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March 15, 2000

Mr. Michael Schlender  
Assistant Laboratory Director  
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Dear Mr. Schlender:

**SUBJECT: DOE APPROVAL OF THE PROJECT MANAGEMENT PLAN, REV. 1 FOR THE  
BROOKHAVEN GRAPHITE RESEARCH REACTOR (BARR)  
DECOMMISSIONING PROJECT**

Reference: Letter, M. Schlender, BNL to S. Mallette, BHG, Subject: Submission of the Brookhaven Graphite Research Reactor Project Management Plan, Rev. 1, Dated March 9, 2000

DOE approves the subject Plan for implementation.

You may consider adding additional sections and narrative to the Plan in future updates or through errata sheets:

1. In Section 6, Project Controls: Add a discussion on Funds Management; Cost Accounting and Accruals Systems; Subcontractor Invoice Payments.
2. In Section 7, Integrated Master Plan for Controlling Work In The Project: In Section 7.3, BARR Work Planning and Authorization there is a specific reference to Plant Engineering Planning Meeting (as required). This should be a generic statement for all D&D Subcontractors (which could include Plant Engineering).

If you have questions or comments, you may contact James D. Goodenough at ext. 2423.

Sincerely,

for Scott Mallette, REM  
Senior Environmental Advisor  
Brookhaven Group Manager

cc: M. Stahr, EM-34, GTN  
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# Brookhaven Graphite Research Reactor Project Management Plan



**March 2, 2000**

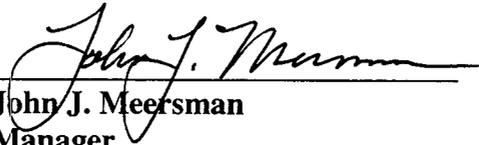
BROOKHAVEN NATIONAL LABORATORY  
BROOKHAVEN SCIENCE ASSOCIATES  
UNDER CONTRACT NO. DE-AC02-98CH01886 WITH THE  
UNITED STATES DEPARTMENT OF ENERGY

**Title of Document:** **BROOKHAVEN GRAPHITE RESEARCH REACTOR  
PROJECT MANAGEMENT PLAN**

**Compiled by:** **BGRR Decommissioning Project Team**

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PROJECT MANAGEMENT PLAN  
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## LIST OF ACRONYMS

AB	Authorization basis
ADM	Action description memorandum
AHA	Activity hazards analysis
ALARA	As Low As Reasonably Achievable
AOC	Area of Concern
BGRR	Brookhaven Graphite Research Reactor
BNI	Bechtel National, Inc.
BNL	Brookhaven National Laboratory
BSA	Brookhaven Science Associates
CERCLA	Comprehensive Environmental Resource Conservation Liabilities Act
CWBS	Contractor work breakdown structure
D&D	Decontamination and decommissioning
DOE	Department of Energy
DOE-BHG	Department of Energy, Brookhaven Group
DOE-CH	Department of Energy, Chicago Operations Office
DOE-EM	Department of Energy, Environmental Management
DOE-HQ	Department of Energy, Headquarters
DQO	Data quality objective
EE/CA	Engineering evaluations/cost analysis
EPA	Environmental Protection Agency
EPG	Environmental Programs Group
ERD	Environmental Restoration Division
ES&H	Environment, safety and health
ESH&Q	Environmental safety, health and quality
FHC	Final hazard classification
HASP	Health and safety plan
HEPA	High efficiency particulate air
HFBR	High Flux Beam Reactor
HVAC	Heating, ventilating, air-conditioning
IAG	Interagency Agreement
ISM	Integrated Safety Management
ISOCS	In-situ object counting system
LCAM	Life cycle assessment management

μR	micro Rem
MOA	Memorandum of agreement
OMB	Office of Management and Budget
NEPA	National Environmental Policy Act
NESHAPS	National Emissions Standards for Hazardous Air Pollutants
NPDES	National Pollution Discharge Elimination System
NPL	National Priority List
NYSDEC	New York State Department of Environmental Conservation
PCB	Polychlorinated biphenyl
PHC	Preliminary hazards classification
QA	Quality assurance
RAA	Removal Action Alternative
RCRA	Resource Conservation and Recovery Act
RESRAD	A computer program used for calculating dose from residual radioactivity
R2A2	Roles, responsibilities, accountabilities and authorities
SBMS	Standards-based management system
SCDOH	Suffolk County Department of Health
SDWA	Safe Drinking Water Act
SHM	Safety and health manager
S&M	Surveillance and maintenance
SPDES	State pollution discharge elimination system
TBC	to be considered
TLD	Thermoluminescent dosimeter
TRU	Transuranic
TSCA	Toxic Substances Control Act
USI	Unreviewed safety issue

## EXECUTIVE SUMMARY

The purpose and scope of this Project Management Plan is to define how the Brookhaven Graphite Research Reactor (BGRR) Decommissioning Project will be controlled from a management perspective, and to establish the technical-, cost-, and schedule-baselines for the project. They define the planned scope and establish that the project should be budgeted for \$46.25 M (without contingency, including \$5.46 M in escalation) and completed in 96 months (start date is set at October 1, 1997). Note that the cost estimates, schedules, and milestones presented here and in Section 6 are correct as of February 2000, and pending approval with the BGRR Project Baseline.

This plan will highlight many aspects that would be included in a Project Execution Plan, as described in Order 430.1A *Life Cycle Asset Management* [1], although adherence to this Order is not required for the BGRR Decommissioning Project.

The BGRR Decommissioning Project lies within the responsibility of the Environmental Management (EM) Directorate at Brookhaven National Laboratory (BNL). The scope, schedule, and cost of the Project, as well as technical processes and personnel, are integrated across the entire EM scope at BNL. In addition, the integration of the BGRR Project with the Environmental Restoration Division is ongoing of this revision. This is an evolving situation which will affect various portions of this plan as the new organization procedures are put in place.

The Project will use BNL's existing infrastructure of procedures, processes, and personnel to complete the decommissioning work at the BGRR to the greatest extent possible. This includes following in full the policies on procedures of the Integrated Safety Management (ISM), Environmental Site Management, and the Standards Based Management Systems (SBMS). Only when the site's systems, policies, or procedures do not provide sufficient guidance for the needed decommissioning work to be carried out safely and cost-effectively will new policies or procedures be generated.

To implement the BGRR Decommissioning within the framework of the Brookhaven Interagency Agreement (IAG) [2], and to be fully compliant with it, the following high-level strategy will apply to major items of the decommissioning work:

1. The BGRR is subject to the provisions of Section X, Areas of Concern, of the Interagency Agreement (IAG) and is identified as Area of Concern (AOC) 9 in that document.
2. Section XI, Removal Actions, Sub Section A, of the IAG allows AOCs to be addressed as removal actions.
3. Currently identified sub-AOCs include 9A, the Canal; 9B, Underground Ductwork; 9C, Spill Sites; and, 9D, the Pile Fan Sump.

4. All sub-AOCs will be documented in a Record of Decision (ROD). The current plan calls for submitting the Draft Final ROD to the regulator in September 2004, and completing the AOC 9C (Spill Sites) as a post-ROD activity.
5. Maintenance will be conducted outside the processes of the Comprehensive Environmental Resource Conservation Liabilities Act (CERCLA).
6. Some cleanup work will be undertaken as time-critical removals. The key documents for such removals will be Action Memorandums and Completion Reports.
7. Other work will involve non-time-critical removals. The key documents will be an Engineering Evaluation/Cost Analysis (EE/CA), Action Memorandum, and Closure Reports.
8. Where sampling and analysis of soil is required, the U.S. Department of Energy (DOE) will discuss such work with the U.S. Environmental Protection Agency (EPA) and New York State Department of Environmental Conservation (NYSDEC) to obtain their input before proceeding. All sampling and analysis plans for Final Status Surveys will be sent to EPA and NYSDEC.
9. A Community-Relations Plan was developed for the overall project encompassing the following items: public involvement with decisions on key removal work, a stakeholder's involvement process related to the removal-action alternatives for the BGRR area, and additional public participation as required by the IAG.

The Removal Action Objectives for the BGRR Decommissioning Project are to achieve the AOC 9 Record of Decision in a manner that protects human health and the environment, achieves future land-use objectives at the Brookhaven National Laboratory, and removes or permanently isolates contaminants of potential concern. In addition, the project shall meet all applicable or relevant and appropriate standards, requirements, criteria, or limitations promulgated under federal or state environmental laws that must be met or waived for removal actions under CERCLA.

To implement this strategy and to reach these objectives, the project will undertake the following actions:

- Perform routine facility maintenance and remove certain equipment under the National Environmental Policy Act (NEPA) Categorical Exclusion for reactor maintenance at BNL,
- Follow the CERCLA process, which incorporates NEPA values, with DOE as the lead agency for any removal actions which could impact the environment, and
- Use the proposed technical approach described in the Contractor Work Breakdown Structure (CWBS) Dictionary integrated with state-of-the-art health/safety/management systems and appropriate technology to carry out the project in a safe, expeditious, and cost-effective manner.

# 1 OVERVIEW OF THE PROJECT

## 1.1 BACKGROUND

The Brookhaven Graphite Research Reactor (BGRR) was a graphite-moderated and -reflected, thermal-neutron, air-cooled research reactor facility. The original fuel loading was natural uranium, and this core obtained criticality on August 22, 1950. The fuel loading was changed to enriched uranium fuel-elements in April 1958. The reactor was finally shut down in 1969. Its nominal power level was 28 megawatts thermal during the natural uranium fuel-loading, and 20 megawatts thermal during the enriched fuel-loading.

The graphite moderator was regularly annealed during the years of operation and again annealed in 1970 to remove any residual stored energy; all the remaining fuel was shipped to the U.S. Department of Energy's (DOE's) Savannah River site during 1972. The BGRR complex was described as being in a safe shutdown condition by the U.S. Atomic Energy Commission and became an "orphaned" facility within the DOE complex. From 1977 until 1997, portions of the facility were used as the Brookhaven National Laboratory's (BNL's) Science Museum.

### 1.1.1 History of Operation and Deactivation

The fuel elements were charged and discharged from the south face of the graphite pile through openings in the biological shield's wall which match the fuel channels in the graphite pile. The spent fuel was lowered into a chute or a cart which then was emptied into the chute extending from the floor of the south plenum to the bottom of the deep pit. The other five faces of the reactor are penetrated by an assortment of experimental openings. The southeast and southwest corners also have eight penetrations, each for control rods. Following permanent shutdown, the control rods were disconnected from the drives and inserted into the graphite pile. The biological shield's penetrations for the control rods were covered with metal plates and tack-welded into place. The experimental openings were closed, plugged, or both.

The deep pit is part of the water-filled canal, which served to shield, store, and prepare fuel-elements and activated sources for shipment. The canal is 64 feet long and 8.5 feet deep, except for the 20-foot deep pit area near the reactor.

Radioactive equipment was removed from the experimental areas and the underwater canal. The water in the canal was pumped down. The canal was cleaned with soap and water and shielded with concrete slabs.

### 1.1.2 Description of the Facility

The BGRR complex (shown in Figure 1.1) consists of the following buildings:

#### Building 701, Reactor Building (Figure 1.2)

This building is a concrete, steel, and brick structure that houses the reactor pile, the reactor's support equipment and systems, and administrative offices. Parts of the building were contaminated during operations. The walkway areas of the building are routinely surveyed. Known areas of contamination are posted to limit access. The following are the radioactivity values: General walkways <50  $\mu\text{R/hr}$ , <1000 disintegrations per minute/100  $\text{cm}^2$  beta/gamma, <20 disintegrations per minute/100  $\text{cm}^2$  alpha; inside posted Contamination Areas up to 100,000 disintegrations per minute/100  $\text{cm}^2$  beta/gamma; inside posted High Contamination Areas >100,000 disintegrations per minute/100  $\text{cm}^2$  beta/gamma and dose rates up to several mR/hr; and inside posted Radiation Areas from dose rates of 5 mR/hr up to 100 mR/hr. There are no known accessible high-radiation areas in Building 701. Access also is limited by restricted key distribution to the locked building's entry door.

#### Building 702, Reactor Pile (Figure 1.3)

The Reactor Pile is the designation for the graphite pile, the control rods, the biological shield, and associated equipment. The control-rod areas are contaminated and are posted. The faces of the reactor are contaminated to various levels and are posted accordingly. Building 702 is entirely enclosed within Building 701, and so its access also is controlled.

#### Building 703, Reactor Laboratory Building with East and West Wing

Building 703 is not within the scope of the Decommissioning Project, nor is it part of the Project Management Plan. The building contained the research areas. Contamination was contained and minimal during reactor operations. The building is being used to support research work and analytical laboratories. There is an interface between Buildings 701 and 703 that may be removed in the future by installing permanent walls and limiting common support services (such as heating, ventilation, air-conditioning (HVAC) ducting, electrical conduits, water, and sewage piping) to the extent practical. This would allow the continued use of all or most portions of Building 703 while work takes place in Building 701. Access to Building 703 is not restricted, but passage through the interface to Building 701 is controlled through the locked entry-door of Building 701.

#### Building 704, Fan House (Figure 1.4)

This building contains the five motors and fans that were the motive force for the cooling-air supply to the BGRR pile. Air ducting from the pile is located on the roof with the equipment inside the building. The fans discharged under the building into duct work that exhausted cooling air into the base of the stack. The interior of this section of ductwork has various levels of fixed- and removable-contamination, as do the fan rooms within the building.

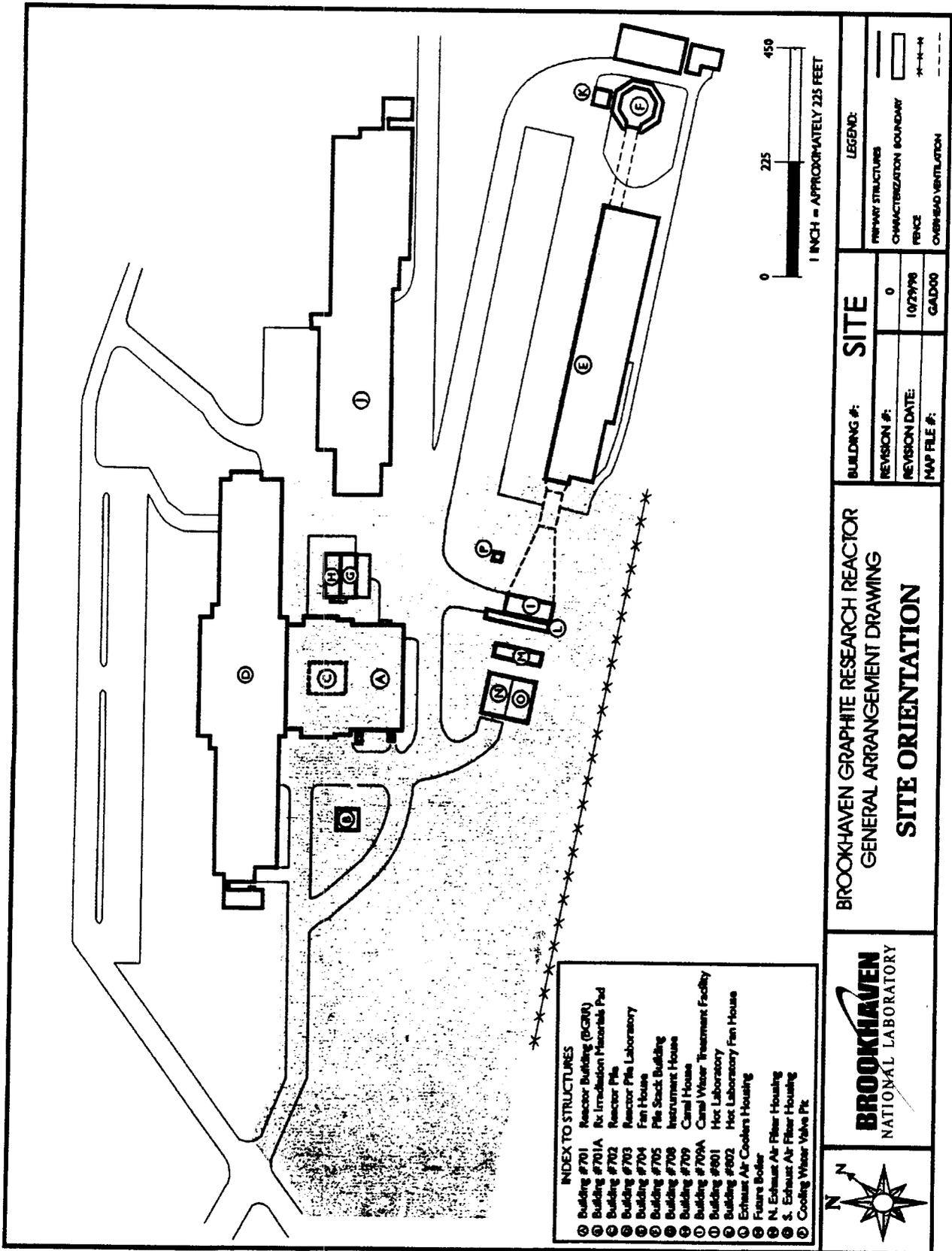


Figure 1.1. BGRR Site Layout Diagram

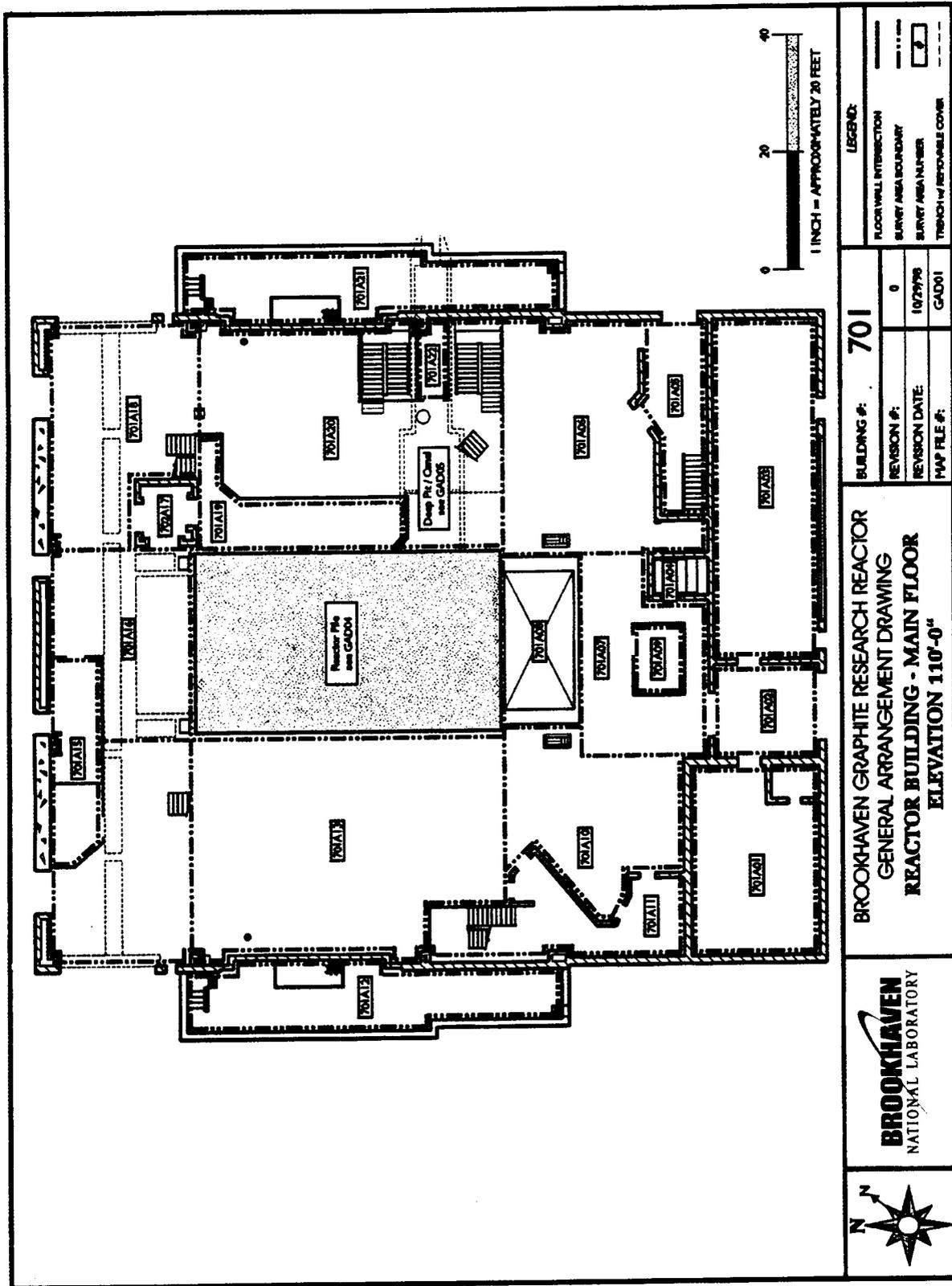


Figure 1.2. Building 701, Reactor Building

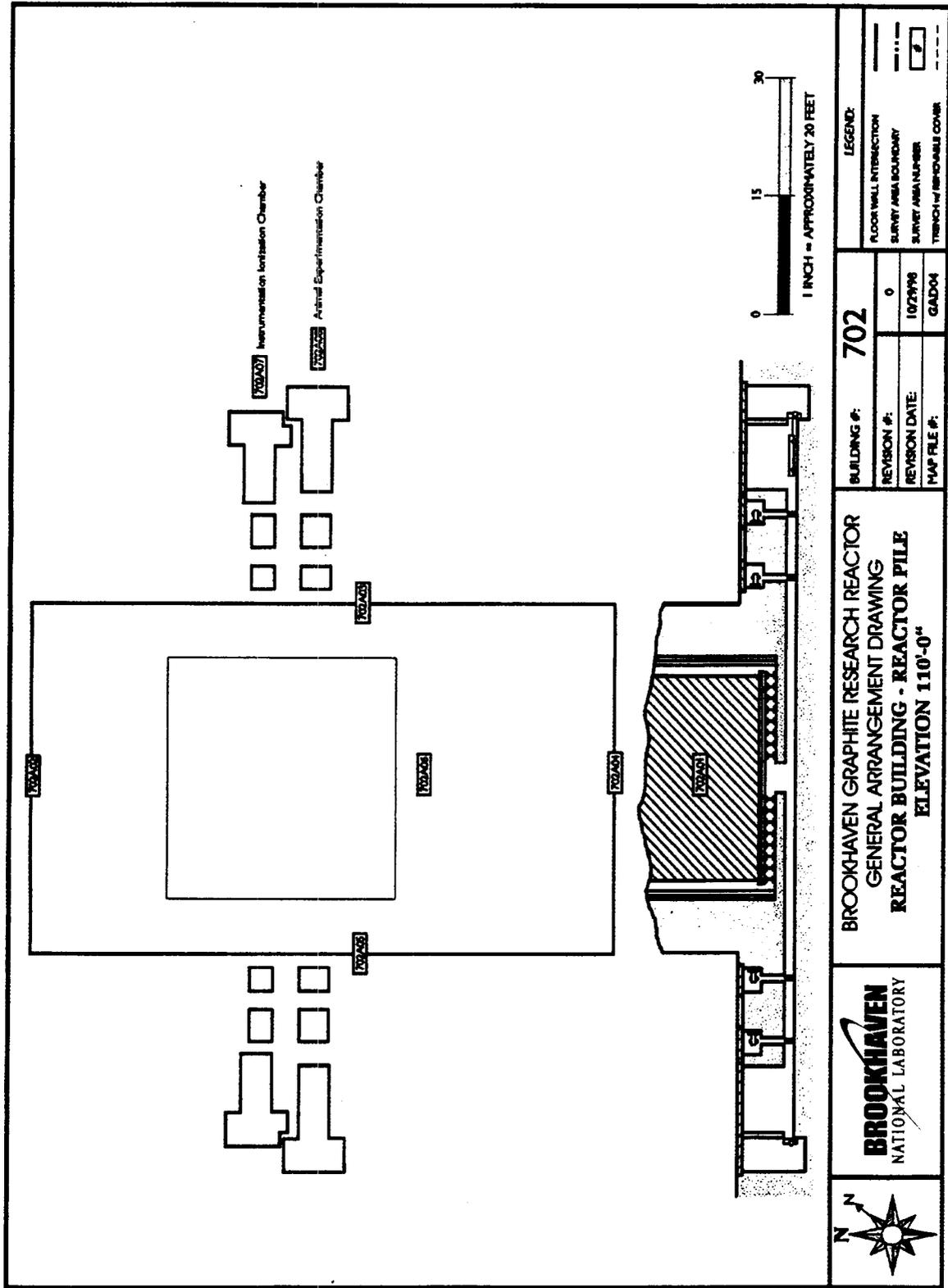


Figure 1.3. Building 702, Reactor Building Pile

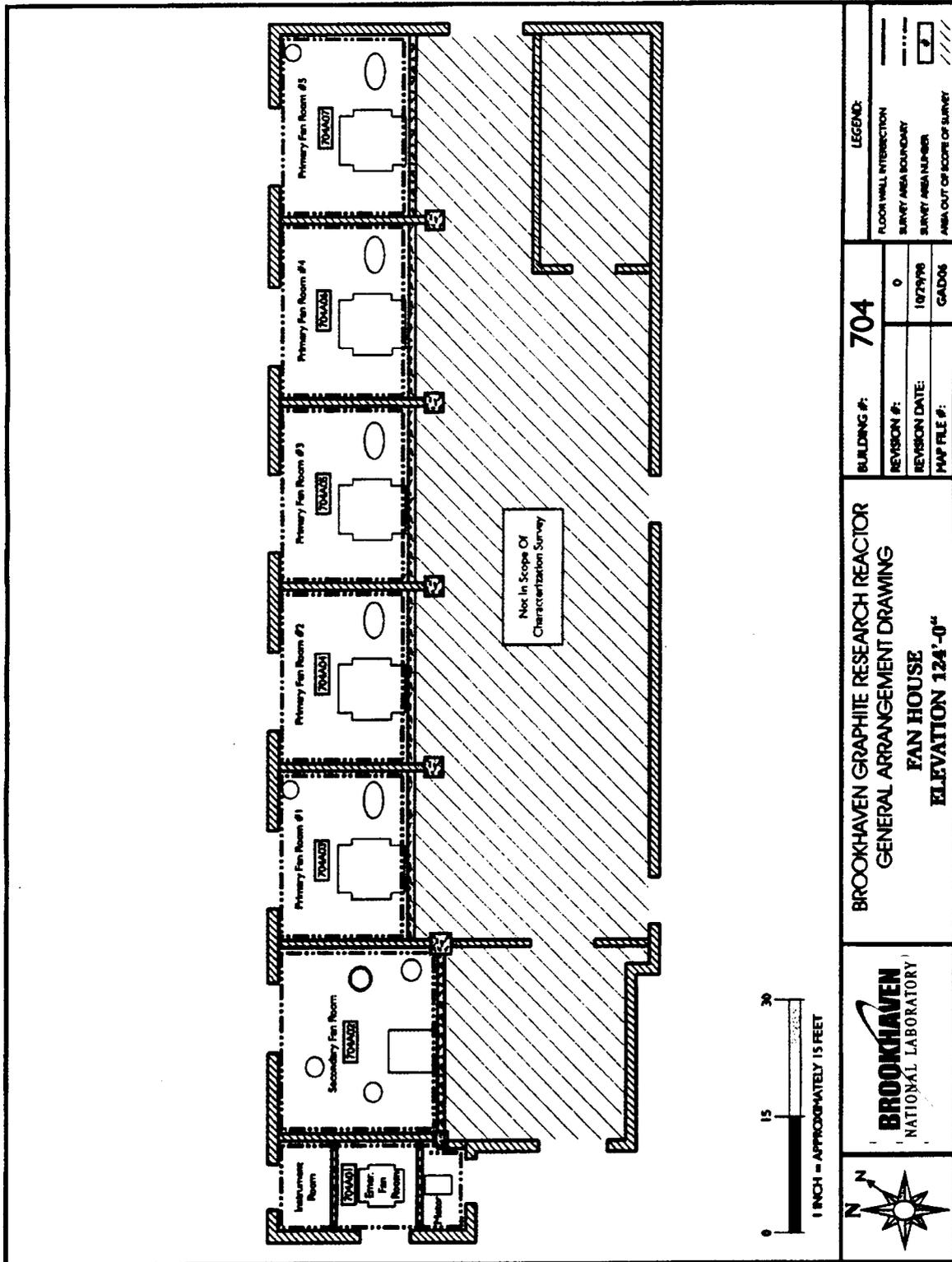


Figure 1.4. Building 704, Fan House

Because there is electrical switchgear and equipment in this building that supports the High Flux Beam Reactor (HFBR), a formal Memorandum of Agreement (MOA) was signed by representatives of the BGRR Decommissioning Project and Reactor Division during project planning. A copy of it appears in Appendix A.

#### Building 708. Instrument House (Figure 1.5)

The Instrument House contained the instrumentation to monitor the cooling ventilation system, and included manometers to monitor differential pressure across filters and downstream coolers. There are radiological- and hazardous-materials inside this building. Both the building and the grounds around it are posted as an Underground Radioactive Materials Area. Surveys show radioactivity levels over 50  $\mu\text{R/hr}$  up to 1.5 mR/hr. The non-radiological hazardous material is asbestos and mercury. This structure is no longer used except to limit water intruding into the underground ducting. A restricted key distribution and locked entry-door limit access to the building.

#### Building 709, Canal House and Outdoor Pad (Figure 1.6)

The Canal House was used to store and prepare fuel, irradiated equipment, and radioactive materials for shipment and disposal. The inside area contained fixed and removable contamination. The outdoor pad has fixed contamination under several layers of asphalt and concrete. The outside area around the Canal House is posted as Controlled Area - TLD Required. An Underground Radioactive Material Area survey show radioactivity of  $>50 \mu\text{R/hr}$  up to 300  $\mu\text{R/hr}$ . The Canal House is connected to the Water Treatment House on the north wall. Restricted key distribution and a locked entry-door limit access to Canal House.

#### Building 709A, Water Treatment House and Outdoor Pad (Figure 1.6)

This area was used to treat the water used in the canal. The outdoor pad area is connected to the outdoor pad area of Building 709, and is known to contain fixed contamination under several layers of paint and asphalt. Restricted key distribution and a locked entry-door limit access to the Water Treatment House.

In addition, the BGRR has several yard systems that are included in the project's scope:

- Four-inch carbon-steel line from the canal discharge of Building 709 to Building 811, Waste Concentration Facility.
- One-and-a-half-inch stainless-steel line from the canal walkway's sump to Building 801, Hot Laboratory.
- Four-inch carbon-steel line from the East Yard Pad Sump connecting to a six-inch line from Building 701's safety showers and pile drains. The line ends in the "F" cell of Building 801, Hot Laboratory.

