



LSD Review December 2012

Schedule, Re-Baseline, & Resource Analysis

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Outline

- **Part II Review Charges Addressed in this Presentation:**
 - Issues raised in Part I Review Report adequately addressed
 - Consider whether the new baseline is achievable
- **Re-Baseline Effort**
 - Changes Implemented
 - Upcoming Changes
- **Schedule**
 - Overview
 - Critical Path
 - Resource Analysis

Part II Review Charges

- **Issues raised in Part I Review Report adequately addressed**
 - The team needs to go through all the talks presented and update the overall plan to:
 - Reflect ALL items discussed
 - Ensure that the different schedules (shutdown work, project, planning for commissioning ops, etc.) are all synchronized
 - Ensure the interconnects and resource overloads that may arise are captured in an overall plan
 - There was the impression that there are disconnects at a significant level including the dates for “1st Beam” to the different halls.
- **Consider whether the new baseline is achievable**
 - Are the resources adequate?
 - Are the critical elements and dates understood and well defined?

Re- Baseline Changes - Overview

LSD - CR #	Title	Timeframe	Float (Days)	Budgeted Labor (Hours)	Delta (BL from Oct)
07	12GeV Hall C Inst. Sch.	Through July 2015	291	62,891	+0.02%
08	12GeV CRs (Hall B (008) & Acc ETC (003)	Various	Various	Various	Various
09	12GeV Acc Beam Transport	Through Sept 2013	33	28,010	+16%
11	Hall A Schedule Update	Through Feb 2014	384	5,281	-52% (HA labor)
12	6GeV Acc Maint.	Through Jan 2014	236	18,182	+16%
13	CM & RF Re-Commissioning	Through Sept 2013	17	1,272	+100%
14	0L04 Project (RF Zone)	Through Sept 2013	18	3,634	+100%
15	Flood Recovery (Acc, Physics, FML)	Various	Various	Various	+100%
16	Dogleg Upgrade	Through May 2014	30	1,610	+100%
17	11GeV Separator	Through March 2014	94	6,416	+100%
19	12GeV Hall B Inst. Sch	Sept 2010 - March 2015	376	156,740	+100%
20	High Power Beam Dump (A&C)	Through May 2014	580	546	+100%
18	Bubble Chamber Test (Injector)	March – July 2013	35	1,144	+100%

Re- Baseline Changes

- End of November Progress of existing schedule in new baseline

	End Of Oct	Re-Baseline
# Activities	~2300	~3100
# Budgeted Labor Hours	339,172	579,693

- LSD CR-07: 12GeV Hall C Installation Schedule & Beamline Work
 - Changes/Action Items from Review held in Oct 2012,
 - Labor estimates, missing line items
- LSD CR-08: 12GeV CRs (008 and 003 – 12GeV Hall B push out dates, Accelerator ETC (labor estimate increases))

Re- Baseline Changes

- LSD CR-09: 12GeV Accelerator Beam Transport (re-sequencing)
 - Removal of logic to correct for sequencing of work actually being done
 - Increase of 16% in labor hours
- LSD CR-11: Hall A Schedule Update
 - Change in experiment – reduction in work, re-plan for activities behind schedule
- LSD CR-12: 6GeV Accelerator Maintenance
 - 2013 activities had placeholder for Feb 2013 – schedule updated for some of the activities. Correlated AWP with existing maintenance list (HCO activities with labor added)

Re-Baseline Changes

- LSD CR-13: CM Re-commissioning plan & RF maintenance/repair
 - Re-commission cryomodules for CEBAF with associated RF for each zone
 - Starting Jan 2013 through end of down (Sept 2013)
- LSD CR-14: 0L04 Project (RF)
 - R100 is installed in 0L04 and will be using 8K klystrons with the newer 12GeV style LLRF hardware and a modified HPA/CPS.
 - Procurement, installation/testing (May – July 2013); new klystrons replacement Oct 2013)
- LSD CR-15: Flood Recovery (Acc, Physics, FML)
 - List of flood recovery items in the accelerator, physics halls, and FML activities

Re- Baseline Changes

- LSD CR-16: Dogleg Upgrade Project
 - Design and procurement (for magnet mods, power supplies) FY13
 - Installation and testing/commissioning FY14 during UIM down
- LSD CR-17: 11GeV Separator Project
 - Design, procurement, installation (tunnel) FY13. Installation upstairs (through April 2014)
- LSD CR-19: 12GeV Hall B Installation Schedule (partial)
 - Review held 14 Nov 2012
 - Integrated detailed activities planned from Nov through April 2013 (S&A supported activities, forward carriage mods, installation of subway addition to existing spaceframe, start pre-cabling of electronic crates on forward carriage)

Re- Baseline Changes

- LSD CR-20: High Power Beam Dump (A&C)
 - Design and procurement FY13 AWP implemented
 - Bottoms-up in progress for Jan
- LSD CR-18: Bubble Chamber Injector Test
 - Installation in April 2013 in the 5MeV region of the injector, commissioning & test during Summer 2013 (3 weeks of data)
 - Requires lockup of Inj and Nlinac
 - High level schedule implemented – detailed bottoms up required with resource provider review

