



Fermilab

Closeout Report

from the

Director's Review

of

Run IIb D-Zero Detector Upgrade Project

February 3-4, 2005

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Executive Summary

Technical:

Good technical progress has been and is being made on all fronts. Trigger prototype boards have been received and tested and are in production or nearly so. Layer 0 (L0) Silicon available aperture measurements were made during the FY04 shutdown and the L0 design as modified fits with some clearance. Early L0 module assemblies have been fabricated and tested. Some change to reduce pedestal variation may be required. Tooling design and fabrication paces assembly of modules on the support structure that is scheduled to start in March 2005.

Status of the AFE II R&D was reported and D-Zero expects to make their recommendation with regard to including this in the project scope in approximately one month.

Cost:

The project examined and revised the budget at completion (BAC) plus contingency. With the project over 55% complete, the average proposed contingency on the estimate to complete (ETC) is 42%. The committee feels the project can be completed for the revised BAC plus contingency. Thus, approximately \$2.1M excess funding may be available for reprogramming. The D-Zero proposal sets aside a total of \$2130K including approximately 50% contingency for possibly adding AFE II to the project scope.

Schedule:

The base schedules presented have little if any slack against the FY05 shutdown date. The installation schedule assumed an August 16, 2005 shutdown start date. A "(12 to) 14 week shutdown" was shown for the D-Zero Run IIb Upgrade installation in the hall. The committee feels the readiness for installation may slip a few to several weeks beyond the assumed August 16 begin shutdown date. This slip is most likely for the L0 and Trigger components. Much will be learned in the coming few months on these systems. A careful look at updated schedule projections in March (prior to the DOE Operations Review) and again in June should give much better information on the likely readiness to install dates. Although the schedule may slip against the "Project Forecast Dates," no Level 1 or Level 2 milestones are threatened.

Management:

The significant technical progress indicates the project and management team is working well. Although installation and commissioning are off project, an updated schedule and cost estimate for installation has been prepared and the Standing Committee on upgrade Installation to Physics Commissioning (SCIPC) has done and continues planning for Technical Commissioning and Physics Commissioning. D-Zero is to be commended on progress to date and for their diligent efforts on installation and commissioning planning.

1.0 Introduction

A Director's Review of the Run IIb D-Zero Detector Upgrade Project was held on February 3-4, 2005. The areas assessed were Technical, Cost, Schedule and Management. The Review Committee's assessment of the project's progress, plans for completion and the cost estimate to complete the work is documented in the body of this report. Reference materials are contained in the Appendices. The Cost and Contingency estimate by the project is shown in Appendix A. The Charge for this review is shown in Appendix B. The review was conducted per the agenda shown in Appendix C. The Reviewer's assignments are noted in Appendix D and their contact information is listed in Appendix E. The Review Participants are listed in Appendix F. Appendix G is a table that contains all the recommendations contained in the body of this report.

2.0 Trigger Status and Installation Plans

Technical/Schedule

Findings:

- Universities based project.
- Project schedule shows ready for installation August 16, 2005.
- Project has prototypes or final versions of all major hardware modules
- Project has test stands in parallel with current trigger system for major items.
- Project requires some (known) access to Collision Hall.
- Project has recently appointed commissioning management team.
- Project is using and developing simulation tools for individual objects and global triggers.
- Firmware engineering is scheduled to be available (on project) through commissioning.

Comments:

- L2 Managers are fully engaged and project shows impressive coherence.
- Impressive amount of hardware, firmware and software development.
- Plans for system testing are thorough;
 - Parallel systems are key to efficient commissioning as is module design which allows simulation and validation of operation.
 - Development of simulation tools is encouraging for understanding of trigger rates and firmware validation.
- Efforts to reduce schedule risk through vendor qualification, early procurement are sensible.
- SCIPC analysis of effort required for commissioning is useful for the collaboration.
- Schedule has no explicit contingency; production issues lurk.

Recommendations:

1. Early use of contingency is to be encouraged.
2. A re-assessment of the schedule can be made when the status of major board production is known. The March Operations Review would be a good time for this to be done if at all possible.

