March 27, 2009
NOVA-doc-3652

January, 2009
NOvA Monthly Report

Table of Contents:

Project Office Overview

(J. Cooper)

NOvA effort at Fermilab, ANL, and universities has mostly returned to the levels prior to the FY08 Omnibus Appropriations Bill passed in December 2007. **The cycle of turning off NOvA in December 2007 and restoring funding in July 2008 actually took a full year to overcome even though the funding was cut off for only 6 months.**

Exceptions to full staffing in January were concentrated in two areas:

- NOvA data acquisition software effort continued to be a problem since Fermilab people had been reassigned to other higher priority projects. A new team will have to be constituted to do the NOvA work. A meeting among the new NOvA data acquisition software manager with the re-assigned workers and a few new team members was been arranged for mid-February.
- NOvA Project Controls effort continued to be a problem since Fermilab NOvA people were participating heavily in preparations for the FRA Earned Value Management System (EVMS) Certification process. NOvA is the example project for this review, but effort has been required on the FRA Procedures separately from the NOvA implementation of those procedures.

A few other individual holes still exist in other areas throughout the collaboration.

A DOE-OECM EVMS Readiness Review took place on January 9, and a NOvA Project overview talk and discussion was a major part of that review. Several FRA and NOvA issues were identified by OECM and their contractor Tecolote Research, Inc. during the review. These issues were still under discussion at the end of January.

A FRA/Fermilab Directorate Internal Readiness Assessment for EVMS took place during Jan 12-16. This was a full dress rehearsal for a DOE-OECM Certification Review complete with interviews of all NOvA Control Account Managers. The review identified several deficiencies with specific NOvA application of FRA procedures and deficiencies of the FRA procedures themselves. Changes responding to the deficiencies began in January.

The OECM EVMS Certification Review of FRA has not yet been scheduled. Dates from March 30 through May 11 were under discussion at the end of January.

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
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
EAW	Environmental Assessment Worksheet (State of Minnesota)
EIR	External Independent Review
ESAAB	DOE Energy Systems Acquisition Advisory Board
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
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
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

A contract Mechanical Engineer was hired for Transfer Line installation planning and mechanical design work. The ADCW switcher magnet pulsed power supply design work has started to be scoped. An effort is being made to coordinate TD measurements with AD EE Support Department to facilitate design process.

ADC magnet prototyping:

An ADC has been disassembled. Methods for better securing of the coils have been considered. The drawings are still underway for the shims for stabilizing the coil positions of ADC magnets during the ramp.

Permanent magnets R&D (PDD, Common tooling, & RQN):

Several permanent quads were disassembled within Technical Division, starting the effort to gain back the knowledge on how to rebuild these magnets. Work on the brick magnetizer and brick measurement system resumed. That aspect of permanent magnet tooling is expected to be operational by mid February, with disassembly and re-assembly of a PDD to follow. Experimental trials of trimming a quad to several different values and measuring it are on hold pending measurement system availability. This effort is expected to resume in February.

PDS:

SmCo5 bricks and magnet parts were shipped to the manufacturer for assembly of a prototype. For the first attempt, the SmCo5 bricks were not oriented properly requiring disassembly and a second attempt at fabrication.

A 53MHz cavity electrical mock-up was built to get a measurement of the resonant modes expected in the actual cavity. Parts were ordered to make a "hairless" cavity mock-up to further test cavity geometry and resonant modes. Calculations were made to understand necessary wall thickness of copper cavity. Search for a company that can machine the OFHC copper has begun.

Engineering specification was completed and sent with original purchase order to S&C for bidding for the switch.

1.0.1.2 Recycler Kicker Systems

Work has mainly been concentrated on the off-project gap clearing kickers. Work on the NOVA/ANU project scope will ramp up later this year. On project PFL, parts arrived and were being set up in late January. Winding is expected to begin in early February. Modeling of the RR Extraction/MI Injection kicker is underway. Winding has begun on four PFL's, but the rest of the cable has been delayed a month. Discussions

have begun on the design of the abort magnet and the design should begin on schedule next month.

1.0.1.3 Recycler Instrumentation

BPM--Work continued on finalizing the design of the BPM cables and transition boards. There was a meeting on finalizing the design of the BPM system. Changes in the injection/extraction/abort lines were noted. The design work is considered on schedule.

DCCT—There was a meeting about designing and fabricating the DCCT in-house. Since we would like to manufacture the DCCT in-house instead of purchasing it from a vendor as originally planned, we are working on a change request. Work is in progress on the conceptual design as well as material considerations. Another meeting was scheduled Feb. 5th to discuss the location and physical constraints in order for the engineer to determine the physical requirements, excitation frequency and power. To order the cores, it seems to be about a 10wk lead time because they are all custom orders.

1.0.1.4 Recycler Radiation Safety

Measurements continued in the regions near MI39 and MI14 as part of planning for penetration and gap clearing kicker installation in 2009. Progress was made on the updated MI shielding assessment. All of the approximately 470 penetrations have been assessed and mitigation solutions are being developed for those that do not meet the new shielding requirements.

1.0.2.1 MI Modifications

LLRF design work continued (reached 30%). A couple of VXI crates and controllers were purchased for system testing.

1.0.2.2 MI RF Cavities

Drawings for the Higher Order Mode dampers were taken to the machine shops. Second Main Injector cavity was tested with water for leaks and we are presently working on cleaning up the water lines on the cavity so we can connect it to the deionized water system.

1.0.2.3 MI Radiation Safety

See 1.0.1.4

1.0.3.1 NuMI Primary Proton Beam

Engineering efforts continued to complete final specifications for procurement of primary beam components designated as CD-3a items (Bμlb regulation systems for six major dipole power supplies, and new 75 kW power supplies and regulation units for the higher current quadrupoles). Final internal AD/EE review of the procurement plans should occur shortly, with submission of the purchase requisitions to follow.

1.0.3.2 NuMI Target Hall Technical Components

Due to concern about the time scale for radiation damage to the target, options for a moving target were examined that would allow remotely rotating in fresh target

material. Because of the risk associated with having moving parts in the high radiation area, alignment concerns, and schedule risk, it was decided to stay with the current fixed target design.

1.0.3.3 NuMI Target Hall Infrastructure

NuMI Target Hall Space Planning & Horn 2 Relocation to ME:
Work continued on the Horn 2 stripline extension: Work was done on an assembly sketch of the walkway extension stripline. Drawings from the existing walkway stripline were marked up for change to meet new anti-corrosion requirements for use on the new extension.

Work started on the task: Design New Equipment for Operations.

Target Chase:
Analysis of chase paint samples for temperature limits was completed by ES&H (these are paints used on the NuMI target chase steel shielding). Final reports have been posted in NOVA-doc-2734. All three paints were found to be safe up to 500F/260C (max temperature predicted in the chase shielding is 308F/153C).

1.0.3.4 Decay Pipe, Hadron Absorber and Utilities
No technical progress.

1.0.4 Beam Physics
Main Injector collimators have arrived at an essentially final operating location, and have started to be evaluated for the ANU loss model. Beam Dynamics and ECloud simulations continued with ORBIT. Optimization of the slip stacking procedure continued. The ECloud detector design is finalized, and we are now exploring when a final installation may take place (probably in 2010 shutdown).

WBS 2.0 ANU Construction

(P. Derwent)

2.0.3.3 NuMI Target Hall Infrastructure

Horn 2 Re-location to Medium Energy—Shielding Reconfiguration
Work started on the task: Final Design Shielding Blocks & Remote Lifting Components (incorporating recommendations from the initial design review).

2.0.4 ANU Project Management
ANU management continued to meet with the project team working on the kicker systems to understand how work needs should be replanned to reflect how the work will be performed. Changes to the schedule for the next 6 months were determined and will be integrated in February.

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 January 2009, the drawings and specifications were issued for a Project Coordination Review. This review included members of the NOvA Collaboration, Fermilab, the University of Minnesota and Hines. As part of the January 2009 NOvA Collaboration Meeting, a working group meeting was held to review the project documents with the affected WBS groups. On January 30th, a meeting was held at the Burns and McDonnell office to present the results of the review.

2.1.1 Site Preparation Package

2.1.1.1 Site Preparation Package - Title 2 (Design) Phase

In January 2009, the drawings and specs were issued for a Project Coordination Review. This review included members of the NOvA Collaboration, Fermilab, the University of Minnesota and Hines. As part of the January 2009 NOvA Collaboration Meeting, a working group meeting was held to review the project documents with the affected WBS groups. On January 30th, a meeting was held at the Burns and McDonnell office to present the results of the review.

The updated Storm Water Pollution Prevention Plan was issued for Project Coordination Review in January 2009. Comments received were forwarded to Burns and McDonnell on January 30th.

The rock excavation portion of the Site Preparation Package presents a construction risk. Two (2) external reviews of the rock excavation work were undertaken in January 2009. The reviewers included an internal Fermilab rock expert not associated with the NOvA project, and an outside engineering firm to review the Geotechnical Baseline Report and the rock excavation drawings. The comments and suggestions were presented to Burns and McDonnell for evaluation on January 30th.

