

NC STATE

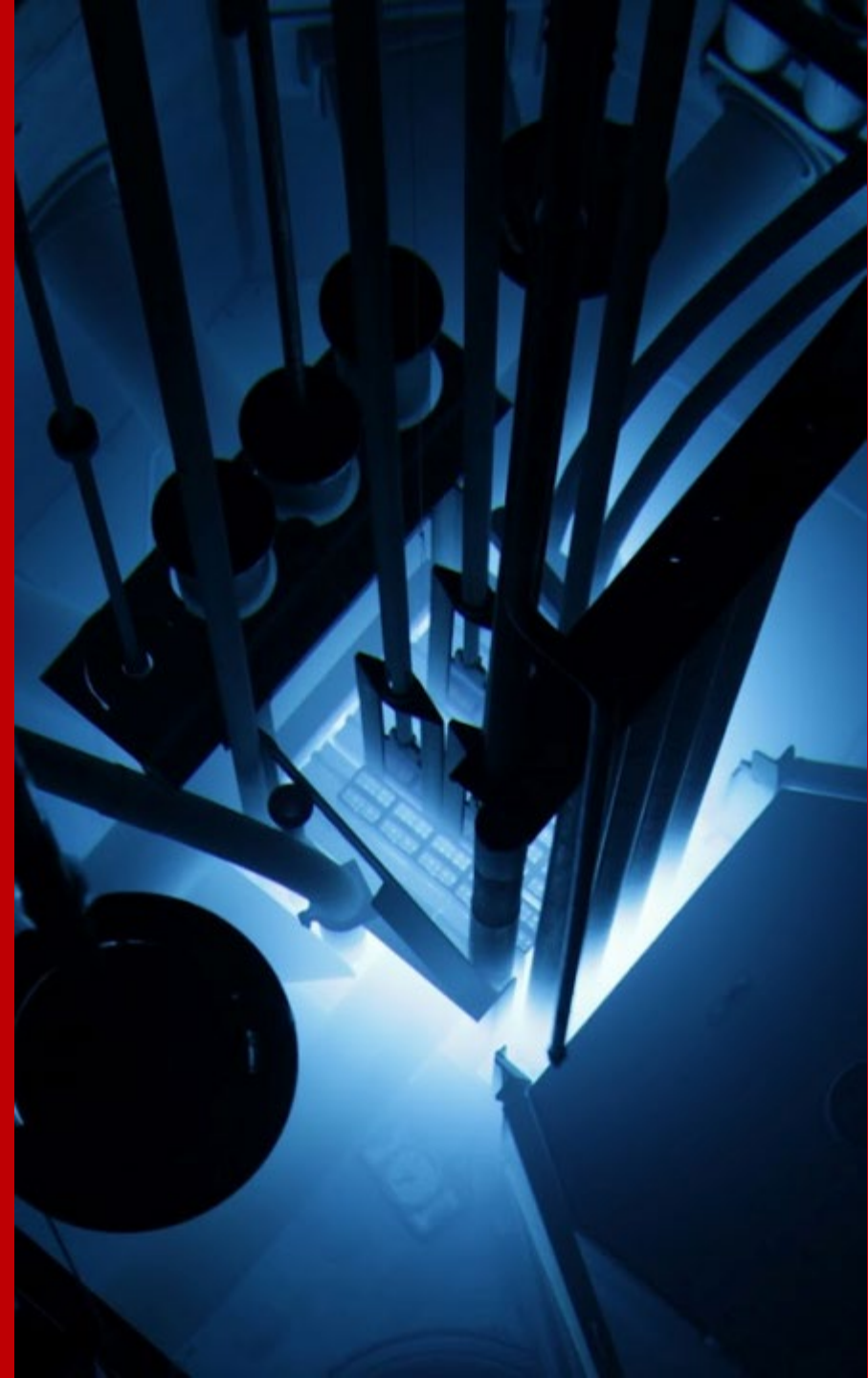
RECENT EXPERIENCE WITH LIGHTWEIGHT DIGITAL TOOLS

