



# NOvA Project Status

John Cooper & Ron Ray

July 19, 2006



# Interactions with DOE

- July 12 talk with Mike Procario, first on Acquisition Strategy
- OECM passed back questions.
  - (OECM getting out of the business of reviewing these unless > \$750M)
- 1. They looked at the CDR, like the performance parameters
  - Would like to see performance parameters on the building
  - Mike is thinking electrical upgrade, power requirements -- I steered him to Life Cycle Costs Chapter
    - And to Chapter 8 (Building) of CDR.
  - Also thinking road - my summary is “all weather, 2 lane, 110 ft right of way w utility corridor”
- 2. They want more on startup costs
  - Mike needs some CD-1 quality text on startup costs during commissioning **(coming in a few slides)**
  - I noted our Cost&Sched has a power cost to operating as we turn on each 5 kt
  - Mike thinks this may lead to CD-4a, b, c, ....
  - Maybe we should have 4a = building, 4b = 10 kt, 4c =20 kt
  - Put this in PEP for CD-2 but don't complicate the preliminary version for CD-1 approval
  - (I mentioned our meeting with Lutha and Webster heading for a new preliminary PEP.
  - Mike not worried if funding profile sum is different from our cost total.)
- 3. Asked why we indexed quote instead of fixed price
  - So as to get ANY quotes for 2012, I said
  - Promised to send him website link / text from Dept of Commerce (actually Dept of Labor) site. **(next slide)**
- 4. Mike hopes to converge with OECM this (last) week.
  - **Did not hear result, Mike is at CERN this week**



# Interactions with DOE

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- Text on indexing

----- Original Message -----

**From:** [John Cooper](#)

**To:** [Procario, Michael](#)

**Cc:** [Ron Ray](#) ; [John Cooper](#)

**Sent:** Wednesday, July 12, 2006 5:26 PM

**Subject:** NOvA price indexing -- Department of Labor link

Mike,

The summary on indexing prices of future contracts comes from the Department of Labor, Bureau of Labor Statistics. It's an "Escalation Guide for Contracting Parties" and they treat it in the context of their Producer Price Index (PPI). The opening paragraph summarizes the philosophy: "Business firms in search of effective methods of coping with inflation often employ price adjustment (escalation) clauses in long-term sales and purchase contracts." NOvA is seeking solid quotes for materials to be delivered in 2012, materials that are derived from crude oil, and the volatility of crude oil prices would prevent vendors from bidding without covering their estimate of the worst case scenario for oil. Using an index instead is a method to protect both the vendor and the buyer and give this buyer (NOvA) a real cost estimate for products usually quoted on a 30 - 90 day basis. As you know we have then treated the price of crude oil as a contingency risk in a full Monte Carlo analysis using the projections of the DOE's Energy Information Administration.

See <http://www.bls.gov/ppi/home.htm> Then look about halfway down that page for "Publications and Other Documentation" and the Escalation Guide document is the third one in the list. I've attached the text below (11 pages) in case you have trouble finding the link.



# Interactions with DOE

- Text on indexing continued

The PPI isn't exactly relevant to our product of interest, since they have "gasoline", "diesel", "transportation", but not "mineral oil with the NOvA specified attenuation length". Maybe "Finished lubricants", ID# WPU0576 is closest, but in fact our mineral oil is more closely linked to ONE finished lubricant known as Group II viscosity 70 -- the base stock for all grades of mineral oil.

So, we asked bidders to index using "the PPI or the CPI (consumer price index) or the Chemical Market Reporter, or the Base Oil Price Report, or the Department of Energy's US Petroleum Prices, or other such readily available, standard and reputable indices." Mineral Oil people selected Group II-70 in the Base Oil Report, aka the "Lube Report" which also comes from a commercial subscription source called ICIS (only \$1,000 per year). Waveshifter people selected the Chemical Market Reporter and picked the relevant chemicals to their process. Transportation people picked the BNSF(Burlington Northern Santa Fe) fuel surcharge. Each or a combination of such indices could be part of an actual contract for NOvA someday.

The "Escalation Guide for Contracting Parties" is a nice handbook about how to use an index in a contract, covering topics like the base period average, the frequency of adjustments, seasonal adjustments if appropriate (e.g. we know PVC resin costs are related to natural gas used in production and natural gas has a large seasonal swing, so we may see that one in the quotes we are about to seek for PVC resin), ...

