
Run II Upgrades Status April Report

Pushpa Bhat
Jeff Spalding

Outline

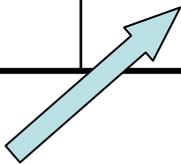
- Technical Highlights
- Status Report for April
 - Milestones
 - % Complete
 - M&S Costs
 - Personnel Costs and Effort Report
- Reviews
- v3 of the Plan
 - Status & Plans
 - List of Major Changes
 - Phase Milestones
- Near-term Recommendations from Feb DOE Review

Technical Highlights

- Protons on Target
 - Slip Stacking is making excellent progress
 - $>6E12$ protons with 1.4 ns bunch length; Booster-MI cogging works for multiple batches.
 - Test stacking - late May or early June
 - 2.5 MHz transfers from AR \rightarrow MI for Tev shots
 - 2.5 MHz Acceleration beam tests with pbars from RR making good progress
- Antiproton Acceptance
 - Progress made with Beam-based identification of limiting apertures
 - Horiz: DB ap. $27\pi \rightarrow 32\pi$, AP2+DB ap. $23\pi \rightarrow 29\pi$ (with bump in extraction region) \rightarrow stack rate increase of 10-13%
 - Vert: prime suspect DB injection (rebuild septum and replace quad this summer)

Class A Milestones

| WBS | Name | Baseline Date | Actual or Forecast |
|--------------|--------------------------------------------|---------------|--------------------|
| 26.6.2.2 | Review Recycler Commissioning Plan | 2/9/04 | 2/29/04 |
| 26.3.4.9.16 | Recycler commissioned for electron cooling | 6/1/04 | 6/1/04 |
| 26.1.2.2.4.2 | Beam Sweeping Operational | 8/25/04 | N/A |