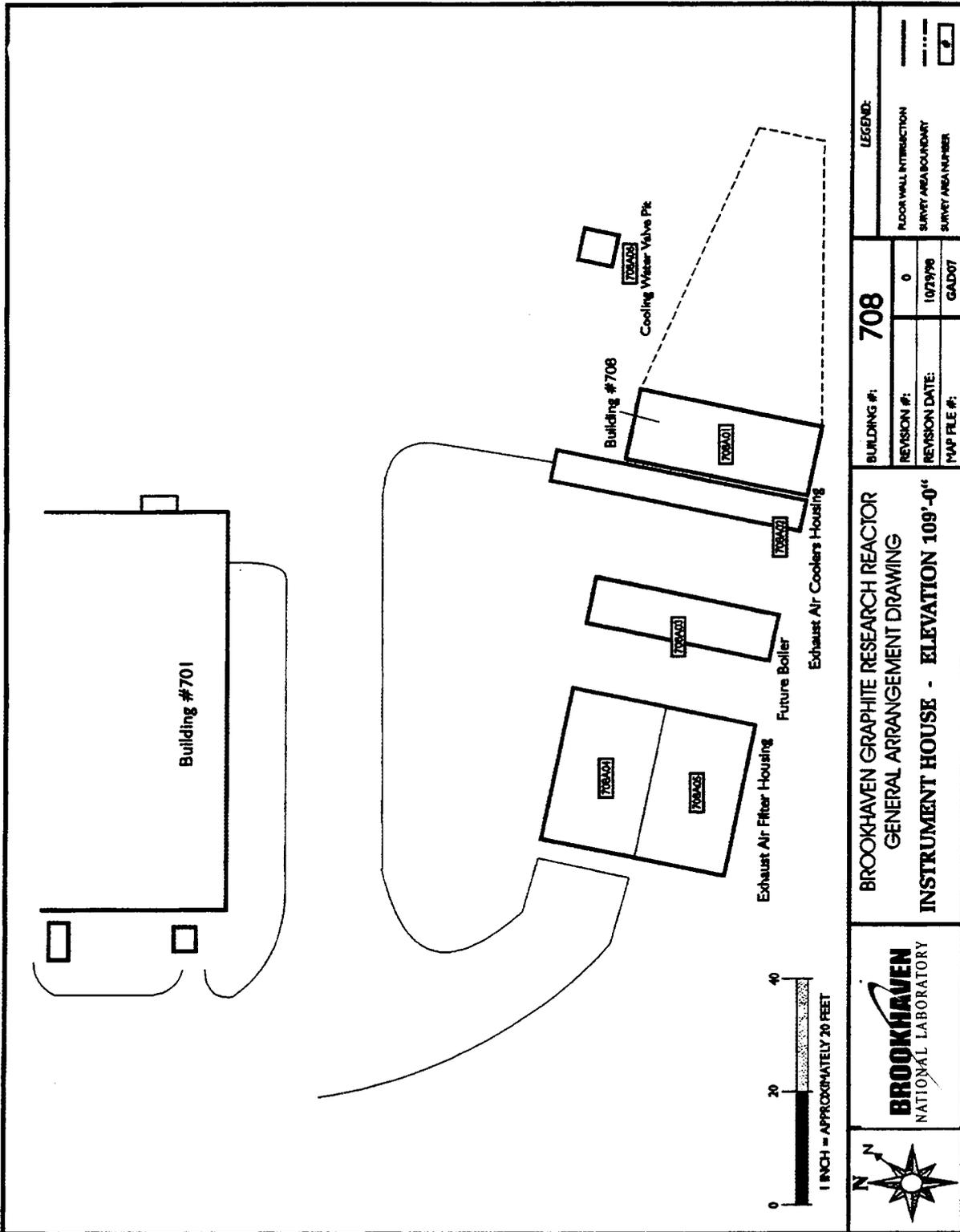


Figure 1.5. Building 708, Instrument House

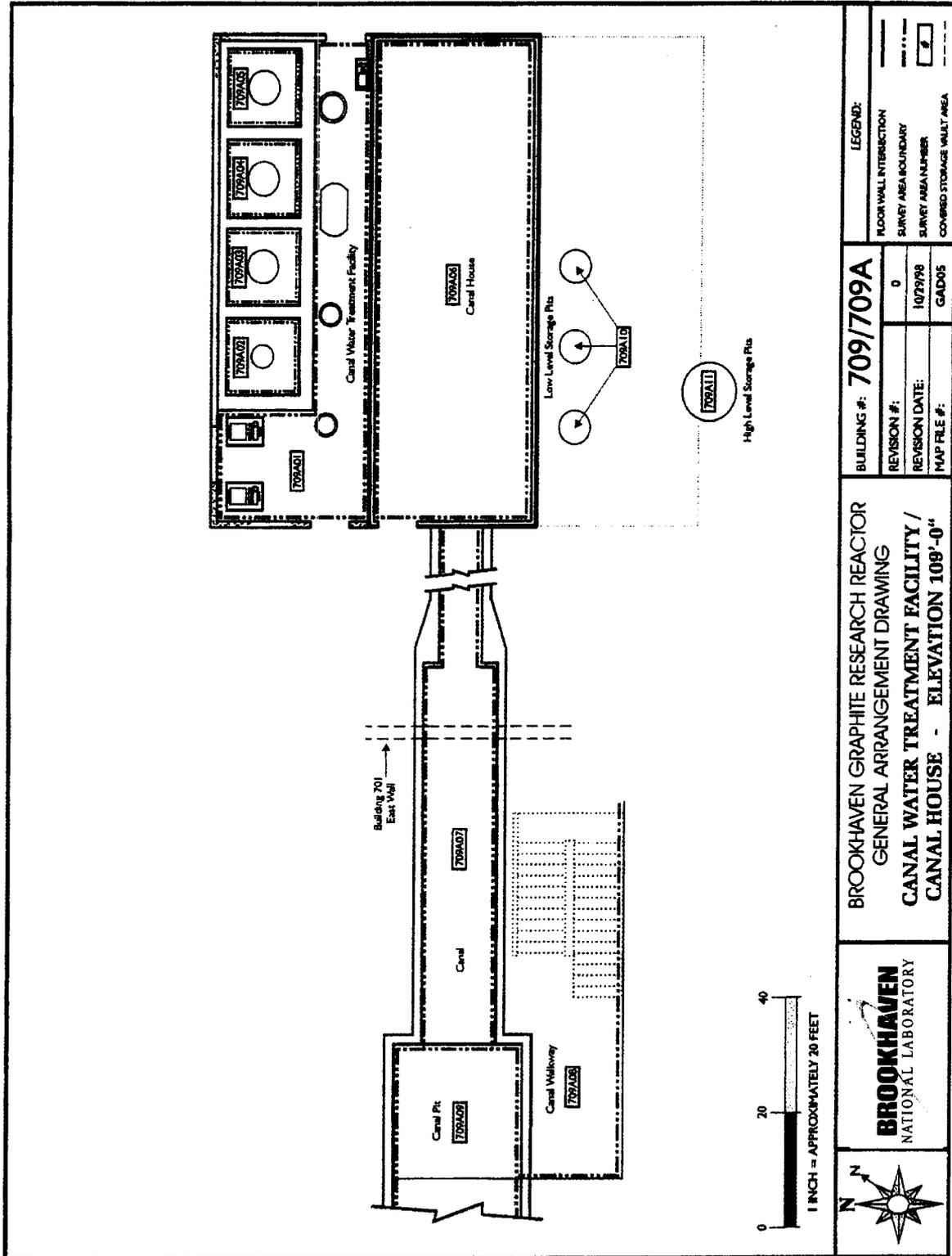


Figure 1.6. Building 709, Canal House and Outdoor Pad

- Pile Fan Sump with connecting lines from Building 704, the Fan House, and to the south wall of Building 801, Hot Laboratory, and stack drains, Building 705. (Note: The Pile Fan Sump is an active system used by the HFBR for collecting water from the stack drains.)
- Building 701A, Chem Nuclear Facility, with above-grade and below-grade piping connecting to Building 701, and the floor-drain line to Building 703's collection pit.
- Valve Pit near Building 708, Instrument House, with piping and valves to control the exhaust-cooler's temperature.
- Pile Laboratory Collection Pit at the southwest corner of Building 703, Laboratory, with a trough to Building 701, up to the sewer connection at Building 801.
- Pneumatic tubes used for transferring samples from the BGRR to the support facilities: two lines to the west wing of Building 703, Laboratory; two lines to the east wing of Building 703, Laboratory; and two lines to Building 801, Hot Laboratory.

### **1.1.3 Conditions of the Facility**

The BGRR facility is fifty years old, and weather and the lack of programmatic maintenance has taken a toll on the building's structures and systems. Some gradual degradation of the facility was observed in the past, and actions were taken to remedy the situation. In 1985 and 1986, work was undertaken to stabilize the canal facilities, and radioactive equipment and piping were removed, together with loose contamination from accessible areas. Continued degradation, no matter how gradual, ultimately can release contaminants to the environment, and, consequently, represent a potential risk to the safety of BNL's personnel and to the public. Environmental concerns, such as the contamination of groundwater and spread of removable contamination, were addressed by installing geo-membranes, soil grading, and paving the parking lot. There are plans to replace an unstable facility transformer, and the aboveground concrete air-plenums have been shored with sheet-metal covers.

Knowledge and documentation of radiological conditions and hazardous materials within the BGRR buildings and systems is limited. Sampling indicated gross alpha/beta contamination in addition to gamma emitters, such as Cesium-137, in the soils and the facility's systems. Radiological surface-scans showed contaminants above background in several locations. An identified underground Strontium-90 plume has been associated with the BGRR. Areas with minimal radiological information include the air-cooling exhaust plenum and exhaust filters, and the reactor pile.

Hazardous materials known or suspected to exist within the BGRR include lead, mercury, asbestos, oil contaminated with polychlorinated biphenyl (PCBs), and, possibly, heavy metals.

## 1.2 PROJECT STRATEGY

The strategy for accelerating the decommissioning of the BGRR is to work in compliance with the terms of the Brookhaven Interagency Agreement (IAG) and the EPA/DOE joint policy on decommissioning DOE facilities. The latter specifies that DOE facilities should be decommissioned as removal actions under CERCLA, unless conditions dictate otherwise.

To implement the BGRR decommissioning within the framework of the IAG, and to be fully compliant with it, the following high-level strategy will apply to the major items of work:

1. BGRR is subject to the provisions of Section X of the IAG, and is identified as AOC 9 in that document.
2. Section XIA of the IAG allows AOCs to be addressed as removal actions.
3. Currently identified sub-AOCs include 9A, The Canal; 9B, Underground Ductwork; 9C, Spill Sites; and 9D, the Pile Fan Sump.
4. All sub-AOCs will be documented in a Record of Decision.
5. Maintenance will be conducted outside the CERCLA process.
6. Some cleanup work will be undertaken as time-critical removals. Key documents for such removals will be Action Memorandums and Completion Reports.
7. Other work will involve non-time-critical removals. The key documents will be an EE/CA, Action Memorandum, and Closure Reports.
8. Where sampling and analysis of soil is required, the DOE will discuss the work with the EPA and NYSDEC to obtain their input before proceeding. All sampling and analysis plans for the remaining soils will be sent to EPA and NYSDEC.
9. A Community Relations Plan will be developed for the overall project encompassing the following items: Public involvement with decisions about the key removal work, a stakeholder's involvement process to consider removal-action alternatives for the BGRR area, and any additional public participation required by the IAG.

The Removal Action Objectives for the BGRR Decommissioning Project are to achieve the AOC 9 Record of Decision in a manner that protects human health and the environment, achieves future land-use objectives at the BNL, and removes or permanently isolates contaminants of potential concern. In addition the project shall meet all applicable or relevant and appropriate standards, requirements, criteria, or limitations promulgated under federal or state environmental laws that must be met or waived for removal actions under CERCLA.

To implement this strategy, and to reach these Removal Action Objectives, the project will undertake the following actions:

- Perform routine facility maintenance and remove certain equipment under the NEPA Categorical Exclusion for reactor maintenance at BNL.
- Follow the CERCLA process, which incorporates NEPA values, with DOE as the lead agency for any removal actions that could impact the environment.
- Use the proposed technical approach described in the CWBS Dictionary that is integrated with state-of-the-art health/safety/management systems and appropriate technology to perform the project in a safe, expedited, and cost-effective manner.
- Use the contingencies identified for each major project element as presented with the Project Baseline. Contingency Management for the BGRR Decommissioning Project will follow the BHG/BNL Environmental Management Division's baseline change process to access contingency funds.
- Make critical decisions for the Project using a tiered approach: a) Community values for the Project will be collected early in the process to modify the Removal Action Objectives, if necessary; b) Community and NEPA values (plus nine CERCLA criteria) will form the Basis of the Removal Action Alternatives (RAA) study for the below-ground ducts/canal/701 Removal Actions; c) The outcome of the RAA study will be the starting point for each Engineering Evaluation/Cost Analysis (EE/CA) for the three removal actions mentioned above; d) The EE/CA will identify the Recommended Alternative for each action; and, e) The results of each Removal Action will be documented in a CERCLA Record of Decision for the BGRR. In addition, the BGRR Decommissioning Project has identified formal Critical Decision points (as defined by DOE Order 430.1 Life Cycle Asset Management) that will result from the above actions:
  - Critical Decision 1 – Project Charter, included as Appendix F of this document.
  - Critical Decision 2 – BGRR Decommissioning Project (September 1999).
  - Multiple Critical Decision 3s – Current Year Plans and the EE/CA for each CERCLA Removal Action, to authorize future work in controlled increments.
  - Critical Decision 4 – Record of Decision for the BGRR in 2004.
- Use the developing BNL-Brookhaven Science Associates (BSA) Integrated Management Systems as much as practical to integrate the BGRR Decommissioning Project processes into the new and enhanced programs for BNL site management. These systems are still being developed in many cases, and how each individual section will be implemented in the decommissioning project will be reviewed during work planning. The particular management system areas that may be used on the BGRR Decommissioning Project are as follows:

- (a) Emergency Preparedness / Off-Normal Event Recording
- (b) Environmental Management Services and Waste Management
- (c) Facility Safety
- (d) Self-Assessment Program
- (e) Quality Management
- (f) Radiological Controls
- (g) Standards Based Management System
- (h) Training and Qualification
- (i) Worker Safety and Health
- (j) External Affairs (Public Relations)
- (k) Life Cycle Asset Management
- (l) Environmental Restoration
- (m) Nuclear Safety
- (n) Work Planning and Controls

To accelerate the project, selected fieldwork is being undertaken parallel to developing this overall Project Management Plan. The following are examples of such contemporary high-priority tasks:

1. Removal of the Pile Fan Sump, which poses an environmental risk and recently was incorporated into the IAG as sub-AOC 9D. This is a CERCLA time-critical removal action, initiated by an Action Memorandum.
2. Disposal of the contaminated wastewater removed from BGRR and temporarily stored in aboveground tanks at the Brookhaven Waste Management Facility. The water is a potential environmental hazard and significantly adds to the overall cost of the decommissioning project due to the surveillance and maintenance needed during its storage. This is a routine maintenance activity and is covered under the NEPA Categorical Exclusion.
3. Removal of the temporary walls and other materials left behind when BNL's Science Museum was relocated. This routine maintenance will reduce the fire load and risk potential within Building 701, and also will allow better access to the remaining BGRR facilities.

This approach will benefit DOE, and all other stakeholders concerned with BNL's cleanup, by more rapidly removing the potential risks associated with the BGRR, and decreasing the overall cost of the cleanup effort.

### 1.3 PROJECT ASSUMPTIONS

This section lists the major planning assumptions for this Project. They are made to define the initial scope, schedule, and cost of the project to meet the Removal Action Objectives. These assumptions may be modified as the Project progresses and further regulatory and community input is obtained. The status of the facility that best meets the Removal Action Objectives will be determined using the CERCLA process and the Record of Decision that will be developed for the BGRR.

1. No internal management reserve in addition to the managed risk-based contingency has been applied to the project cost estimates.
2. Stakeholder concerns (i.e., the public and elected officials) will not change planned activities and end-state decisions, through the Engineering Evaluation/Cost Analysis (EE/CA) and Action Memorandum processes.
3. Baseline Change Proposals will be approved on a timely bases.
4. Funding will be available in the amounts described in the baseline.
5. The areas planned for decommissioning will remain under the control of BNL. Areas cleaned up by Environmental Management (BGRR Decommissioning Project) will be returned for landlord activities, within the BNL/BSA contract.
6. The baseline assumes decontamination or dismantlement and removal of all contaminated equipment and structures identified to be above the approved Derived Concentration Guideline Limits (DCGLs), and confinement of the biological shield and the pile.
7. Escalation is applied at 2.7% per year on FY00 dates.
8. The scope of work will not be increased due to discovery of additional AOCs/soil contamination.
9. A special BSA G&A rate of 14.5% has been applied to BGRR starting in FY00 and will be escalated annually and not be changed.
10. The BGRR is classified as a radiological facility.
11. Buildings and components within the BGRR project have value. Building 701 and contents have no salvage value. The materials will be disposed as construction waste.

12. The environmental remediation strategy is valid. The NEPA categorical exclusion will be used to perform work that does not directly impact soils. The CERCLA “time-critical” and “non-time-critical” removal actions will be applied to environmentally sensitive areas.
13. EE/CAs and Action Memorandums are submitted and approved in time to support required scheduled activities.
14. The contracting strategy for the project includes using the BNL/Plant Engineering workforce to conduct redemption, removal, and restoration activities that are within their capabilities to support the scope and schedule of the project.
15. The baseline plan estimates soil remediation to be no deeper than three feet below the lowest elevation of a removed or remediated structure and three feet from the surface of identified surface soil contamination.
16. Cost estimates are based on current rates for disposal at Envirocare of Utah that are contracted through the DOE Ohio Field Office. If transuranic wastes are identified, a BCP will be approved to prepare a plan that satisfies regulatory requirements for transuranic waste packaging and storage. The plan will be prepared and submitted for DOE approval.
17. Transportation for soils and debris from BNL to Envirocare of Utah is by rail service unless specifically identified otherwise in the project baseline.
18. The Historical Preservation requirements for recorded information about the BGRR Facility are sufficient without having to remediate and preserve any components, systems, or structures planned for removal.
19. The Life Cycle of this project ends September 30, 2005.
20. Clean wastes generated by the project can be disposed of at approved clean waste disposal facilities.
21. No Independent Verification Contractor is required since EPA and NYSDEC will oversee the project under CERCLA, and will take duplicate verification samples.

## 2 ORGANIZATION OF THE PROJECT

The DOE's Environmental Management (DOE-EM) organizational structure has two levels of management: 1) the DOE Headquarters (DOE-HQ) program, and 2) the DOE Chicago (DOE-CH) Environmental Projects Group. The DOE-HQ program defines program management and the responsibilities assigned to CH. The direction for the BGRR Decommissioning Project (BGRR-DP) is the responsibility of the DOE-CH Environmental Programs Group. The charter of the DOE-CH EPG is to plan, coordinate, integrate, and implement the national Environmental Management program for the BNL. The BGRR Decommissioning Project will be managed under the DOE's Chicago Operations Office, Environmental Projects Group. The DOE's Project Manager will have line responsibility directly to the DOE-CH Group Manager. At BNL, the DOE Brookhaven Group (BHG) manages the program and projects of the DOE and its major contractors, including the environmental restoration projects at BNL. DOE-BHG provides support in the technical work, and in the budget, contract administration, and safety and health to the respective DOE management levels, as required. Figure 2.1 shows this organization. Appendix F has a full definition of the DOE BHG/CH's responsibilities.

Bechtel National, Inc. (BNI) was chosen to lead this project team within the existing Brookhaven Science Associates (BSA) contract with BNI. The contractor's project organization chart is included in Figure 2.2. Each management position or job title corresponds to a brief description of the position that follows, and the functional responsibilities that are listed on Figure 2.3. Full descriptions of all the positions and of the corresponding Roles, Responsibilities, Authorities, and Accountabilities (R2A2) have been developed. Some key team members will be drawn from successful decommissioning projects at Hanford to cooperate with the local staff, subcontractors, and the existing project team. Resource-sharing with the BSA site organizations, (notably the Environmental Restoration Division and Waste Management Division) and BNI is planned to maximize efficiency and employee opportunities. These functional interfaces and dependencies also are shown in Figure 2.3.

The Project Manager is responsible for all aspects of the performance of the BGRR Decommissioning Project and all communication with the DOE and regulators. The Project Manager reports internally within BSA for safety, quality, overall project-performance, schedule, and budget control. The Deputy Project Manager will be responsible for these items as assigned by, or in the absence of, the Project Manager.

The Project Engineer is responsible to the Project Manager for the technical decisions and direction for the project. The Project Engineer will coordinate all issues on nuclear safety, licensing, and regulatory compliance, waste management, and any technical subcontract work undertaken for the project.

The Construction Manager reports to the Project Manager and is responsible for carrying out all decommissioning work either by local crafts through the work package system or through subcontract work. The Construction Manager also supervises and directs the field superintendent in doing the decommissioning work.

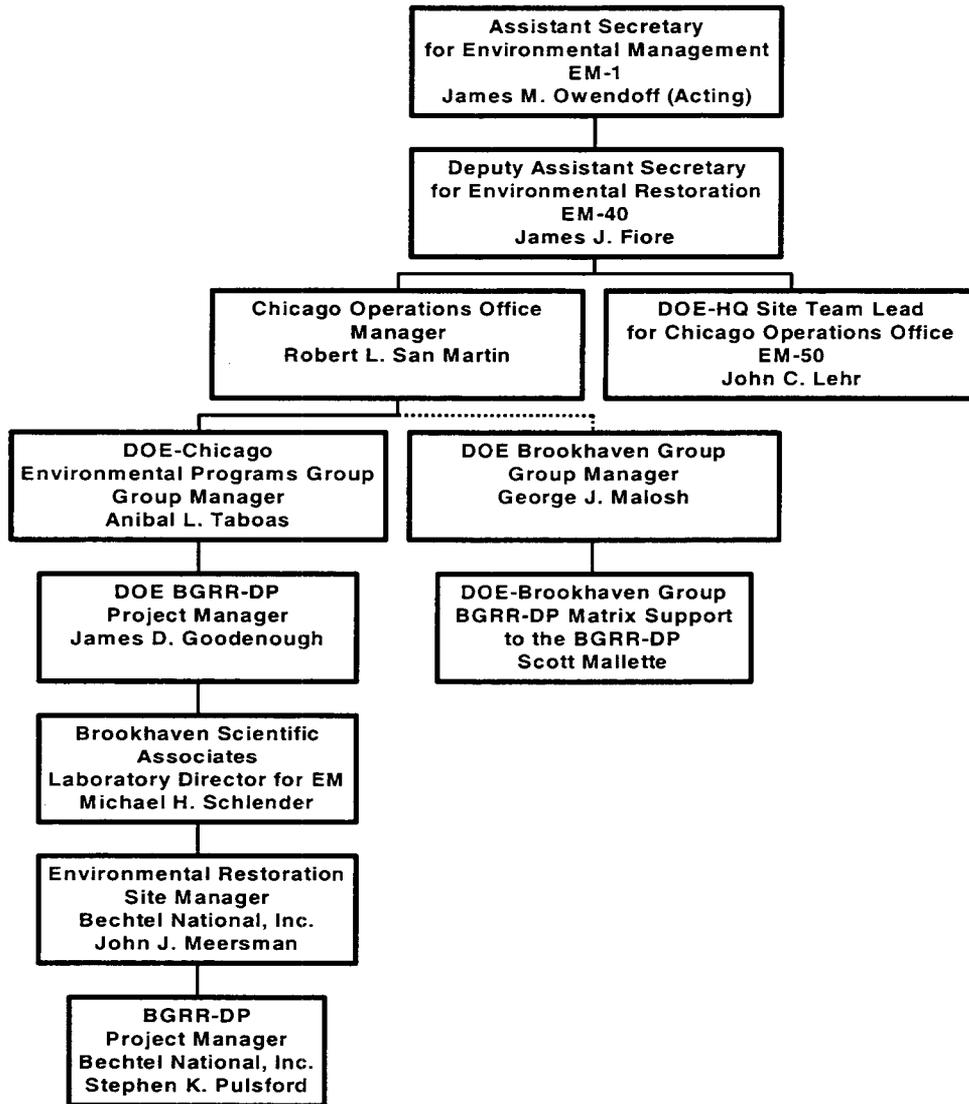


Figure 2.1. Organization of the DOE BGRR Decommissioning Project

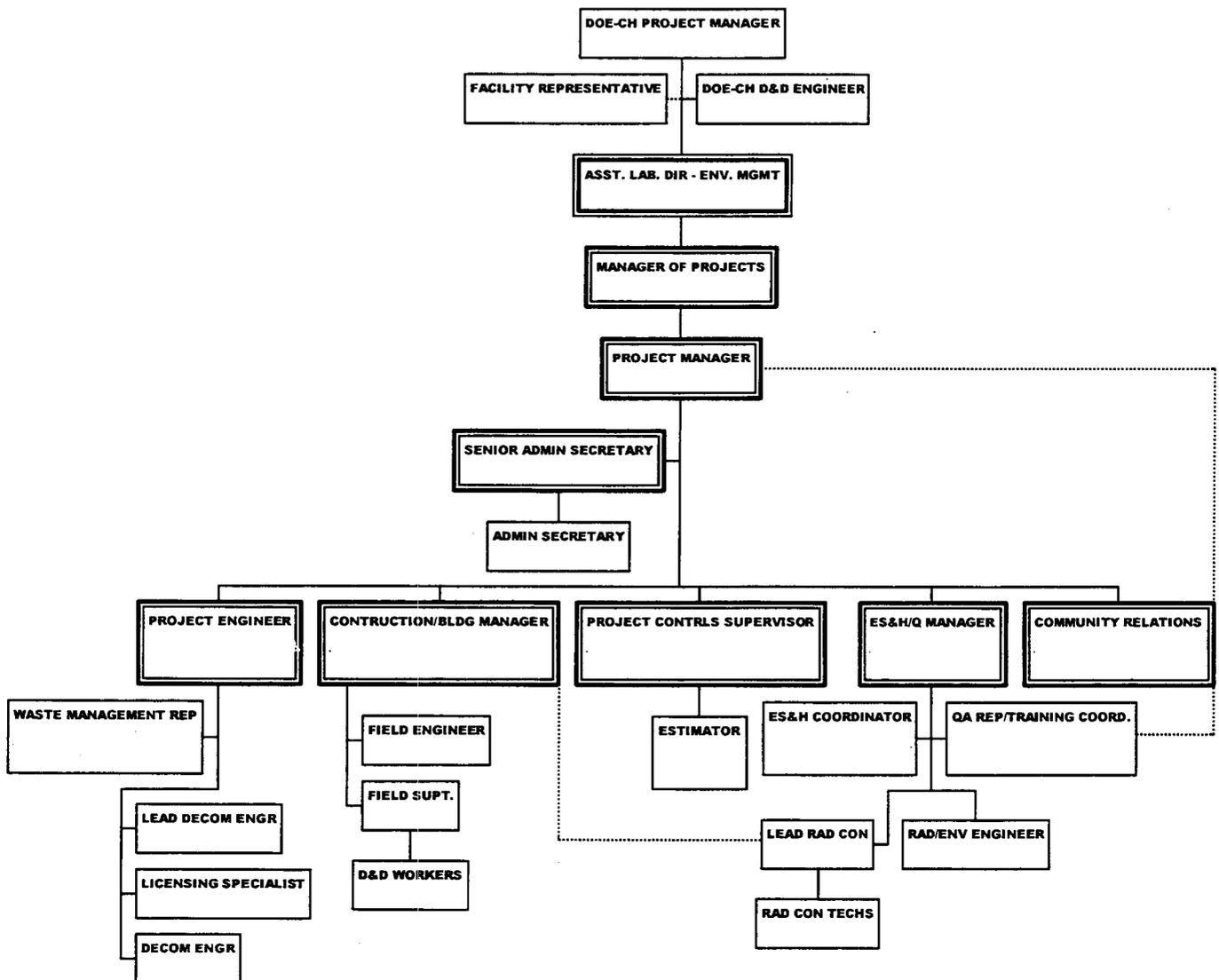
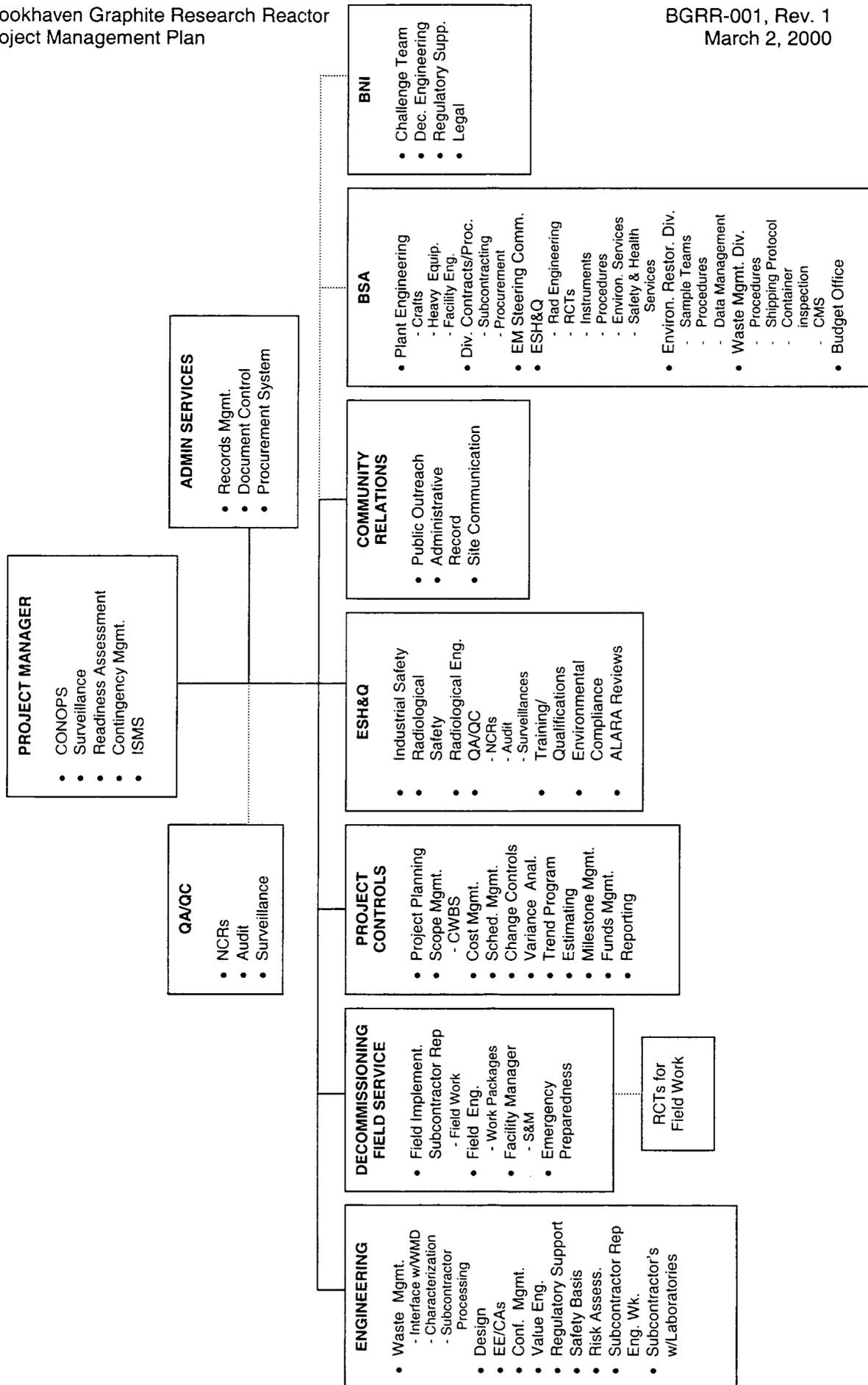


Figure 2.2 Organization of the BGRR Decommissioning Project

Figure 2.3. Functional Responsibilities Matrix



The Environment, Safety, Health and Quality (ESH&Q) Manager is responsible for accomplishing the overall worker safety and health program, quality, and environmental compliance issues for the project. The ESH&Q Manager reports to the Project Manager, and independently reports to BNL's Environmental Safety, Health and Quality (ESH&Q) Directorate. The ESH&Q Manager (or designee) will review / approve all work-packages or plans. This responsibility includes technical support, implementation and oversight for industrial safety, industrial hygiene, and all aspects of the radiological controls and quality programs to protect the workers, the public, and the environment. This individual also works with the Project Administrator in tracking and coordinating the various training needed by personnel based on their jobs.

