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NOvA Monthly Report

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Project Office Overview

(J. Cooper)

During March the Project was notified of $ 55 M in funding from DOE via the America Recovery and Reinvestment Act (Stimulus Bill). $ 40 M will go to the University of Minnesota Cooperative Agreement for the Ash River building and $15 M will go to Fermilab for procurement of accelerator and detector components.

During March, congressional action on the FY09 budget resulted in $ 27.8 M for NOvA in FY09.

During March, the Request for Proposals for the Ash River Site Preparation and Far Detector Building was distributed and the action was advertised in the Minnesota State Register. The University of Minnesota is handling this effort as part of a DOE Cooperative Agreement. A mandatory Pre-Proposal meeting was held in Minneapolis on March 17 with about 60 people attending.

The University then anticipates the following schedule:

- April 15 Proposals due
- April 20 Proposal Review Complete, Short list of bidders developed
- April 24 Interview Short Listed firms
- April 28 Award of Contract

The extent of the Site and Building contract award will depend on the amount of funding from DOE that is in hand at the University of Minnesota on April 28. Currently only $3M is in hand from the Cooperative Agreement FY09 Continuing Resolution allocation, but the ARRA funding should cover the entire site preparation and building cost. The ARRA funds must be in hand at the University of Minnesota by April 28 to allow a full contract award.

In addition to funding, NOvA performance also depends on full staffing of the project. In this aspect, the two problem areas dating from fall 2008 began to see additional effort:

- NOvA data acquisition software effort continued to be a problem since Fermilab people had been reassigned to other higher priority projects. Meetings among the new NOvA data acquisition software manager with the re-assigned workers and a few new team members began to take place in February and continued during March. By the end of March, people were assigned to draft each of the data acquisition requirements documents that serve as the basis for a final design.
- NOvA Project Controls effort had been diverted to support of preparations for the FRA Earned Value Management System (EVMS) Certification process. This FRA effort continued during March at a low level and should drop to zero shortly after the Certification Review during May 11-15.

However, new personnel problems became apparent during March. The Project schedule called for a ramp up of activity during February and March and that level must be

sustained for most of the project. The expected ramp up did not occur all across the project for the following reasons:

- In the Accelerator and NuMI upgrades portion of the project the relevant people for NOvA are now completing the gap-clearing kicker for the Main Injector with installation anticipated during the summer 2009 Fermilab accelerator shutdown (see the narrative section for WBS 1.0 in this report). This gap-clearing kicker is a prototype for several more NOvA kickers and must be complete before the NOvA work can begin. Installation of this kicker and other accelerator work during the upcoming shutdown will hold off increased NOvA effort until early fall.
    - These personnel shortages were discussed during the laboratory's Project Management Group meeting on March 17, 2009, and are a continuing action item for the April PMG.
- On the detector portion of the project, continued problems with some of the R&D tasks did not allow the increase in activity. Technical problems with Far Detector assembly tooling were still not completely solved during March (see the narrative section for WBS 1.8 in this report). Problems with PVC plastic manifolds delayed PVC Module construction for the Integration Prototype Near Detector (see the narrative section for WBS 1.5).
    - These technical problems are not believed to be insurmountable, but they must be solved during the R&D period and they are causing schedule delays.
    - Both technical problems have delayed the <u>start</u> of scheduled R&D activities, but we believe the schedules for Assembly tooling tests (FSAP) and for IPND module construction <u>completion</u> are still achievable. A faster completion of the tasks may eventually translate into an increased R&D cost variance.

During March, the Project Office began looking for other ways to advance the project in light of the increased funding, persistent personnel problems, and continuing R&D technical problems. The goal will be to find work that can be done early to take advantage of <u>available</u> personnel in all divisions at Fermilab and at all the collaborating NOvA institutions. The goal will be to execute procurements that are ready as soon as they are ready. Several candidate efforts and procurements were under study at the end of the month.

Upcoming Reviews:

- The DOE OECM EVMS Certification Review of FRA is scheduled for the week of May 11.
- A Fermilab Director's Review for NOvA CD-3b is scheduled for June 16-18.
- The DOE Office of Science Internal Project Review for NOvA CD-3b is scheduled for July 21-23.

Glossary of Terms

A number of NOvA acronyms and other acronyms are often used in these monthly reports. In an effort to add clarity and reduce editing time, these acronyms are defined here in each report and are not always spelled out in the body of the text.

ACWP	Actual Cost of Work Performed
AD	Fermilab Accelerator Division
ADC	Main Ring Dipole , type A laminations, generation "C"
ADC	electronics, Analog to Digital Converter
ANL	Argonne National Laboratory
ANU	Accelerator and NuMI Upgrades
ARRA	America Recovery and Reinvestment Act of 2009
BAC	Budget at Completion
BCWP	Budgeted Cost of Work Performed
BCWS	Budgeted Cost of Work Scheduled
BOE	Basis of Estimate
BPM	Beam Position Monitor
CalTech	California Institute of Technology
CD	Fermilab Computing Division
CPI	Cost Performance Index = BCWP/ACWP
DCCT	DC Current Transformer
DCM	Data Control Module
DCS	Detector Control System
EA	Environmental Assessment
EAC	Estimate at Completion
EAW	Environmental Assessment Worksheet (State of Minnesota)
EIR	External Independent Review
ESAAB	DOE Energy Systems Acquisition Advisory Board
ETC	Estimate to Complete
EVMS	Earned Value Management System
FEA	Finite Element Analysis
FEB	Front End Board
FHEP	Full Height Engineering Prototype
FONSI	Finding of No Significant Impact
FRA	Fermi Research Alliance, the DOE Contractor for Fermilab
FSAP	Full Scale Assembly Prototype
FSO	Fermilab Site Office of DOE
IHEP	Institute of High Energy Physics (Russia)
IPND	Integration Prototype Near Detector
IPR	Internal Project Review (by DOE)
IU	Indiana University
LLRF	Low Level Radio Frequency
LOE	Level of Effort
MI	Main Injector
MIE	Major Item of Equipment

MLAW	Recycler Injection Lambertson
MSU	Michigan State University
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
N-27	NOvA PVC mixture, version 27 (the final choice)
NEPA	National Environment Preservation Act
NHPA	National Historic Preservation Act
NOVA-doc-####	document number in the NOvA document database
PDB	Power Distribution Box
PDD	Permanent Dipole
PDDW	Permanent Dipole Wide gap
PDS	Permanent Dipole Small
PFL	Pulse Forming Line
PPD	Fermilab Particle Physics Division
RLS	Resource Loaded Schedule
RQN	Recycler Quadrupole
RR	Recycler Ring
S E H	Short Elliot Hendrickson
SHPO	State Historic Preservation Officer
SMU	Southern Methodist University
SPI	Schedule Performance Index = BCWP/BCWS
TD	Fermilab Technical Division
TDU	Timing Distribution Units
TECC	Thermo-Electric Cooler Controller
THPO	Tribal Historic Preservation Officer
UCLA	Univ of California, Los Angeles
UMN	Univ of Minnesota, Twin Cities
USACE	United States Army Corps of Engineers
UTD	University of Texas, Dallas

Narrative Summaries of Technical Progress

WBS 1.0 & 2.0 Accelerator & NuMI Upgrades

(P. Derwent)

1.0.1.1 Recycler Ring Modifications

.2.1.1.4: Contract mechanical engineer compiled existing data for IL planning with assistance of in house mechanical engineer, drafter, and physicist. Areas of possible interference in the IL were well-defined, and potential solutions were explored.

.2.1.3.6/.2.1.3.7: Lamination samples have failed inspection. They have been returned, and we expect new samples mid to late April. Upon satisfactory inspection it will take another 2-3 weeks for the balance. Drawings for other NON-spacer ancillary parts (manifolds & such) are complete and order process is underway. Vendor estimate on the order is 2-3 weeks for the lamination.

.2.1.4.5: Simple trimming (i.e. washer adjustments) can only adjust the magnet by ~5%. Most magnets will need to be reduced by a greater amount. This will require swapping some magnetic bricks for smaller bricks. For that level of "trimming" the magnetizer/measurement system needs to be up and running so we can prepare these new (smaller) bricks. A meeting with the measurement system designers has occurred and we believe we have all the information to bring the measurement system on line.

All effort on the measurement system, however, has been halted (and redirected to work on MI Gap Clearing Kicker system). We hope to have man power freed-up to resume measurement system work by late April. Documentation of the ferrite sizes used in 75% of the magnets has been found. This is being used to work out volume “reduction” plans for the new desired strengths.

.2.1.51: There are more delays on the brick magnetizer measurement system. This is the last part of getting the "tooling" prepared. All effort on the measurement system, however, has been halted (and redirected to work on MI Gap Clearing Kicker system). We hope to have man power freed-up to resume measurement system work by late April

.2.1.8: Vendor had to disassemble and reassemble the magnet with a corrected brick configuration. Disassembly has occurred but current tooling turned out to be insufficient for re-assembly due to the magnet strength. Tooling is being redesigned. Vendor will have information regarding the tooling update the week of April 6, 2009.

1.0.1.2 Recycler Kicker Systems

Work has mainly been concentrating on the off-project gap clearing kickers. Work on the NOVA/ANU project scope will ramp up later this year. Winding has finished on four PFL’s and 7 of 12 cables spools have arrived, but the rest of the cable has been delayed until the beginning of May. The manufacturer had to re-make the cable.

There were also manpower limitations on getting the cable installed in test area. Electric field modeling of the RR Extraction/MI Injection kicker is 50% done. The

design of this magnet (same as abort magnet) is on hold (due to manpower) until the gap clearing magnet is well into production. Drafting on the magnet is waiting for the modeling to get ahead. Procurement on load temperature regulation skids is going well but assembly has not started due to manpower.

1.0.1.3 Recycler Instrumentation

BPM--Work is continuing on finalizing the design of the BPM cables and transition boards, which is considered on schedule. Work on FPGA code development continued.

DCCT – Work on a schedule for building the DCCT in-house began.

1.0.1.4 Recycler Radiation Safety

No measurements were made in March in the regions near MI39 and MI14. We will however take measurements at least a month before the shutdown for penetration and gap clearing kicker installation in 2009. Progress continues on the updated MI shielding assessment. The evaluation of the existing shielding is approximately 85% complete.

1.0.2.1 MI Modifications

LLRF design works continues (has reached 75%). We continue developing the hardware and software for the system (at 20%).

1.0.2.2 MI RF Cavities

All Higher Order Mode dampers have been assembled and are pending testing on the bench. The second Main Injector cavity was tested for vacuum and a leak was discovered. The bellows was damaged in storage. A new bellows assembly to repair the leak was sent to the machine shop and parts are awaited. This repair is why we did not meet the Milestone.

The second Main Injector cavity also developed a water leak, which was repaired. The first Main Injector cavity is still being run in the test station and its vacuum was reworked to remove all o-rings except one. The first Main Injector cavity has successfully been run at 240 kV for extended periods.