2.1.1.2 Site Preparation Package - Wetland Mitigation

In order to complete this task, the wetland banking credits will need to be purchased. The University of Minnesota is currently finalizing this action and it is expected that the credits will be obtained by February 2009.

2.1.1.3 Site Preparation Package – Procurement Phase

Additional discussions with University of Minnesota personnel were ongoing in January 2009. The goal remains to develop a procurement strategy similar to that described in the December 2009 report.

2.1.2 Far Detector Building

2.1.2.1 Far Detector Building - Title 2 (Design) Phase

In January 2009, the drawings and specifications were issued for a Project Coordination Review. This review included members of the NOvA Collaboration, Fermilab, the University of Minnesota and Hines. As part of the January 2009 NOvA Collaboration Meeting, a working group meeting was held to review the project documents with the affected WBS groups. On January 30th, a meeting was held at the Burns and McDonnell office to present the results of the review.

The project team tasked an outside architectural/engineering firm to review the Far Detector Building documents and provide a general overview of the status of the documents and the suitability for the intended purpose. The comments are due back in early February 2009.

2.1.2.2 Far Detector Building – Procurement Phase

See description in 2.1.1.3 above.

2.1.3 Site and Building Security

The activities associated with this WBS item have been incorporated into the design of the Far Detector Building (WBS 2.1.2.1).

WBS 1.2 Liquid Scintillator

(S. Mufson)

1.2.1, 1.2.9 Requirements and Procurement

No change from last month.

1.2.4, 1.2.7 Production Methods

At Indiana several samples of scintillator with varying concentrations of fluors were prepared to study new tests of concentration. These samples were analyzed by Jon Karty of Indiana University Chemistry.

1.2.2, 1.2.3, 1.2.8 R&D Studies

Indiana found a problem in the alpha test that requires us to investigate alternative tests of composition. We have begun tests that use a gamma source instead of an alpha source. These tests consumed most of January. We have not yet found an accurate and reliable test.

1.2.5 QA/QC

Indiana has carefully retested several composite oils in both the IU spec and the tintometer. We are testing over and over again to be sure our methods remain accurate and reliable. Our results are being compared to older data.

The results of our work suggest that the tintometer can be reliably used to distinguish mineral oils with attenuation lengths longer than 3-5 m from those with shorter attenuation lengths. The tintometer can thus be used to qualify mineral oil for NOνA. Further, the tinotmeter is attractive because it is a rugged commercial device that is easily deployed at multiple sites. Quantitatively, a tintometer spec of 0.95 -- when the transmission of mineral oil is compared with a glass standard – assures the acquisition of mineral oil of sufficient quality for NOνA liquid scintillator. We expect to develop a tintometer spec for blended scintillator at the toll blender and at Ash River in the future. The issue of calibrating the tintometer and the procedure for retesting mineral oil or scintillator that fails the tintometer test are still areas being investigated both at IU and SMU.

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

At MSU, after finishing work on the scanning machine to be used for IPND fiber QA, a number of tests are in progress with previously delivered fiber. We made multiple wraps (up to 10) and testing that the attenuation lengths are not affected at normal and increased tension. To calibrate the illumination of the fiber through each hole we measured the light output with a single wrap of fiber over each hole. Sight corrections were needed to balance the response consistent with the expected variation in the holes, however, two holes showed significantly lower response. We cleaned those holes of some burrs and are recalibrating.

We are regularly performing production style scans and we can begin the QA for the IPND fiber when it arrives.

1.3.5 Integration Prototype- Near Detector Production

Fiber delivery is expected in early February.

1.3.6 Production WLS Fiber Specifications

1.3.7 Management – R&D Phase

No change during this month.

WBS 1.4 PVC Extrusions

(R. Talaga)

1.4.1 Physical Properties Determination and Test Method Development

N-27 PVC creep test stands at constant (room) temperature stopped (see October report) due to a fault in the chiller. Repairs were made to the setup, new samples were inserted, and first results indicated a slightly slower creep rate than earlier data. This result is consistent with a sample that had aged longer before the creep test began (700 days vs. 100 days).

A first design of an instrument to measure extrusion flatness by means of a photographic system was completed. The hardware has arrived and has been assembled. Computer interface connections and application software will be implemented next.

1.4.2 Raw Materials

1.4.3 Extrusions

1.4.4 Shipping and Handling1.4.6 Management

No progress this month.

1.4.6 Management

The scope of this task is to manage the activities in WBS 1.4. Monthly Progress reports and Schedule Turnaround reports have been submitted. The L2 manager presented the PVC task at a "mock" EVMS readiness review.

WBS 1.5 PVC Modules

(K. Heller/ D. Hennessy)

1.5.1 Requirements

No Change this month.

1.5.2 End Seal R&D

Redesign of the manifold racetrack to solve the mold flow problem was completed. Extruded tracks will be used instead of molded tracks and costs for this option continue to be investigated.

1.5.3 Photo Detector Interface R&D

No Change this month.

1.5.4 Module Factory R&D

Leak testing double-wide end seals began this month.

1.5.5 Quality Assurance and Quality Control Methods Development

Measurement of water diffusion rates through PVC, HEPC, and Noryl was started. This will allow us to determine the time for desiccant saturation.

1.5.6 Module shipping and storage R&D

No change during this month.

1.5.7 Integration Prototype Detector Modules

Continued readiness preparation for IPND production. A prototype shipping container is 50% complete.

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

The tolerance specifications have been agreed to by Hamamatsu and NOvA for the prototype production. A recent communication to Fermilab on the specifications for the arrays failed to note our more stringent specification on the dark current for the arrays. This oversight was communicated to Hamamatsu and will be the basis of the future quote. It was also the basis of all previous quotes; it was just not on the latest specification sheet for the prototype purchase.

Mock tests of using a finned electronics box for a heat sink for the TEC module has shown success so far. There is still work to be done to understand the range of applicability for a full test.

1.6.2 Front End Board

Completed FEB3 prototypes were received in January.

1.6.3 Power Distribution

Design of the boards for the Power Distribution Box have been completed. Production and assembly is underway.

1.6.4 Management - R&D Phase

No change since last report.

1.6.5 Vertical Slice Tests

Effort continued on the readout of the vertical slice version 2. Additional runs were conducted in December using a scintillator produced with lower quality (shorter attenuation length) oil. This test was intended to determine the suitability of QA tests on the scintillator oil. Analysis of the tests indicated that the light yield is 82% of the baseline scintillator. This would be greater than 27 photoelectrons. This would be sufficient light yield, and therefore the planned oil testing method appears to be sufficient for the NOvA experiment.

The further tests during January have all been consistent with the December results.

WBS 1.7 Data Acquisition

(L. Mualem)

1.7.1 DAQ Software

No progress this month.

1.7.2 DAQ Hardware

Effort on the hardware devices continued with Fermilab CD effort returned to NOvA. Prototype devices for the timing system arrived and documentation for the system is under development.

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

1.8.2. Structural Design Validation

These activities are now 50% complete, with the receipt of the Harvard consultant's report (NOVA-doc-3218). No additional work occurred during January.

1.8.3. Liquid Scintillator Filling and Handling

1.8.4. Near Detector Assembly

No change this month.

1.8.5. Integration Prototype Near Detector (IPND)

During January, 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 continued to better specify the needs of the detector enclosure.

1.8.6. Far Detector Assembly Engineering

Argonne engineers continued work on the vacuum lifting fixture in January. They worked on an investigation of alternative of vacuum cups that might be easier and faster to align than those used to date. Reliable operation of the lifting fixture has not yet been achieved.

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 January. The Level 3 manager for this task continues his review of FESS drawings of the Ash River civil construction. A fire protection system was specified for the adhesive dispenser, and a purchase order for this system was placed. Another round of comments was returned to the architects of the Far Detector building.

1.8.8. Far Detector Prototypes

During January, the scintillator leak test in the CZero building elevator-shaft enclosure was monitored. No leaks were 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 January, 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

One **NOvA Technical Board** meeting was held on January 6. The main part of the meeting was devoted to EVMS training of CAMs.

A **NOvA Project Management Group** meeting was held on January 20. The talks presented and minutes of the meeting are available in NOVA-doc-3523(v5).