John



# Interactions with DOE

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- Text on startup costs

## Startup Costs during NOvA commissioning

The NOvA CD-1 Cost & Schedule includes startup costs in the Site and Building WBS 2.1 based on the philosophy that the building has to have power and be maintained during the construction project until the detector is completely assembled. The CD-1 plan envisions commissioning and start of operations with each 5 kiloton section of the detector as it is completed (see CDR, Chapter 23, section 23.1.2). The associated costs to run each 5 kiloton section of the detector are not part of the project cost and are assumed to be off-project on operating funds. These operating funds could be part of the Cooperative Agreement or be handled as part of the Fermilab budget (as done for MINOS at Soudan). Since the neutrino beam originates at Fermilab, there may be enough coupling between the Fermilab accelerator schedule and the NOvA operating costs to indicate a more cost effective funding through Fermilab.



# Interactions with DOE

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- Text on startup costs continued

The NOvA CD-1 Cost & Schedule assumes the building contractor pays the power bill until beneficial occupancy as part of the building construction contract on WBS 2.1 (this would be in the Cooperative Agreement). Once the building is completed, the project WBS 2.1 explicitly pays the power required to run the building until the first 5 kilotons are complete. This building power cost is estimated at about 33% of the total power described in the CDR Ch 22, Table 22.1. Once the 5 kilotons are complete, the power bill increases as the electronics are turned on, but the project portion of the power bill is decreased under the assumption that now 20% of the building power is dedicated to operations. That is, the project WBS 2.1 continues to pay only the power required for the portion of the building dedicated to the assembly tasks. During the period from beneficial occupancy to project end, this amounts to ~ \$ 800 K (FY06\$) on-project including contingency.



# Interactions with DOE

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- Text on startup costs continued, page 3

The CD-1 Cost & Schedule WBS 2.1 also includes propane for back-up generators, telephone charges, trash pick-up, snow removal, grounds keeping, basic building maintenance and supplies and the salary for a building manager during the period from beneficial occupancy to project end. This amounts to ~ \$ 1,600 K (FY06\$) on-project including contingency.

The off-project power costs during the beneficial occupancy to project end period are estimated at ~ \$300 K (FY06\$). This would be a startup / commissioning cost.

For CD-1 NOvA assumed the human resources required for commissioning the detector would be 100% scientists at no cost. This may not be completely accurate and some modest technical help may be required in addition. Ultimately the required operating staff is estimated at 5 technical people (see CDR, Chapter 22, Table 22.1) once the scientific staff gets the device past the initial debugging period.

All these cost estimates are site-specific and based on the Ash River site. As noted in the CDR, other sites may have different power costs since those sites would have different power providers. See the CDR, Chapter 22, section 22.1.2 for an example.



# Interactions with DOE

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- Text on startup costs continued, page 4

All these costs also assume a 25 kiloton detector as described in the CDR.

The NOvA CD-1 Cost & Schedule WBS 2.1 contains costs that are dominated by funding now thought to be in the Cooperative Agreement, but some portions would not be in the Cooperative Agreement. Examples are the cost of the NOvA Level 2 Project Manager from Fermilab (part of WBS 2.1.5.2), and the installation of the cosmic ray shield wall (WBS 2.1.3) once the detector is complete. This shield wall along with the building overburden completes a shield on all sides of the detector but this last part is installed right next to the detector and is more of a detector related operation than a building construction task.



# Interactions with DOE, MORE

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- July 12 Phone call with Procario continued:
- **FBO Cooperative Agreement**
  - Mike has a meeting tomorrow (last Thursday) to push on this
  - CH will want formally approved Acquisition Strategy before doing much work
  - OHEP will do what they can earlier
- **CD-1 Approval**
  - Mike is having trouble getting the ESSAB together due to vacation schedules, looks like sometime in August.
    - ESSAB = Energy Systems Acquisition Advisory Board
  - Acquisition Strategy approval should be earlier.