1.0.2.3 MI Radiation Safety

See 1.0.1.4

1.0.3.1 NuMI Primary Proton Beam

With the primary beam CD-3a items, procurements are ongoing for the Bμlb regulation systems for the six major dipole power supplies. An AD/EE Department review of procurement readiness for the new 75 kW quadrupole power supplies was held on March 25, including the procurement specification document. Only minor changes were recommended, which have been included in the specification. Also, a review of upgrade plans for primary beam profile monitors is planned for April 13.

1.0.3.2 NuMI Target Hall Technical Components

The IHEP analysis/report on the target window and cooling was received on March 30, on schedule. However, the analysis indicates the beam-heat induced stress in

the upstream target window is too high with the base-line beam parameters. It may be that the MARS Monte Carlo energy deposition program has over-estimated the heating, or, if the estimate is correct, it may be necessary to increase the beam spot-size and with it the target width.

This means we will need to do another round of engineering re-design before starting the construction drawing set for the target. If the target width has to be increased, it may also modestly reduce the neutrino flux per proton-on-target. Other activities for this WBS are suffering from manpower being distracted by operational activities and work on the beam-to-DUSEL conceptual design.

1.0.3.3 NuMI Target Hall Infrastructure

NuMI Target Hall Space Planning & Horn 2 Relocation to ME:_Horn 2 stripline extension: Work on the Horn 2 stripline extension assembly sketch continues. 22 sketches have been made of the various stripline bus pieces. The assembly detail sketch has been refined.

Design New Equipment for Operations: Work continues on this task. This new equipment will mainly be in the form of special concrete and steel shielding blocks (to fill the chase void during the Horn 2 shielding reconfiguration work). Preliminary design details have been developed.

Target Chase: The following task was completed: WBS 1.0.3.3.3.1.3 (Analyze all components & chase items for temperature limits). ES&H test results on the paint samples have been posted in NOVA-doc-2620. Work on the thermal and structural FE Analysis of Horn 1 stripline continues. Different cooling options were evaluated and incorporated into the model.

1.0.3.4 Decay Pipe, Hadron Absorber and Utilities

1.0.4 Beam Physics

No Activity this month.

WBS 2.0 ANU Construction

(P. Derwent)

2.0.2.1.1 Upgrade Vertical Quad Bus with New Transformer

The transformer has been approved by the EE Support Department. Delivery is expected this month.

2.0.3.3 NuMI Target Hall Infrastructure

Work continues on the Final Design-Shielding Blocks & Remote Lifting Components task. Drawings are in the process of being checked and finalized.

2.0.4 ANU Project Management

No Activity this month.

WBS 1.1 & 2.1 Site and Building

(S. Dixon)

1.1.1 Site conditions Investigation

1.1.1.1 Topographic Survey
1.1.1.2 Subsurface Investigation
1.1.1.3 Wetland Delineation
1.1.1.4 Revise Ash River Environmental Assessment Worksheet
These tasks are complete.

1.1.2. Title 1 Preparation

1.1.2.1 Site Preparation Advanced Technical Design
1.1.2.2 Building Design Modifications
1.1.4.1 Independent Cost Estimate Review
1.1.4.2 Secondary Containment Study
1.1.4.3 Overburden Study
1.1.4.5 Risk Management Assessment
These tasks are complete.

1.1.4.7 Advanced Technical Design – Far Detector Building
In March 2009, the construction documents were completed.

2.1.1 Site Preparation Package

2.1.1.1 Site Preparation Package - Title 2 (Design) Phase
In March 2009, the construction documents were completed. A review of the status of the project was presented to the University of Minnesota Code Officials on March 3, 2009. Details can be found in NOVA-doc-3662.

2.1.1.2 Site Preparation Package - Wetland Mitigation
No Activity this month.

2.1.1.3 Site Preparation Package – Procurement Phase
The construction documents for the Site Prep Package were issued in March 2009 for competitive procurement. As part of this effort, a pre-proposal meeting was held at the University of Minnesota. See NOVA-doc-3663 for additional information.

2.1.2 Far Detector Building

2.1.2.1 Far Detector Building - Title 2 (Design) Phase
In March 2009, the construction documents were completed.

2.1.2.2 Far Detector Building – Procurement Phase

The construction documents for the Far Detector Building Package were issued in March 2009 for competitive procurement. As part of this effort, a pre-proposal meeting was held at the University of Minnesota. See NOVA-doc-3663 for additional information.

2.1.2.3 Far Detector Building – Build Phase

No Activity this month.

2.1.3 Site and Building Security

No Activity this month.

WBS 1.2 Liquid Scintillator

(S. Mufson)

1.2.1, 1.2.9 Requirements and Procurement

The waveshifters are a CD-3a procurement. This month NOvA personnel and Fermilab Procurement worked on the technical requirements for the RFP.

1.2.4, 1.2.7 Production Methods

At Indiana, several samples of scintillator with varying concentrations of fluors were prepared to study tests of concentration. These samples were analyzed by Jon Karty of IU Chemistry. These samples are being used in two ways. First the samples are being used to develop reliable testing methods of scintillator composition based on analytical chemistry. The idea is that large batches of scintillator or fluor blend would be made at a toll blender. These chemical tests would be used to base decisions on the quality of the scintillator/fluor blend and remedial steps needed in case the QC testing turns up problems.

IU Chemistry will continue to be a prime resource for testing, but presumably toll blenders will also have lab services. We are investigating commercial labs to assess the range of services available commercially. We will use the samples developed for IU tests with these commercial labs, if this solution is cost effective.

We are also using the samples in a second way in our exploration of the gamma test. Until now we have been plagued by background problems. Recent results, if they hold up, are much more encouraging. The gamma test would be used as a composition test based on one of the key parameters of scintillator performance – light yield. In conjunction with a test of transmission by the tintometer, the gamma test would give us a QC testing procedure that qualifies scintillator performance. The apparatus is not complicated or expensive and could be used at Ash River.

1.2.2, 1.2.3, 1.2.8 R&D Studies

Studies of IU QC procedures are described above. At various times oil samples were retested in the tintometer.

1.2.5 QA/QC

The gamma test setup consists of a gamma source that irradiates a scintillator sample and an alpha source encased in plastic scintillator that provides a calibration signal. The test parameter is the ratio of the channel that registers the scintillator's Compton edge to the channel that registers the calibration alpha peak. The measurements are made with an MCA. The ratio should increase as the concentration of scintillator increases, since the low concentration of fluors should not saturate the scintillator light.

An important question remains as to whether systematic errors will mask the effect. IU continued to address these systematic errors with improvements in the gamma testing procedure.

The work at SMU continued to search for ways to resolve discrepancies between measurements at SMU and IU of mineral oil attenuation length. Measurements are

currently being made of the probe beam profile in SMU spectrometer as a function of oil column length. The measurements are still in progress and no conclusions are available yet. There have been some minor changes to the spectrometer plumbing to improve robustness.

1.2.6 Shipping
1.2.7 Blending Investigations
1.2.8 Component Acquisition Investigations
1.2.9 Integration Prototype Detector Scintillator Production
1.2.10 Production Scintillator Specifications
1.2.11 Management – R&D Phase

No change from last month.

WBS 1.3 Wavelength Shifting Fiber

(C.Bromberg)

1.3.1 Requirements

1.3.2. Vendor Investigations

1.3.3 Wavelength Shifting Fiber Optimization Studies

No change this month.

1.3.4 Development of QA/QC Methods

Extraction of total light output is being integrated into the scanning process. Attenuation length measurements are now routine. Design of a transportable fiber scanner continued.

1.3.5 Integration Prototype- Near Detector Production

Five spools of IPND fiber were run through the QA tests. Attenuation length analysis results are as expected based on the first spool and previous samples. However, total light output measurements have a factor of two variations between spools that are not consistent with the natural 10-20% variations in attenuation length. While attenuation length measurements are not critically dependent on the location of the fiber relative to the spectrometer slit, total light output measurements are sensitive to the fiber location. We are testing different fixtures to remove the location variations when inserting fibers into the spectrometer.

1.3.6 Production WLS Fiber Specifications

1.3.7 Management – R&D Phase

No change during this month.

2.3.1 Preparing order for Production Fiber

Work on this task has been started and we aim to place an order early in Q1 of FY10.

WBS 1.4 PVC Extrusions

(R. Talaga)

1.4.1 Physical Properties Determination and Test Method Development

The scope of this task is to develop methods for testing physical properties of extruded PVC. N-27 PVC creep test stands at constant (room) temperature are in progress.

Tests to look for possible adverse effects of exposing N-27 PVC (under tension) to liquid scintillator have been ongoing for over a year. A sample of N-27 immersed in liquid scintillator and a control sample (N-27, not immersed) were analyzed in March by examination under a microscope. No unusual features were seen. The examiner did not think it advisable to do further examination with a scanning electron microscope because there was no evidence of physical damage.

We continued preparations of a number of QC tests for the upcoming extrusion run (see 1.4.3 below), including a camera system to determine the shape and wall thickness dimensions of extrusions, reflectivity measurements, pressure and vacuum tests as well as drop-dart impact studies. These and other QC methods are being assembled and will be evaluated next month. We expect to have a comprehensive set of QC tests (and instruments) ready at the end of April.

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1.4.2 Raw Materials

No progress this month.

1.4.3 Extrusions

The scope of this task is to extrude PVC resin, which is a powder, into solid PVC panels for NOvA.

The next extrusion prototype production run date was scheduled for the week of May 4, 2009. The primary objective is to produce vertical IPND extrusions and to re-establish the operating conditions last achieved in December of 2007. In addition, we plan to perform tests to determine the operating window by making changing extruding parameters and examining the resulting extrusions' geometrical and physical characteristics. There is sufficient N-27 resin in storage at Extrutech for this production run.

1.4.4 Shipping and Handling1.4.6 Management

The scope of this task is to develop a support and moving system for loading and unloading PVC extrusions into trucks and to devise a shipping plan and determine the cost.

The caster jack prototype, used to move stacks of extrusions onto trucks and about the assembly area, is being developed at the University of Minnesota. An updated design has undergone an engineering evaluation at Argonne and a preliminary report has been written by Jim Grudzinski (NOVA-doc-3670). Jim has contacted Nathaniel Pearson at the University of Minnesota to discuss the recommendations of his study and how they

would be implemented by Nathaniel. A final prototype design should be ready next month and the hardware should be ready in May 2009.

1.4.6 Management

The scope of this task is to manage the activities in WBS 1.4. A Monthly Progress report Schedule Turnaround report was submitted.

WBS 1.5 PVC Modules

(K. Heller/ D. Hennessy)

1.5.1 Requirements

No Change this month.

1.5.2 End Seal R&D

Finished the center seal design.

1.5.3 Photo Detector Interface R&D

No Change this month.

