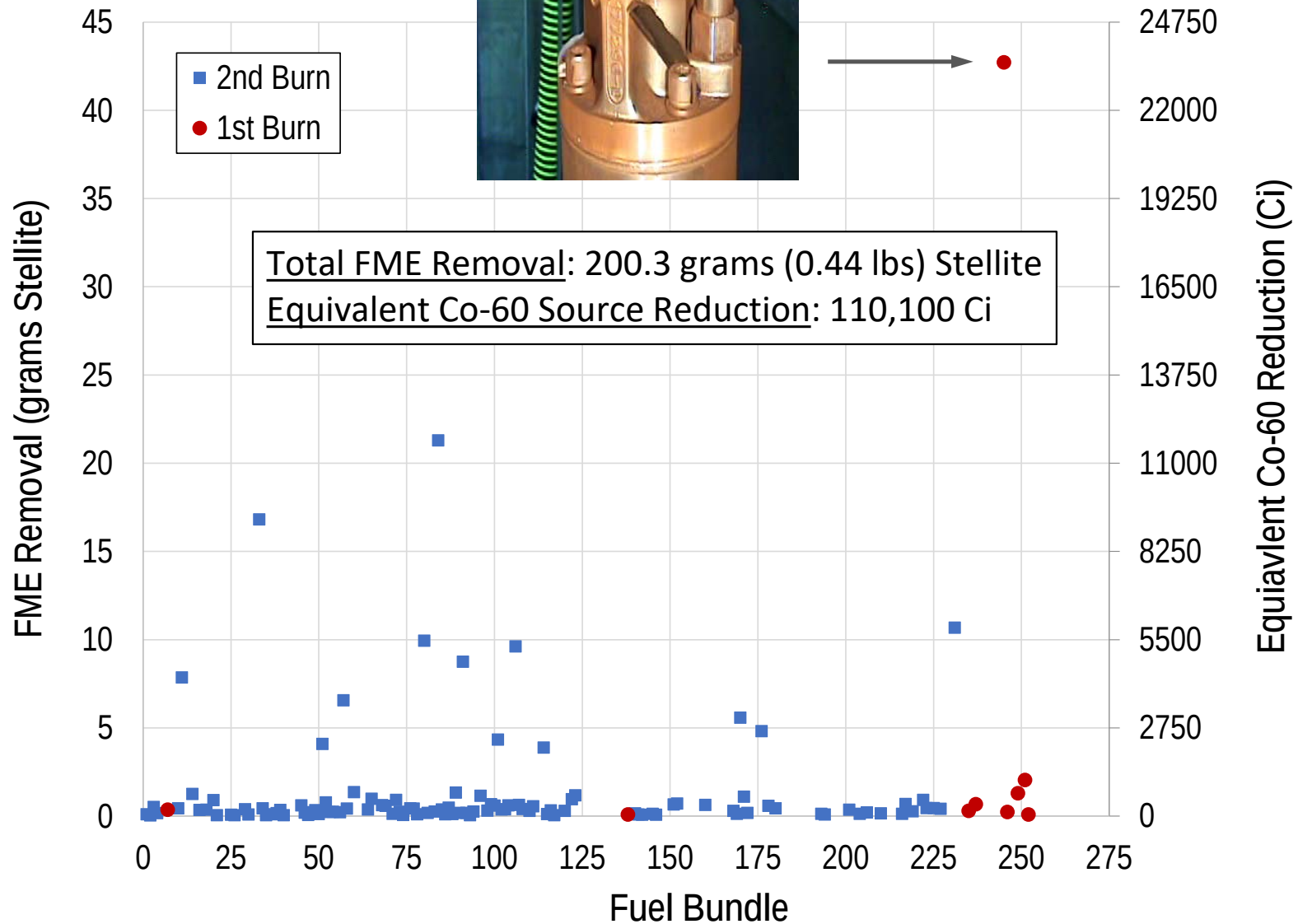
After HE-UFC
(bottom nozzle only)



