

U.S. Dept. of Energy



Office of Science

# U.S. Department of Energy's Office of Science

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## ESAAB Equivalent Review

### Critical Decision 2

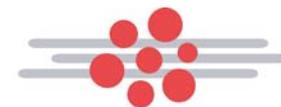
### Approval of Performance Baseline

for the

## The Center for Functional Nanomaterials (CFN)

**Joseph Eng, P.E.**  
**Federal Project Director**  
*May 2004*

Brookhaven Site Office  
Brookhaven Science Associates



Center for Functional Nanomaterials  
Brookhaven National Laboratory



# Purpose of FPD's Briefing

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## ■ Purpose

- To demonstrate that the BNL Center for Functional Nanomaterials project is at a level of maturity necessary to define the performance baselines, that the project is ready for CD-2, and to proceed with the next phase of the project.

## ■ Federal Project Director's Assessment

- That the CFN Project is ready to proceed with final design.



# Mission Need Remains Valid

- One of 5 DOE-BES Nanoscale Science Research Centers (NSRC) supporting the National Nanotechnology Initiative (NNI), with the scientific goal to create, synthesize, characterize and understand new functional materials.
- Provides a National User Facility for nanoscale science and engineering.
- Serves to promote and complement interdisciplinary research in other BNL Departments including Biology, Chemistry, Materials Science, Physics, Instrumentation Division and the National Synchrotron Light Source (NSLS).
- Provides training and education of the “first” generation of nanoscale scientists.
- Houses and supports the internal BNL nanoscience research program.



## CFN Project Description

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- Design and construct a two-story building of approximately 94,500 GSF located across the street from the existing NSLS.
- Facility will include Lab and offices with state-of-the-art clean rooms, wet and dry laboratories for sample preparation, fabrication, and analysis, office space for staff, users, and conferences.



# Perspective View



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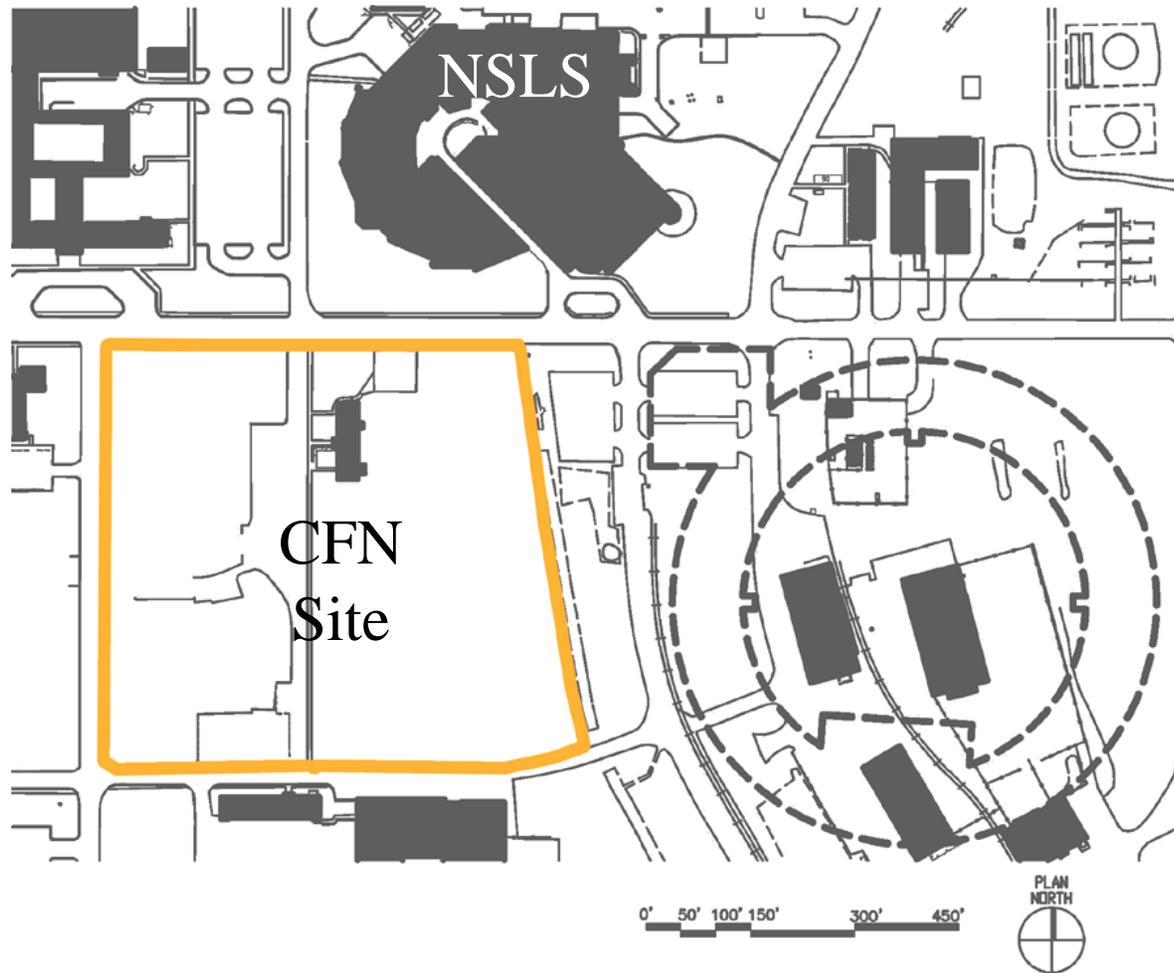
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09/2004