1.5.4 Module Factory R&D

A second version of several manifold injection molded parts is required before IPND module construction can begin. The design of the manifold raceways required significant re-engineering to achieve acceptable plastic flow and cooling rates in the injection mold. This will delay IPND module construction relative to the RLS by a month with startup now expected in July/August. However, this is a delay of 2-3 months relative to our January 2009 forecast which optimistically assumed the first round of manifolds would be adequate.

There has been progress on the robot for gluing. The frame for robot is near completion. The electronic control box is started. The fixture piece that holds manifold is done. Programming of motor control has been started. The corona discharge machine has been ordered (3-4 weeks away).

Construction of a second stringing machine was started this month.

A redesign of caster jacks so that they pass safety inspection was completed.

Two new sets of vacuum lifters were partially constructed.

The six months time trial of glue strength (Plastic Welder) was completed.

1.5.5 Quality Assurance and Quality Control Methods Development

A safety box for pressure testing was constructed. This is the version for the module factory; Argonne's version will be next for testing of modules received for assembly. Software improvements for Quality Assurance package was implemented this month. The bubbler components for the IPND leak tester were completed.

Measurements were made on cell-to-cell variations of extrusions. We need to automate measurements of extrusions for QA (see NOVA-doc-3691).

1.5.6 Module shipping and storage R&D

No change during this month.

1.5.7 Integration Prototype Detector Modules

We continued readiness preparation for IPND production.

1.5.8 Initial Production Module Specifications

1.5.9 Initial Factory Tooling Specifications

1.5.10 Management - R&D Phase

No change during this month.

WBS 1.6 Electronics

(L. Mualem)

1.6.1 APD Module

Ordering of APD Arrays from Hamamatsu continued to drag on during all of March. Details of component procurement plans for the order slowed the preparation of the quote. This has been completed and we are now awaiting the final quote for production.

Documentation of the quantum efficiency results have been produced (see NOVA-doc-3649). Additional documentation of the water cooling system was completed. There are still remaining questions on this design that will need to be answered before a full production system is produced. Final design of the APD test stand has started at UMN as well.

Production of additional components for the APD modules has started at IU. Some parts have been received, and the first articles should be completed in the next month. Quotes for components are coming in and they are so-far in line with what was expected.

Additional design effort on the alternate low-flow cooling system (air cooling) of TECs continued and is nearing a completed design (water cooling with actual flow is still the base plan). Additional tests with the mock-up system are being performed to understand the accuracy of the modeling.

1.6.2 Front End Board

Communication with the FEB3 prototype board was achieved with the USB spy board system. The system is not yet reading out data from all channels, but there is data communication from the board to the host computer. Work continues.

1.6.3 Power Distribution

Documentation and production samples of boards for the power distribution system have been delivered to the Fermilab Particle Physics Division Electronics Engineering Department for a preliminary safety review.

1.6.4 Management - R&D Phase

No change since the last report.

1.6.5 Vertical Slice Tests

Testing of vertical slice fibers from the previous tests were been started.

WBS 1.7 Data Acquisition

(L. Mualem)

1.7.1 DAQ Software

Progress on the software design requirements has continued. Preliminary versions of two more requirements documents have been produced. Primary authors have been assigned for all tasks that did not have anyone currently working to finalize the documents. In addition, effort on the Event builder code continued. Effort this month focused on understanding the data formats and structure of the event buffers.

1.7.2 DAQ Hardware

Progress on the layout of the IPND version of the DCM continued this month. At the same time, design of the timing system is continuing. Preliminary selection of components is underway. The goal is to have parts in common with the DCM system to minimize needed development and maintenance effort.

1.7.3 Detector Control

1.7.4 Detector Control System

1.7.5 Management - R&D Phase

No progress this month.

WBS 1.8 Detector Assembly

(P. Lukens)

1.8.1. Plane Assembly Adhesive

No change this month.

1.8.2. Structural Design Validation

This activity is now 50% complete, with the receipt of the Harvard consultant's report (NOVA-doc-3218). No additional work on this occurred during March.

1.8.3. Liquid Scintillator Filling and Handling

There was no work on this task in March.

1.8.4. Near Detector Assembly

No change this month.

1.8.5. Integration Prototype Near Detector (IPND)

During March, NOvA physicists and engineers continued planning for the resumption of IPND work in the next few months. This month the Level 3 managers for this task, in conjunction with WBS 2.6/2.7 managers, continued the collection, documentation and validation of electrical power requirements for the IPND electronics and DAQ systems. Discussions with FESS occurred to better specify the needs of the detector enclosure, including a discussion about adding additional IPND blocks to the current installation plan. Plans were drawn up for an alternative IPND enclosure that would accommodate the full Near Detector. Final fabrication drawings for the IPND were developed, but are not yet complete.

1.8.6. Far Detector Assembly Engineering

Argonne engineers continued work on the vacuum lifting fixture in March. **This device is now operational.**

The new adhesive pump was received and installed on the dispenser table. It has been operated, and the controls system is close to complete. The motor and gears that allow the lifting fixture to roll over for the extrusion gluing was installed and initial tests were favorable.

Analysis of the block pivoter prototype continues, and no problems have been found in the design.

The Full Height Engineering Prototype mounting plate was designed, and fabrication drawings are complete

1.8.7. Far Detector Installation Procedures

Although this activity has been formally completed, some installation planning work continued under WBS 1.8.9 during March. The Level 3 manager for this task continued his review of FESS drawings of the Ash River civil construction. The fire protection system for the adhesive dispenser was received. Another round of comments was returned to the architects of the Far Detector building. The first estimate of time-

and-motion studies for module handling was made, and is in line with the estimates made for the full assembly schedule.

1.8.8. Far Detector Prototypes

During March, the scintillator leak test in the CZero building elevator-shaft enclosure was monitored (no leaks seen).

Work on the Full Scale Assembly Prototype (FSAP) consisted of preparation of the vacuum lifter and adhesive dispenser, described above under WBS 1.8.6.

1.8.9. Management

During March, the Level 2 and Level 3 detector assembly managers participated actively in most of the WBS 1.8 technical work described elsewhere in this section.

WBS 1.9 & 2.10 Project Management

(J. Cooper)

1.9 Project Management – R&D

This set of WBS items is complete.

2.10 Project Management – Final Design & Construction

2.10.2 FY08

Three **NOvA Technical Board** meetings were held on March 3, 17, and 31. The main part of each meeting was devoted to EVMS training of CAMs. The Variance Analysis Corrective Action Log was discussed by all on March 17.

A **NOvA Project Management Group** meeting was held on March 17. The talks presented and minutes of the meeting are available in NOVA-doc-3523(v7).

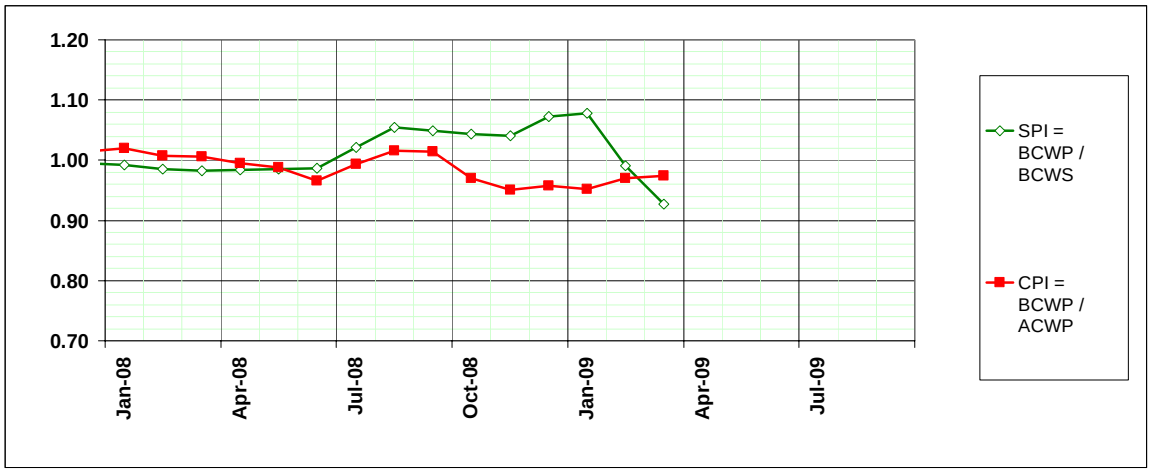
EVMS Summary

(S. Saxer, W. Freeman, H. Ferguson, E. McCluskey)

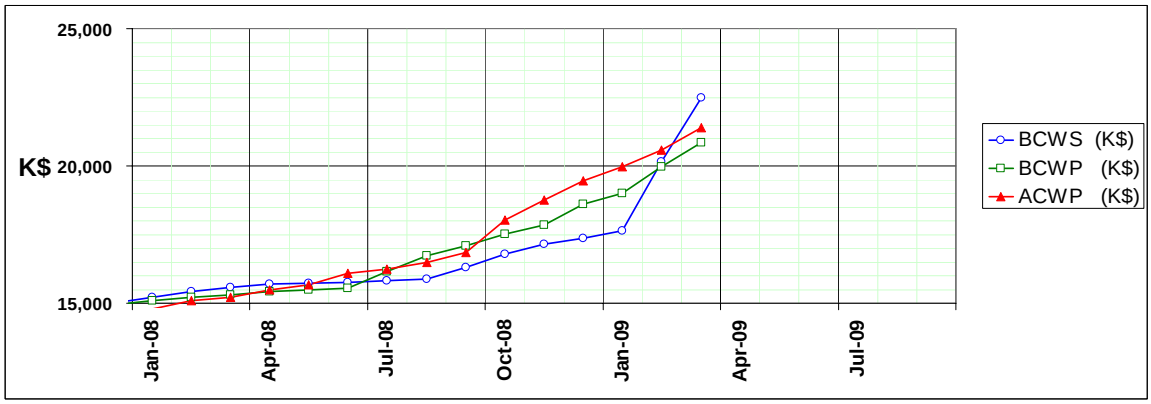
This monthly report focuses on the EVMS status relative to the baselined RLS as reviewed by DOE (Lehman) on April 30, 2008 and approved (CD-2) by Ray Orbach on September 15, 2008.

CPI and SPI curves.