# Interactions with Fermi Office DOE

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- **Met on July 11 with Ron Lutha and Steve Webster regarding preliminary PEP**
  - Add words on 20 kt baseline but will try to build more if funds are available
    - Spares discussed
      - Cooper also discussed later with Connee Trimby
  - Change control threshold
    - Complicated by large NOvA procurements, Steve suggests set at \$500K cumulative (includes \$500K less (we can hope))
- **Also discussed R&D procurements**
  - Chapman is not approving NOvA options



# MORE Interactions with Fermi Office DOE

- **Met on July 12 with Ron Lutha, Steve Webster, John Chapman, Dennis Wilson regarding OPTIONS**
  - With Joe Collins, Bob Cibic, Ron, John
  - John Chapman does not want options in P.O.s
  - Misunderstanding with Procurement who thought exercising the options would clearly require additional approval
  - I was left thinking Procurement would remove options on existing P.O.s
    - Some risk that this will upset vendors with those P.O.s
- **Ron Lutha suggests a NOvA Procurement Plan so we all understand what to expect**
  - Ron Ray is working on a draft from our side
  - Got an detailed outline of a “NOvA Advanced Procurement Plan for Fermilab” late yesterday from Steve
  - We may need to meet on this again?



# What we need for CD-2 Review

NOvA Work List for CD-2 <small>(red means new since last version)</small>		Early Finish Date	Possible Late Finish Date	Actual Finish Date	comments
<b>Cooperative Agreement</b>					
	Recipient Selected = Site Selection	1-Nov-06	15-Dec-06		
	Negotiations concluded	15-Jan-07	1-Apr-07		Needed or cost estimate is uncertain?
<b>NEPA</b>					
	<b>Scoping Meeting</b>	22-Jun-06		22-Jun-06	
	Environmental Impacts Analysis Plan and 5 point timeline	29-Jun-06			Have draft, Keith talking to Sally on Thurs
<b>Minnesota Part</b>					
	RGU (Responsible Government Unit) in place	15-Jan-07			
	Minnesota EAW (site specific)	15-Jan-07	1-Mar-07		This is after the 30 day comment period
	Wetland Permit Processing by USACE	1-Apr-07	1-Dec-07		Need for CD-2, not for CD-2 review
<b>Fermilab NOvA Part</b>					
	Integration Prototype on surface	31-Aug-06			containment, FP
	Near Detector in MINOS access tunnel	31-Aug-06			containment, FP, access issues
	Scintillator Blending & Storage	31-Aug-06			containment, transportation
	Module Factory	31-Aug-06			adhesive ventilation
	Block Raiser construction & tests with load	31-Aug-06			construction activity
	Full scale prototype construction & test	31-Aug-06			construction activity
	Full flat prototype for time & motion study	31-Aug-06			probably at ANL
<b>Fermilab Tritium Part</b>					
	Water Task Force report	21-Sep-06			
<b>Site and Building</b>					
<b>Ash River Site</b>					
	EAW update	1-Nov-06			
	Wetland Permit Application prepared	1-Dec-06			
<b>Other Sites</b>					
	EAW	1-Jul-07	30-Sep-07		
<b>Building</b>					
	Independent Cost & Schedule Review	15-Sep-06	15-Oct-06		
	30% Drawings	15-Dec-06			



# What we need for CD-2 Review, page 2

NOVA Work List for CD-2 <small>(red means new since last version)</small>		Early Finish Date	Possible Late Finish Date	Actual Finish Date	comments
<b>Liquid Scintillator</b>					
Tests of commercial Tintometer		21-Jul-06		11-Jul-06	tagged, sent on to Indiana for tests, 7/17
Fermilab blending model description & cost		15-Aug-06			
issue RFP for off-site blending		1-Aug-06			
RFP responses for off-site blending		1-Sep-06			
evaluate waveshifter concentration					June 27 initial report given
evaluate pseudocumene concentration					June 27 initial report given
decide waveshifter/pseudocumene to match fiber diameter		9-Aug-06			
<b>Wavelength Shifting Fiber</b>					
Updated Kuraray quote		1-Jun-06	1-Jul-06	6-Jul-06	got final quote to Cibic, -3M.8, -3M.7
evaluate fiber diameter		1-Aug-06			
decide fiber diameter		9-Aug-06			
<b>PVC Extrusions</b>					
Choose die proof resin (NOVA-2)		5-May-06		5-Jun-06	
Proof 16 cell die at die manufacturer		26-Jun-06	31-Jul-06		other dates below will also slip ~10 days
Tune 16 cell die at extruder		14-Jul-06	18-Aug-06		includes initial samples
Issue RFP for 70,000 lb test resin + full detector option		5-Jun-06		23-Jun-06	
RFP responses for resin		5-Jun-06	21-Jul-06		material delivered 8/25 - 9/1
Produce 3500 m of 16 cell material, horizontal, rutile		4-Aug-06	15-Sep-06		
Measure mechanical properties of NOVA-2 in 16 cells		30-Sep-06	15-Oct-06		
React to measurements of 16-cell extrusions		31-Oct-06			
Still would have vertical die left to do					4 month turn around on existing die
Still would have anatase vs. rutile TiO2 choice hanging?					May get enough info during "Tune 16 cell die"
Order resin for 1500 m of 16 cell material in anatase		15-Aug-06			
Still would not have final 16 vs 32 cell decision					But would have work around concept/tests