Upcoming Changes – Under Review for January Implementation

- LSD CR-10: 12GeV Hall D Schedule Update
- LSD CR-xx: Detailed High Power Beam Dump Schedule
- LSD CR-xx: Detailed Bubble Chamber Test
- LSD CR-xx: If TLA schedule slips further in January – will include in the schedule
- LSD CR-xx: UIM 4-6 month down (Summer 2014)

CP noted in Red

Schedule - Overview

Activity ID	Activity Name	Start	Finish	Total Float
1.20M.1 MILESTONES				
005m	Start Accelerator Installation Shutdown	18-May-12		
015m	PSS Certs - Accelerator		04-Jan-13 *	28.00d
085m	Complete HALL C 6GeV Deinstallation		29-Jan-13 *	13.00d
090m	Start Hall C 12GeV Installation	20-Feb-13*		0.00d
075m	Start Hall B12GeV Installation	06-Mar-13 *		-16.77d
070m	Complete Hall B 6GeV Deinstallation		06-March-13	-16.77d
020m	End of Accelerator Installation Shutdown		18-Sep-13*	0.00d
025m	PSS Full Lock Up/Function Test	19-Sept-13		91.00d
030m	CEBAF Lock-up Begin Restoration	19-Sept-13		91.00d
035m	Hot Check Out - Start	19-Sept-13		91.00d
040m	Hot Check Out - Complete		24-Oct-13	65.00d
045m	Beam To Hall A Start (12GeV Activity)	06-Feb-14 *		0.00d
052m	3-Pass Beam To Hall A Comp. (12GeV milestone)		03-Mar-14*	206.00d
055m	Beam To Hall D Start (12GeV milestone)	12-Jun-14 *		135.00d
060m	Beam To Hall D Complete (12GeV milestone)		02-Jul-14 *	120.00d
065m	12GeV CD-4A (Approve Accelerator Completion & Start of Operations)		30-Dec-14*	0.00d
070m	2-08 Halls A, B & C Equipment Installation Completed (12GeV milestone) -		Oct-15 (Re-Baseline Date)	0.00d
080m	Beam To Hall B (12GeV milestone)	4/28/2015		356.00d
095m	Beam To Hall C (12GeV milestone)	8/26/2015		273.00d

Schedule – Overview (cont.)

Activity ID	Activity Name	Start	Finish	Total Float
1.20M.2.1/2 ESR MILESTONES & CHL #1 &2 MILESTONES				
12022036	Performance Mapping Complete (of warm compressors)		03-Dec-12	948.00d
12022041	4K Coldbox Cooldown	03-Dec-12		948.00d
12022017	Hall D Refrigerator Ready for Solenoid Cooldown		17-Dec-12 *	457.00d
12022015	CHL #1 Shutdown Maintenance Complete		20-Dec-12	31.00d
12022020	CHL #1 & N/S Linacs Cooldown Start	02-Jan-13 *		28.00d
12022021	CHL #1& N/S Linacs Cooldown Complete (14days of lag from start of cooldown)		22-Jan-13	28.00d
12022031	CHL Individual Runs & (Firing Up)	14-Feb-13 *		902.00d
12021002	CHL 1 Cooldown - Hall C Start	15-Mar-13 *		132.00d
12022026	CHL #2 Fully Operational		01-May-13*	848.00d
12021001	Cryo Plant Summer Configuration Start	06-May-13 *		95.00d
12022046	2K Coldbox Re-Commissioning	03-Sep-13 *		763.00d
12021005	ESR Up - Start Cooldown	06-Sep-13 *		9.00d
12021003	CHL 1 Cooldown - Hall C Complete		06-Sep-13 *	9.00d
1.20M.4 TEST LAB DEMOLITION				
1204055	VTA Start	10-Dec-12 *		35.00d
1204050	CMTF Complete		10-Dec-12*	35.00d
1204060	VTA Complete		24-Dec-12*	43.00d

High Level WBS w/ Re-baseline Changes (Noted in Blue)