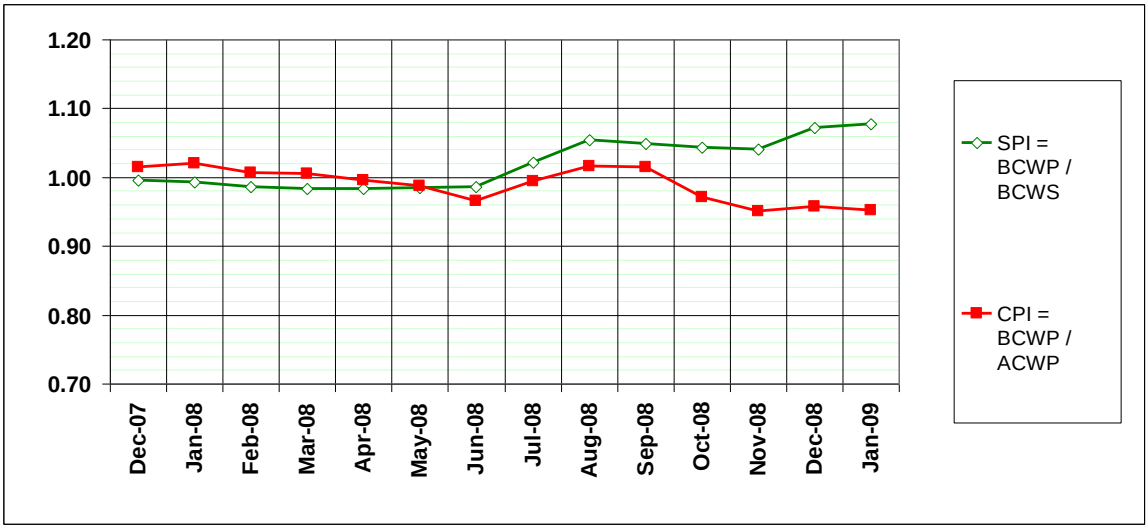
Now that the project has re-started and the full EVMS reporting is in process, the next step is to do the full reporting cycle more quickly. The Project Office has established a schedule for all the reporting input for each month and in November began to push each Level 2 Manager, each CAM, and Project Controls to execute the cycle within the allotted month. In the established schedule, these monthly reports should appear on the 20th working day of the following month (we realize that this month's report is appearing at ~ the 40th working day).

EVMS Summary

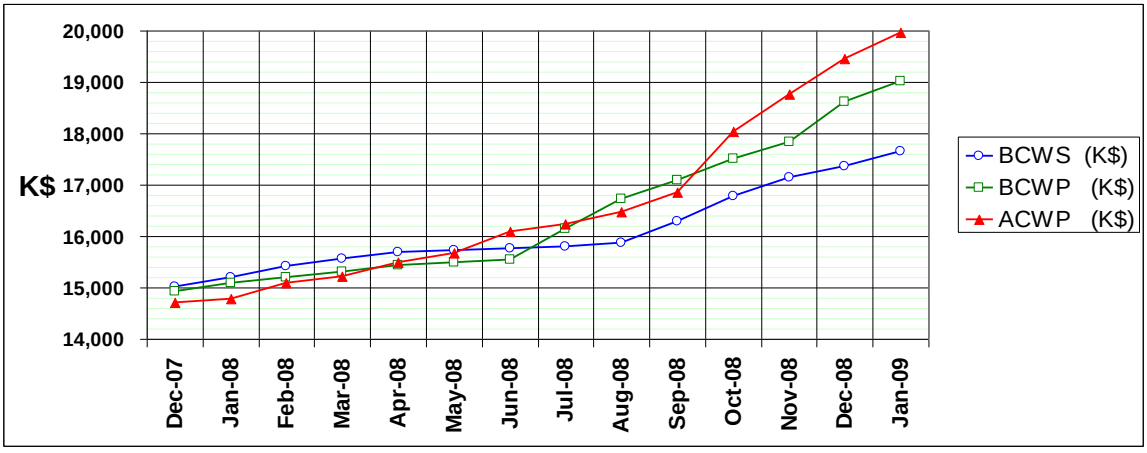
(S. Saxer, W. Freeman, H. Ferguson, E. McCluskey)

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.

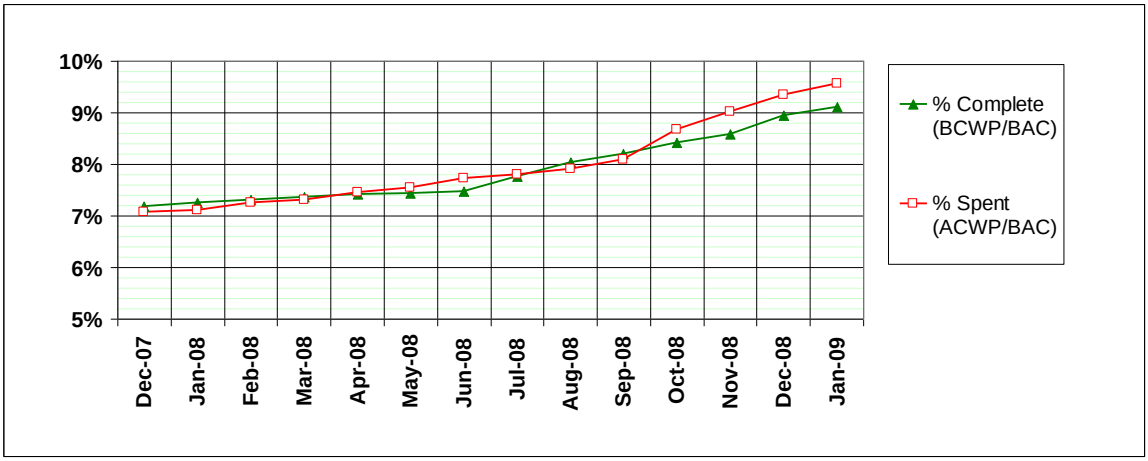
CPI and SPI curves.



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 January, one NOvA change required signature from this board. All changes were within the approval authority of the NOvA Project Manager.

CR Log Query for Monthly Report

CR #	Affected WBS #'s	CO Title	Date:	Level of Change	Final Cost Impact	Final Schedule Impact	Status
56	new tasks: 1.5.4.2.13, 1.5.5.16, 1.5.5.17, 1.5.7.1.6, existing 1.5.7.3.6	PVC Modules – Accommodating 2-Glue Sealing Solution	1/22/2009	L4 (NOVA PM)	$136,169.32	none	Approved by PM
55	new task 1.5.5.15	Leak Checking System for IPND	1/26/2009	L4 (NOVA PM)	$31,694.16		Approved by PM
54	2.0.1.2.1.1.8, 2.0.1.2.3.2.3, 2.0.1.2.3.2.4, 2.0.1.2.3.2.5, 2.0.1.2.3.2.6, 2.0.1.2.3.2.16, 2.0.1.2.3.3.4, 2.0.1.2.5.2.4	ANU Beam Tube Brazing Changes	1/26/2009	L3 (Directorate)	$296,998.61		Approved by DOE FPD

