Tevatron BPM Upgrade Project

Bob Webber and
Stephen Wolbers

August 13, 2003

Outline

- Project Definition
- Timescales
- wbs
- People
- Dollars
- Organization
- Reviews
- Documents/web pages/mailing lists
- Strategy for the next few weeks.

Project Definition

- The Tevatron BPM Upgrade Project will replace the current BPM electronics and the data acquisiton system used to transfer information between the BPMs and the Accelerator Controls Systems. As part of the project, the software used to read out, transfer, store, and analyze the BPM data will be upgraded. The goal of the project is to provide a BPM system based on modern hardware and software that gives the higher resolution and expanded functionality necessary to efficiently understand and operate the Tevatron Collider now and for the forseeable future. Deliverables of the project include all relevant documentation, manuals, users guides and any other written records necessary for maintaining the system.

  The project includes replacing the Tevatron BLM system interface hardware and software that is tightly coupled to the BPM system.

Stephen Wolbers

- Joined Fermilab as a postdoc on experiment E665 in January, 1985
  - After graduating from UC Berkley
    - Graduate work on BC72/73/75 (40" bubble chamber)
- Postdoc, Associate Scientist, Scientist I and II
- Group Leader, Department Head, Deputy Division Head, Associate Head of CD over the years
- Built Drift Chambers (lab 6) and ran them over many years for E665.
  - Also wrote some software, managed offline production.
- Have been on CDF for 6 years or so.
    - Manager of the CDF production farms.
- Responsibilities:
  - Tevatron BPM Project (first priority)
  - CD: Budget and Administrative Staff
  - CDF: Offline Production Activities ("the farms")
  - CDF: Physics Research
  - Other Lab and CERN/Brookhaven responsibilities

Project Management

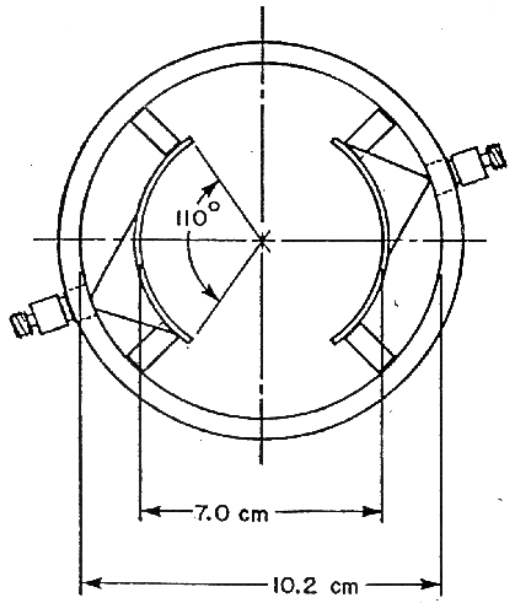
- We don't plan to do the work
- We expect you to do the work and we will facilitate so that can occur.
- This will ramp up quickly as we get the project organized fully

Milestones/Timescales

- Known (or to be negotiated) Important Dates (coming from the Run 2 project):
  - September 1, 2003: Reply to DOE review
  - First half of September: Update Run 2 plan.
  - October 1, 2003: BPM Design Review
  - October 8, 2003: One day mini-review by DOE
  - First half of December: Update Run 2 plan.
  - Late January: Director's review of Run 2 plan.
  - Feb 24-26, 2004: DOE review.

Milestones/Timescales

- The Tevatron BPM Upgrade project itself will need internal milestones.
  - Requirements
  - Design
  - Reviews
    - Coordinated with the overall project.
  - Fabrication
  - Installation
  - Commissioning
  - Documentation and Hand-off to operations