Activity ID	Start	Finish	Total Float	Orig Dur	Budg Lbr
LSD Rebaseline November 2012 Progress	08-Sep-09	01-Sept-15	268.00d	1483.00d	580539.27h
1.20M LSD MILESTONES	18-May-12	26-Aug-15	273.00d	811.00d	0.00h
1.3.1 CRYOMODULES	01-May-12	25-June-13	59.00d	287.00d	2078.37h
1.3.2 POWER SYSTEMS	01-Mar-11	27-June-14	207.00d	829.00d	31310.34h
1.3.3 CRYOGENICS	01-Jun-12	5-March-14	641.00d	434.00d	17112.00h
1.3.4 BEAM TRANSPORT	21-May-12	18-Sept-13	33.00d	334.00d	28010.76h
1.3.5 EXTRACTION	01-Nov-11	9-July-13	801.00d	416.00d	2664.60h
1.3.6 INSTRUMENTATION/CONTROLS/ SAFETY SYS	01-Nov-10	29-April-14	602.00d	863.00d	41908.73h
1.4.2 CONSTRUCTION HALL B	06-Sep-10	30-March-15	376.00d	1128.00d	156740.48h
1.4.3 CONSTRUCTION HALL C	08-Sep-09	30-July-15	291.00d	1460.00d	62891.16h
1.5 HALL D MAINTENANCE & UPGRADE	01-May-12	01-May-14	169.50d	496.50d	29175.63h
1.5.1.10 HALL D FLOOD RECOVERY	02-Jan-13	28-March-13	420.00d	60.00d	0.00h
1.6.1.1.3 BSY SERVICE BUILDING ADDITION	02-Apr-12	17-Dec-12	463.00d	193.00d	144.00h
1.8.1.1 ACCELERATOR BEAM COMMISIONING	17-May-13	1-Sept-15	268.00d	569.00d	17264.00h
1.8.1.3 CONSTRUCTION CRYOMODULES ACCELERATOR PRE-OPS	03-Dec-12	16-Aug-13	773.00d	175.00d	10269.02h

High Level WBS w/ Re-baseline Changes (Noted in Blue)

Activity ID	Start	Finish	Total Float	Orig Dur	Budg Lbr
1.23 ACCELERATOR MAINTENANCE AND UPGRADE	18-May-12	30-May-14	580.00d	504.00d	125643.88h
1.23.1 MAINTENANCE ACTIVITIES	18-May-12	27-May-14	146.00d	501.00d	113366.28h
1.23.1.0 MAINTENANCE ACTIVITIES	18-May-12	16-Jan-14	236.00d	411.00d	16930.00h
1.23.1.1 MAINTENANCE TASKS (RSR AWP FY13)	01-Oct-12	30-Sept-13	7.00d	248.00d	83376.28h
1.23.1.2 CRYOMODULE SHUFFLE	24-May-12	23-Aug-13	17.00d	312.00d	1272.00h
1.23.1.3 11 GeV SEPARATOR	01-Aug-12	1-April-14	94.00d	411.00d	6416.00h
1.23.1.5 DOG LEG UPGRADE	03-Dec-12	27-May-14	30.00d	365.00d	1610.00h
1.23.1.6 0L04	03-Dec-12	1-Nov-13	18.00d	229.00d	3634.00h
1.23.2 PEPPo ACTIVITIES	21-May-12	27-Jul-12	DONE	47.00d	668.00h
1.23.3 WARM-UP ACTIVITIES	23-Aug-12	20-Dec-12	30.00d	83.00d	1344.00h
1.23.4 RECOMMISSION CRYOMODULES & RF	14-Jan-13	24-May-13	80.00d	93.00d	5320.00h
1.23.5 HIGH POWER BEAM DUMP	03-Dec-12	30-May-14	580.00d	368.00d	545.60h
1.23.6 ACC MAINTENANCE FLOOD RECOVERY	01-Oct-12	29-July-13	742.00d	204.00d	4400.00h
1.23.7 BUBBLE CHAMBER TEST INJECTOR	04-Mar-13	30-July-13	35.0d	105.0d	1144.00h

High Level WBS w/ Re-baseline Changes (Noted in Blue)

Activity ID	Start	Finish	Total Float	Orig Dur	Budg Lbr
1.24 HALLS A, B, C MAINTENANCE & UPGRADES	18-May-12	29-April-15	354.00d	730.00d	27210.50h
1.24.1 HALL A MAINTENANCE & UPGRADE	18-May-12	18-Feb-14	652.00d	432.00d	5281.00h
1.24.1.1 CONSTRUCTION HALL A	18-May-12	24-May-13	384.00d	253.00d	1176.00h
1.24.1.2 PROGRAM HALL A	18-May-12	18-Feb-14	652.00d	432.00d	4105.00h
1.24.1.3 HALL A FLOOD RECOVERY	02-Jan-13	28-March-13	212.00d	60.00d	0.00h
1.24.2 HALL B MAINTENANCE & UPGRADE	21-May-12	04-April-13	817.22d	211.00d	12399.50h
1.24.2.2 HALL B FLOOD RECOVERY	02-Jan-13	28-March-13	822.00d	60.00d	0.00h
1.24.3 HALL C MAINTENANCE & UPGRADE	21-May-12	29-April-15	354.00d	729.00d	9530.00h
1.24.3.15 POLARIMETRY and BEALINE MODIFICATIONS	30-Sep-12	29-April-15	354.00d	637.00d	3040.00h
1.24.3.16 HALL C FLOOD RECOVERY	02-Jan-13	28-March-13	827.00d	60.00d	0.00h
1.26 CONVENTIONAL FACILITIES MAINT. & UPGRADES	11-Jan-12	29-Oct-14	474.00d	680.00d	90.00h
1.26.18 FACILITIES FLOOD RECOVERY	01-Oct-12	29-Oct-14	2.00d	497.00d	0.00h
1.27 FEL MAINTENANCE & UPGRADE	27-Feb-12	03-Oct-13	740.00d	403.00d	26661.80h
1.28 ESH & Q	18-May-12	20-Dec-12	183.00d	150.00d	1364.00h
1.29 CRYOGENICS (WORK GROUP SCHEDULE-PARTIAL)	14-Sep-12	09-April-13	864.00d	138.00d	0.00h