The Community Relations Coordinator is responsible to the Project Manager for implementing the Community Relations Plan, including the public reviews needed for some of the project's documentation and all external communications on the project's progress.

The Project Administrator is responsible to the Project Manager for all administrative support to the project. These responsibilities include, among others, document control, allocation of office space, logistical support for automation technology, support of office and staff, and provision of secretarial support.

The Project Controls Supervisor reports to the Project Manager and is responsible for tracking and reporting all developments in project schedules and costs. The supervisor will coordinate the preparation of project reports and financial reports and will trend any variance in work.

### 3 INTEGRATED SAFETY MANAGEMENT PLAN

The BGRR Decommissioning Project will employ the BNL Standards Based Management System (SBMS) to ensure that the work carried out complies with regulations and conforms to applicable Laboratory policies set out at <https://sbms.bnl.gov/policies/cl00d011.htm>. The BNL ES&H Policy in the SBMS states the following:

We are committed to providing a safe and healthy working environment for all staff; protecting the general public and the environment from unacceptable environmental, safety and health risks; operating in a manner that protects the environment by applying pollution prevention techniques to current activities; and remediating the environmental impacts of past operations.

BNL's management systems currently are in a multi-year state of transition whereby the ES&H Standards Manual is being merged into SBMS Management System Descriptions and Subject Areas. Until BNL's management systems are completely updated and in place, the Project will follow a combination of the new SBMS documents and the "legacy" ES&H standards in the SBMS. (The Lab-wide effort to upgrade all programs will be closely followed by establishing them within the BGRR Decommissioning Project.) The Management System Descriptions, at <https://sbms.bnl.gov/mgtsys/ms00t011.htm>, are the highest-level operating- and business-processes, and are designed to fully support the Laboratory's business model, which supports the ES&H mission. These systems are defined through Management System Descriptions, which contain information about individual management systems, including their purpose, ownership, requirements and drivers, customers and outputs, and system operations and responsibilities. The BGRR Decommissioning Project will use the services of the relevant support organizations (or subcontractors using approved programs) to comply with ES&H requirements.

The requirements for radiological protection are in the BNL RadCon Manual, at <https://sbms.bnl.gov/program/pd00t011.htm>. The Manual is the definitive requirements document which, in part, is implemented by Lab-wide institutional operating procedures. The Project is committed to those procedures for operational control of routine radiological work and for improvements in it.

To manage the environmental issues, the Project embraces the commitments in BNL's Environmental Stewardship Policy <http://www.esh.bnl.gov/esd/environm.htm>:

- We are committed to achieving compliance with applicable environmental requirements.
- In consideration of the potential impacts of our activities on the environment, we will integrate pollution prevention/waste minimization, resource conservation, and compliance into all of our planning and decision-making. We will adopt cost-effective practices that eliminate, minimize, or mitigate environmental impacts.
- We will define, prioritize, and aggressively correct and clean up existing environmental problems.

- We will work to continually improve our environmental management system and performance. We will establish appropriate environmental objectives and performance indicators to guide these efforts and measure our progress.
- We will maintain a positive, proactive, and constructive relationship with our neighbors in the community, regulators, DOE, and our other stakeholders.
- We will openly communicate with stakeholders on our progress and performance.

To achieve these commitments, manage environment issues, and ensure a strong environmental performance, the Project will pursue obtaining third-party registration with the ISO 14001 Environmental Management Standard. The Standard includes sixteen elements that define the program:

Environmental Policy	Document Control
Environmental Aspects and Impacts	Operational Control
Legal and Other Requirements	Records
Objectives and Targets	Management Review
Environmental Management Program	Documentation
Organization and Structure	Communications
Training, Awareness, and Competence Audits	Monitoring and Measurement
Emergency Preparedness and Response	
Nonconformance and Corrective/Preventive Action	

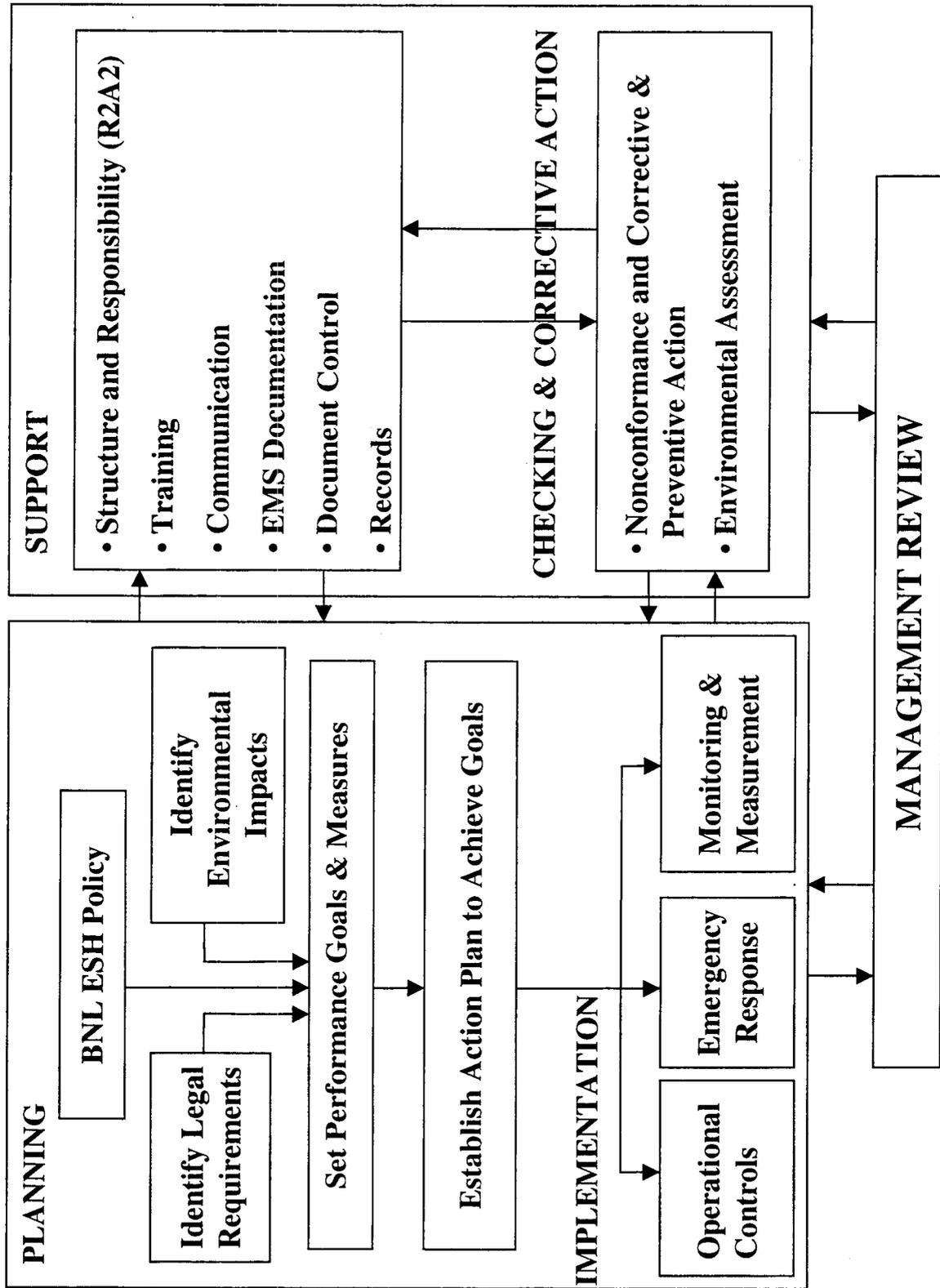
The BNL Work Planning and Control System and the ISO 14001 Standard incorporate five-core functions from Integrated Safety Management: define the scope of work, analyze the hazards, develop and implement the hazard controls, work within the controls, and provide feedback and continuous improvement. The key elements of ISO 14001 are shown by function in Figure 3.1. Registration with ISO 14001 (which provides independent verification of conformance to an international environmental standards plus continual surveillance) is a strong signal that the Project and BNL/BSA are serious about improving environmental management and achieving performance equal to, or better than, the stringent industry standard.

Health, Safety, and Environmental commitments made in this document will be implemented on the BGRR Decommissioning Project through two sub tier documents, the Project Environmental, Health and Safety Plan (HASP), Task-Specific Environment, Health, and Safety Plan (T-HASP) that will be tailored to meet these commitments for each task implemented in the field.

The site-wide Chemical Management System will be implemented in the BGRR Decommissioning Project. This program and the associated worker's right-to-know issues will be coordinated through the Project Manager for ESH&Q and management in the field by the project's construction group.

Within the project's framework, specific operating procedures will be needed to support work plans and activities that are hazardous and specific to the BGRR Decommissioning Project. To that end, permanent or temporary project procedures will be issued (as appropriate), coupled with training and authorization. These procedures will supplement BNL's management systems

Figure 3.1. BNL Environmental Management System Elements



in that some site procedures require a project/division-specific implementing procedure (such as ES&H 1.3.6 Work Planning and Controls) and some additional procedures / directions are needed on the project level to implement some site programs. The Environmental Restoration Division's Management Systems will be used as the platform to publish these documents.

Compliance with the Price-Anderson Amendments Act for the BGRR Decommissioning Project will be implemented according to BNL and programs, e.g., Occurrence Reporting and Processing System, Noncompliance Tracking System, Radiological Awareness Reports sitewide Price-Anderson Amendment Act (PAAA) Working Group. The BNL Independent Oversight group routinely reviews reports and other documents to ensure that the self-reporting aspects of them are met proactively.

## 4 SAFETY AUTHORIZATION BASIS

To ensure adequate control of potential hazards during the BGRR decommissioning, a safety authorization basis is being established. Authorization Basis (AB) documents are required for DOE facilities or activities that have Preliminary Hazards Classification (PHC) of nuclear. The BGRR Decommissioning Project is using an Auditable Safety Analysis, following DOE Order 5482.1B [3], that is required for facilities with a Final Hazard Classification (FHC) of less than nuclear; this requirement is applied to all DOE decommissioning projects where significant inventories of nuclear materials did not exist. Preparing an Auditable Safety Analysis (ASA) ensures that hazards are identified, evaluated, and appropriate controls are defined for working in facilities where there is a potential for the release of, and exposure to hazardous substances. The project's activities will be reviewed against the approved Auditable Safety Analysis to ensure that the bounding conditions, assumptions, and "at-risk inventory" used in the accident analysis will not be exceeded for any planned decommissioning work. This review will be conducted using an Unreviewed Safety Issue (USI) procedure defined below.

### 4.1 GRADED APPROACH

The "graded approach" is used to communicate the DOE's philosophy that the level of analysis, documentation, and actions (for a given requirement) are commensurate with the risks involved. The use of these terms is subjective, and defining the appropriate level of detail is difficult because of differences of opinion and perspective.

Documenting the graded approach is encouraged when preparing an Auditable Safety Analysis. It is generally accepted that the graded approach means that every required element must be addressed at some level of detail. However, there can be widely differing opinions on the level of detail required for each element. In some cases, it may seem appropriate to give a simple statement of non-applicability (e.g., evaluation of a facility's siting criteria may not be appropriate for an existing building). In other cases, presenting detailed information may be appropriate.

Because the ultimate goal of an Auditable Safety Analysis document is to obtain DOE's acceptance of the risks involved and authorization of the planned work, it was essential that the DOE participate in determining the level of detail to be used under the graded approach. Where DOE standards (e.g., DOE-STD-3009-94) [4] are used as guidance for preparing the documents, decisions were made whether to grade them at the chapter level (e.g. Chapter X), or at some lower level (e.g., Chapter X.x.x.x). Again, because opinions may differ about the appropriate level of detail, the participation of DOE staff is desirable. It is generally recommended that the programmatic sections of the Auditable Safety Analysis (e.g., radiological protection, emergency preparedness, safety and health) be graded at the chapter level; accordingly, that approach will be used for the BGRR Decommissioning Project.

## Definitions:

*Preliminary hazards classification (PHC):* An initial screening classification based on the inventory of hazardous substances to identify facilities that require the preparation of authorization basis documents.

*Safety analysis:* A document that identifies hazards and controls relevant to the potential release of, or exposure to, hazardous substances. The safety analysis contains the hazard analysis. Safety-analysis documents define the safety management and facility-specific safety commitments to prevent or mitigate accidental releases.

*Auditable safety analysis (ASA):* The report that documents the safety analysis for facilities with a final hazard classification of less than nuclear. The Auditable Safety Analysis is similar to a safety-analysis report but with less content. An Auditable Safety Analysis systematically identifies hazards and initiating events; identifies measures to eliminate, control, or mitigate hazards; and evaluates their associated risks.

*Final hazard classification (FHC):* The results of an assessment of potential impacts of a facility that are based on a bounding, unmitigated release of hazardous substances and a comparison to defined threshold values. The assessment of potential impacts considers the material's quantity, form, location, dispersibility, and interaction with available energy sources in determining the potential for an unmitigated release.

*Authorization basis (AB):* Those aspects of facility design and operation relied upon by the contractor and DOE to authorize work. For the BGRR Decommissioning Project to implement nuclear safety requirements, an Auditable Safety Analysis is required for facilities with a preliminary hazard classification of nuclear:

- If the FHC is less than nuclear, the safety analysis and the FHC are the authorization basis, which is documented in an Auditable Safety Analysis.
- If the FHC is nuclear, the safety analysis, controls identified in the safety analysis, and the FHC are the authorization basis, which are documented in a Safety Analysis Report.

*Unreviewed Safety Issue (USI):* Proposed activities not specifically addressed under the Auditable Safety Analysis will be reviewed against BGRR-SOP-0902, *Safety Evaluations for Unreviewed Safety Issue Determinations* [5], to estimate if an USI is present. If found, USIs (and their associated safety evaluations) are submitted to the Project's DOE representatives for review and approval before carrying out the proposed work in accordance with DOE Order 430.1A, *Life Cycle Asset Management*.

## 5 SCOPE OF WORK OF THE PROJECT

The BGRR Decommissioning Project Contractor Work Breakdown Structure (CWBS) and Dictionary (Appendix B) systematically lists the work that is needed to complete the project. This dictionary, along with the assumptions listed in Section 1.3, form the basis of the project. Changes to the list of work elements, the list of assumptions, or discoveries that require changing these items constitute an alteration in the project's scope and must be addressed through the change control process described in Section 6 of this document. Project Administration includes, but is not limited to, project management, community relations, developing and updating the safety-basis document, and of surveillance and maintenance of buildings. These are the types of activities that will be required continuously until the project is completed. In addition, the other main CWBS elements were arranged geographically to cover all other work included in the project.

The CWBS dictionary gives a description and the scope of work for each CWBS activity. Where applicable, the CWBS is subdivided into four sections: Objective, Regulatory, Background, and Activities. The Objective section captures succinctly what the CWBS will accomplish. The Regulatory section provides the planned regulatory method and authority that the work activity will be performed. The Background section provides information on the equipment, system, or structure affected by decommissioning. The Activities section gives a high-level sequence that will be used to perform the activity. As each of these CWBS activities are engineered, the activity steps will be further defined, as needed, to perform the fieldwork.

The BGRR Decommissioning Project scope consists of the systems and structures discussed in Appendix B of this document, and the underlying and surrounding soils down to, but not including, the groundwater. Remediation of these soils also is included within the project's work scope. The negotiations with the IAG participants for restoring the BNL site have agreed to clean up the BGRR site to ensure that a future site users (after 2048 will not be exposed to >15 mRem/yr from residual radiological contamination from the BGRR. The exact exposure scenarios for this dose assessment will be developed before starting decommissioning work on a particular area. Specific cleanup levels are radionuclide-specific, based on risk/dose assessment using RESRAD modeling and are media-specific (cleanup level for remaining concrete differs from that for remaining soils, for the same radionuclide). The specific Derived Concentration Guideline Limits (DCGLs) are published in, and approved with, the Sampling and Analysis Plan for each phase of the work.

A Value Engineering Program will be tailored and used as appropriate in keeping with the mission of the decommissioning project to reduce nonessential costs and improve productivity. It will be used in a graded approach as project planning, including scope, schedule, and costs are prepared for each removal activity. Value engineering documentation will accompany project activity planning files as appropriate.

## 6 PROJECT CONTROLS

### 6.1 CONTROL AND REPORTING

Monitoring and controlling the BGRR Decommissioning Project against approved baselines during its execution is a defined process which will meet the intent of applicable DOE Orders, including DOE Order 430.1A, *Life Cycle Asset Management*. This compliance will occur through routine meetings among participants, periodic reports, periodic formal meetings, an approved Change Control system, and procedures to handle special situations that occur or are discovered. The Project Management Plan and the Baseline will serve as the foundation for all control activities. The following are the mechanisms that will be used:

Project Baseline: A project baseline was developed to define the technical scope, schedule, budget requirements, and deliverables for the project. The BGRR Decommissioning Project baseline is included in the BNL/EM Baseline and managed as the basis for future planning and the change control process. The only authority to change the approved project baseline is through the formal change control process, described below.

Current Year Work Plan: The project will be funded on a fiscal-year basis by DOE-CH. Following notification by the DOE Project Manager, the project team will propose a Current Year Work Plan, which will detail the work to be accomplished in accordance with the baseline schedule. Modifications required to the Technical; Cost; or Schedule Baselines due to work falling behind schedule or funding shortfalls will be identified and formally incorporated. The Current Year Work Plan will identify the critical path for the work planned for the coming year. The BGRR Decommissioning Project Manager will approve and issue the Current Year Work Plan after this necessary coordination.

Project Reporting: BNL's Environmental Restoration Division (ERD) will issue monthly reports that incorporate input from the BGRR in accordance with the "Project Reporting Guidance for Environmental Management" modified as appropriate for the BGRR. The report will include the following information:

1. Overall Project Assessment: Briefly describes accomplishments, problems, concerns, issues, and major upcoming activities.
2. Funding Report: Contains Charts of Cost and Schedule Performance including monthly and cumulative budgeted cost of work scheduled (BCWS), budgeted cost of work performed, actual cost of work performed by CWBS, variance analysis, and trends.
3. Milestone Log: Includes information on schedule, variances, and milestone variance analysis.
4. Baseline Change Proposal Log: Identifies approved and proposed baseline-changes.

5. Funding Status Table: Describes status of funding for the project.
6. Procurement Schedule: Identifies current and future contracts, value, scope, and period of performance.

Weekly Highlights Report: A brief report transmitted via e-mail to DOE-CH, DOE-EM, landlord, regulators and other parties describing activities in the previous and for the upcoming week.

Trend Program: The trend program tracks and controls the approved project's scope, quality, cost, and schedule. Trends also are used to convey an understanding of its evolution, as well as present costs and schedule.

Change Control: Scope, Schedule, and Budget Change Control on the BGRR Decommissioning Project will be accomplished in accordance with the approved BNL "Environmental Management Program Standard Operating Procedure" and presented to the Cost Control Change Board (CCCB) for appropriate action. Changes to the approved Technical Requirements, Cost, and Schedule Baselines are formally submitted and approved in accordance with the procedure.

Schedule Management Plan:

Schedule Development: Detailed logic schedules have been prepared for the BGRR Project which depict the specific activities and logical sequence needed to produce the Project deliverables. The schedules are organized by CWBS and are resource-loaded as required to accomplish the scope of work defined in the CWBS Dictionary. Major events are defined by Milestones levels outlined in the BCCP. Detailed working level schedules will be developed for the Field Work activities.

Schedule Maintenance and Control: The Project Schedule will be statused on a weekly basis at the Plan of the Day meeting. The Monthly update will include a percent complete earned value calculation and estimated completion date for all activities scheduled for the current month. BCWP will be derived from the percent complete calculation and reported in the EM Monthly Progress Report. Cost/Schedule/Milestone Variance Analysis will be reported on a monthly basis consistent with the ERD Monthly reporting guidance and thresholds. The Baseline Schedule will be formally issued and schedule changes will be controlled by the process defined in the BNL EM Baseline Change Control Procedure.

Contingency Management Plan: All contingency monies will be controlled and distributed by the DOE BGRR Decommissioning Project Manager in conjunction with DOE-BHG and DOE-EPG per the project charter in Appendix F. Contingency funds will only be accessible to the project through an approved change-control action described above, based on documented changed conditions not anticipated in the project's baseline planning. Contingency funds, while estimated for each fiscal year from the planned work, may not be available to the project at the time the change is discovered since no stand-alone contingency pool exists, but must be created by re-prioritizing other EM work at BNL.

Contingency is determined using a weighted averaging system (refer to the contingency analysis example shown in Figure 6.1). An activity that is considered to have risk associated with completing the task is listed on the contingency analysis form. A “relative importance” factor of completing the task is ranked from a possible score of from the least important 0 to the most important 10. This column is totaled, multiplied by 10, and becomes the “total possible score.” The “probability score” risk factor for the task is ranked from a possible low risk at 1 to a possible high risk of 10. The “relative weight” number is multiplied by the “probability score” number for each task being evaluated, which yields the “weighted score” for each task. The “weighted score” for each task is summed for the activity. The total of the “weighted score” column is divided by the “total possible score” with the quotient becoming the “score ratio.” The “score ratio” number is transferred to the second page of the contingency analysis form where the evaluator chooses the appropriate “normal maximum contingency” percentage. The “score ratio” developed on the first page of the contingency analysis is multiplied by the “normal maximum contingency” percentage. The result is the derived contingency percentage. If there are no other “additional contingency factors” that need to be taken into consideration, the derived contingency percentage is multiplied by the cost of the activity to arrive at a contingency cost associated with the proposed activity.

The “normal maximum contingency” is made up of four categories from which the evaluator may choose. The “planning” category has the highest contingency percentage assigned to it at 35%. This category should be used when the activity is in the early stages of planning and development where minimal information is available to address the cost risks that may be associated with performing the activity. The “conceptual” category has the second highest contingency percentage assigned to it at 25%. This category should be used when the activity is in the later stages of planning and development where additional design and/or characterization information is available to better address the cost risks that may be associated with performing the activity. The “preliminary” category has a contingency percentage assigned to it at 20%. This category should be used when the activity is in the later stages of planning and development where sufficient information is available to address the cost risks associated with performing the activity. The “definitive” category has the lowest contingency percentage assigned to it at 15%. This category should be used when the activity is in the final stages of planning and development where sufficient information is available to clearly assess the cost risks with few exceptions associated with performing the activity.

Estimating/Scheduling: The BNL/ERD will be responsible for supporting all estimating and scheduling for the BGRR Decommissioning Project, and will include the following tasks:

1. Preparing baseline estimates and schedules (including milestones, critical paths, and resource-loaded bottom-up cost estimates).
2. Maintaining the baseline documents throughout the project.
3. Deriving contingencies from the Project Risk Assessment.
4. Preparing estimates, schedules, and analysis for Baseline Change Proposals.

FIGURE 6.1 CONTINGENCY ANALYSIS SAMPLE FOR BGRR			
Fan Removal & Decontaminate Fan House			
PROJECT TITLE: BGRR			
Item Title: Fan Removal & Decontaminate Fan House			
WBS Number: 1.02			
	Relative Weight 0 to 10 0 = N/A 10=Important	Probability Score 1 to 10 1 =Low Risk 10=High Risk	Weighted Score
Planning			
Development	7	2	14
Characterization	10	4	40
Activity Authorization Request	6	2	12
ASTD	6	2	12
Prepare HASP	6	2	12
S/C Bid Specification for Fan Removal	8	3	24
S/C Bid Specification for Waste Disposal	9	3	27
Field Work			0
Characterize Fans	7	2	14
ASTD	7	2	14
Prep Work	8	4	32
Removal	8	6	48
Waste Packaging	6	4	24
Demobilization	3	2	6
Room Decontamination	4	3	12
Final Survey	4	2	8
<b>TOTALS</b>	<b>99</b>	<b>43</b>	<b>299</b>
Total Possible Score =		990	
Total Relative Weights X 10			
Score Ratio = Total Weighted Score / Total Possible Score =			0.302

FIGURE 6.1 CONTINGENCY ANALYSIS SAMPLE FOR BGRR (Cont.)

Fan Removal & Decontaminate Fan House

PROJECT TITLE:	BGRR		
Item Title:	Fan Removal & Decontaminate Fan House		
WBS Number:	1.02		
Normal Maximum Contingency :	Planning		35%
	Conceptual		25%
	Preliminary		20%
	Definitive		15%
	0.302 X	35%	= 10.57%
Additional Contingency Factors (Describe Below):			0.00%
TOTAL PROJECT/ITEM CONTINGENCY PERCENT:			10.57%

5. Preparing the estimate for life-cycle cost.
6. Developing government estimates for evaluating contract bids, analysis of workaroud proposals, and other alternative analyses,
7. Analyzing trends,
8. Calculating Estimate at Completion and Estimate to Complete (ETC),
9. Calculating Davis-Bacon wage rates, and
10. Analyzing budget support and funding profile.

## **6.2 PROJECT SCHEDULE, MILESTONES, AND CRITICAL PATH**

The project summary and detail schedule was developed with the technical baseline and project cost estimate. This schedule is a critical document and will be modified as needed and controlled as described in the section above. Figure 6.2 shows the project summary schedule. It includes major field activities and the DOE-HQ's and IAG's major milestones. Figure 6.3 is a summarized rollup of the detail activities that have been developed for the BGRR Project Baseline. In addition, the project's critical path will be identified in the Project Baseline document and in each Current Year Work Plan submitted to DOE. The Project schedule will be managed and changed according to the process described herein. The project schedule meets the objectives of the project's removal action and the quality objectives within 96 months from the starting date (October 1, 1997).

Figure 6.4 briefly explains the major milestones for the project with the baseline date of each. Figures 6.3 and 6.4 will change with approved change-control actions and this document will NOT be revised to reflect these changes. However, if this document is revised for other reasons, these figures will be updated to reflect current information.

Figure 6.2 BGRR Summary Schedule

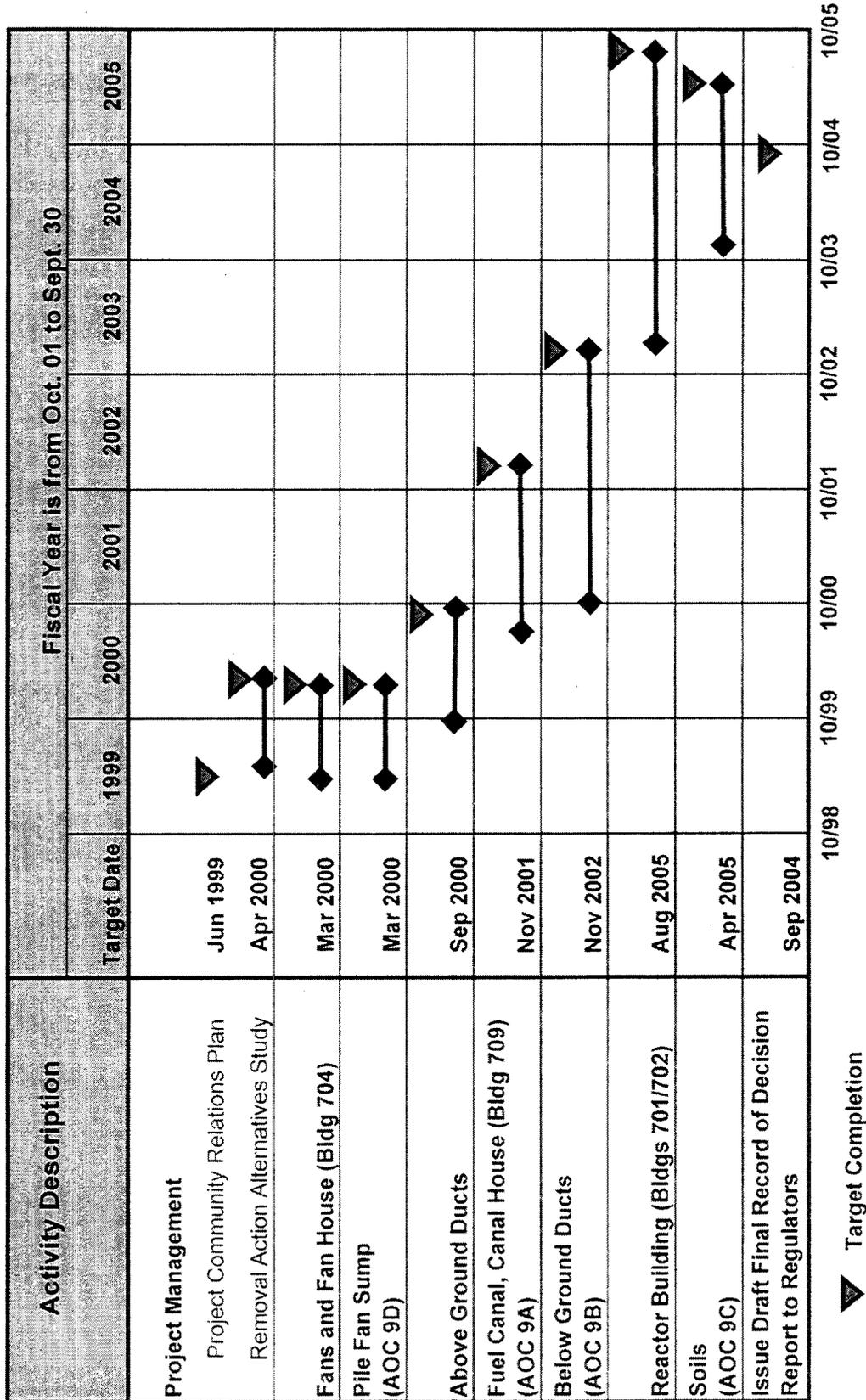


Figure 6.3 Project Summary Schedule

Act ID	Activity Description	Budgeted Cost	Work Days	Early Start	Early Finish	Fiscal Year				
						FY00	FY01	FY02	FY03	FY04
<b>2 BARR FACILITY D&amp;D</b>										
<b>2.1 BARR DECOMMISSIONING PROJECT</b>										
<b>2.1.1 Removal Area #1</b>										
2.1.1.01	Water Disposal	769,394	291	01OCT98A	11NOV99					
+ 2.1.1.01.01 Water Disposal Work Planning										
		293,794	156	01OCT98A	06MAY99A					
+ 2.1.1.01.04 Water Disposal Field Planning										
		460,196	43	30APR99A	29JUN99A					
+ 2.1.1.01.05 Water Disp. Final Status Survey & Cmpilt Rpt										
		15,404	52	01SEP99	11NOV99					
<b>2.1.1.02 Fan Removal &amp; Decontaminate Fan House</b>										
+ 2.1.1.02.01	Fan Removal Work Planning	170,363	281	01OCT98A	28OCT99					
+ 2.1.1.02.04 Fan Removal Field Work										
		663,367	120	01SEP99	15FEB00					
+ 2.1.1.02.05 Fan Removal Final Status Survey & Compl Rpt										
		10,789	32	16FEB00	30MAR00					
<b>2.1.1.03 Pile Fan Sump, Piping &amp; Removal</b>										
+ 2.1.1.03.01	Pile Fan Sump Work Planning	42,474	85	12APR99A	06AUG99A					
+ 2.1.1.03.02 Pile Fan Sump Final Status Survey,SAP Prep&Appr										
		96,165	61	10MAY99A	02AUG99A					
+ 2.1.1.03.03 Pile Fan Sump Time Crit Rem Action Prep & Appr										
		17,296	81	26APR99A	16AUG99A					

