NSLS-II Operations

Emil Zitvogel
Beam Operations Group Leader
NSLS-II Town Meeting
March 11, 2016

Topics

- Schedule
- FY16 Statistics
- Notable Events
- Visual Emergency Notification
- NSLS-II PA System
- Reliability Workshop

Beam Operations Schedule

February-16

Day	Half Shifts						Hours			
	0-4	4-8	8-12	12-16	16-20	20-24	O	S	M	D
1	O	O	O	O	O	O	24	0	0	0
2	O	O/S	S	S	S	S	6	18	0	0
3	S	S	O	O	O	O	16	8	0	0
4	O	O	O	O	O	O	24	0	0	0
5	O	O	O	O	O	O	24	0	0	0
6	O	O	O	O	O	O	24	0	0	0
7	O	O	O	S	S	S	12	12	0	0
8	S	S/M	M	M	M	M	0	6	18	0
9	M	M	M	M	M/S	S	0	6	18	0
10	S	S	S	S	S	S	0	24	0	0
11	S	S	O	O	O	O	16	8	0	0
12	O	O	O	O	O	O	24	0	0	0
13	O	O	O	O	O	O	24	0	0	0
14	O	O	O	O	O	O	24	0	0	0
15	O	O	O	O	O	O	24	0	0	0
16	O	O/S	S	S	S	S	6	18	0	0
17	S	S	O	O	O	O	16	8	0	0
18	O	O	O	O	O	O	24	0	0	0
19	O	O	O	O	O	O	24	0	0	0
20	O	O	O	S	S	S	12	12	0	0
21	S	S	S	S	S	S	0	24	0	0
22	S	S/M	M	M	M	M	0	6	18	0
23	M	M	M	M	M/S	S	0	6	18	0
24	S	S	O	O	O	O	16	8	0	0
25	O	O	O	O	O	O	24	0	0	0
26	O	O	O	O	O	O	24	0	0	0
27	O	O	O	O	O	O	24	0	0	0
28	O	O	O	S	S	S	12	12	0	0
29	S	S/M	M	M	M	M	0	6	18	0
Total Hours - February							696	424	182	90	0
Total Days - February							29	17.7	7.58	3.75	0

March-16

Day	Half Shifts						Hours			
	0-4	4-8	8-12	12-16	16-20	20-24	O	S	M	D
1	M	M	M	M	M/S	S	0	6	18	0
2	S	S	S	S	S	S	0	24	0	0
3	S	S	O	O	O	O	16	8	0	0
4	O	O	O	O	O	O	24	0	0	0
5	O	O	O	O	O	O	24	0	0	0
6	O	O	O	O	O	O	24	0	0	0
7	O	O	O	O	O	O	24	0	0	0
8	O	O/S	S	S	S	S	6	18	0	0
9	S	S	O	O	O	O	16	8	0	0
10	O	O	O	O	O	O	24	0	0	0
11	O	O	O	O	O	O	24	0	0	0
12	O	O	O	O	O	O	24	0	0	0
13	O	O	O	O	O	O	24	0	0	0
14	O	O	O	O	O	O	24	0	0	0
15	O	O/S	S	S	S	S	6	18	0	0
16	S	S	O	O	O	O	16	8	0	0
17	O	O	O	O	O	O	24	0	0	0
18	O	O	O	O	O	O	24	0	0	0
19	O	O	O	S	S	S	12	12	0	0
20	S	S	S	S	S	S	0	24	0	0
21	S	S/M	M	M	M	M	0	6	18	0
22	M	M	M	M	M/S	S	0	6	18	0
23	S	S	O	O	O	O	16	8	0	0
24	O	O	O	O	O	O	24	0	0	0
25	O	O	O	O	O	O	24	0	0	0
26	O	O	O	O	O	O	24	0	0	0
27	O	O	O	O	O	O	24	0	0	0
28	O	O	O	O	O	O	24	0	0	0
29	O	O/S	S	S	S	S	6	18	0	0
30	S	S	O	O	O	O	16	8	0	0
31	O	O	O	O	O	O	24	0	0	0
Total Hours - March							744	518	172	54	0
Total Days - March							31	21.6	7.17	2.25	0

April-16

Day	Half Shifts						Hours			
	0-4	4-8	8-12	12-16	16-20	20-24	O	S	M	D
1	O	O	O	O	O	O	24	0	0	0
2	O	O	O	O	O	O	24	0	0	0
3	O	O	O	O	O	O	24	0	0	0
4	O	O	O	O	O	O	24	0	0	0
5	O	O/S	S	S	S	S	6	18	0	0
6	S	S	O	O	O	O	16	8	0	0
7	O	O	O	O	O	O	24	0	0	0
8	O	O	O	O	O	O	24	0	0	0
9	O	O	O	O	O	O	24	0	0	0
10	O	O	O	S	S	S	12	12	0	0
11	S	S/M	M	M	M	M	0	6	18	0
12	M	M	M	M	M/S	S	0	6	18	0
13	S	S	S	S	S	S	0	24	0	0
14	S	S	O	O	O	O	16	8	0	0
15	O	O	O	O	O	O	24	0	0	0
16	O	O	O	O	O	O	24	0	0	0
17	O	O	O	O	O	O	24	0	0	0
18	O	O	S	S	S	S	8	16	0	0
19	S	S	D	D	D	D	0	8	0	16
20	D	D	D	D	D	D	0	0	0	24
21	D	D	D	D	D	D	0	0	0	24
22	D	D	D	D	D	D	0	0	0	24
23	D	D	D	D	D	D	0	0	0	24
24	D	D	D	D	D	D	0	0	0	24
25	D	D	D	D	D	D	0	0	0	24
26	D	D	D	D	D	D	0	0	0	24
27	D	D	D	D	D	D	0	0	0	24
28	D	D	D	D	D	D	0	0	0	24
29	D	D	D	D	D	D	0	0	0	24
30	D	D	D	D	D	D	0	0	0	24
Total Hours - April							720	298	106	36	280
Total Days - April							30	12.4	4.42	1.5	11.7