Schedule – Critical Path (Float less than 22 days)

- **NO CHANGE TO CP WITH RE-BASELINE EFFORT**
- **12GeV CHL Hall D Transfer Line and Header (0 days float)**
 - Fabrication & Installation of cryogenic transfer line & can for solenoid → 1.8.1.3.3.2 Hall D Cryogenics Pre-Ops (Commission Solenoid Distribution can header → **Start Hall D Solenoid Cooldown (17 Dec constrained date)**)
- **Hall C De-installation (+13 DAYS)**
 - Removal work (QWeak, SOS Dipole, Shield Hut, Concrete Floor, C-Can /Platform) → **Relative to end of de-installation (mid Feb 2013: (12GeV installation of SHMS rails then SHMS carriage fabrication end of April))**
- **Hall B De-installation (-17 DAYS)** → **Relative to end of de-installation goal of mid Feb 2013**
 - **On schedule to meet goal and will be updated in Dec progress**

Schedule – Resource Analysis

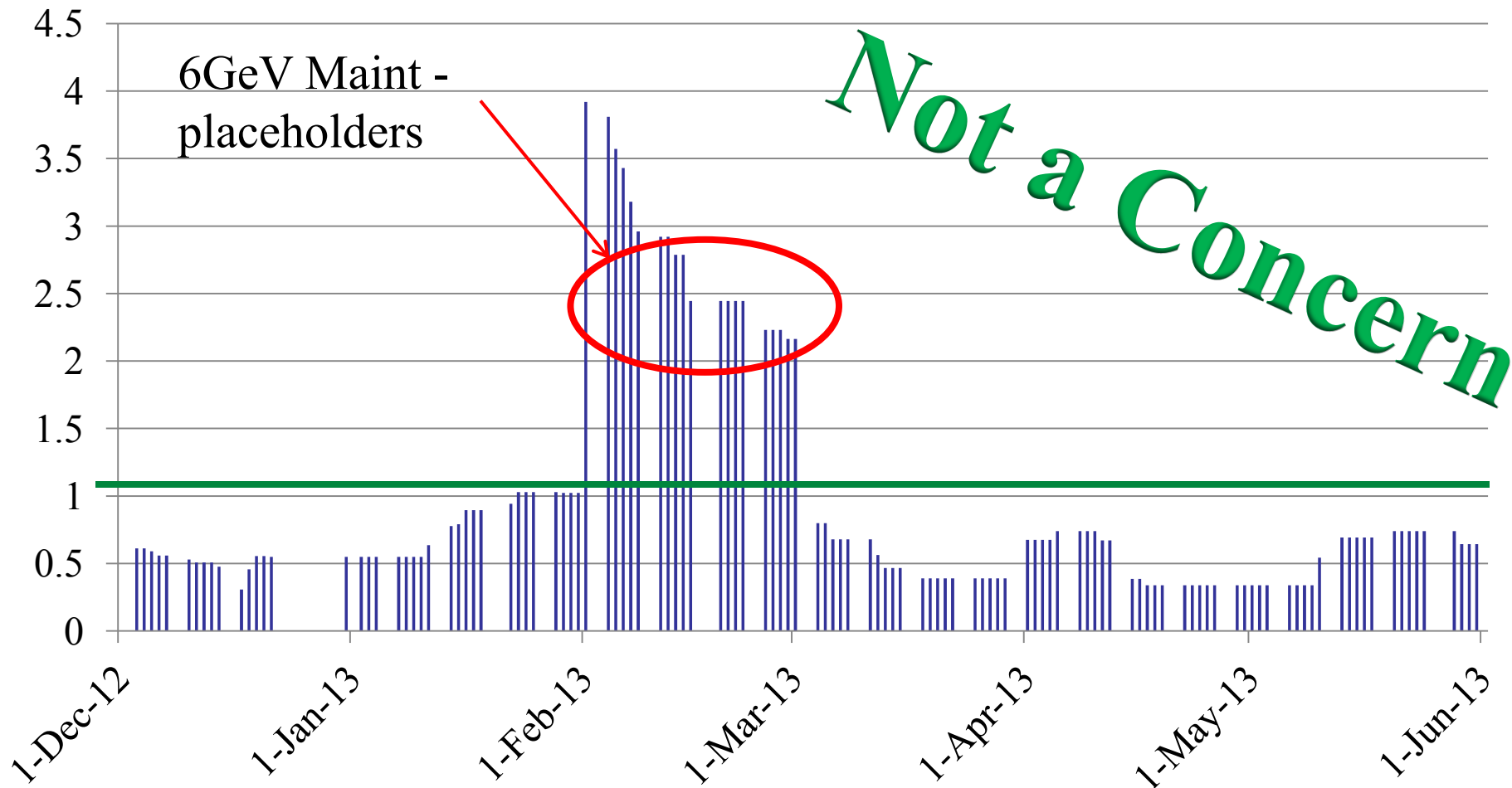
- **Resources Critically Analyzed:**
 - S&A
 - MSINST (installation, vacuum, mag meas)
 - Safety Systems Group
 - Elec Techs (I&C, RF, DC, Electricians)
 - RadCon Techs
- **Resource Charts available** for all listed above, Cryo, SRF, Ops Software & Operators, Engineers, Hall Labor
- **Physics Labor** is not resource leveled in this effort
 - See [W. Akers presentation for Physics Labor](#)
- **Graphs Nomenclature:**
 - UF = Utilization Factor = total hours per day for each activity**
(# people available x 8 hours)