**FOR SCHEDULING AND DOCUMENTATION AT THE NC
STATE PULSTAR RESEARCH REACTOR**

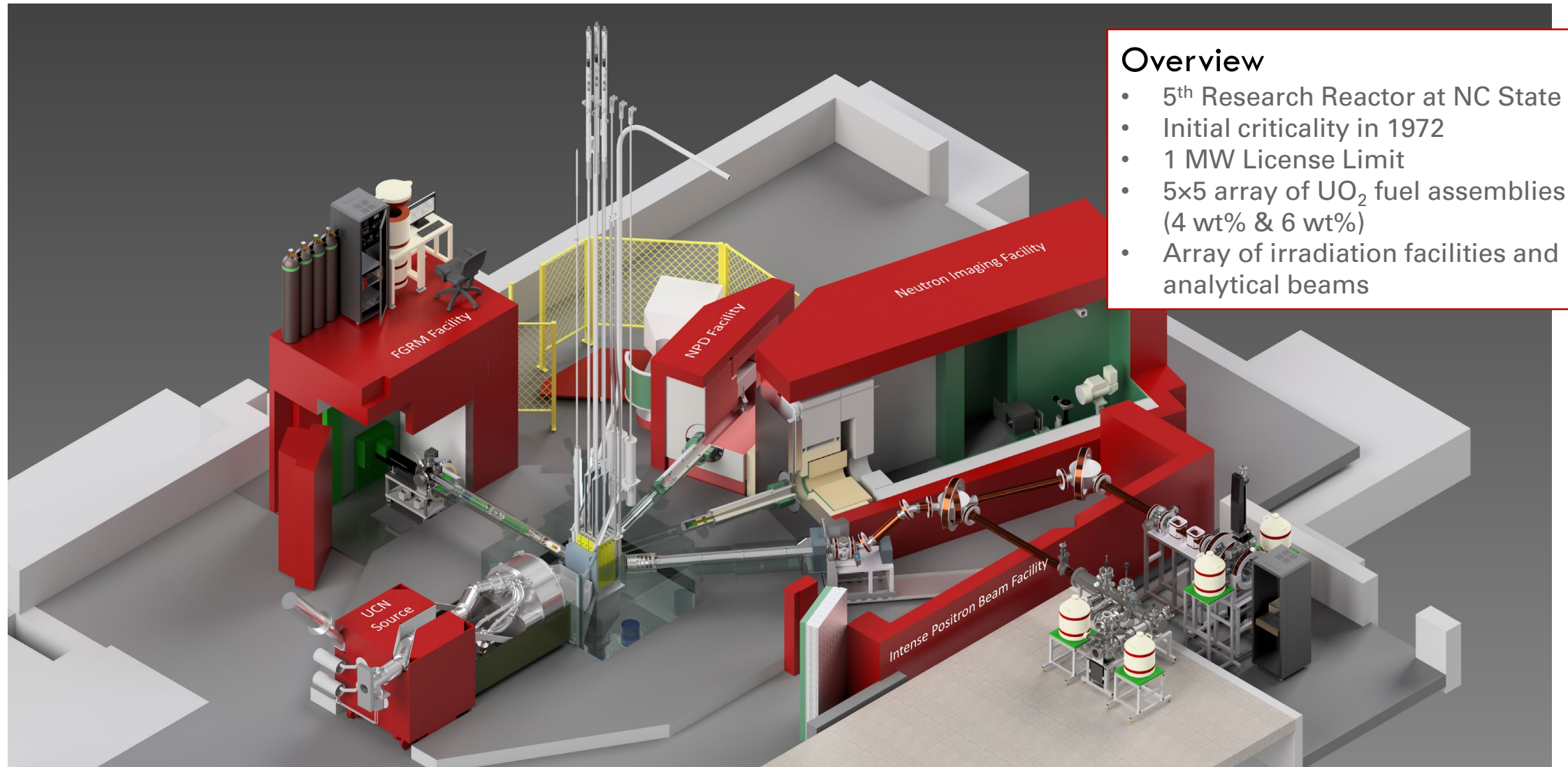
Austin Wells, Zachary Boulton

nrp.ne.ncsu.edu

**2026 TRTR Annual Meeting
September 21st – 25th, 2026**



1.1 - The PULSTAR and Associated Facilities



Overview

- 5th Research Reactor at NC State
- Initial criticality in 1972
- 1 MW License Limit
- 5x5 array of UO_2 fuel assemblies (4 wt% & 6 wt%)
- Array of irradiation facilities and analytical beams

1.2 - The Nuclear Reactor Program



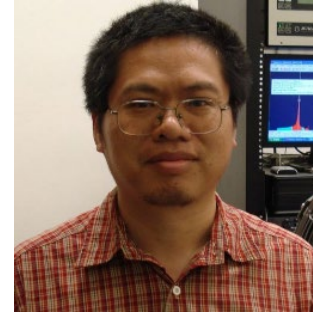
Jason Hou
Professor and
Director of Nuclear
Reactor Program



Nancy Krebs
Administrative
Support Specialist



Ming Liu
Utilization Manager
& Senior Research
Scholar

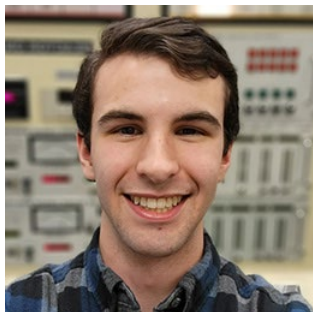


**Qingsheng
Cai**
Research Associate



**Ekaterina
Korobkina**
Research Associate

Operations Team



Austin Wells
Manager of
Engineering and
Operations



**Zachary
Boulton**
Reactor Engineer



**Stephen
Guarino**
Reactor Health
Physicist

Student Team Members

- 11 Licensed ROs
- 1 Engineering Assistant
- 1 Health Physics Assistant

2 - Historical Background

Special Procedure 2.5 “PULSTAR Reactor Surveillance”

❑ Structure

- Surveillance File (aggregate)
- Division (1 of 8 categories)
- Folder (sub-system or component)

❑ Folder contents

- Equipment History
- Periodic Inspection Record
- Manufacturer’s Manual
- Supporting Documents (if applicable)

❑ All documents generated and stored as hardcopies in the Control Room

Staff Turnover Challenges

❑ Generational turnover

- Average age of Operations Team in 2022: ~50
- Average age of Operations Team in 2026: 30
- Chief of Reactor Maintenance retired after 32 years in Fall 2026
- Maintenance responsibility now shared among Ops Team

❑ Surveillance Scheduling

- Surveillance print-outs for each month generated at beginning of year
- Scheduling was based on when ‘the time felt right’ with lots of ball juggling
- No formal coordination mechanism

3.1 – Prolegomena

GOAL & PRINCIPLES

Problems to Address

- How to keep track of the dozens of surveillance items?
- How to onboard personnel to assist in maintenance activities?
- How to manage risk of transitioning to a new platform/system?

We want the accessibility and automation of a digital system, but need to keep the flexibility and reliability of physical records...

...Can we have our cake and eat it too?

Accessibility

- ❑ Documents should be easily accessible
- ❑ Formatting should assist the user in locating and identifying important information
- ❑ Non-essential information should be visible within its context

Compatibility

- ❑ Old system works; new system should work alongside it
- ❑ Preserve organization and structure where practical
- ❑ New system should be platform/device-agnostic (dedicated PDAs are overkill for a small facility)

Coordination

- ❑ Relative timing of maintenance windows should be immediately obvious to the user
- ❑ Completion status of items (especially incomplete status) should be easily assessable by the user

Disclaimers

1. The following presentation is not an endorsement of Google Workspace or any other cloud-based services
2. Your implementation may look different; this is only one example of a possible implementation
3. Dates, Labels, Requirements, and other facility-specific information is included for illustrative purposes only and does not necessarily reflect the actual configuration and operation of the NC State PULSTAR and associated facilities

