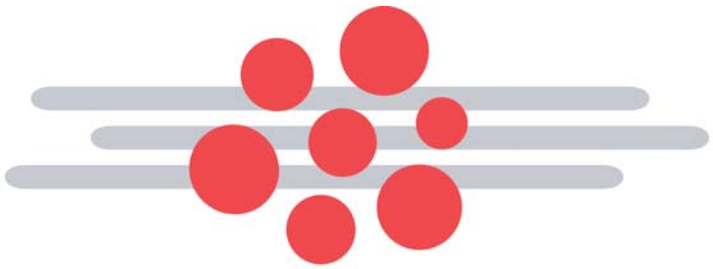
Transition to Operations Plan for the CFN



Center for Functional Nanomaterials
Brookhaven National Laboratory

Project No. 05-R-321
February 2007
Revision 2

BNL Center for Functional Nanomaterials

Basic Energy Sciences

BROOKHAVEN NATIONAL LABORATORY BROOKHAVEN SCIENCE ASSOCIATES

Transition to Operations Plan for the CFN

At

Brookhaven National Laboratory (BNL)
Upton, New York

Submitted by:

Steven Hoey **Date**
ESSH&Q Coordinator

John Taylor **Date**
Special Assistant to the ALD BES, BNL

Approved by:

Michael Schaeffer **Date**
CFN Deputy Project Director, BNL

Michael Harrison **Date**
CFN Project Director, BNL

Emilio Mendez **Date**
CFN Director, BNL

Doon Gibbs **Date**
Associate Laboratory Director for
Basic Energy Sciences, BNL

Michael Holland **Date**
Manager, DOE Brookhaven Site Office

February 2007

BROOKHAVEN NATIONAL LABORATORY

Center for Functional Nanomaterials
Brookhaven National Laboratory

Transition to Operations Plan for the CFN

Change Log

Revision No.	Date	Reason
0	October 2005	New
1	May 2006	Incorporate 12/05 DOE Review comments
2	February 2007	Incorporate 7/06 DOE Review comments, lessons learned from other NSRCs, and CFN Operations perspective

Glossary of Document Acronyms and Abbreviations

AB	Authorization Basis
ALD	Associate Laboratory Director
AE	Acquisition Executive
A/E	Architect/Engineer for CFN Project
APD	CFN Associate Project Director
BES	BNL Basic Energy Sciences Directorate
BHSO	DOE Brookhaven Site Office
BNL	Brookhaven National Laboratory
BORE	Beneficial Occupancy Readiness Evaluation
BSA	Brookhaven Science Associates
CC	Commissioning Contractor
CEGPA	Community, Education, Government and Public Affairs
CFR	Code of Federal Regulations
CFN	Center for Functional Nanomaterials
COSA	CFN Operations and Safety Awareness Form
DOE	Department of Energy
DPD	CFN Deputy Project Director
ECN	Engineering Change Notice
EMI/RFI	Electromagnetic/Radiofrequency Interference
ESH	Environment, Safety and Health
ESR	Experimental Safety Review (Work Planning for Sci. & Tech.)
ESSH&Q	Environment, Safety, Security, Health & Quality
FPD	BHSO Federal Project Director
FUA	BNL Facility Use Agreement
IPT	CFN Integrated Project Team
ISM	Integrated Safety Management
JTA	Job Training Assessment
NSRC	DOE NanoScience Research Center
O&M	Operations and Maintenance organization of Plant Engr. Div.
OSHA	Occupational Safety and Health Administration
ORE	Operational Readiness Evaluation
ORPS	Occurrence Reporting and Processing System
OSH	Occupational Safety and Health

PC	Prime Contractor (for Conventional Construction)
PD	CFN Project Director
PEP	Project Execution Plan
PHA	Preliminary Hazards Analysis
PQAP	Project Quality Assurance Plan
SBMS	Standards-Based Management System
SC	DOE Office of Science
SC-22	DOE Office of Basic Energy Sciences
SME	Subject Matter Expert
SOP	Standard Operating Procedure
TFMA	Transfer for Maintenance Accountability
TOP	Transition to Operations Plan

TABLE OF CONTENTS

1.0 INTRODUCTION

1.1 Scope

This document provides a comprehensive plan to manage the transition from the CFN construction project to the full operation of the CFN facility. This includes the identification of key staff responsibilities, essential program requirements, facility acceptance criteria, technical equipment installation and acceptance criteria, and operational controls.

This plan was initially developed at the beginning of the construction process and has continually evolved to incorporate lessons learned from the construction phase as well as other operations related lessons learned from other NSRC's.

This plan has been formulated to ensure that the transition to operations and routine operations of the CFN are consistent with:

- DOE Orders,
- Recognized standards,
- BNL ESSH&Q Vision and Policy,
- Directions from the BHSO Federal Project Director and the Site Manager of BHSO,
- CFN goals, and
- Additional concerns that BNL, DOE, and contractor personnel identify during the construction, use, and maintenance of the building.

This plan is intended to be integrated with the other BNL and Project documents defining the CFN project including the Project Execution Plan, Risk Management Plan, project schedule, Beneficial Occupancy Readiness Review Plan, etc. but is not intended to supercede those documents.

1.2 Purpose

Transition to operations begins with planning for the Beneficial Occupancy Readiness Evaluation (BORE) which is detailed in the CFN BORE Plan document. A successful BORE means that the construction of the CFN building is essentially complete, that all safety systems are installed and tested, and that the building is ready for occupancy. The BORE is the significant evaluation process that needs to be completed in order to achieve CD-4a, which is the project critical decision that approves building occupation and initial operations. CD-4a approval also indicates that procedures and staffing are in place to initiate final hook-up and testing of the technical equipment that is part of the project scope.

The transition to operations period lasts for approximately one year, from 2/28/07 (BORE) to 4/30/08 (CD-4b). The equipment installation, final hook-up and testing will be performed by BNL scientists and technicians, with equipment vendor support as necessary. At the start of this period the CFN building will be turned over from the Prime Contractor, E.W. Howell, to the BNL CFN Integrated Project Team, who will assume responsibility for operation of the building until turnover to the CFN Operating Organization. This final turnover will take place later in the transition to operations period (tentatively scheduled at the start of FY2008), and will signify that the CFN Operations staff is appropriately complemented and fully trained, and that all administrative controls and documents are in place to support operations in full compliance with applicable BNL and DOE requirements. An Operational Readiness Evaluation (ORE) is conducted to make this determination, and DOE indicates its concurrence by granting CD-4b. The ORE will be preceded by incremental OREs whose scope will consist of 1-3 “mini” OREs per facility.

2.0 BNL ESSH&Q VISION AND POLICY

The CFN is committed to incorporate the BNL ESSH&Q Vision and Policy in all aspects of the design, construction and operations of the facility.

2.1 ESSH&Q Vision

The entire BNL community will establish and sustain an injury-free, healthy, secure and safe workplace for all employees, visitors, and contractors. In fulfilling this vision we are committed to:

- Implement and evaluate OSH programs.
- Communicate requirements via SBMS to comply with applicable Federal, State, and County Regulations.
- Work within the framework of ISM.
- Establish goals and performance indicators to guide these efforts and measure performance and progress.
- Continually improve our OSH program and our performance.
- Follow the Environmental, Safety, Security, Health and Quality Policy.

2.2 Accident and Near-miss Investigation and Reporting

During transition to operations (as at all times) the CFN will follow the SBMS procedures set forth in the Investigation of Incidents, Accidents and Injuries Subject Area and the Occurrence Reporting Subject Area.

All ES&H related incidents or issues that may have an adverse consequence on people, property or the environment will be reported to BHSO via the designated DOE Federal Project Manager or BHSO's representative. The following minimum criteria will be used as guidance for reporting to BHSO:

- Incidents likely to result in lost workday injuries or reportable environmental consequences,
- Near misses deemed significant enough to have caused an injury or reportable environmental consequence,

- Incidents reportable according to (ORPS) requirements,
- Damage to equipment (BNL or Contractor) in excess of $25,000,
- Findings and recommendations resulting from IO&A oversight activities,
- Significant instances of contractor noncompliance observed during routine internal surveillance.

3.0 ORGANIZATIONAL STRUCTURE/RESPONSIBILITIES

3.1 Department of Energy

3.1.1 DOE SC-22 Office of Basic Energy Sciences

Within SC, the Office of Basic Energy Sciences (SC-22) is the DOE/headquarters organization that has programmatic responsibility for the CFN project, and the Associate Director for Basic Energy Sciences is the Acquisition Executive (AE).

3.1.2 DOE – Brookhaven Site Office (BHSO)

The BHSO office will provide Federal oversight for execution of the project to include legal, contracting, environmental and project management. The BHSO Federal Project Director has official federal responsibility and accountability for the overall success of the project. This includes overall oversight and direction of the transition to operations and routine operations and communication of safety performance to DOE SC-22. The project organization is shown in Figure 1.

