

1MW Dump Maintenance Plan

Arne Freyberger

Operations Dept.
Accelerator Division

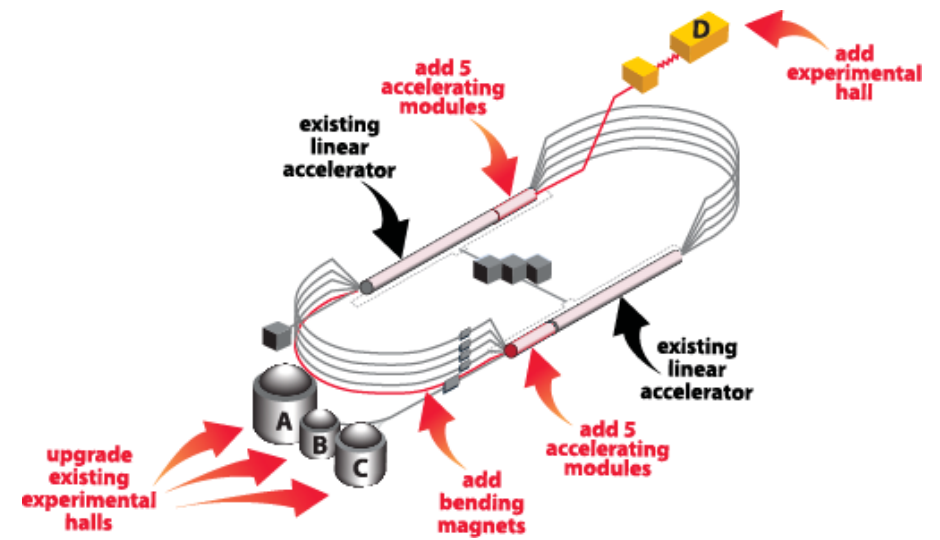
JLAB

December 16, 2012

Accelerator Operations Department

Outline

- 1 Why Dump Maintenance?
- 2 Constraints
- 3 The Team
- 4 The Plan



Why Dump Maintenance?

ALARA Both Hall A & C 1MW dumps will be at a radiological minimum before the resumption of beam delivery for the 12GeV program. A well maintained dump should result in less personnel exposure during operations due to improved reliability.

Reliability Both dumps have been a source of downtime and exposure in the 6GeV era, with Hall-C dump costing QWeak about one week of beam time this spring.

Protection Mismatch Dumps were designed with a very specific worst case scenario, a mis-steer of a $100\mu\text{m}$ 1MW beam off of the dump face. Introduction of permanent beam diffusers during the 6GeV era eliminates this scenario. Need appropriate dump protection for the present/future beam transport design.

Lifetime Maintenance and improved beam transport environment (less acid) will increase the likelihood that the Dumps (including the infrastructure) will last through the 12GeV era.

Constraints

The Dump Maintenance Plan has the following constraints:

Radiation Personnel exposure must not exceed Jlab levels, and should be kept as low as reasonably possible in the execution of this work.

Re-use H₂O Dump The 1MW dump itself will remain in place. Tech-note JLAB-TN-06-022 documents the use of the 1MW dumps for up to 14.5GeV beam.

Schedule The Dump maintenance plan must be completed before Hall A or C start high power CW beam delivery. All dates that follow are from the *Proposed* scenario developed for the 2012 Jan/Feb DOE briefing:

Hall-A Eng/Physics runs 2015-04-03 12wks, CW beam

Hall-C Physics Runs 2016???

The above constraints are **musts** in terms of priority. A **should** is completing the Dump Maintenance before *Detector Checkout* so that CW beam can be delivered to the halls as part of the plan.

Hall-A Detector Checkout 2014-03-15 5days, could be tune mode beam limited.

Hall-C Detector Checkout 2015-10-04, could be tune mode beam

The Team

A multi-division team has been formed, with **Keith Welch** from RadCon leading the effort. The multi-division team consists of:

EHS&Q RadCon Project Leadership/Management, simulation and radiation monitoring.

Mech-Eng Engineering and Design of new transport sections, including tunnel wall. Inspection, removal and installation of dump components.

Elec-Eng Engineering and Design of new diagnostics and controls. Includes inputs to the Machine Protection System.

Facility H₂O and N₂ system maintenance/upgrades

Accelerator CASA beam transport calculations, Operations general oversight and ensuring operability of the completed product.

Physics Beam transport, interface to the target exit and background optimization.