# 30% Design – CFN Site



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# 30% Design – Site Plan

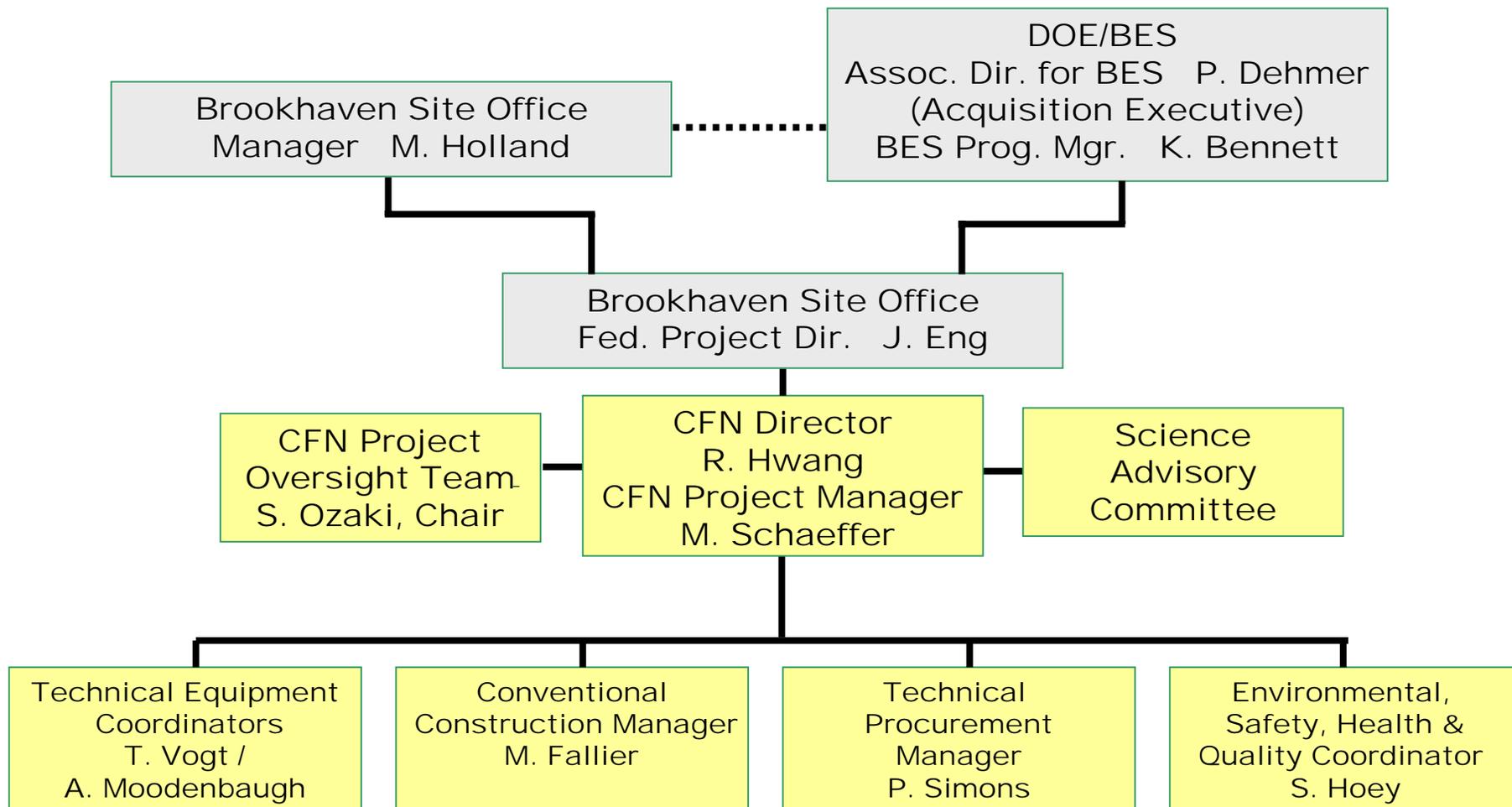


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# Project Organization



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# Integrated Project Team (IPT)

- Headed by Federal Project Director (FPD) and includes the following key members and subject experts:
  - NSRC Program Manager: K. Bennett
  - DOE Contracting Officer: R. Gordon
  - CFN Director: R. Hwang
  - CFN Project Manager: M. Schaeffer
  - Conventional Facility Manager: M. Fallier
  - Technical Equipment Coordinators: T. Vogt & A. Moodenbaugh
  - Procurement: P. Simons
  - Legal: L. Sadler
  - Quality / Safety: S. Hoey
  - Project Controls: K. Koebel



# Facility Coordinators

- Technical Equipment Coordinators headed by Tom Vogt and Arnie Moodenbaugh
  - Nanopatterning: J. Warren / C. Jacobsen
  - Ultrafast Optical Sources: B. Sheehy
  - Electron Microscopy: Y. Zhu
  - Materials Synthesis: A. Moodenbaugh / T. Vogt
  - Proximal Probes: P. Sutter
  - Theory & Computation: J. Davenport
  - CFN Endstations at NSLS: R. Pindak