700 R/hr spike observed
on inline gamma detector
during HE-UFC

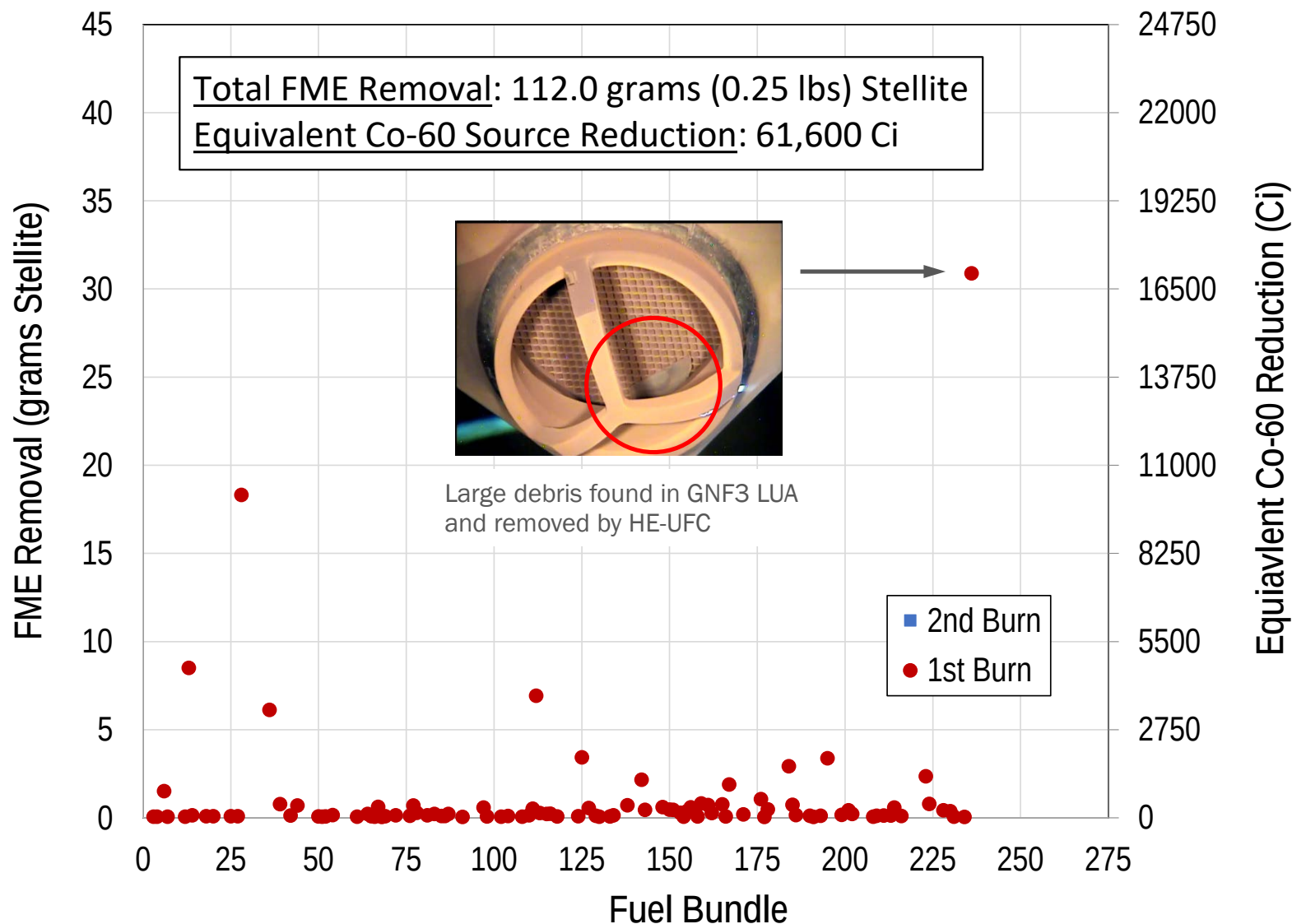
L2R16 HE-UFC – FME Removal

260 Fully-Cleaned Bundles



L2R16 HE-UFC – FME Removal

236 Bundles Cleaned Bottom Nozzle Only (233 with HE-UFC, 3 with Pump only)



HE-UFC - Summary of Foreign Material Removed

- 260 bundles fully cleaned
- 233 bundles cleaned at bottom nozzle only
 - Includes one GNF3 LUA with large debris
 - Three additional GNF3 LUAs were inserted in the cleaner, but subjected to vacuum only with HE-UFC pump
- Highly activated debris removed from 45% of the bundles
 - Suspected to be Stellite fragments due to high activity
(debris found in HE-UFC pump strainer read >15,000 R/hr)
- Total FME removal
 - Stellite mass: 0.69 lbs
 - Equivalent Co-60 reduction: 171,700 Ci (excludes crud activity)
 - Perspective – $3.5E8$ R/hr at 1"

Bottom Head Drain Cleaning



Bottom Head Drain Cleaning



Bottom Head Drain Cleaning – XRF Analysis

Sample 1

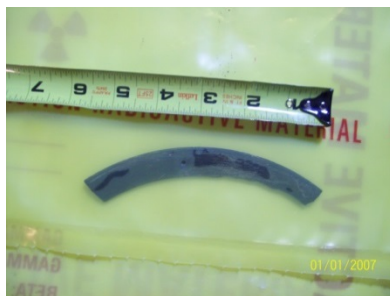
Element	%
Co	48.8
Cr	25.7
Fe	5.7
W	6.6
Hf	5.6
Ni	4.0
Mn	2.1

Sample 2

Element	%
Co	50.8
Cr	20.6
Fe	7.9
W	6.4
Hf	4.8
Ni	4.6
Mn	3.0

Sample 3

Element	%
Co	54.0
Cr	22.9
Fe	4.3
W	7.2
Hf	4.4
Ni	3.9
Mn	2.0



Bottom Head Drain Cleaning

- Material Recovered
 - 307.6 g
 - Activated value 169,510 Ci
 - Perspective – $3.4\text{E}8$ R/hr at 1"

