

12 GeV Accelerator

Cryomodules:	Hogan
Power:	Merz
Cryogenics:	Arenius
Beam Transport:	Bevins
Extraction:	Spata
I&C/Safety:	Spata

Remaining 12 GeV Accelerator Scope

Cryomodules

- Install and commission eight C100 cryomodules

Power

- ~200 new trim supplies
- 15 new box supplies and relocating 14 we already have
- Reconfigure and upgrade ~100 shunts

Cryogenics

- Complete and checkout CHL2 and then connect to linacs
- Complete Hall D cryogenics system

Beam Transport

- Rework extraction beamlines, beamlines to existing halls, final two recirculation arcs, and all spreaders/recombines
- Install beamline to Hall D tagger dump; install tagger dump

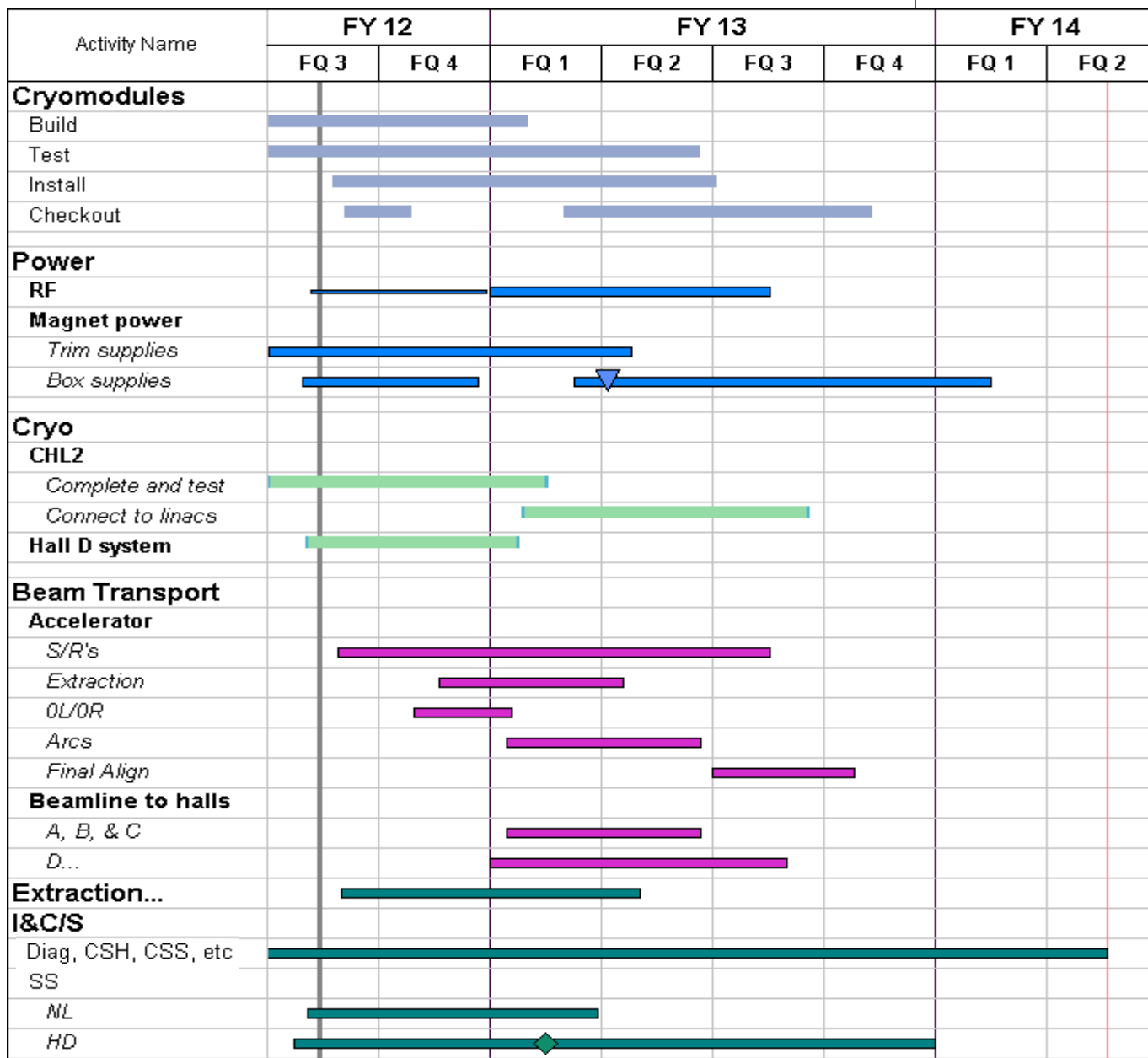
Extraction

- New RF separators and resonance controls

I&C/Safety

- Diagnostics & vacuum controls for arc 10
- Expanded PSS for North Linac
- All systems for beamline to Hall D
- PSS and ODH for Hall D