Contingency

Findings:

- **L1Cal:** The estimated \$249K of contingency is based primarily on the risk factor table used at the inception of the project, but "what if" scenarios were also examined. The current estimate includes funds for possible additional production costs and for engineering working on firmware if the installation date slips since these people are required for the installation and technical commissioning period. The project's PRRs (production readiness reviews) will consider using contingency to speed up board procurements over the next few months, but they have not yet looked at this speed-up formally.
- **L1CTT:** The estimated \$230K of contingency is also based on the old risk factor table. Similar production delay recovery costs and similar engineering costs continuing because of schedule delay have also been considered. One item currently in contingency, FPGA spares, is in process of being formally moved to the cost side as the project is convinced that additional parts are needed to ensure a sufficient number of working boards.

Comments:

- The amounts of contingency are reasonable.

Recommendations:

- None.

L1Cal

Findings:

- Project schedule shows ready for installation July 15, 2005.
- Project has prototypes or final versions of all hardware modules.
- Project has test stand on `sidewalk' in parallel with existing system.
- Project has recovered much of the time lost on the ADF board when Saclay withdrew and has scheduled PRR for ADF board for February 11.
- Project does not require access to Collision Hall.
- Project has recently appointed commissioning management team.

- Project involves complete decommissioning of existing calorimeter trigger.
- The continuing presence of firmware engineering is required till final commissioning with beam.

Comments:

- Schedule has no explicit contingency; production issues lurk.
- Plans for system testing are thorough; `Sidewalk System' is a key to efficient commissioning.

Recommendations:

- None.

L1Caltrack

Findings:

- Clone of L1Mutrack.
- Requires Hall work to modify Muon and Scintillator Control Boards for extra latency; other hall work was accomplished in 2004 shutdown.

Comments:

- None.

Recommendations:

- None.

L1CentralTrackTrigger

Findings:

- Requires Hall Access to install DFEA cards.
- Two cards are being tested in parallel with existing system using infrastructure installed in 2004 shutdown.
- PRR held January 2005 - about to go for fabrication.
- Schedule shows P&T complete August 16, 2005.
- Schedule requires firmware engineering available till July 28.

Comments:

- Schedule has little contingency.
- Production issues could affect schedule and may require buying expensive FPGA's.
- Parallel system is a key to efficient commissioning.

Recommendations:

- None.

L2STT

Findings:

- Project cost has been reduced by decision not to build additional TFC (track fit cards).
- Project is scheduled for P&T complete May 27, 2005.

Comments:

- None.

Recommendations:

- None.

L2BETA

Findings:

- Have an acceptable board having rejected a previous candidate.
- Can be installed at any time.

Comments:

- Installation possible in May is encouraging.

Recommendations:

- None.

3.0 Online Systems

Findings:

- The Online Systems upgrade project includes:
 - WBS 1.3.1 Upgrade to the Level 3 processors.
 - WBS 1.3.2 Host Systems Replacement.
 - WBS 1.3.3 Control Systems Replacement.
- This effort has currently obligated \$219K with an estimate to complete of \$715K and a contingency of \$180K. The contingency is dominated by a \$142k contingency associated with uncertainty in the need for additional Level 3 processors.
- The Report of the July 2004 Director's Review noted that "The online upgrade is well understood and well planned; it was satisfying to see the work being done early in the process." The committee notes continued progress, with the major remaining uncertainty being the size of the Level 3 processor procurement planned for August of this year.
- The base budget will allow for the procurement of an additional 96 nodes including the required additional electrical infrastructure. The project managers feel that contingency is necessary for an additional 64 nodes.
- The plan is to make a final decision on the number of nodes as late as possible to take advantage of the best possible information about the effects of increased luminosity on processing requirements and of the Moore's Law improvements in price. A decision and procurement are expected in August.

Comments:

- The committee endorses the strategy of continuing to refine the understanding of the processing needs while holding off processor procurement as long as is practical.

Recommendations:

- None.

4.0 Silicon Layer 0 Status and Installation Plans

Findings:

- Module assembly
 - All necessary parts and fixtures in hand (including spares), not yet all fully tested but yields look good.
 - Fourteen pre-production and ten production modules built – including at least one of each of the eight types. The quality of these initial parts looks good at this stage, although they have not yet been burned in and encapsulated.
 - An assembly rate of 4 per week has been demonstrated and labor is identified to ramp up to eight per week.
- Two system tests are planned over the next several months:
 - Testing of a mockup with eight modules at SiDet. This will evolve into a system test of the real thing.
 - Testing the operation of a combined SVX2/4 system at D-Zero. This is waiting for acceptable SEQC firmware.
- The test at SiDet has revealed modest pedestal variation due to hybrid-to-cable pickup. Solutions are under development and will be tested soon.
- The design, fabrication and testing of the L0 assembly fixtures is delayed. The team is currently evaluating the effect on the overall schedule.
- The plans, fixturing and procedures for transporting L0 to D-Zero and for the final installation are under development. It appears that the clearances are very challenging, but do-able if tolerances maintained.