RR System Chemical Decontamination

– DF's

1	1	748' A RR Suction (BRAC)	1200	26	46.2	97.8%
2	2	748' A RR Discharge (BRAC)	120	36	3.3	70.0%
3	3	748' B RR Suction (BRAC)	222	34	6.5	84.7%
4	4	748' B RR Discharge (BRAC)	283	22	12.9	92.2%
9	9	740' 2B33-F023A downstream	188	24	7.8	87.2%
10	10	740' 2B33-F023B downstream	460	18	25.6	96.1%
11	11	740' 2B33-F067A downstream	65	38	1.7	41.5%
12	12	740' 2B33-F067B downstream	407	11	37.0	97.3%
13	13	740' A RR loop RWCU line to 2G33-F102 valve from 2G33-F100 (accessible line near the 102 valve under grating)	5600 TELEPOLE	310 TELEPOLE	18.1	94.5%
14	14	740' B RR loop RWCU line to 2G33-F102 valve from 2G33-F106 (accessible line near the 102 valve under grating)	4200 TELEPOLE	910 TELEPOLE	4.6	78.3%
15	15	762' A loop N2A Riser	250 RO-20	190	1.3	24.0%
16	16	762' A loop N2C Riser	230 RO-20	140	1.6	39.1%
17	17	762' B loop N2F Riser	200 RO-20	100	2.0	50.0%
18	18	762' B loop N2H Riser	521 RO-20	250	2.1	52.0%
	Overall		996.1	150.6	12.2	91.8%
FINAL DF BASED ON SHIELDED PROBE READINGS:			368.125	26.125	17.6	83.4%

RR System Chemical Decontamination

– Chemistry Parameters

sample ID	Date	Time	Cond	pH	Fe, ppm	Cr, ppm	Co60, uCi/g	Curies Co-60 removed/step	Total Co-60 Curies Removed	TOC ppm	Chloride ppb
RRS Initial	2/11/2017	20:45	21.31	4.77					75.2		
RRS BIX	2/11/2017	23:00	8.98	7.46							
NP1	2/12/2017	3:10		2.21	0.05	3.85					
NP-1 Bix	2/12/2017	4:10		2.23	LOQ	4.08	2.05E-2				
NP-1	2/12/2017	5:10		2.33	LOQ	4.80	2.34E-2				
NP-1	2/12/2017	6:10		2.25	0.01	5.00	4.49E-2				
RRS OXR-1B1X	2/12/2017	7:30		2.81	8.54	6.37	1.41E-1				
RRS OXR-1 A1X	2/12/2017	8:00		1.97	0.52	10.72	7.71E-1				
RRS OXR-1 B1X	2/12/2017	8:00		2.47	8.64	7.52	9.77E-1	26.8			
RRS OXR-1 A1X	2/12/2017	9:00		2.08	0.51	10.47	2.72E-3				
RRS OXR-1 B1X	2/12/2017	9:00		2.08	5.60	10.02	1.78E-1	15.03			
RRS OXR-1 A1X	2/12/2017	10:00		1.98	0.18	10.28	9.59E-2				
RRS OXR-1 B1X	2/12/2017	10:00		1.90	14.61	10.48	2.08E-3	4.30			
RRS OXR-1 A1X	2/12/2017	11:00		1.98	0.42	11.02	1.52E-2				
RRS OXR-1 B1X	2/12/2017	11:00		1.91	11.67	10.72	8.08E-2	2.75			
RRS OXR-1 A1X	2/12/2017	12:00		2.02	6.61	13.61	2.77E-3				
RRS OXR-1 B1X	2/12/2017	12:00		2.04	12.09	11.01	8.05E-2	2.48			
RRS OXR-1 A1X	2/12/2017	13:00		2.00	6.50	13.2	6.33E-4				
RRS OXR-1 B1X	2/12/2017	13:00		1.81	9.41	11.79	2.72E-2	1.66			
RRS OXR-1 A1X	2/12/17	13:45		2.36	1.15	3.54	3.09E-4				
RRS OXR-1 B1X	2/12/17	13:45		2.57	1.02	9.53	5.78E-3	0.38			
RRS OXR-1 A1X	2/12/17	14:45		2.34	2.81	5.82	5.60E-04				
RRS OXR-1 B1X	2/12/17	14:45		2.41	14.41	5.70	1.11E-02	0.23			
NP2 BIX	2/12/17	16:45		2.65	0.67	7.23	1.39E-2				
NP2 BIX	2/12/17	17:45		2.68	0.53	7.29	1.31E-2				
NP2 BIX	2/12/17	18:45		2.63	0.67	7.99	1.17E-2				
NP2	2/12/17	19:45		2.65	0.41	9.00	1.09E-2				
NP2	2/12/17	20:45		2.71	0.89	9.647	1.99E-2				
OXR2	2/12/17	22:30		2.56	19.43	10.58	3.26E-1	5.43			
OXR2 AIX	2/12/17	23:00		1.97	0.684	14.07	8.16E3				
OXR2 BIX	2/12/17	23:00		2.15	9.44	13.59	9.29E-2	8.2			
OXR2 AIX	2/13/17	00:00		2.07	1.37	13.78	1.96E-4				
OXR2 BIX	2/13/17	00:00		1.92	4.40	14.14	2.41E-2	2.2			
OXR2 AIX	2/13/17	01:00		1.97	2.261	13.611	7.02E-3				
OXR2 BIX	2/13/17	01:00		2.06	8.944	13.925	2.95E-2	0.95			
OXR2 AIX	2/13/17	02:00		2.02	3.343	14.372	4.27E-3				
OXR2 BIX	2/13/17	02:00		2.07	9.384	15.39	1.57E-2	0.69			
OXR2 AIX	2/13/17	03:00		2.04	3.884	17.692	3.19E-03				
OXR2 BIX	2/13/17	03:00		2.00	10.994	18.268	1.34E-02				
RRS-OX Destruct BIX	2/13/17	04:00	1200								
OXR2- BIX	2/13/17	05:50	146.7	3.72							
RRSOXR C/U BIX	2/13/17	06:30	41.6	4.38							
RRSOXR C/U BIX	2/13/17	07:00	12.40	5.64							
MIX TANK	2/13/17	09:00		5.90							
RRS LOMI-1 BIX	2/13/17	11:25		4.26	0.869	0.149	4.17E-2	0.66			
RRS LOMI-1 BIX	2/13/17	12:25		4.35	0.998	0.193	5.717E-2	0.91			
RRS LOMI-1 BIX	2/13/17	13:30		4.45	1.42	0.33	7.73E-2	1.23			
RRS LOMI-1 BIX	2/13/17	14:30		4.28	3.410	.413	8.232E-2	1.31			
RRS LOMI-1 BIX	2/13/17	15:00		4.24	4.04	0.471	9.09E-02				