Sunday, March 15, 2009 Page 1 of 2

WBS Level 2 Contract Performance Report

COST PERFORMANCE REPORT FORMAT 1 - WORK BREAKDOWN STRUCTURE													
CONTRACTOR					CONTRACT		PROGRAM			4. REPORT PERIOD			
NAME Fermi National Accelerator Laboratory					NAME		NAME NOvA Project			FROM 01-Jan-2009 TO 31-Jan-2009			
PERFORMANCE DATA													
CostAcctFndSrc	CURRENT PERIOD					CUMULATIVE TO DATE					AT COMPLETION		
WBS[2] Results...	BUDGETED COST		ACTUAL COST	VARIANCE		BUDGETED COST		ACTUAL COST	VARIANCE			LATEST REVISED	
ITEM	WORK SCHEDULED	WORK PERFORMED	WORK PERFORMED	SCHEDULE	COST	WORK SCHEDULED	WORK PERFORMED	WORK PERFORMED	SCHEDULE	COST	BUDGETED	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$k	0	2	11	2	(9)	207	224	226	17	(2)	29,924	29,967	(43)
CostAcctFndSrcTotals:	0	2	11	2	(9)	207	224	226	17	(2)	29,924	29,967	(43)
DC DOE-CA													
2.1 Site and Building													
Fully burdened AY$k	7	213	46	206	167	296	901	912	605	(10)	46,239	46,405	(166)
CostAcctFndSrcTotals:	7	213	46	206	167	296	901	912	605	(10)	46,239	46,405	(166)
DD DOE-ACEL R&D													
1.0 ANU R&D													
Fully burdened AY$k	10	41	146	31	(106)	1,400	2,075	1,888	675	187	7,604	7,398	206
CostAcctFndSrcTotals:	10	41	146	31	(106)	1,400	2,075	1,888	675	187	7,604	7,398	206
DE DOE-DET MIE													
2.1 Site and Building													
Fully burdened AY$k	7	7	0	0	7	87	87	0	0	87	2,296	2,162	134
2.10 Project Management - Nova Project - Construction													
Fully burdened AY$k	62	62	42	0	20	668	668	534	0	135	5,562	5,398	164
2.2 Liquid Scintillator													
Fully burdened AY$k	0	0	0	0	0	0	0	0	0	0	18,516	18,510	6
2.3 WLS Fiber													
Fully burdened AY$k	0	0	0	0	0	0	0	0	0	0	10,081	10,097	(16)
2.4 PVC Extrusions													
Fully burdened AY$k	0	0	0	0	0	0	0	0	0	0	25,276	25,265	11
2.5 PVC Modules													
Fully burdened AY$k	12	12	0	0	12	49	49	0	0	49	10,306	10,250	56
2.6 Electronics													
Fully burdened AY$k	0	0	0	0	0	0	0	0	0	0	11,843	11,840	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	0	0	0	0	0	0	61	0	61	61	4,249	4,165	84
2.9 Far Detector Assembly													
Fully burdened AY$k	8	8	0	0	8	36	36	5	0	32	11,406	11,318	88
CostAcctFndSrcTotals:	89	89	42	0	47	841	902	538	61	363	103,067	102,537	530
DO DOE-ACEL OPS													
1.0 ANU R&D													
Fully burdened AY$k	0	9	7	9	2	80	215	29	135	186	1,227	1,039	189
CostAcctFndSrcTotals:	0	9	7	9	2	80	215	29	135	186	1,227	1,039	189
DR DOE-POST CD-1 DET R&D													
1.1 Site and Building R&D													
Fully burdened AY$k	71	0	133	(71)	(133)	2,275	2,275	1,626	0	648	2,275	1,626	648
1.2 Liquid Scintillator R&D													
Fully burdened AY$k	8	8	8	0	0	252	252	209	0	43	271	228	43
1.3 WLS Fiber R&D													
Fully burdened AY$k	0	4	0	4	4	147	147	160	0	(13)	299	312	(13)
1.4 PVC Extrusion R&D													
Fully burdened AY$k	0	6	6	6	(0)	926	938	955	13	(17)	1,348	1,368	(20)
1.5 PVC Module R&D													
Fully burdened AY$k	2	13	21	10	(8)	542	525	1,041	(17)	(516)	1,590	2,108	(519)
1.6 Electronics R&D													
Fully burdened AY$k	0	7	12	7	(5)	273	294	535	20	(242)	1,473	1,724	(250)
1.7 DAQ R&D													
Fully burdened AY$k	0	0	1	0	(1)	214	216	780	2	(564)	1,384	1,938	(554)
1.8 Detector Assembly R&D													
Fully burdened AY$k	91	0	68	(91)	(68)	1,011	866	1,697	(145)	(831)	2,851	3,682	(831)
1.9 Project Management R&D													
Fully burdened AY$k	0	0	(0)	0	0	383	383	559	0	(176)	383	559	(176)
CostAcctFndSrcTotals:	173	38	250	(134)	(211)	6,023	5,896	7,562	(127)	(1,667)	11,874	13,544	(1,671)
DY DOE CD-0 TO CD-1 R&D													
1.9 Project Management R&D													
Fully burdened AY$k	0	0	0	0	0	8,801	8,801	8,801	0	0	8,801	8,801	0
CostAcctFndSrcTotals:	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	279	393	502	114	(109)	17,646	19,013	19,957	1,367	(944)	208,735	209,691	(955)
Management Resrv.											69,265		
Total	279	393	502	114	(109)	17,646	19,013	19,957	1,367	(944)	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 changed in January 2009 to limits on the Schedule Variance (%) and on the Cost Variance (%) with $K thresholds for each, while the previous thresholds had been based solely on the SPI and CPI with no $K thresholds:

- Green: SV or CV < 5%
- Yellow: SV or CV in the range ≥ 5% but < 10% and the SV or CV is ≥125 K$
- Red: SV or CV in the range ≥ 10% and 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: Jan-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	10,145	50,048	153,541	39,903	393%	-103,493	-207%	1,479,644	2,289,796	1,917,467	810,152	55%	372,329	16%
1.1 Site and Building R&D	71,115	0	132,813	-71,115	-100%	-132,813	-100%	2,274,519	2,274,519	1,626,249	0	0%	648,270	29%
1.2 Liquid Scintillator R&D	8,436	8,436	8,314	0	0%	121	1%	251,918	251,943	208,893	25	0%	43,050	17%
1.3 WLS Fiber R&D	0	3,716	132	3,716	100%	3,584	96%	146,905	146,905	159,980	0	0%	-13,075	-9%
1.4 PVC Extrusion R&D	0	6,374	6,471	6,374	100%	-96	-2%	925,639	938,211	955,087	12,572	1%	-16,876	-2%
1.5 PVC Module R&D	2,353	12,584	20,790	10,231	435%	-8,206	-65%	542,460	525,091	1,041,055	-17,369	-3%	-515,963	-98%
1.6 Electronics R&D	0	7,103	12,277	7,103	100%	-5,174	-73%	273,209	293,587	535,375	20,378	7%	-241,788	-82%
1.7 DAQ R&D	0	0	1,199	0	0%	-1,199	-100%	214,243	216,297	780,153	2,053	1%	-563,856	-261%
1.8 Detector Assembly R&D	90,802	278	67,779	-90,525	-100%	-67,501	-24292%	1,010,644	865,849	1,696,662	-144,795	-14%	-830,813	-96%
1.9 Project Management R&D	0	0	-28	0	0%	28	-100%	9,184,127	9,184,127	9,359,785	0	0%	-175,658	-2%
Construction														
2.0 ANU Construction	0	2,173	11,387	2,173	100%	-9,214	-424%	206,551	223,528	225,856	16,977	8%	-2,329	-1%
2.1 Site and Building	13,820	219,920	46,000	206,099	1491%	173,920	79%	382,643	988,087	911,617	605,444	158%	76,470	8%
2.10 Project Management - Nova Project - Constr	61,975	61,975	41,789	0	0%	20,186	33%	668,253	668,253	533,698	0	0%	134,555	20%
2.2 Liquid Scintillator	0	0	0	0	0%	0	0%	0	0	0	0	0%	0	0%
2.3 WLS Fiber	0	0	0	0	0%	0	0%	0	0	0	0	0%	0	0%
2.4 PVC Extrusions	0	0	0	0	0%	0	0%	0	0	0	0	0%	0	0%
2.5 PVC Modules	12,092	12,092	0	0	0%	12,092	100%	48,975	48,975	0	0	0%	48,975	100%
2.6 Electronics	0	0	0	0	0%	0	0%	0	0	0	0	0%	0	0%
2.7 DAQ	0	0	0	0	0%	0	0%	0	0	0	0	0%	0	0%
2.8 Near Detector Assembly	0	0	0	0	0%	0	0%	0	61,242	0	61,242	100%	61,242	100%
2.9 Far Detector Assembly	8,492	8,492	0	0	0%	8,492	100%	36,422	36,422	4,692	0	0%	31,731	87%
R&D SubTotal (WBS 1.0-1.9)	182,851	88,540	403,289	-94,312	-52%	-314,749	-355%	16,303,309	16,986,325	18,280,706	683,016	4%	-1,294,381	-8%
Construction SubTotal (WBS 2.0-2	96,380	304,653	99,176	208,273	216%	205,477	67%	1,342,843	2,026,505	1,675,863	683,662	51%	350,643	17%
Project Total	279,231	393,192	502,465	113,961	41%	-109,273	-28%	17,646,152	19,012,831	19,956,568	1,366,678	8%	-943,738	-5%

In the overall project roll-up (see bottom line in the table), the project is within tolerance on both Cumulative and Monthly SV and CV. Since the project started up early following the FY08 Supplementary Appropriation in July 2008, we expect to be ahead of schedule, and the monthly & cumulative SVs confirm that we are slightly ahead.

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 SV and CV in the yellow. In both cases the SV and CV are positive variances reflecting the fact that the project started up ahead of schedule. Only about $ 1.6 M of Construction effort to date

has occurred since July 2008 and that work has been on final designs in preparation for a CD-3b IPR.

The R&D roll-up (third line from the bottom) shows an overall project summary with a positive Cumulative SV in the green (+4%) but negative Cumulative CV in the yellow (-8%). For about $ 18 M of BCWP on R&D to date, the R&D is costing more than planned due primarily to technical problems in the Detector Assembly WBS 1.8. The Current Month R&D SV is within tolerance but has a negative CV in the red due primarily to WBS 1.1 where fees associated with the Cooperative Agreement are coming in faster as the work is completed faster.

In January, 26 of the 68 NOvA Control Accounts were active with scheduled work, performed work, or actual costs in the cumulative view. 9 of the active Control Accounts required a written variance analysis in January. These were written by the CAMs and approved by the Project Manager.

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

Cumulative SV:

- 2.1.2 Far Detector Building SV = +623 K$ on 12 K$ of BCWS
  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 is little BCWS or BCWP until the task starts in the baseline schedule in February. The small ($12k) Cumulative BCWS is one month of costs that were scheduled prior to the interruption caused by the FY08 Omnibus Appropriations Bill. (This explanation is the same as in December's report.)

- 1.0.3 NuMI Upgrades SV = +577 K$ on 173 K$ of BCWS
  The work for 1.0.3 is ahead of schedule because funding and resources became available before the start dates in the project baseline. In December 2008 the NOvA project was rebaselined to start in February 2009 with the expectation that funding would be restored by the US Congress at that time. In the summer of 2008 a supplemental appropriations bill provided funding for the NOvA project earlier than expected but the project was not rebaselined. With funding and resources available, work began within control account 1.0.3 ahead of schedule. Begining work early helps mitigate NOvA risk #95 (see Nova docdb 2841) which is the potential lack of Accelerator Division personnel. (This explanation is the same as in December's report.)