3.2 – Surveillance Master OVERVIEW

	A	B	C	D	E	F	G	H	I	J	EM	EN	EO	EP	EQ	ER	ES	ET	EU	EV	EW	EX	EY	EZ	FA	FB	FC	FD	FE	FF	FG	FH	FI	FJ	FK	FL	FM					
1	Surveillance Master v2				Instructions																																					
2	Today's Date	9/15/2026			- update last completed and next due dates																																					
3					- fill out week cell with completed date																																					
4					- verify next due date is consistent with history file																																					
5											CY26-Q3														CY26-Q4																	
6	File	Name	TS Req.	Freq.	Last Completed	Next Due	Span (d)	Drop-Dead			07/12	07/19	07/26	08/02	08/09	08/16	08/23	08/30	09/06	09/13	09/20	09/27	10/04	10/11	10/18	10/25	11/01	11/08	11/15	11/22	11/29	12/06	12/13	12/20	12/27	01/03	01/10					
7	PS-1-02-2A	High Volt. Supp		semiannual	09/09/26	03/11/27	46	04/26/27											09/09																							
8	PS-1-02-4B	Log-N Monit.		semiannual	09/09/26	03/11/27	46	04/26/27											09/09																							
9	PS-1-03-4A	Lin. Monit.	4.3d-iv	semiannual	09/08/26	03/10/27	46	04/25/27											09/08																							
10	PS-1-03-6	Rec., Pwr.		semiannual	03/25/26	09/01/26	46	10/17/26																																		
11	PS-1-05-3A	Safety Monit.	4.3d-iv	semiannual	09/08/26	03/10/27	46	04/25/27											09/08																							
12	PS-1-07-1	NFMS, SN002		semiannual	09/07/26	03/09/27	46	04/24/27											09/07																							
13	PS-1-07-1	NFMS, SN001		semiannual	n/a																																					
14	PS-1-08-1	Ion Chamb., N-	4.3c	semiannual	03/03/26	09/01/26	46	10/17/26																																		
15	PS-1-08-2A	High Volt. Supp	4.3c	semiannual	09/11/26	03/13/27	46	04/28/27											09/11																							
16	PS-1-08-4A	E-Meter, N-16	4.3c	semiannual	03/20/26	09/01/26	46	10/17/26																																		
17	PS-1-10	Temp. Measure	4.3d-i	semiannual	08/31/26	03/02/27	46	04/17/27																																		
18	PS-1-11-1	Therm. Switch	4.3d-i	semiannual	08/31/26	03/02/27	46	04/17/27											08/31																							
19	PS-1-14-1	Rad. Alarm Pnl		monthly	09/15/26	10/16/26	12	10/28/26			7/15				8/19					9/15																						
20	PS-1-14-1	Rad. Alarm Pnl		quarterly	07/15/26	10/14/26	23	11/06/26			7/15																															
21	PS-2-01-1B	Air Comp.		semiannual	03/03/26	09/02/26	46	10/18/26																																		
22	PS-2-01-2B	Air Dryer		monthly	03/03/26	04/03/26	12	04/15/26																																		
23	PS-2-02-2	Pool Lvl., +/- 6 i		quarterly	08/31/26	11/30/26	23	12/23/26											08/31																							
24	PS-2-02-3	Pool Lvl., +/- 36		quarterly	06/01/26	08/31/26	23	09/23/26																																		
25	PS-2-02-5	Pool Lvl	4.3d-iii	semiannual	08/31/26	03/02/27	46	04/17/27											08/31																							
26	PS-2-03A	Flow Measuring	4.3d-ii	semiannual	08/31/26	03/02/27	46	04/17/27											08/31																							
27	PS-3-01-1	Pump, Primary		semiannual	09/08/26	03/10/27	46	04/25/27											09/08																							
28	PS-3-01-2	Motor, Primary		semiannual	03/03/26	09/02/26	46	10/18/26																																		
29	PS-3-01-4	Calorimetric Pw	4.3c	semiannual	03/25/26	09/24/26	46	11/09/26																																		
30	PS-3-01-6	Heat Exchange	n/a		n/a																																					
31	PS-3-01-7	N-16 Delay Tan	n/a		n/a																																					
32	PS-3-01-8	Piping, Primary		semiannual	03/04/26	09/03/26	46	10/19/26																																		
33	PS-3-01-9	Valves, Primary		semiannual																																						
34	PS-3-02-1	Pump, Second		semiannual	03/03/26	09/02/26	46	10/18/26																																		
35	PS-3-02-2	Motor, Second		semiannual	03/03/26	09/02/26	46	10/18/26																																		

+

≡

Surveillance (2 Week) ▾

Surveillance (complete) ▾

S&M Outage Planner [OLD] ▾

Revision Control ▾

3.2 – Surveillance Master

SURVEILLANCE ITEM LIST

Every Row a Surveillance Item with the following attributes

- File Number (linked to file location)
- Item Name
- Requirement Basis (TS, PSP, etc.)
- Frequency
- “Last Completed”
- (automated) Next Due
- (automated) Span
- (automated) Drop-Dead

Formatting & Automation

- **Next Due** – orange highlight if before current date
- **Span** – determined based on Frequency
- **Drop-dead** – orange text if TS req.
- Untracked items – grey highlight