RWCU System Chemical Decontamination – DF's

RT

	Survey Point	Description	Baseline Contact Exposure Rate (mRem/hour)	End Contact Exposure Rate (mRem/hour)	Decon Factor (DF)	% Reduction
5	7	761' RB RT pump room valve aisle elbow upstream 2G33-F043A	9800	9200	1.1	6.1%
6	8	761' RB RT pump room valve aisle elbow upstream 2G33-F043B	4800	250	19.2	94.8%
8	10	761' RB RT pump room valve aisle on elbow downstream 2G33-F013A	7800	110	70.9	98.6%
9	11	761' RB RT pump room valve aisle on elbow downstream 2G33-F013B	4300	100	43.0	97.7%
1 1	13	786' RB B RT Hx Room downstream 2G33-F105D	1800	100	18.0	94.4%
1 2	14	786' RB A RT Hx Room downstream 2G33-F105A	2500	220	11.4	91.2%
1 3	15	786' RB A RT Hx Room downstream 2G33-F048A	270	270	1.0	0.0%
1 4	16	786' RB B RT Hx Room downstream 2G33-F048B	80	80	1.0	0.0%
Overall RT based on shielded probe:			3918.8	1291.3	20.7	95.2%

RWCU System Chemical Decontamination – Chemistry Parameters

RWCU Chem Decon											
Sample ID	Date	Time	Cond	pH	Fe, ppm	Cr, ppm	Co60 uCi/g	Curies Co60 removed/step	Total Co60 (curies) removed	TOC, ppm	Cl, ppb
Initial BIX	2/20/17	17:00	105.9	3.77					60.4 58.99		
BIX	2/20/17	18:30	53.0	9.31							
BIX	2/20/17	19:30	2.89	7.07							
NP-0 BIX	2/20/17	22:30	4760	2.15	0.37	44.4	3.87E-2				
NP-1 BIX	2/20/17	23:30		2.29	0.15	31.4	3.75E-3				
NP-1 BIX	2/21/17	00:30		2.33	0.36	55.8	1.07E-3				
NP-1 BIX	2/21/17	01:30		2.36	0.16	51.3	2.08E-3				
OXR BIX	2/21/17	02:15		2.38	6.3	57.1	1.23E-1	1.3			
OXR BIX	2/21/17	02:45		2.29	272	80.2	1.64E0	9.9			
OXR AIX	2/21/17	02:45		1.96	1.73	74.3	9.02E-3				
OXR BIX	2/21/17	03:15		2.25	153	58.3	1.26E-1	1.4			
OXR AIX	2/21/17	03:15		2.03	1.07	63.8	1.47E-3				
OXR BIX	2/21/17	04:15		2.26	110	73	2.14E-2	1.1			
OXR AIX	2/21/17	04:15		1.96	0.75	74.5	2.74E-4				
OXR BIX	2/21/17	05:15		2.28	100	79	8.80E-03	0.38			
OXR AIX	2/21/17	05:15		2.08	1.6	81	1.05E-03				
OXR BIX	2/21/17	07:15	2.69	2.26			1.95E-02	1.08			
OXR AIX	2/21/17	07:15	3.81	2.11			4.42E-04				
Citrox BIX	2/21/17	08:45		1.75	110.57	159	6.59E-3	0.60			
Citrox AIX	2/21/17	08:45		1.79	6.62	111.20	4.68E-4				
Citrox BIX	2/21/17	09:45		2.02	95.7	118.56	4.31E-1	16.75		Valved in Bottom Head Drain	
Citrox AIX	2/21/17	09:45		2.04	2.19	118.30	1.53E-3				
Citrox BIX	2/21/17	11:45		2.18	95.2	153.6	2.29E-2	18.9			
Citrox AIX	2/21/17	11:45		2.06	3.0	159.4	7.00E-4				
Citrox BIX	2/21/2017	13:45		2.32	173.7	189.2	2.00E-2	1.57			
Citrox AIX	2/21/2017	13:45		1.95	5.29	186	8.94E-4				
Citrox BIX	2/21/2017	15:45		1.97	83.2	211.2	1.18E-2	1.42			
Citrox AIX	2/21/2017	15:45		1.96	5.24	213.4	9.88E-4				
Citrox BIX	2/21/17	17:45		1.95	73.1	194	9.15E-3	0.99			
Citrox AIX	2/21/17	17:45		2.11	1.3	163	3.94E-4				
Citrox BIX	2/21/17	19:45		2.22	90	235	5.68E-3	0.94			
Citrox AIX	2/21/17	19:45		2.23	0.63	216	1.10E-3				
Citrox BIX	2/21/17	21:45		2.28	103	220	3.86E-3	0.60			
Citrox AIX	2/21/17	21:45		2.16	1.36	212	2.35E-4				
Citrox BIX	2/22/17	01:30		2.61	113	165	1.25E-2	1.28			
Citrox AIX	2/22/17	01:30		2.34	1.18	174	1.03E-3				
Citrox BIX	2/22/17	04:45		2.66	93	125	5.66E-3	0.85			
				93		125	5.66E-3	0.85			
Citrox AIX	2/22/17	04:45		2.39	3.12	136	1.80E-3				
				2.39	3.13	136	1.80E-3				
Citrox BIX	2/22/17	06:45		2.73	107.7	152.3	4.25E-3	0.35			
Citrox AIX	2/22/17	06:45		2.37	2.80	154.4	1.48E-3				
Citrox BIX	2/22/17	08:45		3.23	226.0	173.2	7.60E-3	0.34			
Citrox AIX	2/22/17	08:45		2.32	7.08	169.0	3.69E-3				
Citrox BIX	2/22/17	10:45		2.28	60.2	132.7	2.45E-3	0.47			
Citrox AIX	2/22/17	10:45		2.25	0.8	127.8	4.52E-4				
Citrox BIX	2/22/17	12:45		2.42	62.2	140.1	2.27E-3	0.29			