- 1.8 Detector Assembly R&D SV = -145 K$ on 866 K$ of BCWP
  The variance is largely due to the fact that several technical issues with the detector structure and its assembly remained unresolved. The most significant variances are due to two categories of work:
  - W.B.S. 1.8.2 - Labor estimates for the structure analysis were too low, contributing to an overrun in cost and schedule here. The

design of the Far Detector was developed as the understanding of internal stresses improved, so the overall time and cost overran the schedule.

- W.B.S. 1.8.8 – Technical problems with the module lifting fixture and the prototype adhesive dispenser have slowed work on these items, so they remain incomplete.
    - Lifting fixture work has required more effort than anticipated to obtain a reliable vacuum connection between the fixture and the module. A new vacuum cup system was designed for the lifting fixture, and early tests have indicated that the reliability needed for this system may be achieved soon.
    - The adhesive dispenser work was delayed while several safety questions, which had not been anticipated, were resolved. The adhesive pump that was obtained for the dispenser proved unsuitable, due to an unforeseen problem with clogging in the pumping mechanism. These issues have delayed completion of the prototype program. An order for a replacement pump was placed in December and all safety issues with the dispenser mechanism have been addressed.

Cumulative CV:

- 1.1 Site & Building R&D CV = +577 K$ on 2,275 K$ of BCWP

  This positive variance is due to a better understanding of the work scope and a design cost from the architectural/engineering firm (Burns and McDonnell) less than anticipated. The NOvA Project was scheduled to reach the construction phase in October 2007, but funding delays in the beginning of FY08, funding cancelation and subsequent supplemental funding allocations contributed to the less than ideal execution of the work. Once work resumed, a better understanding of the site conditions, wetland permitting process and building design resulted in actual costs less than estimated. In addition, costs associated this WBS have had incorrect effort reporting to WBS 2.1.1 and 2.1.2 in December.
  (This explanation is the same as in December's report.)

- 1.0.3 NuMI Upgrades CV = +187 K$ on 1,054 K$ of BCWP

  The positive cost variance has been steadily growing and now appears to be due to a systematic over estimate of the manpower needed to complete the tasks. We will continue to monitor the situation and in the future can consider changing the estimate at completion as more data becomes available.
  (This explanation is the same as in December's report.)

- 1.7 DAQ R&D CV = -564 K$ on 216 K$ of BCWP

The majority of the cumulative variance was in several areas. The amount of debugging that was necessary on the first version of the DAQ hardware was more extensive than anticipated. The initial version of the device was more complicated than originally anticipated. Some of this variance may be reclaimed in that there will be less development needed since the hardware has a more standard interface rather than a custom implementation. The DAQ software variance is appears to be spread over all tasks, and is still under investigation for a complete accounting.

- 1.8 Detector Assembly R&D CV = -831 K$ on 866 K$ of BCWP

  The cumulative cost variance is largely due to the fact that several technical issues with the detector structure and its assembly remained unresolved, or the level of effort needed to complete the design was underestimated. The largest cost to this task is labor, both within Fermilab and purchased from ANL. Through November, $778K has been purchased from ANL (P.O. 563811).

  The most significant variances are due to two categories of work:

  - W.B.S. 1.8.2 - Structural Design Validation, $283K ACWP – 64% complete
    - Labor estimates for the structure analysis were too low, contributing to an overrun in cost and schedule here. The design of the Far Detector was developed as the understanding of internal stresses improved, so the overall time and cost overran the schedule.
  - W.B.S. 1.8.8 – Far Detector Prototypes, $791K ACWP – 19% complete
    - Technical problems with the module lifting fixture and the prototype adhesive dispenser have slowed work on these items, so they remain incomplete. Lifting fixture work has required more effort than anticipated to obtain a reliable vacuum connection between the fixture and the module. The adhesive dispenser work was delayed while several safety questions, which had not been anticipated, were resolved. The adhesive pump that was obtained for the dispenser proved unsuitable, due to an unforeseen problem with clogging in the pumping mechanism. All these issues have delayed completion of the prototype program. An order for a replacement pump was placed in December and all safety issues with the dispenser mechanism have been addressed. A new vacuum cup system was designed for the lifting fixture, and early tests indicated that the reliability needed for this system may be achieved soon.

  (This explanation is the same as in December's report.)

Since the FRA variance reporting rules have been modified during the last few months in preparation for an EVMS Certification review, it is interesting to look at the Level 2 variance report for both October 2008 and January 2009 under the January rules.

Report Period: Oct-08									
	Cumulative								
WBS Level 2	BCWS (AY$)	BCWP (AY$)	ACWP (AY$)	SV (AY$)	SV (%)	CV (AY$)	CV (%)	SPI	CPI
R&D at Level 2									
1.0 ANU R&D	1,445,420	1,965,600	1,701,491	520,180	36%	264,109	13%	1.36	1.16
1.1 Site and Building R&D	1,944,545	2,221,182	938,760	276,637	14%	1,282,422	58%	1.14	2.37
1.2 Liquid Scintillator R&D	227,454	227,479	191,240	25	0%	36,240	16%	1.00	1.19
1.3 WLS Fiber R&D	120,892	118,662	131,032	-2,230	-2%	-12,370	-10%	0.98	0.91
1.4 PVC Extrusion R&D	925,639	925,639	928,907	0	0%	-3,268	0%	1.00	1.00
1.5 PVC Module R&D	540,108	501,356	821,792	-38,751	-7%	-320,435	-64%	0.93	0.61
1.6 Electronics R&D	273,209	282,390	409,087	9,181	3%	-126,697	-45%	1.03	0.69
1.7 DAQ R&D	214,243	214,243	777,361	0	0%	-563,118	-263%	1.00	0.28
1.8 Detector Assembly R&D	840,092	812,005	1,419,872	-28,087	-3%	-607,867	-75%	0.97	0.57
1.9 Project Management R&D	9,184,127	9,184,127	9,359,813	0	0%	-175,686	-2%	1.00	0.98
Construction at Level 2									
2.0 ANU Construction	206,551	206,551	169,092	0	0%	37,459	18%	1.00	1.22
2.1 Site and Building	342,564	281,325	773,617	-61,239	-18%	-492,291	-175%	0.82	0.36
2.10 Project Management - Constructi	488,526	488,526	409,150	0	0%	79,376	16%	1.00	1.19
2.2 Liquid Scintillator	0	0	0	0	0%	0	0%	1.00	1.00
2.3 WLS Fiber	0	0	0	0	0%	0	0%	1.00	1.00
2.4 PVC Extrusions	0	0	0	0	0%	0	0%	1.00	1.00
2.5 PVC Modules	13,906	13,906	0	0	0%	13,906	100%	1.00	N/A
2.6 Electronics	0	0	0	0	0%	0	0%	1.00	1.00
2.7 DAQ	0	0	0	0	0%	0	0%	1.00	1.00
2.8 Near Detector Assembly	0	49,189	0	49,189	100%	49,189	100%	N/A	N/A
2.9 Far Detector Assembly	11,794	11,794	4,692	0	0%	7,103	60%	1.00	2.51
R&D SubTotal (1.0 - 1.9)	**15,715,729**	**16,452,684**	**16,679,355**	**736,955**	**4.7%**	**-226,671**	**-1.4%**	**1.047**	**0.986**
Constr. SubTotal (2.0-2.1	**1,063,341**	**1,051,291**	**1,356,550**	**-12,050**	**-1.1%**	**-305,259**	**-29%**	**0.989**	**0.775**
Project Total	**16,779,070**	**17,503,976**	**18,035,905**	**724,905**	**4.3%**	**-531,929**	**-3.0%**	**1.043**	**0.971**