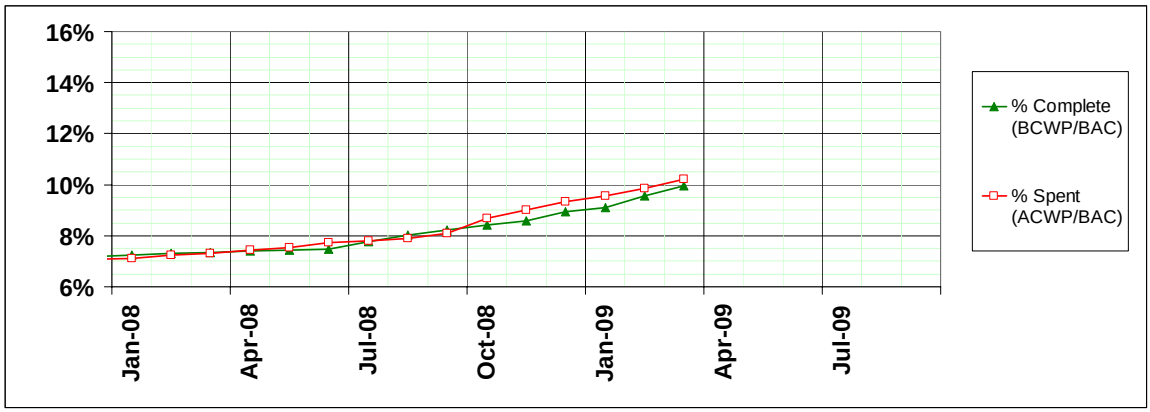
As discussed in the Overview section of this report, the Schedule Performance Index moved from 1.08 in January to 0.93 in March. This reflects the fact that in February real time crossed into the part of the NOvA schedule to which all tasks had been delayed to compensate for the FY08 Omnibus Bill action. Effectively, the project did manage to work ahead of schedule from July through January once funding was restored by the FY08 Supplementary Funding Bill and the FY09 Continuing Resolution, but that schedule advantage has disappeared as we crossed into the delayed tasks.



BCWS, BCWP, ACWP History.



Percent Complete Plots.



Baseline Change Control Log Actions

The NOvA Project Management Group serves as the highest level change control board. During February, two NOvA changes were approved by the NOvA Project Manager.

In addition, CR# 62 received preliminary approval by the Associate Director for Research prior to all EVMS calculations.

CR Log Query for Monthly Report

CR #	Affected WBS #'s	CO Title	Date:	Level of Change	Final Cost Impact	Final Schedule Impact	Status
65	1.4.4.17 (new task)	Caster Jack Construction	4/1/2009	L4 (NOVA PM)	$19,847.37	none	Approved by PM
64	1.6.1.2	Water Vapor Transmission Tests	4/1/2009	L4 (NOVA PM)	$16,628.02		Approved by PM
63	1.6.5.3, 1.6.5.3.1 to 1.6.5.3.3	Vertical Slice Test 3	4/1/2009	L4 (NOVA PM)	$46,877.83		Approved by PM
62	various in 1.6, 1.8, 2.6, 2.9, and 2.10	HU Engineering Labor Subsidy Change	4/1/2009	L3 (Directorate)	$597,633.58		Approved by PM
61	1.7.1.6, 1.7.1.9	Partial DAQ SW Reassignment to UMNTC	4/1/2009	L4 (NOVA PM)	$1,149.59		Approved by PM
				Total Contingency Use this Month	$682,136.39		

Friday, April 17, 2009 Page 1 of 1

WBS Level 2 Contract Performance Report

The usual CPR1 report is shown below. For March, we continue this section to discuss changes in the far right two columns: the Estimate at Completion (EAC) and variance of EAC from Budget at Completion (BAC, the baselined budget).

COST PERFORMANCE REPORT
FORMAT 1 - WORK BREAKDOWN STRUCTURE

CONTRACTOR	CONTRACT	PROGRAM	4. REPORT PERIOD
NAME	NAME	NAME	FROM 01-Mar-2009
Fermi National Accelerator Laboratory		NOvA Project	TO 31-Mar-2009

PERFORMANCE DATA

CTC-FndSrc WBS[2] Results... ITEM	CURRENT PERIOD BUDGETED COST WORK SCHEDULED	BUDGETED COST WORK PERFORMED	ACTUAL COST WORK PERFORMED	VARIANCE SCHEDULE	VARIANCE COST	CUMULATIVE TO DATE BUDGETED COST WORK SCHEDULED	BUDGETED COST WORK PERFORMED	ACTUAL COST WORK PERFORMED	VARIANCE SCHEDULE	VARIANCE COST	AT COMPLETION BUDGETED	LATEST REVISED ESTIMATE	VARIANCE
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
DA DOE-ACEL MIE													
2.0 ANU Construction													
Fully Burdened AY$k	192	230	84	37	146	785	552	367	(233)	185	29,946	29,836	110
CTC-FndSrcTotals:	192	230	84	37	146	785	552	367	(233)	185	29,946	29,836	110
DC DOE-CA													
2.1 Site and Building													
Fully Burdened AY$k	59	181	109	122	72	409	1,459	1,067	1,049	392	46,239	46,178	61
CTC-FndSrcTotals:	59	181	109	122	72	409	1,459	1,067	1,049	392	46,239	46,178	61
DD DOE-ACEL R&D													
1.0 ANU R&D													
Fully Burdened AY$k	693	152	151	(541)	0	2,690	2,374	2,184	(317)	189	7,604	7,419	184
CTC-FndSrcTotals:	693	152	151	(541)	0	2,690	2,374	2,184	(317)	189	7,604	7,419	184
DE DOE-DET MIE													
2.1 Site and Building													
Fully Burdened AY$k	64	64	80	0	(16)	209	209	80	0	129	2,296	2,128	168
2.10 Project Management - Nova Project - Construction													
Fully Burdened AY$k	74	74	59	0	15	804	804	648	0	156	5,901	5,719	183
2.2 Liquid Scintillator													
Fully Burdened AY$k	6	6	0	0	6	11	11	0	0	11	18,516	18,511	5
2.3 WLS Fiber													
Fully Burdened AY$k	1	1	0	0	1	2	2	0	0	2	10,081	10,117	(36)
2.4 PVC Extrusions													
Fully Burdened AY$k	162	17	0	(146)	17	242	18	0	(224)	18	25,276	25,248	28
2.5 PVC Modules													
Fully Burdened AY$k	13	13	0	0	13	74	74	0	0	74	10,306	10,246	59
2.6 Electronics													
Fully Burdened AY$k	1	1	0	0	1	2	2	0	0	2	11,984	11,991	(7)
2.7 DAQ													
Fully Burdened AY$k	0	0	0	0	0	0	0	0	0	0	3,532	3,532	0
2.8 Near Detector Assembly													
Fully Burdened AY$k	30	7	0	(23)	7	57	75	46	18	28	4,249	4,218	31
2.9 Far Detector Assembly													
Fully Burdened AY$k	48	9	0	(38)	9	204	54	5	(150)	50	11,408	11,337	70
CTC-FndSrcTotals:	399	192	140	(207)	53	1,606	1,250	780	(357)	470	103,549	103,048	501
DO DOE-ACEL OPS													
1.0 ANU R&D													
Fully Burdened AY$k	55	26	52	(29)	(26)	284	259	108	(25)	151	1,227	1,074	153
CTC-FndSrcTotals:	55	26	52	(29)	(26)	284	259	108	(25)	151	1,227	1,074	153
DR DOE-POST CD-1 DET R&D													
1.1 Site and Building R&D													
Fully Burdened AY$k	0	0	(38)	0	38	2,275	2,275	1,628	0	646	2,275	1,628	646
1.2 Liquid Scintillator R&D													
Fully Burdened AY$k	5	5	8	0	(3)	269	261	219	(8)	42	271	230	42
1.3 WLS Fiber R&D													
Fully Burdened AY$k	33	4	22	(29)	(18)	206	238	283	32	(45)	341	386	(45)
1.4 PVC Extrusion R&D													
Fully Burdened AY$k	90	11	14	(79)	(3)	1,097	949	989	(147)	(39)	1,368	1,412	(44)
1.5 PVC Module R&D													
Fully Burdened AY$k	281	24	84	(257)	(60)	1,110	574	1,125	(536)	(551)	1,590	2,148	(558)
1.6 Electronics R&D													
Fully Burdened AY$k	196	48	19	(148)	28	625	361	569	(264)	(208)	1,653	1,881	(229)
1.7 DAQ R&D													
Fully Burdened AY$k	128	5	33	(123)	(28)	467	223	831	(244)	(608)	1,385	1,984	(599)
1.8 Detector Assembly R&D													
Fully Burdened AY$k	194	13	166	(181)	(153)	1,465	892	1,899	(573)	(1,007)	2,851	3,862	(1,011)
1.9 Project Management R&D													
Fully Burdened AY$k	0	0	0	0	0	383	383	559	0	(176)	383	559	(176)
CTC-FndSrcTotals:	926	110	308	(817)	(198)	7,895	6,156	8,103	(1,739)	(1,947)	12,116	14,090	(1,974)
DY DOE CD-0 TO CD-1 R&D													
1.9 Project Management R&D													
Fully Burdened AY$k	0	0	0	0	0	8,801	8,801	8,801	0	0	8,801	8,801	0
CTC-FndSrcTotals:	0	0	0	0	0	8,801	8,801	8,801	0	0	8,801	8,801	0
Undist. Budget											0	0	0
Sub Total	2,325	891	844	(1,434)	47	22,472	20,850	21,409	(1,621)	(559)	209,482	210,447	(965)
Management Resrv.											68,518		
Total	2,325	891	844	(1,434)	47	22,472	20,850	21,409	(1,621)	(559)	278,000		

The CPR1 report on the previous page uses a default forecast method (called F1) in Cobra for the EAC computation (EAC=ACWP+F1). F1 is a statistical forecast calculated at the chargeable task code level. It is based on the budgeted-cost-of-work-remaining (i.e. PF*(BAC-BCWP) with a performance factor (PF) of 1.0, adjusted/respread to the early dates that are calculated by Open Plan each month and loaded into Cobra during the monthly processing of schedule progress. That is, our Estimate to Complete (ETC) process has only incorporated schedule statusing information so far.

To make the ETC more useful we are now switching to use of a manual forecast based on the early dates at the work package level. This forecast method uses the remaining quantities of each assigned resource calculated in Open Plan. The calculated remaining quantities are based on the activity progress (i.e. remaining duration/original duration in Open Plan) and then loaded from Open Plan into Cobra. That is, this ETC process also incorporates schedule statusing information, but in a slightly different way.

This method also permits us to manually change the assigned resource levels on unstarted tasks in Open Plan (which also modifies their associated remaining quantities) and then load the modified remaining quantities into Cobra as a forecast to produce a revised ETC. Note that this does not represent a baseline change, nor does it use baseline quantities in the forecast.

This is the method we will use going forward to calculate the EAC presented in the CPR1. Note that nothing in Cobra or Open Plan prevents us from using both forecast methods, or other alternative forecasts should we find them useful in the future.

While exploring the manual method and comparing it to the default F1 method, we also uncovered a "feature" of the F1 forecast as it relates to some in-progress Level of Effort (LOE) tasks that can be a bit misleading and is the main contributor to the ($942K) Variance at Completion (VAC) seen in the far right column of the CPR1 on the previous page. Since the Project was ahead of schedule during the first part of FY09, LOE tasks that started early did not earn any BCWP until the tasks crossed the baseline start time for the tasks; moreover, the F1 forecast assumed that all the cost was still to appear even if some ACWP had already appeared. Using the manual forecast avoids this “feature” and significantly reduces our VAC, down to ($ 22 K) from ($ 942 K) in this March report. This is shown on the CPR1 on the next page.