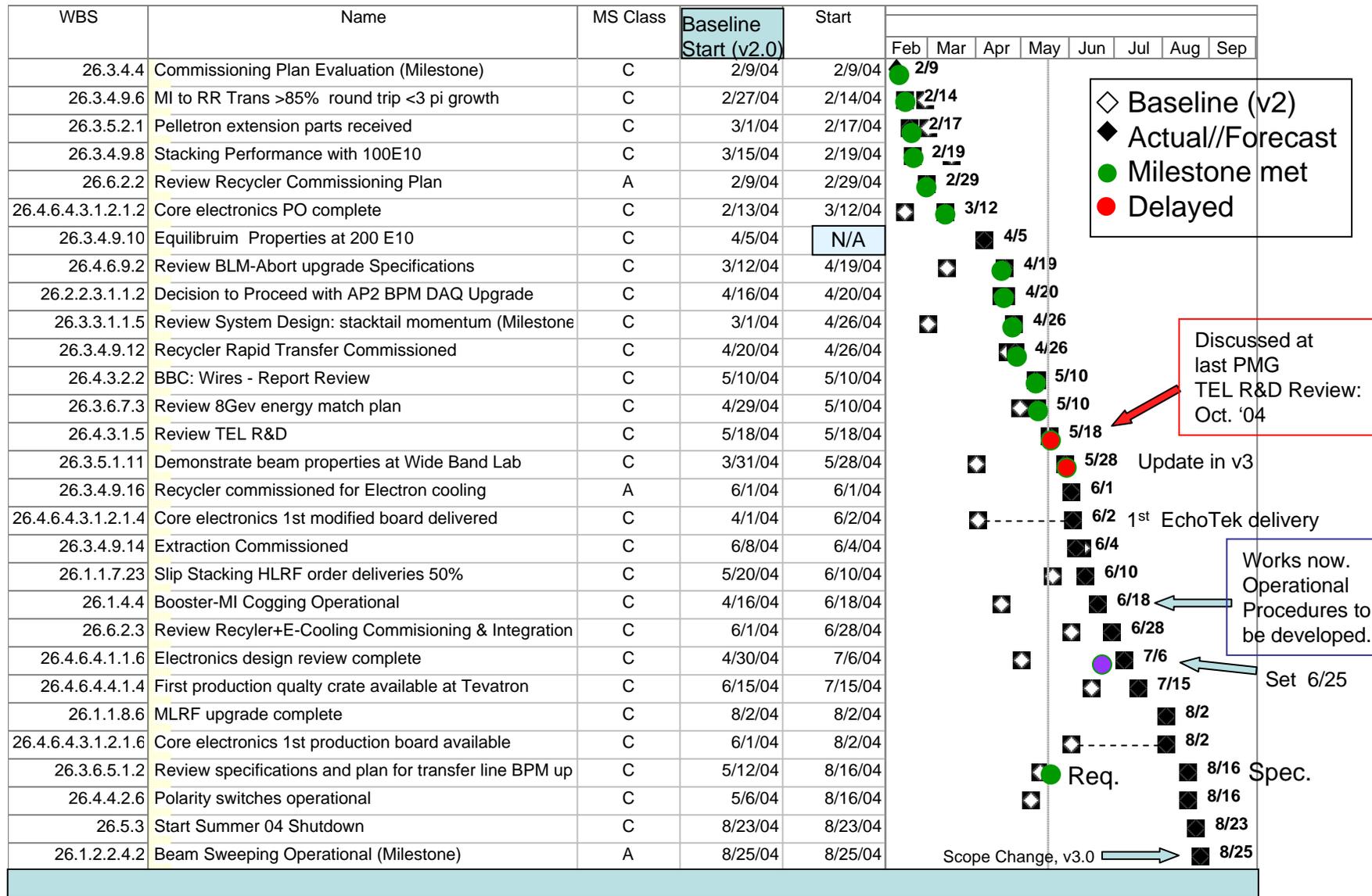


Scope Change: v3



Depends on study time and pbars to Recycler

All Milestones: Feb. - August '04



Planned & Actual % Complete

| WBS | WBS Name | Planned % Complete (P%C) | Actual % Complete (A%C) | (A%C)/(P%C) |
|-----------|--------------------------------------|-----------------------------|----------------------------|-------------|
| 1 | Run II | 36% | 29% | 0.80 |
| 26 | Luminosity Upgrades | 37% | 28% | 0.77 |
| 26.1 | Protons on Target | 36% | 29% | 0.80 |
| 26.2 | Pbar Acceptance | 28% | 19% | 0.69 |
| 26.3 | Pbar Stacking and Cooling | 45% | 38% | 0.86 |
| 26.4 | Tevatron High Luminosity | 35% | 24% | 0.69 |
| 26.6 | Project Management | 37% | 37% | 1.00 |
| 27 | Maintenance & Reliability | 31% | 32% | 1.02 |

26.2 Pbar acceptance at 0.69 of Planned due to
(1) Change in Plans and (2) Competing with operations for resources
and study time

26.4 Tevatron High Luminosity at 0.69 of Planned primarily due to delays in
TEL, Tev BPM, IPM and Electrostatic Separators

M&S Costs through April '04

M&S Cost Summary through April 2004 (\$K)

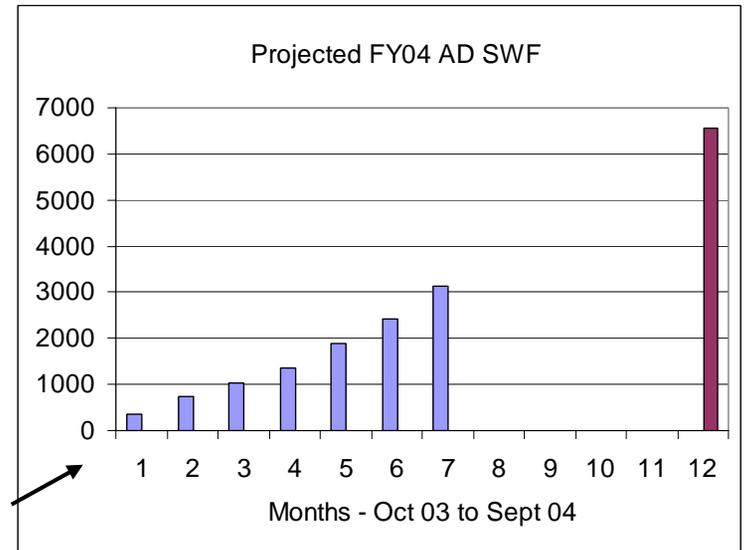
| ROLL UP | TASK DESCRIPTION | 04 | | | | | (OBL + RIP) / OBLBUD |
|-----------|---------------------------|--------|---------|---------|-------|----------|-------------------------|
| | | OblBud | YTD OBL | YTD Act | PY OC | 4/04 RIP | |
| 26 and 27 | | 10,536 | 5,037 | 1,984 | 802 | 343 | 51% |
| 26 | Luminosity Upgrades | 9,153 | 4,055 | 1,664 | 802 | 261 | 47% |
| 26.1 | Protons on Target | 481 | 320 | 292 | 531 | 0 | 67% |
| 26.2 | Pbar Acceptance | 801 | 175 | 90 | 12 | 27 | 25% |
| 26.3 | Pbar Stacking and Cooling | 3,856 | 1,388 | 542 | 185 | 10 | 36% |
| 26.4 | Tevatron | 3,420 | 2,083 | 650 | 74 | 224 | 67% |
| 26.6 | Management | 595 | 90 | 90 | 0 | 0 | 15% |
| 27 | Maintenance Upgrades | 1,383 | 981 | 319 | 0 | 82 | 77% |