May-16

Day	Half Shifts						Hours			
	0-4	4-8	8-12	12-16	16-20	20-24	O	S	M	D
1	D	D	D	D	D	D	0	0	0	24
2	D	D	D	D	D	D	0	0	0	24
3	D	D	D	D	D	D	0	0	0	24
4	D	D	D	D	D	D	0	0	0	24
5	D	D	D	D	D	D	0	0	0	24
6	D	D	D	D	D	D	0	0	0	24
7	D	D	D	D	D	D	0	0	0	24
8	D	D	D	D	D	D	0	0	0	24
9	D	D	D	D	D	D	0	0	0	24
10	D	D	D	D	D	D	0	0	0	24
11	D	D	D	D	D	D	0	0	0	24
12	D	D	D	D	D	D	0	0	0	24
13	D	D	D	D	D	D	0	0	0	24
14	D	D	D	D	D	D	0	0	0	24
15	D	D	D	D	D	D	0	0	0	24
16	D	D	D	D	D	D	0	0	0	24
17	D	D	D	D	D	D	0	0	0	24
18	D	D	D	D	D	D	0	0	0	24
19	D	D	D	D	D	D	0	0	0	24
20	D	D	D	D	D	D	0	0	0	24
21	D	D	D	D	D	D	0	0	0	24
22	D	D	D	D	D	D	0	0	0	24
23	D	D	D	D	D	D	0	0	0	24
24	D	D	D	D	D	D	0	0	0	24
25	D	D	D	D	D	D	0	0	0	24
26	D	D	D	D	D	D	0	0	0	24
27	D	D	D	D	D	D	0	0	0	24
28	D	D	D	D	D	D	0	0	0	24
29	D	D	D	D	D	D	0	0	0	24
30	D	D	D	D	D	D	0	0	0	24
31	D	D	S	S	S	S	0	16	0	8
Total Hours - May							744	0	16	0	728
Total Days - May							31	0	0.67	0	30.3

We are transitioning to 2 maintenance days every other week during the current cycle.

Beam Operations Schedule

June-16

Day	Half Shifts						Hours			
	0-4	4-8	8-12	12-16	16-20	20-24	O	S	M	D
1	S	S	S	S	S	S	0	24	0	0
2	S	S	S	S	S	S	0	24	0	0
3	S	S	S	O	O	O	12	12	0	0
4	O	O	O	O	O	O	24	0	0	0
5	O	O	O	O	O	O	24	0	0	0
6	O	O	O	O	O	O	24	0	0	0
7	O	O	O	O	O	O	24	0	0	0
8	O	O	O	O	O	O	24	0	0	0
9	O	O	O	O	O	O	24	0	0	0
10	O	O	O	O	O	O	24	0	0	0
11	O	O	O	S	S	S	12	12	0	0
12	S	S	S	S	S	S	0	24	0	0
13	S	S	S	S	S	S	0	24	0	0
14	S	S/M	M	M	M	M	0	6	18	0
15	M	M	M	M	M/S	S	0	6	18	0
16	S	S	O	O	O	O	16	8	0	0
17	O	O	O	O	O	O	24	0	0	0
18	O	O	O	O	O	O	24	0	0	0
19	O	O	O	O	O	O	24	0	0	0
20	O	O	O	O	O	O	24	0	0	0
21	O	O	O	O	O	O	24	0	0	0
22	O	O	O	O	O	O	24	0	0	0
23	O	O	O	O	O	O	24	0	0	0
24	O	O	O	O	O	O	24	0	0	0
25	O	O	O	S	S	S	12	12	0	0
26	S	S	S	S	S	S	0	24	0	0
27	S	S	S	S	S	S	0	24	0	0
28	S	S/M	M	M	M	M	0	6	18	0
29	M	M	M	M	M/S	S	0	6	18	0
30	S	S	O	O	O	O	16	8	0	0
	Total Hours - June					720	428	220	72	0
	Total Days - June					30	17.8	9.17	3	0

July-16

Day	Half Shifts						Hours			
	0-4	4-8	8-12	12-16	16-20	20-24	O	S	M	D
1	O	O	O	O	O	O	24	0	0	0
2	O	O	O	O	O	O	24	0	0	0
3	O	O	O	O	O	O	24	0	0	0
4	O	O	O	O	O	O	24	0	0	0
5	O	O	O	O	O	O	24	0	0	0
6	O	O	O	O	O	O	24	0	0	0
7	O	O	O	O	O	O	24	0	0	0
8	O	O	O	O	O	O	24	0	0	0
9	O	O	O	S	S	S	12	12	0	0
10	S	S	S	S	S	S	0	24	0	0
11	S	S	S	S	S	S	0	24	0	0
12	S	S/M	M	M	M	M	0	6	18	0
13	M	M	M	M	M/S	S	0	6	18	0
14	S	S	O	O	O	O	16	8	0	0
15	O	O	O	O	O	O	24	0	0	0
16	O	O	O	O	O	O	24	0	0	0
17	O	O	O	O	O	O	24	0	0	0
18	O	O	O	O	O	O	24	0	0	0
19	O	O	O	O	O	O	24	0	0	0
20	O	O	O	O	O	O	24	0	0	0
21	O	O	O	O	O	O	24	0	0	0
22	O	O	O	O	O	O	24	0	0	0
23	O	O	O	S	S	S	12	12	0	0
24*	S	S	S	S	S	S	0	24	0	0
25	S	S	S	S	S	S	0	24	0	0
26	S	S/M	M	M	M	M	0	6	18	0
27	M	M	M	M	M/S	S	0	6	18	0
28	S	S	O	O	O	O	16	8	0	0
29	O	O	O	O	O	O	24	0	0	0
30	O	O	O	O	O	O	24	0	0	0
31	O	O	O	O	O	O	24	0	0	0
	Total Hours - July					744	512	160	72	0
	Total Days - July					31	21.3	6.67	3	0