We have revisited the January, February, and March 09 files to recalculate the EACs using the manual forecast instead of F1 as shown in the following table:

Month	EAC with F1 “feature” ($K)	New Manual EAC ($K)	Change in EAC (Manual-F1) ($K)
January 2009	209,691	209,303	(388)
February 2009	209,493	208,844	(649)
March 2009	210,447	209,504	(942)

The March 2009 CPR1 revised to use the manual ETC method.

COST PERFORMANCE REPORT
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PERFORMANCE DATA

CTC-FndSrc WBS[2] Results... ITEM	CURRENT PERIOD BUDGETED COST WORK SCHEDULED	BUDGETED COST WORK PERFORMED	ACTUAL COST WORK PERFORMED	VARIANCE SCHEDULE	VARIANCE COST	CUMULATIVE TO DATE BUDGETED COST WORK SCHEDULED	BUDGETED COST WORK PERFORMED	ACTUAL COST WORK PERFORMED	VARIANCE SCHEDULE	VARIANCE COST	AT COMPLETION BUDGETED	LATEST REVISED ESTIMATE	VARIANCE
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
DA DOE-ACEL MIE													
2.0 ANU Construction													
Fully burdened AY$k	192	230	84	37	146	785	552	367	(233)	185	29,946	29,716	230
CTC-FndSrcTotals:	192	230	84	37	146	785	552	367	(233)	185	29,946	29,716	230
DC DOE-CA													
2.1 Site and Building													
Fully burdened AY$k	59	181	109	122	72	409	1,459	1,067	1,049	392	46,239	45,849	390
CTC-FndSrcTotals:	59	181	109	122	72	409	1,459	1,067	1,049	392	46,239	45,849	390
DD DOE-ACEL R&D													
1.0 ANU R&D													
Fully burdened AY$k	693	152	151	(541)	0	2,690	2,374	2,184	(317)	189	7,604	7,343	261
CTC-FndSrcTotals:	693	152	151	(541)	0	2,690	2,374	2,184	(317)	189	7,604	7,343	261
DE DOE-DET MIE													
2.1 Site and Building													
Fully burdened AY$k	64	64	80	0	(16)	209	209	80	0	129	2,296	1,776	520
2.10 Project Management - Nova Project - Construction													
Fully burdened AY$k	74	74	59	0	15	804	804	648	0	156	5,901	5,749	153
2.2 Liquid Scintillator													
Fully burdened AY$k	6	6	0	0	6	11	11	0	0	11	18,516	18,514	2
2.3 WLS Fiber													
Fully burdened AY$k	1	1	0	0	1	2	2	0	0	2	10,081	10,079	2
2.4 PVC Extrusions													
Fully burdened AY$k	162	17	0	(146)	17	242	18	0	(224)	18	25,276	25,251	25
2.5 PVC Modules													
Fully burdened AY$k	13	13	0	0	13	74	74	0	0	74	10,306	10,240	66
2.6 Electronics													
Fully burdened AY$k	1	1	0	0	1	2	2	0	0	2	11,984	11,987	(3)
2.7 DAQ													
Fully burdened AY$k	0	0	0	0	0	0	0	0	0	0	3,532	3,532	0
2.8 Near Detector Assembly													
Fully burdened AY$k	30	7	0	(23)	7	57	75	46	18	28	4,249	4,228	21
2.9 Far Detector Assembly													
Fully burdened AY$k	48	9	0	(38)	9	204	54	5	(150)	50	11,408	11,369	38
CTC-FndSrcTotals:	399	192	140	(207)	53	1,606	1,250	780	(357)	470	103,549	102,725	823
DO DOE-ACEL OPS													
1.0 ANU R&D													
Fully burdened AY$k	55	26	52	(29)	(26)	284	259	108	(25)	151	1,227	1,113	115
CTC-FndSrcTotals:	55	26	52	(29)	(26)	284	259	108	(25)	151	1,227	1,113	115
DR DOE-POST CD-1 DET R&D													
1.1 Site and Building R&D													
Fully burdened AY$k	0	0	(38)	0	38	2,275	2,275	1,628	0	646	2,275	1,628	646
1.2 Liquid Scintillator R&D													
Fully burdened AY$k	5	5	8	0	(3)	269	261	219	(8)	42	271	229	42
1.3 WLS Fiber R&D													
Fully burdened AY$k	33	4	22	(29)	(18)	206	238	283	32	(45)	341	355	(14)
1.4 PVC Extrusion R&D													
Fully burdened AY$k	90	11	14	(79)	(3)	1,097	949	989	(147)	(39)	1,368	1,412	(44)
1.5 PVC Module R&D													
Fully burdened AY$k	281	24	84	(257)	(60)	1,110	574	1,125	(536)	(551)	1,590	2,039	(450)
1.6 Electronics R&D													
Fully burdened AY$k	196	48	19	(148)	28	625	361	569	(264)	(208)	1,653	1,875	(222)
1.7 DAQ R&D													
Fully burdened AY$k	128	5	33	(123)	(28)	467	223	831	(244)	(608)	1,385	1,997	(612)
1.8 Detector Assembly R&D													
Fully burdened AY$k	194	13	166	(181)	(153)	1,465	892	1,899	(573)	(1,007)	2,851	3,863	(1,012)
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Fully burdened AY$k	0	0	0	0	0	383	383	559	0	(176)	383	559	(176)
CTC-FndSrcTotals:	926	110	308	(817)	(198)	7,895	6,156	8,103	(1,739)	(1,947)	12,116	13,958	(1,842)
DY DOE CD-0 TO CD-1 R&D													
1.9 Project Management R&D													
Fully burdened AY$k	0	0	0	0	0	8,801	8,801	8,801	0	0	8,801	8,801	0
CTC-FndSrcTotals:	0	0	0	0	0	8,801	8,801	8,801	0	0	8,801	8,801	0
Undist. Budget											0	0	0
Sub Total	2,325	891	844	(1,434)	47	22,472	20,850	21,409	(1,621)	(559)	209,482	209,504	(22)
Management Resrv.											68,518		
Total	2,325	891	844	(1,434)	47	22,472	20,850	21,409	(1,621)	(559)	278,000		

In addition to changing the ETC forecast method, we made our first manual adjustments to the ETC in March by implementing two ETC changes approved by the Project Manager and noted in the ETC Log below.

NOvA Log of Estimate to Complete Changes						7-May-09
ETC#	Item	WBS items	CAM	estimated amount	approved?	date of email approval
1	Labor reductions on 1.0.3	1.0.3.2, 1.0.3.3	Martens	< $100K decrease in base estimate	yes	15-Apr-09
2	Near Cavern updated estimate following Conceptual design by Harza, checked by Wightman	2.8.1.4.5, 2.8.1.4.6	Lukens	only $20K increase in base estimate, but a change in contingency estimate from 100% to 50%	yes	15-Apr-09

ETC 002 does not actually change the ETC but does change the contingency estimate on the Near Cavern now that we have additional design information from two consultants. This ETC is an example of the method we will use to update our bottoms up contingency estimate as the project progresses. This will be important for the DOE IPR CD-3b Review scheduled for July 21, 2009.

ETC 001 manually adjusts the remaining labor resource quantities in Open Plan for thirteen unstarted accelerator tasks in WBS 1.0.3 where the CAM now believes we have overestimated the labor by a large factor based on experience to date. When loaded into Cobra to produce a further revision to the ETC/EAC, this new estimate gives a further reduction of $ 92 K in the ETC as shown in the final March CPR1 on the next page. The net VAR becomes a positive $ 70 K relative to the BAC (red circle), with the change occurring on the line for WBS 1.0 (blue dotted square, compare page 31 to page 29).

The details of each change are captured in updated Basis of Estimate documents in the NOvA database, e.g. see NOVA-doc-3764 for ETC 002. This documentation will carry forward for

- updated estimates from the CAMs,
- major schedule changes outside of the usual monthly status reports,
- new labor rate tables,
- updated contingency estimates

Final March CPR1 including a manual change with the new ETC method.

COST PERFORMANCE REPORT
FORMAT 1 - WORK BREAKDOWN STRUCTURE

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(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
DA DOE-ACEL MIE													
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1.0 ANU R&D													
Fully birdened AY$k	693	152	151	(541)	0	2,690	2,374	2,184	(317)	189	7,604	7,250	354
CTC-FndSrcTotals:	693	152	151	(541)	0	2,690	2,374	2,184	(317)	189	7,604	7,250	354
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2.9 Far Detector Assembly													
Fully birdened AY$k	48	9	0	(38)	9	204	54	5	(150)	50	11,408	11,369	38
CTC-FndSrcTotals:	399	192	140	(207)	53	1,606	1,250	780	(357)	470	103,549	102,725	823
DO DOE-ACEL OPS													
1.0 ANU R&D													
Fully birdened AY$k	55	26	52	(29)	(26)	284	259	108	(25)	151	1,227	1,113	115
CTC-FndSrcTotals:	55	26	52	(29)	(26)	284	259	108	(25)	151	1,227	1,113	115
DR DOE-POST CD-1 DET R&D													
1.1 Site and Building R&D													
Fully birdened AY$k	0	0	(38)	0	38	2,275	2,275	1,628	0	646	2,275	1,628	646
1.2 Liquid Scintillator R&D													
Fully birdened AY$k	5	5	8	0	(3)	269	261	219	(8)	42	271	229	42
1.3 WLS Fiber R&D													
Fully birdened AY$k	33	4	22	(29)	(18)	206	238	283	32	(45)	341	355	(14)
1.4 PVC Extrusion R&D													
Fully birdened AY$k	90	11	14	(79)	(3)	1,097	949	989	(147)	(39)	1,368	1,412	(44)
1.5 PVC Module R&D													
Fully birdened AY$k	281	24	84	(257)	(60)	1,110	574	1,125	(536)	(551)	1,590	2,039	(450)
1.6 Electronics R&D													
Fully birdened AY$k	196	48	19	(148)	28	625	361	569	(264)	(208)	1,653	1,875	(222)
1.7 DAQ R&D													
Fully birdened AY$k	128	5	33	(123)	(28)	467	223	831	(244)	(608)	1,385	1,997	(612)
1.8 Detector Assembly R&D													
Fully birdened AY$k	194	13	166	(181)	(153)	1,465	892	1,899	(573)	(1,007)	2,851	3,863	(1,012)
1.9 Project Management R&D													
Fully birdened AY$k	0	0	0	0	0	383	383	559	0	(176)	383	559	(176)
CTC-FndSrcTotals:	926	110	308	(817)	(198)	7,895	6,156	8,103	(1,739)	(1,947)	12,116	13,958	(1,842)
DY DOE CD-0 TO CD-1 R&D													
1.9 Project Management R&D													
Fully birdened AY$k	0	0	0	0	0	8,801	8,801	8,801	0	0	8,801	8,801	0
CTC-FndSrcTotals:	0	0	0	0	0	8,801	8,801	8,801	0	0	8,801	8,801	0
Undist. Budget											0	0	0
Sub Total	2,325	891	844	(1,434)	47	22,472	20,850	21,409	(1,621)	(559)	209,482	209,412	70
Management Resrv.											68,518		
Total	2,325	891	844	(1,434)	47	22,472	20,850	21,409	(1,621)	(559)	278,000		

Variance Summary for NOvA Control Accounts at WBS Level 2

The NOvA Control Accounts have been rolled up to WBS Level 2 in this report to match the Level 2 Contract Performance Report 1 on the previous page. The table below summarizes the status.