The Plan

Now→2013-09-30 Design new transport sections, beam diffuser, diagnostics and controls. Inspect existing dumps. If resources [MSINST] available start removal of damaged and obsolete components. Develop detailed plan (schedule and budget) for FY14.

- Detailed AWP in place, totals to over 1FTE for FY13.

2013-10-01→2014-03-01 Fabricate and install new dump beam transport tubes in Hall-A. Install new diagnostics and controls, N2 Wall. If work is **not** completed by March 2014, restrict beam operations in Hall-A to tune-mode beam.

- Detailed plan for FY14 will be developed as part of the FY13 effort.

2014-05-01→2014-09-30 Utilize UIM down to complete work in Hall-A (if needed) and start work in Hall-C.

BACKUP SLIDES

Thank you for the time
and attention



Is that a good thing or a bad thing?

First Accelerator Commissioning Run: FY14

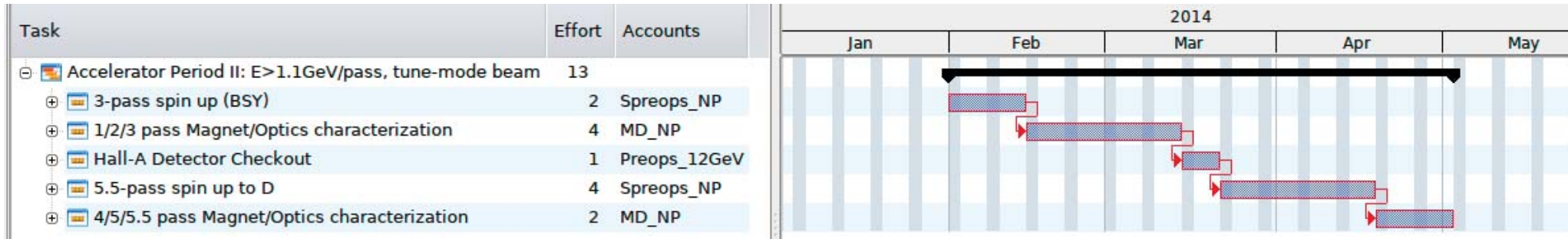
Task	Effort	Accounts	Oct 2013					Nov 2013				Dec 2013			
			W40	W41	W42	W43	W44	W45	W46	W47	W48	W49	W50	W51	
⊖ Accelerator Period I: 2.2GeV/pass to 2R, tune-mode beam	6														
⊕ Recover: Beam up to 5MeV	1	Spreops_NP													
⊕ Spin up 1pass beam to 2R	5	Preops_12GeV													

- 6wks of operation
- Establish 1-pass beam with 2.2 GeV/pass energy

New Hardware

- R100 Cryomodule in the injector
- Injection Chicane
- 1S, 1R, 2S, 2R Spreader and Recombiners
- 10 C100 modules

Second Accelerator Commissioning Run: FY14



- Establish beam to Hall-A (magnetic separation)
- Establish beam to start of the Hall-D transport line
- Linac energy $< 2.2\text{GeV/pass}$

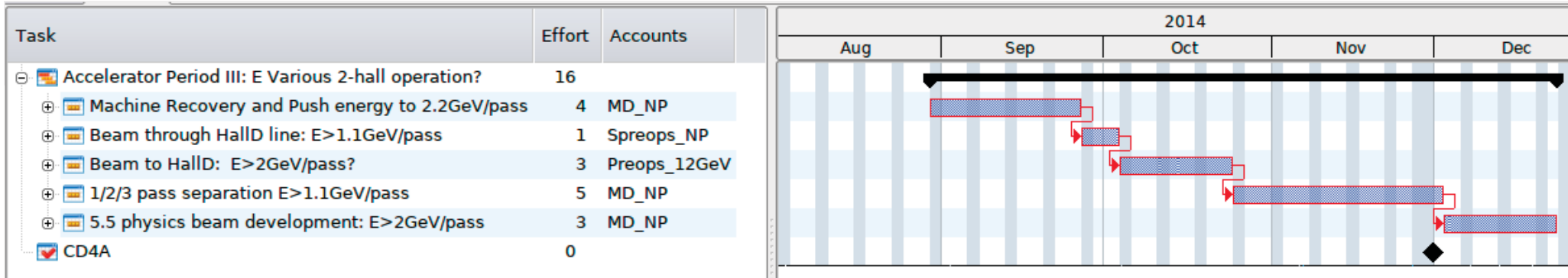
New Hardware

- All the Spreaders and Recombiners
- Transport lines
- Arc10
- 6-beams in the North Linac

Beam Physics Issues

- Magnetic field characterization. Beam based measurements of magnetic fields, compare with measurements and models.
- Globally optimized multi-pass optics used for the first time on 12GeV CEBAF.

