

# **Cost and Scheduling**

## **(non-magnetic elements)**

**Mike Church**

**FNAL**

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# Methodology

- In conformance with the rest of the BTeV project, Open Plan is being used for cost and schedule analysis (with input from MS Project)
- Using standard “resource file”, calendar, milestones, G&A, contingency, ....
- Level 3 managers provide detailed task information in spreadsheet form, with specific instructions on content and format from the Project Manager
- Lots of manual data entry or “cut and paste” by the Project Manager

# WBS

<b>ID</b>	<b>Subproject</b>	<b>Manager</b>
2.1	magnet fabrication and test	Kerby (Tompkins, Chichili)
2.2	Convert C0 to normal straight (2005 shutdown)	Garbincius
2.3	Power supplies	Krafczyk
2.4	Cryogenics	Theilacker
2.5	Controls	Lackey
2.6	Instrumentation	Pordes
2.7	Installation (2009 shutdown)	Reilly
2.8	Commissioning	Church

## **Two comments:**

- **Wide variety of tasks and task lengths**
- **Subprojects can proceed in parallel**

# Status of Cost Estimates (1)

- **2005 Shutdown**

Detailed worklist with labor and T&M estimates – rolled up into Open Plan; estimates based on previous shutdown experience.

- **Power Supplies**

Using 10/04 estimates. Detailed cost itemization in hand, but not presented at this review.

- **Cryogenics**

Detailed worklist with labor and M&S estimates – entered into Open Plan.

- **Controls**

Detailed worklist with labor and M&S estimates – rolled up into Open Plan.

## Status of Cost Estimates (2)

- **Instrumentation**

Major cost item is Tevatron modification to accommodate synch light monitor. Rough estimate.

- **2009 Shutdown**

Very rough estimate on manpower required to install magnets. Separator estimate rough. Cryo estimate is detailed.

- **Commissioning**

Assuming an additional 1 month of commissioning effort by Operations, Tevatron group and others. Rough estimate.

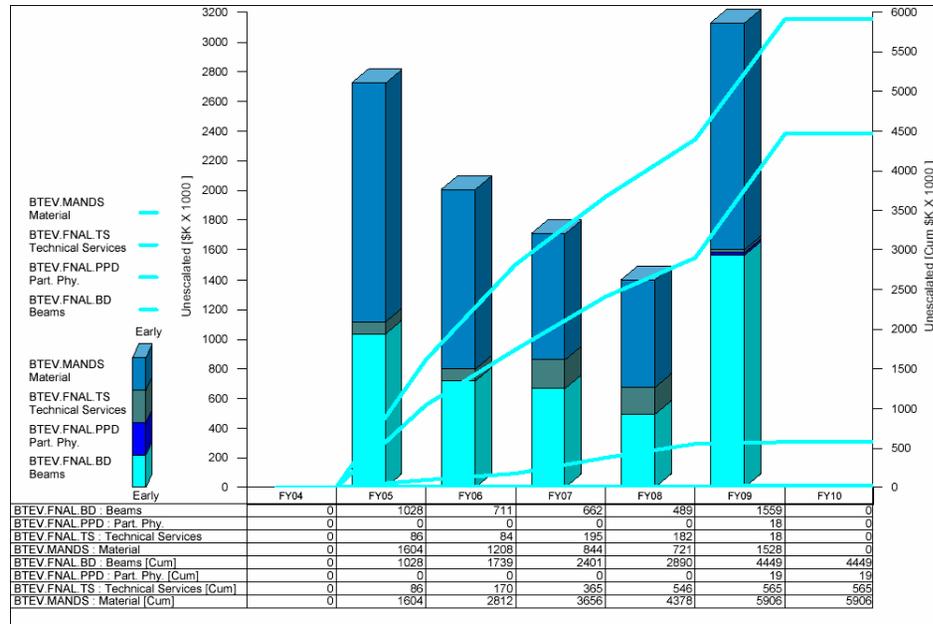
# Caveats and Conditions (1)

- Many estimates are very rough !
- Costs broken down by subproject and FY (FY05 – FY09)
- Costs broken down into M&S and FNAL labor (AD, TD, PPD)
- Costs include G&A (16% on M&S, 30% on labor)
- Costs calculated with and without spares (M&S and labor) (almost all spares in tunnel cryogenic elements)
- Costs do not include “special process spares” (ie., buying and selling spare magnets in and out of storage) (this amounts to ~.89M\$ in favor of the BTeV project !)
- FNAL labor rates are in FY05 \$\$
- M&S not reviewed carefully enough yet to define FY of estimate
- In most cases the Basis of Estimate (BoE) is “previous experience” (we are building, installing, and commissioning things we have recent experience with)