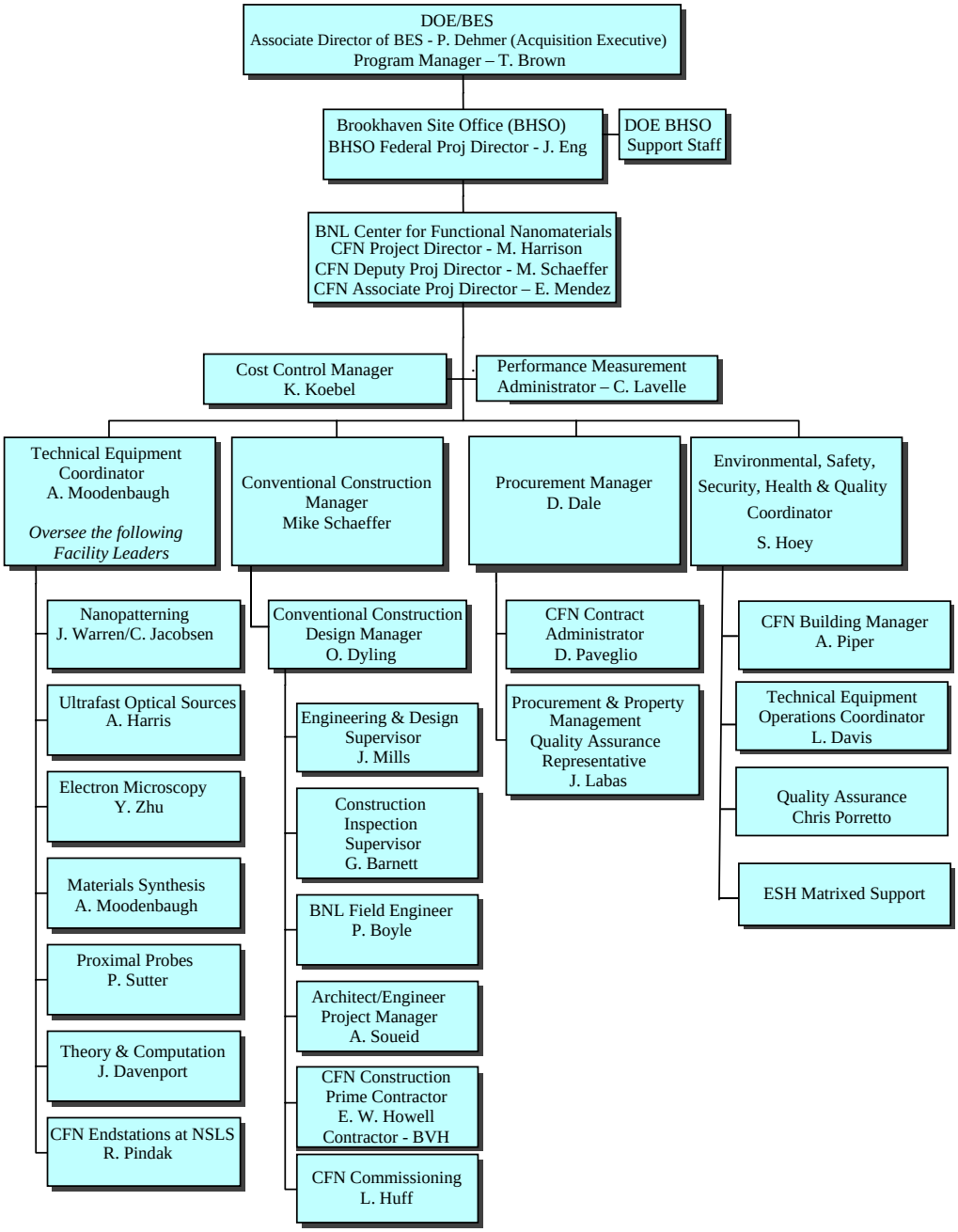
3.2 CFN Line Management Responsibility

The CFN Project Director has line management responsibility for implementation of the Transition to Operations Plan. He will exercise this responsibility through the CFN Project. A description of the key project positions related to the transition to operations period is included in Appendix A.

Figure 1

Center for Functional Nanomaterials (CFN)

Transition to Operations Phase for the Integrated Project Team



4.0 TRANSITION TO OPERATIONS

4.1 Project Scope

4.1.1 Conventional Construction

The conventional construction portion of the CFN consists of the building, supporting systems (HVAC, electrical distribution, communication, water, sewer, etc) and the developed CFN site (parking lots, sidewalks, etc). The conventional construction also includes the basic infrastructure needed to support the technical equipment. This includes the clean room, and general laboratory services that are part of the building systems (compressed gases, cooling water, etc). It does not include the technical equipment and the dedicated components needed to support individual items of technical equipment.

Construction of the building and supporting systems will be by the CFN Prime Contractor (PC). Testing and acceptance criteria for all building systems are included in the building contract. Commissioning of conventional building systems will be performed by the CFN PC with oversight by the CFN Commissioning Contractor (BVH Integrated Services) in accordance with the BVH CFN Construction Phase Commissioning Plan. Commissioning of the Clean Room will require use of an independent testing contractor for certification of cleanliness and system performance. BNL staff will provide final termination, testing and start-up of communication/data and security systems. Independent contractors under the A/E contract (HDR) will perform vibration and EMI/RFI testing to verify that vibration, acoustic and electromagnetic/radio frequency interference levels meet design goals.

4.1.2 Technical Equipment Scope

The CFN technical equipment scope is defined by the CFN Technical Equipment List, which was established as part of the CFN baseline. This scope includes the scientific instruments, associated sample processing and preparation equipment and dedicated supporting equipment needed to operate individual instruments.

This scope does not include building utility systems, fume hoods or centralized laboratory services such as cooling water. The CFN technical equipment baseline has been revised with approval of baseline change proposals (BCP's) Nos. 10 & 11.

4.2 Schedule and Milestone Activities

4.2.1 Schedule

Transition to Operations begins with planning for the Beneficial Occupancy Readiness Evaluation (BORE), and assembly of the requisite documentation (Appendix B and C) to support the BORE and CD-4a review. The BORE is the significant evaluation process that needs to be completed in order to achieve CD-4a and is described in further detail in the CFN BORE Plan. Equipment installation may begin after BORE approval. The transitions to operations field activities begin with the approval by DOE of CD-4a, which is the project critical decision to approve the building occupation and the start of initial operations. This milestone signifies that the construction of the CFN building is complete, that all safety systems are installed and tested, and that the building is ready for occupancy. CD-4a approval also indicates that procedures and staffing are in place to initiate final hook-up and testing of the technical equipment that is part of the project scope. The transition to operations period ends with the approval by DOE of CD-4b, the project critical decision to permit the start of full operations. This signifies that the project has completed its responsibilities, i.e. construction has been completed, and all technical equipment has been installed, tested, and accepted. CD-4b also signifies that the CFN Operations staff is at full complement and fully qualified, and that all administrative controls and documents are in place to support operations in full compliance with applicable BNL and DOE requirements. An Operational Readiness Evaluation (ORE) is conducted to make this determination, and DOE indicates its concurrence by granting CD-4b. The ORE will be preceded by incremental OREs whose scope will consist of 1-3 "mini" OREs per facility. Table 1 is a schedule of transition to operations activities and Figure 2 illustrates the logic flow of these activities.