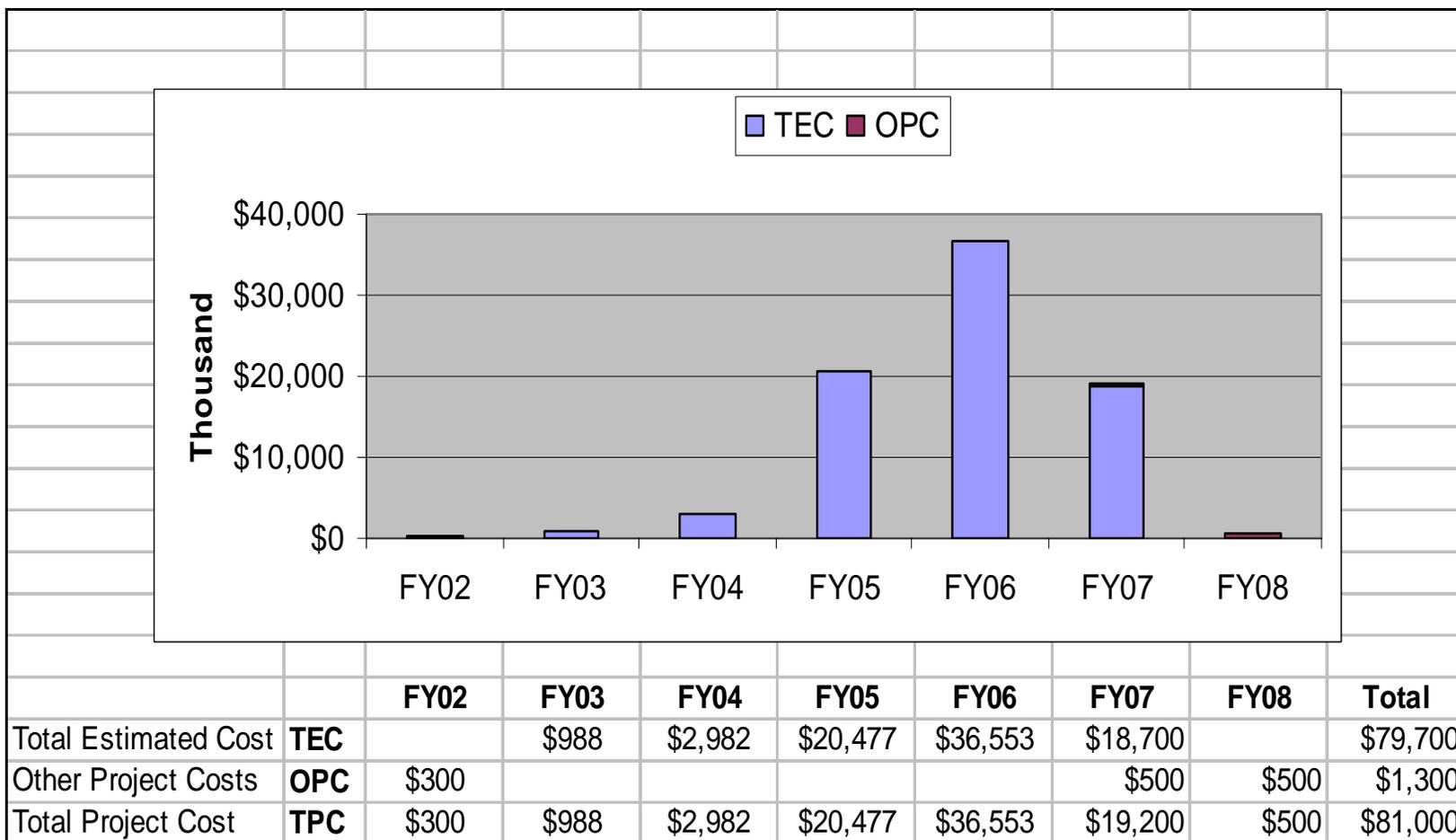


# Readiness to Proceed

- |  |           |
|--|-----------|
| ■ CD-0 Approve Mission Need  | Completed |
| ■ CD-1 Approve Alter. Selection & Cost                             | Completed |
| ■ Acquisition Strategy approved                                    | Completed |
| ■ NEPA (CX)  | Completed |
| ■ 100% Title I Design complete                                     | Completed |
| ■ Independent Cost Estimate (ICE)                                  | Completed |
| ■ Performance Baseline defined                                     | Completed |
| ■ Risk and mitigation strategies accounted in Performance Baseline | Completed |
| ■ Baseline validated by EIR  | Completed |
| ■ Project Execution Plan (Updated)                                 | Completed |