Report Period: Jan-09									
	Cumulative								
WBS Level 2	BCWS (AY$)	BCWP (AY$)	ACWP (AY$)	SV (AY$)	SV (%)	CV (AY$)	CV (%)	SPI	CPI
R&D									
1.0 ANU R&D	1,479,644	2,289,796	1,917,467	810,152	55%	372,329	16%	1.55	1.19
1.1 Site and Building R&D	2,274,519	2,274,519	1,626,249	0	0%	648,270	29%	1.00	1.40
1.2 Liquid Scintillator R&D	251,918	251,943	208,893	25	0%	43,050	17%	1.00	1.21
1.3 WLS Fiber R&D	146,905	146,905	159,980	0	0%	-13,075	-9%	1.00	0.92
1.4 PVC Extrusion R&D	925,639	938,211	955,087	12,572	1%	-16,876	-2%	1.01	0.98
1.5 PVC Module R&D	542,460	525,091	1,041,055	-17,369	-3%	-515,963	-98%	0.97	0.50
1.6 Electronics R&D	273,209	293,587	535,375	20,378	7%	-241,788	-82%	1.07	0.55
1.7 DAQ R&D	214,243	216,297	780,153	2,053	1%	-563,856	-261%	1.01	0.28
1.8 Detector Assembly R&D	1,010,644	865,849	1,696,662	-144,795	-14%	-830,813	-96%	0.86	0.51
1.9 Project Management R&D	9,184,127	9,184,127	9,359,785	0	0%	-175,658	-2%	1.00	0.98
Construction									
2.0 ANU Construction	206,551	223,528	225,856	16,977	8%	-2,329	-1%	1.08	0.99
2.1 Site and Building	382,643	988,087	911,617	605,444	158%	76,470	8%	2.58	1.08
2.10 Project Management - Nova Proj	668,253	668,253	533,698	0	0%	134,555	20%	1.00	1.25
2.2 Liquid Scintillator	0	0	0	0	0%	0	0%	1.00	1.00
2.3 WLS Fiber	0	0	0	0	0%	0	0%	1.00	1.00
2.4 PVC Extrusions	0	0	0	0	0%	0	0%	1.00	1.00
2.5 PVC Modules	48,975	48,975	0	0	0%	48,975	100%	1.00	N/A
2.6 Electronics	0	0	0	0	0%	0	0%	1.00	1.00
2.7 DAQ	0	0	0	0	0%	0	0%	1.00	1.00
2.8 Near Detector Assembly	0	61,242	0	61,242	100%	61,242	100%	N/A	N/A
2.9 Far Detector Assembly	36,422	36,422	4,692	0	0%	31,731	87%	1.00	7.76
R&D SubTotal (WBS 1.0-1	**16,303,309**	**16,986,325**	**18,280,706**	**683,016**	**4.2%**	**-1,294,381**	**-7.6%**	**1.04**	**0.93**
Construction SubTotal (W	**1,342,843**	**2,026,505**	**1,675,863**	**683,662**	**51%**	**350,643**	**17%**	**1.51**	**1.21**
Project Total	**17,646,152**	**19,012,831**	**19,956,568**	**1,366,678**	**7.7%**	**-943,738**	**-5.0%**	**1.08**	**0.95**

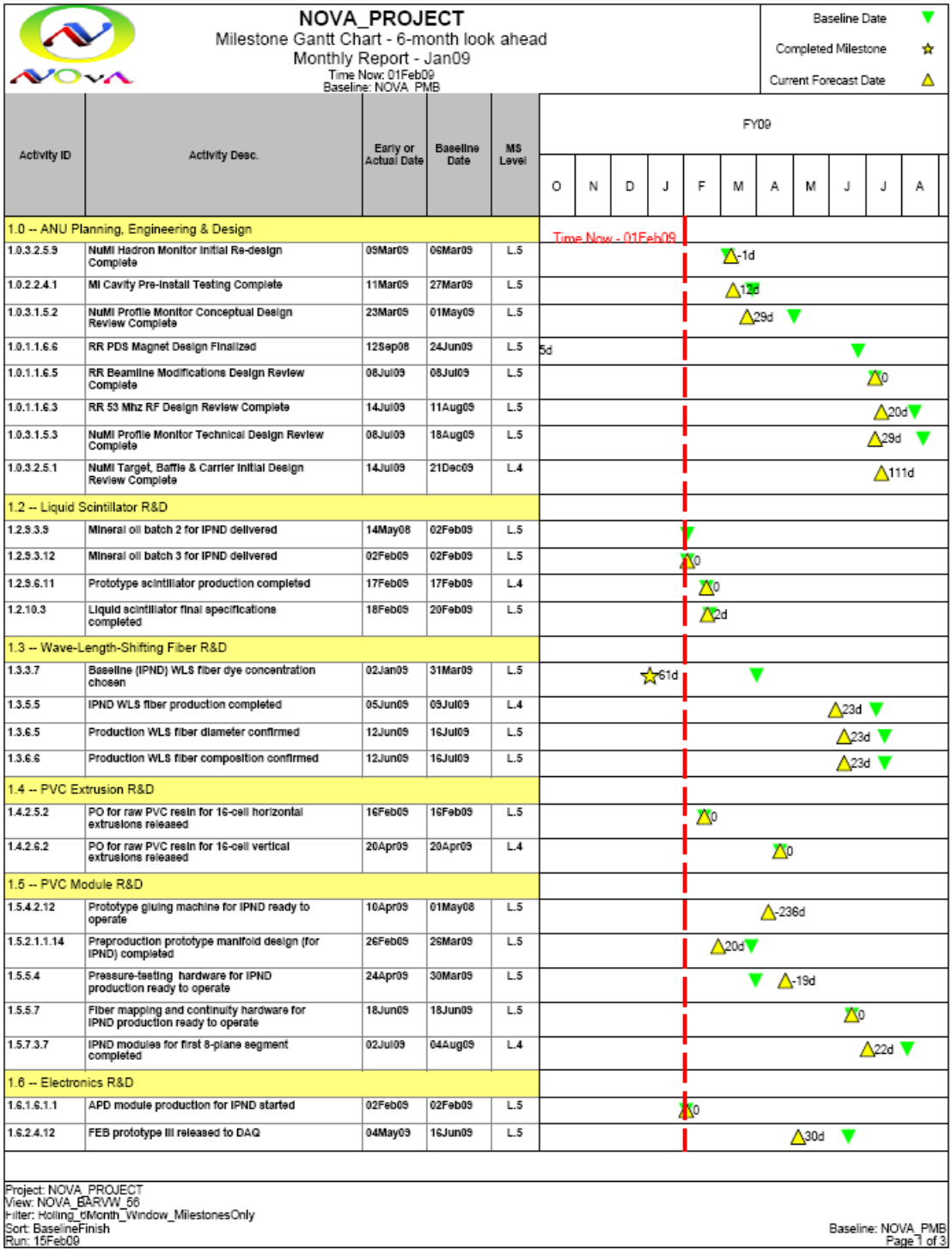
The cumulative Level 2 data shows 2 red schedule variances in each month, but on different lines and for different amounts. The data shows 6 red cost variances in October and only 5 in January.

Milestone Analysis

Milestones completed this month: 1

Milestones which should be complete by now but are not yet completed: 3

Many Current Forecast dates now lie on top of baseline dates since the project is about to catch up to the baseline schedule which had all work delayed to Feb 1, 2009 due to FY08 funding delays.



NOVA_PROJECT
Milestone Gantt Chart - 6-month look ahead
Monthly Report - Jan09
Time Now: 01Feb09
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	09Mar09	06Mar09	L5
1.0.2.2.4.1	MI Cavity Pre-Install Testing Complete	11Mar09	27Mar09	L5
1.0.3.1.5.2	NuMI Profile Monitor Conceptual Design Review Complete	23Mar09	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	08Jul09	08Jul09	L5
1.0.1.1.6.3	RR 53 Mhz RF Design Review Complete	14Jul09	11Aug09	L5
1.0.3.1.5.3	NuMI Profile Monitor Technical Design Review Complete	08Jul09	18Aug09	L5
1.0.3.2.5.1	NuMI Target, Baffle & Carrier Initial Design Review Complete	14Jul09	21Dec09	L4
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	02Feb09	02Feb09	L5
1.2.9.6.11	Prototype scintillator production completed	17Feb09	17Feb09	L4
1.2.10.3	Liquid scintillator final specifications completed	18Feb09	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	05Jun09	09Jul09	L4
1.3.6.5	Production WLS fiber diameter confirmed	12Jun09	16Jul09	L5
1.3.6.6	Production WLS fiber composition confirmed	12Jun09	16Jul09	L5
1.4 -- PVC Extrusion R&D				
1.4.2.5.2	PO for raw PVC resin for 16-cell horizontal extrusions released	16Feb09	16Feb09	L5
1.4.2.6.2	PO for raw PVC resin for 16-cell vertical extrusions released	20Apr09	20Apr09	L4
1.5 -- PVC Module R&D				
1.5.4.2.12	Prototype gluing machine for IPND ready to operate	10Apr09	01May08	L5
1.5.2.1.1.14	Preproduction prototype manifold design (for IPND) completed	26Feb09	26Mar09	L5
1.5.5.4	Pressure-testing hardware for IPND production ready to operate	24Apr09	30Mar09	L5
1.5.5.7	Fiber mapping and continuity hardware for IPND production ready to operate	18Jun09	18Jun09	L5
1.5.7.3.7	IPND modules for first 8-plane segment completed	02Jul09	04Aug09	L4
1.6 -- Electronics R&D				
1.6.1.6.1.1	APD module production for IPND started	02Feb09	02Feb09	L5
1.6.2.4.12	FEB prototype III released to DAQ	04May09	16Jun09	L5

Project: NOVA_PROJECT
View: NOVA_BARVW_56
Filter: Rolling_6Month_Window_MilestonesOnly
Sort: BaselineFinish
Run: 15Feb09