Sheet 1 of 6

ENVIRONMENTAL RESTORATION DIVISION  
BARR FACILITY D&D  
PROJECT BASELINE

ECWS-BORR

Early Bar  
Progress Bar  
Critical Activity

Project Start: 01OCT98  
Project Finish: 30SEP99  
Data Date: 01SEP99  
Run Date: 02MAR00

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Act ID	Activity Description	Budgeted Cost	Work Days	Early Start	Early Finish	Fiscal Year					
						FY00	FY01	FY02	FY03	FY04	FY05
+ 2.1.1 .03.04	Pile Fan Sump Field Work	148,906	74	24AUG99A	09DEC99						
+ 2.1.1 .03.05	Pile Fan Sump Final Status Survey & Compl Rpt	34,480	81	10DEC99	31MAR00						
+ 2.1.1 .03.06	PFS Draft Final Completion Rpt to NYSDEC & EPA	0	0	03APR00	31MAR00						
2.1.1 .04	Above Ground Duct Rem & Instrument House Cleanup										
+ 2.1.1 .04.01	AG Duct Work Planning	454,762	433	01OCT98A	22JUN00						
+ 2.1.1 .04.02	AG Duct Final Status Survey SAP Prep&Appr	23,736	20	02AUG99A	17SEP99A						
+ 2.1.1 .04.03	AG Duct Rem.Action Prep & Approve	65,206	0		21APR00						
+ 2.1.1 .04.04	AG Duct Field Work	2,317,732	735	10DEC99	07NOV02						
+ 2.1.1 .04.05	AG Duct Final Status Survey & Activity Report	13,269	50	21JUL00	28SEP00						
2.1.2	Removal Area #2										
2.1.2 .01	Museum Walls & Materials Removal 701										
+ 2.1.2 .01.01	Museum Walls Work Planning	0	30	22MAR99A	30APR99A						
+ 2.1.2 .01.04	Museum Walls Field Work	52,920	102	26MAY99A	14OCT99						
2.1.2 .02	Seal Pile Openings at Bio-Shield Wall										
+ 2.1.2 .02.01	Seal Pile Openings Work Planning	232,719	230	30MAR99A	25FEB00						
+ 2.1.2 .02.04	Seal Pile Openings Field Work	564,262	150	12NOV99	08JUN00						

Sheet 2 of 6

**ENVIRONMENTAL RESTORATION DIVISION  
BGRR FACILITY D&D  
PROJECT BASELINE**

Project Start: 01OCT96  
Project Finish: 30SEP04  
Date Data: 01SEP99  
Run Date: 02MAR00

ECWS BGRR

Early Bar  
 Progress Bar  
 Critical Activity

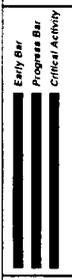
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Act ID	Activity Description	Budgeted Cost	Work Days	Early Start	Early Finish	Fiscal Year					
						FY00	FY01	FY02	FY03	FY04	FY05
+ 2.1.2 .02.05	Seal Pile Openings Activity Report	13,827	55	19MAY00	03AUG00	█					
2.1.2 .03	Isolate Bldg 701 from Bldg 703										
+ 2.1.2 .03.04	Isolate Bldg 701 from 703 Field Work	124,959	213	17JAN00	08NOV00	█					
2.1.3	Removal Area #3										
2.1.3 .01	UG Air Plenum 701 Filter, Cool.Colis&Soil Remov										
+ 2.1.3 .01.01	UG Air Plenum Filter Work Planning	266,904	375	02OCT00	08MAR02	█					
+ 2.1.3 .01.02	UG Air Plenum Final Status Survey SAP Prep&Appr	30,018	115	02OCT00	09MAR01	█					
+ 2.1.3 .01.03	UG Air Plenum EE/CA Prep & Appr	109,226	130	16APR01	12OCT01	█					
+ 2.1.3 .01.04	UG Air Plenum Field Work	3,797,235	354	30APR01	05SEP02	█					
+ 2.1.3 .01.05	UG Air Plenum Final Status Survey & Complet Rep	123,054	76	08AUG02	21NOV02			█			
2.1.3 .02	Underground Filter Removal										
+ 2.1.3 .02.04	Underground Filter Removal Field Work	1,023,545	52	12APR02	24JUN02			█			
2.1.3 .03	Underground Cooler Removal										
+ 2.1.3 .03.04	Underground Cooler Removal Field Work	173,889	24	11MAR02	11APR02				█		
2.1.4	Removal Area #4										
2.1.4 .01	Canal & W.T. House & Solis Removal										
+ 2.1.4 .01.01	Canal & WT House Work Planning	376,498	259	30MAY00	25MAY01	█					

Sheet 3 of 6

**ENVIRONMENTAL RESTORATION DIVISION  
BGRF FACILITY D&D  
PROJECT BASELINE**

BCWS-BGRF



Project Start: 01OCT96  
 Project Finish: 30SEP04  
 Date Date: 01SEP99  
 Run Date: 02MAR00

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Act ID	Activity Description	Budgeted Cost	Work Days	Early Start	Early Finish	FY00	FY01	FY02	FY03	FY04	FY05
+ 2.1.4 .01.02	Canal & WT House Final Status Survey,SAP Prep	37,789	60	15AUG00	06NOV00						
+ 2.1.4 .01.03	Canal & WT House EE/CA Preps & Appr	70,748	144	15AUG00	02MAR01						
+ 2.1.4 .01.04	Canal & WT House Field Work	967,480	137	07MAY01	13NOV01						
+ 2.1.4 .01.05	Canal & WT House Final Status Survey & Comp Rpt	219,034	88	09JUL01	07NOV01						
2.1.4 .02	Below Grade Piping & System & Soils Removal										
+ 2.1.4 .02.01	BG Piping Work Planning	61,706	220	01OCT99	03AUG00						
+ 2.1.4 .02.02	BG Piping Final Status Survey SAP Prep&Appr	2,762	60	12NOV99	03FEB00						
+ 2.1.4 .02.03	BG Piping Action Memo Preparation & Approval	38,828	120	12NOV99	27APR00						
+ 2.1.4 .02.04	BG Piping Field Work	112,743	30	04AUG00	14SEP00						
+ 2.1.4 .02.05	BG Piping Final Status Survey&Completion Report	378,740	323	15SEP00	28DEC01						
2.1.4 .03	Remaining Soils Removal										
+ 2.1.4 .03.01	Remaining Soils Work Planning	413,033	239	02FEB04	30DEC04						
+ 2.1.4 .03.02	Remaining Soils Final Status Survey SAP Prep&Ap	19,011	50	05APR04	11JUN04						
+ 2.1.4 .03.03	Remaining Soils Input to ROD	33,601	20	14JUN04	09JUL04						
+ 2.1.4 .03.04	Remaining Soils Field Work	1,820,000	21	31DEC04	28JAN05						

Sheet 4 of 6

**ENVIRONMENTAL RESTORATION DIVISION  
BGRR FACILITY D&D  
PROJECT BASELINE**

BCWS-BORR

Early Bar  
 Progress Bar  
 Critical Activity

Project Start 01OCT99  
 Project Finish 30SEP04  
 Date Date 01SEP99  
 Run Date 02MAR00

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Act ID	Activity Description	Budgeted Cost	Work Days	Early Start	Early Finish	Fiscal Year					
						FY00	FY01	FY02	FY03	FY04	FY05
+ 2.1.4 .03.05	Remaining Soils Final Status Survey & Compl Rep	363,821	65	31JAN05	29APR05						█
<b>2.1.5 Removal Area #5</b>											
2.1.5.01 Bldg. 701 Disposition											
+ 2.1.5 .01.01	Bldg 701 Disp. Work Planning	649,427	275	12DEC02	31DEC03						
+ 2.1.5 .01.02	Bldg 701 Disp. Final Status Survey SAP Prep&App	40,024	105	04SEP03	28JAN04						
+ 2.1.5 .01.03	Bldg 701 Disp. EE/CA Prep&Appr	130,330	140	27FEB03	10SEP03						
+ 2.1.5 .01.04	Bldg. 701 Disp. Field Work	2,595,403	330	26JUN03	29SEP04						
+ 2.1.5 .01.05	Bldg. 701 Disp Final Status Survey & Comp Rep	84,298	55	12MAY05	27JUL05						█
2.1.5 .03 Experimental Equipment Removal from Building701											
+ 2.1.5 .03.04	Experimental Equip. Removal from 701 Field Work	426,837	84	15APR04	10AUG04						
2.1.5 .04 Equipment & Systems Removal											
+ 2.1.5 .04.04	Equipment & Systems Removal Field Work	3,165,178	410	03FEB04	29AUG05						
<b>2.1.6 Project Administration</b>											
2.1.6 .01 Project Management											
+ 2.1.6 .01.01	Initial Planning	759,423	172	01OCT98A	28MAY99A						
+ 2.1.6 .01.02	Alternative Analysis	204,874	213	22JUN99A	13APR00						

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8CWS 80RR

01OCT98	Early Bar
30SEP94	Progress Bar
01SEP98	Critical Activity
02MAR00	

Project Start  
Project Finish  
Date Date  
Run Date

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**ENVIRONMENTAL RESTORATION DIVISION  
BGRF FACILITY D&D  
PROJECT BASELINE**

Act ID	Activity Description	Budgeted Cost	Work Days	Early Start	Early Finish	Fiscal Year					
						FY00	FY01	FY02	FY03	FY04	FY05
+ 2.1.6 .01.03	Project Management/Control	4,433,215	1,489	01OCT99	29AUG05						
+ 2.1.6 .01.04	Annual Reviews/Self Assessments	147,115	1,766	01OCT98A	07JUL05						
+ 2.1.6 .02	Community Relations	1,116,599	1,766	01OCT98A	07JUL05						
+ 2.1.6 .03	Project Procedures Manual	436,909	1,766	01OCT98A	07JUL05						
+ 2.1.6 .04	Project Administration	3,269,048	1,766	01OCT98A	07JUL05						
+ 2.1.6 .05	Regulatory Compliance	173,188	1,648	25MAR99A	18JUL05						
+ 2.1.6 .06	Facility Monit'g/Maint & Building Management	1,871,411	1,767	30SEP98A	07JUL05						
+ 2.1.6 .07	Record of Decision	117,318	174	02FEB04	30SEP04						
+ 2.1.6 .08	Monitoring Wells	345,660	166	11JAN99A	30AUG99A						
2.1.6 .09	Air Emissions Report	213,638	152	01OCT98A	30APR99A						
+ 2.1.6 .11	Long Term Steward Monitoring	4,350,000	10,592	01OCT05	30SEP34						

Sheet 6 of 6

**ENVIRONMENTAL RESTORATION DIVISION  
BGRF FACILITY D&D  
PROJECT BASELINE**

BCWS:BORR

Early Bw  
 Progress Bw  
 Critical Activity

Project Start: 01OCT99  
 Project Finish: 30SEP04  
 Date Date: 01SEP99  
 Run Date: 02MAR00

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BROOKHAVEN NATIONAL LABORATORY  
 ENVIRONMENTAL RESTORATION DIVISION  
 BGRR D&D

REPORT DATE 01MAR00  
 18:12

Figure 6.4 BGRR Milestone Log

CWBS	Milestone Titles	Milestone Control Level	PRI IAG	Plan Date	Completion Criteria
<b>Fan Removal &amp; Decontaminate Fan House</b>					
2.1.1.02	Waste Shipping Complete	L3		01FEB00	Waste from Fan Removal and 704 decontamination Shipped to Interim Processing.
2.1.1.02	Waste Disposal Complete	L3		15FEB00	Waste from Fan Removal and 704 decontamination shipped to disposal contractor.
2.1.1.02	Fan Removal Submit Activity Compl Rpt to DOE	L2B		09MAR00	Draft Final Activity Report transmitted to DOE.
2.1.1.02	Return Fan Rooms to HFBR	L2B		30MAR00	Issue Memo documenting Return of Fan Rooms HFBR
<b>Pile Fan Sump, Piping &amp; Removal</b>					
2.1.1.03	EPA/DEC Confirms soil remediation Complete	L3		03FEB00	EPA/DEC allowed opportunity for split sample collection
2.1.1.03	AOC 9D Pile Fan Sump Completion Milestone	L3		31MAR00	Completion Report sent from DOE to EPA/DEC
2.1.1.03	Submit PFS Draft Completion Rpt to EPA/DEC	L2B	Y	31MAR00	Draft Final Completion Report for NYSDEC & EPA, with DOE comments incorporated, is transmitted to the regulators.
<b>Above Ground Duct Rem &amp; Instrument House Cleanup</b>					
2.1.1.04	Submit Draft Action Memo AB Ground Duct to DOE	L2B		14OCT99	Draft EE/CA, with BSA comments incorporated, transmitted to DOE.
2.1.1.04	BGRR Submit Action Memo to (EPA/DEC) for Review	L2B	Y	24DEC99	Draft Final EE/CA for Above Grade Ducts, with DOE comments incorporated, is transmitted to the regulators.
2.1.1.04	Draft Final Comp. Report- AG Duct to EPA/DEC	L3		28SEP00	Draft Final Completion Report for NYSDEC & EPA, with DOE comments incorporated, is transmitted regulators.
<b>Seal Pile Openings at Bio-Shield Wall</b>					
2.1.2.02	S/C Bid Submittal	L3		25FEB00	Receive S/C bids from DCP to perform work
2.1.2.02	Seal Pile Opening Completion Milestone	L3		03AUG00	Draft Final Activity Report transmitted to DOE.

BROOKHAVEN NATIONAL LABORATORY  
ENVIRONMENTAL RESTORATION DIVISION  
BGRR D&D

REPORT DATE 01/MAR/00  
18:12

Figure 6.4

BGRR MILESTONE LOG

CWBS	Milestone Titles	Milestone Control Level	PRI IAG	Plan Date	Completion Criteria
<b>UG Air Plenum 701 Filter, Cool.Coils&amp;Soil Remov</b>					
2.1.3.01	Submit Draft EE/CA #2 for UG Air Plenum to DOE	L2B		25MAY01	Draft EE/CA, with BSA comments incorporated, transmitted to DOE.
2.1.3.01	Submit Draft EE/CA #2 to (EPA/NYDEC) for Review	L2B	Y	29JUN01	Draft Final EE/CA for UG Air Plenum, with DOE comments incorporated, is transmitted to the regulators.
2.1.3.01	Complete AOC 9B Underground Air Plenum	L2B	Y	21NOV02	Draft Final Completion Report for NYSDEC & EPA with DOE comments incorporated, is transmitted to the regulators.
<b>Canal &amp; W.T. House &amp; Soils Removal</b>					
2.1.4.01	Submit Draft EE/CA#3 for Canal/WT House to DOE	L2B		25SEP00	Draft EE/CA, with BSA comments incorporated, transmitted to DOE.
2.1.4.01	Submit Draft EE/CA #3 to (EPA/NYDEC) for Review	L2B	Y	03NOV00	Draft Final EE/CA for UG Air Plenum, with DOE comments incorporated, is transmitted to the regulators.
2.1.4.01	Complete AOC 9A Canal & Water Treatment House	L2B	Y	07NOV01	Draft Final Completion Report for NYSDEC & EPA with DOE comments incorporated, is transmitted to the regulators.
<b>Below Grade Piping &amp; System &amp; Soils Removal</b>					
2.1.4.02	Submit Draft Action Memo for BG Piping to DOE	L2B		08DEC99	Letter report from project to DOE to define path forward for this work scope
2.1.4.02	Draft BG Piping & Soils Completion Report to DOE	L2B		20NOV01	Milestone will be satisfied by completion of the required activities for the Below Grade Piping and Soils and submittal of the draft Completion Report to DOE for review.
2.1.4.02	Below Ground Piping Completion MILESTONE	L3		28DEC01	Draft Final Activity Report transmitted to DOE
<b>Remaining Soils Removal</b>					
2.1.4.03	Complete AOC 9C Soils Removal	L2B	Y	29APR05	Draft Final Completion Report for NYSDEC & EPA, with DOE comments incorporated, is transmitted to the regulators.

BROOKHAVEN NATIONAL LABORATORY  
ENVIRONMENTAL RESTORATION DIVISION  
BGRR D&D

BGRR MILESTONE LOG

REPORT DATE 01MAR00  
18:12

Figure 6.4

CWBS	Milestone Titles	Milestone Control Level	PRI IAG	Plan Date	Completion Criteria
<b>Remaining Soils Removal</b>					
<b>Bldg. 701 Disposition</b>					
2 .1.5 .01	Submit Draft EE/CA #4 for Building 701 to DOE	L2B		09APR03	Draft EE/CA, with BSA comments incorporated, transmitted to DOE.
2 .1.5 .01	BGRR Submit EE/CA #4 to (EPAN/DEC) for Review	L2B	Y	14MAY03	Draft Final EE/CA for UG Air Plenum, with DOE comments incorporated, is transmitted to the regulators.
2 .1.5 .01	<b>BUILDING 701 COMPLETION MILESTONE</b>	L3		27JUL05	Draft Final Completion Report transmitted to DOE.
<b>Project Management</b>					
2 .1.6 .01	Deliver Alternative Analysis Draft A to Task Mgr	L3		09DEC99	Receipt of Draft A Report
2 .1.6 .01	Deliver Alternative Analysis Draft B to Task Mgr	L3		17JAN00	Receipt of Draft B Report
2 .1.6 .01	Deliver Alternative Analysis Report to DOE	L3		31JAN00	Issue Memo/Report to DOE
2 .1.6 .01	S/C Deliver to Project	L3		23MAR00	All Comments Incorporated/Report Delivered
2 .1.6 .01	Deliver Draft Alternative Analysis Report to DOE	L2A		13APR00	Rev. 0 of the Removal Action Alternative Analysis following public comment incorporation to DOE for approval.
2 .1.6 .01	Submit 01 CYWP for DOE Approval	L3		06SEP00	Issue memo to Submit Draft Document to DOE
2 .1.6 .01	Submit 02 CYWP for DOE Approval	L3		06SEP01	Issue memo to Submit Draft Document to DOE
2 .1.6 .01	Submit 03 CYWP for DOE Approval	L3		05SEP02	Issue memo to Submit Draft Document to DOE
2 .1.6 .01	Submit 04 CYWP for DOE Approval	L3		04SEP03	Issue memo to Submit Draft Document to DOE
2 .1.6 .01	Submit 05 CYWP for DOE Approval	L3		06SEP04	Issue memo to Submit Draft Document to DOE
<b>Regulatory Compliance</b>					
2 .1.6 .05	DOE Approve BGRR ASA Rev 0	L2A		11NOV99	All required DOE signatures in place for approval of the BGRR Project Auditable Safety Analysis.

BROOKHAVEN NATIONAL LABORATORY  
ENVIRONMENTAL RESTORATION DIVISION  
BGRR D&D

REPORT DATE 01MAR00  
18:12

Figure 6.4

BGRR MILESTONE LOG

CWBS	Milestone Titles	Milestone Control Level	PRI IAG	Plan Date	Completion Criteria
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Regulatory Compliance

Record of Decision

2.1.6.07	Submit Record of Decision (ROD) for DOE Review	L3		23APR04	BSA approved BGRR ROD submitted to DOE for approval.
2.1.6.07	Submit Final ROD to DOE/EPA/DEC	L2B	Y	22JUL04	DOE approved BGRR ROD, with regulator comments incorporated, submitted for public review.
2.1.6.07	Submit Draft ROD to EPA/DEC Review & Comment	L2B		21SEP04	DOE approved BGRR ROD submitted to regulators for review & comment in preparation for public review.
2.1.6.07	Submit DOE Signed ROD to EPA/DEC for Approval	L2A		30SEP04	DOE approved BGRR ROD, with regulator and public comments incorporated, submitted for regulator approval.
2.1.6.01	Complete BGRR Decommissioning (PBS End)	L1A		29AUG05	Milestone Represents Project Activities complete and ready to turn over to Science.

### 6.3 COST ESTIMATE

The project's cost estimate was based on the technical baseline described in the CWBS Dictionary and is consistent with the major assumptions and baseline planning described in Section 1.3 of this Project Management Plan. The cost estimate follows the baseline schedule in that each activity listed is resource-loaded with expected costs of personnel hours (by resource), waste management / disposal / sampling costs, planned Inter-Laboratory Requisitions for employing BNL personnel and resources), and any planned subcontracting costs. Actual labor rates were used for on-site resources, and local and regional published information was used to estimate the subcontracting costs. Figure 6.5 gives this baseline estimate.

This cost estimate encompasses the work within the project's scope described in Appendix B, CWBS Dictionary. These values do not include out-year surveillance and maintenance costs of any structures/components that may remain when the work scope is complete. As part of the EE/CA preparation for each of the decommissioning work-steps, a life-cycle cost (through 2034) will be assessed for each alternative analyzed. As the various alternatives are selected for the different CWBS elements, a Life Cycle Cost of the BGRR Facility through 2034 will be developed. For this decommissioning project, and with the known information, the Life Cycle Cost of the Decommissioning Project is its baseline cost through to completion in 2005. Surveillance maintenance and monitoring from 2000 through 2034 has been estimated and is shown as long-term monitoring.

The cost estimate follows the baseline work scope. If any EE/CA recommends a different action from the baseline, change-control and re-estimating will be part of DOE's approval process of that EE/CA.

Figure 6.5 Project Cost Plan

BARR FACILITY D&D Project Baseline COST PLAN BCP ER-00-01												
CWBS No:	WBS Titles	Fiscal Year 1998	Fiscal Year 1999	Fiscal Year 2000	Fiscal Year 2001	Fiscal Year 2002	Fiscal Year 2003	Fiscal Year 2004	Fiscal Year 2005	Fiscal Years 2006-2034	Total	
2.1.01	Water Disposal		753,990								753,990	
2.1.02	Fan Removal & Decontaminate Fan House		440,069	404,450							844,519	
2.1.03	Pile Fan Sump, Piping, & Soils Removal		190,527	148,794							339,321	
2.1.04	Above Ground Duct Removal & Instrument House		107,109	1,840,257		927,339					2,874,705	
2.2.01	Museum Walls		39,079								39,079	
2.2.02	Seal Pile Openings at Bio-Shield Wall		16,555	794,253							810,808	
2.2.03	Isolate Building 701 from 703			48,981	75,978						124,959	
2.3.01	Underground Air Plenum to Bldg. 701 & Soils Removal				1,113,184	3,159,160	54,093				4,326,437	
2.3.02	Underground Filter Removal					1,023,545					1,023,545	
2.3.03	Underground Cooler Removal					173,889					173,889	
2.4.01	Above & Below Ground Canal & Water Treatment House & Soils Rem.			354,377	920,925	396,247					1,671,549	
2.4.02	Below Grade Piping Systems & Soils Removal			256,274		338,505			2,276,719		2,649,466	
2.4.03	Remaining Soils Remediation						1,522,827	372,747	84,298		3,499,482	
2.5.01	Building 701 Disposition							426,837			426,837	
2.5.03	Experimental Equipment Removal from Bldg. 701							874,861			874,861	
2.5.04	Equipment & Systems Removal							812,622	597,465		1,410,087	
2.6.01	Project Management		982,060	905,535	758,254	744,209	744,481	155,194	123,598		5,544,626	
2.6.02	Community Relations		194,961	177,264	155,194	155,194	155,194	155,194	123,598		1,116,599	
2.6.03	Project Procedures		80,733	90,434	53,976	67,890	56,838	64,568	22,470		436,909	
2.6.04	Administration		605,051	805,560	381,469	366,632	319,600	341,193	449,543		3,269,048	
2.6.05	Regulatory Compliance		55,253	16,671	13,797	17,876	29,531	29,462	10,598		173,188	
2.6.06	Monitoring/ Maintenance/ Building Management	268,000	731,523	187,732	206,416	108,415	120,365	128,826	120,134		1,603,411	
2.6.07	Project Closeout Reports		29,245					117,318			146,563	
2.6.08	Monitoring Well Installation		345,660								345,660	
2.6.09	Air Emissions Report		213,638	0							213,638	
	Long Term Steward Monitoring											
	<b>Total</b>	268,000	4,785,453	6,030,562	3,679,193	6,551,562	3,930,268	5,215,985	5,975,142	4,350,000	40,786,185	
	Escalation Rate (Compound)				2.70%	5.47%	8.32%	11.25%	14.25%	17.33% - 147.4%		
	Escalation \$				99,338	358,560	327,025	586,555	851,395	3,246,857	5,469,730	
	<b>EM40/Science</b>											
	<b>EM50 (ASTD)</b>	268,000	4,785,453	6,030,562	3,778,531	6,910,122	44,257,293	55,802,540	6,826,537	7,596,857	46,255,915	
	Total Project Cost w/Out Contingency	268,000	4,785,453	6,030,562	3,778,531	7,712,158	44,257,293	55,802,540	6,826,537	7,596,857	47,057,951	

## 7 INTEGRATED MASTER PLAN FOR CONTROLLING WORK IN THE PROJECT

### 7.1 CONTROL OF DECOMMISSIONING WORK

The BGRR Decommissioning Project requires that a formal work control system govern all field work. The BNL Work Control System is used to establish the mandatory requirements (<https://sbms.bnl.gov/mgtsys/ms0w/ms0wd011.htm>). BGRR implements this process through the Work Planning and Control System. Incorporated into this standard are the five core functions from Integrated Safety Management as follows: define the scope of work, analyze the hazards, develop and implement the hazard controls, work within the controls, and provide feedback and continuous improvement. The primary elements of enhanced work planning, line management ownership, worker involvement, graded approach to planning, and multidisciplinary teams for planning and review, also are reflected in the work control system.

The work control standard applies to all groups, BNL or non-BNL, which undertake decommissioning, maintenance, modification, setup, and construction within the BGRR Decommissioning Project's scope of work. A key aspect of the Work Planning and Control System is that it is a consistent method for identifying and analyzing job hazards. The rigor of the planning and control process will be commensurate with the level of the hazard and with quality assurance using a graded approach.

Because the Project will work under two similar but different regulatory frameworks, the comparison below shows how the Integrated Safety Management is woven into each program.

BNL Work Control System	CERCLA Process
1. Determine exact scope from the CWBS Dictionary and develop the work package	1. Determine exact scope from the CWBS Dictionary
2. Determine requirements and collect characterization data	2. Determine requirements and collect characterization data.
3. Determine PHC for the work (analyze the hazards)	3. Determine PHC for the work (analyze the hazards)
4. Initiate the USI process and determine if additional safety analysis is needed (develop FHC as needed)	4. Initiate the USI process and determine if additional Safety Analysis is needed for the work (develop FHC as needed)
5. Confirm work may be completed under an existing NEPA Categorical Exclusion	5. Develop the EE/CA, Waste Analysis and Planning (includes disposal site approvals), Soil Sampling and Analysis Plan

BNL Work Control System	CERCLA Process
<p>6. Prepare Work Package, Waste Analysis and Planning (includes disposal-site approvals) and obtain necessary permits</p> <p>7. Mobilize and train the workers to perform the task</p> <p>8. Carry out the work within the established controls</p> <p>9. Dispose of any waste generated during the work</p> <p>10. Closeout the work package and review any lessons-learned or configuration management tasks to reflect this work, or both.</p> <p>11. Prepare the completion report(s) for each major work activity, as required, for submitting to DOE or DOE/Regulators as in the Project's schedule</p>	<p>6. Submit plan to Regulators and public for 30-day review (DOE)</p> <p>7. Send an Action Description Memorandum to the Project authorizing work described in the EE/CA (DOE and Regulators)</p> <p>8. Receive bids, evaluate, and award a contract</p> <p>9. Prepare a Removal Action Work Plan and HASP for work.</p> <p>10. Mobilize workers and/or subcontractors; Project approves Subcontractor schedules, health and safety plans, and work plans</p> <p>12. Subcontractor performs the work within the established controls</p> <p>13. BGRR Project disposes of all waste generated during the work</p> <p>14. Close-out the work, demobilize the Subcontractor and review any lessons-learned and/or configuration management tasks to reflect this work</p> <p>15. Prepare the completion report(s) for each major work activity, as required, for submitting to DOE or DOE/Regulators as in the Project's schedule</p>

## 7.2 CONDUCT OF OPERATIONS FOR DECOMMISSIONING WORK

The Conduct of Operations (DOE Order 5480.19) [6] is a set of guidelines to ensure that facility communications and controls are in place or addressed to adequately control any DOE operation. This Order is being applied to the BGRR Decommissioning in a graded approach to ensure that the necessary attributes needing attention in the decommissioning are well-controlled and, equally important, well-communicated to all involved. The individual guidelines of the Order are graded and explained in Appendix D of this Project Management Plan.

Decommissioning involves a controlled process of exposing or uncovering various hazards to remediate or remove them. This is especially true when a sequential characterization approach to the decommissioning project is undertaken, as is planned for the BGRR. Decommissioning has been compared with construction in reverse, which is somewhat inaccurate since the hazards involved in construction are those the constructor adds to the site. With a decommissioning project, the hazards are pre-existing and waiting to be discovered. This demands a high level of

attention to detail; planning for personnel safety and waste-management issues is critical for success. Decommissioning is a highly intensive waste-generating work; therefore, the BGRR Decommissioning Project is committed to emphasizing high attention to detail in segregating, packaging, processing, and disposing of waste. This requires exceptional coordination on the part of the project's management, technical- and labor-staff.

The BGRR Decommissioning Project will control the work at various levels, using a defense-in-depth approach. This will take the form of the following:

- employing technically qualified and **experienced personnel** and sub-contractors to plan in great detail every aspect of the characterization, removal, and close-out of the project,
- providing **clear direction** and expectations to all personnel for all work,
- providing **clear procedures and safety instructions** for all decommissioning tasks,
- conducting **pre-job briefings and training** to ensure that precautions, expectations, and goals are clearly communicated at all levels of the project's organization,
- conducting **plan-of-the-day meetings** before every shift to ensure that all group supervisors and support personnel understand what work, other than their own, is planned in the facility, and how those activities may interact,
- providing **safety-performance incentives** to all project personnel, and encouraging **open communications** at all levels to identify the best work practices to accomplish the decommissioning.

The combination of all of these items will ensure completion of the project's scope of work in a safe, environmentally sound, and cost-efficient manner.