Table 1

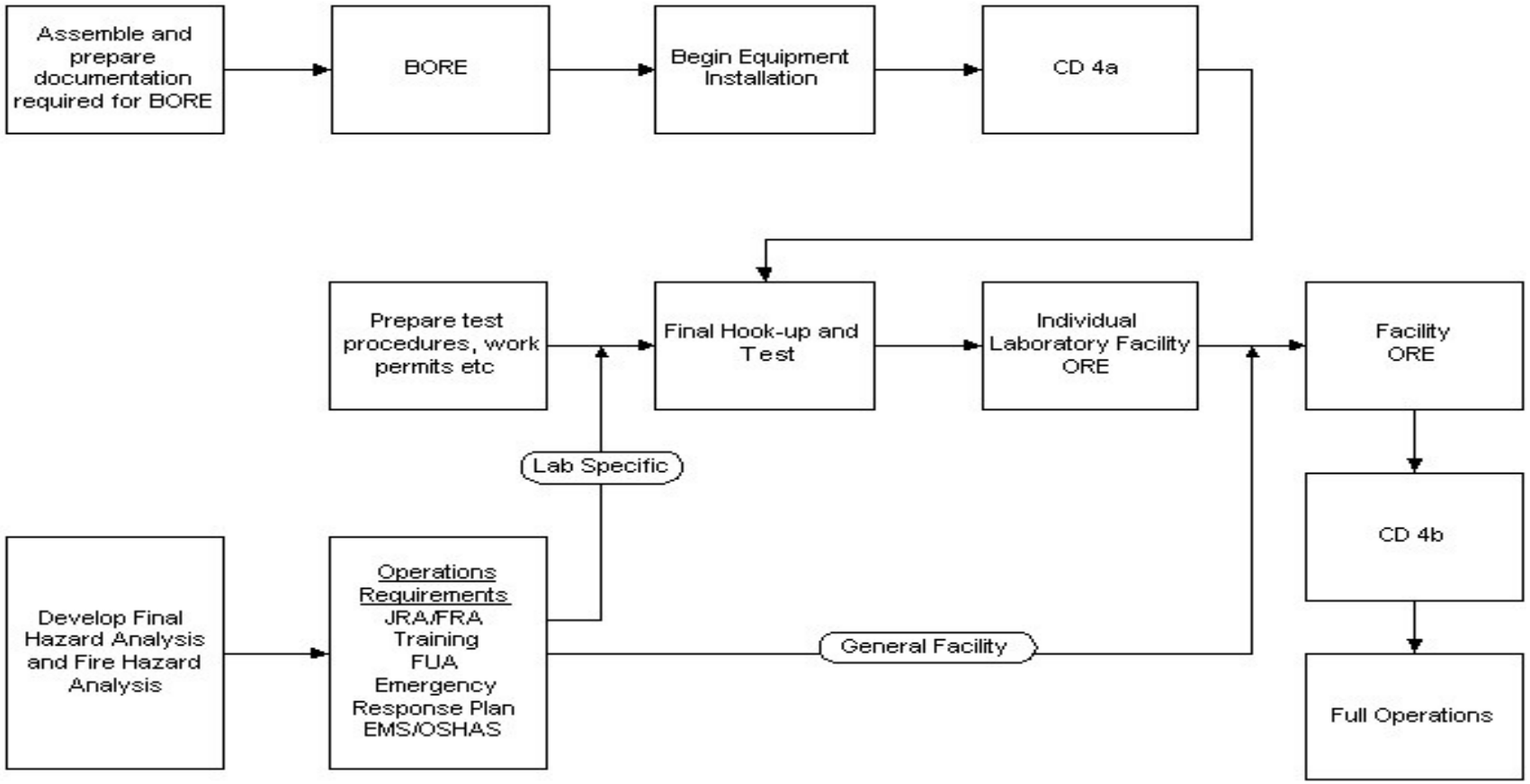
Transition to Operations Schedule

	Start Date	Completion Date
Transition to Operations Start	08/01/06	08/01/06 (A)
BORE Planning	08/01/06	02/27/07
Hazard Analysis Update	08/01/06	03/30/07
Assemble/Prepare BORE Documentation	10/02/06	01/19/07 (A)
BORE Complete	02/28/07	02/28/07
Construction Complete *	03/30/07	03/30/07
Prime Contractor Contract Complete	04/06/07	04/06/07
Approve Building Occupation - CD-4a	04/03/07	04/30/07
Lab Facility Transition to Operations [The steps are common to all of the facilities. The specific dates are for the Electron Microscopy Facility.]		
Prepare Test Procedures & Work Permits	12/05/06	12/01/07
Install Equipment	04/13/07	12/03/07
Final Hookup & Test	08/07/07	12/31/07
Facility ORE	01/02/08	01/15/08
Operational Readiness Evaluation Complete – All Facilities	01/02/08	01/15/08
Prepare Operational Documents	12/30/07	12/31/07
Approve Start of Operations - CD-4b	04/01/08	04/30/08

* Project Milestone activities

Figure 2

CFN Transition to Operations Logic Flow



4.2.2 Beneficial Occupancy Readiness Evaluation (BORE)

Beneficial occupancy is the phase of the project cycle when BNL accepts all or a portion of the facility from the contractor as substantially complete to begin beneficial use of that portion of the facility. To achieve beneficial occupancy for the CFN, all essential prime contractor deliverables must be completed except for minor work items, punch list items, and final contract closeout. The purpose of the BORE is to assure that all necessary safety systems are in place and functional prior to incremental start-up of the facility and process, to conduct performance testing of facility equipment and/or safety testing of facility equipment, and to install process equipment. Several BOREs may be conducted to facilitate a phased start up of the facility.

The CFN will be required to complete the Beneficial Occupancy Readiness Evaluation meeting the requirements of the Operational Readiness Evaluation Subject Area and are detailed in the BORE Plan for the CFN.

The criteria and documentation for Beneficial Occupancy acceptance are included as Appendix B.

The CFN BORE Project Leader (ESSH&Q Coordinator) has the responsibility to coordinate all BORE activities with the Laboratory Readiness Review Coordinator who chairs the Laboratory BORE Committee.

As the CFN nears completion the CFN Project Team and the BORE Committee have been performing regular Pre-BORE walk downs of the building to review completion status and develop punch lists. The Project Team periodically attends commissioning activities and witnesses testing at their discretion. They will also verify document submittal status and training status for operating staff. All outstanding requirements needed to achieve Beneficial Occupancy will be documented on a punch list and be reviewed at regular Integrated Project Team meetings until they are completed.

BNL will coordinate delivery schedules for technical equipment with the prime contractor's construction schedule to minimize double handling and storage of technical equipment. As such this may require a phased Beneficial Occupancy whereby individual Lab spaces are accepted prior to acceptance of the entire building. The Laboratory BORE Committee will review the criteria applicable to each phased acceptance of a space for Beneficial Occupancy and determine the applicable requirements. In all cases this acceptance will include all life safety requirements and the environmental and security requirements necessary to assure the equipment is maintained in a clean, dry, secure area with restricted access control.

4.2.3 Approve Building Occupation (CD-4a)

The CFN will be ready for building occupancy and start of initial operations when construction is complete (all building systems have been completed and are operational), the criteria for Beneficial Occupancy have been met, transition to operations planning is complete and the necessary CD-4a DOE review has been conducted and approval is provided. This transition will signify that control and operational responsibility for the facility has been transferred from the CFN Construction Prime Contractor to the CFN Project Team. Operational procedures and controls will be in place to assure that CFN Project staff are aware of their responsibilities under the transition to operations phase and that they have had the required training. Following CD-4a, the technical equipment installation will continue, and the equipment will be connected, energized, calibrated, adjusted, tested and accepted with project funds. The transition to the CFN Operating Staff will begin in support of BES programmatic and User activities. The criteria and documentation for CD-4a approval are included in Appendix C.

4.2.4 Operational Readiness Evaluation (ORE)

An Operational Readiness Evaluation (ORE) will be performed meeting the requirements of the Operational Readiness Evaluation Subject Area to determine the status of the CFN before start-up is authorized. The purpose of an ORE is to

verify that all personnel, hardware, and procedures are ready to permit the activity to be undertaken in a safe and environmentally sound manner. The ORE ensures that BNL managers, supervisors, and staff are aware of their responsibility for health and safety while providing independent review of these responsibilities. A completed ORE is required for CD-4b.

Laboratory start-up will be phased to coincide with the project schedule and the delivery of scientific equipment. Operational Readiness Reviews (ORR's) will be conducted for each lab or group of labs identified. The CFN Project Director in conjunction with the ESSH&Q Coordinator, Technical Equipment Operations Coordinator and appropriate Facility Leader will identify the scope of the ORE(s) and assign a single point of contact representing each laboratory who will have operational and ESH responsibility.

4.2.5 Approve Start of Operations (CD-4b)

The CFN will be ready for start of full operations when all the technical equipment has been installed and certified as ready to support research operations, the criteria for the Operational Readiness evaluation have been met, all transition to operations milestones complete and the necessary CD-4b DOE review has been conducted and approval is provided.

The Facility Leaders will oversee the equipment installation and testing process for their respective facilities. Status of technical equipment installation will be reviewed at regular project status meetings by the CFN Project Director and Technical Equipment Coordinator and include periodic observation of actual commissioning and testing activities.

Any items not completed will be documented on a provisional acceptance document signed by the ORE Team. Upon completion of all items the technical equipment will be accepted for operations.

The criteria and documentation for CD-4b approval is included as Appendix D.

4.3 Installation, Testing and Acceptance of Technical Equipment

4.3.1 Installation and Testing of Technical Equipment

Final hook up and testing of equipment will be initiated subsequent to CD-4a approval, and will be conducted by equipment vendor representatives and BNL staff (Note: while technical equipment installation may actually begin subsequent to the Construction Complete milestone, it is anticipated that based on the current project schedule all installation activities will be post CD – 4a). For the major technical equipment (indicated in Table 2) the equipment vendor contracts require installation, and initial testing to be conducted by the vendors. BNL is responsible for these activities for all other technical equipment. For the technical equipment in Table 2 activities will be conducted by the equipment manufacturers and witnessed/approved by the corresponding BNL facility Leader. All work that is performed during the final hook up and test period will be conducted under BNL's Work Planning program, i.e. work permits will be used to identify hazards and establish appropriate controls. Later experimental work will be conducted under the experimental safety review program. It is not expected that any work will involve the use of engineered nanomaterials during the initial test period. These activities will be coordinated by the CFN ESSH&Q Coordinator, Building Manager and Technical Equipment Operations Coordinator. Within each suite of facility laboratories, activities will be coordinated by the appropriate CFN Facility Leader or their designee working in conjunction with the aforementioned trio. The project team, principally the Deputy Project Director, the Technical Equipment Coordinator and the CFN Contract Administrator, will assure that technical equipment is specified, ordered and delivered on time to support the project schedule.

Table 2 Technical Equipment Vendors (>$200K) Providing Installation and Startup Support			
WBS	Facility	Technical Equipment	Vendor
1.2.1	Nanopatterning	Focused Ion Beam Nanoimprinter Deep 5 Etch System	FEI Molecular Imprints Oxford Instruments
1.2.2	Ultrafast	Laser Spectroscopy System	In Procurement
1.2.3	Electron Microscopy	STEM 200 KeV FEG TEM	Hitachi FEI
1.2.4	Materials Synthesis	x-Ray Reflectometer Confocal microscope Chemical Vapor Deposition System SEM	In Procurement In Procurement In Procurement In Procurement
1.2.5	Proximal Probes	LEEM Var Temp STM Low Temp STM UHV Nanoprobe Comb. NSOM/AFM Low Temp Confocal	Elemitec RHK Spec Omicron In ProcurementIn Procurement
1.2.6	Theory & Computing	Computer System	Adv. Clustering, Inc.
1.2.7	CFN End Sta – NSLS	End station instrumentation	in-house support

4.3.2 Acceptance of Technical Equipment

Equipment acceptance will be by designated project and operations representatives, e.g. Facility Leader, Technical Equipment Coordinator, QA Representative, ESSH&Q Coordinator and Deputy Project Director. The basis for acceptance will be inspection and test. All items will be inspected to verify that the correct item and quantity was received, with no apparent damage (referred to as kind, count, and condition). In addition, physical, functional, and performance criteria will be verified, as determined by the Facility Leaders. All inspection and test criteria, as well as results, will be documented on a *BNL Inspection/Test Record* (ITR) form (included in Appendix E). The process is depicted in Figure 3.