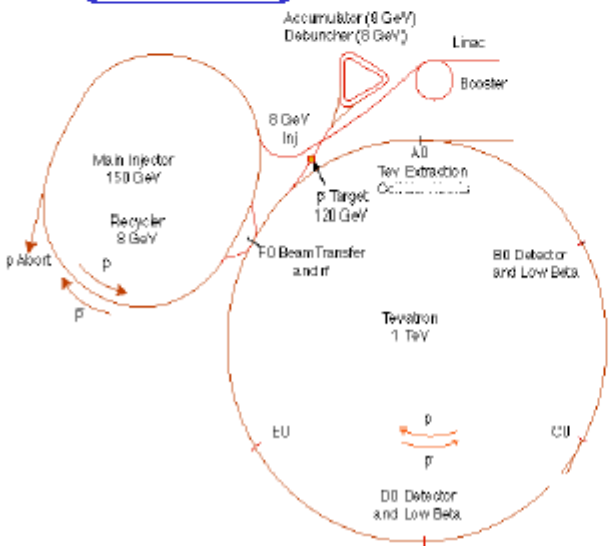


WBS

- We have a rudimentary wbs (see next page).
  - This is a part of the overall Run 2 luminosity project, headed by Jeff Spalding
- The WBS will reflect the tasks and milestones that will be required to finish the project.
- The intention is to describe tasks at a reasonably detailed level, to track effort and dollars, and write reports.
- We will have help with the technical aspects of keeping a wbs.
  - Bakul Banerjee from CD will start working with us soon.

Luminosity Upgrade Organization

- **1.3 Luminosity Upgrades** — J. Spalding Prj Mgr; D McGinnis Tech Coord
  - **1.3.1 Protons on pbar Target** — I Kourbanis
    - 1.3.1.1 Slip stacking — R Pasquinelli
    - 1.3.1.2 Pbar Target — J Morgan
    - 1.3.1.3 MI Upgrades — I Kourbanis
  - **1.3.2 Pbar Acceptance** — S Werkema
    - 1.3.2.1 Li Lens Upgrade — J Morgan
    - 1.3.2.2 AP2 & Deb Acc — K Gollwitzer
  - **1.3.3 Pbar Stacking & Cooling** — P Derwent
    - 1.3.3.1 Integ Task Force — S Nagaitsev
    - 1.3.3.2 Debuncher — P Derwent
    - 1.3.3.3 Stacktail — P Derwent
    - 1.3.3.4 Recycler Comm — S Nagaitsev
    - 1.3.3.5 Electron-Cooling — S Nagaitsev
    - 1.3.3.6 Rapid Transfers — E Harms
  - **1.3.4 Tevatron High Luminosity** — V Shiltsev
    - 1.3.4.1 Tevatron Task Force — V Lebedev
    - 1.3.4.2 Beam-beam Studies — T Sen
    - 1.3.4.3 Active B-B Comp — V Shiltsev
    - 1.3.4.4 Helix Separation — R Moore
    - 1.3.4.5 Luminosity Leveling — M Martens
    - 1.3.4.6 Control & Diag — J Steimel ← **We are here**
    - 1.3.4.7 Vacu Improvements — B Hanna
    - 1.3.4.8 Tevatron Alignment — R Stefanski



WBS	Name	In Charge	M&S Base Cost Est.	Labor Base Cost Est	Contingency %
1.3.4.6.4	**Tevatron BPM Upgrade**	**J. Steimel**	**$900,000.00**	**$412,356.15**	

Notes

WBS Dictionary:
Upgrade the Tevatron BPM system. Specifications are in preparation. Estimates here are based on the recent Recycler BPM upgrade - which was the same scale of project and probably a similar implementation. Tevatron is more complex due to the need to measure both proton and pbar beams.

WBS	Name	In Charge	M&S Base Cost Est.	Labor Base Cost Est	Contingency %
1.3.4.6.4.1	Tev BPM system design	Physicist	$0.00	$63,376.92	40%

ID	Resource Name	Units	Work	Delay	Start	Finish
4	MI Study Shifts	4	176 days	0 days	Fri 8/1/03	Wed 10/1/03
5	Physicist	0.5	22 days	0 days	Fri 8/1/03	Wed 10/1/03
6	Computer Professional	2	88 days	0 days	Fri 8/1/03	Wed 10/1/03
7	Electrical Engineer	1	44 days	0 days	Fri 8/1/03	Wed 10/1/03

WBS	Name	In Charge	M&S Base Cost Est.	Labor Base Cost Est	Contingency %
1.3.4.6.4.3	Tev BPM system fabrication	Physicist	$900,000.00	$241,873.08	60%

ID	Resource Name	Units	Work	Delay	Start	Finish
5	Physicist	0.2	22 days	0 days	Thu 10/2/03	Wed 3/3/04
6	Computer Professional	2	220 days	0 days	Thu 10/2/03	Wed 3/3/04
7	Electrical Engineer	1.5	165 days	0 days	Thu 10/2/03	Wed 3/3/04
8	Electrical Tech.	3.2	352 days	0 days	Thu 10/2/03	Wed 3/3/04

Notes

M&S BOE:
Recycler system (240 BPMs) has 67 EchoTek boards in 10 crates and was estimated to cost $800K incl spares (B Webber). The Tevatron system will be about the same size but somewhat more complex due to the need to measure both proton and pbar beams.