Timelines in LSD Schedule



Managing the work: Beyond the lab-wide meetings

MBWA

Weekly meetings already going

- **Different levels of integration and time horizons**
 - Integration across Accelerator Systems: APM+CAMs
 - System-specific: CAMs + resource leads for near-mid time horizons
- **Monthly meetings on mid-long time horizons**

Additional meetings for some specific tasks

- **Example: Cryomodules installation**
 - Will be done like C100-2
 - Pre-start coordination (already happening)
 - Daily during installation

Safety & Quality

Safety: 6MSD went pretty well

- **Follow all established policies**
- **Have reviewed work and refined work practices including special tooling**
 - **Special attention to material handling for S/R's and beamlines to HB and HD**

Quality: 6MSD went pretty well

- **Updated procedures with lessons-learned from 6MSD**
 - **Examples: thermal interlocks, stub tuners, PZT locks**

Work plans, resources, critical paths

Comparison to 6MSD

Lessons learned: Transport of material does not lead to schedule conflicts for different crews

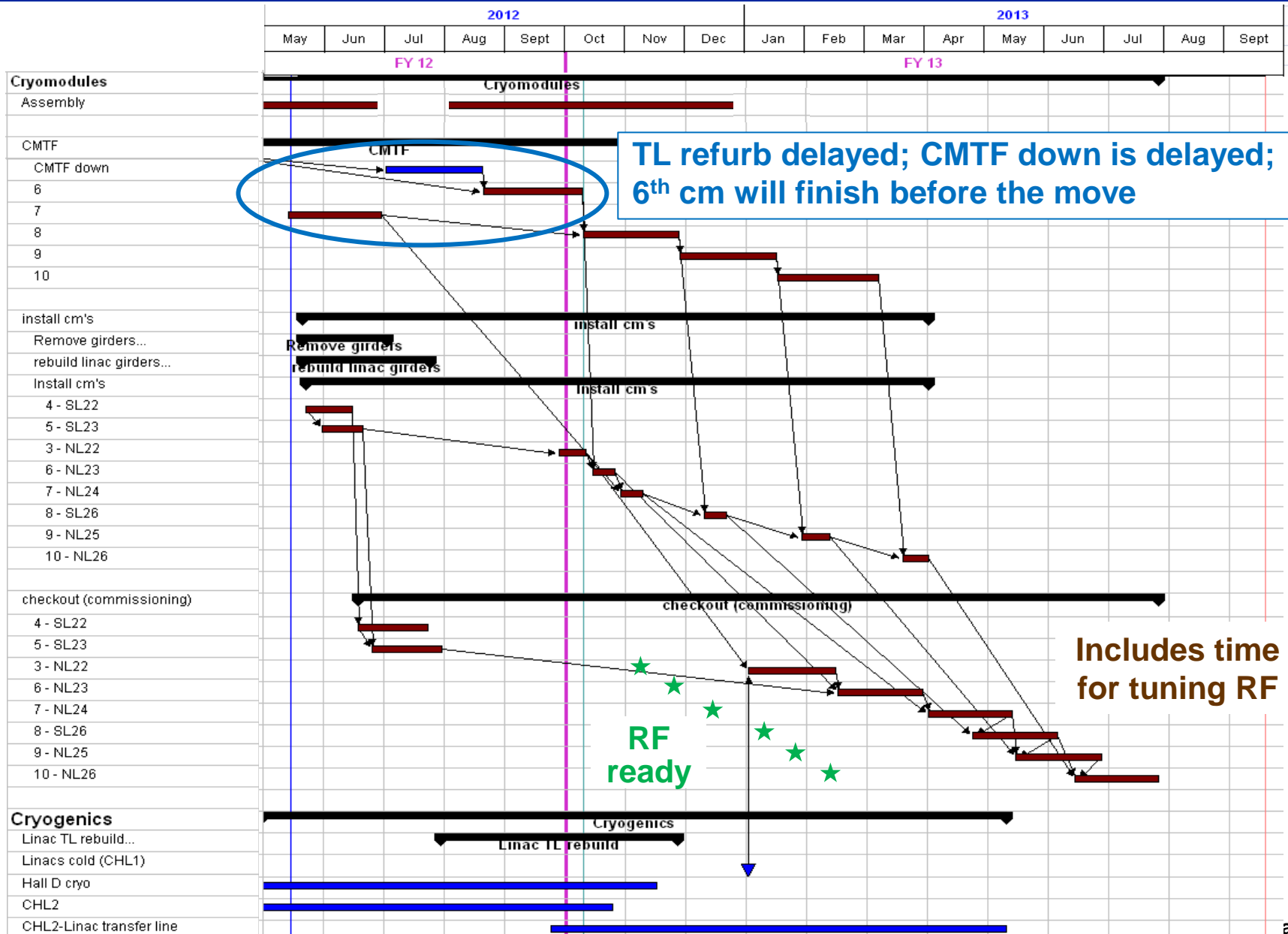
- **Can have different groups working in adjacent areas**
⇒ **Scheduling is much more flexible than had been anticipated before 6MSD**