Third Accelerator Commissioning Run: FY15



- Establish beam to Hall-D
- 12GeV Project Goal: CD-4A
- Establish two-hall operations (stretch goal)

New Hardware

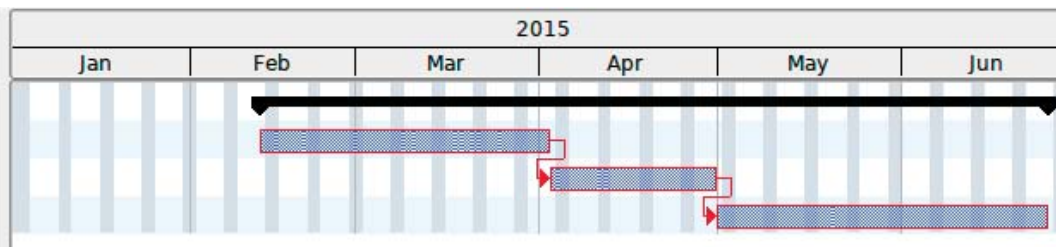
- RF Separators
- Hall-D Transport line

Beam Physics Issues

- Emittance and $\frac{dp}{p}$ growth in the upper arcs

First Physics Run: FY15

Task	Effort	Accounts
⊖ Accelerator Period IV: E>2GeV/pass 2-hall operation	19	
⊕ Restoration and Multiple beam characterization	7	MD_NP
⊕ A engineering run/D? engineering run	4	MD_NP
⊕ Physics Run I: HallA	8	Research_NP



- First Physics Run in Hall-A
- If 2-hall capable, simultaneous engineering run in Hall-D

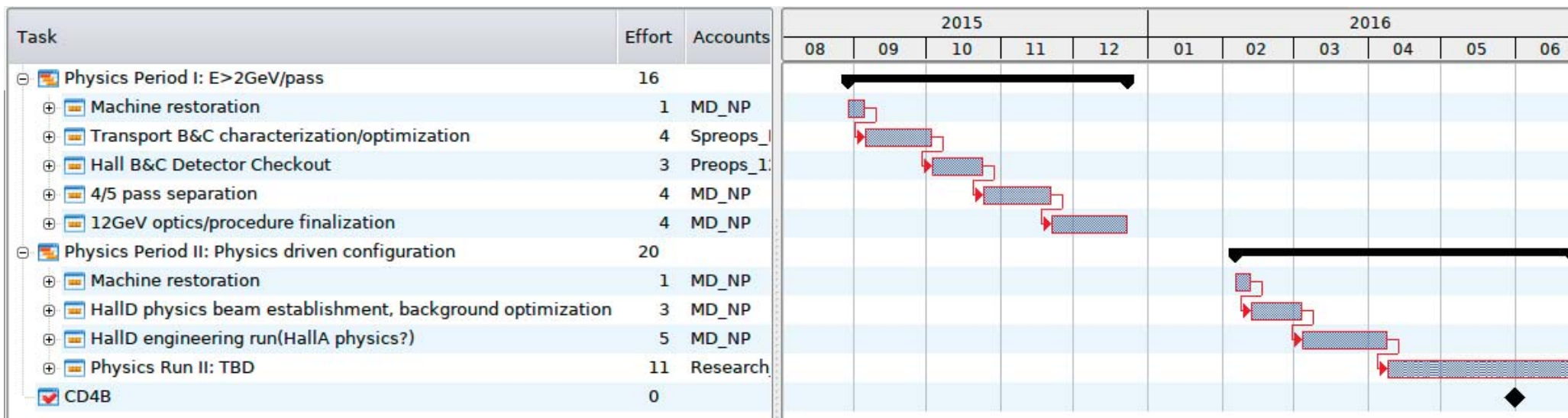
New Hardware

- None

Beam Physics Issues

- Multiple beam transport.

Physics: FY16 →



- Beams to B & C
- 3-beam operation
- Physics!

New Hardware

- B & C transport channels
- 4th & 5th pass separators

Beam Physics Issues

- Energy scaling and reproducibility