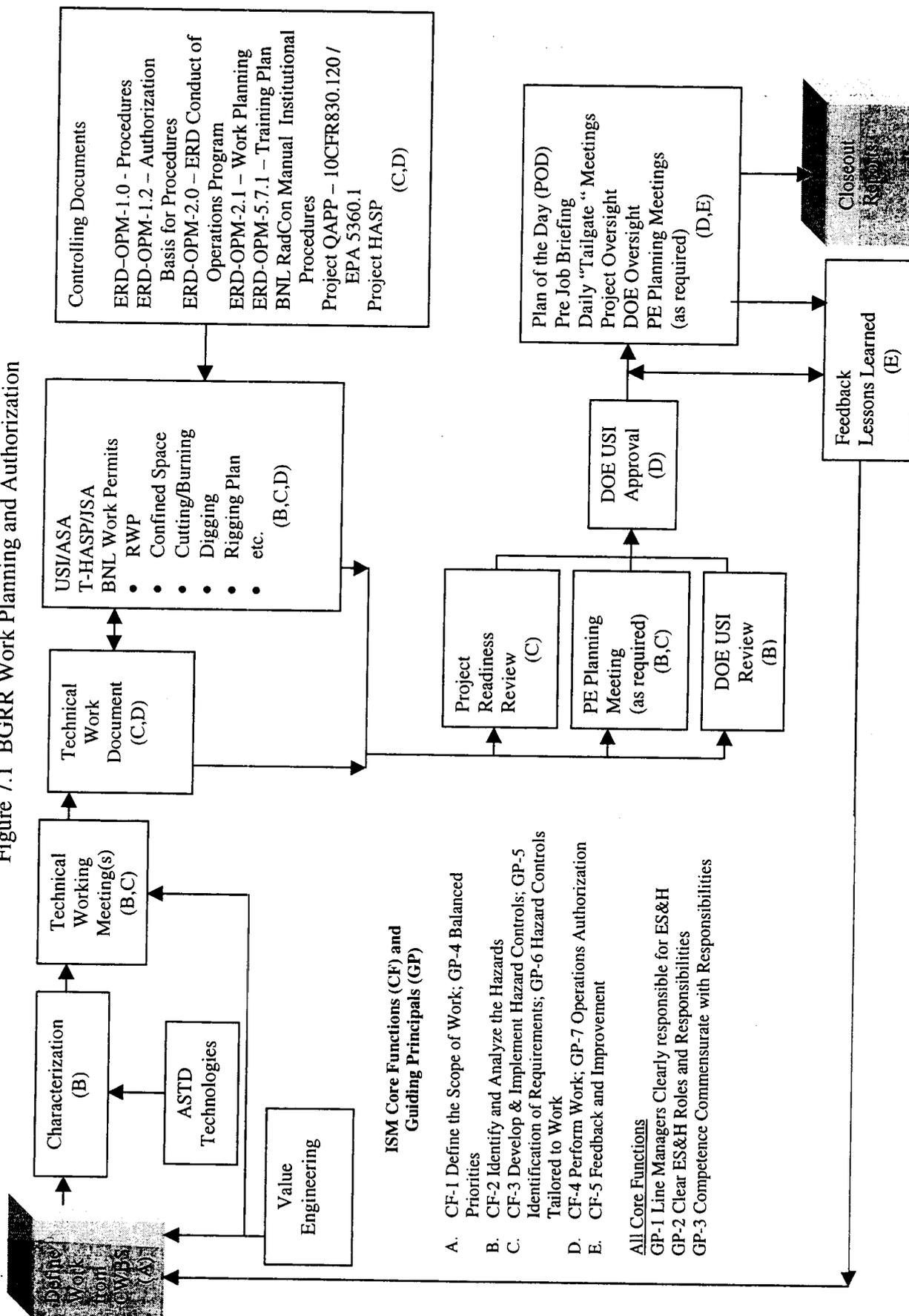
### 7.3 BGRR WORK PLANNING AND AUTHORIZATION

The BGRR Work Planning and Authorization flowchart (Figure 7.1) provides the elements that are used by the Project to plan work, authorize work, perform the work, and provide lessons learned feedback.

#### 1. Define Work from CWBS

Several different documents, Contractor Work Breakdown Structure (CWBS) descriptions, Engineering Evaluation/Cost Analysis (EE/CA), and other work scope descriptions may be used to define the work to be performed. Value Engineering (VE) begins here and carries through the optimization process to insure non-essential costs are minimized or eliminated and productivity improved.

Figure 7.1 BGRR Work Planning and Authorization



## 2. Characterization

As soon as the boundaries for the proposed scope of work are defined, hazardous and radiological characterization begins. The characterization performed is to provide a technical basis for the Unresolved Safety Issue Evaluation, protection of the workers who will be performing the work, the onsite and offsite public, the environment and for waste disposal categorization and shipment. Techniques used to perform the characterization include the Accelerated Site Technologies Deployment (ASTD), In-Situ Gamma Spectroscopy Counting System, unique remotely operated devices, cameras, independent laboratory analyses, and standard industry survey practices.

## 3. Technical Work Meeting(s)

Representatives of all the project disciplines needed to prepare the various supporting documents necessary to perform the work activity attend this meeting. Typically, engineering personnel call the initial meeting to provide an overview of the proposed work activity. If needed, subsequent meetings may be called to provide updated information or work scope.

## 4. Technical Work Document

The Technical Work Document contains the information necessary to perform the work activity. It is typically prepared in the format of a prescriptive temporary procedure that includes purpose, scope, prerequisites, procedural steps, characterization data as needed, drawings, pictures, and needed references.

The Technical Work Document provides the steps to safely perform the work activity; it is supported by the USI, Task Specific Environment Health and Safety Plan (T-HASP), Radiation Work Permit (RWP), and any additional supporting work permits.

BNL and Project approved policies, programs, procedures, are used to prepare the technical work and supporting documents for the proposed work activity.

## 5. Project Readiness Review

After the technical work and supporting documents have been prepared, a project readiness review is conducted and chaired by the BGRR Project Manager or his designee. This meeting brings the personnel together who are responsible for the many disciplines and support functions needed for the proposed work activity. The readiness review provides for a coordinated effort to insure all functional areas are ready and capable of supporting the work activity.

6. Plant Engineering Planning Meeting(s) (as required)

When Plant Engineering (PE) personnel are involved in the proposed work activity a meeting is held concurrently to the Project Readiness Review meeting to brief PE on the scope, schedule and level of effort of the proposed work activity. Weekly PE meetings are held during the work activity to insure needed resources are available, review progress to date, and if needed, adjust near-term plans.

7. USI Review and Approval

Several documents are submitted to the DOE for authorization to perform the proposed work activity. The USI is submitted to BHG for review and approval. It is accompanied by information documents, as a minimum, the technical work document and the task-specific health and safety plan.

When the DOE approves the USI, the intrusive work activity proposed in the work package can begin. Set-up work, mobilization, and non-intrusive work needed to support an activity may begin before the DOE approves the USI. This work must have appropriate work permits before it is performed.

8. Plan-of-the-Day (POD) Meeting

The Project conducts a daily Plan of the Day (POD) meeting for project managers, supervisors, and leads. This meeting has a safety topic presented, reviews the work accomplishments, problems, schedules, upcoming meetings, and additional work.

When a new activity is started, a Pre-Job Briefing is conducted. This meeting includes all the workers, supervisors, and support personnel that will be associated with the work activity. The complete work activity is reviewed in detail to provide an understanding of the intended work, associated hazards, safety requirements, and special directions.

A daily "tailgate" meeting is held at the job site with all personnel working on the activity. The meeting provides a description of the work to be performed that day, safety requirements, identified hazards, any hold points, and to insure that all workers understand the work to be performed.

Throughout the performance of the work activity the Project has committed to safety and supervisory oversight. The DOE provides oversight through their facility support program.

When PE personnel provide resources for the work activity, weekly coordination meetings are held with supervision to review the work, required resources to perform the work, and to resolve any work concerns.

#### 9. Feedback/Lessons learned

As the work activities are performed, any lessons learned are incorporated into the dynamic work activities through the various meetings described in element number nine above.

Additionally, any lessons learned from the work activities are carried forward and implemented as appropriate into the earliest stages of defining and planning the next work activity.

#### 10. Closeout Reports

When a work activity is completed a closure report of the entire activity is prepared. The closure report will include supporting documentation to show that the work was accomplished and the removal, remediation, and restoration activities were completed in accordance with established criteria.

## **8 SURVEILLANCE, MAINTENANCE, AND CONFIGURATION MANAGEMENT**

This section defines management's commitments to safely controlling the structures, systems, drawings, and documents of the BGRR during decommissioning by formal, though graded programs of Surveillance and Maintenance and configuration management. This commitment covers the entire facility for the length of the project, and emphasizes the safety of the workers, public, and the environment.

As the footprint of the facility is reduced and hazards are removed through the decommissioning, the physical scope of the surveillance and maintenance will decrease, but not the safety expectations of the work. As the project progresses, the efforts for configuration management will likely increase due to the need to work with the Plant Engineering Division to exactly specify what remains of the BGRR through as-left drawings. The configuration management of the project's document system is expected to be constant throughout the project.

### **8.1 SURVEILLANCE AND MAINTENANCE**

The BGRR complex will be maintained throughout the Decommissioning Project in such a way as to ensure workers' safety and to protect the public and the environment. To meet this commitment, a BSA-approved Monitoring and Surveillance Procedure [7] and appropriate implementing procedures were developed with the following objectives:

- To maintain the facility as a safe and healthy workplace, which minimizes potential hazards to the workers and the public.
- To ensure compliance with all federal, state, and local requirements.
- To minimize or eliminate the release of hazardous material to the environment.
- To ensure radioactive and hazardous materials are adequately controlled and confined.
- To establish access controls.
- To inspect the complex with adequate frequency to identify potential hazards.
- To maintain selected systems or equipment that will be essential for decommissioning in a standby or operational mode, if economically justified.

To meet these objectives, the BGRR Decommissioning Project incorporated the Conduct of Operations Matrix (Appendix D) into the Surveillance and Maintenance Plan and uses the following activities (not an all-inclusive list) to meet the project's objectives:

1. Facility Walkdowns – These walkdowns will identify hazardous and unsafe conditions; they will be both formal ones (rounds by BGRR staff with log readings and ES&H quarterly Tier 1 inspections) and informal ones.
2. Procedures and Work Instructions – Surveillance, monitoring, and work within the BGRR will be undertaken and documented in accordance with written instructions.
3. Facility Access – Access will be controlled under a locked door and key-controlled system.
4. Emergency Planning – Instructions and directions for emergency response actions and for leaving the building will be provided throughout all phases of the Decommissioning Project to all workers and facility occupants.
5. Radioactive and Hazardous Material Control - All radioactive and hazardous material will be properly sorted, stored, and dispositioned in accordance with BNL/BGRR written procedures and policies.
6. Designated Building Manager – An individual will be assigned to coordinate and oversee all operations within the BGRR complex. The Building Manager will serve as the “owner” of the BGRR’s buildings and utilities.

Other BNL- and BGRR-specific programs will be implemented during the Decommissioning Project to further ensure the proper safety and management of the BGRR complex. These programs include the applicable parts of the SBMS, a Health Physics Monitoring Program, a Self-Assessment Program, and a Quality Assurance Program.

## **8.2 CONFIGURATION MANAGEMENT – DRAWINGS**

It is necessary to ensure that the BGRR’s as-built configuration is accurately maintained and documented to support maintenance and surveillance, future decontaminating and decommissioning (D&D) modifications, adjacent building interfaces, and future actions. A BGRR Design Control and Configuration Management Procedure will be developed to explain how to complete Engineering Change Request Forms, and reviewed by the BGRR D&D Engineering Group, the Plant Engineering Department, and other affected groups, who will approve changes to facility drawings.

The drawing process for changes is procedurally controlled and requires the approval of the BGRR Decommissioning Project Engineer. (The Plant Engineering Division is custodian of all BGRR drawings and site-utility maps.) Management of drawings is procedurally controlled during the removal to ensure that all changes are reviewed at the appropriate engineering and management levels to determine their impacts on concurrent activities and on reaching the objectives of the removal action.

Appropriate personnel from Plant Engineering and BGRR Decommissioning Project Engineering will review proposed work to determine the need to update drawings, procedures for operations, or changes in operations, and notify adjacent work groups of the pending removal and any impact it may have on the affected group. When it is determined that an adjacent building will be affected by a proposed activity, the appropriate building manager will be notified and required to concur with the activity using the site's Facility Use Agreements as the mechanism and framework for these concurrences.

The following buildings are impacted by the BGRR Decommissioning Project: Laboratory Building 703; Hot Laboratory, Building 801; Fan House, Building 704; HFBR Building 750 (common underground air duct with HFBR); and, Waste Concentration Facility, Building 811. Additionally, yard areas and roadways leading to, and around, the BGRR structures will be affected by the D&D.

Systems that will be impacted by the Decommissioning Project activities are those interconnected to the BGRR: BNL's sewers, storm drains, steam-, condensate-chilled water systems, electrical power supply, and miscellaneous communication systems.

### **8.3 CONFIGURATION MANAGEMENT – DOCUMENTS**

The BGRR Decommissioning Project controls the configuration and tracking of documents within the site's electronic document systems for site-wide policies and procedures used for the project, as well as a project-specific tracking and numbering system for letters, documents, and records. Specific items that will be controlled in hard copy at BGRR Decommissioning Project offices include as a minimum, letters, BGRR documents, and work packages. This system uses available systems on site, but is tailored to the specific needs of the project. Certain project documents and all work packages will incorporate a controlled distribution system to ensure that only the most recent, approved documents are in the field for project's staff to use.

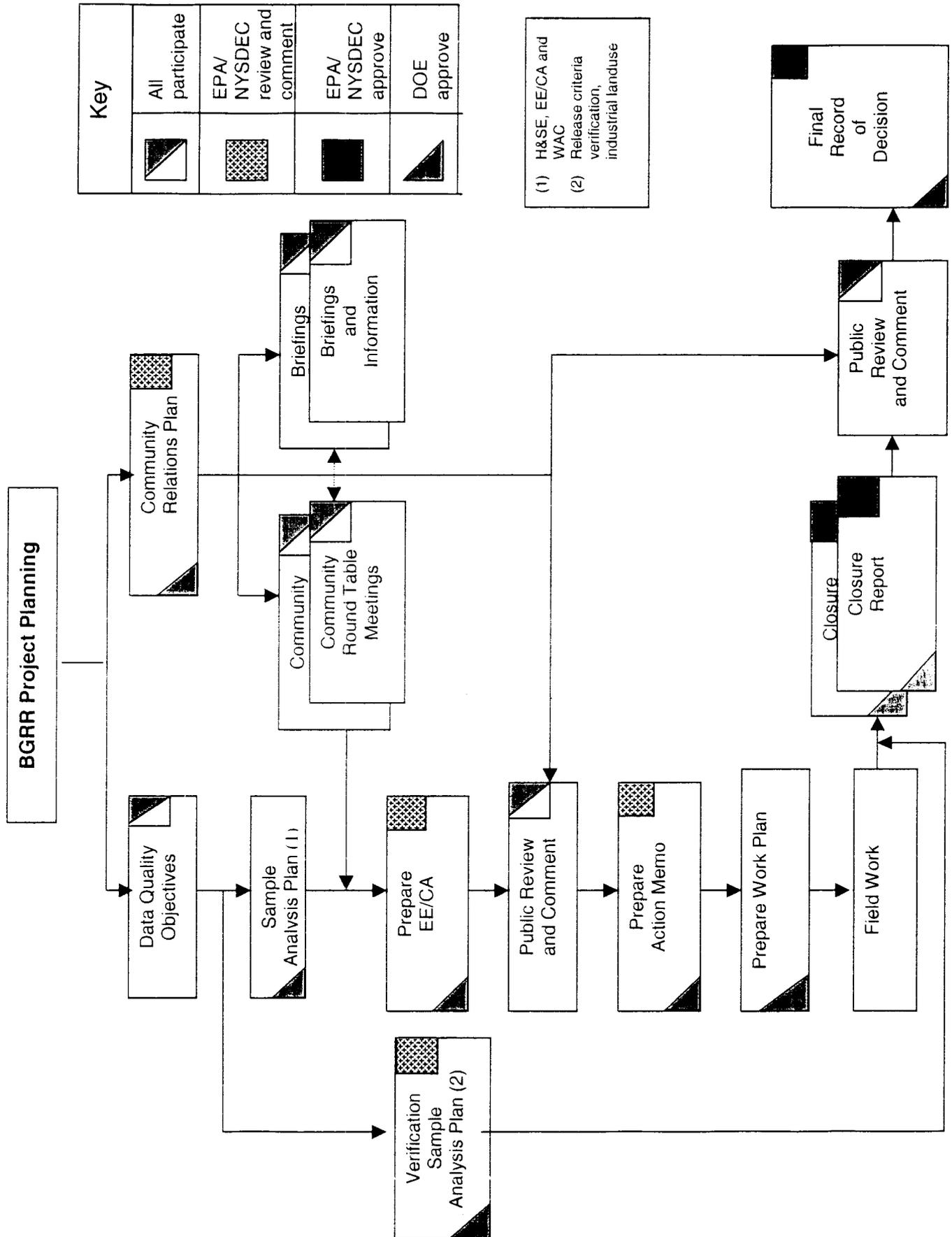
The Administrative Services group shall assign letters, work packages and documents numbers using the pre-established record-tracking system, and maintain the master files for these documents once they are issued.

## 9 REGULATORY STRATEGY

The regulatory strategy for the BGRR Decommissioning Project consists of the following two specific regulatory-pathways dependent on the planned scope of work:

- Surveillance and maintenance (S&M) (before, during, and after facility disposition) will be conducted in accordance with the NEPA process under the DOE-approved categorical exclusion for routine maintenance (Categorical Exclusion B1.3). Such routine maintenance includes removal of equipment and housekeeping. Housekeeping includes the removal and disposal of discarded personal protective-equipment or other materials used during surveillance, cleanup and contamination control of outdoor contamination areas, and removal of waste caused by intrusion of animal. Before removing any significant equipment or modifying the facility, an historical review, conducted in accordance with the *National Historic Preservation Act* (16 USC 470) [8] will determine any mitigation actions that may be required. No environmental permits are anticipated to be required during S&M; however, each such will be reviewed before implementing it to determine permitting requirements. If a permit is required, it will be obtained in accordance with the applicable state, local, and/or federal regulation.
- AOC 9 cleanup and facility disposition activities will be conducted as CERCLA removal actions (Figure 9.1) in accordance with section XI, Removal Actions, of the IAG. When a sub-AOC cleanup or facility disposition task is identified as a non-time critical removal action, an EE/CA will be prepared identifying potential alternatives and comparing each to criteria established in 40 CFR 300.415 [9]. Concurrently with developing an EE/CA, a single Community Relations Plan for the entire BGRR decommissioning will be developed and approved. When the plan is finalized and DOE approves the EE/CA, the EE/CA will be sent out for public review and comment for 30 calendar days. Public comments will be incorporated into the Action Memorandum, which documents and authorizes implementation of the selected alternative. DOE-CH will issue the Action Memorandum with input from the public, EPA, and the NYSDEC. Some AOC cleanup or facility disposition will be conducted as time-critical removal actions. These actions will be documented solely under an Action Memorandum reviewed by the EPA, NYSDEC, and DOE for review and approval. Before the selected alternative is implemented, a Removal Action work plan will be prepared detailing the specific tasks necessary to complete the selected alternative in accordance with the requirements of the Action Memorandum. The work plan will be submitted to EPA and the NYSDEC for review and to DOE for review and approval. Characterization activities may be required before, during, and after sub-AOC cleanup and facility disposition. The process for DQOs will be used for designing sampling and analyses for such characterization. There are two phases for characterization:

Figure 9.1. Process for CERCLA Removal



1. Waste Designation – this work includes gathering data to define waste streams and associated concentrations to dispose of waste. Sampling and Analysis Instruction will be prepared and submitted to DOE for review and approval before undertaking major sampling and analysis to designate the waste.

NOTE: The designs also will ensure the amount and quality of data generated by any sampling work will support ES&H and USI work-planning efforts.

2. Verification – this activity includes gathering data to ensure that cleanup criteria have been met. A DQO Summary report and Sampling and Analysis Plan will be prepared and submitted to DOE, EPA, and the NYSDEC for review and approval. The data gathered for verification will be documented in a closeout report, and eventually be used for formal AOC closeout through the issuance of a final Record of Decision in accordance with section X.G. of the IAG.

Regulatory requirements for S&M activities are anticipated to be limited to waste management as follows:

Hazardous and Mixed Waste

*Resource Conservation and Recovery Act* - 40 CFR 262-272 [10]

New York State Hazardous Waste Regulations - 6 NYCRR Parts 370-373 [11]

PCBs

*Toxic Substances Control Act* - 40 CFR 761 [12]

Asbestos

*Clean Air Act* for removal and disposal - 40 CFR 61, Subpart M [13]

Transportation

49 CFR 100-179 [14]

Radioactive

DOE Order 435, *Radioactive Waste Management* [15]

As stated above, permits are not anticipated to be required for any S&M. Any air emissions will be reviewed for their potential to emit under the Clean Air Act (40 CFR 61) and Title 6 Chapter II Parts 200 to 257 of the Codes, Rules and Regulations of the State of New York [16]. If the potential to emit is greater than 1% of the 10mrem/yr dose-limit, a permit will be obtained. 10 CFR 835 will be followed for controlling and managing radiological-controlled areas for all work.

The requirements for CERCLA actions will be defined by establishing applicable or relevant and appropriate requirements and To-Be-Considered requirements (TBCs) in the EE/CA and Action Memorandum.

The disposition phase of a DOE facility also is governed by the requirements of DOE Order 430.1A, *Life Cycle Asset Management*, which defines the minimum requirements for retiring a surplus facility from service. Facility disposition also is subject to the integrated safety-management requirements of DOE Policy 450.4, *Safety Management System Policy* [17]. Guidance on implementing these directives for decommissioning facilities is given in DOE Guide 430.A-4, *Decommissioning Implementation Guide* [18], and for surveillance and maintenance of deactivated facilities in DOE Guide 430.1A-2, *Surveillance and Maintenance During Facility Disposition* [19].

## 10 WASTE MANAGEMENT

The charter of BNL's Waste Management Division (WMD) is to support the various organizations at the Laboratory to ensure that DOE's waste is managed efficiently and in a compliant manner. The BGRR Decommissioning Project uses the services of a Waste Management Representative to coordinate between the project and the WMD. This coordination ensures that the forecasting, planning, packaging, transportation, and disposal of wastes takes full advantage of the Waste Management Division contracts, experience, policies, and procedures.

The BGRR Decommissioning Project will use the appropriate Waste Management Division plans, procedures, and policies to manage the removal, packaging, storage and disposal of the Project's wastes in a safe, compliant, and cost-effective manner. It should be noted that the DOE is the generator for the BGRR decommissioning waste and the various contractors involved with sampling, packaging, shipping it are acting as agents for DOE. The wastes generated generally will be shipped directly to the disposal-processing- or treatment-site without being handled through the WMD. The WMD's on-site facilities normally handle any waste generated by typical surveillance or maintenance work.

The project will conduct a data quality objective (DQO) session to establish sampling requirements to ensure that the correct information is available to properly plan and dispose of the BGRR waste in the most timely, cost-effective manner. Some reliance will be placed on historic operations and sampling data. Using historic data can be very valuable, but can also be confusing or it may be outdated. Any historic information will be scrutinized closely to determine its acceptability of the planned use part of any data evaluation. The Waste Management Division representative and BGRR project management will approve the resultant sampling instructions from the DQO, with DOE's concurrence, by participating in the DQO process meetings. Part of the subsequent task-planning efforts will include analyzing the potential waste streams (classification and volumes) as well as paths to disposal **before** the waste is generated. Much of the waste from the BGRR Decommissioning Project will be bulk-handled and shipped directly from the site. Physical restrictions in the area need careful planning which must be factored into the overall project plans.

The waste planning, from the DQO to filing the disposal documentation, involves the Waste Management Division representative assigned to the BGRR Decommissioning Project. This individual reports to both organizations and acts as the primary contact point for collecting sample designation waste, and planning its disposal (DOE or commercial companies). The Waste management Division representative ensures that the appropriate Waste Acceptance Criteria are included in the waste-stream packaging instructions, trains workers on these instructions, oversees its packaging, and shipping documentation. The Waste Management Division representative will coordinate all waste shipping with the Waste Management Division waste-shipper to ensure that the project's work and schedule is not impacted. Compliance with the waste-acceptance criteria and all local; state; and federal-requirements for waste disposal, as well as waste minimization planning, will be detailed in the appropriate work instructions prepared or approved by the Waste Management Division representative.

The project work and waste generation will occur in separate phases, thus allowing the segmented planning for the waste management activities. All waste-generating work will be scrutinized for possible minimization that include reuse, segregation, on-site decontamination and/or release, and application of good radiological controls to minimize the production of more secondary waste than necessary.

During the first year of the project, a formal Pollution Prevention/Recycle/Reuse review of the project baseline approach will be conducted. The results will be used in future project planning and engineering. Subsequent waste-reduction efforts will be forecast, tracked, and reported quarterly as part of the waste-minimization reporting and Cost Savings Worksheets.

Waste planning and its implementation will be part of each identified activity. This approach makes the issues of generated wastes, their processing and disposal, major portions of each planned activity. Early identification of the waste in each scheduled activity ensures its rapid and efficient handling and disposal.

## 10.1 TRANSURANIC WASTE

The BGRR Decommissioning Project is not expected to generate any transuranic waste (as defined by DOE Order 435.1 as 100 nCi/gram) during the performance of the project work scope. However, because of the potentially large time and cost impacts of generating or discovering materials that will generate transuranic waste, the following contingency planning / scope determination has been performed.

If during the decommissioning planning and scoping surveys there is sufficient transuranic material found in a form and distribution that could be concentrated during the decommissioning process, the following steps will be taken:

- The isotopic breakdown, form and best estimate of the volume of material will be determined.
- The decommissioning process planned for that area or component will be reviewed to determine the likelihood and extent of concentrating the material in the process to exceed the transuranic waste limits. Alternate decommissioning processes may be available and should be investigated that will not concentrate the material to ensure that waste thresholds are not exceeded.
- If the decommissioning process will generate a transuranic waste, a baseline change request should be prepared to address the cost and schedule impacts of preparing a transuranic waste management plan for this non-defense transuranic waste.
- The Transuranic Waste Management Plan will mimic the requirements for sending waste to the Waste Isolation Pilot Project (WIPP) contained in DOE/WIPP-069, Waste Acceptance Criteria for the Waste Acceptance Pilot Plant. Additionally, the plan must include an onsite storage component since WIPP can only accept transuranic waste resulting from defense production work. This onsite storage could be a very contentious situation and must be thoroughly evaluated and approved at the appropriate levels within DOE prior to publishing this waste management plan.

## 11 QUALITY PROGRAM

The project's Quality Program (BGRR-011) and plans shall incorporate a graded approach to implement DOE Order 414.1A [20]. The BGRR Decommissioning Project's Quality Program shall do the following:

- Focus on performance, the decommissioning process, and recordkeeping
- Achieve quality in a planned, systematic manner.
- Provide specific guidelines for important quality matters.

While meeting the requirements of the DOE Order as stated above, the quality program should emphasize the need to have high-quality outcomes in the areas of worker safety, waste management, environmental protection, and site-release documentation. Fundamental quality principles shall be implemented throughout the work-process controls system.

The quality planning for each task shall implement the applicable portions of the overall quality program. In general, the following quality elements will be considered and established in a graded approach:

- Define policies and objectives; ensure they are understood and accepted.
- Specify roles and responsibilities; ensure they are understood and accepted.
- Specify expectations; identify and allocate resources to achieve them.
- Ensure people are competent at the work they do.
- Ensure people have the right information at the right time.
- Seek and use relevant experience.
- Plan and control the work.
- Use the right materials, tools, and processes implementing controls and changes to them, as needed.
- Access work to ensure it meets expectations.
- Identify and remedy errors and deficiencies.
- Periodically assess management processes to improve effectiveness and efficiency.
- Identify, report, and evaluate potential problem areas through self-assessment.
- Identify, report, and evaluate opportunities for improvement.
- Encourage continuous improvements in performance of work.

The Quality Program shall require approval outside the project to demonstrate that the program is independent of line management authorities. The BNL Quality Management Office shall approve the QA Program Plan. The project's Quality Representative shall approve the Quality Plans for each task.

One element of any dynamic, effective system is continuous improvement. A Self-Assessment Plan is in place to ensure that the BGRR Decommissioning Project improves in all areas and it is closely tied to, but not exclusive to, the other assessment function of the project. These two similar systems are integrated to provide the project's staff with current, relevant, and focussed information to continuously improve operations. The overall management-control system shall implement the following quality aspects:

- Verification and oversight to demonstrate the quality achieved is appropriate.
- Planned and periodic assessments to improve items, processes, and quality.
- Non-conformance and deficiency-tracking systems using BNL's systems to ensure appropriate review, trending, and closeout of the identified deficiencies.
- Assurance of the adequacy, validity, and traceability of data.
- Assurance that structures, systems, process, and components perform their intended functions.
- Assurance that a planned activity is carried out to specified requirements.

## **12 WORKERS' QUALIFICATIONS**

This section describes how the project will identify, plan for, and manage issues on workers' qualifications for the project's personnel. The requirements established here apply to all personnel, team members, and subcontractors alike. The requirements are function-dependent, not length-of-stay on the project nor employer-dependent. The requirements come from many different sources and many are based on job descriptions with varying re-training, qualification or proficiency requirements. Capturing how all these elements will be managed on the BGRR Decommissioning Project is outlined below.

The training program requirements will be documented in the Brookhaven Training Management System (<http://training.bnl.gov>) and will be implemented on the BGRR Decommissioning Project.

### **12.1 IMPLEMENTATION OF TRAINING**

A project procedure shall define the plan to implement requirements, required reading program, tracking, scheduling, and training records. The tracking system, based on the Brookhaven Training Management System, will help ensure that workers are aware of their training needs and re-training requirements, schedule for training or retraining as needed, attended the training, and that the appropriate records systems are updated to track it.

### **12.2 OCCUPATIONAL/MEDICAL MONITORING PROGRAM**

Project personnel with job functions that require occupational/medical monitoring (lead exposure, radiological uptake, radiological dosimetry) shall be incorporated into BNL's site monitoring programs. These requirements shall be identified from these site programs and utilize the site systems for records-tracking and periodic update/recall tracking.

## 13 RISK PLANNING

### 13.1 PROGRAMMATIC AND TECHNICAL RISK

The success of the BGRR Decommissioning Project requires involvement with the public and regulators, removal of above- and below-ground contaminated facilities, soils, and management of the generated waste streams. Each element has an associated degree of risk. Risk analysis (both formal and informal) will be used throughout the BGRR Decommissioning Project to identify, analyze, and respond to these risks. It will include maximizing the results of positive events and mitigating the consequences of adverse events. Risk management will include the following:

- Risk Identification
- Risk Quantification
- Risk Response Development
- Risk Response Control

Risk Identification determines risks and their potential impact on the Technical, Cost, and Schedule Baselines. Technical risks are identified in the *Hazard Classification and Auditable Safety Analysis for BGRR Decommissioning Project* [21], and other programmatic risks are included in the risk analysis in Figure 13.1.

Risk Quantification evaluates the identified risks and assesses the range of impacts on the project's baselines. The quantification will include grading the risks as "low, medium, or high" based on the project team's input. The assignment of a grade includes addressing the probability of occurrence, and the consequence of the realized risk. The evaluation quantifies the consequences in terms of expense and schedule duration. This risk assessment is the basis of the cost or schedule contingency to ensure a reasonable probability of success. The contingency for the BGRR Decommissioning Project will be included as part of the Baseline Cost Estimate shown in Figure 6.5. Figure 13.1 shows the identification of the risks by CWBS.

Risk Response Development determines how each risk will be avoided, mitigated, or managed by the BGRR Decommissioning Project, including the DOE and the Contractor. This includes identifying risk-abatement methods and opportunities for enhancing positive results. Risk responses identified here lead to more detailed discussions in every other section of this BGRR Decommissioning Project Management Plan, including Baselines, Change Control, Contracting Strategy, Regulatory Strategy, and Environmental, Health and Safety.

Risk Response Control executes the risk management plan to adequately and appropriately responds to events that occur over the project's life. It further includes responding to changes in risk conditions using the USI process defined in Section 4 of this document. The USI process is a graded approach, adapting the methodology of DOE Order 5480.21 *Unreviewed Safety Questions* [22] and applying that to a Radiological Facility.