	A	B	C	D	E	F	G	H	I
1	Surveillance Master v2				Instructions				
2	Today's Date	9/15/2026			- update last completed and next due dates				
3					- fill out week cell with completed date				
4					- verify next due date is consistent with history file				
5									
6	File	Name	TS Req.	Freq.	Last Completed	Next Due	Span (d)	Drop-Dead	
7	PS-1-02-2A	High Volt. Supp		semiannual	09/09/26	03/11/27	46	04/26/27	
8	PS-1-02-4B	Log-N Monit.		semiannual	09/09/26	03/11/27	46	04/26/27	
9	PS-1-03-4A	Lin. Monit.	4.3d-iv	semiannual	09/08/26	03/10/27	46	04/25/27	
10	PS-1-03-6	Rec., Pwr.		semiannual	03/25/26	09/01/26	46	10/17/26	
11	PS-1-05-3A	Safety Monit.	4.3d-iv	semiannual	09/08/26	03/10/27	46	04/25/27	
12	PS-1-07-1	NFMS, SN002		semiannual	09/07/26	03/09/27	46	04/24/27	
13	PS-1-07-1	NFMS, SN001		semiannual	n/a				
14	PS-1-08-1	Ion Chamb., N-	4.3c	semiannual	03/03/26	09/01/26	46	10/17/26	
15	PS-1-08-2A	High Volt. Supp	4.3c	semiannual	09/11/26	03/13/27	46	04/28/27	
16	PS-1-08-4A	E-Meter, N-16	4.3c	semiannual	03/20/26	09/01/26	46	10/17/26	
17	PS-1-10	Temp. Measure	4.3d-i	semiannual	08/31/26	03/02/27	46	04/17/27	
18	PS-1-11-1	Therm. Switch	4.3d-i	semiannual	08/31/26	03/02/27	46	04/17/27	
19	PS-1-14-1	Rad. Alarm Pnl		monthly	09/15/26	10/16/26	12	10/28/26	
20	PS-1-14-1	Rad. Alarm Pnl		quarterly	07/15/26	10/14/26	23	11/06/26	
21	PS-2-01-1B	Air Comp.		semiannual	03/03/26	09/02/26	46	10/18/26	
22	PS-2-01-2B	Air Dryer		monthly	03/03/26	04/03/26	12	04/15/26	
23	PS-2-02-2	Pool Lvl., +/- 6 i		quarterly	08/31/26	11/30/26	23	12/23/26	
24	PS-2-02-3	Pool Lvl., +/- 36		quarterly	06/01/26	08/31/26	23	09/23/26	
25	PS-2-02-5	Pool Lvl	4.3d-iii	semiannual	08/31/26	03/02/27	46	04/17/27	
26	PS-2-03A	Flow Measuring	4.3d-ii	semiannual	08/31/26	03/02/27	46	04/17/27	
27	PS-3-01-1	Pump, Primary		semiannual	09/08/26	03/10/27	46	04/25/27	
28	PS-3-01-2	Motor, Primary		semiannual	03/03/26	09/02/26	46	10/18/26	
29	PS-3-01-4	Calorimetric Pw	4.3c	semiannual	03/25/26	09/24/26	46	11/09/26	
30	PS-3-01-6	Heat Exchange		n/a	n/a				
31	PS-3-01-7	N-16 Delay Tan		n/a	n/a				
32	PS-3-01-8	Piping, Primary		semiannual	03/04/26	09/03/26	46	10/19/26	
33	PS-3-01-9	Valves, Primary		semiannual					
34	PS-3-02-1	Pump, Second		semiannual	03/03/26	09/02/26	46	10/18/26	
35	PS-3-02-2	Motor, Second		semiannual	03/03/26	09/02/26	46	10/18/26	
+ ≡ Surveillance (2 Week) ▾					Surveillance (complete) ▾		S&M Ou		

3.2 – Surveillance Master TIMELINE

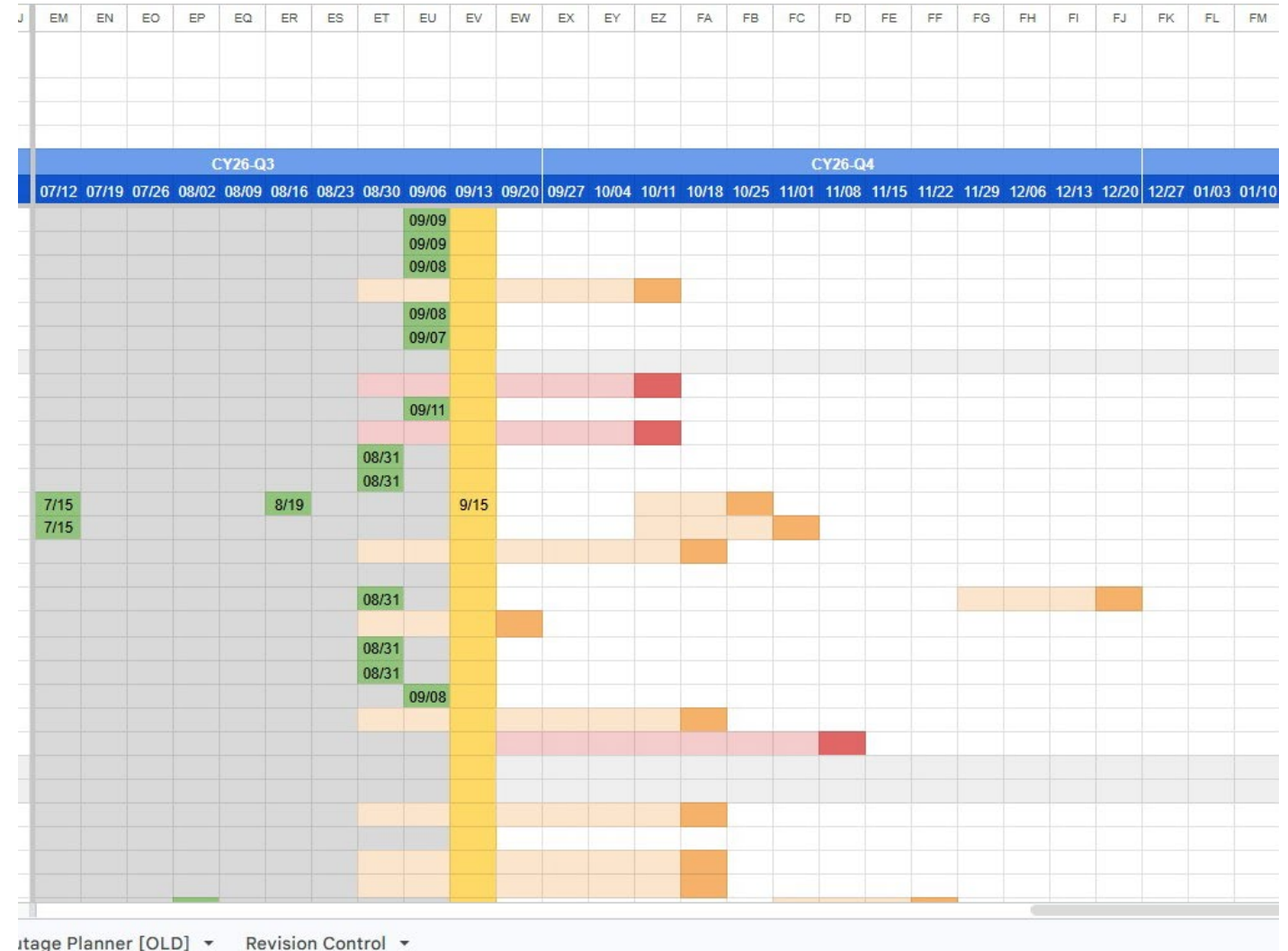
Design Principles

- User should be able to ascertain status without reading any values

Conditional Formatting

- Yellow** – Current week
- Green** – Week of “Last Complete” or cell has value
- Dark Red** – Drop-Dead for TS req. item
- Light Red** – Surveillance window for TS req. item
- Dark Orange** – Drop-Dead for non-TS req. item
- Light Orange** – Surveillance window for non-TS req. item
- Grey** – Past weeks