Schedule – Resource Analysis

- **Areas of Concern: S&A, Elec Techs (as of end of Oct)**
 - S&A group is fully utilized & current delays for Hall support are helping now, but concerns that this work will soon pile up
 - Elec techs are fully utilized & new requests are being made
- **Current Areas of Concern w/Re-baselined Schedule (UF >1):**
 - S&A
 - RF Elec Techs
- **Important to Know:**
 - Resource data from re-baseline is not leveled & will be done in Jan 2013
 - Timeline Focus: Jan 2013 – June 2013
 - Past resource leveling efforts say we CAN level this, identified scope contingency available if needed
 - LSD schedule will re-baseline again in April 2013

Resource Utilization Analysis

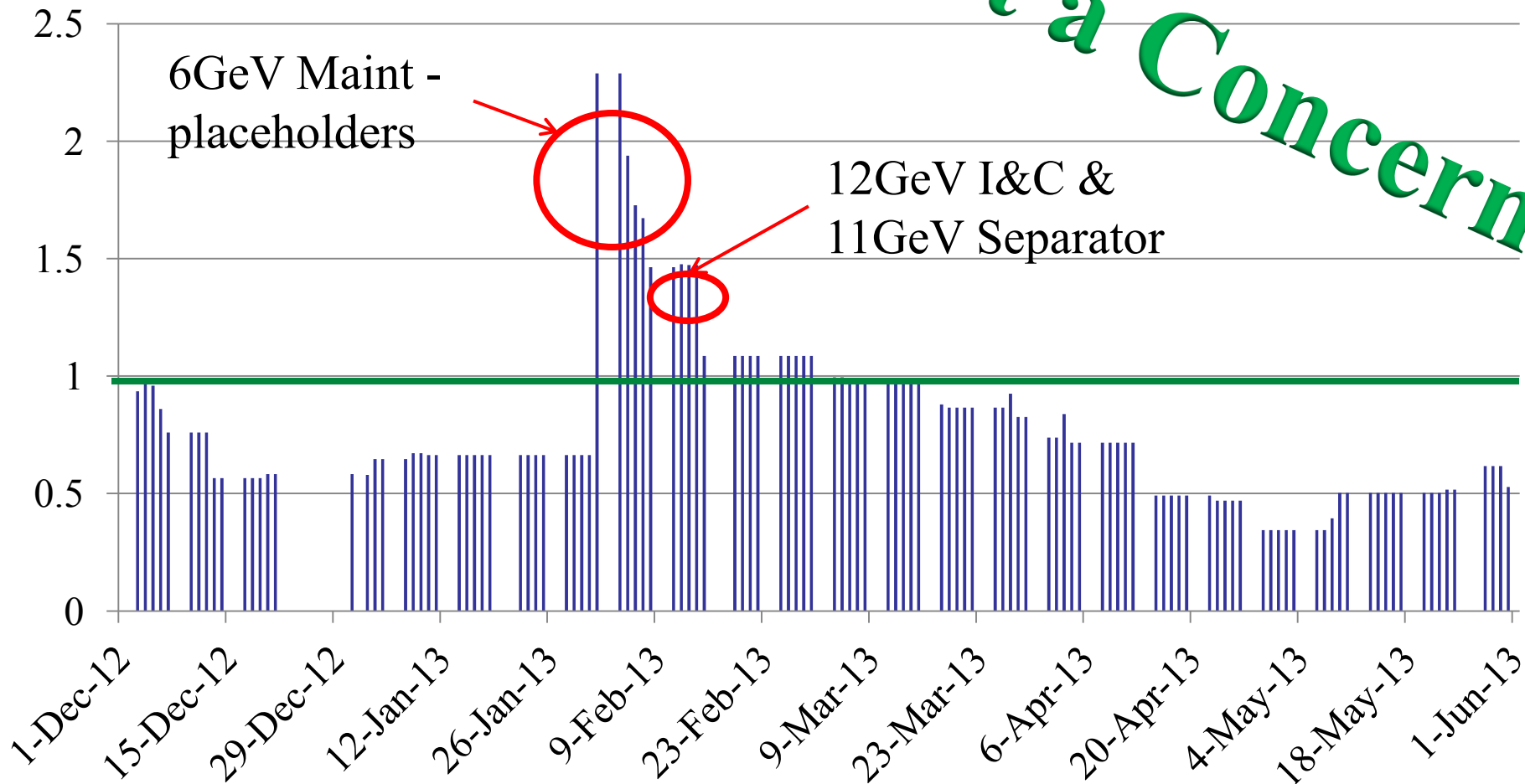
utilization factor - SAF Elec Des, Eng, Tech
(7 people)