Baseline: NOVA_PMB
Page 1 of 3

NOVA_PROJECT

Milestone Gantt Chart - 6-month look ahead

Monthly Report - Jan09

Time Now: 01Feb09

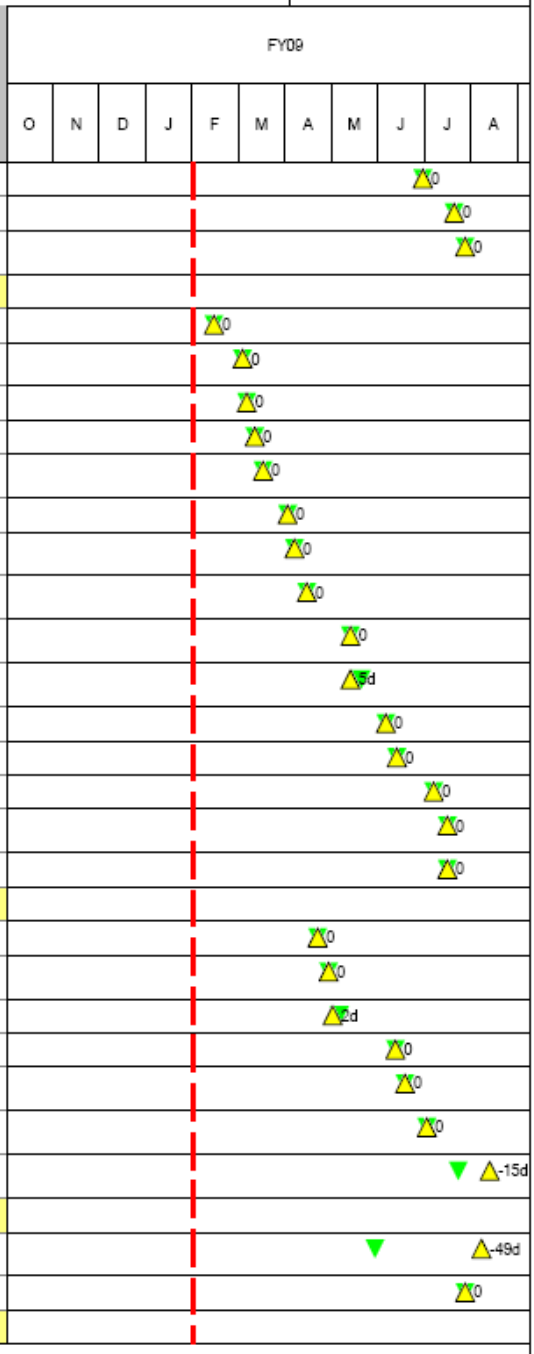
Baseline: NOVA_PMB

Baseline Date ▼

Completed Milestone ☆

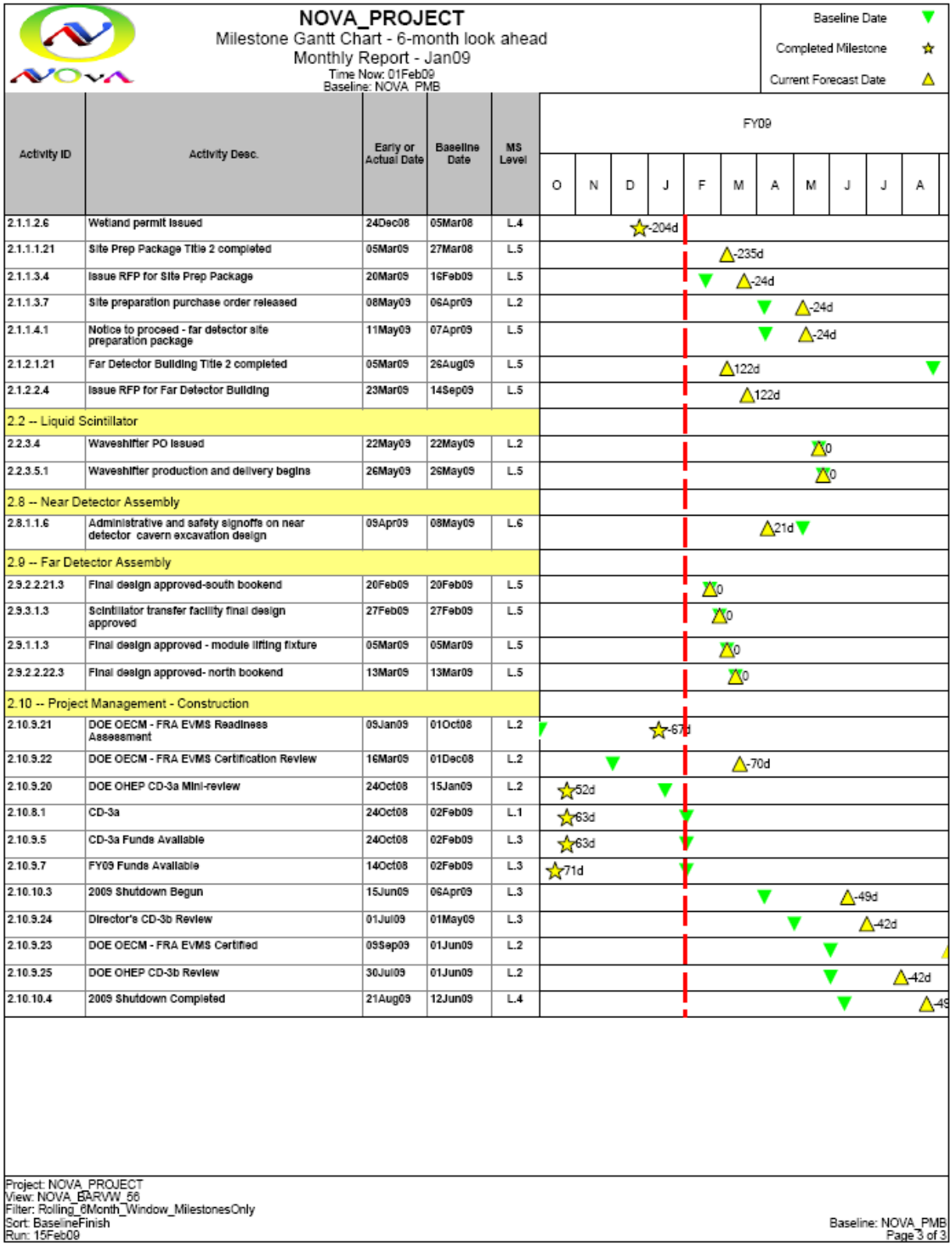
Current Forecast Date △

Activity ID	Activity Desc.	Early or Actual Date	Baseline Date	MS Level
1.6.2.5.1	FEB modules for IPND started	29Jun09	29Jun09	L5
1.6.1.2.8	QA/QC station ready	20Jul09	20Jul09	L5
1.6.1.6.1.7	APD modules for 8-plane segment completed	27Jul09	27Jul09	L5
1.7 -- DAQ System R&D				
1.7.2.2.2.3.4	Schematic approved	13Feb09	13Feb09	L5
1.7.1.4.4.7	Run control system for software first release	03Mar09	03Mar09	L5
1.7.2.3.1.3	Requirements approved	05Mar09	05Mar09	L5
1.7.2.2.3.3	PCB manufacturing approved	11Mar09	11Mar09	L5
1.7.1.6.4.1.6	Event buffer farm server for software first release	16Mar09	16Mar09	L5
1.7.2.3.4	Evaluation components received	02Apr09	02Apr09	L5
1.7.1.6.3.1.13	Event buffer farm core software for software first release	06Apr09	06Apr09	L5
1.7.2.1.6.2	IPND data concentrator PCBs and components received	14Apr09	14Apr09	L5
1.7.1.8.3.6	Global trigger system for software first release	13May09	13May09	L5
1.7.2.2.3.5	Prototype PCBs and components received for control and timing system	13May09	20May09	L5
1.7.2.4.1.3	Requirements approved	05Jun09	05Jun09	L5
1.7.4.11	Detector control system released	12Jun09	12Jun09	L5
1.7.2.4.3	Evaluation components received	06Jul09	06Jul09	L5
1.7.1.8.4.8	Global trigger system for software second release	15Jul09	15Jul09	L5
1.7.1.11	DAQ software ready for IPND	15Jul09	15Jul09	L4
1.8 -- Detector Assembly R&D				
1.8.5.2.12	IPND systems designs completed	21Apr09	21Apr09	L5
1.8.6.4	30% design of far detector mechanical systems and tooling completed	28Apr09	28Apr09	L5
1.8.8.2.6	Select site for block installation at FNAL	01May09	05May09	L5
1.8.5.4.5	IPND block assembly facility completed	11Jun09	11Jun09	L6
1.8.5.6.1.4	Notice to proceed on Phase 1 of IPND infrastructure in MSB	18Jun09	18Jun09	L6
1.8.5.6.2.4	Notice to proceed - Phase 1 of IPND containment	02Jul09	02Jul09	L6
1.8.8.1.13	Full-scale block assembly prototype testing completed	13Aug09	23Jul09	L4
2.0 -- ANU Construction				
2.0.2.2.5.1	MI RF Cavities Bus Bar Fabrication & Installation Complete	07Aug09	29May09	L4
2.0.1.3.4.3	RR DCCT Ready for Installation	27Jul09	27Jul09	L5
2.1 -- Site and Building				



Project: NOVA_PROJECT
View: NOVA_BARVW_56
Filter: Rolling_6Month_Window_MilestonesOnly
Sort: BaselineFinish
Run: 15Feb09