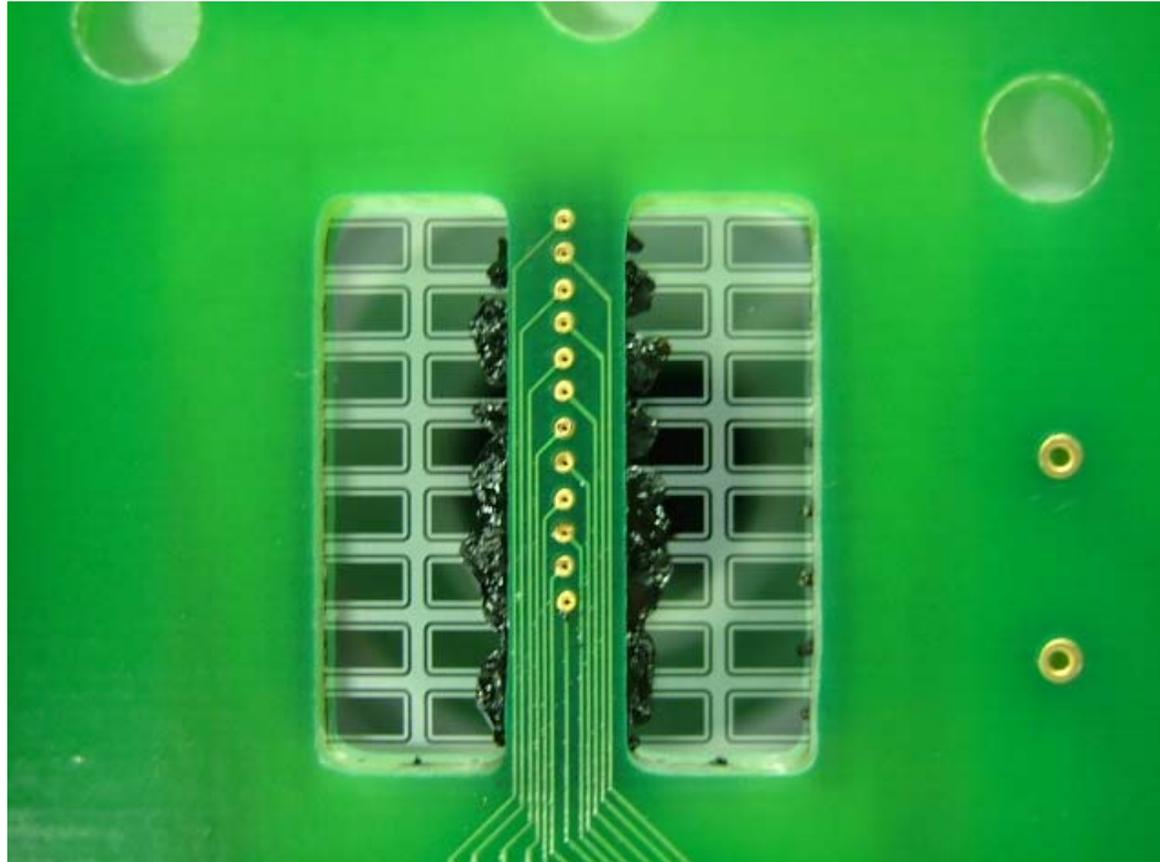


# What we need for CD-2 Review, page 3

<b>NOVA Work List for CD-2</b> (red means new since last version)		Early Finish Date	Possible Late Finish Date	Actual Finish Date	comments
<b>PVC Modules</b>					
	final endplate design	31-Aug-06			
	final manifold design	31-Aug-06			
	adhesive choice	30-Sep-06			
	adhesive vs. RF welding	1-Dec-06	1-Apr-07		
	factory stringing machine and flycutting machine	1-Oct-06			
	factory gluing machine	1-Nov-06			
	final overflow tank design (now grouped and part of assembly)				
	Time & Motion studies with 16 cell, 12 ft(early) & 53 ft(later) objects	15-Dec-06			
<b>Electronics</b>					
	Receive 1st 10 APDs from Hamamatsu	1-Oct-06			recent board flat, but bonding charred resin
	Get updated "target price" of APDs from Hamamatsu	1-Nov-06			
	completed studies of front end ASIC	10-Aug-06			
	Front End Board prototype II testing	6-Oct-06			
<b>Data Acquisition</b>					
	prototype Data Concentrator tests complete	15-Dec-06			
<b>Near Assembly</b>					
	Initial design of mechanical structure				
	Initial design of mechanical systems				
<b>Far Assembly</b>					
	Validation of plane adhesive choice	16-May-06		11-Jul-06	3M-2216 is the choice
	Validation of installation procedures	27-Jul-06	15-Aug-06		
	Validation of structural design	17-Aug-06			
	Initial designs of mechanical systems (access,light tightening,cooling,filling)	30-Sep-06			
	Designs of mechanical systems & tooling	8-Jan-07			



# APD PC board



- Changed material, different resin (trying to get flatter and succeeded)
  - Charred in compression and heating to 350 deg C
  - Roger Rusack talking to Hamamatsu about process details.....



# What we need for CD-2 Review, page 4

<b>NOVA Work List for CD-2</b> <small>(red means new since last version)</small>		Early Finish Date	Possible Late Finish Date	Actual Finish Date	comments
<b>Project Management</b>					
	final Project Execution Plan	1-Aug-06			Iterated with Lutha & Webster 7/11-12
	final Project Management Plan				
	final Configuration Management Document				
	final Risk Management Plan				
	<b>Procurement Plan</b>	1-Aug-06			request from Lutha
	<b>draft</b> Performance Management System Document (EVMS)	21-Jul-06			
	final Performance Management System Document (EVMS)				
	<b>draft</b> PSAD				
	Outside Review Mechanical Structure: Creep Mitigation	1-Sep-06			
	<b>1st draft</b> Technical Design Report (blanks identified)	1-Oct-06			Project Office produces draft 1