Resource Utilization Analysis

utilization factor - icd elec tech
(10 people)

Not a Concern

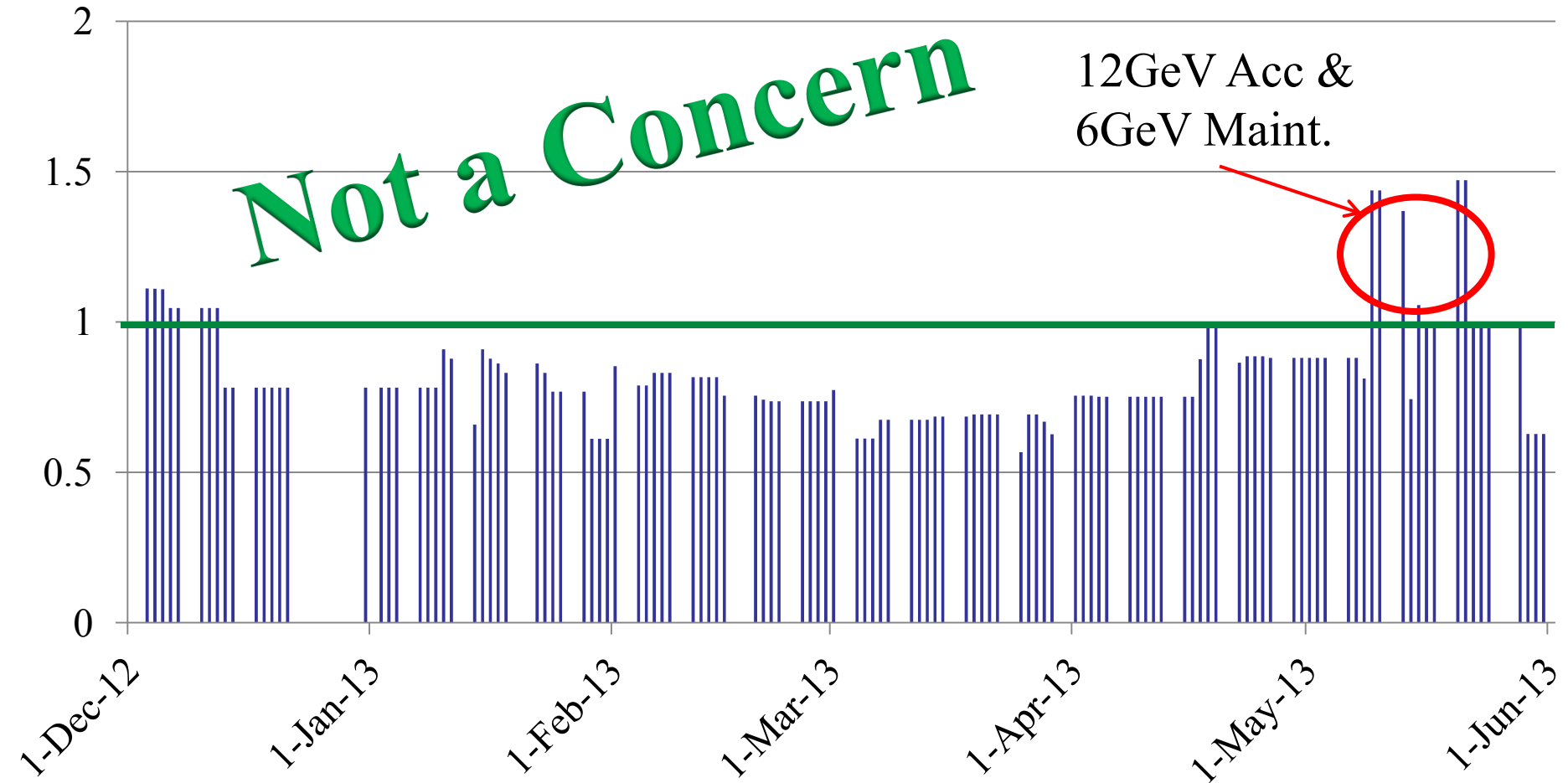


Resource Utilization Analysis

utilization factor - dc elec tech
(8 people)

Not a Concern

12GeV Acc &
6GeV Maint.