# CFN Construction Funding Profile



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# Cost Summary - Project

WBS 1.0	BNL Center for Functional Nanomaterials		
WBS 1.1	Project Support		\$ 8,538,000
WBS 1.1.1	Project Management	\$ 4,166,000	
WBS 1.1.2	Project Engineering	4,372,000	
WBS 1.2	Technical Equipment		\$ 26,393,000
WBS 1.2.1	Nanopatterning	\$ 7,471,000	
WBS 1.2.2	Ultrafast Optical Sources	3,042,000	
WBS 1.2.3	Electron Microscopy	5,850,000	
WBS 1.2.4	Materials Synthesis	2,759,000	
WBS 1.2.5	Proximal Probes	5,628,000	
WBS 1.2.6	Theory and Computation	603,000	
WBS 1.2.7	CFN Endstations at NSLS	1,040,000	
WBS 1.3	Conventional Construction		\$ 32,349,000
WBS 1.3.1	Improvements to Land	\$ 865,000	
WBS 1.3.2	Building	26,957,000	
WBS 1.3.3	Utilities	3,700,000	
WBS 1.3.4	Other Construction Costs	827,000	
WBS 1.4	Standard Equipment		\$ 903,000
	Contingency (16.9%)		\$ 11,517,000
	Total Estimated Cost (TEC)		\$ 79,700,000
WBS 1.5	Other Project Costs (OPC)		\$ 1,300,000
	Total Project Cost (TPC)		\$ 81,000,000

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# Contingency/Risk Analysis

WBS 1.0	BNL Center for Functional Nanomaterials		16.9%
WBS 1.1	Project Support		10.0%
WBS 1.1.1	Project Management	10.0%	
WBS 1.1.2	Project Engineering	10.0%	
WBS 1.2	Technical Equipment		15.8%
WBS 1.2.1	Nanopatterning	17.2%	
WBS 1.2.2	Ultrafast Optical Sources	17.0%	
WBS 1.2.3	Electron Microscopy	17.2%	
WBS 1.2.4	Materials Synthesis	15.0%	
WBS 1.2.5	Proximal Probes	15.0%	
WBS 1.2.6	Theory and Computation	10.0%	
WBS 1.2.7	CFN Endstations at NSLS	17.0%	
WBS 1.3	Conventional Construction		19.0%
WBS 1.3.1	Improvements to Land	9.8%	
WBS 1.3.2	Building	20.6%	
WBS 1.3.3	Utilities	16.0%	
WBS 1.3.4	Other Construction Costs	10.0%	
WBS 1.4	Standard Equipment		5.0%

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# Schedule Milestones

- Level 1
  - CD-0 Approve Mission Need Jun 2002 (A)
  - CD-1 Approve Alt. Selection & Cost Range Jul 2003 (A)
  - CD-2 Approve Performance Baseline May 2004
  - CD-3 Approve Start of Construction Dec 2004
  - CD-4a Approve Start of Initial Operations Apr 2007
  - CD-4b Approve Start of Full Operations Apr 2008
- Level 2
  - Complete Design of Conventional Facilities Sep 2004
  - Approve Technical Equipment Baseline May 2004
  - Start Conventional Facilities Construction Jun 2005
  - Complete Technical Design Jul 2006
  - Complete ORE for Beneficial Occup. of Bldg. Feb 2007
  - Complete Procurement Mar 2007
  - Complete Installation & Testing of Technical Equip. Mar 2008
- Level 3
  - Start Title I Design of Conventional Facilities Aug 2003 (A)
  - Award Conventional Facilities Constr. Contract Mar 2005