**Figure 13.1 BGRR Decommissioning Project Risk Assessment/Contingency Basis**

Risk Source by CWBS Element	Potential Issues	Probability of Occurrence	Risk Mitigation (DOE)	Risk Mitigation (Contractor)
1.0 Removal Area 1 - Pile Fan Sump - Fan House - Above-ground Ducts	Volume of soil remediation exceeds estimates	Low	Integrate soil remediation with OU-1. Modify Baseline Change Proposal for added scope.	Use in-process measurements to ensure that no more soil is removed than needed to meet cleanup goals
2.0 Removal Area 2 - Building 701 Isolation and Process Equipment	Unexpected contaminants are discovered in systems and equipment that increase waste disposal costs	Low	Monitor DQO and SAP Process. Verify SAP protocols.	Apply process knowledge and historical information conservatively to estimate waste classifications in a reasonable, conservative way
3.0 Removal Area 3 - Below Grade Ducts and Soils Removal	Waste disposal issues for the air-filter media	Low	Monitor DQO and SAP Process. Modify SAP protocols.	Start to aggressively manage the waste management of this material as soon as better characterization data is available
	Scope of soil remediation exceeds estimates at the Below-Grade Air Plenum	Moderate	Integrate soil remediation with OU-1. Process Baseline Change Proposal for added scope.	Use in-process measurements to ensure no more soil is removed than needed to meet cleanup goals
4.0 Removal Area 4 - Fuel Canal and Water Treatment House - Remaining Soils	Waste disposal issues for the canal's concrete and underlying soils (possibly Transuranic Waste)	Moderate	Pursue disposal options for non-Defense Transuranic (TRU) Waste	Determine volume of possible TRU Waste as soon as possible in the characterization of this area
	Scope of soil remediation exceeds estimates at the Below Grade Air-Plenum	Moderate	Integrate soil remediation with OU-1. Process Baseline Change Proposal for added scope.	Use in-process measurements to ensure no more soil is removed than needed to meet cleanup goals
5.0 Removal Area 5 - Building 701 and 702 Disposition	Finding fuel pieces or TRU waste in the air plenums	Moderate	Pursue Disposal options for non-Defense TRU Waste	Determine volume of possible TRU Waste as soon as possible in the characterization of this area
6.0 Project Administration	The BGRR Decommissioning Project's Hazard Category is incorrectly classified as a radiological facility.	Moderate	Write a Safety Evaluation Report to establish commitments and limiting conditions. Review USIs to insure commitments are met.	Characterize areas well, apply the USI process, and respond accordingly
	The BGRR-site's future-use scenario is not agreed to by the IAG participants.	Moderate	Work with the public and regulators to firmly establish a future land use for BNL	Use change control to manage the baseline to capture impact of differential cost and schedule

A BGRR Local Emergency Plan [23] is in place to identify the capabilities necessary to respond to an emergency condition, to provide guidance and instruction for initiating emergency-response actions, and to serve as a basis for training personnel in emergency actions. The emergency actions will be consistent with BNL's emergency procedures, DOE Orders, and federal-, state-, and local-regulations. Other activities outside the contingency allowances may affect the Project; plans or procedures will be in place to prevent or mitigate them. They include the following activities:

- Offsite transportation to disposal areas (strict compliance with 49CFR requirements)
- Continued funding at the planned level to maintain the project's continuity and progress (EM Baseline for the BNL)
- Loss of control of hazardous or radiological material (Project and Task Health and Safety Plans)
- Personnel injury (Task Health and Safety Plans)

## **13.2 ENVIRONMENTAL RISK**

To evaluate the BGRR Decommissioning Project against other (competing) environmental restoration work at BNL, a uniform means was developed to qualitatively rank environmental risk. Figures 13.2 and 13.3 show the BGRR results of this BNL-EM program-wide evaluation.

**Figure 13.2. BGRR Environmental Risk Ranking**

Category	Score (Code) <sup>1</sup>			Score (H/M/L) <sup>2</sup>			Justification
	B	D	A	B	D	A	
<b>Public Safety and Health</b>	3C	3C	3D	L	L	L	<p><b>Before:</b> The BGRR building and ductwork contain radioactive material that represents a potential threat to groundwater, with potential exposures to the public in the 10- to 100-year timeframe if no D&amp;D is done. The graphite cube that acted as the moderator for the reactor presents a potential public health risk if contaminated material were to escape from it or from the filters used to remove contaminants from the air cooling of the reactor. This is a low probability (&gt;1%) of exposure or injury from such a scenario if the reactor is not decommissioned.</p> <p><b>During:</b> Decommissioning of the reactor may involve a very slight increased risk to the public because of potential airborne contamination and accidents from offsite transportation of material.</p> <p><b>After:</b> After D&amp;D risks will be minimal.</p>
<b>Site Personnel Safety and Health</b>	4C	3B	4D	L	M	L	<p><b>Before:</b> Site personnel working in offices in the BGRR building have no significant risk of exposures. Trained personnel routinely monitoring the building may be subject to low-level exposures (less than 20% of allowable) with a probability of &lt;10% per year.</p> <p><b>During:</b> During D&amp;D, trained personnel performing the decommissioning work may be subject to low level exposures (probability &gt;10%) as well as an increased risk of construction and transportation accidents.</p> <p><b>After:</b> After D&amp;D, risks will be minimal.</p>
<b>Environmental Protection</b>	3B	3B	3D	M	M	L	<p><b>Before:</b> The BGRR building and underground ductwork contains radioactive material. There is a medium (&gt;1%) probability of localized damage to the environment if the decommissioning is not done. Risk ranking is Medium because 1) known groundwater contamination is being addressed under other projects, and 2) characterization has not been completed.</p> <p><b>During:</b> Some minor environmental damage may occur during decommissioning because it is intrusive. This work will be monitored and any release minimized and corrected immediately.</p> <p><b>After:</b> Residual impact is Low probability (&lt;1%) of minor environmental damage.</p>

<sup>1</sup> Scoring code, see Figure 13.3, Environmental Risk Ranking Key. B: Before, D: During, A: After

<sup>2</sup> High, Medium, or Low Score, based on scoring code, see Figure 13.3, Environmental Risk Ranking Key.

**Figure 13.3 Environmental Risk Ranking Key**

Impacts	Likelihood of Occurrence			
	A	B	C	D
	Very High	High	Medium	Low
<b>Category: Public Safety and Health</b>				
PS1. Immediate or eventual loss of life/permanent disability	H	H	M	M
PS2. Excessive exposure and/or injury	H	M	M	L
PS3. Moderate- to low-level exposure	M	M	L	L
<b>Category: Site Personnel Safety and Health</b>				
SP1. Catastrophic – Injuries/illnesses involving permanent total disability, chronic or irreversible illnesses, extreme overexposure, or death	H	H	M	M
SP2. Critical – Injuries/illnesses resulting in permanent partial disability or temporary total disability >3 months, slight overexposure near limits (20-100%)	H	M	M	L
SP3. Marginal – Injuries/illnesses resulting in hospitalization, temporary, reversible illnesses with a variable but limited period of disability of <3 months, slight overexposure, or exposure near limits (20-100%)	M	M	L	L
SP4. Negligible – Injuries/illnesses not resulting in hospitalization, temporary reversible illnesses requiring minor supportive treatment, or exposures below 20% of limits.	M	L	L	L
<b>Category: Environmental Protection</b>				
EN1. Catastrophic damage to the environment (widespread and long-term or irreversible effects)	H	H	M	M
EN2. Significant damage to the environment (widespread and short-term effects, or localized and long-term or irreversible effects)	H	M	M	L
EN3. Minor to moderate damage to the environment (localized and short-term effects)	M	M	L	L

**Scoring Key**

Likelihood	Very High (A)	High (B)	Medium (C)	Low (D)
Probability of Occurrence	1 per year	≥0.01/year <1/year	≥0.01/year <0.11/year	<0.01/year
Expected Time to Impact	≤1 per year	> 1/year ≤10 years	>10 years ≤10 years	>100 years
Simple	Certain	>10%	>1%	<+1%

## 14 COMMUNITY INVOLVEMENT AND COMMUNICATIONS

The BGRR Decommissioning Project developed a Communications Plan as a framework for communicating with key stakeholders and interested parties about project-specific plans and work. Stakeholders on this project include individuals and organizations interested in, involved with, or potentially affected by decisions associated with decommissioning the BGRR facility, and BNL's other environmental-restoration and waste-management activities.

The BGRR Communications Plan is consistent with the goals and policies outlined in BNL's Community Involvement Plan. The Communications Plan identifies opportunities to provide stakeholders with information about the project, and to solicit input and feedback on proposed decisions that may affect the surrounding communities.

The Communications Plan was developed with several key objectives in mind. The first objective is to support BNL's ongoing efforts to improve overall communications with external stakeholders. This requires providing timely, accurate, and consistent information about the project's plans and activities. The second objective is to obtain the stakeholders' input before and as part of key decision points in the project. The intent is to make decisions that reflect stakeholders' values and that are understood and accepted by the community at large, as well as by the organizations responsible for regulatory approval and oversight of the BGRR Decommissioning Project. The third objective is to satisfy all CERCLA requirements for communications with stakeholders.

The Communications Plan identifies external stakeholders, the appropriate mechanisms for interaction by the project team, and the project milestones that are anticipated to require such communications. Information tools, such as a briefing book and web page, are used to assist the project's team members in communicating consistent, accurate messages to external stakeholders.

Ongoing relationships with many stakeholder groups, including regulatory agencies, elected officials, and community organizations already have been established by BNL, and are identified in the Communications Plan. These groups serve as a pool of resources to seek the community's input on project activities. The recommended methods of communications with them are identified in the Communications Plan and include public meetings, roundtable sessions, *Brookhaven Bulletin* articles, press releases, newsletters, tours, presentations, and the Internet. Working groups also may be formed to facilitate the stakeholders' involvement on project issues, such as the BGRR Removal Action Alternative Analysis.

The anticipated CERCLA removal actions will require activity-specific communications with both community members and regulatory agencies. Plans will be developed to address these particular activities in more detail, consistent with the project's schedule. The focus of the activity-specific plans will be to clearly identify means to provide information or solicit input to support decision-making processes. They also will be geared toward obtaining stakeholder's

feedback to support BGRR activities when seeking acceptance from the regulatory agencies. As such plans are created, they will be incorporated as appendices into the overall communications plan.

As with other aspects of this project, there will be monthly and quarterly updated reports on work completed and planned. These reports will also serve as a self-assessment for the effectiveness or outreach and opportunities for improvement.

The Administrative Record for the BGRR Decommissioning Project shall be maintained in the following locations by the Community Relations Coordinator:

1. BNL Research Library  
Building 477A  
Brookhaven Avenue  
Upton, NY 11973
2. Longwood Public Library  
800 Middle Country Road  
Middle Island, NY 11953
3. Mastic-Moriches-Shirley Community Library  
301 William Floyd Parkway  
Shirley, NY 11967
4. U.S. EPA Region II Library  
Administrative Records Room  
290 Broadway  
New York, NY 10007-1866

Specific documents that are placed in the Administrative Record shall be as required by CERCLA and the Interagency Agreement between the Department of Energy, the U.S. Environmental Protection Agency, and New York State Department of Environmental Conservation.

## 15 CONTRACTING STRATEGY

In general, the BNL/ERD procurement group will be used to buy materials and award subcontracts to support the BGRR Decommissioning Project, using a fixed-price approach as much as possible. The Environmental Restoration and Waste Management Divisions have some Basic Ordering Agreements that may be used (especially in the early phases of the project) to support the project's specific needs. The desire to award fixed-price contracts demands that detailed accurate scopes of work be developed. However, many decommissioning activities will require a very stringent process for change control applied to tightly controlled contracts. The project will use the BNL/ERD's process for contract change to control these changes. The BGRR Decommissioning Project Team will provide the Project and Construction Management for all work subcontracts.

The make/buy decision process as used by the project will be based on the project's schedule, baseline costs, and resources available for the particular task. The project expects to use on-site resources as long as they are qualified, available, and cost-effective to meet the schedule; this applies to both non-manual and manual tasks. Figure 15.1 shows the contracting strategy in the planning case for BGRR Decommissioning.

**Figure 15.1. Contracting Strategy in the Planning Case for BGRR Decommissioning**

<b>CWBS Element<sup>1</sup></b> <b>(Physical Decommissioning Work Elements)</b>		<b>Subcontractor or Plant Forces</b>
1.01	Water Disposal	Subcontractor
1.02	Fan Removal and Decontaminate Fan House	BNL Plant Forces
1.03	Pile Fan Sump, Piping and Soils Removal	BNL Plant Forces
1.04	Above-grade Duct Removal and Instrument House Removal	Subcontractor
2.01	Museum Walls and Materials Removal, Building 701	BNL Plant Forces
2.02	Seal Pile Openings at Bio-Wall	Subcontractor
2.03	Isolate 701 from 703	BNL Plant Forces
3.01	Underground Air Plenum to Building 701 and Soils Removal	Subcontractor
4.01	Above and Below Ground Canal and Water Treatment House and Soils Removal	Subcontractor
4.02	Below-Grade Piping and Systems and Soils Removal	Subcontractor
4.03	Remaining Soils	Subcontractor
5.01	Building 701 Disposition	Subcontractor

<sup>1</sup>Physical decommissioning work elements.

## 16 REFERENCES

1. Department of Energy, *Life Cycle Asset Management*, DOE Order 430.1A (U.S. Department of Energy, Washington, D.C.), October 14, 1998.
2. Interagency Agreement between United States Environmental Protection Agency -Region II, United States Department of Energy, and New York State Department of Environmental Conservation. Federal Facility Agreement under CERCLA Section 120, Administrative Document Number II-CERCLA-FFA-00201, 1992
3. Department of Energy, *Environment, Safety, and Health Appraisal Program*, DOE Order 5482.1B, Change 1 (U.S. Department of Energy, Washington, D.C.), November 18, 1991.
4. Department of Energy, *Preparation Guide for U.S. DOE Nonreactor Nuclear Facility Safety Analysis Reports*, DOE-STD-3009-94 (U.S. Department of Energy, Washington, D.C.), July 1994.
5. Brookhaven National Laboratory, *Safety Evaluations for Unreviewed Safety Issue Determinations*, BGRR Decommissioning Project, ERD-OPM 4.4, 1999.
6. U.S. Department of Energy, *Conduct of Operations Requirements for DOE Facilities, Change 1*, DOE Order 5480.19, May 18, 1992.
7. Brookhaven National Laboratory, *Brookhaven Graphite Research Reactor Monitoring and Surveillance Procedure*, ERD-OPM 4.2, 1999.
8. *National Historic Preservation Act*, 16 USC 470.
9. Code of Federal Regulations, *Hazardous Substance Response*, 40 CFR 300.415 (U.S. Government Printing Office, Washington, D.C.), July 1, 1998.
10. Code of Federal Regulations, *Standards Applicable to Generators of Hazardous Waste*, 40 CFR 262-272, (U.S. Government Printing Office, Washington, D.C.), July 1, 1998.
11. New York Code of Rules and Regulations, *New York's Hazardous Waste Management Program*, 6 NYCRR Parts 370-373
12. Code of Federal Regulations, *Toxic Substances Control Act*, 40 CFR 761 (U.S. Government Printing Office, Washington, D.C.).
13. Code of Federal Regulations, *National Emissions Standard for Asbestos*, 40 CFR 61, Subpart M (U.S. Government Printing Office, Washington, D.C.).

14. Code of Federal Regulations, *Department of Transportation Regulations*, 49 CFR 100-179 (U.S. Government Printing Office, Washington, D.C.).
15. U.S. Department of Energy, *Radioactive Waste Management*, DOE Order 5820.2A (U.S. Department of Energy, Washington, D.C.), September 26, 1988.
16. Codes, Rules, and Regulations of the State of New York, Title 6, Chapter II, Parts 200-257.
17. Department of Energy, *Safety Management System Policy*, DOE Policy 450.4 (U.S. Department of Energy, Washington, D.C.), October 1996.
18. Department of Energy, *Decommissioning Implementation Guide (Draft)*, DOE Guidance 430.1A-4 (U.S. Department of Energy, Washington, D.C.), December 10, 1997.
19. Department of Energy, *Surveillance and Maintenance During Facility Disposition (Draft)*, DOE Guidance 430.1A-2 (U.S. Department of Energy, Washington, D.C.), December 1997.
20. Department of Energy, *Quality Assurance*, DOE Order 414.1A (U.S. Department of Energy, Washington, D.C.), September 29, 1999.
21. Brookhaven National Laboratory, *BGRR Hazard Classification and Auditable Safety Analysis for the BGRR Project*, BGRR Decommissioning Project, BGRR-002, September 8, 1999.
22. Department of Energy, *Unreviewed Safety Questions*, DOE Order 5480.21 (U.S. Department of Energy, Washington, D.C.), December 24, 1991.
23. Brookhaven National Laboratory, *BGRR Local Emergency Plan and Building Access Requirements*, ERD-OPM 3.0, Rev. 1, 1999.

## **APPENDIX A**

### **Building 704 Memorandum of Agreement**

**BROOKHAVEN NATIONAL LABORATORY  
M E M O R A N D U M**

*Brookhaven Graphite Research Reactor (BGRR)  
Building 701*

**DATE:** December 11, 1998

**TO:** W. Reeside, Reactor Division

**FROM:** F. Petschauer, Project Manager *FP*

**SUBJECT:** **Memorandum Of Agreement (MOA) for the Ownership of the Fan House, Building 704, and the Primary Exhaust Air Duct System and Associated Systems and Components**

On Thursday, November 19, 1998, and subsequently, Messrs. C. Newson and E. Lilimpakis of the BGRR Project staff and Mr. L. Somma, HFBR Facility Manager, met and conducted a walk down and inspection of the Fan House Building 704, the primary exhaust air duct system and associated systems and components. The purpose of the meeting was to determine a reasonable and acceptable approach to the ownership of the Fan House Building 704 and associated system components. This will support the operational HFBR activities and the stabilization of the BGRR complex and the near term Decontamination and Decommissioning (D&D) of the BGRR.

The exhaust air duct located on the roof of Building 704, the fans up to the fan discharge isolation valves and the fan rooms will be characterized during the upcoming BGRR facility characterization scheduled to begin in February 1999. The results of the characterization will be used to stabilize the structures and systems and the data evaluation will provide input into D&D alternatives for the near term D&D of the BGRR facilities, presently scheduled for FY02.

Control and ownership of the Fan House Building 704 fan rooms, primary exhaust air duct work, the building west side end rooms needs to be relinquished to the BGRR Project. The BGRR fans and duct work will be isolated in the fan house from the underground primary exhaust air duct work to support HFBR operations at the following locations:

- Fan Discharge Isolation Valves for Fans 1 through 5, located in each fan room.
- Secondary air discharge Motor Operated Valve (MOV) located in the secondary air cell.
- Fan 5, 48" butterfly bypass discharge isolation valve, located in the fan motor room.
- The emergency fan discharge isolation valve to the underground duct, located in the secondary air fan room.

F. Petschauer to W. Reeside  
December 11, 1998  
Page 2

Control and ownership of the Fan House Building 704 that includes the motor rooms, HFBR electrical distribution switchgear area, battery room, and the two west storage areas remain with the HFBR.

In an effort to accomplish these tasks, it is necessary to clear HFBR materials stored in the fan rooms and the building west side end rooms. The BGRR Project will properly dispose of all materials that remain in these rooms after April 1, 1999.

During the stabilization of the Fan House, the BGRR Project will seal any north wall penetrations between the fan rooms and motor rooms to provide a physical barrier to the HFBR electrical distribution switchgear room and west end storage areas and duct work and BGRR areas.

The above ground roof duct work will be removed during decommissioning. This will include the fans, associated valves, and metal duct work. The duct work under the Fan House will be isolated at the fan discharge isolation valves as listed above to provide the HFBR confinement. This duct work is pressurized from HFBR operations downstream of the fan discharge isolation valves.

Systems, equipment, components and structures common to the HFBR and the BGRR, the steam return from the motor room unit heaters, fire detection, electrical distribution and any others, will be controlled by the HFBR. Necessary communications will be conducted to ensure the operating requirements for both the HFBR and the BGRR can be adequately supported.

Please review the attached proposed HFBR and BGRR Memorandum of Agreement (MOA).

I look forward to meeting with you and members of your staff to finalize details that will minimize any inconvenience in separating the BGRR and the HFBR operations at the Fan House, Building 704, the primary air cooling duct work and associated equipment and structures.

cn/mcb

Attachment

cc: E. Lilimpakis, BGRR  
C. Newson, BGRR  
C. Polanish, DOE-BHG  
A. Queirolo, Reactor  
M. Schlender, DO  
T. Sheridan, DO  
L. Somma, Reactor  
File 1.4.1

**Memorandum of Agreement (MOA)  
Between  
High Flux Beam Reactor (HFBR) and  
Brookhaven Graphite Research Reactor (BGRR)**

**Ownership and Control of Fan House Building 704 and Associated Equipment,  
Systems and Structures**

**HFBR**

- Remove HFBR desired or necessary materials from the Fan House Building 704 north side five (5) fan rooms, the secondary air fan room, the instrument room and the west side secondary fan room, and the gas engine drive emergency exhaust room, a total of nine (9) rooms, by April 1, 1999.
- Isolate the duct from the HFBR by:
  - Verifying CLOSED and tag closed, Fan Discharge Isolation Valves for Fans 1 through 5, located in each fan room.
  - Verifying CLOSED and tag closed, Secondary air discharge Motor Operated Valves (MOV s) located in the secondary air cell.
  - Verifying CLOSED and tag closed, Fan 5, 48" butterfly bypass discharge isolation valve, located in the fan motor room.
  - Verify closed and tag closed, the emergency fan discharge isolation valve to the underground duct, located in the secondary air fan room.
- Control and maintain the Fan House Building 704 south side Motor Room, associated electrical equipment, battery room, west end storage areas, systems, and adjacent out doors paved land areas.

**BGRR**

- Control and maintain the Fan House Building 704 north side five (5) fan rooms, the secondary air fan room, the west side emergency fan room, and the gas engine drive emergency room, a total of nine (9) rooms, associated equipment, systems, and adjacent out doors paved land areas.
- It is the intent of the BGRR project to characterize the primary air exhaust duct work under the Fan House Building 704 north side downstream of the fan discharge isolation valves. It is further the intent of the BGRR Project to isolate the HFBR duct work from the BGRR portion of the duct work and D&D the isolated duct work during the near term D&D of the BGRR.

- Dispose of any remaining materials in the controlled and maintained areas of the Fan House Building 704.
- Seal the wall penetrations between the motor and fan rooms and verify instrumentation tubing associated with the duct work is sealed to provide a physical barrier to the HFBR electrical distribution switchgear, minimize the potential to spread contamination and water intrusion during BGRR stabilization activities.

**BGRR and HFBR**

- Systems, equipment, components, and structures common to the HFBR and the BGRR, the steam return from the motor room unit heaters, fire detection, electrical distribution and any others, will be controlled by the HFBR. The HFBR will notify the BGRR when maintenance or surveillance monitoring is needed that changes the systems that support the BGRR controlled areas. Necessary communications will be conducted to ensure the operating requirements for both the HFBR and the BGRR can be adequately supported.
- Following the characterization of the fan rooms on the north side of the fan house building 704, at least one of the fan rooms will be made available to the HFBR for storage of material until suitable long term storage arrangements can be made by the HFBR.
- Key Plans maintained by the Plant Engineering Department will be revised to reflect the division of responsibilities for the Fan House Building 704 delineating the BGRR and HFBR as the contact for planning work activities in their respective areas of the building. The Fan House Building 704 Key Plan will also be revised to require notification of the other organization of the impact for any planned work activities to be conducted in and around the building.
- The contact person for the HFBR is Leo Somma, HFBR Facility Manager, 344-3103.
- The contact person for the BGRR is Clyde Newson, BGRR Project Engineer, 344-2646.

William A. Reeside Jr.  
 W. Reeside  
 Reactor Division Manager

12/18/98  
 Date

F. Petschauer  
 F. Petschauer  
 BGRR Project Manager

12/11/98  
 Date

**APPENDIX B**

**Contractor Work-Breakdown Structure (CWBS)**  
**Dictionary**



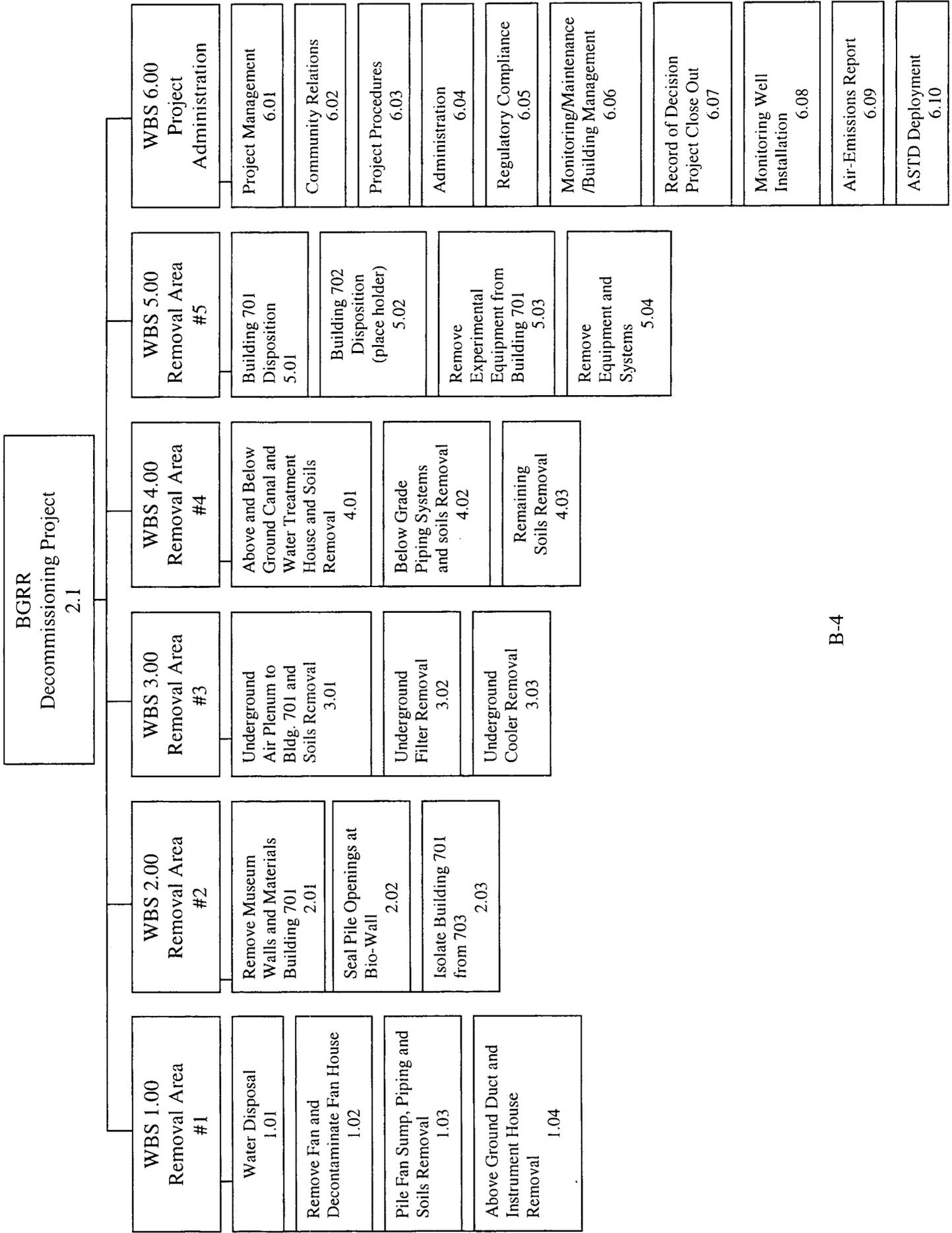
## **CONTRACTOR WORK-BREAKDOWN STRUCTURE**

The Contractor Work Breakdown Structure (CWBS) was prepared by the BGRR Decommissioning Project team. The team evaluated each CWBS activity. The basis for the evaluation was the health and safety of the public, workers, and the potential impact to the environment. The team was also cognizant of the need to insure compliance with regulatory requirements. Secondly, the team was influenced by the high visibility the project has from the regulatory community, the public, including the special interest groups, and the various diverse departments within the DOE.

The BGRR Decommissioning Project CWBS chart and dictionary systematically lists the work that is needed to complete the project's work. Project Administration includes, but is not limited to, project management, community relations, development and control of project procedures, building maintenance, monitoring and management, regulatory compliance, and the Record of Decision. These are the types of activities that will be required continuously until the project is completed. In addition, the other main CWBS elements were arranged geographically to cover all of the other work that is included in the project.

The CWBS dictionary provides a description and scope of work for each CWBS activity. Where applicable, the CWBS is subdivided into three sections: Objective, Background, and Activities. The Objective section captures succinctly what the CWBS will accomplish. The Background section provides information on the equipment, system, or structure affected by decommissioning. The Activities section provides a high-level sequence that will be used to perform the activity. As each of these CWBS activities are engineered, the activity steps will be further defined as needed to perform the fieldwork.

# Contractor Work-Breakdown Structure (CWBS)



## **BGRR DECOMMISSIONING PROJECT CONTRACTOR WORK BREAKDOWN STRUCTURE (CWBS) DICTIONARY**

### **CWBS 2.1 BGRR DECOMMISSIONING PROJECT**

#### **CWBS 1.00 REMOVAL AREA #1**

##### **CWBS 1.01 Water Disposal**

###### **1.0 OBJECTIVE**

1.1 Dispose of the stored contaminated water.

###### **2.0 REGULATORY**

The removal and disposal of water from the BGRR will be conducted in accordance with the regulations associated with the NEPA Categorical Exclusions.

###### **3.0 BACKGROUND**

The remaining contaminated water pumped from the underground cooling-air exhaust duct, approximately 35,700 gallons of water, is being stored at the Waste Management Division's (WMD's) facility in two temporary storage tanks that have been covered with a leased temporary structure. WMD technicians and supervisors perform necessary surveillance and monitoring of the stored water.

###### **4.0 ACTIVITIES**

4.1 Contract for the off-site shipment, treatment and disposal of the contaminated water.

4.2 Terminate the lease of the two temporary storage tanks.

4.3 Terminate the MOA with WMD for the surveillance and monitoring of the contaminated water.

#### **CWBS 1.02 Remove Fan and Decontaminate Fan House**

###### **1.0 OBJECTIVE**

1.1 Remove and dispose of contaminated equipment in the fan rooms.

1.2 Decontaminate, or fix as appropriate, contamination in the fan rooms.

1.3 Return custody of the fan rooms to the High Flux Beam Reactor (HFBR) Division.

## 2.0 REGULATORY

Removal of the fans and the decontamination of the fan rooms will be conducted in accordance with the NEPA regulations associated with Categorical Exclusions.

## 3.0 BACKGROUND

The Fan House Building 704 has two major sections. The main section is the motor-house area located on the south side of the building that includes the normal- and emergency-electrical power feeds to the High Flux Beam Reactor (HFBR). This section includes one primary fan motor, the secondary fan motor, and some associated valving and instrumentation. The north and west ends of the building are divided into nine rooms. Five of the rooms house the primary air-cooling fans. One room houses instrumentation for fan operations. One room houses the primary emergency fan. One room houses the secondary air-cooling fan and associated valves. The southwest room houses the emergency engine for the primary air emergency-cooling fan. The fans are internally contaminated, and there are contaminated areas in most of the fan rooms.

