Run II Upgrades Status
September 2005 Report

Pushpa Bhat
Outline

• Technical Progress
  ➢ Highlights for Sep. -Oct. ’05
  ➢ Review of FY05 work since OPS review in Mar. 05
  ➢ Outlook for FY06/07
  ➢ Preview of v4 plan

• Status Report for September ’05
  ➢ Milestones
  ➢ % Complete
  ➢ M&S Costs
  ➢ Effort Report

• Change requests

• Contingency Analysis
Technical Highlights (1)

• Status of electron cooling in the Recycler
  - e-cool essentially integrated into HEP operations
  - Routine “Recycler only” stores
    • Up to 285E10 pbars stored in the machine
    • ~250E10 max transferred to Tevatron store
  - Cooling utilizes electron beam ~200mA
    • 670 mA for 30 minutes
  - Studying instabilities on over-cooling
    • Testing techniques for preventing the on-set of instabilities
    • Testing medium-band damper
    • Will review to proceed with broad-band damper

• Rapid Transfers
  - Accumulator to Recycler
    • AP1 ramping PS upgrade -in progress
    • AP1,AP3 beamline BPM upgrades done; P1,P2 to follow
    • Hall probes
    • Injection dampers in MI
Technical Highlights (2)

• **MI BPM electronics design review**
  - Conducted Oct. 12, ’05
  - Recommendation was to go ahead with procurement of parts
  - Project piggy-backs on Tev BPM project; many systems copied

• **Pbar situation**
  - Dave’s talk
  - **Target**
    - Had switched to Inconel-600 from stainless steel because of longevity issue, even though SS was declared the best target with regards to yield
    - New target/target motion/target cooling design being worked on
    - Beam sweeping to be re-visited
  - Internal report being prepared on target, Li lens, pulsed magnet status and plans.
Scope of Work  

(DOE OPS review March ‘05)

• FY05
  - Continue optimizing slip-stacking (Operations) ✓
  - Complete Tev BPM project ✓
  - Commission 2.5 MHz pbar acceleration
    - Ready to implement for pbars from recycler
    - Suffers from lack of study time and support
    - Can save 10-15% pbars in each Tevatron shot
  - Continue improving pbar acceptance & stack rate
    - Work continues
    - What will we have? 20+, 30+ mA/hr ??
  - Improve diagnostics in AP2/DB/D→A ✓ continue
  - Commission electron cooling ✓
  - Continue helix/separators R&D ✓
  - Prepare TEL2, IPM and OTR for installation ✓
    - IPM, OTR will be ready
    - TEL2 status review in November
Scope of Work  (DOE OPS review March ‘05)

• FY06
  - Make electron cooling operational ✓
  - Implement stacktail upgrades (in two steps)
    • Tank move as soon as stack rate/flux requires it
    • Decide on bandwidth upgrade in summer ‘06
  - Continue to improve antiproton acceptance
  - Commission TEL2 into operations
  - Complete MI BPM project (on track)
  - Complete BLM project (on track)

• FY07
  - Complete antiproton acceptance improvements
  - Complete helix improvements

V3→v4 Scope Change:
  Install & commission full bandwidth upgrade in ‘07 shutdown (v3 had it in ‘06)
Project Plan Version 4

• Will have a version 4 plan in Nov. - Dec. with revised scope for some projects
• Delay in shutdown (originally scheduled to start Aug. 8, ’05) impacts many projects
• Will re-baseline with new shutdown dates and new scope for v4.0 by Dec. 1
Preview of Version 4

• Redefining Operational Phases
• V3:
  - Phase 2: After slip-stacking ← current phase
  - Phase 3 ≡ e-cool for HEP + tank move
  - Phase 4 ≡ bandwidth upgrade + helix

• Proposal for V4:
  - Phase 3 ≡ Integration of e-cool for HEP
    - to commence on Nov. 1?
  - Phase 4: First phase of stacktail upgrade
    - tank move when we reach stack rates that would require it
  - Defer work on Stacktail bandwidth upgrade
    - Decision milestone in summer ‘06 (mid-July ‘06)
      - back from shutdown in June
  - Phase 5: bandwidth upgrade and/or remaining aperture
    + Tev upgrades
Other items for Version 4

- Separators done
  - All R&D wrapped up except Ti electrode but no plans for using in operation
  - Get the spares ready, transfer to Tev Department and close out

- Review TEL2 status and beam-beam simulation/studies
  - Likely to cancel TEL3
September Status
## Milestones

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- ◇ Baseline Finish Date
- ♦ Actual Finish Date
- ○ Forecast Date

Run II PMG  10/20/05
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Pushpa Bhat  11
## % Complete

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**A/P % Complete:** 93% last month

**Shutdown delay ↔ Primary cause for further lag this month**
## M&S Spending through FY05

### Run II Upgrades

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**Note:** Obl+RIP = Obligation + Reserve in Place
### Effort for September 2005

#### Adjusted FTE September 2005

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**Shutdown delay taken into account**
Current Change Requests (M&S)

- Thyratron replacement prototype $65K
- MI BPM $100K
- Drop 7835 development facility -$100K
- BLM prototype iteration 2 $10K
- Operational improvements for protons on target (Booster, Main Injector) $316K

Total : $391K
Contingency Analysis

- Estimate to complete: $18,665K - $14,445K = $4,220K
- Contingency remaining: $20,946K - $18,665K = $2,281K
  (Of this $550K has been borrowed for cryomodule clean room)

- Contingency Need estimate
  - MI BPM $200K
  - Rapid Transfers $100K
  - Recycler $200K
  - E-cool $100K
  - Stacktail $300K
  - Other $200K

  Major Concerns/New scope?
  - Pbar Stack rate related $200K

  → $1.3 M

- Serious Vulnerability → Linac 7835 tubes
  - Test station for candidate tubes ~ $2 M
### Change Requests (Nov. ‘05)

- **E-cool upgrades**  $100K
- **Tev upgrades visitors/travel**  $30K
- **Target upgrades**  $20K
- **Ramp corrector PS @F23**  $20K
- **Tev Separator vacuum shells**  $210K

- **Total: 380K**