August-16

Day	Half Shifts						Hours			
	0-4	4-8	8-12	12-16	16-20	20-24	O	S	M	D
1	O	O	O	O	O	O	24	0	0	0
2	O	O	O	O	O	O	24	0	0	0
3	O	O	O	O	O	O	24	0	0	0
4	O	O	O	O	O	O	24	0	0	0
5	O	O	O	O	O	O	24	0	0	0
6	O	O	O	S	S	S	12	12	0	0
7	S	S	S	S	S	S	0	24	0	0
8	S	S	S	S	S	S	0	24	0	0
9	S	S/M	M	M	M	M	0	6	18	0
10	M	M	M	M	M/S	S	0	6	18	0
11	S	S	O	O	O	O	16	8	0	0
12	O	O	O	O	O	O	24	0	0	0
13	O	O	O	O	O	O	24	0	0	0
14	O	O	O	O	O	O	24	0	0	0
15	O	O	O	O	O	O	24	0	0	0
16	O	O/M	M	M	M	M	6	0	18	0
17	M	M	M	M	M/S	S	0	6	18	0
18	S	S	O	O	O	O	16	8	0	0
19	O	O	O	O	O	O	24	0	0	0
20	O	O	O	O	O	O	24	0	0	0
21	O	O	O	O	O	O	24	0	0	0
22	O	O	O	O	O	O	24	0	0	0
23	O	O	O	O	O	O	24	0	0	0
24	O	O	O	O	O	O	24	0	0	0
25	O	O	O	O	O	O	24	0	0	0
26	O	O	O	S	S	S	12	12	0	0
27	S	S	S	S	S	S	0	24	0	0
28	S	S	S	S	S	S	0	24	0	0
29	S	S	S	S	S	S	0	24	0	0
30	S	S	D	D	D	D	0	8	0	16
31	D	D	D	D	D	D	0	0	0	24
	Total Hours - August					744	446	186	72	40
	Total Days - August					31	18.6	7.75	3	1.67

