

DUNE Project Status

Eric James

DUNE PMG Meeting

March 22, 2016

35-ton Status

- Failure of a piping connection on LAPD over weekend led to non-recoverable contamination of liquid argon in 35-ton cryostat
- This failure was preceded by issues associated with site-wide power outage on the weekend of 3/5 and the failure of a valve in the liquid nitrogen system leading to the loss of several inches of liquid argon
- The most recent event ends 35-ton operations about two weeks earlier than planned
- Will still be able to attempt ramping the detector to its nominal high-voltage setting (120 kV) this week

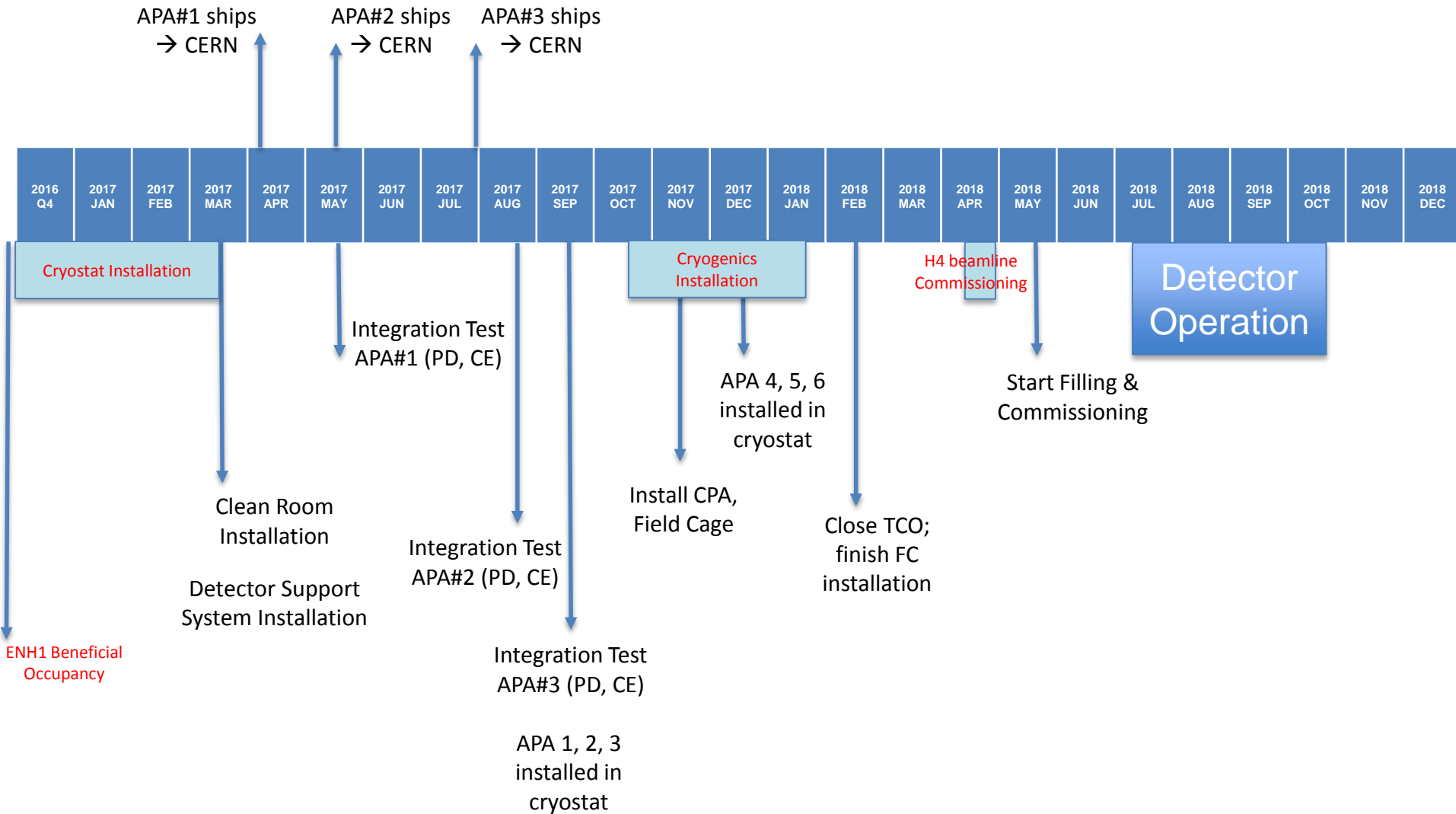
35-ton Post-mortem

- We learned a lot
- Some successes
 - Required liquid argon purity obtained within one week of turning on filtration system
 - Detector survived cool-down with no broken components
 - Able to record and reconstruct a large sample of cosmic tracks
- Some significant issues
 - Electronics noise was about 4-5 times higher than expected (will be investigated further over next several weeks)
 - Failure of cryogenic components led to several issues and controls system was not adequate for preventing contamination of liquid argon