WBS	Name	In Charge	M&S Base Cost Est.	Labor Base Cost Est	Contingency %
1.3.4.6.4.4	Tev BPM system installation	Physicist	$0.00	$27,500.00	60%

ID	Resource Name	Units	Work	Delay	Start	Finish
6	Computer Professional	1	22 days	0 days	Thu 3/4/04	Fri 4/2/04
7	Electrical Engineer	1	22 days	0 days	Thu 3/4/04	Fri 4/2/04
8	Electrical Tech.	2	44 days	0 days	Thu 3/4/04	Fri 4/2/04

Notes

Labor BOE:
Estimates based on Recycler BPM work

WBS	Name	In Charge	M&S Base Cost Est.	Labor Base Cost Est	Contingency %
1.3.4.6.4.5	Tev BPM system commissioning	Physicist	$0.00	$79,606.15	60%

ID	Resource Name	Units	Work	Delay	Start	Finish
5	Physicist	0.8	35.2 days	0 days	Mon 4/5/04	Thu 6/3/04
6	Computer Professional	2	88 days	0 days	Mon 4/5/04	Thu 6/3/04
7	Electrical Engineer	0.8	35.2 days	0 days	Mon 4/5/04	Thu 6/3/04
8	Electrical Tech.	1.6	70.4 days	0 days	Mon 4/5/04	Thu 6/3/04

Reports

- Reports will be necessary to track the project.
- We will probably need reports from each level 2 leader each month
  - Frequency yet to be decided.
- The project as a whole will most likely be required to write reports at some frequency to the overall project management (Jeff Spalding, et al.)

People

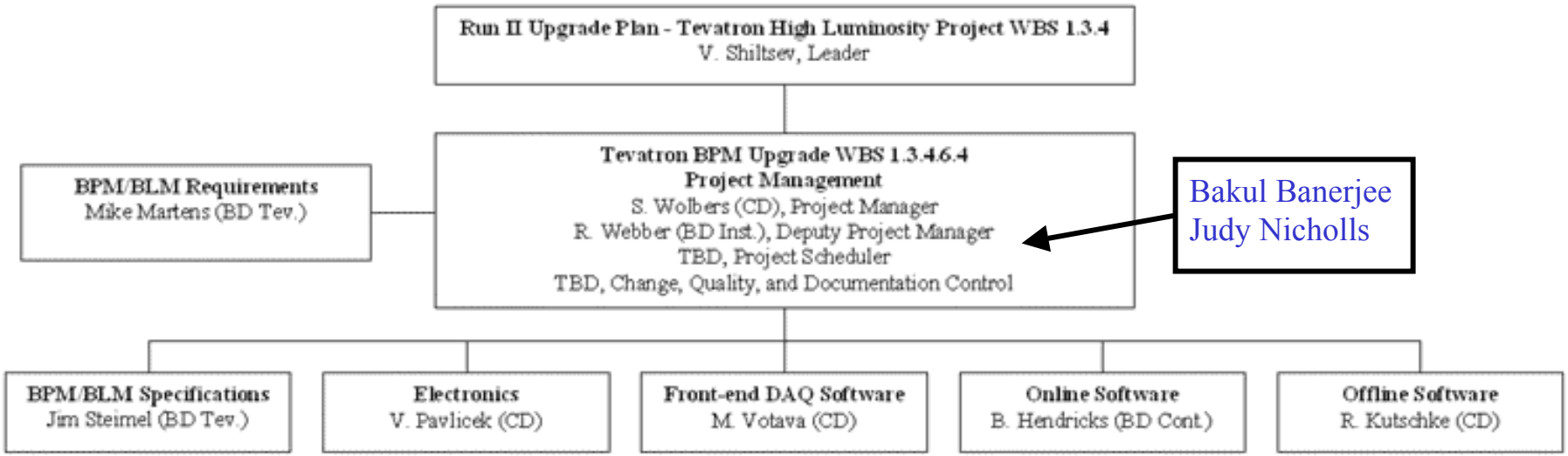
- The project will call on many people to ensure that it is a success.
- The people will come from many organizations:
  - BD, CD, PPD, other.
  - They will be working together to make the project a success.
- For most people working on it, this will be their highest priority. For many it will be their only job.
- We (the project management) will do all that we can to ensure that the correct number and type of people are in fact working on the project.