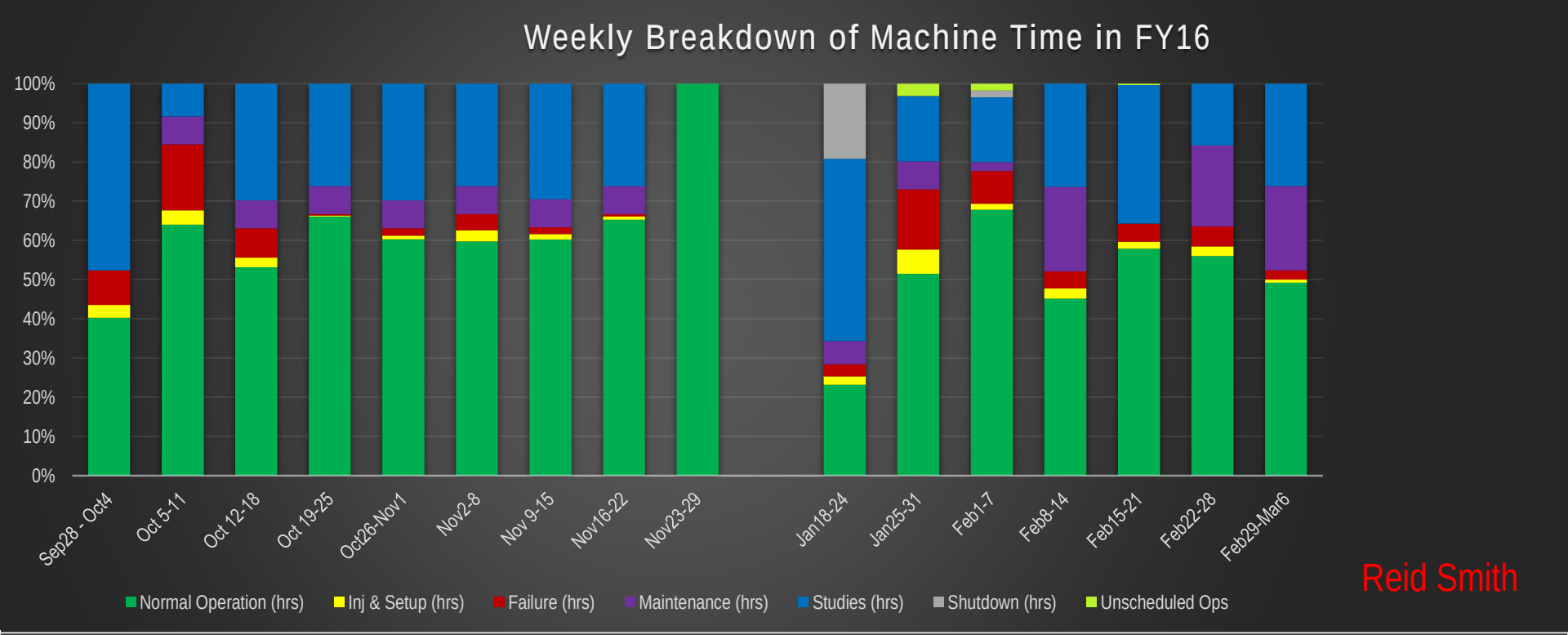
September-16

Day	Half Shifts						Hours			
	0-4	4-8	8-12	12-16	16-20	20-24	O	S	M	D
1	D	D	D	D	D	D	0	0	0	24
2	D	D	D	D	D	D	0	0	0	24
3	D	D	D	D	D	D	0	0	0	24
4	D	D	D	D	D	D	0	0	0	24
5	D	D	D	D	D	D	0	0	0	24
6	D	D	D	D	D	D	0	0	0	24
7	D	D	D	D	D	D	0	0	0	24
8	D	D	D	D	D	D	0	0	0	24
9	D	D	D	D	D	D	0	0	0	24
10	D	D	D	D	D	D	0	0	0	24
11	D	D	D	D	D	D	0	0	0	24
12	D	D	D	D	D	D	0	0	0	24
13	D	D	D	D	D	D	0	0	0	24
14	D	D	D	D	D	D	0	0	0	24
15	D	D	D	D	D	D	0	0	0	24
16	D	D	D	D	D	D	0	0	0	24
17	D	D	D	D	D	D	0	0	0	24
18	D	D	D	D	D	D	0	0	0	24
19	D	D	D	D	D	D	0	0	0	24
20	D	D	D	D	D	D	0	0	0	24
21	D	D	D	D	D	D	0	0	0	24
22	D	D	D	D	D	D	0	0	0	24
23	D	D	D	D	D	D	0	0	0	24
24	D	D	D	D	D	D	0	0	0	24
25	D	D	D	D	D	D	0	0	0	24
26	D	D	D	D	D	D	0	0	0	24
27	D	D	D	D	D	D	0	0	0	24
28	D	D	S	S	S	S	0	16	0	8
29	S	S	S	S	S	S	0	24	0	0
30	S	S	S	S	S	S	0	24	0	0
	Total Hours - September					720	0	64	0	656
	Total Days - September					30	0	2.67	0	27.3

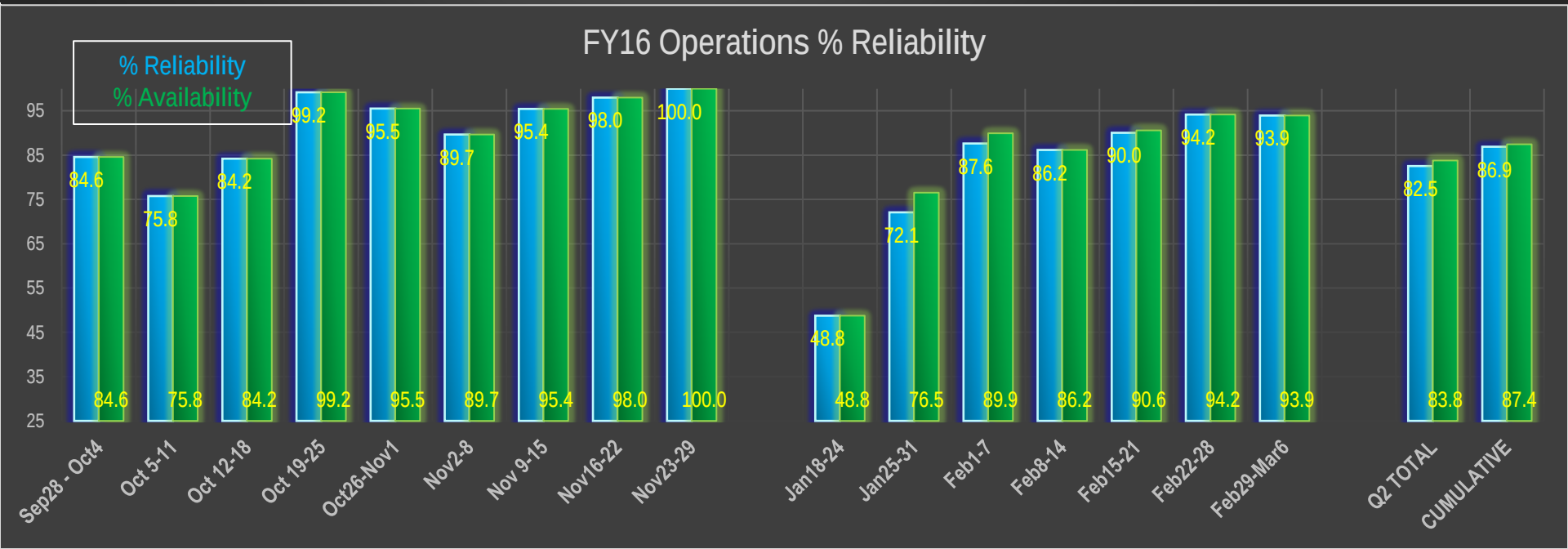
June-16 | July-16 | August-16 | September-16

