# Office of Basic Energy Sciences
# Office of Science

# CD-3, Approve Start of Construction for the Center for Nanophase Materials Sciences (CNMS) A Nanoscale Science Research Center at Oak Ridge National Laboratory

## A. Purpose

The purpose of this paper is to document the review by the Office of Science Energy Systems Acquisition Advisory Board-equivalent for the Critical Decision "Approve Start of Construction (CD-3)" for the Center for Nanophase Materials Sciences (CNMS), a Nanoscale Science Research Center (NSRC) at Oak Ridge National Laboratory (ORNL).

## B. Mission Need

ORNL will establish a highly collaborative and multidisciplinary CNMS that will provide a unique resource for nanoscale science research. The CNMS will integrate nanoscale research with neutron science, synthesis science, and theory/modeling/simulation (TMS).

The CNMS will provide the research infrastructure and environment needed for a user facility with highly collaborative and interdisciplinary research. The user community will include resident scientific collaborators and both long- and short-term visiting scientists. The CNMS will also provide the necessary infrastructure for the research including technical support personnel, synthesis and characterization facilities, high quality and novel research materials, properties measurement facilities, and nanofabrication capabilities, within its research focus areas. This will permit assembling teams to tackle research problems of a scope, disciplinary breadth, and complexity that cannot be done by small-group efforts. More than half the users of the Center will be researchers from academia, industry, and other national laboratories. The Center will provide a unique training opportunity to introduce young scientists and engineers to nanoscale science, neutron science, and advanced synthesis and TMS tools.

## C. Project Performance Scope Baseline

The final CNMS Project Execution Plan has been revised for Critical Decision-3 and to incorporate comments from the recent Execution Readiness Independent Review.

The CNMS facility will consist of a multi-story building including the main laboratory and office building and a single-story Nanofabrication Research Laboratory (NRL). Based on the Title II (final) design, the total gross area of the new building will be approximately 80,000 square feet, providing state-of-the-art clean rooms, and general laboratories for sample preparation, fabrication and analysis. Included will be initial equipment for nanoscale materials research such

as surface analysis equipment, nanofabrication facilities, etc. A list of this equipment will be maintained under configuration control as part of the Systems Requirements Document. The facility, co-located with the Spallation Neutron Source (SNS) complex, will house ORNL staff members and visiting scientists from academia and industry.

## D. Project Performance Cost and Schedule Baseline

The performance baseline Total Estimated Cost (TEC) of $64.0 million and performance baseline Total Project Cost (TPC) of $65.0 million are based on receiving the following funding levels (in thousands of dollars):

| Fiscal Year | Total Estimated Cost | | Other Project Costs | Total Project Cost |
|---|---|---|---|---|
| | Project Engineering & Design | Construction | Conceptual Design, NEPA, Hazard Analysis, Other, and Pre-Operations | Total |
| Prior | | | 250 | 250 |
| 2002 | 1,500 | | 225 | 1,725 |
| 2003 | 1,000 | 24,000 | 100 | 25,100 |
| 2004 | | 20,000 | 250 | 20,250 |
| 2005 | | 17,500 | 100 | 17,600 |
| 2006 | | | 75 | 75 |
| | 2,500 | 61,500 | | |
| Total | 64,000 | | 1,000 | 65,000 |

The project schedule baseline is as follows:

| | | |
|---|---|---|
| CD-0 | Approve Mission Need | June 2001 |
| CD-1 | Approve Preliminary Baseline Range | February 2002 |
| CD-2 | Approve Performance Baseline | September 2002 |
| CD-3 | Approve Start of Construction | February 2003 |
| CD-4a | Approve Start of Initial Operations | February 2005* |
| CD-4b | Approve Start of Full Operations | September 2006 |

*CD-4a delayed from December 2004 due to impact of FY2003 Continuing Resolution constraints on new construction starts. Date based on construction funds available early February 2003.

## E. Final Design, Procurement Package, and Execution Readiness Independent Review

The CNMS final design drawings are complete and the conventional facilities procurement bid package is in preparation by the construction manager. In December 2002, the Office of Science conducted the Execution Readiness Independent Review and issued the final report in January 2003. The CNMS project team has adequately responded to the Independent Review action item and recommendations.

## F. Safety Documentation

The CNMS Environment Safety and Health plan was revised to include the latest chemical and gas inventory projections. In addition, the hazards screening/safety assessment has been revised to incorporate the broad range of hazards (e.g., lasers, high pressures, etc.) and a brief description of how such hazards are controlled (e.g., relevant procedures) at ORNL. The updated documents will also reference the current ISM procedures and processes that will be used for CNMS operations.

## G. Risk Assessment/Plan

The CNMS project risk assessment/plan was revised to describe the methodology used in preparing/assessing the risks. Risk assessment will be performed periodically during the duration of the project.

Center for Nanophase Materials Sciences at ORNL
CD-3 ESAAB-Equivalent Review

**Submitted by:**

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1/28/03
Date

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**Recommendations**

The undersigned "Do Recommend" (Yes) or "Do Not Recommend" (No) approval of CD-3, Approve Start of Construction, for the Center for Nanophase Materials Sciences at ORNL as noted below.

| | | |
|---|---|---|
| ESAAB Secretariat, Construction Mgmt Support Division | Date | Yes____ No____ |
| Representative, Non-Proponent SC Program Office | Date | Yes____ No____ |
| Representative, Financial Mgmt. Division | Date | Yes____ No____ |
| Representative, Environmental, Safety and Health Division | Date | Yes____ No____ |
| Representative, Security Mgmt. Team | Date | Yes____ No____ |
| Representative, Laboratory Infrastructure Division | Date | Yes____ No____ |
| Representative, Grants and Contracts Division | Date | Yes____ No____ |

**Approval**

Based on the information presented above and at this review, Critical Decision-3, Approve Start of Construction, is approved. Therefore, the Oak Ridge Operations Office is authorized to expend construction funds when they are in a HQ approved funding program and there are no Continuing Resolution constraints for the Center for Nanophase Materials Sciences, a Nanoscale Science Research Center.

Patricia M. Dehmer
Associate Director of the Office of Science
for Basic Energy Sciences

Date