- \$3.7M Contingency was returned to Directorate, leaving \$10.5M assigned in AD
- "26.6 Management" includes \$0.5M "contingency" generated by minor scope/cost adjustments
- 51% obligated

SWF/Effort for April '04

Labor costs vs budget by division

| FY04 SWF Costs (\$K) through April 2004 | | | |
|-----------------------------------------|--------------|--------------|------------|
| | Budget | YTD Actual | % |
| Total | 9,335 | 4,213 | 45% |
| 20 Accelerator Division | 6,544 | 3,131 | 48% |
| 30 Technical Division | 1,785 | 722 | 40% |
| 50 Computer Division | 1,006 | 359 | 36% |



AD labor cost projection

Effort reporting from AD and CD (still need to integrate TD and PPD)

| Effort Report for April (FTE) | | | | | | | | |
|-------------------------------|---------------------------|-------------|------------|-----------------|------------------|--------------|-------------------|------------|
| WBS | | AD Effort | CD Effort | TD Effort (Est) | PPD Effort (Est) | Total | 85% FTE Corrected | Proj Need |
| 26.1 | Protons on Target | 9.9 | | | | 9.9 | 11.7 | |
| 26.2 | Pbar Acceptance | 5.9 | | 4 | 1 | 10.9 | 12.8 | |
| 26.3 | Pbar Stacking and Cooling | 25.0 | | 3 | 3 | 31.0 | 36.4 | |
| 26.4 | Tevatron | 22.6 | 8.4 | 8 | 2 | 41.0 | 48.3 | |
| 26.6 | Management | 1.5 | 1.0 | | | 2.5 | 3.0 | |
| 27 | Maintenance Upgrades | 3.1 | | 2 | | 5.1 | 6.0 | |
| | Total | 68.1 | 9.4 | 17 | 6 | 100.5 | 118.2 | 113 |

Use of Contingency?

Pending:

- 3 OTR beam monitors in A1 line (to replace multiwire chambers) \$110K M&S, \$140K labor
- BLM upgrade for MI (~\$200K)
- Move MI BPM upgrade FY05 → FY04

Reviews (1)

- Tev BLM Upgrade Specifications
 - April 19, 2004
 - Committee: Mike Martens (Chair), Jerry Annala, Carl Bromberg (CDF), Brian Hendricks, Ron Lipton (DØ), Nikolai Mokhov, Bob Webber
 - Recommendations include:
 - Continue efforts on protecting the Tevatron with the existing BLM system.
 - Consider using a BLM front-end system which is separate from the BPM upgrade front-end
 - Keep CDF and DØ in mind - may use the upgraded hardware
- Web site: <http://www-bd.fnal.gov/run2upgrade/reviews/>

Reviews (2)