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# Project Schedule

Activity ID	Activity Description	Orig Dur	Early Start	Early Finish	Total Float	Fiscal Year					
						FY03	FY04	FY05	FY06	FY07	FY08
<b>+ 1.1.2 Project Engineering</b>											
		212	01MAR04	31DEC04	0						
<b>1.2.3 Electron Microscopy</b>											
12300020	FY05 Procurement of STEM	62	03JAN05	31MAR05	0						
12300025	Assembly of STEM at Factory and Ship	500	01APR05	30MAR07	0						
12300030	Delivery of STEM	0		30MAR07	0						
12300035	Installation & Testing of STEM	251	02APR07	31MAR08	0						
10000059	Technical Equipment Installation Complete	0		31MAR08	0						
10000065	ESAAB/Preparation for ESAAB for CD-4b	22	01APR08	30APR08	0						
10000069	CD-4b APPROVAL-Start of Full Operations	0		30APR08	0						
<b>1.3.0 Conventional Construction</b>											
13000053	CONSTRUCTION CONTRACT AWARD	0		31MAR05*	0						
13000054	CONSTRUCTION - NOTICE TO PROCEED	0		02MAY05	0						
13000070	Mobilize	20	03MAY05	31MAY05	0						
13000072	Site Work	28	01JUN05	12JUL05	0						
13000075	Sub structure	45	13JUL05	14SEP05	0						
13000080	Super Structure	100	08AUG05	30DEC05	0						
13000140	H.V.A.C.	369	07SEP05	28FEB07	0						
13000085	Exterior Closure	116	28NOV05	11MAY06	0						
13000135	Fire Protection	189	05DEC05	01SEP06	0						
13000090	Roofing	125	12DEC05	09JUN06	0						
13000145	Electrical/Life Safety/Telecomm	288	04JAN06	28FEB07	0						
13000165	Substantial Completion (ORE)	0		28FEB07	0						
13000185	Contractor Completes final Punchlist Items	22	01MAR07	30MAR07	0						
13000195	Construction Complete	0		30MAR07	0						
Start Date	27 MAR02	Early Bar			CF17	Sheet 1 of 1					
Finish Date	30 APR08	Progress Bar			<b>Brookhaven National Laboratory</b>						
Date Date	01 MAR04	Critical Activity			<b>CENTER for FUNCTIONAL NANOMATERIALS</b>						
Run Date	14 MAY04 15:03				<b>[CFN]</b>						
					<b>Critical Path</b>						
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# Sustainable Design/LEED Certification

- Sustainable Design Principle Incorporated.
- LEED Certification/Registration is part of the A/E Contract.
- Project Registered with US Green Building Council February 04.
- On-Track to achieve LEED Certification –
  - 26 points required for certification
  - Silver Rating is possible – requires 33 points
  - Currently 26 “Yes” with 23 “Maybe”



# Environment, Safety, Health & Quality

- BNL is committed to simultaneous excellence in science, operations, and ESH&Q through implementation of:
  - Integrated Safety Management (ISM)
  - Standards Based Management System (SBMS) (vehicle for requirements identification and dissemination via management systems and subject areas)
  - Environmental Management System (ISO 14001 Certification)
- Preliminary Hazards Analysis (PHA) Report completed
  - Iterative hazard assessments and analyses will evaluate and specify controls for future research activities



# Environment, Safety, Health & Quality

## ■ Quality Assurance

- Detailed Project QAP for CFN was developed during the Preliminary Design (Title I) phase

## ■ National Environmental Policy Act (NEPA)

- DOE review determined CFN to be “Categorically Excluded” (CX) – October 6, 2003

## ■ Construction Safety

- A Construction Safety Plan will be developed by the contractor and approved by BNL. It will be updated on a continuing basis throughout construction



# Excess Space Offset

- The excess facility offset requirement will come from the “space bank” accumulated by BNL since 2002 through the Excess Facility Disposal Program.

• Excess Space Banked as of Sept. 2004	166,133 SF
• RSB	+65,000 SF
• CFN	+ <u>94,500 SF</u>

159,500 SF

Balance:

6,633 SF

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# External Independent Review (EIR)

- A performance baseline EIR was conducted March 22-26, 2004.
- The project was found to be appropriately managed within the project scope.
  - The CFN Team is working well together at all observed levels.
  - Cost estimates and schedule durations are reasonable and realistic.
  - Title I design documents are appropriate and sufficient.
  - Contingency dollars are appropriate.
- Nine findings were identified and addressed.
- The EIR team judged the CFN ready for CD-2 after the findings are remedied.
- Corrective Action Plan has been completed.



# FPD's Risk Assessment

- The cost estimate for the project increases due to scope creep
  - Mitigation: Continuous involvement from CFN management to control scope creep
- Program evolution leading to changes in technical equipment
  - Mitigation: Maximize interactions with future user community; continuous management over scope
- Bidding Climate and Material Cost Increase
  - Mitigation: Nationally advertised, Independent Cost Estimate (ICE), alternates, and appropriate contingencies



## Conclusion

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- The CFN project's Performance Baseline is well defined. I am requesting your approval of CD-2 in order to proceed with the final design!