In the event that a nonconformance is discovered, it shall be documented on the ITR form or on a *CFN Deviation/Waiver Request* (DWR) form (included in Appendix E). Nonconformances are classified as either Type I or Type II depending on severity. Type I are those that can affect performance, interchangeability, durability, systems interface, or ES&H; Type II are those not classified as Type I. A DWR form must be use for all items with a purchase price above $50K, or where a Type I nonconformance exists. The Facility Leader shall determine the disposition of the nonconforming item, which involves the decision to return to vendor (RTV), use-as-is, rework, repair, or scrap.

For items with a purchase price above $50K, once the acceptance activities have been completed, and the item has satisfied all specification and contract requirements, the Project shall issue a *CFN Acceptance Certificate* (included in Appendix E). The Certificate documents the approval of the item for operation in the CFN, including that:

- All systems, parts, materials, and accessories have been received and installed.

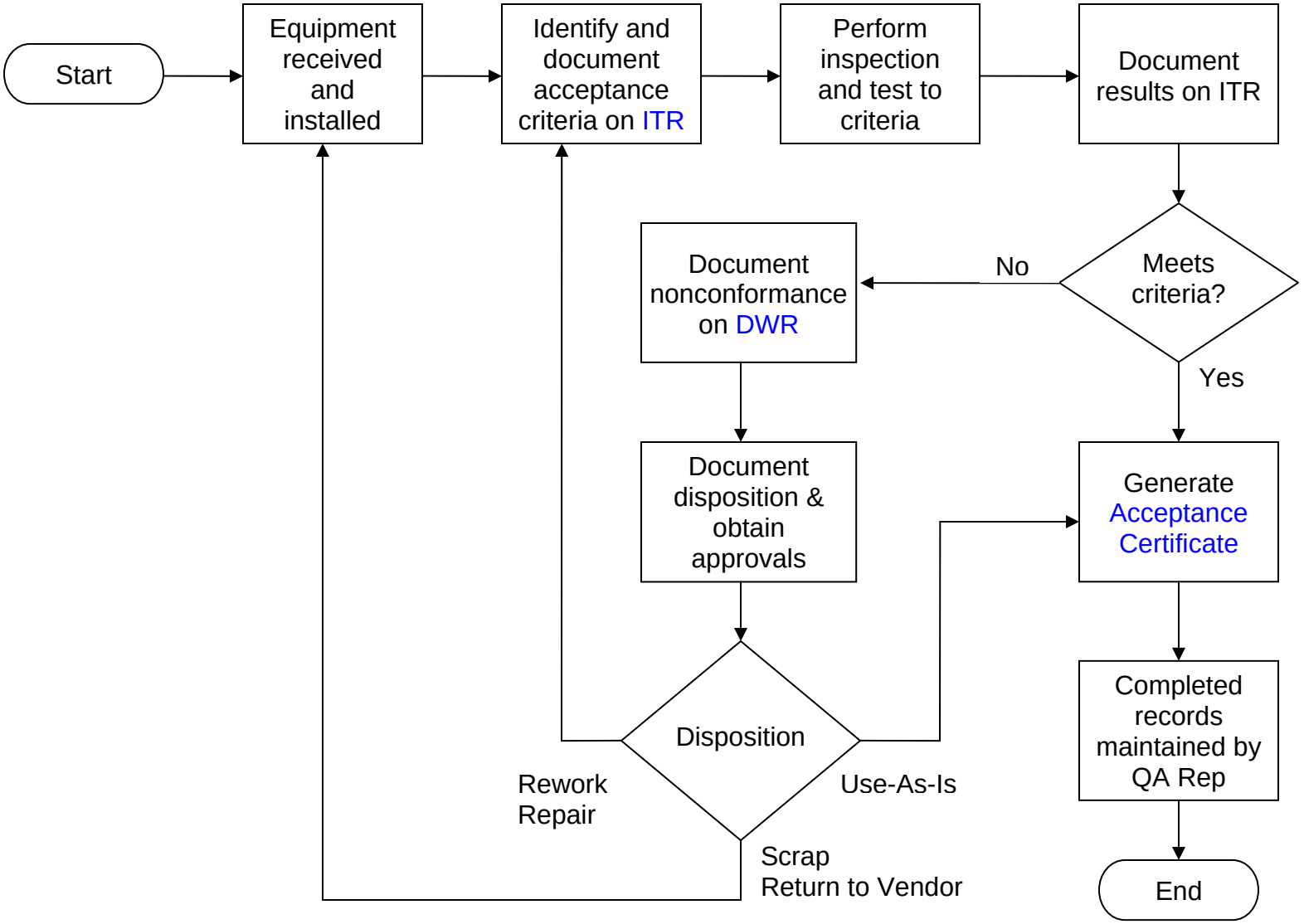
- All inspection and testing has been successfully completed and documented, and any exceptions have been documented and resolved.
- All required documentation, such as operating or maintenance manuals, has been received.
- All records of acceptance activities have been assembled and reviewed.
- All required training that is deemed necessary for BNL staff to operate and maintain the equipment has been completed.

As part of the acceptance process, the QA Representative will collect and assemble records for each item, including the specification, contract/PO, vendor records (inspection & test data, certificate of conformance, calibration certificate), and BNL acceptance records (ITR, DWR, acceptance certificate). The records will be indexed by item/WBS, and turned over to the Technical Equipment Operations Coordinator at project closeout.

The following records will be collected, assembled and maintained in the CFN for each item: specification, contract/PO, vendor records (inspection & test data, certificate of conformance, calibration certificate), and BNL acceptance record (ITR, DWR, acceptance certificate). The records will be indexed by item/WBS, and turned over to the Technical Equipment Operations Coordinator.

Figure 3

CFN Technical Equipment Acceptance



4.4 Operations and Maintenance

4.4.1 Maintenance of Building and Technical Equipment

The CFN Commissioning Plan will address facility maintenance requirements. The commissioning process documentation deliverables will include all equipment manufacturer's data, operations and maintenance manuals, design performance, actual performance at start-up, training requirements, parts lists and recommended spares. The Commissioning Plan will be reviewed by the Deputy Manager of the BNL Operations and Maintenance Division to assure that facility maintenance requirements are adequately addressed in the commissioning process. The appropriate equipment data will be entered into BNL's Preventive Maintenance program. The program will be implemented in accordance with the manufacturer - recommended schedule after TFMA (Transfer for Maintenance Accountability) and Beneficial Occupancy.

The Facility Leaders will determine all required maintenance for technical equipment within their facility based on the manufacturers recommended maintenance requirements for each item. Where items can be maintained by in-house staff, the items will be provided to the BNL maintenance management center for programming into the Preventive Maintenance program. Where items require periodic vendor maintenance services they will be programmed as "ticklers" into Preventive Maintenance program to serve as a reminder that maintenance is due so the vendor can be scheduled to provide the service. The CFN Project Director or his designee will periodically assess the maintenance status of technical equipment to verify that required maintenance is being properly performed and to evaluate the effectiveness of the Preventive Maintenance system.

4.4.2 Training – Operations of Building and Technical Equipment

The training necessary for transition to operations includes training of O&M staff on the operation and maintenance requirements for the building systems and training of CFN

staff on ESH, lab services, security and communication systems. These training requirements will be documented in specific Job Training Assessments (JTA's) assigned to each person working in the CFN that are not covered under a specific work permit or a sub-contractor HASP. All training will be documented in the BNL training database.

The training necessary for operation of technical equipment includes training of CFN operating staff on the safe operation and maintenance requirements for the technical equipment and any associated safety systems. These training requirements will also be documented in the BNL training database.

The training schedule will be coordinated with the technical equipment vendors schedule for delivery, startup and training of equipment operators. Any adjustments to the schedule will be agreed to at regular progress meetings. Training participants will be notified of training dates as early as practicable. All training will be documented in the BNL training database or specific instrument SOP.

4.4.3 O&M Expenses

The building operating and maintenance costs that are incurred during the transition to operations period will be covered as part of the BNL space management program. Electric power costs will be paid by the CFN when operating funds are available at the start of FY2008.

4.4.4 Staffing

The level of effort that is required to complete the transition to operations activities is incorporated into the resource loaded project schedule. Technical equipment installation will be performed by the equipment manufacturer working in concert with the construction prime contractor. Technical equipment hookup, test and initial operation will be performed by BNL scientists and technicians who are already on staff at BNL. The larger technical equipment procurement contracts include installation and test

support by the equipment vendor. Operations support will be provided by the ESSH&Q Coordinator, Building Manager, and Technical Equipment Operations Coordinator who are currently working full time in these positions. Subject matter experts from BNL support organizations will be used as necessary. The level of staffing that has been estimated to support the transition to operations activities is indicated in able 3.