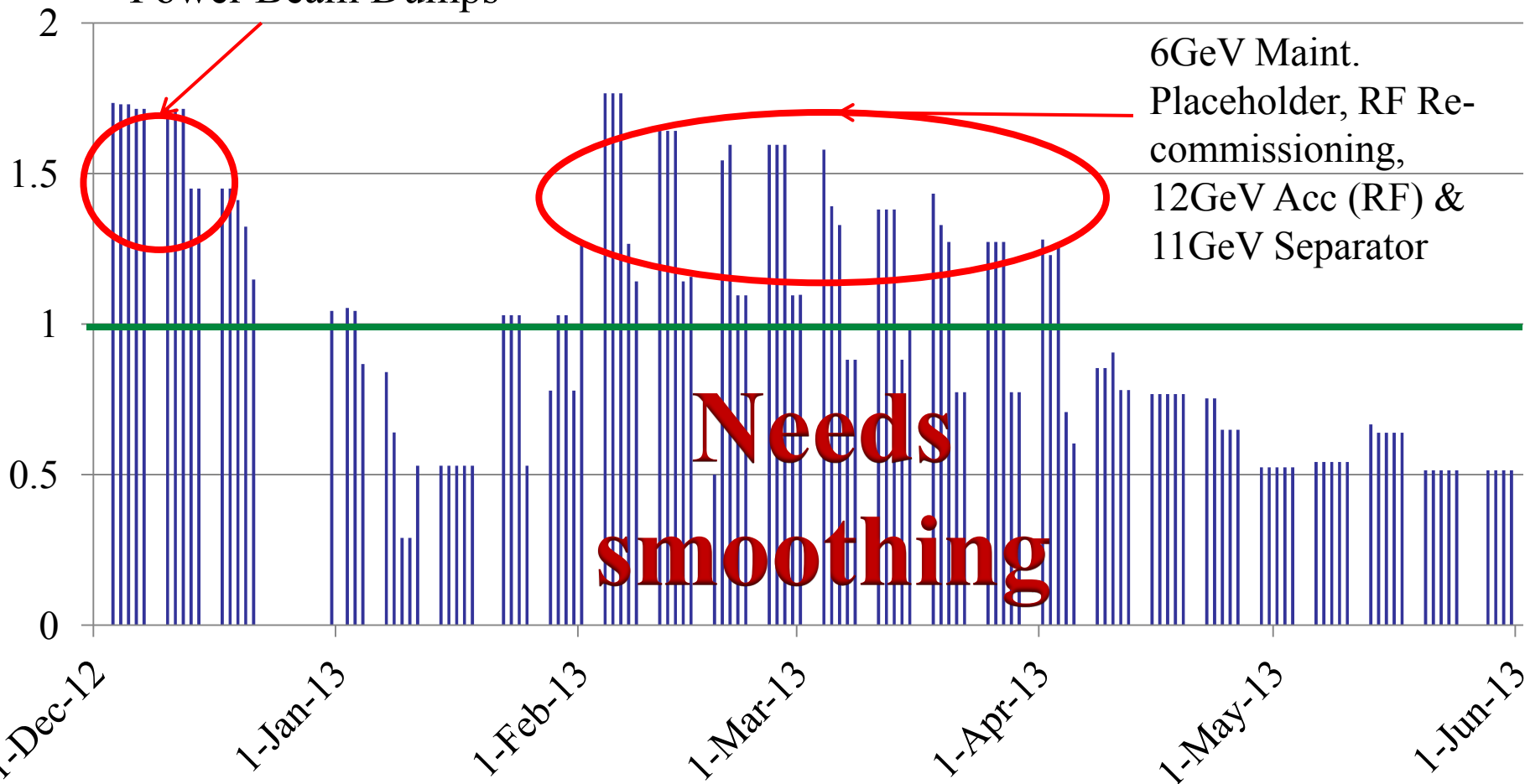


Resource Utilization Analysis

12GeV Acc (RF), FEL,
11GeV Separator, High
Power Beam Dumps

utilization factor - rf elec tech
(8 people)