## 4.0 ACTIVITIES

- 4.1 The Fan House's components scheduled for removal will be sampled and evaluated *in situ*.
- 4.2 Obtain samples of the fan internals for fan #5 and fan #3.
- 4.3 Send the samples for offsite laboratory analysis.
- 4.4 The fans will be removed as part of the primary air cooling system for the BGRR.
- 4.5 Each fan will be removed with its associated piping, louvers, fan, and piping to the downstream isolation valve.
- 4.6 Each fan discharge valve provides the confinement isolation for the HFBR duct section in the basement of the Fan House.
- 4.7 All services, such as air, water, steam, to any of the rooms will be isolated in the motor room, and piping will be removed in the fan room.
- 4.8 The above-ground duct to each fan will be sealed from inside each fan room during the fan isolation work using the fan inlet isolation valve.
- 4.9 The fans and piping will be placed in sealand containers for shipment to a processing facility for volume reduction and disposal.
- 4.10 Once the equipment is removed, any contamination remaining will be evaluated, fixed in place, or removed and isolated from the motor rooms.
- 4.11 The fire-detection system will be deactivated.
- 4.12 As-left surveys and samples will be collected, analyzed, and documented.
- 4.13 An activity-closure report will be prepared.
- 4.14 Custody of the fan house will be returned to the HFBR.
- 4.15 Prepare a closure report.

## **CWBS 1.03 Pile Fan Sump, Piping, and Soils Removal**

### 1.0 OBJECTIVE

- 1.1 Remove the Pile Fan Sump (PFS) and associated drain piping to reduce the “footprint” of the BGRR Complex.

### 2.0 REGULATORY

Removal of the Pile Fan Sump, piping, and associated soils will be in accordance with the CERCLA time-critical removal action process. An action memorandum will be prepared based upon the time-critical removal action submittal to the DOE.

### 3.0 BACKGROUND

The Pile Fan Sump (PFS) is an operational sump that collects water from various BGRR, HFBR and ancillary facilities. Plant Engineering is modifying drain lines to the main stack and Building 802 to comply with the requirements of Suffolk County Article 12. The proposed modification is to plug drains in the Building 704 Fan House, remove portions of the existing drain piping, and cap and “abandon in place” other portions of it. The PFS, a concrete structure weighing approximately 27,000 pounds with approximately 250 feet of drain piping associated with the system, will be removed.

### 4.0 ACTIVITIES

- 4.1 Perform characterization activities.
- 4.2 Install a cap on the 14” acid vent line at the top of the stack to prevent rain water from entering the line and draining to the Pile Fan Sump.
- 4.3 Install a stack drain modification to allow the removal of the Pile Fan Sump and piping before the stack drain modification is installed.
- 4.4 Control the progress of work before and during excavation and removal of drain lines by monitoring for radioactive materials in the pipes and contiguous soils.
- 4.5 Remove the underground drain line from the Building 802 Fan House drain to Building 704 Fan House. This will be from the point at which the new piping to Building 704 will be installed.
- 4.6 Remove the underground drain line from the Building 704 Fan House to the PFS, approximately 200 feet of 4” cast-iron piping.
- 4.7 Remove the 14” acid vent-line and 2” SS effluent-line from the PFS to Building 801.
- 4.8 Cap the 14” vent-line near the PFS and the Building 802 Fan House.
- 4.9 Remove the 5’W x 7’L x 10’D PFS.
- 4.10 If the fan rooms have not been cleared of equipment and decontaminated before the drain lines are plugged, then install berms in the Fan-House rooms to prevent any water leaking in to spread contamination by seeping under the roll-up door and onto the uncontrolled asphalt outside.

- 4.11 Characterize and dispose of the waste materials, concrete, cast-iron and steel piping, and contaminated soils.
- 4.12 Perform endpoint surveys, sampling, and analysis.
- 4.13 Conduct independent verification surveying, sampling, and analysis.
- 4.14 Backfill areas where components or soils have been removed.
- 4.15 Prepare the Closure Report

#### **CWBS 1.4 Above-Ground Duct and Instrument House Building 708 Removal**

##### 1.0 OBJECTIVE

- 1.1 Remove all of the above-ground primary air-cooling duct work from the first joint above the ground eastward over the top of Building 704.
- 1.2 Prepare for removal the above-grade Instrument House Building 708 that is constructed over portions of the underground duct work.
- 1.3 Characterize the below-ground coolers and filters.

##### 2.0 REGULATORY

Removal of the above-ground duct work and preparing the Instrument House for demolition will be performed using a CERCLA “non-time critical” removal action. Characterization activities will be conducted in accordance with the regulations associated with the NEPA Categorical Exclusion.

##### 3.0 BACKGROUND

The above-ground primary air-cooling duct work is part of the pile’s primary air cooling system. Pile cooling air was ducted towards the top of the fan house Building 704 where the north and south air-plenums join to form a common header over the Fan House. The common header ducted the air to the intake of five fans. The fans discharged air into an underground duct that carried it to the main stack. The internal surfaces of the duct work are contaminated.

The Instrument House is a steel, concrete, and brick structure, approximately 45’ long, 14’ wide, and 10’ high. It was built over the underground primary air-cooling duct work and contained air-flow monitoring instrumentation, primary air-exhaust water-cooling piping, and valves for the cooler’s operations.

##### 4.0 ACTIVITIES

The duct work will be removed in approximately twelve large sections, the heaviest of which will be approximately 170,000 pounds. The duct work has five joints on the roof of the Fan House that will be used to sectionalize the duct work into five pieces. The north and south duct venturis and the convergence piece require cutting which will create three pieces of duct work. Two small pieces and two large pieces of duct work will be

removed at their respective joints. Each section will be separated from its adjacent section by mechanical cutting its expansion joint.

Radiological samples will be taken from the interior surfaces of the duct work to determine the type and amounts of contamination present. A fixant will be used on any interior surfaces that exhibit loose surface radiological contamination. The openings will be capped and sealed to prevent the spread of contamination.

The circular ducting from the main duct to each of the exhaust fans will be cut using diamond wire cutting techniques and capped. The opening at the Fan House's interior roof will be capped to prevent water intruding into the fan rooms, and capped on the duct side to prevent the spread of contamination following removal. The remaining duct work opening, just east of the instrument house will be covered and sealed to prevent water entering to the remaining underground duct work.

The duct work sections will be removed with a crane, and a heavy-hauler truck will transport them to a designated staging area for additional cutting, if required, package preparation, and transport to off-site disposal. The initial plan is to use the parking lot on the east side of Building 701 as the cutting area. It is estimated that the volume-reduced ducting will be staged and shipped by railcar service to Envirocare of Utah for disposal.

- 4.1 Removal of the above-ground duct work
  - 4.1.1 Sample and evaluate *in-situ* the interior of the duct work. Characterize the coolers and filters.
  - 4.1.2 Apply a fixative to the interior surfaces of the duct work.
  - 4.1.3 Perform diamond-wire cuts of the concrete.
  - 4.1.4 Cap and seal all openings.
  - 4.1.5 Disassemble the first joint above the Fan House.
  - 4.1.6 Cap and seal the ends.
  - 4.1.7 Using a crane, remove the section, and place it on a heavy hauler.
  - 4.1.8 Transport and unload the piece at the designated staging area in the east parking lot.
  - 4.1.9 Cut the piece for shipment and off-site disposal.
  - 4.1.10 Package, characterize, and ship the pieces for off-site disposal using railcar service.
  - 4.1.11 Repeat the steps for the remaining straight sections of duct work.
  - 4.1.12 Shore the "Y" section of the ducting.
  - 4.1.13 Cut the section at the designated location.
  - 4.1.14 Using a crane, remove the pieces.
  - 4.1.15 Package, characterize, and ship the pieces for off-site disposal using railcar service.
- 4.2 Preparation for removing the Instrument House Building 708.
  - 4.2.1 Survey the building's interior for radiological and non-radiological hazards.
  - 4.2.2 Seal duct openings.

- 4.2.3 Remove instrumentation, including mercury and water piping to the cooler that contains asbestos.
  - 4.2.4 Cut and seal cooling-water piping penetrations to the underground duct work.
  - 4.2.5 Dispose of the low-level radwaste and non-radwaste materials.
- 4.3 Prepare an activity closure report.

## CWBS 2.00 REMOVAL AREA #2

### CWBS 2.01 Museum Walls and Materials Removal Building 701

#### 1.0 OBJECTIVE

- 1.1 Remove temporary architectural changes made to Building 701 and return it to the near-original pile configuration.
- 1.2 Reduce flammable materials, thereby reducing the fire loading.
- 1.3 Uncover areas to allow for inspection and removal-planning.

#### 2.0 REGULATORY

Removal of the museum walls will be conducted in accordance with the regulations associated with the NEPA Categorical Exclusions.

#### 3.0 BACKGROUND

The BGRR Building 701 floor areas at different elevations and the top of the pile were modified using architectural materials to become the museum for Brookhaven National Laboratory. Temporary walls were installed to delineate the museum area. Walls and barriers were constructed to cover areas that would not be made accessible to the public. When the museum was closed and displays moved to the new location, several displays, walls, rooms, and barriers were abandoned in Building 701.

#### 4.0 ACTIVITIES

- 4.1 Carpenters and laborers will remove walls, displays, materials and all waste materials that were used at the museum.
- 4.2 All materials to be removed will be surveyed to free-release criteria by health physics technicians, and documented on standard survey forms.
- 4.3 The work will be controlled using existing work permits, radiological permits, and health physics coverage practices as necessary to complete the work in a controlled, safe manner.
- 4.4 Electricians will de-energize outlets and lighting fixtures.
- 4.5 The carpeted area on the top of the pile will be removed. Other carpeted areas will not be removed.

### CWBS 2.02 Seal Pile Openings at the Bio-Shield Wall

#### 1.0 OBJECTIVE

- 1.1 Seal and verify sealed opening in the bio-shield wall.
- 1.2 Keep graphite dust from becoming a hazard in Building 701.

- 1.4 Provide assurance that removal activities in Building 701 will not have an impact on the graphite pile.

## 2.0 REGULATORY

Sealing of the Pile at the bio-shield wall will be performed in accordance with the regulations associated with the NEPA Categorical Exclusion.

## 3.0 BACKGROUND

The pile and its associated bio-shield wall are considered Building 702. There is a negative-pressure filtered air system associated with the pile. All openings in the bio-shield will be sealed to seal the pile from Building 701; this will include the removing of experimental equipment that was left attached to the bio-shield wall. This isolation work enhances the radiological classification of the facility. This isolation at the bio-shield wall will be sufficient to satisfy isolation requirements with Building 701 as the weather tight protection for the Pile.

## 4.0 ACTIVITIES

- 4.1 Characterize the Pile.
- 4.2 Remove abandoned experimental equipment from the bio-shield's walls.
- 4.3 Characterize the equipment for disposal as rad or non-rad materials.
- 4.4 Undertake mechanical isolation work related to blanking, sealing, or verifying that all experimental and operational pile penetrations, and removable block mating surfaces are isolated or sealed; provide a mechanical barrier for all potential air-flow paths between Building 701 and the interior spaces of the pile's biological shielding. This includes the pile's top, east, south, west, north faces and part of the floor area that is in communication with the pile through the animal- and instrument-tunnels.
- 4.5 Carry out electrical isolation work related to cutting thermocouple wires and capping the thermocouple penetrations in the biological shielding.
- 4.6 Remove the filters from the east intake area, and replace the plywood on the east and west intake areas with aluminum- or carbon-steel plates.
- 4.7 Install a passive HEPA filtration system.
- 4.8 Perform "as left" surveys, sampling, and analysis.
- 4.9 Prepare an activity closure report.

### CWBS 2.03 Isolate Building 701 from 703

## 1.0 OBJECTIVE

- 1.1 Remove Air Handling units 01 and 03 from service.
- 1.2 Provide a barrier between Building 701 and Building 703.

- 1.3 Prevent any work being performed in Building 701 from impacting the activities in Building 703.

## 2.0 REGULATORY

Isolating Building 701 from Building 703 will be performed in accordance with the regulations associated with the NEPA Categorical Exclusion.

## 3.0 BACKGROUND

Building 701 joins Building 703 along its north side. There are several access doors between the two buildings, in addition to ventilation-duct penetrations. There are two air-handling units, duct work, and integrated heating- and cooling-coils located in Building 703 that ventilate Building 701. Electric utilities for Building 701 are provided through Building 703.

It is necessary to isolate Building 701 from Building 703 due to the movement of air from the former to the latter. Isolating the two buildings provides greater assurance that Building 703 will not become contaminated as a result of D&D being conducted in Building 701, since Building 703's ventilation system presently runs at a lower pressure and introduces Building 701's air into Building 703's air flows.

## 4.0 ACTIVITIES

- 4.1 Temporarily isolate the buildings and perform radon testing.
- 4.2 Remove from service the ventilation equipment, fans, coolers, louvers, and duct work for the two air-handling units located in Building 703.
- 4.3 Install an exhaust HEPA filter-system that will maintain Building 701's internal air-space at a negative level to control for any air movement.
- 4.4 Install a HEPA system concurrent with sealing of Building 701 from Building 703.
- 4.5 Prepare an activity closure report.

## **CWBS 3.00 REMOVAL AREA #3**

### **CWBS 3.01 Underground Air Plenum to Building 701, and Soils Removal**

#### **1.0 OBJECTIVE**

- 1.1 Remove the Primary Air Exhaust Filter.
- 1.2 Remove the Primary Exhaust Air Cooling Coils.
- 1.3 Remove the Underground Duct Work to Building 701.
- 1.4 Remediate Surrounding Soils to Established Cleanup Levels.

#### **2.0 REGULATORY**

Removal of the underground ducting to Building 701, coolers, filters, and associated soils will be performed in accordance with the regulations associated with the CERCLA "non-time-critical" removal action.

#### **3.0 BACKGROUND**

The underground air plenum is approximately 170 feet long from Building 701 to the above-ground joint. Each of the north and south exhaust air-plenums are approximately ten feet wide and fourteen feet high. They are made of carbon steel with a carbon-shell secondary air cooling encapsulated in concrete. The bottom of the air-plenum concrete is at an approximate elevation of 75 feet, about 35 feet below the grade level at an elevation of 110 feet. The air plenums are considered highly contaminated.

The primary exhaust filters were installed at the beginning of reactor operations and were used throughout its eighteen years of operation. During 1963, radiation was measured near the filters and the reading was twenty Roentgen per hour. The filters are suspected to be highly contaminated, partially because they were never changed and also because of the history of fuel failures during the time natural fuel was used. There are sixteen filter units. Each duct has eight filter units. Each filter units consists of forty-two filter cells that are two feet by two feet and four inches thick. The filter cell is a dry panel-type filter of bonded or woven corrugated glass cloth with asbestos rope seals.

The air coolers are located in the underground air-plenum downstream of the air filters and were used to cool the exhaust air. Water was circulated through the cooling coils. Valves in the instrument house were used to adjust the water flow for each coil to control the exhaust air's temperature. The cooling coils were replaced during the operating lifetime of the pile.

## 4.0 ACTIVITIES

These removal activities are grouped together because they have several jobs in common. However, each of the removal tasks is a major activity and will be performed using separate work packages, one for the filters, and one for the coolers.

- 4.1 The activities that are common to these removals are the erecting a confinement structure with redundant negative-pressure HEPA-filter instrumented systems, rigging equipment, and the close proximity of the shield's access blocks.
- 4.2 A temporary plug will be installed between column A and column AA in the north and south ducts using the Building 701 manways to access the below-ground ducts. This seals the Pile from the ducts where work will be performed.
- 4.3 The access shield plug for the coolers and filters to be removed will be removed under continuous radiological coverage. Once the covers are removed, the confinement structure noted in 4.1 above will be installed over the opening. See CWBS items 3.02 and 3.03 for a description of the filter and cooler removal activities.
- 4.4 After the coolers and filters have been removed, the temporary structure will remain in place and be modified as necessary to become the access point to the north and south underground ducts to support D&D activities.
- 4.5 Duct work at the south face of Building 701 will be excavated.
- 4.6 The section of ducting approximately 12 feet long will be cut using diamond wire-cutting techniques. The ducting will be removed and sectionalized for packaging, transport, and disposal.
- 4.7 On the Building 701 side of the removed section, a permanent barrier will be installed to isolate the ninety feet of duct work under Building 701 from the remaining underground ducting.
- 4.8 The portions of the underground duct where this work activity will be conducted will be inspected and evaluated to determine if the environment was impacted by the primary air exhaust system.
- 4.9 The first step will be to fix or remove any loose surface contamination from the interior of the ducting.
- 4.10 Using a shear, the carbon steel duct will be removed in sizes that can be packaged for metal melt or disposal.
- 4.11 The area around the ducting will be excavated to expose the top surfaces of the concrete ducting to five feet below the top of the duct.
- 4.12 Install a temporary movable housing over the section of the duct to be cut.
- 4.13 Using diamond wire-cutting techniques, cut the top of the duct.
- 4.14 Remove the cut sections to a staging area for sizing, packaging, transportation, and disposal.
- 4.15 Remove the steel liner, size and package for transport and disposal.
- 4.16 Conduct adequate sampling and analysis to detect any soil contamination. If soil contamination is found, evaluate the contaminants and concentrations.
- 4.17 The excavation will continue minimizing any further environmental impact.

- 4.18 The ducting will be segmented and removed to a staging area for packaging, characterization, and disposal.
- 4.19 An activity closure report will be prepared.

### CWBS 3.02 Underground Filter Removal

#### 1.0 OBJECTIVE

- 1.1 Remove the primary air exhaust filters.
- 1.2 Remediate the surrounding soils to established cleanup levels.

#### 2.0 REGULATORY

Removal of the underground ducting to Building 701, coolers, filters and associated soils will be performed in accordance with the regulations associated with the CERCLA "non-time critical" removal action.

#### 3.0 BACKGROUND

The primary exhaust filters were installed at the beginning of reactor operations and were used throughout the eighteen years of its operation. During 1963, radiation was measured near the filters and the reading was twenty Roentgen per hour. The filters are suspected to be highly contaminated partially because they were never changed and also because of the history of fuel failures during the period that natural fuel was used. There are sixteen filter units installed. Each duct has eight filter units. Each filter unit consists of forty-two filter cells that are two feet by two feet and four inches thick. A filter cell corrugated dry-panel type filter of bonded or woven glass cloth with asbestos rope seals.

#### 4.0 ACTIVITIES

This removal is grouped with CWBS 3.1 because it has work in common. However, each removal task is a major activity and will be performed using separate work packages; the filters, the duct work activities, and the coolers will have separate work packages.

- 4.1 The work that is common to these removals are the erecting of a containment structure with redundant negative-pressure HEPA-filter instrumented systems, rigging equipment and the close proximity of the shield access blocks.
- 4.2 There is a filter unit in each north and south exhaust-air-duct. The access shield plug for the filter that will be removed will be taken out under continuous radiological surveillance. The filters will be more contaminated than the coolers and extra care will be needed to contain the contamination. If necessary, the boxes in which the filters will be placed will be shielded.
- 4.3 The disposal packaging for the filters to be removed will be placed in the temporary structure.

- 4.4 The filters will be mechanically loosened or cut, sawsall, band saw, etc. to reduce the risk of airborne contamination.
- 4.5 The filters will be fitted into the package for characterization, shipment and disposal. The disposal option is limited to off-site burial.
- 4.6 The plugs will be reinstalled and the other filter access plugs will be pulled.
- 4.7 If a concrete access plug is damaged during removal and will not reseal the duct, a temporary metal access cover will be constructed to cover and seal the duct access point.
- 4.8 After removing the filters, the temporary structure will remain in place and be modified as necessary to become the access point to the north and south underground ducts to support D&D activities.
- 4.9 An activity closure report will be prepared.

### CWBS 3.03 Underground Primary Air Exhaust Coolers Removal

#### 1.0 OBJECTIVE

- 1.1 Remove the Primary Air Exhaust Coolers.
- 1.2 Remediate Surrounding Soils to Established Cleanup Levels.

#### 2.0 REGULATORY

Removal of the underground ducting to Building 701, coolers, filters and associated soils will be performed in accordance with the regulations associated with the CERCLA "non-time critical" removal action.

#### 3.0 BACKGROUND

The air coolers are located in the underground air-plenum downstream of the air filters and were used to cool the exhaust air. Water was circulated through the cooling coils. Valves in the Instrument House adjusted the water flow for each coil to control the exhaust's air temperature. The cooling coils were replaced during the operating lifetime of the pile.

#### 4.0 ACTIVITIES

This removal activity is grouped with CWBS 3.1 because it has several activities in common. However, each removal task is a major activity and will be performed using separate work packages; the filters, the duct-work, and the coolers will all have separate work packages.

- 4.1 The activities that are common to these removals are erecting a containment structure with redundant negative-pressure HEPA-filter instrumented systems, rigging equipment and the close proximity of the shield's access blocks.

- 4.2 There is a cooler unit in each north and south exhaust-air duct. The access shield plug for the cooler that will be removed will be taken out under continuous radiological surveillance.
- 4.3 The disposal packaging for the coolers to be removed will be placed in the temporary structure.
- 4.4 The coolers will be mechanically loosened or cut, sawsall, band saw, to reduce the risk of airborne contamination.
- 4.5 The coolers will be fitted into the package for characterization, shipment and disposal. The disposal option will be off-site burial or metal melt.
- 4.6 The plugs will be reinstalled and the access plugs to the other cooler will be pulled.
- 4.7 If a concrete access plug is damaged during removal and will not reseal the duct, a temporary metal access-cover will be constructed to cover and seal the duct access point.
- 4.8 After the coolers and filters are removed, the temporary structure will remain in place and be modified as necessary to become the access point to the north and south underground ducts to support D&D activities.
- 4.9 An activity closure report will be prepared.

## CWBS 4.00 REMOVAL AREA #4

### CWBS 4.01 Above- and Below-Ground Canal and Water Treatment House and Soils Removal

#### 1.0 OBJECTIVE

- 1.1 Demolish the Canal House Building 709.
- 1.2 Demolish the Water Treatment House Building 709A.
- 1.3 Remove the Foundation and Canal of the Canal House Building 709.
- 1.4 Remove the Foundation of the Water Treatment House Building 709A.
- 1.5 Remediate Surrounding Soils to Established Cleanup Levels.

#### 2.0 REGULATORY

Removal of the above & below ground Canal & Water Treatment Houses and associated soils will be performed in accordance with the regulations associated with the CERCLA "non-time critical" removal action. System removal activities inside the structure will be performed in accordance with the regulations associated with the NEPA Categorical Exclusion.

#### 3.0 BACKGROUND

The Canal House Building 709 is a separate structure that has a canal which contained water and connected into Building 701 to the deep pit area. The structure is metal-framed and cement-sided approximately 39' long, 15' wide and 19' high with a layered built-up roof. When the reactor was refueled, fuel was placed into the deep pit and moved underwater to the Canal House where it was prepared and loaded into casks for shipment.

The Water Treatment House Building 709A was attached to Building 709. It is a cement-block-structure approximately 39' long, 14' wide, and 12' high with a layered built-up roof. It has cells separated by walls, that contained the water-filtration and purification equipment to maintain the canal's water chemistry and clarity.

The interior surfaces of the Canal and Water Treatment Houses have approximately one-million dpm/100 cm<sup>2</sup> of loose surface contamination; the predominant isotope is Cs-137.

The walls of the Canal House contain asbestos.

The foundation of the concrete canal area is up to two-feet thick. The lowest elevation of the concrete is approximately 89 feet, approximately 20 feet below-grade elevation of 109 feet.

## 4.0 ACTIVITIES

- 4.1 Characterize the Canal area and below-grade soils.
- 4.2 The loose surface contamination in these structures will be removed or fixed. The canal and floor areas will be sealed.
- 4.3 A temporary structure may be erected which will permit the dismantling of the Canal and Water Treatment Houses within a controlled area. The structure will be suitable to contain the radioactive and hazardous material that will be removed during demolition of the above ground structures.
- 4.4 Using a temporary structure the asphalt and concrete foundations, canal, and pad areas will be removed and characterized for disposal.
- 4.5 Following the removal of the concrete, metal debris, and asphalt the temporary structure may be dismantled to allow better access for any needed remediation to the soils under and around the canal and water treatment houses.
- 4.6 Perform endpoint surveys, sampling and analysis.
- 4.7 Conduct independent verification surveys, sampling and analysis.
- 4.8 Evaluate analyses to insure the regulatory cleanup levels are not exceeded.
- 4.9 Install a permanent barrier at the Building 701 east wall, column 7 at the Canal.
- 4.10 Appropriate fill will be used to backfill in the areas where materials and/or soils are remediated.
- 4.11 Prepare an activity closure report.

### CWBS 4.02 Below Grade Piping and Systems and Soils Removal

#### 1.0 OBJECTIVE

- 1.1 Remove Below-Grade Piping Associated with the BGRR.
- 1.2 Remove Below-Grade Systems Associated with the BGRR.
- 1.3 Remediate Surrounding Soils to Established Cleanup Levels.

#### 2.0 REGULATORY

Removal of the below grade piping, systems and soils will be performed in accordance with the regulations associated with the CERCLA "non-time critical" removal action. System removal that does not impact soils may be performed in accordance with the regulations associated with the NEPA Categorical Exclusion.

#### 3.0 BACKGROUND

Several systems in that area connected to Building 701 were located below-grade. These systems will be evaluated for removal during this removal task, but it may be combined with other work where it is efficient, prudent, and cost-effective. The following are some of the below-grade systems associated with the BGRR:

- 3.1 Pneumatic transfer tubes from Building 701 that are connected to Building 801 to the south east and to Building 703 to the north east
- 3.2 Domestic water
- 3.3 Heating steam
- 3.4 Chilled water
- 3.5 Sanitary drains
- 3.6 Associated soils

The removal of each of these systems will be engineered and planned individually, or they will be grouped together, based on their below-grade locations.

#### 4.0 ACTIVITIES

- 4.1 Determine the radiological and hazardous materials to ensure worker safety and for waste disposal.
- 4.2 Prepare a work package for removing the piping or system.
- 4.3 Integrate the work into the removal plans.
- 4.4 Conduct the work.
- 4.5 Prepare the materials for waste disposal.
- 4.6 Remediate surrounding soils to established cleanup levels using surveys, sampling, and analysis.
- 4.7 Conduct independent verification surveys, sampling, and analysis to insure regulatory cleanup levels are not exceeded.
- 4.8 Package and characterize the wastes for disposal.
- 4.9 Prepare an activity closure report.

#### CWBS 4.03 Removal of Remaining Soils

##### 1.0 OBJECTIVE

- 1.1 Ensure all soil areas not identified in specific areas that are part of the BGRR Decommissioning Project are adequately surveyed.
- 1.2 Ensure all soil areas not identified in specific areas that are part of the BGRR Decommissioning Project meet established regulatory limits.

##### 2.0 REGULATORY

Removal of the remaining soil associated with the D&D of the BGRR will be performed in accordance with the regulations associated with the BGRR CERCLA Record of Decision as a Post-ROD work plan item.

##### 3.0 BACKGROUND

Much of the soil associated with the BGRR Facility is included in various specific removals. An example is the soil within 2 feet in all directions of the Pile Fan Sump. This example was used in estimating the cost for removing and disposing of the soils. The soils that are included here are those that may fall between the work areas, such as the soils between the underground ducting and the canal house area; this will include the soils to the east, southeast, west, and southwest of the BGRR which are presently not included in specific work areas. Area of Concern 9C (AOC 9C) spill areas will be included in this work. The volume of soils to be remediated is estimated to be that amount contained in a volume of 200'L x 200'W x 3'D, or approximately 120,000 cubic feet.

#### 4.0 ACTIVITIES

- 4.1 Conduct surveys and sampling.
- 4.2 Determine if the soils meet the established regulatory criteria.
- 4.3 If the soil analyses meet the established regulatory limits, carry out adequate verification surveys and sampling.
- 4.4 If the soils are contaminated and require remediation, perform sufficient surveying and sampling to establish their boundaries.
- 4.5 Remove and dispose of the contaminated soils.
- 4.6 Survey and sample until established regulatory limits are satisfied.
- 4.7 Request Regulators to conduct confirmatory surveys and samples.
- 4.8 When the Regulators report that their surveys and sampling confirms that the soils meet the established regulatory limits, restore the remediated area.

## CWBS 5.00 REMOVAL AREA #5

### CWBS 5.01 Disposition of Building 701

#### 1.0 OBJECTIVE

- 1.1 Determine an acceptable end-state, final disposition for Building 701.

#### 2.0 REGULATORY

Disposition of Building 701, refurbishment as the weather enclosure for the Pile will be performed in accordance with the regulations associated with the CERCLA "non-time critical" removal action. Systems and building internal refurbishment may proceed in accordance with the regulations associated with the NEPA Categorical Exclusion.

#### 3.0 BACKGROUND

Building 701 contains the offices, maintenance shop, control room, vault, and supporting structures for the graphite pile operations. The structure houses an overhead bridge crane that is used for work in the operating hall. The foundation of Building 701 contains the east and west inlet air ducts that directed cooling air to the pile and the north- and south-pile exhaust air-ducts that run from the north side of the pile to the southernmost building column. The fuel- and equipment-handling canal is located approximately 20 feet below-grade from the south end of the pile running to the easternmost column of Building 701 where it is joined to the canal-house portion of the canal. The foundation of Building 701 also supports the 700-ton graphite pile, associated biological shield walls, and the top of pile's shield blocks.

The final disposition of Building 701 will be determined by the EE/CA for the 701 / 702 Buildings. Until this is determined, the BGRR Project will use refurbishment of Building 701 to be the long term protective structure for the pile Building 702. When a final end-state has been determined, the decommissioning project planning and estimate will be revised to reflect the agreed upon end-state for Building 701. Refurbishment includes decontamination as needed, replacing the roof, pointing the exterior bricks, repair/replacement of the exterior doors and windows.

#### 4.0 ACTIVITIES

- 4.1 Survey and sample walls, floors, and materials.
- 4.2 Based on the results of the surveys and analyses, determine the types of waste that will be generated during the cleanup and refurbishment of the building.
- 4.3 Complete the closure of the pile and biological shielding.
- 4.4 Decontaminate or remove systems.
- 4.5 Decontaminate the deep pit and canal inside Building 701.
- 4.6 Decontaminate floor drains, and mezzanine areas and/or remove mezzanines.

- 4.7 Remove CRD Mechanisms, Charging elevator, Freight elevator.
- 4.8 Survey the building for Posting Removal per 10CFR835 criteria/decon as needed.
- 4.9 Point the exterior bricks, replace the roof, refurbish exterior doors and windows.
- 4.10 Dispose of wastes generated.

## CWBS 5.02 Disposition of Building 702

### 1.0 OBJECTIVE

- 1.1 Determine an acceptable end-state, final disposition for the pile Building 702.
- 1.2 Determine whether the disposition for Building 702 for project planning, scope, cost, and schedule, will be to seal the pile at the bio-wall and use the Building 701 as the weather protective structure for the pile Building 702. This activity is completed in CWBS 2.02, Seal the Pile at the Bio-Shield Wall. This CWBS has been added as a place holder until a final decision is made as to the final end-state of the Pile.

### 2.0 REGULATORY

The final disposition of the Pile will be performed in accordance with the regulations associated with the CERCLA "non-time critical" removal action. Any associated systems and interior work may be performed in accordance with the regulations associated with the NEPA Categorical Exclusion.