## Caveats and Conditions (2)

- **Shutdown tasks are tied to the BTeV level 1 milestones “Start FYxx Shutdown” (which all occur in the Summer)**
- **Currently the C0 IR project utilizes only FY05 and FY09 shutdowns (will be changed)**
- **Fabrication tasks are tied to the BTeV level 1 milestone “Start Construction Phase” (Oct. 1 '04)**
- **Except for shutdowns, subprojects are semi-independent and parallel (cryogenic components, power supplies, electrostatic separators, magnets, controls, ...)**
- **“Resource leveling” == stretch subprojects to ~52 months (2/09)**

# Cost Summary (by FY)



FY -->	05	06	07	08	09	total
<b>labor (M\$)</b>	<b>1.12</b>	<b>0.79</b>	<b>0.86</b>	<b>0.67</b>	<b>1.59</b>	<b>5.03</b>
<b>M&amp;S (M\$)</b>	<b>1.60</b>	<b>1.21</b>	<b>0.84</b>	<b>0.72</b>	<b>1.53</b>	<b>5.90</b>
<b>Total (M\$)</b>	<b>2.72</b>	<b>2.00</b>	<b>1.70</b>	<b>1.39</b>	<b>3.12</b>	<b>10.93</b>
<b>labor (no spares)</b>	<b>0.95</b>	<b>0.64</b>	<b>0.70</b>	<b>0.56</b>	<b>1.52</b>	<b>4.37</b>
<b>M&amp;S (no spares)</b>	<b>1.51</b>	<b>1.11</b>	<b>0.74</b>	<b>0.63</b>	<b>1.51</b>	<b>5.50</b>
<b>Total (no spares)</b>	<b>2.46</b>	<b>1.75</b>	<b>1.44</b>	<b>1.19</b>	<b>3.03</b>	<b>9.87</b>

## Cost Summary (by subproject)

	<b>Total</b>
<b>2005 Installation</b>	<b>0.60</b>
<b>PS</b>	<b>3.56</b>
<b>Cryogenics</b>	<b>2.63</b>
<b>Controls</b>	<b>0.34</b>
<b>Instrumentation</b>	<b>0.03</b>
<b>2009 Installation</b>	<b>3.48</b>
<b>Commissioning</b>	<b>0.30</b>

← Includes electrostatic separators

# 2005 Shutdown

- **2 months in length**
- **Major cost elements are**
  - **Magnet moves -- 195K\$**
  - **Cryogenic modifications – 57K\$**
  - **Synchrotron light monitor move – 175K\$**
  - **LCW modifications – 163K\$**
  - **Miscellanea – 10K\$**

# 2009 Shutdown

- **5 months in length, assuming 4 vacuum crews, no overtime**
- **Warm up 4 Tevatron houses (A4, B1, B4, C1)**
- **Major cost elements are**
  - **Cryogenic modifications -- 740K\$**
  - **Electrostatic separators – 690K\$**
  - **Magnet moves in B4/C1 – 870K\$**
  - **Magnet moves in A4/B1 – 100K\$**
  - **Buswork and LCW modifications – 950K\$**
  - **Miscellanea (shield wall, collimators, ...) – 130K\$**

# The Bottom Line

## Attempt to get a coherent number:

- **Add G&A to magnet costs:  $19.05 + 3.36 = 22.41\text{M}\$$**   
**(30% on labor, 16% on M&S, 0% on procurements over 50K\$)**
- **$22.41 + 10.93 = 33.34\text{M}\$$  for a C0 IR (including spares cost)**
- **30% quad spares, 30% spool spares, 1.1M\$ other spares**
- **$33.34 - 6.77 = 26.67\text{M}\$$  for a C0 IR (not including spares cost)**

# Plans

- **This is just a start on a “bottom up” cost and schedule analysis**
- **Modify WBS slightly (2006, 2007, 2008 shutdowns, ES separators, ...)**
- **Continue extensive data entry into Open Plan**
- **Import magnet cost/schedule data from MS Project to Open Plan**
- **Import shutdown cost/schedule data from MS Project to Open Plan (?)**
- **Careful review for completeness, accuracy, and Basis of Estimates**
- **Iterate as necessary**