6GeV Maint.
Placeholder, RF Re-
commissioning,
12GeV Acc (RF) &
11GeV Separator

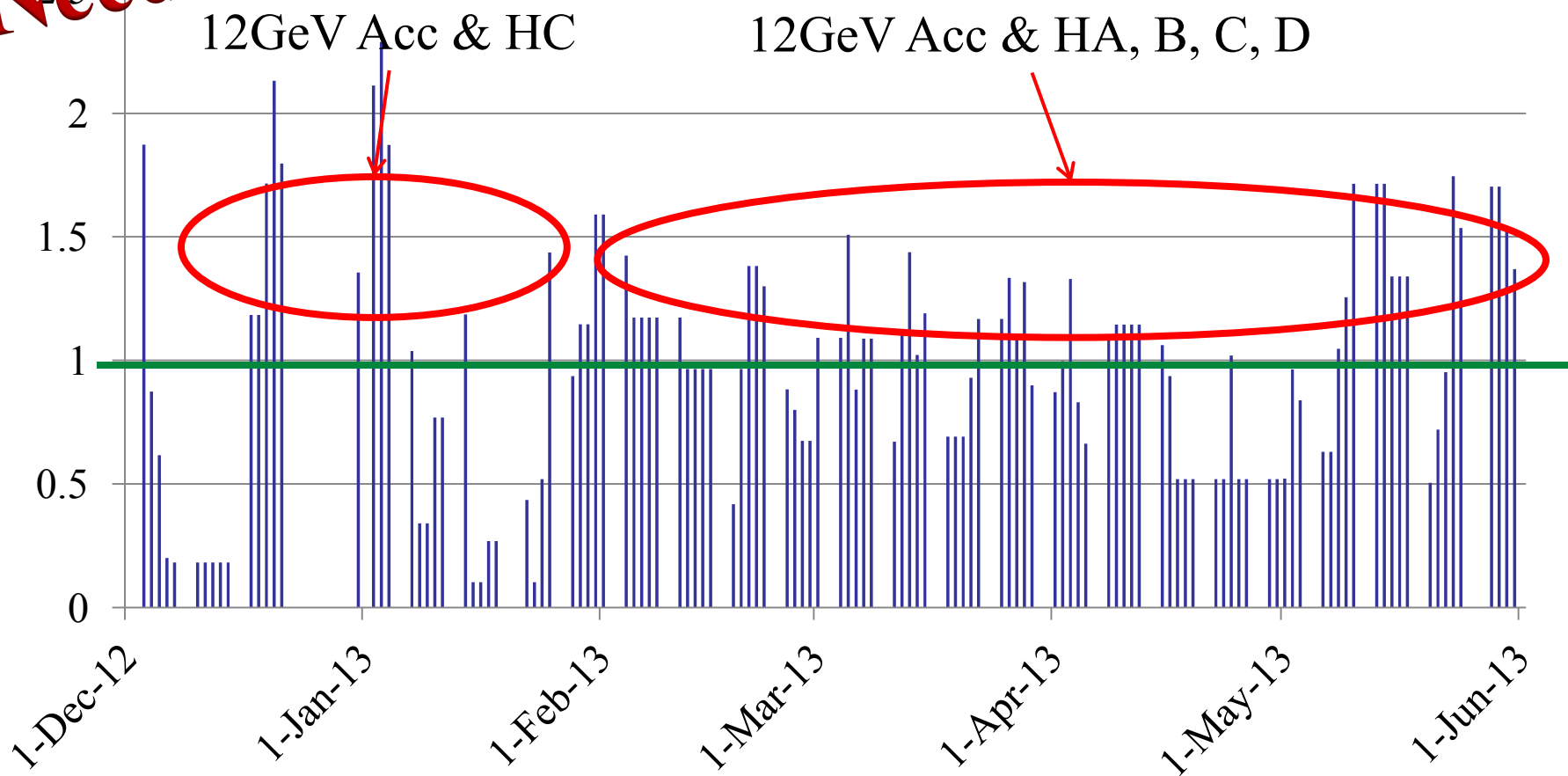


**Needs
smoothing**

Resource Utilization Analysis

Needs smoothing

utilization factor - mech align tech
(6 people)



Part II Review Charges - Summary

- **Issues raised in Part I Review Report adequately addressed**
 - The team needs to go through all the talks presented and update the overall plan to:
 - ✓ Reflect ALL items discussed
 - ✓ Ensure that the different schedules (shutdown work, project, planning for commissioning ops, etc.) are all synchronized
 - ✓ Ensure the interconnects and resource overloads that may arise are captured in an overall plan
 - ✓ There was the impression that there are disconnects at a significant level including the dates for “1st Beam” to the different halls.
- **Consider whether the new baseline is achievable**
 - Are the resources adequate? → **Yes** - RF Techs to be reviewed & minor resource leveling still needed & planned for Jan 2013
 - Are the critical elements and dates understood and well defined?
→ **Yes** & critical milestones implemented as well

Backup

Beam Delivery Dates (Hall A)

- **12GeV CD-4A** **30-Dec-14**
 - Requirements: Accelerator commissioned by transporting a ≥ 2 nA electron beam at 2.2 GeV beam energy (1 pass)
 - **Accelerator Commissioning #1 (6 weeks)** **Oct – Nov/Dec 2013**
 - 1 pass @ 2.2GeV/pass to 2R Dump
- **12GeV Hall A Beam Commissioning Comp. (2-09 milestone)** **Mar-14**
 - Requirements: Beam energy of at least 6 GeV and at least 2 nA average beam current
 - Beam To Hall A Start Comm. (12GeV 1.8 Activity) Feb-14
 - **Accelerator Commissioning #2 (13 weeks)** **Jan – March 2014**
 - **3 pass to HA** & 5 ½ pass through HD transport line to dump

Beam Delivery Dates (Hall D)

- **Accelerator Commissioning #2 (13 weeks) Jan – March 2014**
 - 3 pass to HA & **5 ½ pass through HD transport line to dump**
- 2-12 Hall D Equipment Installation Comp. (12GeV Milestone) Jun-14
- Beam To Hall D Start (12GeV Milestone) → Early start Jun-14
- Beam To Hall D Complete (12GeV Milestone) → Early finish Jul-14
- Hall D Commissioning Start (12GeV Cartoon Schedule) Oct-14
- 2-13 Hall D Beam Commissioning Completed (12GeV Milestone) Dec-14