B RHR Chemical Decontamination – DF's

	Survey Point	Description	Baseline Contact Exposure Rate (mRem/hour)	End Contact Exposure Rate (mRem/hour)	Decon Factor (DF)	% Reduction
1	2	673' RB B RHR C 15.5 upstream 2E12-F006B	29	1.2	24.2	95.9%
2	3	673' RB B RHR C-15.5 pump suction strainer (approx. 3ft from pump)	37	1.2	30.8	96.8%
3	4	673' RB B RHR C-15.5 downstream check valve 2E12-F31B	21	0.9	23.3	95.7%
4	5	673' RB B-16 upstream 2E12-F067 valve	2	1.5	1.3	25.0%
5	6	673' RB B RHR pump room on suction X-tie to A SF	7	0.5	14.0	92.9%
6	7	694' RB B RHR B-15 on 2E12-F048B	58	6	9.7	89.7%
7	8	694' RB B RHR B-16 2E12-F003B	4	1.8	2.2	55.0%
8	9	710' RB B RHR suction side of B RHR Hx	19	0.5	38.0	97.4%
9	10	710' RB B RHR discharge side of B RHR Hx	17	1.5	11.3	91.2%
10	11	710' RB B RHR C-16 T intersection upstream 2E12-F047B from 2B RHR pump and to 2B Hx bypass line	27	5.5	4.9	79.6%
11	27	740' RB H-17 B LPCI near Tee above VQ platform	60	4	15.0	93.3%
12	29	710' RB A-15.5 B RHR elbow near 2E12-F024B	6	2.8	2.1	53.3%
13	30	694' RB B-17 raceway B RHR SDC suction header	15	0.8	18.8	94.7%
	Overall		23.2	2.2	15.1	81.6%

B RHR Chemical Decontamination – Chemistry Parameters

RHR-B Chem Decon											
Sample ID	Date	Time	Cond	pH	Fe, ppm	Cr, ppm	Co60 uCi/g	Curies Co-60 removed/step	Total Co-60 Curies Removed	TOC, ppm	Chloride ppb
RHR-B Mix Tank	2/15/17	20:30		1.01					3.74		
RHR-B BIX	2/15/17	22:15		2.05	85.839	0.44	1.65E-2	0.2			
RHR-B AIX	2/15/17	22:15		1.89	2.19	0.36	8.12E-4				
RHR-B BIX	2/15/17	23:15		2.06	75.231	0.762	1.29E-2	0.7			
RHR-B AIX	2/15/17	23:15		2.19	1.697	0.820	1.55E-3				
RHR-B BIX	2/16/17	00:15		2.07	58.02	1.19	9.62E-3	0.5			
RHR-B AIX	2/16/17	00:15		2.14	7.31	1.32	9.71E-4				
RHR-B BIX	2/16/17	01:15		2.14	56.12	1.43	6.28E-3	0.4			
RHR-B AIX	2/16/17	01:15		2.11	10.19	1.52	8.15E-4				
RHR-B BIX	2/16/17	02:15		2.10	49.26	1.63	4.43E-3	0.3			
RHR-B AIX	2/16/17	02:15		2.26	16.67	2.01	2.41E-4				
RHR-B BIX	2/16/17	03:15		2.20	46.4	1.83	3.46E-3	0.2			
RHR-B AIX	2/16/17	03:15		2.17	18.27	2.30	2.28E-4				
RHR-B BIX	2/16/17	05:15		2.26	52.596	3.192	2.33E-3	0.3			
RHR-B AIX	2/16/17	05:15		2.18	19.607	2.611	1.97E-4				
RHR-B BIX	2/16/17	07:15		2.00	49.1	4.12	1.99E-3	0.2			
RHR-B AIX	2/16/17	07:15		2.11	0.48	3.39	1.02E-4				
RHR-B BIX	2/16/17	10:15	3450	2.00	36.6	3.04	1.66E-3	0.3			
RHR-B AIX	2/16/17	10:15		2.07	1.09	6.12	8.00E-5				
RHR-B BIX	2/16/17	13:15		1.99	52.4	22.0	1.40E-3	0.2			
RHR-B AIX	2/16/17	13:15		2.21	1.08	7.64	1.20E-4				
RHR-B BIX	2/16/17	16:15		2.04	42.3	35.6	1.07E-3	0.2			
RHR-B AIX	2/16/17	16:15		2.08	2.13	27.4	1.13E-4				
RHR-B BIX	2/16/17	19:15		2.21	31.63	36.79	7.62E-4	0.1			
RHR-B AIX	2/16/17	19:15		2.19	1.52	32.6	1.24E-4				
RHR-B BIX	2/16/17	22:15		2.21	30.79	45.21	5.70E-4	0.1			
RHR-B AIX	2/16/17	22:15		2.14	0.77	40.58	1.23E-4				
RHR-B BIX	2/17/17	00:15		2.18	30.55	49.98	4.56E-4	0.04			