Management Update – Schedule

- Significant amount of effort over past several months to produce an updated resource-loaded schedule
- Consistent with goal of operating single-phase ProtoDUNE detector in 2018
 - Includes integration testing at CERN prior to installation of detector
- Many changes compared to last summer
 - Significant changes by subsystem incorporating contributions from additional collaboration institutes
 - Significant increase in resources required for FY16 & FY17
 - Mostly non-Fermilab labor
 - Maintains critical activities required for Far Detector design effort, in particular for cold electronics development

Management Update – SP ProtoDUNE Integrated Schedule



Management Update – Schedule Update Completion

- Schedule now includes interface milestones from dual-phase detector, CERN neutrino platform, and LBNF cryogenics
- Incorporates small shifts in scope from LBNF to DUNE
 - Beam window / beam plug
 - Internal cryogenics
- Anticipated future changes:
 - Additional development of institutional partnerships (EOI process)
 - Further clarification of non-DOE contributions
 - Updates to EHN1 schedule (cryostat, cryogenics, beamline, etc...)
- In April, plan to begin statusing new schedule for both single-phase and dual-phase ProtoDUNE activities
- Incorporate updated schedule within joint LBNF/DUNE schedule
- Utilize change control process for further updates

Management Update – Design Reviews

- Establishing review process for single-phase ProtoDUNE detector components and have embedded review milestones within the updated schedule
- The DUNE Technical Board will review detector conceptual designs which have further evolved since last summer's CD-1R DOE review
- After collaboration approval of the conceptual designs, the project will be responsible for conducting design and production readiness reviews for all components (incorporating external reviewers)

Management Update – Design Reviews

- Design Review: ensure design quality & sufficiency, review ES&H provisions, examine interfaces, evaluate whether functional objectives are met
- Production Readiness Review: examine manufacturing process & ensure that quality control is in place

| Sub-System | Design Review | Production Readiness |
|------------------|---------------|----------------------|
| APA | June 2016 | Jan 2017 |
| CPA / FC | Oct 2016 | Feb 2017 |
| DAQ | Aug 2016 | Feb 2017 |
| Cold Electronics | Aug 2016 | Feb 2017 |
| Photon | Jul 2016 | Feb 2017 |
| Installation | With system | Mar 2017 |

Management Update – Single and Dual-phase ProtoDUNE Synergies

- Joint single and dual-phase management meeting held at CERN on February 22nd
- Proposed changes to DUNE working group structure
 - Common single/dual-phase working groups
 - Beam Monitoring Detectors
 - Beam Window/Beam Plug
 - Slow Controls/Monitoring
 - Online Computing
 - Cosmic Tagging Detectors
 - Joint detector development within far detector organization
 - Beam Window/Beam Plug
 - High Voltage Distribution
 - Field Cage
 - Joint offline computing effort within software & computing organization
 - Formation of interface group including representatives of CERN IT and Fermilab CD

Management Update – Technical Progress

- ProtoDUNE grounding & shielding Meeting at CERN on February 23rd
 - Initial proposal for ProtoDUNE grounding & shielding plan
- DAQ workshop at CERN on February 25th
 - Propose single-phase ProtoDUNE DAQ based on 35-ton
 - DUNE Technical Board to review detailed proposal
- Offline Computing Meeting at CERN on February 26th
- Electronics integration workshop at BNL on March 2-3rd
 - Discussion of noise issues encountered in 35-ton. Planning for how to address these issues moving forward. Includes post-operation testing plans for 35-ton, development of integrated noise test facility at Fermilab, and integration tests at CERN

Management Update – Technical Progress

- TPC Integration workshop at BNL on March 7-11th
 - Focus on design of CPA/Field Cage/HV and installation procedures
 - Concurrent LBNF meetings
- SPSC Meeting at CERN, April 18-19
 - Single and dual-phase ProtoDUNE Status reports due April 4th
- Installation engineering meetings at CERN during last week of April
- Additional meetings focusing on less time-critical components later this spring
 - Photon detection meeting at Colorado State, May 16-18th
 - Warm electronics board workshop, TBD
- DUNE Technical Board will play a larger role in vetting decisions and proposals coming out of these meetings