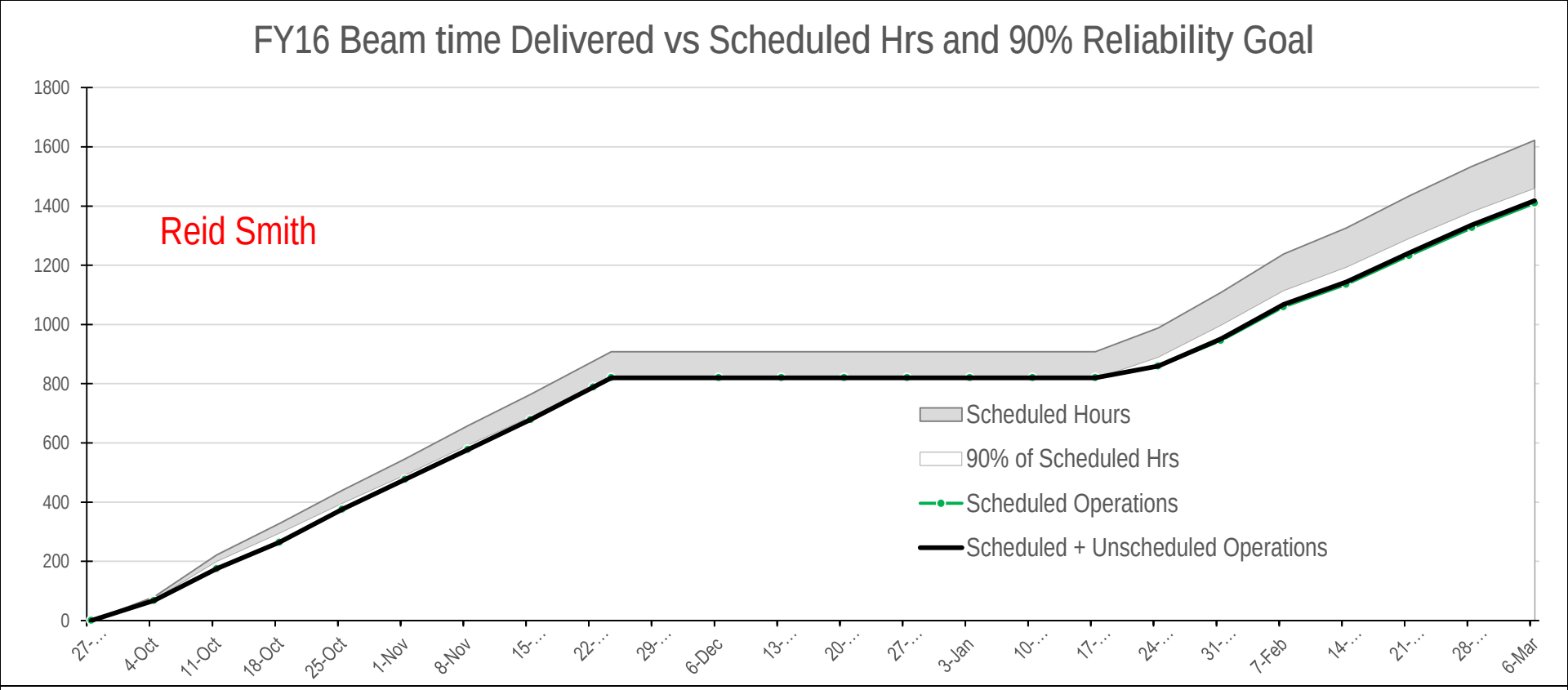
* July 24 Summer Sunday

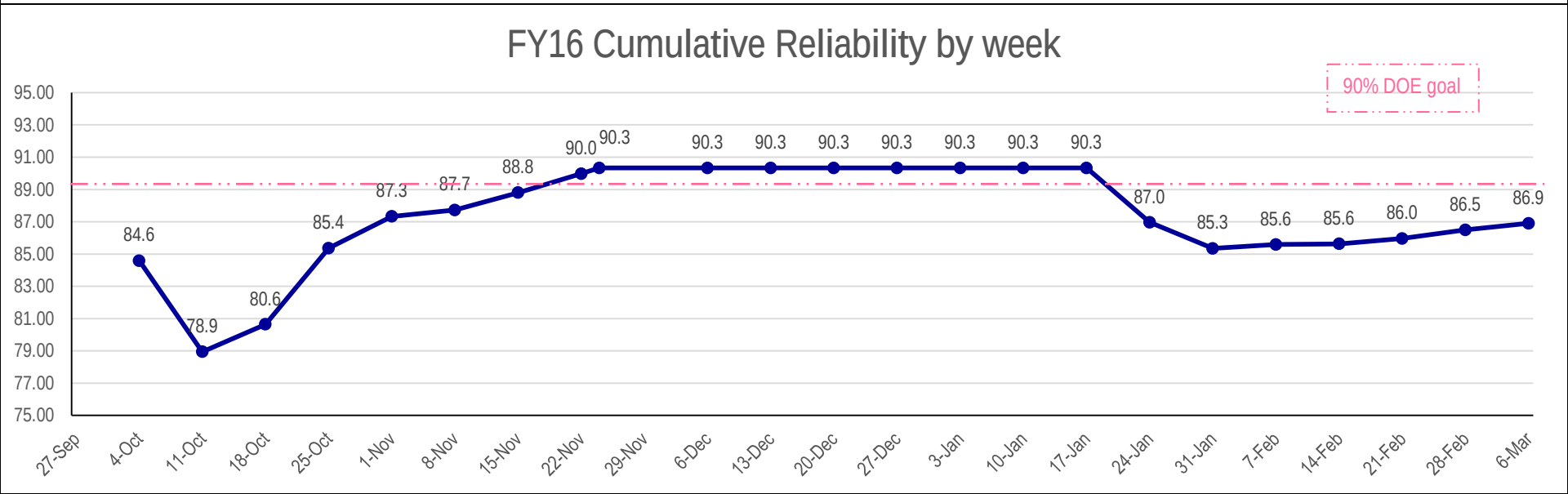
FY 16 STATISTICS


Weekly Breakdown of Machine Time in FY16
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Sep28 - Oct4
Oct 5-11
Oct 12-18
Oct 19-25
Oct26-Nov1
Nov2-8
Nov 9-15
Nov16-22
Nov23-29
Jan18-24
Jan25-31
Feb1-7
Feb8-14
Feb15-21
Feb22-28
Feb29-Mar6
Normal Operation (hrs)
Inj & Setup (hrs)
Failure (hrs)
Maintenance (hrs)
Studies (hrs)
Shutdown (hrs)
Unscheduled Ops