The FRA EVMS required reporting thresholds to DOE at WBS Level 2 are:

- Green: SV or CV < 5%
- Yellow: SV or CV in the range ≥ 5% but < 10% <u>and</u> the SV or CV is ≥125 K$
- Red: SV or CV in the range ≥ 10% <u>and</u> the SV or CV is ≥ 250 K$

At the Control Account Level, the green/yellow/red bands have the same % thresholds, but the $ thresholds are changed to 50 K$ for the yellow and to 100 K$ for the Red. Red requires a written variance analysis at the Control Account level.

Report Period: Mar-09															
	Current Period							Cumulative							
WBS Level 2	BCWS (AY$)	BCWP (AY$)	ACWP (AY$)	SV (AY$)	SV (%)	CV (AY$)	CV (%)	BCWS (AY$)	BCWP (AY$)	ACWP (AY$)	SV (AY$)	SV (%)	CV (AY$)	CV (%)
R&D															
1.0 ANU R&D	748,207	178,045	203,385	-570,161	-76%	-25,340	-14%	2,974,611	2,633,003	2,292,596	-341,608	-11%	340,407	13%
1.1 Site and Building R&D	0	0	-38,251	0	0%	38,251	-100%	2,274,519	2,274,519	1,628,232	0	0%	646,286	28%
1.2 Liquid Scintillator R&D	4,643	4,643	8,017	0	0%	-3,374	-73%	268,501	260,807	219,156	-7,694	-3%	41,652	16%
1.3 WLS Fiber R&D	33,394	4,047	22,329	-29,347	-88%	-18,283	-452%	205,602	238,061	283,251	32,459	16%	-45,190	-19%
1.4 PVC Extrusion R&D	89,826	11,151	13,860	-78,674	-88%	-2,709	-24%	1,096,549	949,362	988,776	-147,187	-13%	-39,414	-4%
1.5 PVC Module R&D	280,623	23,729	83,722	-256,894	-92%	-59,992	-253%	1,109,819	574,021	1,124,776	-535,798	-48%	-550,755	-96%
1.6 Electronics R&D	195,816	47,508	19,099	-148,309	-76%	28,409	60%	624,865	360,537	568,945	-264,328	-42%	-208,407	-58%
1.7 DAQ R&D	127,939	5,403	33,098	-122,535	-96%	-27,695	-513%	467,357	223,447	831,234	-243,911	-52%	-607,787	-272%
1.8 Detector Assembly R&D	194,043	13,234	166,325	-180,810	-93%	-153,091	-1157%	1,464,812	892,200	1,899,469	-572,612	-39%	-1,007,269	-113%
1.9 Project Management R&D	0	0	0	0	0%	0	0%	9,184,127	9,184,127	9,359,785	0	0%	-175,658	-2%
Construction															
2.0 ANU Construction	192,300	229,762	83,848	37,462	19%	145,914	64%	785,145	551,789	366,742	-233,356	-30%	185,047	34%
2.1 Site and Building	123,000	245,332	189,227	122,331	99%	56,105	23%	618,885	1,668,079	1,146,843	1,049,194	170%	521,236	31%
2.10 Project Management - Nova Project - Construction	74,032	74,032	59,497	0	0%	14,534	20%	804,259	804,259	648,395	0	0%	155,864	19%
2.2 Liquid Scintillator	5,732	5,732	0	0	0%	5,732	100%	10,944	10,944	0	0	0%	10,944	100%
2.3 WLS Fiber	949	949	0	0	0%	949	100%	1,811	1,811	0	0	0%	1,811	100%
2.4 PVC Extrusions	162,494	16,735	0	-145,759	-90%	16,735	100%	242,427	18,138	0	-224,290	-93%	18,138	100%
2.5 PVC Modules	13,302	13,302	0	0	0%	13,302	100%	74,369	74,369	0	0	0%	74,369	100%
2.6 Electronics	826	826	0	0	0%	826	100%	1,578	1,578	0	0	0%	1,578	100%
2.7 DAQ	234	234	0	0	0%	234	100%	447	447	0	0	0%	447	100%
2.8 Near Detector Assembly	29,865	7,051	0	-22,815	-76%	7,051	100%	57,016	74,703	46,427	17,687	31%	28,275	38%
2.9 Far Detector Assembly	47,535	9,342	0	-38,193	-80%	9,342	100%	204,186	54,256	4,692	-149,930	-73%	49,565	91%
R&D SubTotal (WBS 1.0-1.9)	1,674,490	287,760	511,584	-1,386,730	-83%	-223,824	-78%	19,670,762	17,590,084	19,196,220	-2,080,678	-11%	-1,606,136	-9%
Construction SubTotal (WBS 2.0-2.10)	650,269	603,296	332,572	-46,973	-7%	270,725	45%	2,801,066	3,260,372	2,213,099	459,305	16%	1,047,272	32%
Project Total	2,324,760	891,056	844,156	-1,433,703	-62%	46,901	5%	22,471,828	20,850,456	21,409,319	-1,621,373	-7%	-558,863	-3%

In the overall project roll-up (see bottom line in the table), the project is within tolerance on the Cumulative CV but now yellow (-7%) on the Cumulative SV. The project started up early following the FY08 Supplementary Appropriation in July 2008, but in February 2009 crossed into the baseline schedule where tasks had been delayed following instructions from DOE. Our cumulative schedule variance SV moved from + 8% in January to -1% in February to -7% in March as tasks were not completed as scheduled.

The Construction roll-up (second line from the bottom) shows an overall project summary with the Cumulative SV and CV in the red and Current Month CV in the red. In both cases these are <u>positive</u> variances, but only on about $ 3.3 M of Construction effort to date. Most of the work has been on final designs in preparation for a CD-3b IPR.

The Current Month SV is negative, reflecting some work which should have been accomplished as we crossed into the tasks delayed to our scheduled February 2009 restart.

On the R&D side (roll-up is on the third line from the bottom in the table above), the R&D schedule shows an overall project summary with Cumulative SV in the red (negative 2.1 M$) and Current Month R&D SV in the red (negative 1.4 M).

- The schedule slippages are due primarily to technical problems in the Detector Assembly WBS 1.8 and in the PVC Module Assembly WBS 1.5. The Recycler Upgrades WBS 1.0.1 also contributes due to a lack of human resources to complete the scheduled work. These problems are discussed in the narrative reports.

The R&D costs show an overall project summary with Cumulative CV in the yellow (negative 1.6 M$) and the Current Month R&D CV in the red (negative 0.2 M$).

- For about $ 20 M of BCWP on R&D to date, the R&D is costing about 9% more than planned due primarily to technical problems in the Detector Assembly WBS 1.8 and in PVC Module Assembly WBS 1.5. These problems are discussed in the narrative reports.

In February, 38 of the 68 NOvA Control Accounts were active with scheduled work, performed work, or actual costs in the cumulative view. 3 Control Accounts have been closed since some of the R&D is now complete. 14 of the active Control Accounts required a written variance analysis in March. These were written by the CAMs and approved by the Project Manager.

The largest (positive and negative) cumulative variances and their explanations as extracted from the March Variance Analysis Reports are as follows:

Largest two Cumulative SVs:

- 2.1.2 Far Detector Building SV = +1080 K$ on 188 K$ of BCWS

  This SV increased from +960K$ to +1080K$ between February and March.

  Work was started in October 2008 using FY07 carryover funds as a Project Manager sanctioned strategy to advance this critical path item. Since this is a Level of Effort task, there was little BCWS or BCWP until the task started in the baseline schedule in February. The tasks have now started, but even more work was accomplished due to the final push to get a biddable design ready for distribution. This work is nearly complete.

- 1.8 Detector Assembly R&D SV = -572 K$ on 1,465 K$ of BCWS

  This SV got worse from -391K$ to -572K$ between February and March.

  The variance is largely due to the fact that technical issues with the Vacuum Lifting Fixture were only recently solved in February after months of effort. Technical issues with the Adhesive Dispenser were beginning to be resolved in March. Lack of these fixtures is holding off scheduled work on the Full Size Assembly Prototype (FSAP), but the Level 2 Manager / CAM believes the completion of the FSAP can still occur on schedule.

Largest two Cumulative CVs:

- 1.1 Site & Building R&D CV = +646 K$ on 2,275 K$ of BCWP
  This CV changed from +577K$ to +646K$ between February and March. This work is now complete as the final drawings went out for bid in March.

- 1.8 Detector Assembly R&D CV = -1,007 K$ on 892 K$ of BCWP
  This CV changed from -845K$ to -1,007K$ between February and March. The cumulative cost variance is largely due to the fact that several technical issues with the detector assembly remained unresolved as discussed above in the SV variance summary.

Milestone Analysis

Milestones completed this month: 5
Milestones which should be complete by now but are not yet completed: 18

The list of missed milestones is shown below. Eight new milestones were missed in March, reflecting uncompleted tasks that the project had moved to 2009 following the budget crisis caused by the FY08 Omnibus Bill.