*This is not a Gantt chart (we have different sheets for that)



3.3 – Documentation EQUIPMENT HISTORY

Procedure Revision Controller

- Revision control for surveillance and maintenance procedures
- Also tracks what procedures are available digitally

Drive Filesystem

- Located on the 'general' NRP Drive (digital binder shelf)
- Structure is analogous to inherited hanging files:
 - Separate folders for each item
 - Equipment History
 - Procedures and Datasheets
 - Surveillance Records (data)
- PS files for TS req. equipment have orange folder icons to assist with identification by users

	A	B	C	D	E	F	G	H	I	J	
1	Procedure Revision Controller										
2	Today's Date	9/15/2026									
3											
4											
5											
6	File	Name	TS Req.	Freq.	Drive Available	Current Rev.	Date Implemented	Prev. Rev.			
26	PS-2-03A	Flow Measuring	4.3d-ii	semiannual	yes	3	2015-06-01	2			
27	PS-3-01-1	Pump, Primary		semiannual							
28	PS-3-01-2	Motor, Primary		semiannual							
29	PS-3-01-4	Calorimetric Pwr	4.3c	semiannual	yes	7	2015-01-01	6			
30	PS-3-01-6	Heat Exchanger		n/a							
31	PS-3-01-7	N-16 Delay Tank		n/a							
32	PS-3-01-8	Piping, Primary		semiannual	yes						
33	PS-3-01-9	Valves, Primary		semiannual	draft						
34	PS-3-02-1	Pump, Secondary		semiannual							
35	PS-3-02-2	Motor, Secondary		semiannual							
36	PS-3-02-5A	Cooling Twr.		quarterly							
37	PS-3-02-5A	Motor, Cooling T		quarterly							
38	PS-3-02-5A	Cooling Twr.		semiannual							
39	PS-3-03-2	Demin., Primary		semiannual	draft						
40	PS-4-01-1	In-Line Drive Pk	4.2b	annual	yes	3	2012-02-13	2			
41	PS-4-01-1	In-Line Drive Pk		quarterly	draft						
42	PS-4-01-2	Control Rod	4.2a	annual	yes	3	2015-06-01				
43	PS-4-01-2	Control Rod	4.2c	biennial	yes	3	2015-06-01				
44	PS-4-02-1	In-Line Drive Pk	4.2b	annual	yes	3	2012-02-13	2			
45	PS-4-02-1	In-Line Drive Pk		quarterly	draft						
46	PS-4-02-2	Control Rod	4.2a	annual	yes	3	2012-02-13	2			
47	PS-4-02-2	Control Rod	4.2c	biennial	draft						
48	PS-4-03-1	In-Line Drive Pk	4.2b	annual	yes	3	2015-06-01				
49	PS-4-03-1	In-Line Drive Pk		quarterly	yes	3	2015-06-01				
50	PS-4-03-2	Control Rod	4.2a	annual	yes	3	2012-02-13	2			
51	PS-4-03-2	Control Rod	4.2c	biennial	draft						
52	PS-4-04-1	In-Line Drive Pk	4.2b	annual	yes	3	2012-02-13	2			
53	PS-4-04-1	In-Line Drive Pk		quarterly	draft						
54	PS-4-04-3	Control Rod	4.2a	annual	yes	3	2015-06-01				
55	PS-4-04-3	Control Rod	4.2c	biennial	yes	3	2015-06-01				
+ ☰ Surveillance (2 Week) ▾ Surveillance (complete) ▾ S&M Outage Planner [OLD] ▾ Revision Control ▾											