- Stacktail Upgrade Review
 - April 26-28, 2004
 - Committee: John Marriner (Chair), Flemming Pedersen (CERN), Gerry Dugan (Cornell), Kris Anderson
 - Charge Summary:
 - Review phased stacktail cooling system upgrade (and parameters) in the context of mixed mode operation (using pbars from both the Acc. and RR)
 - Interim upgrade (tank move option) summer 05
 - Full upgrade ready in early 06
 - Outcome : The committee endorsed the overall strategy
 - Plan and perform "essential" beam experiments before the 04 shutdown.
 - Consider building new kicker tanks
 - Continue Pick-up & kicker design R&D using HFSS

Reviews (3)

- 8 GeV energy match across the complex
 - May 5, 2004
 - Outcome:
 - Agreed that the energy match should be done when a suitable opportunity arises. Not to be done immediately.
 - There are ideas and good arguments for doing it in two steps - (1) Booster-MI-RR and (2) Pbar Source
 - For now, develop and maintain different ramps in the MI to handle pbars from AR and RR in a mixed-mode operation.
 - Make better estimates of work required in the pbar Source and outline a detailed plan for implementation.
- Transferline BPM upgrade Requirements
 - In progress.

v3 of the Plan

At the last PMG, we set a goal of June 1 for v3

Current status:

- June 1
 - will have a working version with the scope/logic updates, in time for May status
- By June PMG
 - update the WBS hierarchy to allow development of cross-division cost reporting
 - write a brief documentation summarizing scope, schedule and cost changes
 - prepare change requests
 - update luminosity projection

Major Scope/Schedule Changes for v3 (Draft)

- Pbar target
 - make beam sweeping the backup plan
 - new target stack will last 2-3 months with slip-stacking
 - quick to build and replace - keep ahead with spares
 - spot size extends life for 5% reduction in acceptance
 - install and commission beam sweeping system only if necessary
- AP2 & DB acceptance
 - reduce scope of specific tasks: injection septum vacuum, extraction kicker tube...
- Stacking and Cooling
 - update electron-cooling schedule
 - stretch 10 weeks (move from WBL)
 - maybe longer commissioning ramp-up
 - Stacktail upgrade (following review)
 - 2-step upgrade: tank move as soon as e-cooling is in operation, bandwidth increase ready at start of 06
- Tevatron
 - add fewer separators in summer 04, the rest in 05
 - upgraded TEL will not be ready for summer 04, target 05
 - BPM project stretched - deliveries... commissioning plan included

Preview v3 Milestone changes

"Start of phase" are the top level milestones

- e-cooling: 10 week extension ~ collides with 05 shutdown, so start of phase 3 is after shutdown recovery
- interim stacktail upgrade added in 05, full upgrade in 06

| Operating Phase and Start Date | | | | | |
|--------------------------------|-------------------------------|------------|-------------------------------------|-------------------|---------------------------------------------|
| | v2 | | v3 | | Comment |
| 1 | Current Operation | | Current Operation | | |
| 2 | Slip Stacking Operational | 12/23/2004 | Slip Stacking and Mixed-Mode | 12/23/2004 | |
| 3 | Electron Cooling Operational | 6/1/2005 | Electron Cooling Operational | Nov/Dec 05 | following return from shutdown |
| 4 | Stacktail Upgrade Operational | 12/6/2005 | Stacktail Tank Move | Nov/Dec 05 | following return from shutdown |
| | | | Stacktail Bandwidth Upgrade | 2006 | ready to install early 06, likely summer 06 |
| 5 | Tevatron Helix+BBC Complete | 2/12/2007 | Tevatron Helix+BBC Complete | 2/12/2007 | follow summer 06 |

- date and length of 05 shutdown probably not optimal ...

Near-term Recommendations from Feb DOE Review

- By May 1, 2004 develop and implement procedures to utilize the upgrade plan as a basis to monitor and track and evaluate progress on the upgrades against expectations.
 - Been doing since v1 (July 03)
 - **Technical** - reviews
 - **Schedule** - milestones and %complete reports
 - **Cost and Effort** - done, but reports not automated, especially across divisions
 - Plan to improve cost and effort report generation, by September...
- By June 1, 2004 produce a comprehensive plan addressing manpower needs and expected progress for the operations, commissioning and maintenance components of Run II.
 - Under discussion...