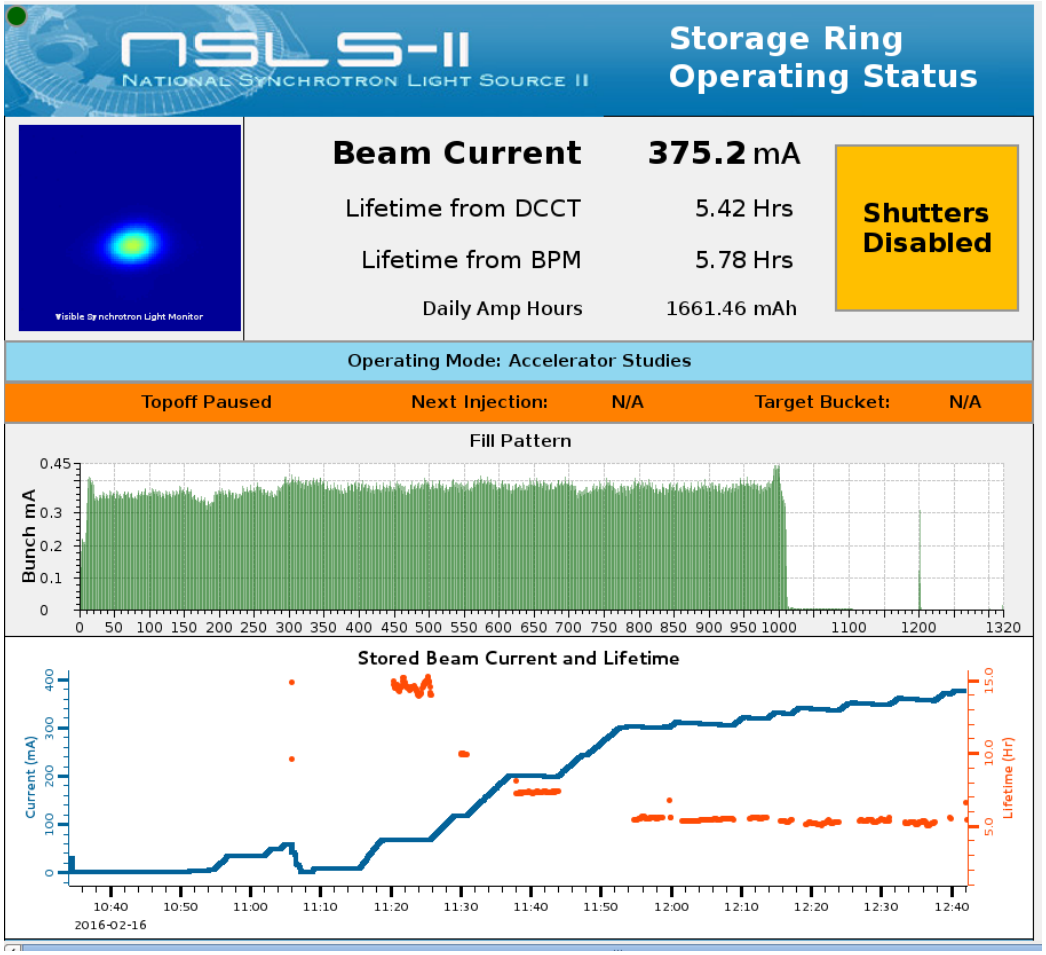
Reid Smith


FY16 Operations % Reliability
% Reliability
% Availability
95
85
75
65
55
45
35
25
84.6
75.8
84.2
99.2
95.5
89.7
95.4
98.0
100.0
48.8
72.1
87.6
86.2
90.0
94.2
93.9
82.5
86.9
84.6
75.8
84.2
99.2
95.5
89.7
95.4
98.0
100.0
48.8
76.5
89.9
86.2
90.6
94.2
93.9
83.8
87.4
Sep28 - Oct4
Oct 5-11
Oct 12-18
Oct 19-25
Oct26-Nov1
Nov2-8
Nov 9-15
Nov16-22
Nov23-29
Jan18-24
Jan25-31
Feb1-7
Feb8-14
Feb15-21
Feb22-28
Feb29-Mar6
Q2 TOTAL
CUMULATIVE


FY16 Beam time Delivered vs Scheduled Hrs and 90% Reliability Goal
Reid Smith
1800
1600
1400
1200
1000
800
600
400
200
0
Scheduled Hours
90% of Scheduled Hrs
Scheduled Operations
Scheduled + Unscheduled Operations
27-…
4-Oct
11-Oct
18-Oct
25-Oct
1-Nov
8-Nov
15-…
22-…
29-…
6-Dec
13-…
20-…
27-…
3-Jan
10-…
17-…
24-…
31-…
7-Feb
14-…
21-…
28-…
6-Mar


FY16 Cumulative Reliability by week
90% DOE goal
95.00
93.00
91.00
89.00
87.00
85.00
83.00
81.00
79.00
77.00
75.00
84.6
78.9
80.6
85.4
87.3
87.7
88.8
90.0
90.3
90.3
90.3
90.3
90.3
90.3
90.3
87.0
85.3
85.6
85.6
86.0
86.5
86.9
27-Sep
4-Oct
11-Oct
18-Oct
25-Oct
1-Nov
8-Nov
15-Nov
22-Nov
29-Nov
6-Dec
13-Dec
20-Dec
27-Dec
3-Jan
10-Jan
17-Jan
24-Jan
31-Jan
7-Feb
14-Feb
21-Feb
28-Feb
6-Mar