3.3 – Documentation

EXAMPLE USING PS-2-03

PS-2-03 > Equipment History

Type

People

Modified

Source

Name

2024-03-11 Datasheet - PS-2-03:S1

2024-09-09 Datasheet - PS-2-03:S1

2025-03-10 Datasheet - PS-2-03:S1

2025-09-30 Datasheet - PS-2-03:S1

2026-03-02 Datasheet - PS-2-03:S1

2026-06-31 Datasheet - PS-2-03:S1

Surveillance Files > PS-2-03

Type

People

Modified

Source

Name

Equipment History

Datasheet - PS-2-03:S1

Datasheet - PS-4-06-2:S1

PS-2-03:S1

NRP > Surveillance > Surveillance Files

Type

People

Modified

Source

Name

PS-1-08-2

PS-1-08-4

PS-1-10

PS-1-10-07

PS-1-11-1

PS-1-14-1

PS-1-14-11

PS-2-01-1

PS-2-02-2

PS-2-02-3

PS-2-02-5

PS-2-03

PS-3-01-1

PS-3-01-2

PS-3-01-4

June 1, 2015
Revision 3
1 of 2

PS-2-03:S1

Flow Measuring Channel Calibration Datasheet

June 1, 2015
Revision 3
1 of 2

PS-2-03:S1

Flow Measuring Channel Calibration

June 1, 2015
Revision 3
1 of 2

PS-2-03:S1

Flow Measuring Channel Calibration

	A	B	C	D	E	F	G	H	I
1	Surveillance Master v2					Instructions			
2	Today's Date	9/15/2026				- update last completed and next due dates			
3						- fill out week cell with completed date			
4						- verify next due date is consistent with history file			
5									
6	File	Name	TS Req	Freq	Last Completed	Next Due	Span (d)	Drop-Dead	
7	PS-1-02-2A	High Volt. Supp		semiannual	09/09/26	03/11/27	46	04/26/27	
8	PS-1-02-4B	Log-N Monit.		semiannual	09/09/26	03/11/27	46	04/26/27	
9	PS-1-03-4A	Lin. Monit.	4.3d-iv	semiannual	09/08/26	03/10/27	46	04/25/27	
10	PS-1-03-6	Rec., Pwr.		semiannual	03/25/26	09/01/26	46	10/17/26	
11	PS-1-05-3A	Safety Monit.	4.3d-iv	semiannual	09/08/26	03/10/27	46	04/25/27	
12	PS-1-07-1	NFMS, SN002		semiannual	09/07/26	03/09/27	46	04/24/27	
13	PS-1-07-1	NFMS, SN001		semiannual	n/a				
14	PS-1-08-1	Ion Chamb., N- 4.3c		semiannual	03/03/26	09/01/26	46	10/17/26	
15	PS-1-08-2A	High Volt. Supp 4.3c		semiannual	09/11/26	03/13/27	46	04/28/27	
16	PS-1-08-4A	E-Meter, N-16 4.3c		semiannual	03/20/26	09/01/26	46	10/17/26	
17	PS-1-10	Temp. Measure 4.3d-i		semiannual	08/31/26	03/02/27	46	04/17/27	
18	PS-1-11-1	Therm. Switch 4.3d-i		semiannual	08/31/26	03/02/27	46	04/17/27	
19	PS-1-14-1	Rad. Alarm Pnl		monthly	09/15/26	10/16/26	12	10/28/26	
20	PS-1-14-1	Rad. Alarm Pnl		quarterly	07/15/26	10/14/26	23	11/06/26	
21	PS-2-01-1B	Air Comp.		semiannual	03/03/26	09/02/26	46	10/18/26	
22	PS-2-01-2B	Air Dryer		monthly	03/03/26	04/03/26	12	04/15/26	
23	PS-2-02-2	Pool Lvl., +/- 6 i		quarterly	08/31/26	11/30/26	23	12/23/26	
24	PS-2-02-3	Pool Lvl., +/- 36 i		quarterly	06/01/26	08/31/26	23	09/23/26	
25	PS-2-02-5	Pool Lvl. 4.3d-iii		semiannual	08/31/26	03/02/27	46	04/17/27	
26	PS-2-03A	Flow Measuring 4.3d-ii		semiannual	08/31/26	03/02/27	46	04/17/27	
27	PS-3-01-1	Pump, Primary		semiannual	09/08/26	03/10/27	46	04/25/27	
28	PS-3-01-2	Motor, Primary		semiannual	03/03/26	09/02/26	46	10/18/26	
29	PS-3-01-4	Calorimetric Pw 4.3c		semiannual	03/25/26	09/24/26	46	11/09/26	
30	PS-3-01-6	Heat Exchange		n/a	n/a				
31	PS-3-01-7	N-16 Delay Tan		n/a	n/a				
32	PS-3-01-8	Piping, Primary		semiannual	03/04/26	09/03/26	46	10/19/26	
33	PS-3-01-9	Valves, Primary		semiannual					
34	PS-3-02-1	Pump, Second		semiannual	03/03/26	09/02/26	46	10/18/26	
35	PS-3-02-2	Motor, Second		semiannual	03/03/26	09/02/26	46	10/18/26	

NRP
NUCLEAR REACTOR PROGRAM

11

4.1 – Experience

WHAT WORKED

Accessibility

- New personnel can be trained on and review procedures remotely
- Reduced legibility of records (a timely concern)
- Records, data, and manuals accessible to staff from any device; helpful when...
 - Working with external service providers
 - Ordering parts and materials
 - Evaluating replacement options

Coordination of Tasks

- Some procedures require data to be collected from multiple locations at each test point
 - Digital datasheets allow simultaneous data collection, reducing completion time

Prioritization

- Conditional formatting assists personnel in distinguishing TS and non-TS surveillances

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
1	Surveillance Dashboard v1					Instructions															
2	Today's Date		9/15/2026		- update Surveillance Master (this sheet will update)																
3	- select rows 7-85 and hold ctrl+alt+shift+1 to sort items by due date																				
4																					
5										Week 1								Week 2			
6	File	Name	TS Req	Freq.	Last Completed	Next Due	Span (d)	Drop-Dead	09/15	09/16	09/17	09/18	09/19	09/20	09/21	09/22	09/23	09/24	09/25	09/26	
7	PS-2-01-2B	Air Dryer		monthly	03/03/26	04/03/26	12	04/15/26													
8	PS-2-02-3	Pool Lvl., +/- 36		quarterly	06/01/26	08/31/26	23	09/23/26													
9	PS-1-08-1	Ion Chamb., N-	4.3c	semiannual	03/03/26	09/01/26	46	10/17/26													
10	PS-1-08-4A	E-Meter, N-16	4.3c	semiannual	03/20/26	09/01/26	46	10/17/26													
11	PS-1-03-6	Rec., Pwr.		semiannual	03/25/26	09/01/26	46	10/17/26													
12	PS-2-01-1B	Air Comp.		semiannual	03/03/26	09/02/26	46	10/18/26													
13	PS-3-01-2	Motor, Primary		semiannual	03/03/26	09/02/26	46	10/18/26													
14	PS-3-02-1	Pump, Second		semiannual	03/03/26	09/02/26	46	10/18/26													
15	PS-3-02-2	Motor, Second		semiannual	03/03/26	09/02/26	46	10/18/26													
16	PS-3-03-2	Demin., Primary		semiannual	03/03/26	09/02/26	46	10/18/26													
17	PS-5-03-3	CF-1	4.5e	biennial	09/09/24	09/09/26	183	03/11/27													
18	PS-5-04-3	CF-2	4.5e	biennial	09/09/24	09/09/26	183	03/11/27													
19	PS-7-05-1B	Intrusion Alarm		weekly	09/04/26	09/11/26	3	09/14/26													
20	PS-3-01-4	Calorimetric Pw	4.3c	semiannual	03/25/26	09/24/26	46	11/09/26													
21	PS-7-05-1B	Intrusion Alarm		monthly	08/31/26	10/01/26	12	10/13/26													
22	PS-8-02-1	K_ex & SDM	4.2d	monthly	09/01/26	10/02/26	12	10/14/26													
23	PS-8-05-1	NIF		semiannual	04/02/26	10/02/26	46	11/17/26													
24	PS-1-14-1	Rad. Alarm Pnl.		quarterly	07/15/26	10/14/26	23	11/06/26													
25	PS-7-02-1A	Aux. Gen.	4.5b	monthly	09/15/26	10/16/26	12	10/28/26													
26	PS-1-14-1	Rad. Alarm Pnl.		monthly	09/15/26	10/16/26	12	10/28/26													
27	PS-5-03-1	CF-1	4.5b	monthly	09/15/26	10/16/26	12	10/28/26													
28	PS-5-04-1	CF-2	4.5b	monthly	09/15/26	10/16/26	12	10/28/26													
29	PS-4-01-2	Control Rod	4.2a	annual	10/20/25	10/20/26	91	01/19/27													
30	PS-4-02-2	Control Rod	4.2a	annual	10/20/25	10/20/26	91	01/19/27													
31	PS-4-03-2	Control Rod	4.2a	annual	10/20/25	10/20/26	91	01/19/27													
32	PS-4-08-1	Ganged CR Ca		annual	10/21/25	10/21/26	91	01/20/27													
33	PS-4-04-3	Control Rod	4.2a	annual	10/21/25	10/21/26	91	01/20/27													
34	PS-4-08-1	Control Rod		annual	10/21/25	10/21/26	91	01/20/27													
35	PS-7-05-1B	Intrusion Alarm		quarterly	07/24/26	10/23/26	23	11/15/26													
36	PS-3-02-5A	Motor, Cooling		quarterly	08/05/26	11/04/26	23	11/27/26													
+ Surveillance (2 Week) Surveillance (complete) S&M Outage Planner [OLD] Revision Control																					