NOVA_PROJECT
Milestone Gantt Chart - Missed milestones
Monthly Report - Feb09
Time Now: 01Apr09
Baseline: NOVA_PMB

Baseline Date ▼
Completed Milestone ☆
Current Forecast Date △

Activity ID	Activity Desc.	Early or Actual Date	Baseline Date	MS Level	FY09 (M J J A S O N D J F M A M J)
1.0 -- ANU Planning, Engineering & Design					Time Now - 01Apr09
1.0.3.2.5.9	NuMI Hadron Monitor Initial Re-design Complete	22Jun09	06Mar09	L.5	△-7
1.0.2.2.4.1	MI Cavity Pre-install Testing Complete	08May09	27Mar09	L.5	△-30d
1.2 -- Liquid Scintillator R&D					
1.2.9.3.12	Mineral oil batch 3 for IPND delivered	01Apr09	02Feb09	L.5	△-42d
1.2.9.6.11	Prototype scintillator production completed	16Apr09	17Feb09	L.4	△-42d
1.4 -- PVC Extrusion R&D					
1.4.2.5.2	PO for raw PVC resin for 16-cell horizontal extrusions released	15Apr09	16Feb09	L.5	△-42d
1.5 -- PVC Module R&D					
1.5.4.2.12	Prototype gluing machine for IPND ready to operate	04Jun09	01May08	L.5	△-274
1.5.2.1.1.14	Preproduction prototype manifold design (for IPND) completed	27Apr09	26Mar09	L.5	△-22d
1.5.5.4	Pressure-testing hardware for IPND production ready to operate	27May09	30Mar09	L.5	△-41d
1.6 -- Electronics R&D					
1.6.1.6.1.1	APD module production for IPND started	01Apr09	02Feb09	L.5	△-42d
1.7 -- DAQ System R&D					
1.7.2.2.2.3.4	Schematic approved	14Apr09	13Feb09	L.5	△-42d
1.7.1.4.4.7	Run control system for software first release	30Apr09	03Mar09	L.5	△-42d
1.7.2.3.1.3	Requirements approved	04May09	05Mar09	L.5	△-42d
1.7.2.2.3.3	PCB manufacturing approved	08May09	11Mar09	L.5	△-42d
2.9 -- Far Detector Assembly					
2.9.2.2.21.3	Final design approved-south bookend	21Apr09	20Feb09	L.5	△-42d
2.9.3.1.3	Scintillator transfer facility final design approved	28Apr09	27Feb09	L.5	△-42d
2.9.1.1.3	Final design approved - module lifting fixture	04May09	05Mar09	L.5	△-42d
2.9.2.2.22.3	Final design approved- north bookend	12May09	13Mar09	L.5	△-42d
2.10 -- Project Management - Construction					
2.10.9.22	DOE OECM - FRA EVMS Certification Review	15May09	01Dec08	L.2	△-113d

Here is the usual NOvA summary of milestones scheduled during the last few months with a six month look ahead to the future. The pace of scheduled milestones has increased, so the next few months present a challenge to increase and maintain the pace of completed effort throughout the project.

NOVA_PROJECT

Milestone Gantt Chart - 6-month look ahead

Monthly Report - Mar09

Time Now: 01Apr09

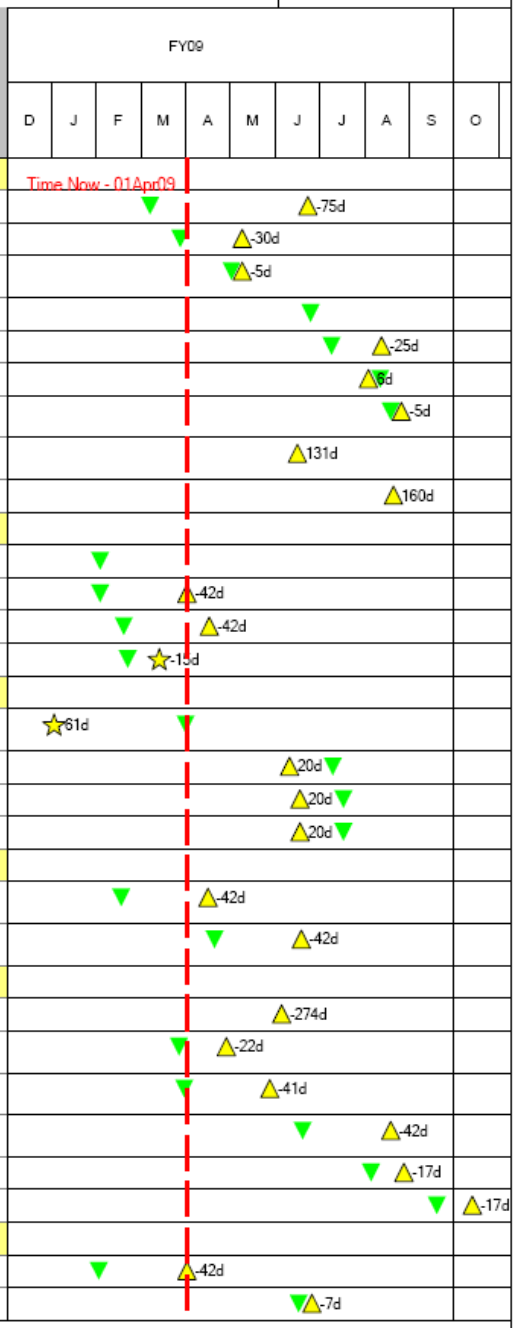
Baseline: NOVA_PMB

Baseline Date ▼

Completed Milestone ☆

Current Forecast Date △

Activity ID	Activity Desc.	Early or Actual Date	Baseline Date	MS Level
1.0 -- ANU Planning, Engineering & Design				
1.0.3.2.5.9	NuMI Hadron Monitor Initial Re-design Complete	22Jun09	06Mar09	L5
1.0.2.2.4.1	MI Cavity Pre-install Testing Complete	08May09	27Mar09	L5
1.0.3.1.5.2	NuMI Profile Monitor Conceptual Design Review Complete	08May09	01May09	L5
1.0.1.1.6.6	RR PDS Magnet Design Finalized	12Sep08	24Jun09	L5
1.0.1.1.6.5	RR Beamline Modifications Design Review Complete	12Aug09	08Jul09	L5
1.0.1.1.6.3	RR 53 Mhz RF Design Review Complete	03Aug09	11Aug09	L5
1.0.3.1.5.3	NuMI Profile Monitor Technical Design Review Complete	25Aug09	18Aug09	L5
1.0.3.2.5.1	NuMI Target, Baffle & Carrier Initial Design Review Complete	15Jun09	21Dec09	L4
1.0.3.3.5.3	NuMI Target Chase Cooling Design Complete	20Aug09	13Apr10	L5
1.2 -- Liquid Scintillator R&D				
1.2.9.3.9	Mineral oil batch 2 for IPND delivered	14May08	02Feb09	L5
1.2.9.3.12	Mineral oil batch 3 for IPND delivered	01Apr09	02Feb09	L5
1.2.9.6.11	Prototype scintillator production completed	16Apr09	17Feb09	L4
1.2.10.3	Liquid scintillator final specifications completed	13Mar09	20Feb09	L5
1.3 -- Wave-Length-Shifting Fiber R&D				
1.3.3.7	Baseline (IPND) WLS fiber dye concentration chosen	02Jan09	31Mar09	L5
1.3.5.5	IPND WLS fiber production completed	10Jun09	09Jul09	L4
1.3.6.5	Production WLS fiber diameter confirmed	17Jun09	16Jul09	L5
1.3.6.6	Production WLS fiber composition confirmed	17Jun09	16Jul09	L5
1.4 -- PVC Extrusion R&D				
1.4.2.5.2	PO for raw PVC resin for 16-cell horizontal extrusions released	15Apr09	16Feb09	L5
1.4.2.6.2	PO for raw PVC resin for 16-cell vertical extrusions released	18Jun09	20Apr09	L4
1.5 -- PVC Module R&D				
1.5.4.2.12	Prototype gluing machine for IPND ready to operate	04Jun09	01May08	L5
1.5.2.1.1.14	Preproduction prototype manifold design (for IPND) completed	27Apr09	26Mar09	L5
1.5.5.4	Pressure-testing hardware for IPND production ready to operate	27May09	30Mar09	L5
1.5.5.7	Fiber mapping and continuity hardware for IPND production ready to operate	18Aug09	18Jun09	L5
1.5.7.3.7	IPND modules for first 8-plane segment completed	27Aug09	04Aug09	L4
1.5.7.3.8	IPND module production 50% complete	13Oct09	18Sep09	L4
1.6 -- Electronics R&D				
1.6.1.6.1.1	APD module production for IPND started	01Apr09	02Feb09	L5
1.6.2.4.12	FEB prototype III released to DAQ	25Jun09	16Jun09	L5



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View: NOVA_BARVW_56
Filter: Rolling_6Month_Window_MilestonesOnly
Sort: BaselineFinish
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Baseline: NOVA_PMB
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Milestone Gantt Chart - 6-month look ahead

Monthly Report - Mar09

Time Now: 01Apr09

Baseline: NOVA_PMB

Baseline Date ▼

Completed Milestone ☆

Current Forecast Date △

Activity ID	Activity Desc.	Early or Actual Date	Baseline Date	MS Level	FY09 D	J	F	M	A	M	J	J	A	S	O
1.6.2.5.1	FEB modules for IPND started	24Jul09	29Jun09	L5									△-18d		
1.6.1.2.8	QA/QC station ready	04Sep09	20Jul09	L5										△-34d	
1.6.1.6.1.7	APD modules for 8-plane segment completed	14Sep09	27Jul09	L5										△-34d	
1.7 -- DAQ System R&D															
1.7.2.2.2.3.4	Schematic approved	14Apr09	13Feb09	L5					△-42d						
1.7.1.4.4.7	Run control system for software first release	30Apr09	03Mar09	L5					△-42d						
1.7.2.3.1.3	Requirements approved	04May09	05Mar09	L5					△-42d						
1.7.2.2.3.3	PCB manufacturing approved	08May09	11Mar09	L5					△-42d						
1.7.2.3.4	Evaluation components received	02Jun09	02Apr09	L5					△-42d						
1.7.2.1.6.2	IPND data concentrator PCBs and components received	11Jun09	14Apr09	L5					△-41d						
1.7.1.8.3.6	Global trigger system for software first release	14Jul09	13May09	L5					△-42d						
1.7.1.6.4.1.6	Event buffer farm server for software first release	17Jun09	15May09	L5					△-22d						
1.7.2.2.3.5	Prototype PCBs and components received for control and timing system	14Jul09	20May09	L5					△-37d						
1.7.2.4.1.3	Requirements approved	05Aug09	05Jun09	L5					△-42d						
1.7.4.11	Detector control system released	12Aug09	12Jun09	L5					△-42d						
1.7.1.6.3.1.13	Event buffer farm core software for software first release	17Jul09	16Jun09	L5					△-22d						
1.7.2.4.3	Evaluation components received	02Sep09	06Jul09	L5					△-42d						
1.7.1.8.4.8	Global trigger system for software second release	14Sep09	15Jul09	L5					△-42d						
1.7.1.11	DAQ software ready for IPND	14Sep09	15Jul09	L4					△-42d						
1.7.2.1.8	IPND data concentrators ready for installation	20Oct09	21Aug09	L4											△-41
1.7.2.2.4.4	Control and timing prototype tests completed	21Oct09	28Aug09	L5											△-37
1.8 -- Detector Assembly R&D															
1.8.5.2.12	IPND systems designs completed	19Jun09	21Apr09	L5					△-42d						
1.8.6.4	30% design of far detector mechanical systems and tooling completed	26Jun09	28Apr09	L5					△-42d						
1.8.8.2.6	Select site for block installation at FNAL	25Jun09	05May09	L5					△-36d						
1.8.5.4.5	IPND block assembly facility completed	11Aug09	11Jun09	L6					△-42d						
1.8.5.6.1.4	Notice to proceed on Phase 1 of IPND infrastructure in MSB	18Aug09	18Jun09	L6					△-42d						
1.8.5.6.2.4	Notice to proceed - Phase 1 of IPND containment	01Sep09	02Jul09	L6					△-42d						
1.8.8.1.13	Full-scale block assembly prototype testing completed	13Oct09	23Jul09	L4											△-57d
2.0 -- ANU Construction															
2.0.2.2.5.1	MI RF Cavities Bus Bar Fabrication & Installation Complete	07Aug09	29May09	L4					△-49d						
2.0.1.3.4.3	RR DCCT Ready for Installation	24Sep09	24Sep09	L5											△0
2.0.1.1.5.3	RR Orders Placed for Copper for 53 Mhz RF	29Sep09	07Oct09	L5											△6d