	<b>2nd draft</b> Technical Design Report (50% blanks filled)	1-Nov-06			updates from L2 Managers
	<b>final</b> Technical Design Report	15-Dec-06			final updates, final edit by Project Office
	<b>draft</b> 20 kt Cost & Schedule matching funding profile	10-Aug-06			
	<b>final</b> Cost & Schedule	15-Dec-06			??



# Sufficient Project Personnel - Needs?

- **Administrative support high level full time**
  - Req almost in system? (Elaine Phillips reports that the req is with HR, July 17)
- **Help for monthly report startup**
  - Could be admin person?
- **More engineering on Block Raiser**
  - Final design, staged design allowing test phase?
  - Dave Pushka & Vic Guarino go back to basics before proceeding
    - Still talking, not yet agreeing, but **still** creeping closer to resolution
  - More PPD effort, **FEAs ongoing**
- **More engineering & help on Near Detector**
  - Leon Beverly? John Voirin? Both familiar with shaft & tunnel.
    - Installation transport, containment, fire protection, mobility
  - Have Karen Kephart, Peter Lucas, have ANL engineers (Guarino)
    - **New issue with design/drafting, lack of access to Don Friend, reported to PPD Eng Resource Mtg on July 17**
    - **Got Don back on July 18**
    - **Kurt Kremptez will watch situation**



# Sufficient Project Personnel – Needs 2 ?

- **Scintillator Blending**
  - On-site
    - Thinking about prototype mix for early 2007 in house
    - Involve PPD process control group?
  - Still looking at off-site: Meeting with L2, L3s, Bob Cibic June 29
    - QA step length is critical parameter
      - Tintometer July 10, might be a 30 second measurement
      - developing 2 devices to check it, they might take an hour for each measurement
      - Current device takes 3 hours and must be monitored during measurement
    - Bob C. developing a list of bidders, goal is “August” for RFP and in-house.
    - Thinking to visit an outside blender so we don’t invent too much for a Fermilab model
    - **Visit scheduled to Kinder Morgan’s Argo Terminal on July 20**
- **QA person, part time probably OK for now.....**
  - No progress
- **Electronics infrastructure and Slow Controls**
  - Italy for Slow controls, but when?, Leon Beverly for infrastructure?
  - Craig Dukes (Univ of Virginia) as new L3
    - understands Italians eventually, already working with them
  - John Oliver & Dave Pushka to look harder at the power & cooling issues across L2 boundaries