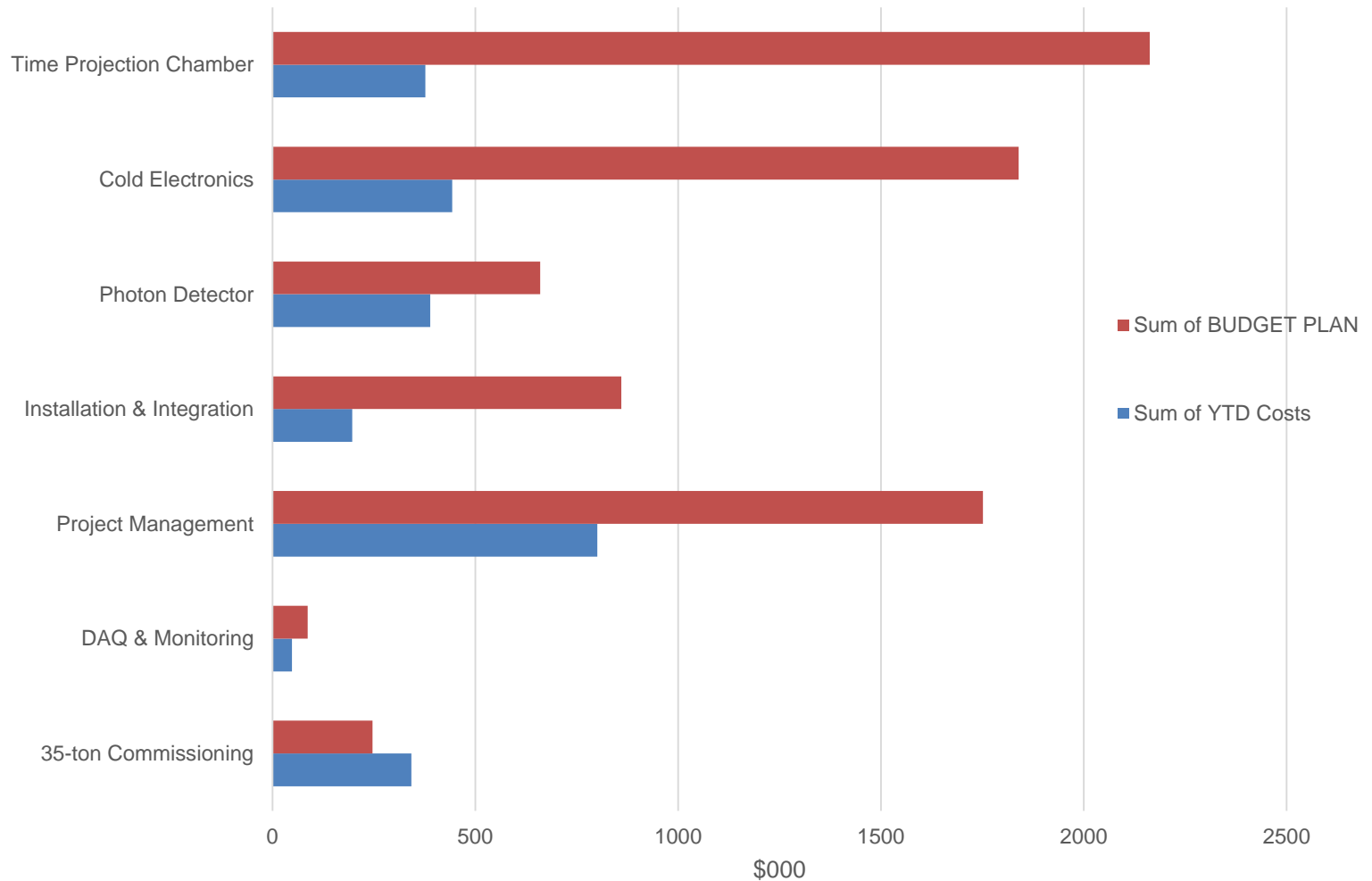
Management Update – Project Staffing

- Increased cold electronics effort at Fermilab!
- Jeff Dolph is Project Mechanical Engineer and DUNE Systems Engineer
 - Many thanks to Russ Rucinski for all of his efforts!
- Jolie Macier at DOE Project Management Workshop this week
- Updating working group structure TPC → APA, FC/CPA/HV
 - Revising WBS (TPC, CFD)

Management News – Collaboration Activities

- Continue to reach out to collaboration institutions interested in participating in ProtoDUNE based on submitted “Expressions of Interest”
 - Outreach underway
 - Status of outreach to be updated in early April
 - Meeting at CERN in early April to further develop European engagement in ProtoDUNE
 - Meeting at Fermilab in late April to further develop Latin American engagement in ProtoDUNE
 - Goal is to have final responsibilities in place by end of June

Management Update – Budget (Oct-15 re-plan) Status, by L3 WBS



Management Update – Budget Plan to year-end

- Revised schedule for Far Detector WBS indicates costing should be at \$3.7m through February 2016
- Far Detector WBS actual costing at \$2.0m
- First turnaround reports due end of April will provide a clear indication of actual schedule progress by subsystem
- In process of incorporating additional \$2m in FY16 spending based on schedule priorities

Interfaces with LBNF

- Working on finalizing DUNE-related change control items that need resolution prior to proceeding with final far site design
- Progressing on studies of fluid flow requirements inside cryostat with goal of addressing associated LBNF change control items
- Working with LBNF project office on 2017 funding scenarios
- Submitted component list for duty-free entry waiver for all LBNF/DUNE imports; SBN coordinating submittal to DOE
 - Far site: cryostat, cryogenics, detectors
 - Near site: beamline, detector

ProtoDUNE Operations Budget

- Fermilab Directorate and DOE charged DUNE management with producing a proposal for a U.S. operations budget for the ProtoDUNE detectors by March 4th
- Proposal outlines funds needed for travel and housing expenses of U.S. personnel required at CERN for operating the detectors, detector consumables such as cryogenics, and offline computing needs (not covered by project)
- Fermilab Computing Division is in contact with CERN IT department for initial conversations regarding the potential division of responsibilities for ProtoDUNE-related computing activities