Comments:

- There is an experienced team in place and there seems to be a reasonable, thorough and well considered plan for bringing the project to completion in a safe and efficient manner.
- The team responded to the recommendation of last review to measure apertures for installation and did an impressive and thorough job. This has led to the development of present installation plan.
- We encourage the team to complete the burn-in and encapsulation of the first ten modules as soon as possible to shake out the entire module production chain.
- The delay in the L0 assembly fixture is on the critical path for the project and will result in a delay of at least six weeks (our opinion) in readiness for transport to DAB, which is 7/19/05 in the present schedule. While reportable milestones are not in jeopardy, this is

significant for the shutdown schedule, and would reduce the float to less than two weeks compared to the current lab schedule for the FY05 shutdown. In our opinion it is very likely that a shutdown later than presently scheduled will be necessary.

- Due attention should be paid to safe transfer and transportation fixturing for the move to DAB.

Recommendations:

1. The development of the DAB installation plan and fixturing should be a coordinated effort between the L0 Group and the Installation Group.
2. The above effort urgently needs engineering. We recommend that personnel be identified immediately and preferably at FNAL.
3. The plan should include a realistic mock installation with realistic apertures and tolerances - this is a sizeable effort requiring its own design and fabrication.
4. There should be an engineering review of the installation process (i.e. fixtures, procedures, clearances, etc).
5. We recommend that the work to develop these fixtures be planned under WBS 1.6, and that the engineering and material costs be included in the base estimate there. *[There appears to be some double-counting currently, with costs included in both 1.5 and 1.6.]*
6. Consider spending some contingency to speed the delivery of the remaining parts for the L0 "Module Installation" fixture.

5.0 2005 Shutdown Installation & Upgrade Commissioning Schedule and Plans

Findings:

- The project has developed and continues to refine a detailed bottoms up estimate of the time and personnel effort required to install the components of the Run IIb Upgrade during the 2005 shutdown.
- The D-Zero Spokespersons have additionally convened a Standing Committee on Upgrade Installation to Physics Commissioning which maintains, as a “living document” complete plan which covers;
 - Installation and technical commissioning of the hardware.
 - Calibration databases, both online and offline.
 - Updates to data unpacking & formatting.
 - Development of Level 3 filtering algorithms.
- Updates to clustering and track finding, both online and offline.
- Development of Monte Carlo and TRIGSIM.
- The plan provides a detailed analysis of all resources required including engineers, technicians, and physicists.
- The plan includes a measure of estimated lost luminosity due to commissioning.
- The most recent installation schedule is based on refined information from the subsystems and has expanded by roughly six weeks relative to the installation schedule presented in July 2004.
- The most notable change is an increase from 7 weeks to 12 weeks in the installation time required for silicon L0.

Comments:

- The increased installation time for L0 reflects a considerable improvement in the understanding of the technical requirements for that task. The sense of the committee is that the underlying technical analysis is sound and that this schedule is more realistic, and that the time required for installation may continue to evolve with further analysis.

Recommendations:

- None.

6.0 Cost, Schedule and Management

Findings:

- The D-Zero Project Manager presented an Estimate to Complete (for the DOE MIE portion of the project) of \$3,050K with an additional estimate for contingency needed of \$1,274K. This contingency then represents about 42% of the remaining cost. (See Appendix A for D-Zero's Cost and Contingency Estimate spreadsheet.)
- The original estimated Budget at Completion (BAC) + contingency was higher than the current updated estimate by \$2,164. That is, the BAC + contingency has been reduced from \$10,357K to \$8,193K.
- The schedule is driven by completion of two major tasks: The Layer 0 Silicon Detector "Ready to Move to DAB" on July 19, 2005, and the L1 Trigger Upgrade "Production and Testing Complete" on August 16, 2005.
- The additional "off-project" schedule for installation during a Tevatron shutdown would require 14 weeks, 12 of those in one block at the beginning, 1 additional week for closing up the detector following a week (or more) of checkout. All the shutdown tasks are based on a 40 hour, 5 day week.
- The additional "off-project" schedule for commissioning the detector was estimated at an additional 13 weeks. This includes technical commissioning of new devices and physics commissioning of the detector with beam. During the last few weeks of physics commissioning, the detector would be taking regular data more than 50% of the time with less than 50% devoted to special commissioning runs.