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Milestone Gantt Chart - 6-month look ahead

Monthly Report - Mar09

Time Now: 01Apr09

Baseline: NOVA_PMB

Baseline Date ▼

Completed Milestone ☆

Current Forecast Date △

Activity ID	Activity Desc.	Early or Actual Date	Baseline Date	MS Level	FY09 D	J	F	M	A	M	J	J	A	S	O
2.0.3.2.4.7	NuMI IHEP ME Target Accord Signed	27Aug09	10Mar10	L.5										△131d	
2.1 -- Site and Building															
2.1.1.1.21	Site Prep Package Title 2 completed	11Mar09	27Mar08	L.5				☆-239d							
2.1.1.3.4	Issue RFP for Site Prep Package	09Mar09	16Feb09	L.5			▼	☆-15d							
2.1.1.3.7	Site preparation purchase order released	21Apr09	06Apr09	L.2					▼ △-11d						
2.1.1.4.1	Notice to proceed - far detector site preparation package	28May09	07Apr09	L.5					▼	△-36d					
2.1.2.1.21	Far Detector Building Title 2 completed	11Mar09	26Aug09	L.5				☆118d					▼		
2.1.2.2.4	Issue RFP for Far Detector Building	09Mar09	14Sep09	L.5				☆132d						▼	
2.2 -- Liquid Scintillator															
2.2.3.4	Waveshifter PO issued	23Jul09	22May09	L.2						▼		△-42d			
2.2.3.5.1	Waveshifter production and delivery begins	24Jul09	26May09	L.5						▼		△-42d			
2.2.3.5.4	Waveshifter production 15% completed	20Nov09	23Sep09	L.5										▼	
2.4 -- PVC Extrusions															
2.4.1.2.3.2	Vendor Samples POs issued	25Sep09	25Sep09	L.5										▼△0	
2.8 -- Near Detector Assembly															
2.8.1.1.6	Administrative and safety signoffs on near detector cavern excavation design	09Jun09	08May09	L.6						▼	△-21d				
2.9 -- Far Detector Assembly															
2.9.2.2.21.3	Final design approved-south bookend	21Apr09	20Feb09	L.5			▼		△-42d						
2.9.3.1.3	Scintillator transfer facility final design approved	28Apr09	27Feb09	L.5			▼		△-42d						
2.9.1.1.3	Final design approved - module lifting fixture	04May09	05Mar09	L.5			▼		△-42d						
2.9.2.2.22.3	Final design approved- north bookend	12May09	13Mar09	L.5			▼		△-42d						
2.10 -- Project Management - Construction															
2.10.9.21	DOE OECM - FRA EVMS Readiness Assessment	09Jan09	01Oct08	L.2		☆-67d									
2.10.9.22	DOE OECM - FRA EVMS Certification Review	15May09	01Dec08	L.2	▼					△-113d					
2.10.9.20	DOE OHEP CD-3a Mini-review	24Oct08	15Jan09	L.2		▼									
2.10.8.1	CD-3a	24Oct08	02Feb09	L.1			▼								
2.10.9.5	CD-3a Funds Available	24Oct08	02Feb09	L.3			▼								
2.10.9.7	FY09 Funds Available	14Oct08	02Feb09	L.3			▼								
2.10.10.3	2009 Shutdown Begun	15Jun09	06Apr09	L.3					▼		△-49d				
2.10.9.24	Director's CD-3b Review	15Jun09	01May09	L.3						▼	△-30d				
2.10.9.23	DOE OECM - FRA EVMS Certified	29Sep09	01Jun09	L.2							▼				△-84d
2.10.9.25	DOE OHEP CD-3b Review	23Jul09	01Jun09	L.2							▼		△-36d		
2.10.10.4	2009 Shutdown Completed	21Aug09	12Jun09	L.4								▼		△-49d	

Project: NOVA_PROJECT
View: NOVA_BARVW_56
Filter: Rolling_6Month_Window_MilestonesOnly
Sort: BaselineFinish
Run: 14Apr09

Baseline: NOVA_PMB
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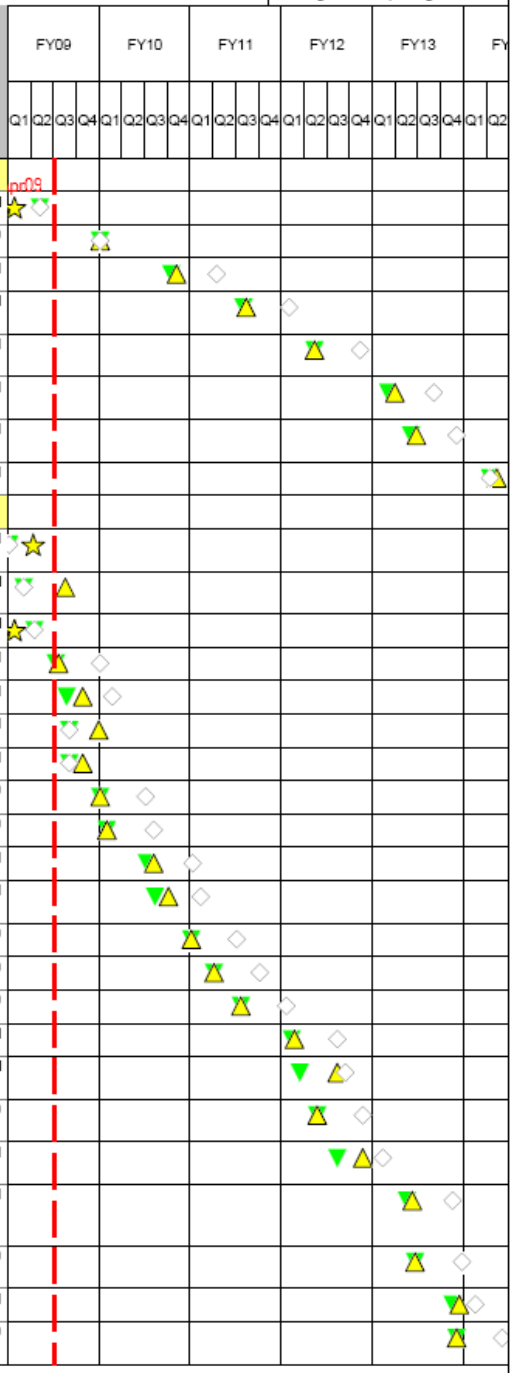
Milestone Analysis by Management Level

This looks ahead to all remaining L1 and L2 milestones in the project.

Nova Project
Milestone Gantt Chart
Nova_Milestones_L1_L2 = [BOOL.T] and ESDATE >= {10/1/08}
Mar09 Status
TimeNow: 01Apr09

Baseline Date
Completed Milestone
Current Forecast Date
Management Reporting Date

Activity Desc.	Baseline Date	Forecast / Actual Date	Management Reporting Date	Reporting Milestone Float	Baseline Variance
L.1 -- DOE - OHEP Associate Director Milestone					
CD-3a	02Feb09	24Oct08	02Feb09	63d	63d
CD-3b	01Oct09	01Oct09	01Oct09	0	0
IPND ready to take data	12Jul10	04Aug10	12Jan11	108d	-17d
Benefical occupancy - far detector building construction	28Apr11	11May11	28Oct11	118d	-9d
Beneficial occupancy of near detector cavern	10Feb12	09Feb12	10Aug12	128d	1d
NuMI neutrino event observed in Superblock 1	03Dec12	28Dec12	03Jun13	106d	-17d
Near detector completed and ready to operate	01Mar13	26Mar13	03Sep13	111d	-17d
14 kt installation completed	16Jan14	11Feb14	16Jan14	-18d	-17d
L.2 -- DOE- NOVA Project Director Milestone					
DOE OECM - FRA EVMS Readiness Assessment	01Oct08	09Jan09	01Oct08	-67d	-67d
DOE OECM - FRA EVMS Certification Review	01Dec08	15May09	01Dec08	-114d	-113d
DOE OHEP CD-3a Mini-review	15Jan09	24Oct08	15Jan09	52d	52d
Site preparation purchase order released	06Apr09	21Apr09	06Oct09	116d	-11d
Waveshifter PO issued	22May09	23Jul09	23Nov09	85d	-42d
DOE OECM - FRA EVMS Certified	01Jun09	29Sep09	01Jun09	-85d	-84d
DOE OHEP CD-3b Review	01Jun09	23Jul09	01Jun09	-37d	-36d
Extrusion PO issued	01Oct09	01Oct09	01Apr10	122d	0
WLS fiber PO issued	02Nov09	02Nov09	03May10	123d	0
IPND blocks completed	09Apr10	04May10	08Oct10	109d	-17d
Decision point for buying additional waveshifter powders	11May10	01Jul10	11Nov10	93d	-36d
Mineral oil PO issued	01Oct10	01Oct10	01Apr11	124d	0
APDs PO issued	03Jan11	03Jan11	01Jul11	127d	0
Block pivoter completed	20Apr11	20Apr11	20Oct11	127d	0
Decision point for buying additional APDs	11Nov11	23Nov11	11May12	115d	-8d
MI Ring Modifications Ready for Beam Transport	14Dec11	09May12	14Jun12	24d	-100d
Decision point for buying additional WLS fiber	23Feb12	23Feb12	23Aug12	128d	0
RR Modifications Ready for Beam Transport	10May12	23Aug12	09Nov12	54d	-73d
Decision point for buying additional extrusions, modules, mineral oil, pseudocumene	13Feb13	08Mar13	13Aug13	110d	-17d
Far Detector extrusions for 14kt completed	20Mar13	20Mar13	20Sep13	128d	0
Far detector modules for 14 kt shipped	15Aug13	10Sep13	15Nov13	47d	-17d
Ready to Commission Upgrades with Medium Energy Neutrino Beam	03Sep13	03Sep13	03Mar14	121d	0



Project: NOVA_PROJECT
View: NOVA_BARVW_446
Filter: Nova_Milestones_L1_L2 = [BOOL.T] and ESDATE >= {10/1/08}
Sort: BaselineFinish
Run: 13Apr09

Baseline: NOVA_PMB
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