Only remaining notable inter-crew interference is lockup of tunnel for cryomodule commissioning

- **Change: In-tunnel cryomodule commissioning will not normally be done on day shift during regular work week**
⇒ **Other crews have free access and scheduling is much more flexible**

Have used and will use this additional flexibility to optimized work plans

Linacs: Cryomodules, RF, and Cryogenics



TL refurb delayed; CMTF down is delayed; 6th cm will finish before the move

Includes time for tuning RF

RF ready

Linac: Critical Path

Critical path runs thru cryomodule commissioning

- **Float**
 - 6 weeks of float
 - Additional contingency built into commissioning activities
- **Two critical predecessors: 2 weeks internal float to start of cryomodule commissioning**
 - NL transfer line cold (Ops activity): 12/1/12
 - NL PSS certified: 12/19/12
- **CMTF re-start is further back in timeline**
 - Latest information from FM is that prompt re-occupation of Test Lab could be a problem
 - Silica dust
 - Bird guano
 - There is precedence for installing cryomodules w/o testing in CMTF
 - Compromise in quality? Improved cost-schedule/benefit? Both?

BT work plan

Developed detailed plan

- **Technical**
 - Best practice: all final alignment done in continuous sweep
- **Float**
 - All work complete August 1, 2013
 - Significant internal float
 - Accommodated Peppo schedule
- **Staffing**
 - Total matched post-cut staffing cube
 - Level coordinated with EngDiv
 - ~Flat for total for MT's (fixed-size pool that get shifted between teams as needed)
 - Survey/align and Machine Shop within EngDiv plans

Plan was reviewed 3/28

- Small tweaks were identified

BT work plan (cont'd)

3/30 we found out that the new stands for S/R's would be late by 2+ months ⇒

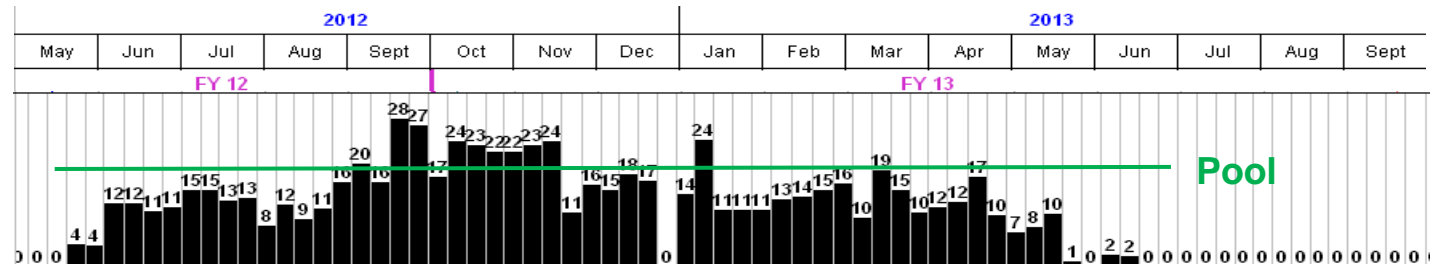
Plan was busted and rework was required

Updated plan was developed

However, timeline for LSD schedule development did not permit time to get the polishing of the previous version.

- Labor total for FY12 consistent with cube but MT profile isn't flat

MT "100%"



- Alignment is over-utilized in spring/summer of next year if all final alignment was at the end and float (6 weeks) was maintained.