(above) Dashboard v1 provides a 2-week daily overview of tasks, sorted by due date

4.1 – Experience AREAS FOR IMPROVEMENT

Document Digitization

- Only 32/83 procedures currently available
- Legacy equipment manuals may require manual digitization
- Digital Maintenance Log (ML) currently stored in separate location

Accessibility Gaps

- Users can forget to update the tracking sheet (usually gets caught at weekly O&M meeting)
- Automatically calculated “next due” does not prevent schedule creep
- Especially out-of-date items can fall off the visual timetable

	A	B	C	D	E	F	G	H	I	J	EM	EN	EO	EP	EQ	ER	ES	ET	EU	EV	EW	EX	EY	EZ	FA	FB	FC	FD	FE	I						
1	Surveillance Master v2					Instructions																														
2	Today's Date	9/15/2026				- update last completed and next due dates																														
3						- fill out week cell with completed date																														
4						- verify next due date is consistent with history file																														
5											CY26-Q3															CY26-Q4										
6	File	Name	TS Req	Freq	Last Completed	Next Due	Span (d)	Drop-Dead	07/12 07/19 07/26 08/02 08/09 08/16 08/23 08/30 09/06 09/13 09/20										09/27 10/04 10/11 10/18 10/25 11/01 11/08 11/15																	
7	PS-1-02-2A	High Volt. Supp		semiannual	09/09/26	03/11/27	46	04/26/27											09/09																	
8	PS-1-02-4B	Log-N Monit.		semiannual	09/09/26	03/11/27	46	04/26/27											09/09																	
9	PS-1-03-4A	Lin. Monit.	4.3d-iv	semiannual	09/08/26	03/10/27	46	04/25/27											09/08																	
10	PS-1-03-6	Rec., Pwr.		semiannual	03/25/26	09/01/26	46	10/17/26																												
11	PS-1-05-3A	Safety Monit.	4.3d-iv	semiannual	09/08/26	03/10/27	46	04/25/27											09/08																	
12	PS-1-07-1	NFMS, SN002		semiannual	09/07/26	03/09/27	46	04/24/27											09/07																	
13	PS-1-07-1	NFMS, SN001		semiannual	n/a																															
14	PS-1-08-1	Ion Chamb., N- 4.3c		semiannual	03/03/26	09/01/26	46	10/17/26																												
15	PS-1-08-2A	High Volt. Supp 4.3c		semiannual	09/11/26	03/13/27	46	04/28/27											09/11																	
16	PS-1-08-4A	E-Meter, N-16 4.3c		semiannual	03/20/26	09/01/26	46	10/17/26																												
17	PS-1-10	Temp. Measure 4.3d-i		semiannual	08/31/26	03/02/27	46	04/17/27																												
18	PS-1-11-1	Therm. Switch 4.3d-i		semiannual	08/31/26	03/02/27	46	04/17/27											08/31																	
19	PS-1-14-1	Rad. Alarm Pnl		monthly	09/15/26	10/16/26	12	10/28/26	7/15										08/31																	
20	PS-1-14-1	Rad. Alarm Pnl		quarterly	07/15/26	10/14/26	23	11/06/26	7/15																											
21	PS-2-01-1B	Air Comp.		semiannual	03/03/26	09/02/26	46	10/18/26																												
22	PS-2-01-2B	Air Dryer		monthly	03/03/26	04/03/26	12	04/15/26																												
23	PS-2-02-2	Pool Lvl., +/- 6 i		quarterly	08/31/26	11/30/26	23	12/23/26											08/31																	
24	PS-2-02-3	Pool Lvl., +/- 36 i		quarterly	06/01/26	08/31/26	23	09/23/26																												
25	PS-2-02-5	Pool Lvl 4.3d-iii		semiannual	08/31/26	03/02/27	46	04/17/27											08/31																	
26	PS-2-03A	Flow Measuring 4.3d-ii		semiannual	08/31/26	03/02/27	46	04/17/27											08/31																	
27	PS-3-01-1	Pump, Primary		semiannual	09/08/26	03/10/27	46	04/25/27											09/08																	
28	PS-3-01-2	Motor, Primary		semiannual	03/03/26	09/02/26	46	10/18/26																												
29	PS-3-01-4	Calorimetric Pw 4.3c		semiannual	03/25/26	09/24/26	46	11/09/26																												
30	PS-3-01-6	Heat Exchange		n/a	n/a																															
31	PS-3-01-7	N-16 Delay Tan		n/a	n/a																															
32	PS-3-01-8	Piping, Primary		semiannual	03/04/26	09/03/26	46	10/19/26																												
33	PS-3-01-9	Valves, Primary		semiannual																																
34	PS-3-02-1	Pump, Second		semiannual	03/03/26	09/02/26	46	10/18/26																												
35	PS-3-02-2	Motor, Second		semiannual	03/03/26	09/02/26	46	10/18/26																												