Comments:

- The project team seems organized and on top of the details at every level. The Project Manager, the L2 managers, and the L3 managers were cognizant of the details of their parts of the cost estimate, the contingency analysis, and the schedule. The status reports were informative and well done.
- Overall the updated cost information was based on a bottom up look by the L2 and L3 managers at the task level. This was done as part of their standard monthly update of the project schedule as completed in December 2004. In addition for this review, many of the L3 managers examined this updated schedule for reality, looking in particular for items that were new or had grown in cost. The managers typically admitted that they had not looked as hard for items that were in progress and likely to under run the current estimates. Thus the cost

estimate may be a bit high, but we do not believe the amount would be large.

- The contingency estimate less well justified. It is still largely based on the original risk factor table used at the inception of the project but now applied to the remaining cost items. The project is just beginning to think of using contingency funds to speed up or maintain the schedule during the final ~28 weeks before the currently scheduled Tevatron shutdown. This needs more serious thought and will be one of the recommendations below.
- The major schedule driving milestones mentioned in the Findings do have schedule float built in, but it appears that all the float has been consumed. It looks to the reviewers as though the ready dates for the start of the Tevatron shutdown will likely be missed by a few to several weeks. This is of concern to the reviewers and to the laboratory as the laboratory attempts to schedule the shutdown involving not only D-Zero but also other projects.
- The schedule for installation during the Tevatron shutdown was new and had not been examined in detail by the top level project management. The reviewers and the laboratory suffered massive “sticker shock” on hearing of a 12 week + 1 week (to close the detector later) shutdown duration for D-Zero. This schedule requires additional examination by the project managers with an eye to speeding up as many tasks as possible. While the basic installation of the Layer 0 silicon can perhaps not be speeded up by much, all other tasks should be speeded up to the maximum extent possible. Even the Layer 0 installation should be examined again by the proponents for possible new ways to safely expedite the work.
- The schedule for technical and physics commissioning is also long. The collaboration has created a mechanism (SC-IPC or Standing Committee on Upgrade Installation to Physics Commissioning) to keep on top of this part of the job. They have estimated the cost (122 of the first delivered 172 pb-1) in luminosity for this commissioning and seem appropriately anxious to get it done expeditiously.

Recommendations:

1. The project needs to start spending their estimated contingency NOW to hold or speed up the schedule in all ways possible. Spending this contingency in August will have no effect. Every effort should be taken now to use overtime, to advance procurements of boards with premiums for early delivery, to procure fixtures in advance of their anticipated need.

2. The laboratory should examine the use of contingency by this project again in a few months. Contingency not used (or not well justified) at that time should be removed from the project budget.
3. The project should take the time to evaluate their latest new installation schedule with a particular eye to speeding up as many steps as possible.
4. The laboratory should review the installation schedule again. Our understanding is that this will happen automatically for an operations review scheduled for March 29. It should be reviewed again (in a PMG) in early June to help the laboratory establish the actual shutdown start and actual duration. There is a danger that D-Zero will come into conflict with the other projects involved in this shutdown.

Appendix A

WBS	Items	Project's Cost Estimate (Fully Loaded At Year) K\$							
		Original (BAC + Cont.)	Latest BAC \$ (w/o cont.)	ACWP	ETC (w/o cont.)	Cont.	% Cont. for Remaining Work	Original % Cont (for comparison)	Total (BAC+Cont.) + BAC Adj
1.1	Run IIb Silicon	\$2,542	\$1,935	\$1,935	\$0	\$0	0%		\$1,935
1.2	Run IIb Trigger Upgrade	\$3,451	\$2,181	\$839	\$1,342	\$600	45%	43%	\$2,810
1.3	Online Systems	\$1,389	\$973	\$101	\$872	\$180	21%	31%	\$1,119
1.4	Run IIb Project Administration	\$1,151	\$855	\$408	\$447	\$137	31%	25%	\$992
1.6	Layer 0 Silicon Detector	\$1,824	\$980	\$591	\$389	\$357	92%	96%	\$1,337
1.X	AFEII	N/A	N/A	N/A	N/A	\$2,130	N/A		\$2,130
Project Totals						\$3,404			\$10,322
"left over \$\$" (present contingency calculation vs. original)						\$1,529			
OTHER COSTS									
1.5	Installation		\$1,435		\$1,435	\$718	50	100	\$2,153