Table 3

Transition to Operations Staffing

FY2007 – FY2008

Facility[(1)]	Level of Effort (FTE)
Nanopatterning	1.4
Ultrafast	0.7
Electron Microscopy	1.8
Materials Synthesis	1.3
Proximal Probes	1.6
Theory & Computation	0.6
Light Sources	0.8
Operations	
ESSH&Q Coordinator	1.0
Building Manager	1.0
Technical Equipment	1.0
Operations Coordinator	
Quality Assurance Engineer	0.50
CFN Admin support (training, user coordinator etc)	3.0
ESH&Q Directorate Support (matrixed)	0.75
TOTAL	**15.45**

(1) Facility Labor is split between the Facility Leader, support scientists and Technical support. All support is currently on staff at BNL. Technical support is available from the other organizations within BNL and will be purchased as necessary.

5.0 CFN OPERATIONAL OVERVIEW

5.1 CFN User Program

The Center for Functional Nanomaterials will be operated as a national user facility, accessible to researchers at universities, industrial laboratories and national laboratories through peer-reviewed proposals. The user program will provide access to state-of-the-art Laboratory facilities staffed by laboratory scientists, postdocs and technical support personnel who are active in nanoscience research. A ”Jumpstart” User program is currently in place using existing BNL equipment. The “Jumpstart” User program contains most of the elements that are described here for the User program that will be in place for normal operations.

5.1.1 Modes of User Access

There are two basic modes of user access, General User access and Partner access. General Users are individuals or groups who need access to the facility to carry out their research, using existing equipment in the CFN. General Users apply for access by submission of a proposal that is evaluated by the Proposal Review Panel (PRP). The scope of a General User proposal can vary from a single experiment proposal to a proposal for multiple visits and substantial access to a range of equipment to a "special" proposal (i.e. rapid access). Individual and group proposals, including collaborative proposals with CFN staff, are encouraged. There are no charges for facility time under the General User program. Partners are individuals or groups who not only carry out research at the CFN but also enhance the capabilities or contribute to the operation of the Center. Typically they develop the facility instrumentation in some way, bringing outside financial and/or intellectual capital into the evolution of the CFN, or contribute to the operation of equipment and facilities, which must be made available to the General Users. In recognition of their investment of either resources or intellectual capital and to facilitate and encourage their involvement, Partners may be allocated limited access to

one or more facilities over a period of several years. Partner scientific programs are subject to the same peer review process as General Users' proposals.

5.1.2 Proposal Process

Facility time at the Center for Functional Nanomaterials (CFN) is granted through a peer-reviewed proposal system. Principal Investigators (PI) are encouraged to contact the Facility Leader for assistance in developing their proposal. A PI requests facility time by completing a General User Proposal form, which can be downloaded from http://www.bnl.gov/cfn/docs/cfn-proposal.doc. Proposals may request more than one facility or equipment. There are three scheduling cycles per year at the CFN: January-April, May-August, and September-December.
Proposals are reviewed and evaluated by the PRP for technical feasibility, safety, personnel resources, and conformance to facility capabilities.

Proposals are rated on a scale of 1 to 5 (1 being the highest and 5 being the lowest). The user will receive written notification of the rating and PRP comments. Proposals are rated according to the scale below:

1. The proposal involves highly innovative research of great importance. An open-ended project that will either launch a new application for nanoscience research or will clearly impact one of the outstanding problems in the field of nanoscience. A nanoscience facility is essential.
2. A well-conceived, original, research project with a strong potential for making an important contribution to the field of nanoscience research. The experimenters have a good track record and the results obtained are likely to be published in a leading refereed publication. No alternative analytical tool is available.
3. An extension of a nanoscience project that has produced publications in leading refereed publications. Although not groundbreaking, it is near cutting-edge and likely to produce significant results. The need for a nanoscience facility is evident.

4. A nanoscience facility is required and the science is interesting, but routine measurements in a well-worked area of research. The results from the research, although useful, are not likely to create excitement in the field.
5. Serious doubt exists regarding the feasibility of the proposed project or there is no evident need for the use of a nanoscience facility.

Proposals that are approved and allocated are active for 2 years (6 cycles). If the experiment continues beyond two years, a new proposal must be submitted and undergo a new review by the PRP.

5.1.3 Facility Time Allocation

The Allocation Committee allocates facility time to both new proposals and requests for additional facility time. The amount of facility time allocated depends on the rating of the proposal relative to other proposals, on facility equipment availability, and on demonstrated progress from previous cycles (if applicable). After the allocation process is complete, the PI will receive an email notification of the facility assigned and the number of days allocated for the cycle. The PI will also receive instructions to notify the Facility Leader to schedule the facility time.

5.1.4 Safety Approvals

The Safety Approval Form (SAF) must be submitted with the proposal. It is required to reduce or eliminate possible risks and hazards associated with the experiment. A SAF must be completed for every experiment at the CFN and can be downloaded as a Word document from http://www.bnl.gov/cfn/docs/SafetyApprovalForm.doc. Once approved, SAFs are valid for 1 year. For experiments that present unusual risk, users must contact the CFN ESSH&Q Coordinator directly as early as practical during the planning of their work. Time is needed to review the proposal and for configuring appropriate

controls. Some experiments require committee review, which may take several months to complete. Users must consult Facility Leaders if they have additional specific questions.

5.1.5 User Training

All users must complete or update their safety training prior to arrival at the CFN. These training modules are facility and equipment specific and available online at http://training.bnl.gov. SAFs will not be approved by the appropriate Experimental Review Coordinator and CFN ESSH&Q Coordinator without completion of the safety training requirements. CFN Operation and Safety Awareness (COSA) training is required for all users. This in-lab training is facility and equipment specific and will be executed by the Facility Leader or designated COSA trainer upon arrival at the facility. Each user must be instructed in safe procedures in CFN related activities. Instructions are valid for one year, unless there are significant changes to the experiment content and/or safety policies. Facility personnel must keep readily available all relevant instructions and safety literature, including current Experimental Safety Reviews.

5.1.6 User Institutional Agreements

Users must have a Pre-Competitive Nanoscale Science Research Agreement in place prior to performing work at CFN, executed by an appropriate official from their institution. While the vast majority of user research should be in the public domain, and so must be disseminated by publication in the open literature, there may be access for a reasonable percentage of proprietary research which utilizes these unique facilities to benefit the national economy. Users conducting proprietary research may access the facility as General Users, Partners, or under a Cooperative Research and Development Agreement. Full cost recovery is required from the User, and it is a requirement that DOE must approve a non-proprietary description of the work and the proprietary

research agreement. Efforts will be made to secure appropriate intellectual property control for proprietary users to permit them to exploit their experimental results.

5.1.7 Reporting Requirements

All users should inform the CFN of their publications based on research carried out, in whole or in part, at the facility. The CFN compiles a list of all of these publications, and makes it available in various publications and reports. The list includes published work only. Users submit references into the online Publications Database. As part of an annual DOE reporting process, the CFN is required to ask users to take part in a user satisfaction survey to provide requested feedback and to improve user services and the CFN facilities. Users will be asked to complete the survey after completion of each experiment.

5.1.8 Peer Review and Advisory Bodies

The Scientific Advisory Committee (SAC) advises senior management on policies related to the optimization of the quality and quantity of the scientific productivity of the facility. The SAC will be composed of distinguished scientists from both inside and outside the nanoscale science community. Appointments to the SAC will be made by senior management based on nominations from the user community, the Center management, and its advisory bodies. The SAC will report to the Laboratory Director or Associate Laboratory Director with senior management oversight responsibility for the Center.

The Users' Executive Committee (UEC) is elected by the user community at large. The UEC will serve as the official voice of the user community in its interactions with Center management. The UEC will elect its Chair and Vice-chair from among its own members.

The Proposal Review Panel (PRP) carries out evaluation of General User (GU) proposals. The rank order of scores generated by the PRP will be the primary input in the allocation of facility access to General Users. The PRP will also provide feedback to the investigators on the quality of their proposals and, where relevant, on perceived weaknesses. The PRP will consist of external scientists (without affiliation to the CFN) with expertise in various research fields related to nanoscale research. Appointment to the PRP will be made by the CFN Director or designee based on nominations received from the user community and suggestions from the facility management.

5.2 Operational Controls

The Operational Controls for the CFN have been determined based on several inputs; first, the controls that are indicated by the Preliminary Hazards Analysis (or are required to maintain the assumptions associated with the analysis); second, the design of the facility; and, third the existing Laboratory Management Systems as defined in the Standards Based Management System (SBMS). The following describe a sampling of some of the critical operational controls that will be instituted at the CFN.

5.2.1 Inventory Control

An inventory control system will be implemented to ensure that the hazardous materials are limited to the minimum amount necessary to support the experimental program. Controls will be established to assure that quantities in any one control area or collective for the building do not exceed the limits set forth in the New York State Building Code. Chemical inventory is tracked through the Chemical Management System. The CMS consists of a web-based inventory that captures incoming chemicals (type, quantity and location) to the site with bar code identification and tracks these chemicals through their use and ultimate disposal. All chemicals used at the CFN will be tracked in this fashion.

Due to the manifolding of the fume hoods administrative controls it will be necessary to assure the compatibility of materials used in the hoods. While separate exhaust systems will be required for any perchlorate material the general use hoods will be manifolded together and be used for a variety of chemicals. As part of the experimental safety review process, all materials used in the facility will be evaluated for hazard and controls including incompatibilities with other materials. Three hoods will have HEPA filters installed for use with nanomaterials.

5.2.2 Radiation Protection

The existing Laboratory radiation protection program will be in effect for the CFN Facility in compliance with 10CFR835. This will have limited impact on the facility since Facility Hazard Categorization (FHC) of the CFN has been determined to be a “Industrial Facility.” No radiological inventory is planned for the CFN. However radiation generating devices will be utilized in the facility and will be monitored on a periodic basis (as per 10CFR 835) to assure that equipment shielding is maintained to preclude the creation of radiation areas.