Remedy: Refine timeline

BT work plan (cont'd)

Important aspect of BT work:

- There are essentially no interdependencies of work in the different sections (5 S/R's, east arcs, west arcs, extraction, injector, 4 beamlines to halls)....other than resources

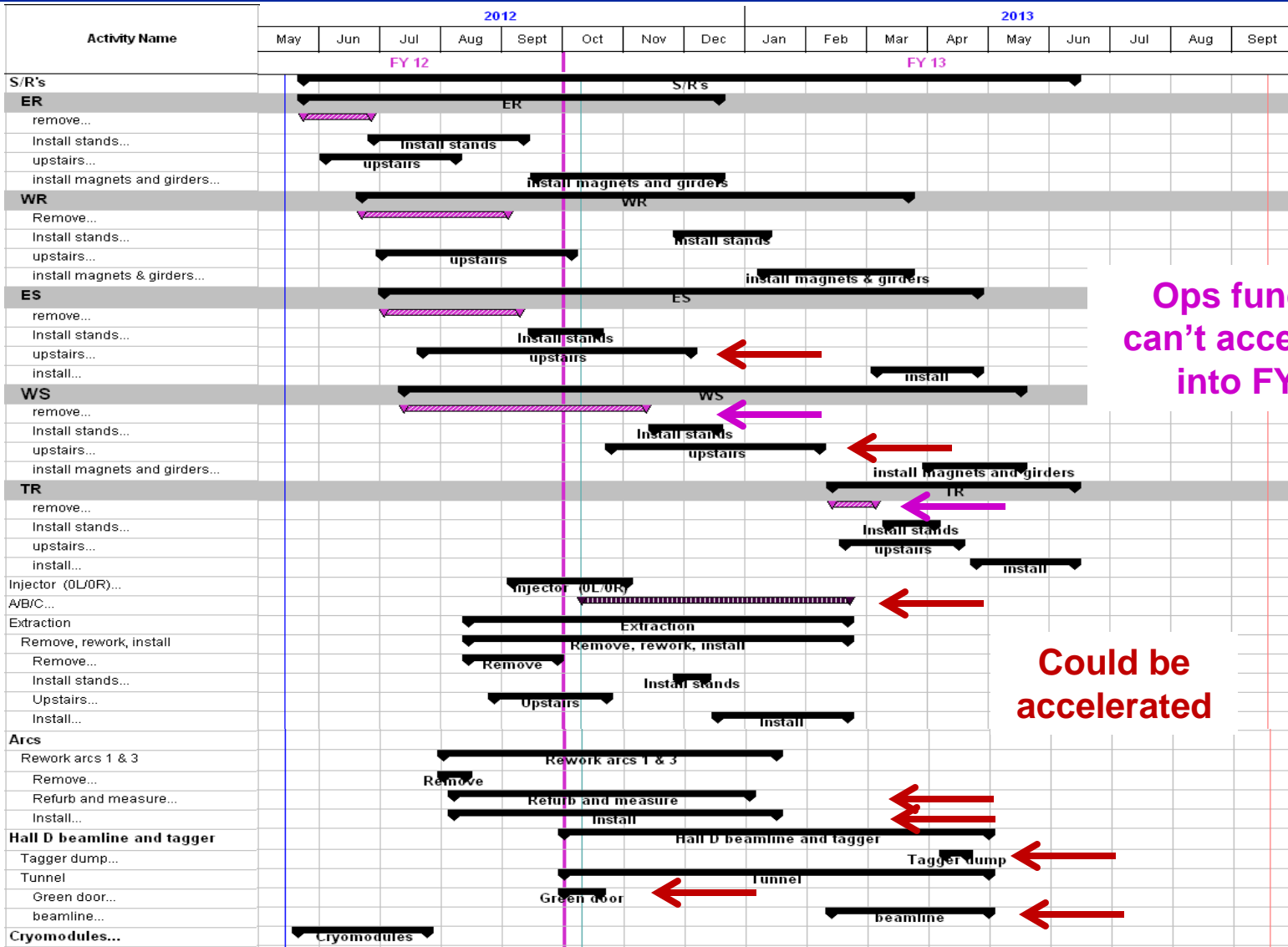
Primary constraints on refining BT timeline:

- S/R removal is Ops funded and thus constrained in FY12
- Cannot start S/R installation w/o vendor supplied stands
- Cannot use contract labor for leverage