A RHR Chemical Decontamination – DF's

Survey Point	Description	Baseline Contact Exposure Rate (mRem/hour)	End Contact Exposure Rate (mRem/hour)	Decon Factor (DF)	% Reduction
2	673' Raceway G-19.8 outside A RHR pump room on suction x-tie to LPCS	12	3.2	3.8	73.3%
3	673' RB A RHR G-20.5 upstream 2E12-F006A	71	2.0	35.5	97.2%
4	673' RB A RHR G-20.5 pump suction strainer (approx. 3ft from pump)	91	3.4	26.8	96.3%
5	673' RB A RHR G-15.5 pump discharge elbow	38	2.3	16.5	93.9%
6	673' RB raceway B-17 C RHR suction line from suppression pool at T to B SF pump	10	10.0	1.0	0.0%
7	673' RB A RHR G-20 downstream check valve 2E12-F031A	41	5.4	7.6	86.8%
8	694' RB A RHR J-20.5 on 2E12-F003A	42	5.3	7.9	87.4%
9	710' RB A RHR suction side of A RHR Hx	23	2.3	10.0	90.0%
10	710' RB A RHR discharge side of A RHR Hx	20	8.4	2.4	58.0%
11	710' RB B RHR B-15 on 2E12-F048A	107	21.0	5.1	80.4%
12	710' RB A RHR I-20 downstream (above) 2E12-F047A	115	22.0	5.2	80.9%
Overall		51.8	7.8	11.1	91.0%