Appendix B

**Charge
for the February 3-4, 2005
DIRECTOR'S REVIEW
OF THE D-ZERO RUN IIB DETECTOR UPGRADE**

Please arrange and conduct a Director's Review of the D-Zero Run IIB Detector Upgrade project. The review should cover the technical, cost, schedule and management aspects of the project. The following areas should be focused on during the review:

- Assessing progress to date by the Project Team.
- Assessments of progress on the Layer 0 Silicon and the trigger/DAQ upgrades.
- The AFEII system has not yet been made part of the Run IIB Upgrade baseline. The collaboration will give a status update on this possible scope increase. Please comment on the status and plans for this system. (This may be the subject of a dedicated review at a later date)
- An assessment by the committee of the cost to complete and needed contingency on the balance of the project is requested.
- Assessment of the schedule for completing the project relative to the Project's formal CD-4 date, Level 1/2 Milestone formal dates, as well as, the Project's current forecast dates.

Milestone #	Description	PEP Baseline Date	PMP Baseline Date	Project Forecast Date (10/04)
0.5	CD-4: Approve Project Completion	11/06	N/A	N/A
D-Zero 1.2/ 2.20	Online System Production and Testing Complete (WBS 1.3)	10/05	10/07/05	06/17/05
D-Zero 1.4/ 2.17	Level 2 Trigger Production and Testing Complete (WBS 1.2)	01/06	01/05/06	05/27/05
D-Zero 1.5/ 2.19	Level 1 Trigger Production and Testing Complete (WBS 1.2)	04/06	04/10/06	08/19/05
D-Zero 1.6/ 2.10	Silicon Ready to Move to D-Zero Assembly Building (WBS 1.6)	05/06	05/25/06	07/05/05

- Assessment of the Project's response to the recommendations from the prior Director's Review conducted on July 15-16, 2004.
- Finally, although installation of the upgrade is "off project," please examine the plans for the 2005 installation activities and comment on these activities.

Please present the Committee findings, comments, and recommendations in a closeout meeting with the D-Zero Run IIb Detector Upgrade Project Team and Fermilab management and provide a written report within two weeks.

Appendix C

**DIRECTOR'S REVIEW OF THE
RUN IIb D-ZERO DETECTOR UPGRADE
FEBRUARY 3-4, 2005
HORNETS NEST (WH8X)**

AGENDA**Thursday**

10:30 am-11:00 am
11:00 am-11:45 am
11:45 am-12:15 pm
12:15 pm-12:45 pm
12:45 pm- 1:05 pm

1:05 pm- 2:00 pm
2:00 pm- 2:20 pm
2:20 pm- 2:50 pm
2:50 pm- 3:20 pm

3:20 pm- 3:50 pm
3:50 pm- 4:05 pm
4:05 pm- 4:35 pm
4:35 pm- 5:05 pm

5:15 pm

February 3, 2005

Executive Session
D-Zero Run IIb project status and overview
Run IIb Trigger Status
Run IIb Trigger Endgame and ETC
Run IIb Trigger Simulation Status and Plans

LUNCH (2nd Floor Crossover)
Online Status and ETC
Silicon L0 Status and ETC
Silicon L0: clearance, support structure and installation plans

AFE II Status and Plans
BREAK
Run IIb Installation Plans
Report from the Standing Committee on Installation-to-Commissioning

Executive Session

E. Temple
V. O'Dell
P. Padley
D. Wood
E. Barberis/
M. Hildreth

S. Fuess
A. Nomerotski
W. Cooper

P. Rubinov

R. Smith
G. Blazey

E. Temple

Friday

8:00 am-10:00 am

10:00 am-12:00 am
12:00 noon
12:00 noon
2:00 pm

February 4, 2005

Breakout Sessions

- Cost/Schedule/Management
- Installation

Write Report
Working Lunch
Start Closeout Dry Run
Closeout

Appendix D

**Report Outline and Reviewer Assignments
for
Director's Review of Run IIb D-Zero Detector Upgrade
February 3-4, 2005**

Executive Summary	<u>Ed Temple</u>
1.0 Introduction	<u>Dean Hoffer</u>
2.0 Trigger Status and Installation Plans	<u>Stephen Pordes,</u> John Cooper
3.0 Online Systems	<u>Mike Crisler</u>
4.0 Silicon Layer 0 Status and Installation Plans	<u>Jeff Spalding,</u> Doug Glenzinski
5.0 AFE II Status and Plans	<u>William Wester,</u> Dave Christian
6.0 2005 Shutdown Installation and Upgrade Commissioning Schedule and Plans	<u>Mike Crisler</u>
7.0 Cost, Schedule and Management	<u>John Cooper,</u> Jeff Spalding, Dean Hoffer

* Note underlined names are the primary writer.