Strategy for remedy

- Use flexibility in sequence of working the different sections

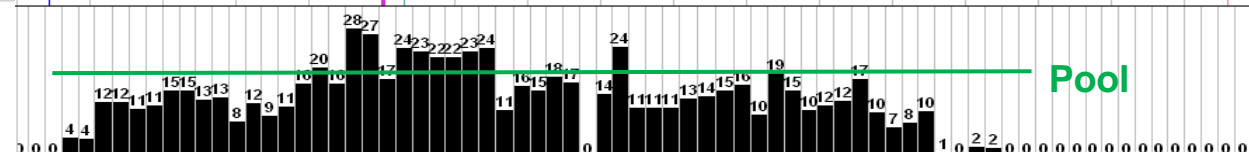
BT Workplan: MT's



Ops funded;
can't accelerate
into FY12

Could be
accelerated

MT "100%"



Survey/Alignment

Activity Name	FY 12		FY 13			
	FQ 3	FQ 4	FQ 1	FQ 2	FQ 3	FQ 4
Cryomodules						
Build	[Bar]					
Test	[Bar]					
Install	[Bar]					
Checkout	[Bar]		[Bar]			
Beam Transport Accelerator						
<i>S/R's</i>	[Bar]					
<i>Extraction</i>		[Bar]				
<i>OL/OR</i>		[Bar]				
<i>Arcs</i>			[Bar]			
<i>Final Align</i>					[Bar]	
Beamline to halls						
<i>A, B, & C</i>			[Bar]			
<i>D...</i>			[Bar]			
Extraction...		[Bar]				

- Coalescing all final alignment to the end is not required
- Can shift to doing final alignment as components are installed

BT work plan (cont'd)

Will shift some tasks earlier

- Re-sequence to flatten MT profile
 - Beamlines to HA, HB, HC, & HD 3.2 p-yr
 - Moveable shield door tunnel to tagger 0.2 p-yr
 - Tagger dump and shielding 0.4 p-yr
 - Arcs 1 & 3 1.5 p-yr
 - Some of S/R rework
 - Do final alignment as early as feasible
- Candidate work totals >5 p-yr that could be shifted

Bevins (CAM), Dipette (Install/vac group leader), and Curtis (S/A group leader) are working the adjustments

Backup plan if they can't make it work: restart RF and/or shift to personnel to Cryo

Critical Path for Beamlines

BT:

- **Standard “critical path” concept doesn’t really apply**
 - Timing for much of the work can be shifted w.r.t the other work
- **Standard concept does apply with regard to sections for which we’re on waiting the stands**
 - Latest are for Extraction and TR installations
- **TR is last in the pipeline. Completion of installation is 6/28/13**
 - Anticipate 1 month(+/-) acceleration in update of plan
 - Fully utilize available MT resources

Power:

- **Depends on contract that’s still to be awarded**

Work plan and Resources

**Work plan is matched to latest labor cube
Has been incorporated into 12 GeV Baseline**

	<u>Near term</u>	<u>FY13</u>
Cryomodules	Staffing is well established	
Power	RF is effectively on hold for FY12 Mag power staffing indentified	Need return of ET's
Cryogenics	Staffing established (being update coupled to maintenance work)	
Beam Transport	Staffing identified (next slide)	Replace ET's with contract
Extraction	Scope is procurements and fab Staffing identified	Staffing identified
I&C/Safety	Scope is procurements and fab Staffing identified	Staffing identified

Notable Concerns (Outside Our Control)

	<u>Concern</u>	<u>Mitigation</u>
Cryomodules	Major delay in restoration of CMTF operation	Install cryomodules w/o CMTF testing (as done in original construction)
Power	Box supply vendor runs late	Structuring contract with deliveries based on when need
Cryogenics	None	NA
Beam Transport	Loss of “loaned” ET’s in FY13 and no contractors	SRF, Cryo, Halls (???)
Extraction	None	NA
I&C/Safety	None	NA

Summary

Scope is identified

Staffing is identified

Work-plans have float

BT being adjusted

Work practices were reviewed and updated for safety and quality

Critical paths identified

Notable concerns have been identified, along with mitigations

Questions?

Charge for the review

1. Scale

1. Concentrate on that part of the shutdown for which the schedule is fully developed .
2. Consider scope, schedule and resources.

2. Questions

1. Is the critical path understood and articulated?
2. Is the approach to management of the “project” appropriate?
3. Is there is a clear strategy for dealing with problems that might develop?
4. Identify schedule or scope contingency; is the schedule contingency adequate?
5. Identify places in the schedule where scope and resources are not well matched?
6. Is there work scope outside of the current schedule which could potentially represent constraints or impacts on the schedule; is this adequately addressed?
7. Have quality, Safety, Risk and other Concerns been adequately addressed?