Notable events

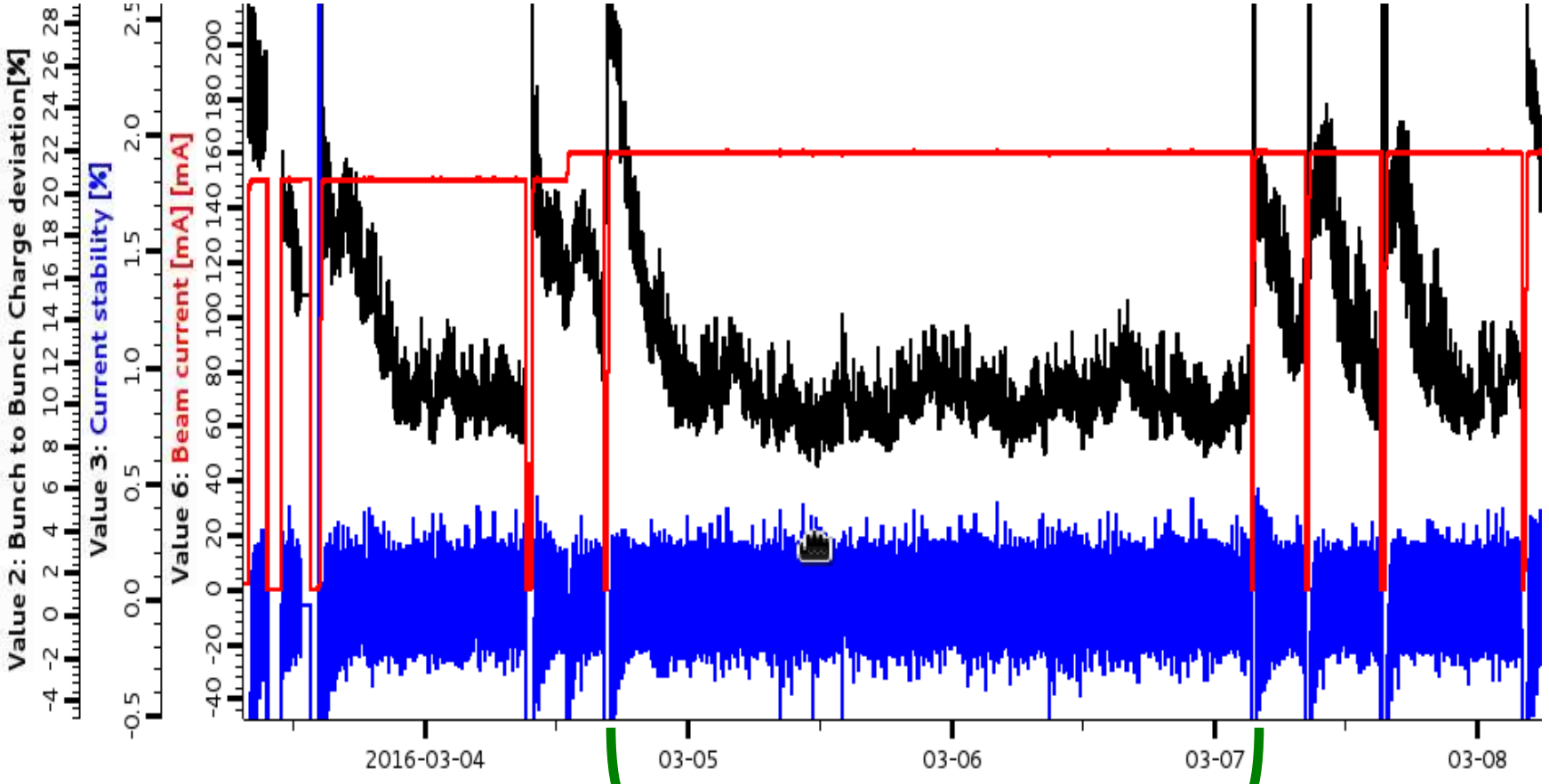


375 mA!

Bare Lattice

Surveys Completed

Notable events



Guimei Wang

58 hours of uninterrupted beam operations beginning last Friday at 4 pm

Notable events

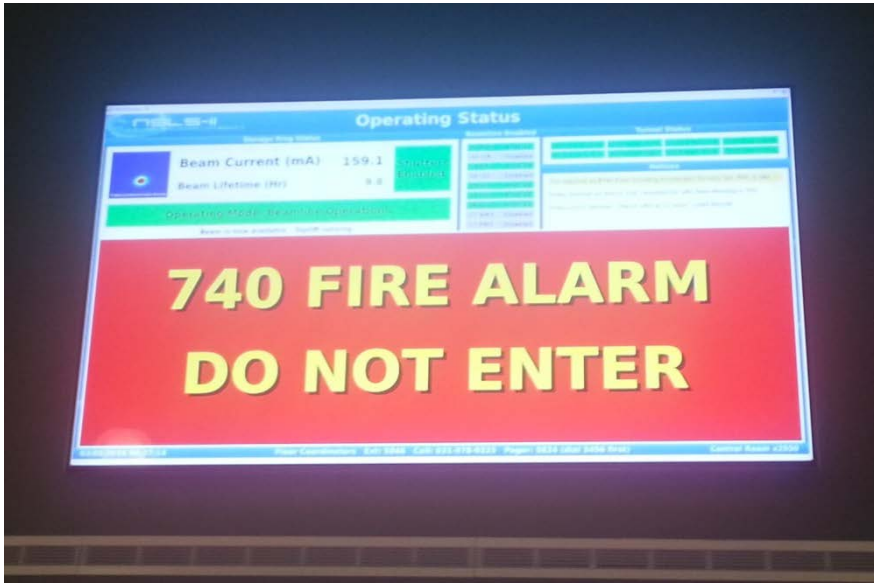
- Cell 8 damping wiggler and front-end were commissioned to 75 mA with radiation surveys
- Storage ring lattice with single damping wiggler 8 was studied to enable early beamline commissioning
- RF system optimization:
  - Beam dumps since January have been dominated by RF trips and arcs
  - A small vacuum leak was found in cavity D which disappeared after warm-up.
  - Each RF cavity was warmed up during maintenance to remove residual gas, improving performance
  - RF study shifts included high voltage and high ring current operation
  - Each trip was recorded including a full history of the event
  - We have begun increasing ring current in small increments every 3-4 days while observing RF and orbit performance