5.2.3 Access Control

The CFN management will establish appropriate access controls to ensure that access to the facility is controlled for security purposes and for when hazardous conditions exist. This will typically be done via the use of a card reader system capable of programming access to specific areas within the facility.

5.2.4 Transportation and Handling of Hazardous Materials

The CFN will follow the Laboratory Transportation and Handling of Hazardous Materials program. Samples will be controlled by standard operating procedures that will cover handling, packaging and transportation to and from the facility. These procedures exist for other BNL facilities and will be adapted to accommodate CFN Operations.

Emergency procedures will be established for the CFN Facility to address releases of hazardous material, exposures of personnel, fires, etc.

5.2.5 Fire Hazard Controls

A comprehensive Fire Hazards Analysis was completed for the CFN and recommendations incorporated into the design, including a 100% fire sprinkler system and detection systems. Operationally combustible loading will be managed to ensure that no unnecessary flammable materials accumulate in the facility or that no unnecessary flammable materials are introduced to the facility.

5.2.6 Configuration and Change Management

The CFN facility will establish configuration and change management systems to ensure that identified safety systems are maintained in a suitable state and that changes do not adversely affect the facility safety operations.

5.2.7 Training and Qualifications

The CFN will follow the Laboratory Training and Qualifications Program. This program is to ensure that BNL employees, guests, users, and contractors are trained and qualified to perform their assigned tasks and job functions. The Laboratory has established training requirements in accordance with regulatory requirements for work to be performed, hazards that may be encountered, areas that will be accessed, potential for risk, and general site requirements. BNL has defined minimum training requirements for work to be performed, and monitors the completion of these requirements. In addition, a specific CFN facility orientation has been developed and will be required for every person working in the facility. BNL is working in concert with other NSRC's to develop a general awareness course for working with nanomaterials which will be on line prior to the CFN introducing nanomateials.

The Laboratory is committed to ensuring that personnel receive appropriate training, and that workers are qualified to perform their jobs. Qualification is defined in terms of

education, experience, training, and any special requirements (e.g., medical exams, external certification) necessary for all unescorted work, as well as work while escorted that, according to work planning, requires specific training and qualifications.

5.2.8 Work Planning and Control

All work performed at the CFN including experimental, routine work and maintenance will be conducted in accordance with the existing Laboratory Subject Area "Work Planning and Control".

This subject area establishes work control processes based on the Integrated Safety Management (ISM) Core Functions to define the scope of work, identify the hazards, develop controls, work within the controls, and provide feedback and continuous improvement. The subject area provides a graded approach to management of a wide range of operational and experimental activities from routine to highly complex, and integrates other systems and subject areas such as hazard analysis tools, training requirements, and environmental management into the processes.

The significant aspects of this Subject Area with applicability to the CFN are as follows:

Experimental Safety Review - All organizations conducting experiments use this process to identify the hazards, plan the work controls, and authorize the experiment. The process provides a graded approach to determine the level of planning rigor needed in the documentation. All experiments are required to undergo an initial review by an ESR committee. Each Department/Division uses an Experimental Review Coordinator to determine if a proposed or modified experiment requires a new Experimental Safety Review Committee review or if it fits within established controls from previous reviews. Experimental Safety Reviews must be renewed annually at a minimum

Work Planning and Control for Operations -This process applies to all physical work performed by BNL and non-BNL staff, and also uses a graded

approach to identify hazards, risks, and complexity levels, and to establish the level of rigor for planning and review. The process requires use of a site-wide work permit form for all moderate and high hazard work, not already covered in Standard Operating Procedures, to key the work control process.

5.2.9 Authorization Basis

BNL uses a Facility Use Agreement (FUA) program to document the authorization basis (AB) of facilities. The FUA documents the operational parameters, required hazard and risk analysis, safety envelope, and the authorization basis for the CFN facility. The FUA will be established prior to the final Operational Readiness Evaluation that is required prior to occupancy. A "Safety Analysis Report" is not required as an AB document due to the "Industrial Facility" hazard categorization assigned.

5.2.10 Risks Associated with Nanoparticles

The CFN is aware of the uncertainty about the ESSH&Q risks associated with working with engineered nanoparticles, in particular nanoparticles composed of substances normally considered to pose little risk in the bulk form. The CFN will require conservative precautions consistent with the handling of toxic chemicals whenever nanoparticles are handled in a form and manner that might cause them to become airborne or otherwise enable them to enter or contact the body or to be released into the environment. Such precautions will be specified in experimental safety reviews that are a part of the basis for authorization to conduct work at the CFN. The precautions might require that:

- Work be conducted in designated locations with engineered exposure and/or environmental controls; or
- Work follow formal procedures that specify prohibited and required work practices, including wearing personal protective equipment.

Precautions written into experimental safety review plans are mandatory not only for the nanoparticles whose toxic potential has been determined through empirical study, but

also for all other nanoparticles, including those composed of substances normally considered to be inert or to have low toxicity. Hazard control plans for nanoparticulate forms of substances otherwise managed as higher risk chemicals will require more rigorous controls, and those controls will, again, be specified in the experimental safety review for each activity. Higher risk chemicals include:

- substances composed, in part, of some structures of biological origin;
- compounds BNL considers to be carcinogens requiring rigorous control; and
- teratogens and mutagens, and substances recognized as having high toxicity.

The efficacy of some hazard controls with respect to nanoparticles is uncertain and the CFN requires users to take all reasonable precautions to avoid exposure to dispersible nanoparticulates as well as to prevent these particles from escaping into the environment. Although such precautions normally will not be required for nanostructures "built" on substrates, they may, in some cases, be required for particles suspended in liquids. In collaboration with the other DOE Nanoscale Research Centers (NSRCs), the CFN will implement controls based on the “NSRC: Approach to Nanomaterial ESH” document as well as any other regulatory or consensus documents that may be written. This is consistent with the DOE Secretarial Policy 456.1 for “Nanoscale Safety” and the BNL implementation plan for that policy.

5.2.11 Emergency Planning

The CFN has an Emergency Plan in accordance with the BNL Emergency Preparedness Subject Area to assure that the CFN is integrated into the laboratory’s comprehensive emergency management program. This plan will be periodically updated as the inventory of hazardous materials and technical equipment is introduced into the facility.

6.0 REFERENCES

- CFN Preliminary Hazards Analysis – October 2004
- CFN Fire Hazards Analysis – December 2004
- ESSH&Q Plan for the Construction of CFN Conventional Facilities – February 2007
- Beneficial Occupancy Readiness Evaluation Plan for the CFN – December 2006
- CFN Operations Plan – January 2007
- Project Management Subject Area
- Operational Readiness Evaluation Subject Area
- Occurrence Reporting Subject Area
- Investigation of Incidents, Accidents and Injuries Subject Area
- Standards Based Management System (operational control subject areas)
- DOE Policy 456.1 “Secretarial Policy Statement on Nanoscale Safety”
- BNL Interim Procedure: Approach to Nanomaterial ES&H – September 2006
- Beneficial Occupancy Readiness Evaluation Plan for the CFN – January 2007

Appendix A
BNL CFN Organizational Responsibilities

Associate Laboratory Director for Basic Energy Sciences

The ALD for BES has responsibilities relating to the CFN transition to operations and routine operational safety: The ALD 1) oversees the ESSH&Q performance of the CFN and the other BES organizational units to ensure that operation and work is compliant with DOE regulations, Federal Law, State of New York and Suffolk County Laws and regulations, and BNL procedures, policies, and applicable BNL FUAs; 2) regularly communicates with DOE science managers of relevant programs for feedback on funding, scientific programs, ESSH&Q performance and operations; and 3) has budget authority for operations of the experimental programs of DOE SC-22 funded facilities.

CFN Project Director (PD)

The CFN Project Director has full responsibility and authority for carrying out the CFN project in a manner consistent with this Transition to Operations Plan and other project plans. He is responsible for future transition to the operations of the new facility. The CFN PD transitions ownership to the CFN Director at the completion of commissioning. The CFN Project Director reports to DOE/BES through the BHSO Federal Project Director. The CFN Project Director also supports the BNL goal that “the BNL community together will achieve and sustain an injury-free, healthy, and safe workplace for all employees, visitors, and contractors”. In fulfilling this vision he is committed to:

- Work within the framework of Integrated Safety Management (ISM)
- Implement, and evaluate the Occupational Safety and Health (OSH) programs
- Ensure communication of requirements through Standards-Based Management System (SBMS) to comply with applicable Federal, State, and County Regulations

- Establish goals and performance indicators to guide our efforts and measure our progress
- Hold the subcontractor responsible and accountable for successful execution of contractor's project scope of work to meet technical, schedule, cost and quality objective
- Support the BHSO Federal Project Director in implementing DOE project management process and objectives
- Manage project execution activities
- Ensure project deliverables as defined in the contract are on time and within budget
- Communicate accurate and reliable project status and performance issues to DOE management
- Identify and manage project risks
- Ensure effective implementation of Quality Assurance Plan
- Chair the Risk Management Team

CFN Deputy Project Director (DPD)

In addition to the responsibility to implement management methods to achieve the CFN scope, cost and schedule objectives, the CFN Deputy Project Director directly supports the CFN Project Director to achieve the CFN project's ESSH&Q objectives with special emphasis on conventional construction. To achieve the ESSH&Q objectives he will:

- Hold the prime contractor responsible and accountable for successful execution of contractor's project scope of work including ESSH&Q & quality objectives
- Review and approve ESSH&Q staffing and planning decisions for the CFN IPT
- Participate in regular contractor progress meetings to review ESSH&Q performance
- Participate in periodic ESSH&Q inspections of the CFN construction site to verify contractor performance

- Communicate accurate and reliable project ESSH&Q status and performance issues to DOE management
- Identify and manage project ESSH&Q risks
- Work within the framework of Integrated Safety Management (ISM)
- Ensure effective implementation of CFN ESSH&Q Conventional Construction Safety Plan by CFN IPT staff
- Review and approve Project safety analysis
- Verify receipt of all required environmental evaluations and permits
- Coordinate reviews for final acceptance of project facilities and occupancy permit documentation

The CFN Deputy Project Director's obligations for keeping the BHSO Federal Project Director apprised of the CFN project status are set forth in the CFN *Project Execution Plan* and *Project Management System Description*. This document does not supersede those documents, but supplements them by making clear that the DPD will keep the FPD informed about ESSH&Q aspects of the conventional construction project (including transition to operations). The DPD will promptly report:

- Incidents likely to result in lost workday injuries or reportable environmental consequences,
- Incidents reportable according to ORPS requirements,
- Findings and recommendations resulting from Independent Oversight and Audit (IO&A) activities,
- Significant instances of contractor noncompliance observed during routine internal surveillance,
- CFN facility visits by DOE personnel, and
- Instances where a "Stop Work" order is issued under BNL's general "Stop Work" policy.

CFN Associate Project Director (APD)/CFN Director

The CFN Associate Project Director directly supports the CFN Project Director to achieve the CFN project specific objectives with special emphasis on technical equipment and the user program. The CFN Associate Project Director has the continuing responsibility to develop participation of and commitment from outside research community as to provide input to the design and construction of the CFN to accommodate the requirements of the researches, including overall ESSH&Q responsibilities. The CFN Associate Project Director is responsible for the CFN User outreach programs and experimental programs of the facility. At the completion of commissioning, the ownership of the facility is transferred from the CFN Project Director to the CFN Associate Project Director, who becomes the CFN Director. The CFN Associate Project Director will:

- Report to the CFN Project Director or his designee
- Work within the framework of ISM etc.
- Identify and advise the CFN Project Director of project risks and their management
- Identify critical issues in regard to the specification and/or procurement of the technical equipment with the Technical Equipment Coordinator and advise the CFN Project Director to ensure their timely resolution
- Help the CFN Project Director coordinate functions and work among the various disciplines of the project as a key member of the CFN Integrated Project Team (IPT)
- Develop and organize the CFN User outreach programs
- Develop strategy and plans for the transition to operation in collaboration with other members of the IPT

Environmental, Safety, Security, Health & Quality Coordinator

The ESSH&Q Coordinator is responsible for implementing the BNL ISM program for the CFN project to assure that environmental, safety, security and health issues are addressed in the design, construction, transition to operations and routine operations of the CFN. The ESSH&Q Coordinator plays a significant role in developing and maintaining the ESH requirements and controls related to working with nanomaterials. The ESSH&Q Coordinator is the single point-of-contact for the ORPS. The ESSH&Q Coordinator will interact with the IPT and management as indicated in Figure 1. In this capacity, the ESSH&Q Coordinator will:

- Report to the CFN PD or designee during transition and to the APD during operations
- Oversee preparation of Hazards Analyses and insure that the facility design addresses identified hazards wherever feasible
- Utilize appropriate BNL ESSH&Q subject matter experts to prepare hazard analyses, review design documents, and oversee transition and operations activities to assure compliance with ESSH&Q standards
- Oversee implementation of safety program to assure compliance with BNL and OSHA regulations and monitor progress toward the zero injury goal
- Be responsible for internal oversight and evaluations of the implementation of the CFN safety program. The evaluations shall address consistency with defined expectations, i.e., conformance to internal procedures, as well as identification of hazards that need to be more effectively addressed by the program
- Oversee BORE and ORE of the CFN to enable timely operations while adhering to ESSH&Q requirements
- Serve as the CFN Work Control Manager
- After an event, oversee and coordinate adherence to required procedures in reporting abnormal events or conditions following the BNL SBMS Subject Area Occurrence Reporting and Processing System (ORPS)

- Oversee development of a PQAP
- Serve as the primary CFN interface with BNL ESSH&Q oversight personnel looking into ESSH&Q concerns and notify the PD of plans for DOE and of other non-BNL safety and environmental protection oversight activities at the CFN Facility, and
- Support the implementation of an ESSH&Q program consistent with BNL expectations by 1) Identifying expectations and 2) Drafting an ESSH&Q plan for implementing those expectations.

Technical Equipment Coordinator

The Technical Equipment Coordinator is directly responsible for scope, cost and schedule performance of technical design, technical procurement, technical liaison, and installation and commissioning of technical equipment. In this capacity, the Technical Equipment Coordinator will:

- Report to the CFN Project Director or his designee
- Coordinate the efforts of the individual facility leaders to assure technical performance objectives are achieved
- Provide technical specifications to the Procurement Manager and assures Facility Leaders act as technical liaison during procurement and contract closeout
- Provide technical requirements for conventional facilities to the Conventional Construction Manager
- Coordinate and oversee installation, commissioning and testing of technical equipment
- Coordinate transition from technical construction to operation
- Work within the framework of Integrated Safety Management (ISM)

Facility Leaders

The Facility Leaders report to the Technical Equipment Coordinator and are responsible for developing the technical performance criteria for their assigned research area, preparing equipment specifications for procurement and design requirements for the supporting conventional facilities needed to achieve the CFN's technical performance objectives. The Facility Leaders will coordinate and interpret user outreach feedback in concert with DOE program guidance and BNL collaborating departments to develop the program and capability of each facility. Facility Leaders will coordinate and oversee procurement, startup and commissioning for operations of instruments in their respective facilities.

Procurement Manager

The Procurement Manager is responsible for preparation of bidding, award and contractual documents and oversight of all major procurements of technical equipment. The Procurement Manager will assure that procurements are carried out in accordance with DOE and Federal acquisition regulations (DEAR's/FAR's), and that technical performance requirements included in the contracts are met through implementation of the Quality Assurance Program. The Procurement Manager is also responsible for preparation of bidding, award and contractual documents for the building.

CFN Construction Prime Contractor (E. W. Howell)

The CFN Construction Prime Contractor, E. W. Howell, is responsible for all aspects of the conventional facilities construction, including all labor and materials (mostly through subcontracts), supervision, scheduling, coordination, quality assurance and management of subcontractors. The PC is an active participant during the transition to operations phase and is responsible for assisting BNL in demonstrating that the completed building structures and systems are in full compliance with all of the requirements and specifications for the CFN conventional facilities.

Commissioning Agent

The company BVH Integrated Services has been contracted to be the commissioning agent for the CFN building, and as such will provide and execute the commissioning plan.

Vendors

Various independent vendors have provided materials, equipment, and/or services for the construction of the CFN. During the transition to operations phase some of the vendors are contractually required to demonstrate or verify the correct installation, performance, and/or operation of their products.

CFN Project Oversight Team

The CFN Project Oversight Team conducts periodic, independent reviews of the BNL CFN project. The Team performs formal technical, cost, schedule, construction, ESSH&Q and management reviews on a quarterly basis to assess project progress, identify issues, and provide recommendations for improvement. The CFN project baseline (Project Data Sheet and CD-2 documentation) will be the reference documents for the reviews. Findings, conclusions, recommendations and action items from each review are formally documented in a written report that is provided to the Deputy Director for Science & Technology.

Building Manager

The CFN Building Manager (BM) is responsible for operations, maintenance and housekeeping of the building structure, common areas, and building utility systems. He will work with the ESSH&Q Coordinator in ensuring compliance with ESH policies and procedures in common building areas. The BM will support CFN project transition to operations activities such as technical equipment installation, hook up and initial testing.

The BM serves as Work Control Coordinator, and in that role authorizes work to proceed on work permits, is the primary interface with Plant Engineering for facility related work. The BM is also the primary point of contact for the Safeguards and Security Division, and is responsible for building security, alarms and key control. The BM ensures compliance with the requirements in the Emergency preparedness program and serves as the primary point of contact for building systems and off-hour emergencies involving building systems.

Technical Equipment Operations Coordinator

The Technical Equipment Operations Coordinator (TEOC) plays an important role during transition to operations in assuring that the facility and equipment become fully functional in a timely fashion to support the scientific mission of the CFN. The TEOC, along with the BM, will be the primary interface between the Project Technical Equipment Manager, Equipment Vendors and Facility Leaders to assure that each piece of equipment in CFN is brought up to operational status. The TEOC will work with the Project Technical Equipment Manager to develop and implement equipment specific test procedures and acceptance criteria; and coordinate between the Building Manager and the equipment vendors on utility interfaces. The TEOC will develop and deploy clean room operations protocols including access training for staff, users, and maintenance personnel. The TEOC will assure that materials/equipment or processes introduced into the CFN experimental review program will not impact the operations or the safety of the equipment and facility. The TEOC will coordinate with the Building Manager to assure that facility modifications will not impact the scientific equipment. As the CFN user program expands the TEOC will assist the BM in interfacing between the users and the CFN.