Appendix E**DIRECTOR'S REVIEW OF
RUN IIB D-ZERO DETECTOR UPGRADE****February 3-4, 2005****REVIEW COMMITTEE CONTACT LIST**

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Appendix F

**DIRECTOR'S REVIEW OF THE
RUN IIB D-ZERO DETECTOR UPGRADE
February 3-4, 2005**

Participant List

Reviewers

David Christian
John Cooper
Michael Crisler
Doug Glenzinski
Dean Hoffer
Stephen Pordes
Jeff Spalding
Ed Temple
William Wester

Directorate

Jeff Appel
Hugh Montgomery
Ken Stanfield

Department of Energy

Joanna Livengood
Ron Lutha
Paul Philp

D-Zero Presenters

Vivian O'Dell
Brian P. Padley
Darien Wood
Emanuela Barberis
Michael Hildreth
Stuart Fuess
Andrei Nomerotski
William Cooper
Paul Rubinson
Richard Smith
Benjamin Blazey

Other Participants

Doug Benjamin
Mike Lindgren
T.J. Sarlina
Dale Knapp
Linda Stutte
Pat Lukens
Jim Strait
Greg Bock
Don Lincoln
Meenakshi Narain
Henry Lubatti
Stefano Rapisarda
Ron Lipton
Alice Bean
Alan Bross
Maris Abolins (*)
Raymond Brock(*)
Hal Evans
Marvin Johnson
George Ginther
Linda Bagby
Ken Johns
Bob Hirosky
Rick Jessick
Harry Weerts

(*) Indicates attended by video conference.

Appendix G

Table of Recommendations

No.	Recommendation	Assigned To	Status/Action	Date
Section 2.0 – Trigger Status and Installation Plans				
2.1	Early use of contingency is to be encouraged.			
2.2	A re-assessment of the schedule can be made when the status of major board production is known. The March Operations Review would be a good time for this to be done if at all possible.			
Section 4.0 – Silicon Layer 0 Status and Installation Plans				
4.1	The development of the DAB installation plan and fixturing should be a coordinated effort between the LO Group and the Installation Group.			
4.2	The above effort urgently needs engineering. We recommend that personnel be identified immediately and preferably at FNAL.			
4.3	The plan should include a realistic mock installation with realistic apertures and tolerances – this is a sizeable effort requiring its own design and fabrication.			
4.4	There should be an engineering review of the installation process (i.e., fixtures, procedures, clearances, etc.).			
4.5	We recommend that the work to develop these fixtures be planned under WBS 1.6, and that the engineering and material costs be included in the base estimate there [<i>There appears to be some double-counting currently, with costs included in both 1.5 and 1.6.</i>]			

No.	Recommendation	Assigned To	Status/Action	Date
4.6	Consider spending some contingency to speed the delivery of the remaining parts for the L0 "Module Installation" fixture.			
Section 6.0 - Cost, Schedule and Management				
6.1	The project needs to start spending their estimated contingency NOW to hold or speed up the schedule in all ways possible. Spending this contingency in August will have no effect. Every effort should be taken now to use overtime, to advance procurements of boards with premiums for early delivery, to procure fixtures in advance of their anticipated need.			
6.2	The laboratory should examine the use of contingency by this project again in a few months. Contingency not used (or not well justified) at that time should be removed from the project budget.			
6.3	The project should take the time to evaluate their latest new installation schedule with a particular eye to speeding up as many steps as possible.			
6.4	The laboratory should review the installation schedule again. Our understanding is that this will happen automatically for an operations review scheduled for March 29. It should be reviewed again (in a PMG) in early June to help the laboratory establish the actual shutdown start and actual duration. There is a danger the D-Zero will come into conflict with the other projects involved in this shutdown.			