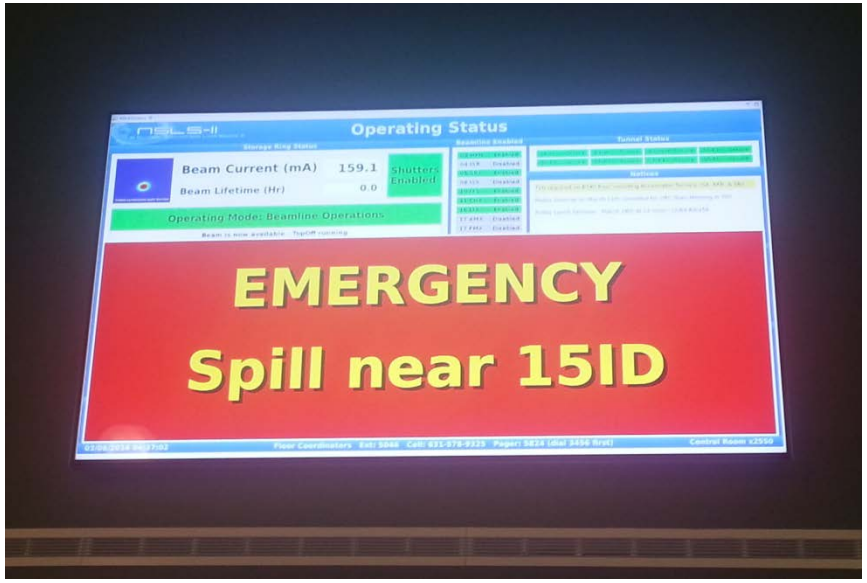
Visual Emergency Notification

- During an emergency evacuation of B740, Fire/Rescue may silence the bells prior to allowing personnel to return into the building.
- This has caused confusion where staff may believe the silence means they may return to B740.
- Operator now has the ability to post an emergency notification on the LOB displays in the event of an evacuation of B740.
- We have the capability of posting a canned message or displaying specific instructions

Visual Emergency Notification

- When this is displayed on the monitors, no one can enter B740.
- When the display is in the normal mode, access to B740 is permitted.
- Display will be cleared when we get an all-clear from Fire/Rescue.
- Weakness is that we currently do not have displays at every entrance.

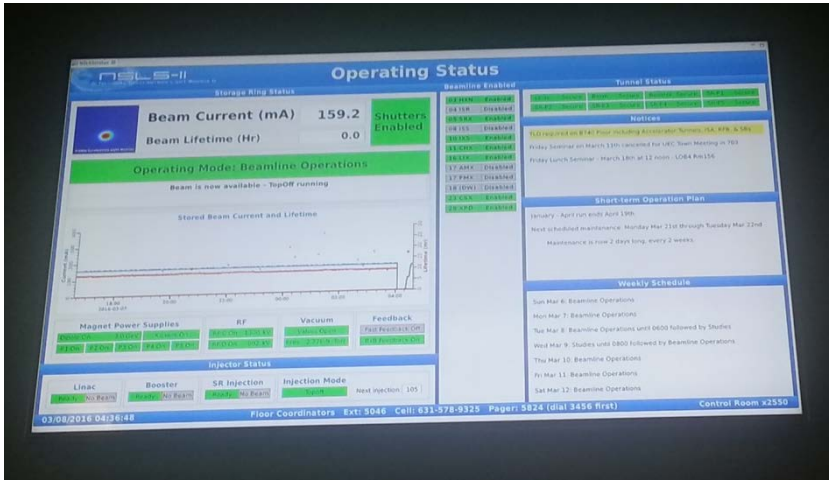




Displays will pulsate to enhance the warning

Many thanks to Reid Smith and Tasha Summers for creating these displays

NSLS-II PA System



- Operators Ed Zeitler and Gary Weiner have devised a way to make a PA system using the streaming media audio in the ops display monitors.
- This utilizes an Android box as an interface between the display and the campus network.
- The microphone is at the lead operators desk.
- Users may also access the PA through a PC running the streaming media using VLC Media Player.
- We plan to put this into full use following the spring shutdown.
- Beamline announcements as well as emergency information will be broadcast over this PA system.
- Ed is looking into a way to create a looping announcement to augment the emergency displays.
- Weakness is also in the sparse placement of the displays.

Reliability Workshop

- At the request of Ferdinand, members of the accelerator division met with a committee of experienced scientists and engineers from other light sources in the US and Europe to examine if our efforts to achieve high reliability at NSLS-II are on a successful track.
- The workshop spanned two days (Feb 25th & 26th) and included presentations from NSLS-II staff and our invited guests.
- The second day featured breakout meetings where maintenance and reliability of specific equipment was discussed (RF, IDs, utilities, etc.)
- The charge included discussion of the following questions:
  - Does the NSLS-II preventive maintenance program address critical and relevant issues to improve operational reliability?
  - Are there obvious gaps in the planned NSLS-II preventive maintenance program?
  - Does the NSLS-II operations schedule allow for an optimum operational reliability program?
  - Is the allocation of resources for the various NSLS-II operating tasks optimum?
  - Is the NSLS-II spares program adequately funded?
  - Will the strategy of concentrating on small improvements and preventive maintenance on the short term lead to difficulties in the medium term?
- Comments from the committee were generally positive and supported our intended pathway to achieving high reliability through careful planning and scheduling of interventions, cross-training of staff including the control room staff, scheduling periods of dedicated RF conditioning, and a strong preventative maintenance program including an adequate spares inventory.
- The final report is in draft awaiting comments from workshop participants.

Closing Remarks

Operations statistics are on a strong upward path.

We are encouraged and excited by each new milestone reached in the operation of the storage ring as well as commissioning of new beamlines.

The accelerator staff are looking for ways to improve operations.

We have held very productive conversations with our colleagues around the world and are on a good path to achieve the high reliability that we expect from NSLS-II.

-Thank you-

-Questions-