A RHR Chemical Decontamination – DF's

A RHR

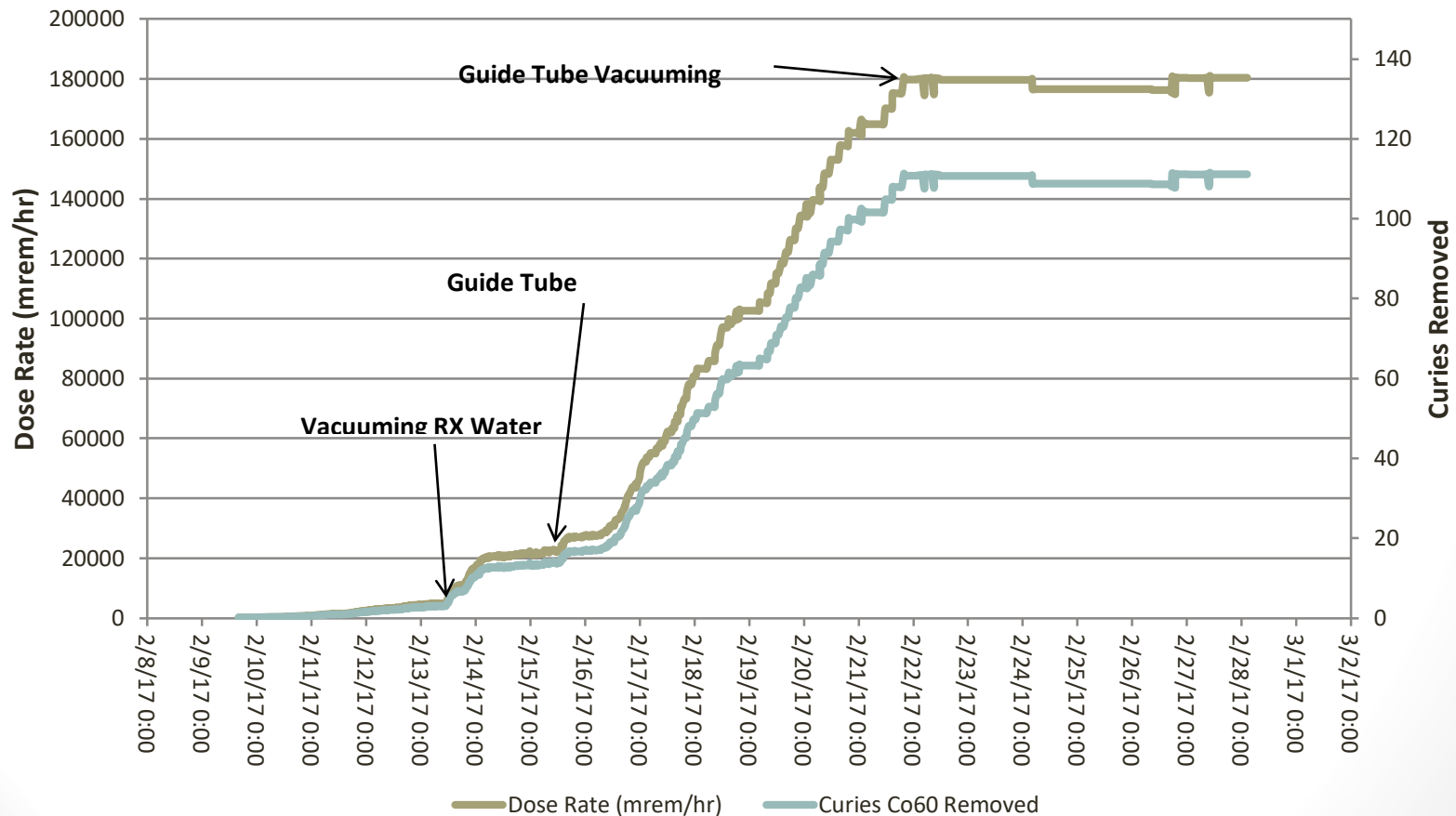
	Survey Point	Description	Baseline Contact Exposure Rate (mRem/hour)	End Contact Exposure Rate (mRem/hour)	Decon Factor (DF)	% Reduction
1	2	673' Raceway G-19.8 outside A RHR pump room on suction x-tie to LPCS	12	3.2	3.8	73.3%
2	3	673' RB A RHR G-20.5 upstream 2E12-F006A	71	2.0	35.5	97.2%
3	4	673' RB A RHR G-20.5 pump suction strainer (approx. 3ft from pump)	91	3.4	26.8	96.3%
4	5	673' RB A RHR G-15.5 pump discharge elbow	38	2.3	16.5	93.9%
5	6	673' RB raceway B-17 C RHR suction line from suppression pool at T to B SF pump	10	11.8	0.8	-18.0%
6	7	673' RB A RHR G-20 downstream check valve 2E12-F031A	41	5.4	7.6	86.8%
7	8	694' RB A RHR J-20.5 on 2E12-F003A	42	5.3	7.9	87.4%
8	9	710' RB A RHR suction side of A RHR Hx	23	2.3	10.0	90.0%
9	10	710' RB A RHR discharge side of A RHR Hx	20	8.4	2.4	58.0%
10	11	710' RB B RHR B-15 on 2E12-F048A	107	21.0	5.1	80.4%
11	12	710' RB A RHR I-20 downstream (above) 2E12-F047A	115	2.2	52.3	98.1%
		Overall	51.8	6.1	15.3	93.5%

A RHR Chemical Decontamination – Chemistry Parameters

RHR A Chem Decon											
Sample ID	Date	Time	Cond	pH	Fe, ppm	Cr, ppm	Co60 uCi/g	Curies Co-60 removed/step	Total Co-60 Curies Removed	TOC, ppm	Chloride ppb
Citrox									3.99		
BIX	2/27/17	13:45	30.9	5.06	0.17	0.02	9.92E-4	0.02			
AIX	2/27/17	13:45	11.06	4.83	0.06	0.06	3.55E-4				
BIX	2/27/17	14:45		2.14	97.6	1.01	5.63E-3	0.196			
AIX	2/27/17	14:45		2.13	1.77	0.84	3.38E-4				
BIX	2/27/17	16:45		1.99	57.9	1.13	8.88E-3	0.92			
AIX	2/27/17	16:45		1.94	27.1	1.12	3.63E-4				
BIX	2/27/17	18:45		1.86	108	2.82	4.94E-3	0.87			
AIX	2/27/17	18:45		1.82	71	2.80	3.59E-4				
BIX	2/27/17	20:45		1.97	105	3.64	3.64E-3	0.53			
AIX	2/27/17	20:45		1.88	81	3.89	2.66E-4				
BIX	2/27/17	22:45		1.97	113	4.66	2.83E-3	0.40			
AIX	2/27/17	22:45		1.98	83	4.40	2.48E-4				
BIX	2/28/17	00:30		1.97	115	5.28	2.37E-3	0.28			
AIX	2/28/17	00:30		1.98	85	4.94	2.44E-4				
BIX	2/28/17	02:45		1.97	112	5.71	2.01E-3	0.29			
AIX	2/28/17	02:45		2.00	83	5.52	2.26E-4				
BIX	2/28/17	04:45		2.01	107	6.30	1.86E-3	0.12			
AIX	2/28/17	04:45		2.02	83	5.97	2.22E-4				
BIX	2/28/17	06:45		2.00	99.3	6.6	1.10E-3	0.17			
AIX	2/28/17	06:45		1.96	78.8	6.6	2.30E-4				
BIX	2/28/17	08:45		1.97	98.6	7.5	9.566E-4	0.11			
AIX	2/28/17	08:45		2.00	80.0	7.5	2.359E-4				
BIX	2/28/17	10:45		2.02	95.1	8.2	8.86E-4	0.09			