Resources (dollars)

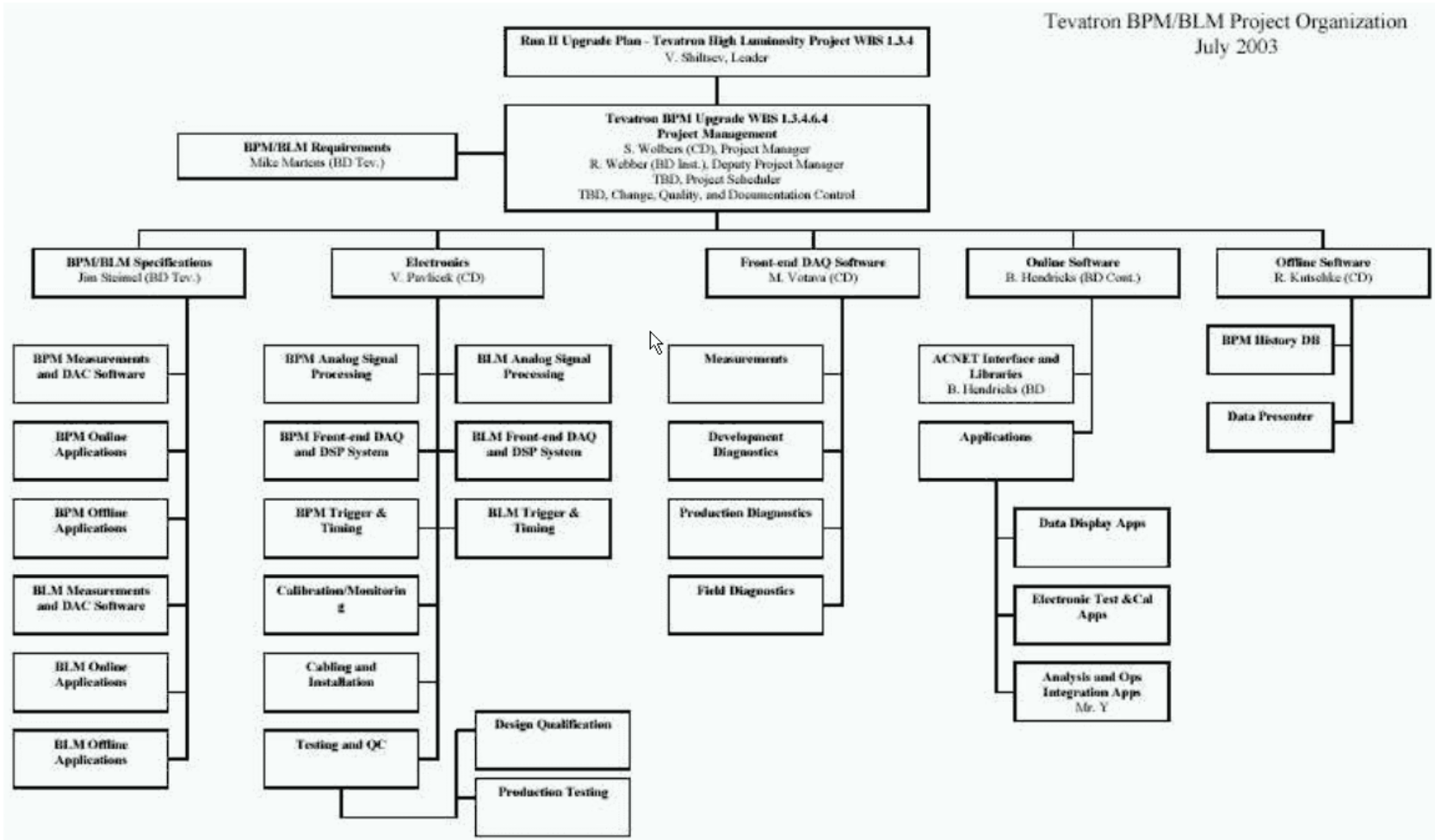
- The project has a proposed budget for materials and services of $900K + a large contingency.
- This will be refined as we specify the solutions and scope of the project.
  - Readout boards.
  - People costs (included? Or not?)
  - Cabling.
  - BLM.
  - Other.
- At the moment we are assuming that the budget will not be a serious constraint.