Baseline: NOVA_PMB
Page 2 of 3



NOVA_PROJECT

Milestone Gantt Chart - 6-month look ahead

Monthly Report - Jan09

Time Now: 01Feb09

Baseline: NOVA_PMB

Baseline Date

Completed Milestone

Current Forecast Date

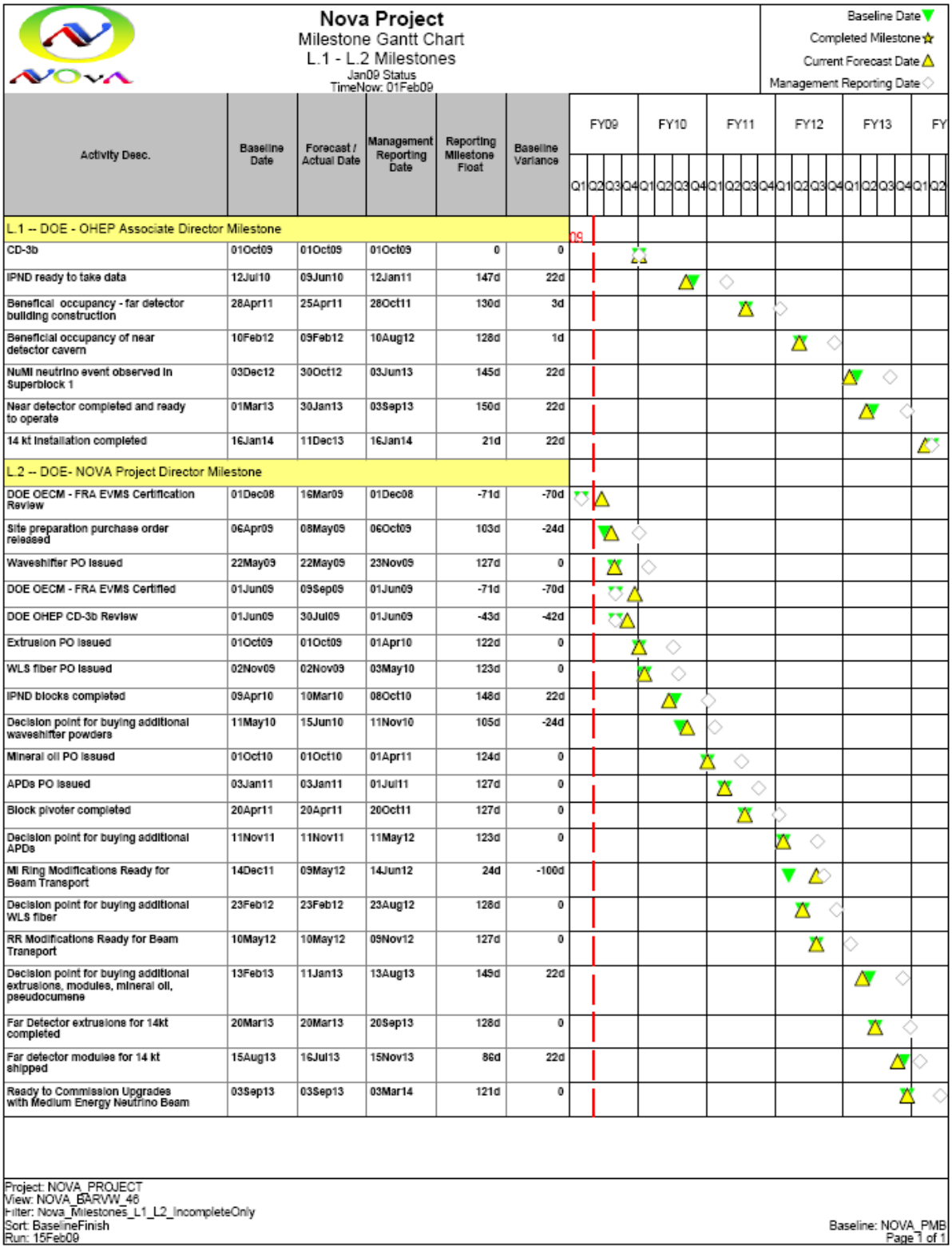
Activity ID	Activity Desc.	Early or Actual Date	Baseline Date	MS Level
2.1.1.2.6	Wetland permit issued	24Dec08	05Mar08	L.4
2.1.1.1.21	Site Prep Package Title 2 completed	05Mar09	27Mar08	L.5
2.1.1.3.4	Issue RFP for Site Prep Package	20Mar09	16Feb09	L.5
2.1.1.3.7	Site preparation purchase order released	08May09	06Apr09	L.2
2.1.1.4.1	Notice to proceed - far detector site preparation package	11May09	07Apr09	L.5
2.1.2.1.21	Far Detector Building Title 2 completed	05Mar09	26Aug09	L.5
2.1.2.2.4	Issue RFP for Far Detector Building	23Mar09	14Sep09	L.5
2.2 -- Liquid Scintillator				
2.2.3.4	Waveshifter PO issued	22May09	22May09	L.2
2.2.3.5.1	Waveshifter production and delivery begins	26May09	26May09	L.5
2.8 -- Near Detector Assembly				
2.8.1.1.6	Administrative and safety signoffs on near detector cavern excavation design	09Apr09	08May09	L.6
2.9 -- Far Detector Assembly				
2.9.2.2.21.3	Final design approved-south bookend	20Feb09	20Feb09	L.5
2.9.3.1.3	Scintillator transfer facility final design approved	27Feb09	27Feb09	L.5
2.9.1.1.3	Final design approved - module lifting fixture	05Mar09	05Mar09	L.5
2.9.2.2.22.3	Final design approved- north bookend	13Mar09	13Mar09	L.5
2.10 -- Project Management - Construction				
2.10.9.21	DOE OECM - FRA EVMS Readiness Assessment	09Jan09	01Oct08	L.2
2.10.9.22	DOE OECM - FRA EVMS Certification Review	16Mar09	01Dec08	L.2
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
2.10.9.24	Director's CD-3b Review	01Jul09	01May09	L.3
2.10.9.23	DOE OECM - FRA EVMS Certified	09Sep09	01Jun09	L.2
2.10.9.25	DOE OHEP CD-3b Review	30Jul09	01Jun09	L.2
2.10.10.4	2009 Shutdown Completed	21Aug09	12Jun09	L.4

Project: NOVA_PROJECT
View: NOVA_BARVW_56
Filter: Rolling_6Month_Window_MilestonesOnly
Sort: BaselineFinish
Run: 15Feb09

Baseline: NOVA_PMB
Page 3 of 3

Milestone Analysis by Management Level

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



Nova Project
Milestone Gantt Chart
L.1 - L.2 Milestones
Jan09 Status
TimeNow: 01Feb09

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-3b	01Oct09	01Oct09	01Oct09	0	0
IPND ready to take data	12Jul10	09Jun10	12Jan11	147d	22d
Benefical occupancy - far detector building construction	28Apr11	25Apr11	28Oct11	130d	3d
Beneficial occupancy of near detector cavern	10Feb12	09Feb12	10Aug12	128d	1d
NuMI neutrino event observed in Superblock 1	03Dec12	30Oct12	03Jun13	145d	22d
Near detector completed and ready to operate	01Mar13	30Jan13	03Sep13	150d	22d
14 kt installation completed	16Jan14	11Dec13	16Jan14	21d	22d
L.2 -- DOE- NOVA Project Director Milestone					
DOE OECM - FRA EVMS Certification Review	01Dec08	16Mar09	01Dec08	-71d	-70d
Site preparation purchase order released	06Apr09	08May09	06Oct09	103d	-24d
Waveshifter PO Issued	22May09	22May09	23Nov09	127d	0
DOE OECM - FRA EVMS Certified	01Jun09	09Sep09	01Jun09	-71d	-70d
DOE OHEP CD-3b Review	01Jun09	30Jul09	01Jun09	-43d	-42d
Extrusion PO Issued	01Oct09	01Oct09	01Apr10	122d	0
WLS fiber PO Issued	02Nov09	02Nov09	03May10	123d	0
IPND blocks completed	09Apr10	10Mar10	08Oct10	148d	22d
Decision point for buying additional waveshifter powders	11May10	15Jun10	11Nov10	105d	-24d
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	11Nov11	11May12	123d	0
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	10May12	09Nov12	127d	0
Decision point for buying additional extrusions, modules, mineral oil, pseudocumene	13Feb13	11Jan13	13Aug13	149d	22d
Far Detector extrusions for 14kt completed	20Mar13	20Mar13	20Sep13	128d	0
Far detector modules for 14 kt shipped	15Aug13	16Jul13	15Nov13	86d	22d
Ready to Commission Upgrades with Medium Energy Neutrino Beam	03Sep13	03Sep13	03Mar14	121d	0

Project: NOVA_PROJECT
View: NOVA_BARVW_46
Filter: Nova_Milestones_L1_L2_IncompleteOnly
Sort: BaselineFinish
Run: 15Feb09

Baseline: NOVA_PMB
Page 1 of 1