Guide Tube Vacuuming

Refuel Floor DTS Filter Unit



Guide Tube Vacuuming

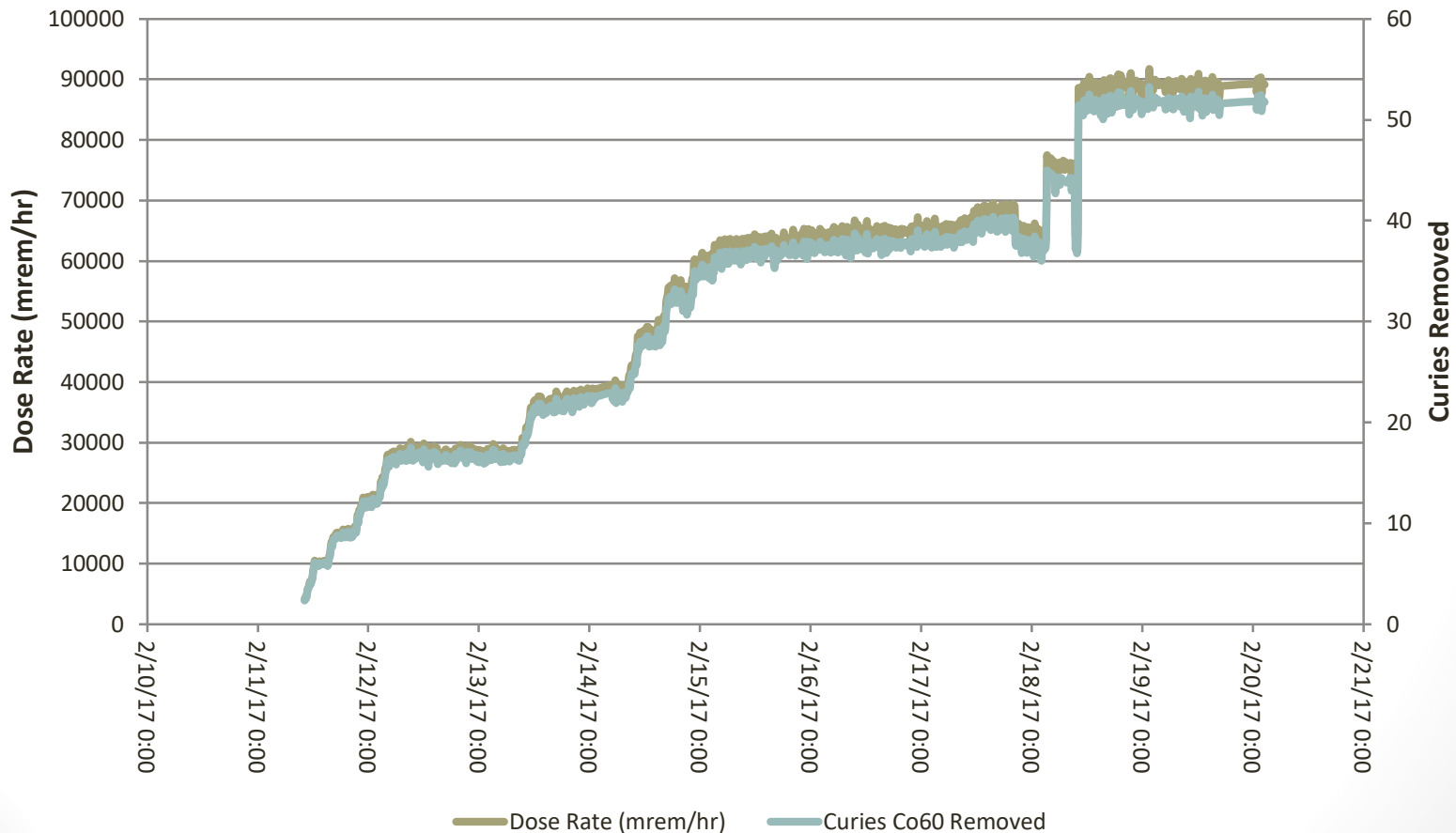
- 110 Ci of activity removed
 - Perspective – $2.2\text{E}5$ R/hr at 1"

Suppression Pool Vacuuming



Suppression Pool Vacuuming

Suppression Pool Triton Filter Unit



Suppression Pool Vacuuming

- 52 Ci of activity removed
 - Perspective – 1.0E5 R/hr at 1”
- Suppression pool nozzle hydrolazing

Nozzle	Pre-flush Contact	Pre-flush 30 cm	Post-flush Contact	Post-flush 30 cm
HPCS	855	162	35	18
RHR “A”	280	95	60	20
RHR “B”	1800	330	23	12
RHR “C”	1380	330	85	30
LPCS	1200	317	36	16
RCIC	1900	600	15	8

Summary of Source Term Removed

Initiative	Activity Removed (Curies)
“B” RH Chemical Decontamination	3.74
RR Chemical Decontamination	75.2
RT Chemical Decontamination	60.4
“A” RH Chemical Decontamination	3.99
Suppression Pool Vacuuming	52
Guide Tube Vacuuming	110
HE-UFC (planned cleaning)	10418
HE-UFC (debris screen)	171,700 (assumes all stellite activated)
Bottom Head Drain Cleaning	169,510 (assumes all stellite activated)