Organization

- A first draft of an organization was made for the DOE review



Organization – more boxes



Organization

- The organization is not "frozen" – much work needs to occur before many of the tasks/boxes can be completely identified and people assigned.

Reviews

- Our project will be reviewed, potentially many times.
- We assume that these will be concentrated in the early stages of the project as we make (or need help to make) decisions and choose directions.
- Reviews are quite helpful and we will use them to help us make progress.

Documents/web pages/mailing lists

- Documents are important. We need to properly document what we did, why we did it, how to use what was built, etc.
- The Beams Division document database will be used for all relevant information – talks, emails, memos, user guides, programmer's guides, etc.
  - Topic Tevatron/BPM
- Old documents will be scanned in as necessary to give us a complete set of information.

OPERATIONS BULLETIN #888

FERMILAB ENERGY DOUBLER
BEAM POSITION MONITOR SYSTEM

Rod Gerig
July 28 1982

1.0 INTRODUCTION

Although many documents have been written on the proposed beam position monitor system for the energy doubler there seems to be an omission of an overview which describes the system in general, and in addition acts as a bibliography for the rest of the documents. This document is intended to fill that gap. The first section of this document will describe the goals and design criteria of the BPM system. Data acquisition schemes are discussed next along with a brief desription of the formatting and presentation of this data to the host computer. The final section will deal with the hardware as a block diagram description. A listing of documents grouped as BPM Design Notes is included at the end.

The emphasis throughout this document is on aspects of the system which will be reflected in the response of the system as viewed by a Main Control Room user.

2.0 GOALS AND DESIGN CRITERIA

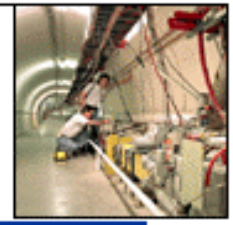
The goals considered in designing the BPM system can be summarized as follows:

1. Protection of the superconducting magnets by aborting the beam if the closed orbit measured at any detector exceeds a unique preset limit. These measurements can be repeated at a rate up to once per millisecond. There are two sets of abort limits chosen as a function of energy. Larger excursions of the beam are allowed at lower energies. The energy at which the processor switches from 'low field limits' to 'high field limits' is settable by the host.

2. A second category of preset limits is set inside (ie. closer to the center of the beam chamber) the abort limits. These limits are used during the

Web Pages/mailing lists

- We have web pages (wwwserver2.fnal.gov/tevbpm)
  - I set it up before I learned much about the docdb.
  - Organization is somewhat different and so is useful, at least to me.
- Mailing lists
  - tev-bpm-project@fnal.gov
    - Easy to subscribe or unsubscribe
    - This list is archived, easy to find the mails later
  - More will be created as needed



Tevatron BPM and BLM Upgrade Project

- Organization
- Meetings
- Reviews
- Documents
- Presentations
- WBS
- Mailing Lists

last modified by JN email wolbers@fnal.gov

Strategy

- This project has high visibility and is meant to occur as quickly as possible.
- We will all work together to make it happen. We anticipate that this will require many talks, meetings, reviews, etc. And the involvement of many people.

Strategy(2)

- August is a big vacation month, and probably also September.
- We will just push ahead and will continue the three/week meeting schedule.
- The project itself will meet more often to discuss project business.
  - This meeting is more or less the first one.
  - The next one will either be next week (Aug. 20) or the week after (Aug. 27)

Schedules

- Steve Wolbers will be away August 16-23 and August 30-September 6.
  - Both trips were planned before taking this job!
- Steve Wolbers has shift at CDF September 26 to October 3.
- Steve will be away October 9 and 10.

Near-term issues

- Requirements!
- September 1 response to DOE review.
- Measurements while the beam is on (before September 8).
- Work to be done during the shutdown.
- Make connection with current BPM efforts.
- Choice of electronics/boards.
  - Commonality with other BPM systems.
    - Recycler
    - MI/beamlines
- Review of design in October.
- Organization of people and tasks.

Discussion