Past-due item does not appear on timeline

Procedure still in development

+

≡

Surveillance (2 Week) ▾

Surveillance (complete) ▾

S&M Outage Planner [OLD] ▾

Revision Control ▾

Past-due item does not appear on timeline

Procedure still in development

4.1 – Experience

AREAS FOR IMPROVEMENT

Maintenance Outage Panning

- Surveillance Master v2 does not support outage scheduling automation
 - It does help with identifying what should be included in the Itinerary
- Current system does not include information on effort-hours for each task
 - The data exists, but is collected manually
 - Possibly could incorporate into Revision Controller
- Outage Schedule Automation Challenges

	A	B	C	D	E	F	G	H	I
1	Maintenance Outage - Spring 2025								
2									
3		Timetable - day 1			Timetable - day 2		Timetable - day 3		
4	Time	MT Wells	MT Boulton		MT Wells	MT Boulton		MT Wells	MT Boulton
5	6:30								
6	6:45								
7	7:00	Inline Drive Pkg. (PS-4-02/4-1Q)			CT Chemistry - Return Line Refurbishment		CT Chemistry - Return Line Refurbishment		
8	7:15								
9	7:30								
10	7:45								
11	8:00	RTD Cal. Setup (PS-1-10)			Safety Channel - Gasket Replacement		Reserved for Contingency		
12	8:15								
13	8:30								
14	8:45								
15	9:00	RTDs - 80 F	Auxiliary Generator Escort		Air Compressor Annual Service		Reserved for Contingency		
16	9:15								
17	9:30	Flow Channel Cal. (PS-2-03A)							
18	9:45								
19	10:00	RTDs - 100 F							
20	10:15								
21	10:30	Flow Channel Cal. (PS-2-03A)	Conf. 2 - Impeller Access		BT&TC Filter Train Upgrade		Reserved for Contingency		
22	10:45								
23	11:00	RTDs - 120 F							
24	11:15								
25	11:30	Flow Channel Cal. (PS-2-03A)	Isoprobes - Investigation						
26	11:45								
27	12:00								
28	12:15	Lunch	Lunch		Lunch				
29	12:30								
30	12:45								
31	13:00	T2 Cal Setup (PS-1-10)			Safety Channel - Gasket Replacement		Reserved for Contingency		
32	13:15								
33	13:30								
34	13:45								
35	14:00	Pool Level (PS-2-02-5)	Isoprobes - Repair		BT&TC Filter Train Upgrade		Inline Drive Pkg. (PS-4-02/4-1A)		
36	14:15								
37	14:30								
38	14:45								
39	15:00	Temp Switch (PS-1-11-1)			dP Gauge Cal. (PS-5-06-1/2)		Clean-up for Operations		
40	15:15								
41	15:30	T2 - 116 F	END OF DAY						
42	15:45	T2 - 120 F							
43	16:00	END OF DAY			END OF DAY		END OF DAY		
44	16:15								
45									
46									

1 Items

3 Itinerary

4.2 – Other Applications

MAINTENANCE TRACKING

- Link to ML File
- Link to PS Equipment File (if applicable)
- Description
- Priority
- Work Requirements
 - Outage?
 - Internal/External?
 - Weather-dependent?
 - Radiological?
- Assignment
 - Primary
 - Backup
- Comments and current status

	A	B	C	D	E	F	G	H	I
1									
2	Category	System	ML No.	Item	Priority	Outage Req.	Assignment	Comments	
3	Upgrade	Liquid Waste		Waste Tank Level Sensing	2	☐	Boulton	ANI requests implementation of this as a means of verifying that uncont	
4	Upgrade	Effluent		Pool Water Sampling	3	☐	Dias/Din		
5	Preventative	NIF		NIF Shutter Cable	3	☐		temporary repairs performed on 26 Aug 2025, cable needs replaced and	
6	Repair	RAC		Air Dryer	3	☐	Boulton	Dryer coolant High Pressure, currently bypassed	
7	Preventative	RSS		Safety Channel UIC	3	☐	Wells	Safety UIC housing has nitrogen leak; recommend full housing redesign	
8	Maintenance	Liquid Waste		Air Valve Control Line	3	☐	Boulton/Guarino	will require someone to operate the control panel in basement to locate	
9	Upgrade	Console		Digital Channel Installation	4	☒	Wells		
10	Upgrade	Labs		DAQ System	4	☒	Boulton		
11	Preventative	NIF		NIF Shutter Bearing	4	☒			
12	Repair	NIF		NIF Latch	4	☐			
13	Repair	NIF		NIF Piston/Solenoid	4	☐			
14	Upgrade	NIF		NIF Control System	4	☐			
15	Upgrade	PPV		PPV Sump Pump	4	☒	Boulton		
16	Preventative	Primary		Primary Flow Measuring	4	☐		Enhanced flow monitoring req'd to characterize noise and trends	
17	Repair	Building Leaks		PPV Water Ingress (Room Sealing)	5	☐			
18	Repair	e+		E+ Door Camera	5	☐		Camera has dead pixels but works; LCD monitor is cooked, needs repla	
19	Upgrade	Nitrogen		N2 Purge Upgrade (Generator)	5	☐			
20	Repair	PPV		PPV Camera View	5	☐		Camera has dead pixels but works; LCD monitor is cooked, needs repla	
21	Project	FGL		FGL Cave Lighting	-	☐	Boulton		
22									
23									
24									

(above) clip from in-development standing maintenance item dashboard; not all properties implemented

4.2 – Other Applications

PERIODIC TRAINING

Examples

- Operator Requalification Plan
- Lab Safety Training
- Organizational Refresher Training

Do you have ideas for other applications?

The audience is encouraged to discuss among themselves after the presentation

Thank You

Questions?

Email us at: nrp-pulstar@ncsu.edu