Appendix B
Beneficial Occupancy Criteria

1. The building structures are complete including all walls, floors, ceilings, roofs, windows, structural members, and means of egress such as doors and stairs.
2. Life safety systems (exit lights, emergency lights, building alarms), including the fire sprinkler and detection systems in common areas and ducts (with the exception of the laser detector in the atrium), have been accepted and placed in service.
3. All building egress systems (exit doors and stairs) have been accepted, are in service and not obstructed or compromised by on-going construction activity.
4. All facility electrical power, communication and lighting systems necessary for life safety are completed, accepted and placed in service.
5. All conventional building services and utilities are accepted and placed in service including water, sewer, HVAC, compressed air, chilled water, steam & condensate. Note: Functional Testing of HVAC cooling capacity may be deferred functional testing to assure optimum ambient condition.
6. Surface treatments such as paint, carpet, floor tile, ceiling tile etc. have been substantially completed in the common and support areas of the building and those labs identified for initial occupancy.
7. Air flows throughout the building are adequate to assure that the building HVAC system is functioning properly, and necessary exhaust flows and pressures for operational safety are achieved.
8. BNL O&M / Fire Department staff have received necessary training for the building life safety systems determined to be necessary for beneficial occupancy in accordance with the BVH Commissioning Plan.
9. All testing, inspection and certification documents for life safety systems have been turned over to the CFN Project.

Beneficial Occupancy Documentation

- Preliminary Hazard Analysis
- Fire Hazard Analysis
- Baseline Chemical Inventory
- Training and Qualification Requirements/Records
- Interim operating procedures – as needed
- Building emergency plans
- BORE Appointment Memo
- Fire Department Run Card
- Completed Fire Department Orientation (all shifts)
- Completed Security Orientation (all shifts)
- Commissioning Plan
- Commissioning documents/checklists for safety systems

Appendix C
CD-4a Criteria

1. All prime contractor construction is substantially complete.
2. All Beneficial Occupancy Readiness Evaluation (BORE) pre-start items are complete.
3. All BORE post-start and contractor punch list items scheduled and assigned
4. Final operations and maintenance documentation for building systems has been turned over to the project and to BNL's Operations and Maintenance (O&M) Division.
5. All testing, inspection and certification documents have been turned over to the CFN Project.
6. All as-built drawings and Engineering Change Notices (ECNs) are available to the project for configuration management.

CD-4a Documentation

- Critical Decision 4a (CD-4a) sign off document
- Preliminary Hazard Analysis
- Fire Hazard Analysis
- Baseline Chemical Inventory
- Training and Qualification Requirements/Records
- Interim operating procedures
- Building emergency plans
- Project closeout documentation
- Transition to Operations Plan
- BORE Appointment Memo
- BORE Report

Appendix D
CD-4b Criteria

1. The technical equipment installation is complete, including all supporting equipment, and accessories needed for operation.
2. All required conventional utilities have been connected and are providing the specified level of service in their final configuration. No temporary connections remain.
3. All testing, inspection, and certification has been completed and documented as required by the equipment design and contract specification.
4. All associated safety systems are fully operational.
5. All required training necessary for BNL staff to operate and maintain the equipment has been completed.
6. All required operation and maintenance manuals have been completed and documentation turned over to operating staff.
7. An Operational Readiness Evaluation (ORE) (verifying the items above) has been conducted and all operations critical action items resulting from the ORE have been completed.
8. An ESAAB review for CD-4b providing approval to begin final operations as been completed.
9. An operational Readiness Team will evaluate and review completion of the required criteria. Any deficiencies will be documented and tracked to completion.
10. Final as-built drawings of the facility configuration are available for operations staff.

Appendix D (continued)
CD-4b Documentation

- Critical Decision 4b (CD-4b) sign off document
- Final Hazard Analysis
- Facility Use Agreement
- Facility Risk Assessment
- Job Risk Assessments
- Equipment Manuals
- Equipment acceptance reports
- Staff T&Q matrix
- Final Chemical Inventory System
- ORE Report
- Facility as-built drawings

Appendix E
Technical Equipment Acceptance Form

ACCEPTANCE CERTIFICATE

Technical Equipment Name:_____

Facility:_____ WBS No.:_____

The CFN Project has performed an evaluation of the above technical equipment to determine acceptance for operations. The results of the evaluation indicate that all acceptance activities have been completed, and the item has satisfied all specification and contract requirements. To wit:

- All systems, parts, materials, and accessories have been received and installed.
- All inspection and testing has been successfully completed and documented, and any exceptions have been documented and resolved.
- All required documentation, such as operating or maintenance manuals, has been received.
- All records of acceptance activities have been assembled and reviewed.

Therefore, the equipment is accepted for operation in the CFN.

Cognizant Scientist: _____

Facility Leader: _____

Technical Equipment Coordinator: _____

Technical Equipment Operations Coordinator: _____

QA Representative: _____

ESSH&Q Coordinator: _____

Conventional Construction Design Manager: _____

Deputy Project Director: _____

Appendix E (continued)
Nonconformance Form (page 1 of 2)

DEVIATION & WAIVER REQUEST

DEVIATION/WAIVER CLASSIFICATION ☐ TYPE I ☐ TYPE II		DWR NO.:
EQUIPMENT NAME:		DWR ORIGINATION DATE:
FACILITY:		WBS NO.:
QUANTITY:	INTERNAL __ EXTERNAL __ (INCLUDE SUPPLIER NAME & ADDRESS)	
SERIAL NO.(S):		
DESCRIPTION OF DEVIATION/WAIVER:		
INSTRUCTIONS:		
		NOTE: CONTINUE ON SEPARATE SHEET
DISPOSITION OF ITEM: RTV ☐ USE-AS-IS ☐ REWORK ☐ REPAIR ☐ SCRAP ☐		

APPROVAL

COGNIZANT SCIENTIST _____ DATE _____

FACILITY LEADER _____ DATE _____

TECHNICAL EQUIPMENT COORDINATOR _____ DATE _____

TECHNICAL EQUIPMENT OPERTIONS COORDINATOR _____ DATE _____

QA REPRESENTATIVE _____ DATE _____

ESSH&Q COORDINATOR _____ DATE _____

CONV. CONSTR. DESIGN MNGR. (TYPE I ONLY) _____ **DATE** _____

DEPUTY PROJECT DIRECTOR (TYPE I ONLY) _____ **DATE** _____

PROJECT DIRECTOR (TYPE I ONLY) _____ **DATE** _____

DIRECTOR (TYPE I ONLY) _____ **DATE** _____

Appendix E (continued)
Nonconformance Form (page 2 of 2)

REJECTION

REJECTED BY _____ DATE _____

REASON _____

_____

IMPACT ASSESSMENT

ESTIMATE OF COST IMPACT: _____

_____

SCHEDULE IMPACT: _____

_____

ESS&H IMPACT: _____

_____

IMPACT ON OTHER SYSTEM: _____

_____

CORRECTIVE ACTION REQUIRED YES ☐ NO ☐ INITIATED BY _____

DWR DISTRIBUTION:

Cognizant Scientist
Facility Leader
Technical Equipment Coordinator
Technical Equipment Operations Coordinator
QA Representative
ESSH&Q Coordinator

Conventional Construction Design Manager (TYPE I)
Deputy Project Director (TYPE I)
Project Director (TYPE I)
Director (TYPE I)

Appendix E (continued)
Test Documentation Form (page 1 of 2)

BROOKHAVEN NATIONAL LABORATORY

INSPECTION/TEST RECORD

SHEET ____ OF ____

DEPARTMENT/DIVISION/PROJECT _____

QA CLASSIFICATION: ☐ A1 (CRITICAL/HIGH) ☐ A2 (MAJOR/MODERATE) ☐ A3 (MINOR/LOW) ☐ A4 (NEGLIGIBLE)

PART NAME:	
PART NO.:	REV.:
PREPARED BY:	DATE:
VENDOR:	P.O. NO.:
QTY. RECD.:	DATE RECD.:

COMMENTS _____

☐ Inspection/Test Data Attached (Data Sheet To Include: Part Name, Part No., Date, & Sheet _____of _____)

ITEM	CHARACTERISTIC/REQUIREMENT	INSP. / REJ.	INSPECTOR'S SIGNATURE/LIFE #	DATE
1				
2				
3				
4				
5				
6				
7				
8				
9				

Record all nonconformances for each item on page 2 of ITR.

QTY. Accepted._____ Serial (LOT) NOS Accepted _____

1.0/2h02e011.pdf 1 (09/2000) BQF-003 (8/2000)

Appendix E (continued) 1

Appendix E (continued)
Test Documentation Form (page 2 of 2)

MEASUREMENT AND TEST EQUIPMENT RECORD

DESCRIPTION	MODEL NO.	SERIAL NO. /BNL NO.	MFG. NAME	CALIBRATION DUE DATE	* RESP. IND. SIG. (IF REQD.)

* Responsible Individual concurrence is required if M&TE is not calibrated, out of calibration, or not in calibration system.

NONCONFORMING REPORT

ITEM/SER. NO.	DESCRIPTION	** DISPOSITION CODE	RESP. IND. SIG. & DATE

**CODES: UAI (Use as is); RTV (Return to Vendor); RWK (Rework); Repair; Scrap

If nonconforming item is A1 or A2 and disposition is Repair, RTV, RWK, Scrap or UAI, provide additional concurrence below:

QA (if reqd.)_____ DATE _____ OTHER (if reqd.)_____ DATE_____

COMMENTS: _____