### 3.0 BACKGROUND

Building 701 contains the offices, maintenance shop, control room, vault, and supporting structures for the graphite pile operations. The structure houses an overhead bridge crane that supports work activities in the operating hall. The foundation of Building 701 contains the east- and west-inlet air-ducts that directed cooling air to the pile and the north and south pile exhaust air ducts that run from the north side of the pile to the southernmost building column. The fuel- and equipment-handling canal is located approximately 20 feet below-grade from the south end of the pile running to the easternmost column of Building 701 where it is joined to the canal house portion of the canal. The foundation of Building 701 also supports the 700 ton graphite pile, associated biological shield walls, and the top of pile shield blocks.

The final disposition of the pile Building 702 will be determined by the EE/CA for the 701/702 Buildings. Until the final disposition of the pile Building 702 is determined, the BGRR Project will use "sealing the pile at the biological shield wall using Building 701 as the weather tight enclosure around the pile Building 702" to prepare estimates for the decommissioning project. When a final end-state has been determined, the decommissioning project planning and estimate will be revised to reflect the agreed upon end-state for the pile Building 702.

#### 4.0 ACTIVITIES

SEE CWBS 2.02 Seal Pile Openings at the Bio-Wall

#### CWBS 5.03 Removal of Experimental Equipment from Building 701

##### 1.0 OBJECTIVE

Remove experimental equipment from Building 701.

##### 2.0 REGULATORY

Experimental Equipment removal from Building 701 will be in accordance with the regulations associated with the NEPA Categorical Exclusion.

##### 3.0 BACKGROUND

During the operation of the BGRR, equipment was installed for experiments. This equipment was abandoned in place. The equipment includes but is not limited to the following:

- 3.1 The chemo-nuclear-related equipment and shielding both inside and outside Building 701
- 3.2 Beam-guide equipment and sample-change equipment
- 3.3 Temporary tanks
- 3.4 Portable shielding
- 3.5 Three collection tanks on an elevation of 110 feet. One tank has a capacity for 275 gallons, and there are two smaller tanks.

##### 4.0 ACTIVITIES

- 4.1 Evaluate radiological and hazardous materials.
- 4.2 Prepare work packages for removing equipment.
- 4.3 Properly dispose of the materials removed.
- 4.4 Prepare a closure report

#### CWBS 5.04 Removal of Equipment and Systems

##### 1.0 OBJECTIVE

- 1.1 Remove the Control Rod Drive Mechanisms from Building 701
- 1.2 Remove the Charging Elevator and associated Structural Steel from Building 701.
- 1.3 Remove the systems piping within Building 701.

## 2.0 REGULATORY

Equipment and systems removal in Building 701 will be performed in accordance with the regulations associated with the NEPA Categorical Exclusion.

## 3.0 BACKGROUND

The sixteen control rods have been inserted into the core and disconnected from their drive mechanisms. The control-rod drive mechanisms are the part of the system that moved the control rods during reactor operations. With the control rods fully inserted into the core and disconnected from the drive mechanisms, the drive mechanisms can be removed and disposed of. The control-rod drive mechanisms consist of motors, flywheels, lubricating systems, structural-steel frame-work, and lead shielding for the control rods when they were withdrawn from the reactor.

The control-rod drive mechanisms are located on the southeast and southwest corners of the biological shield wall. They are arranged four mechanisms high and two wide on each side.

The Charging Elevator is located on the south face of the biological shielding wall; it was used for refueling operations. It could be moved from 108' elevation to approximately 138'. The elevator consists of the work platform, the motor and gearing, cables, electrical connections, structural-steel and associated equipment.

Several systems were used to support the operation of the BGRR. Utility systems will be evaluated for removal or isolation based on the planned end-state for Building 701. Included the following but was not limited to them:

- 3.1 Domestic Water system
- 3.2 Sanitary Drains system
- 3.3 Compressed Air system
- 3.4 Compressed Gas system
- 3.5 Steam Heating system
- 3.6 Chilled Water Cooling system
- 3.7 Storm Drains system
- 3.8 Pneumatic Tube Transfer system

## 4.0 ACTIVITIES

- 4.1 Survey the equipment for radiological and material hazards to ensure the worker's safety and proper disposal.
- 4.2 Remove the control-rod drive mechanisms beginning at the upper mechanisms using the installed overhead crane to assist in the dismantling.
- 4.3 Remove the charging elevator starting at the upper sections.

- 4.4 Characterize, package, and dispose of the materials.
- 4.5 Fill and seal the Charging and freight elevator pits.
- 4.6 Identify and remove the building's isolation points for each system selected.
- 4.7 Seal building isolation points.
- 4.8 Survey the system or portions to be removed to determine the radiological and material hazards for disposal and the worker's safety.
- 4.9 Remove, characterize, and dispose of selected system piping and components.
- 4.10 Prepare a closure report.

## **CWBS 6.00 PROJECT ADMINISTRATION**

### **CWBS 6.01 Project Management**

Provides for a full-time project management, administrative support, and the cost and schedule control support to provide overall management control of the approved cost, scope, and schedule of the project.

Provides for the day-to-day management and administration of the project. Includes the development and maintenance of the Project Management Plan, operation of the records-retention program, preparation of reports, and costs associated with preparing, operating and attending required meetings.

Support activities are included for the steering- and working-groups' meetings that will develop an end-state recommendation. Critical outcome and tier-inspections of the project also are included to support the self-assessment and quality programs.

Initial project planning which includes project management plan development, project scope, schedule, and costs development for FY99 and the Baseline, and transition plan implementation is included in the CWBS.

The Removal Action Alternatives Analysis (including preparation of the subcontract scope of work, contractor bid, evaluation, and award, document preparation by a subcontractor, public comment and submittal to the DOE) is included.

Annual Reviews and Self Assessments which includes monthly management inspections of the facility, the BGRR Self Assessment Program, and quarterly tier-inspections of the facility.

### **CWBS 6.02 Community Relations**

Develop and maintain the BGRR Decommissioning Project's Communications Plan with a community-relations specialist to provide a public-relations contact and an integrated approach to community relations throughout the project. This includes meeting of the roundtable, public officials, and regulators to support the project work and status. This includes the development of information materials, regulator presentations, development and maintenance of the BGRR web page, involvement in Brookhaven Executive Roundtable meetings (BER), Community Advisory Council meetings (CAC), and public event opportunities.

### **CWBS 6.03 Project Procedures**

Identify, develop, and maintain programs, plans, procedures, and instructions for administering and operationing the project. This includes program and procedure development, procedure maintenance, and periodic reviews of project procedures.

#### CWBS 6.04 Project Administration

It includes travel and relocation expenses, office supplies and equipment needed to manage the project. Allocated costs such as space, heat, electrical, and communication are also included. Consumables, small hand-tools, equipment, and training associated with the project are included in this CWBS.

#### CWBS 6.05 Regulatory Compliance

The initial safety basis will be developed as an Auditable Safety Analysis (ASA). The ASA will be updated via the USI process, as necessary, to include those CWBS activities that may be outside the scope of the ASA. ASA changes may be documented in the work packages when they are prepared to conduct removal work. These will be appended to the ASA to insure all activities have been adequately evaluated. The ASA will be reviewed annually and documented to insure the review continues to adequately address the safety basis for the BGRR. This CWBS also includes the NEPA categorical exclusion applications, review and appropriate approvals for FY99 activities, and another for future planned activities to be conducted under the NEPA categorical exclusion. The historical preservation documentation will be prepared, evaluated, and maintained to insure applicable regulatory requirements for historic site documentation are satisfied.

#### CWBS 6.06 Facility Monitoring, Maintenance, and Building Management

##### 1.0 OBJECTIVE

- 1.1 Monitor and maintain the BGRR facility to insure the safety of personnel and that the environment is not being impacted as a result of deterioration in the building/facility. This activity includes routine radiological surveys, building inspections, water intrusion monitoring.

##### 2.0 REGULATORY

Facility monitoring, maintenance, and building management will be conducted in accordance with the regulations associated with the NEPA Categorical Exclusion.

##### 3.0 BACKGROUND

During the recent Facility Review performed by Laboratory personnel, approximately 57,000 gallons of water was found in the below-ground cooling air ductwork. The water was pumped from the ductwork and repairs were made to prevent further intrusion of water.

## 4.0 ACTIVITIES

- 4.1 Conduct routine tier 1 inspections.
- 4.2 Prepare and implement management directives and ES&H policies to protect the health and safety the building's residents.
- 4.3 Perform routine surveillance and monitoring.
  - 4.3.1 Perform routine radiological surveys.
  - 4.3.2 Perform routine sampling and analysis.
  - 4.3.3 Perform structural integrity inspections.
- 4.4 Monitor for water intrusion.
- 4.5 Maintain instrumentation; repair and calibration.
- 4.6 Package and dispose of low-level radwaste material generated during routine monitoring.
- 4.7 Perform routine maintenance.
- 4.8 Remove the bubble chamber, plug, and inspection tube.
- 4.9 Remove materials stored in Building 701's vault.
- 4.10 Remove fuel casks and shielding on the asphalt area on the north side of Building 704.

### CWBS 6.07 Record of Decision Project Close-Out

A closure report for each CERCLA removal action will be prepared. The closure report will include information that describes the work including background information, regulatory drivers, planning, implementation synopsis, maps, pictures, and other appropriate data that demonstrates compliance with the regulatory end-state.

The closure reports will be used as supporting information for the Record of Decision (ROD) for the BGRR Decommissioning Project.

This CWBS will include the preparation of the Record of Decision (ROD) for project close out. Activity closure reports will be prepared as appropriate at the completion of each removal action. These reports will be used to prepare the ROD and may become part of it.

### CWBS 6.08 Monitoring of Wells Installation

#### 1.0 OBJECTIVE

- 1. Install 35 monitoring wells to complete the network for monitoring the Sr-90 contamination of groundwater.

#### 2.0 REGULATORY

Installation of monitoring wells will be performed in accordance with the regulations associated with the CERCLA "non-time critical" removal action.

### 3.0 BACKGROUND

Twenty-three monitoring wells have been installed in the vicinity of the BGRR to monitor the Sr-90 contamination of the groundwater from activities at the BGRR, the Pile Fan Sump, and nearby. An additional thirty-five monitoring wells will be installed to complete the network for monitoring the Sr-90 contamination.

### 4.0 ACTIVITIES

- 4.1 Install 35 monitoring wells in designated locations near the BGRR.
- 4.2 Install a dedicated bladder-pump in each monitoring well.
- 4.3 Collect, sample and analyze drill cuttings for waste disposal.
- 4.4 Prepare PPE and drill cuttings for transport and disposal.
- 4.5 Transport and dispose of the contaminated drill cuttings and PPE materials.

### CWBS 6.09 Air Emissions Report

#### 1.0 OBJECTIVE

- 1.1.1 Develop the history of emissions from Brookhaven National Laboratory from 1947 to 1962.
- 1.1.2 Issue a final draft report to the Department of Energy.

#### 2.0 BACKGROUND

BNL has published an annual Site Environmental Report since 1971. For each year from 1962 to 1966, it published the radiological releases that had been monitored and reported in internal monthly reports. From 1967 through 1970, the monthly reports and source data were compiled into a summary level report that was published in November 1998. Completing the remaining years of operating history is the subject of this work. This requires reviewing and evaluating documents that describe operations during the early years of BNL's existence from 1948 through 1961.

#### 3.0 ACTIVITIES

The scope of work covers a historical data review, specifically related to radioactive air emissions from the Brookhaven Graphite Research Reactor including those attributable to fuel cladding failures. It also includes radioactive and non-radioactive liquid releases from the Sewage Treatment Plant, and both air- and liquid-releases from facilities which operated during this period.

### 3.1 Historical Data Review

The available historical data will be reviewed to gather information on the emissions that were released from BNL during the period of interest. The historical data will be collected from sources such as facility operating records, monthly reports, off-normal incident reports, health physics log books, control room logbooks, process knowledge, interviews with personnel, and instrumentation monitoring records. Records important for this work have been located in various buildings around the site, including Building 494 (Archives). Some documents related to the design of certain facilities have been shipped off-site for safe storage; however, it is assumed that those documents will not have to be obtained and reviewed for this project.

### 3.2 Work Approach

The work will be conducted in a phased approach based upon the following priorities:

- ▶ radioactive air emissions
- ▶ radioactive liquid emissions
- ▶ external radiation levels (background plus field gamma sources)
- ▶ non-radioactive air- and liquid-emissions

#### 3.2.1 Phase 1; radioactive air emissions

The radioactive air emissions data will be the focus of the first phase of the work. Before 1962, most radioactive air emissions originated from the BGRR, BMRR, and the Van de Graaff accelerator. Contributions from other potential sources such as the Chemistry- and Medical-Departments also will be investigated. The total activity of I-131 released to the atmosphere before 1962 as a result of 28 reported fuel-cladding failures also will be considered.

#### 3.2.2 Phase 2; radioactive liquid emissions

The primary pathway for the release of radioactive liquids was via the Sewage Treatment Plant. Records of flow, and sampling and analyses that were conducted prior to 1962 will be compiled. Emissions of various measured radioactive isotopes will be presented on an annual basis.

#### 3.2.3 Phase 3; external radiation levels

This portion of the review will focus on the significant amount of data that were compiled to monitor the effects of nuclear-weapons testing. The background level produced from fallout, as well as any experiments that used sources which could also provide a direct exposure term, will be completed.

#### 3.2.4 Phase 4; non-radioactive air and liquid releases

Data which provide insights on the air non-radioactive emissions and liquid releases will be reviewed to and tabulated for the pre-1962 period. Because of the limited amount of data available, it is anticipated that both air and liquid non-radiological releases can be grouped together. If there are insufficient data, this section may be omitted.

### 3.3 Prepare Historical Emissions Report

A Historical Emissions Report will be prepared in a format similar to the annual site environmental reports. The report will include, but not be limited to, an executive summary, an introduction, a detailed description of the various emission sources, a summary of the data for each media, a description of any computational methods and calculation methods that are used, and a listing of references used to compile the data. Appendices will include tables for each of the emission data types presented in a year-by-year manner, consistent with the draft 1967-1970 emissions report recently completed.

### 3.4 Deliverables

The deliverables include the following items:

- 3.4.1 Monthly report on the progress of the project
- 3.4.2 Public access to the Reference Documents (Reading Room)
- 3.4.3 Draft Interim Report for phase 1; radioactive air emissions
- 3.4.4 Final Interim Report for phase 1; radioactive air emissions
- 3.4.5 Draft Report (all phases) for review and comment within BNL
- 3.4.6 Final Draft Report (all phases) for DOE's review
- 3.4.7 Presentations (to BNL, DOE, and/or the community) on the progress and results
- 3.4.8 Final Report to DOE

### CWBS 6.10 Accelerated Site Technology Deployment (ASTD)

*Note: This is being provided as information. It is not part of the Baseline because EM-50 are being expended for this activity. However, the cost of the ASTD, approximately \$802K, will be added to the total project costs.*

*Reference: Deployment of Innovative Characterization Technologies and Implementation of the MARSSIM Process at Radiologically Contaminated Sites, October 1999 Accelerated Site Technology Deployment Project TTP No. CH39DD63.*

## 1.0 OBJECTIVE

Demonstrate that the In-Situ Object Counting System (ISOCS) system can reduce the costs associated with facility characterization in preparation for decontamination and

decommissioning through the use of field measurements compared to off-site laboratory analysis.

## 2.0 BACKGROUND

The DOE Office of Science and Technology (EM-50) has partnered with the Chicago Operations Office and Brookhaven National Laboratory in an Accelerated Site Technology Deployment (ASTD) project. EM-50 is providing the funding over two years, FY99 and FY00, for establishing the innovative Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) and characterization using in-situ gamma spectroscopy. A Canberra ISOCS will be procured and used to take field characterization data for the BGRR D&D planning, and then will be applied during the D&D activities to minimize worker exposure and ensure the proper disposition of the waste generated.

## 3.0 ACTIVITIES

1. Procure an ISOCS System.
2. Establish background and baseline data.
3. Characterize areas of planned removal or remediation activities. Provide quick field measurements.
4. Take data information during the work.
5. Characterize the waste.
6. Document the results.
7. Prepare a final report.

**APPENDIX C**

**SC/EM**

**Memorandum of Agreement**



Department of Energy  
Washington, DC 20585

February 18, 1999

MEMORANDUM FOR

John P. Kennedy  
Acting Manager, Chicago Operations Office.

FROM:

Martha A. Krebs, Director  
Office of Science

James M. Owendoff, Acting Assistant Secretary  
for Environmental Management

  
2/19/99

SUBJECT:

Management of the Brookhaven Graphite Research Reactor

Attached for your use is the Office of Science (SC) Office of Environmental Management (EM) Memorandum of Agreement (MOA). This MOA transfers the responsibility for management of activities associated with the Brookhaven Graphite Research Reactor (BGRR) and its associated support facilities at Brookhaven National Laboratory from SC to EM.

The BGRR is an environmental concern for the Brookhaven site and is becoming increasingly more visible to DOE regulators and stakeholders. Therefore, because of this and the potential efficiencies to be gained by managing this work as a single project, EM and SC negotiated the attached MOA consistent with the Department's Life Cycle Asset Management Order.

Under this agreement, EM will manage both EM's and SC's FY 1999 and FY 2000 funding for BGRR activities. Beginning in FY 2001, EM will fund activities through the completion of decommissioning. There will be extensive characterization underway during FY 1999. If through the end of FY 2001 these characterization or other activities indicate an environmental, safety, or health issue that requires significant near-term unplanned work, SC will be responsible to fund, or identify alternative sources to fund the necessary stabilization actions.

Please contact Milton Johnson, SC (301-903-4097), or John Lehr, EM, (301-903-7260), if you have any questions or wish to discuss this agreement further.

Attachment

cc:  
D. Michaels, EH-1  
F. Peters, FM-1  
G. Malosh, BHG

Revised 1/27/99

Office of Science/Office of Environmental Management  
**MEMORANDUM OF AGREEMENT**  
Brookhaven Graphite Research Reactor

**PURPOSE**

The purpose of this Memorandum of Agreement (MOA) is to transfer the responsibility for management of activities associated with the surplus Brookhaven Graphite Research Reactor (BGRR) and associated support facilities at Brookhaven National Laboratory from the Office of Science (SC) to the Office of Environmental Management (EM).

**BACKGROUND**

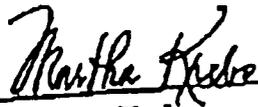
In accordance with the Department of Energy Life Cycle Asset Management order, SC is responsible for the stabilization and characterization of the BGRR. However, since this facility is an environmental concern for the Brookhaven site and is becoming increasingly more visible to our regulators, it is agreed that addressing such activities will be better served under EM. This will enable the Department to initiate decontamination and decommissioning (D&D) activities in an integrated site-wide risk based manner and coordinate BGRR stabilization and clean-up activities that also affect stakeholder interactions regarding Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) clean-up.

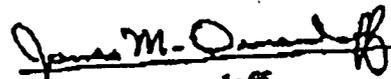
**AGREEMENT**

Effective as of the date of the signature of this agreement, EM will assume ownership of the BGRR and have program management responsibilities with the following understandings:

1. EM will take ownership of those facilities associated with the BGRR as listed in Attachment 1.
2. EM will be responsible for the scope of work as defined in Attachment 2. However, it is understood this scope of work may change depending on factors such as EM's determination of the ultimate endpoint of the facility.
3. EM will determine the contractor strategy for BGRR stabilization/D&D.
4. SC provides funding in the amounts of \$1,784 K in FY 1999, \$4,893 K in FY 2000, and \$200 K in FY 2001 (EM manages SC funds, as well as EM funds).
5. The EM \$5.7 million plus-up for FY 1999 is spent on BGRR and other EM activities.
6. EM will provide for BGRR decommissioning in the FY 2001 outyears budget formulation and its funding will be determined in conjunction with Brookhaven's site-wide priorities for clean-up.

7. In the event an unforeseen environment, safety or health issue should arise as part of the facility characterization and associated stabilization activities during the time period between the date of this agreement and the end of FY2001 that results in a significant cost increase, SC will be responsible to fund, or identify alternative resources to fund the necessary stabilization actions. Beyond FY2001, it is expected that EM will be responsible for all D&D activities and funding, as indicated in *Paths to Closure*.

  
\_\_\_\_\_  
Martha A. Krebs  
Director  
Office of Science  
2/17/99  
Date

  
\_\_\_\_\_  
James M. Owendoff  
Acting Assistant Secretary  
for Environmental Management  
2/17/99  
Date

cc:  
D. Goodwin, SC-20  
M. Johnson, SC-80  
J. Hawkins, SC-82  
A. Edelman, SC-83  
J. Lehr, EM-40  
M. Stahr, EM-44  
D. Mackenzie, EM-44  
A. Szilagyi, EM-62  
R. Blowitski, EH-73  
G. Malosh, BHG  
S. Malette, BHG  
C. Polanski, BHG  
J. Eng, BHG  
A. Taboas, CH  
S. Heston, CH

**Facilities to be Transferred Under this Agreement**

The BGRR and associated support facilities to be transferred include the following buildings and other structures:

**Building 701:** Main reactor building with office spaces, machine shop, vault, and support areas housing the BGRR pile, ventilation systems, etc. Portions of building are currently used for offices, nuclear material storage and RHIC support; however, these uses are planned to be concluded in FY 1999.

**Building 702:** The BGRR proper including the biological shield, control rod drive mechanisms, graphite pile, experimental facilities within the reactor, and north and south exhaust plenums.

**Building 704:** Support structure for primary and secondary fans, instrumentation for fan operation, steam and cooling water systems, motor control center, fan motors. Note: The Motor Room of Building 704 is the electrical supply for the High Flux Beam Reactor (HFBR) and will remain in active use by BNL.

**Building 708:** Air intake and exhaust ducts, exhaust filters, coolers, instrument house, secondary air system, above ground ducts through the pile fans, continuation of duct up to the silencers.

**Building 709:** Fuel canals - including the deep pit area under the reactor, the canal and canal walkway, deep drain sump and canal walkway sump, and canal water treatment area (Building 709A).

**Other Structures:**

4" carbon steel line from canal discharge in Building 709 to Building 811, Waste Concentration Facility.

1 1/2" stainless steel line from canal walkway sump to Building 801, Hot Laboratory.

4" carbon steel line from the East Yard Sump connecting to 6" line from safety showers and pile drains. Line ends in the DFU cell of Building 801, Hot Laboratory.

Building 701A, Chem. Nuclear Facility, with above grade and below grade piping connecting to Building 701, BGRR.

Valve Pit near Building 708, Instrument House with piping and valves to control exhaust cooler temperature.

Pile Laboratory Collection Pit at southwest corner of Building 703, Laboratory, with connecting line to Building 701, BGRR.

Pneumatic tubes used for sample transfers from the BGRR to support facilities: two lines to west wing of Building 703, Laboratory; two lines to east wing of Building 703, Laboratory; and two lines to Building 801, Hot Laboratory.

Soils and paved areas in the immediate vicinity of the facilities listed above.

## Planned Scope of Work

Year	SC Funds	EM Funds	Scope
FY 99:	\$1,584	\$2,463	Develop and approve characterization plan Initiate characterization Continue water storage/disposal Relocate personnel Surveillance and Maintenance
	\$200		
FY 00:	\$4,693	\$130	Complete characterization Initiate D&D planning/engineering Complete water disposal Conduct stabilization of ducts, canal area, instrument house, Building 701, utilities D&D scoping Surveillance and Maintenance
	\$200		
FY 01:		\$4,081	Continue D&D planning/engineering Conduct stabilization of Building 701, utilities, fin house, Exterior structure Surveillance and Maintenance
	\$200		

[Note: FY 01 scope and budget is at a low level of confidence until FY 99 characterization is undertaken. Scope and budget is also subject to prioritization within all planned EM activities and target.]

FY 02:	\$6,109	D&D
FY 03:	\$14,657	D&D
FY 04:	\$6,165	D&D
FY 05:	\$2,865	D&D

[Note: FY 02 through FY 05 are estimates provided in the June, 1998 *Paths to Closure*.]

**Current Stabilization and Deactivation Planned Activities  
(Responsibilities of EM)**

Some of the listed activities are already underway or were completed prior to transfer. It is understood that this scope is subject to change depending on the results of characterization, D&D Scoping activities, and other factors.

- Building 701 Reactor Building: isolation, fixation, and/or removal of loose contamination from interior surfaces, sealing of the building envelope to prevent water intrusion and

contamination migration. The utility systems supporting the Building will be isolated from those serving the adjoining Building 703. (Building 703 is a laboratory /office facility that will remain in use by the BNL and is not one of the facilities to be transferred. SC is responsible for operational activities within building 703.)

- Reactor Building Systems inside Building 701: Isolation, fixation, and/or removal of loose contamination from reactor air cooling ducts, sealing all penetrations into the reactor pile, Building 702, and establishing positive contamination controls within the facility.
- Underground Filter Stabilization: sealing the building envelope to prevent water intrusion and contamination migration.
- Above Ground Exhaust Duct System Stabilization: fixation of contamination within the duct, weatherproofing of the exterior duct surfaces to prevent further deterioration or water intrusion, isolation of the duct with fencing to prevent uncontrolled access to the immediate area and erection of a barrier system to catch any falling debris.
- Isolation of Building 704 Fan House: sealing the building envelope to prevent water intrusion and contamination migration. Provide physical and systems separation between BGRR and HFBR facilities.
- Isolation of Building 708, Instrument House: sealing the building envelope to prevent water intrusion and contamination migration isolation of all connected systems.
- Isolation of Building 709, Canal House and Walkway: removal of loose contamination from walkway and sealing of canal house envelope to prevent water intrusion and contamination migration.
- Plugging and Seal of Outside Piping and Drains: sealing yard piping, trenches, and sumps to prevent water intrusion and contamination migration.
- Disposal of Contaminated Wastewater: shipment and disposal of wastewater created by stormwater intrusion into the duct system.
- Planning for the final state of BGRR and associated support facilities.
- Planning for NEPA documentation.
- Budgeting for D&D.
- Possible pre-D&D activities to facilitate D&D.

**APPENDIX D**

**Conduct of Operations  
Matrix**

## CONDUCT OF OPERATIONS

### Responsibilities

The BGRR-DP Project Manager is directly responsible for implementing a Conduct of Operations Program and to ensure that all activities comply with the requirements based on a graded approach that considers the risks involved with the activity. Accordingly the Project Manager is responsible to:

- Support those activities related to conduct of operations practices, training, reporting, and other actions that are designated to enhance the performance in operational ES&H and reliability of operations.
- Appoint a Conduct of Operations Coordinator for the Project.

The Conduct of Operations Coordinator shall act as the principle for all Project matters relating to the conduct of operations. This includes:

- Review of Project operations against the criteria contained in Section 4 of BNL-O&M-I-01 *Conduct of Operations Implementation of DOE Order 5480.19*.
- Assist the Project in development and implementation of the conduct of operations program.
- Performing self-assessments.

Supervisors are responsible for ensuring that activities under their jurisdiction are conducted in accordance with the specified requirements and procedures to assure safe and reliable operations.

Each employee is responsible to conform to the requirements stated in Project ConOps related documents and training to ensure that:

- Their actions are responsive to facility conditions and maintain facility safety and reliability.
- Suggestions are made to improve operational ES&H and reliability. They should bring their suggestions and report suspected deficiencies to a supervisor.

### Implementation

DOE Order 5480.19 shall be implemented using a graded approach to ensure that the level of formality in operations is appropriate for the potential risks and hazards posed by the operations.

Because the BGRR-DP has been classified as a Radiological Facility, it has the potential for environmental, safety, or health impact and with sufficient probability of occurrence such that a formal conduct of operations program is required. BNL-O&M-I-01 also

requires facilities, which have the potential to adversely impact several programs or site-wide Laboratory operations, and meet the potential consequences criteria of Quality Assurance Classification A-1, or A-2 (see BNL Quality Assurance Manual, Guide BNL-QAG-301, *Designation of Quality Assurance Classification Categories*, Appendix E, "ES&H and Program Criteria for QA Classification Category A"), and pose a credible risk (estimated Occurrence Rate  $>10^{-4}$  /year), shall have a formal conduct of operations program. Project Management assessed the potential impact of BGRR-DP operations against these criteria and determined that inclusion in a formal ConOps program is warranted.

The Auditable Safety Analysis and Unreviewed Safety Issue Process conforms to ES&H Standard 1.3.3, *Safety Analysis Reports / Safety Assessment Documents*.

**APPENDIX D**  
**Conduct of Operations Matrix**

DOE 5480.19 ATTACHMENT 1 GUIDELINE	APPLICABILITY (Yes/Partial/No)	BASIS FOR PARTIAL APPLICABILITY/DEVIATION	IMPLEMENTATION PROCEDURES
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**CHAPTER I OPERATIONS ORGANIZATION AND ADMINISTRATION**

C.1 Operations Policies	Partial	Exception: The provisions of DOE Order 5630.11 do not apply to planned D&D activities.	Institute Procedures in Standards-Based Management System (SBMS), BGRR-DP Project Management Plan (PMP) for project "operations"
C.2 Resources	Partial	Exception: Resources are planned per the work planning documents. Resources for D&D activities will be planned for each activity which is of relatively short duration. A long-range staffing plan is not required.	BGRR-DP PMP, Section 2
C.3 Monitoring of Operating Performance	Partial	Exception: Although Decommissioning Project facilities could be considered operable because of the presence of substantial quantities of radioactive material, these facilities do not include operating plants or production processes, and therefore do not have goals which would be associated with such processes. Some of the goals listed are not applicable including minimizing the unavailability of safety systems, minimizing the lost facility capability, minimizing shutdowns, minimizing the number of lighted annunciators. The project specific goals are contained in the Detailed Work Plan (DWP), Performance Based Incentive Criteria (PBCI).	ERD Self-Assessment Plan, BGRR Quality Assurance Project Plan (QAPP) ERD-OPM-4.2 Monitoring & Surveillance Procedure, applicable BNL performance measures; project milestones, monthly EM project feedback, meetings with DOE.
C.4 Accountability	Yes		BGRR-DP R2A2s
C.5 Management Training	Yes	Clarification: D&D operations may require shift work and will depend upon the work. First line management will receive training as set forth in the implementing documents. The training requirements for D&D activities will be commensurate with the risk of the activities conducted in the D&D process. The training program as established, allows a graded approach in identifying requirements in relation to minimum "core" requirements, and project- and hazard-specific training in relation to the work to be conducted.	BGRR-DP Training Plan ERD-OPM-5.7.1
C.6 Planning for Safety	Yes		BGRR Project ES&H Plan, applicable documents in SBMS, PMP, Section 3, BGRR Work Controls Procedure, which implements ESH STD 1.3.6, ERD-OPM-2.1, 5.1.1

**CHAPTER II SHIFT ROUTINES AND OPERATING PRACTICES**

C.1 Status Practices	Partial	Exception: The Field Superintendent is the first-line supervisor responsible for Decommissioning Project's field activities. There are no continuously manned systems or control areas.	Daily Plan-of-the-Day Meetings (PODs)
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DOE 5480.19 ATTACHMENT 1 GUIDELINE	APPLICABILITY (Yes/Partial/No)	BASIS FOR PARTIAL APPLICABILITY/DEVIATION	IMPLEMENTATION PROCEDURES
C.3 Operator Inspection Tours	Partial	Exception: Although Decommissioning Project facilities could be considered operable because of the presence of substantial quantities of radioactive material, these facilities do not include operating plants or production processes. The status of the work and equipment is conveyed to workers at the prejob and or POD meetings. Where systems require verification of working condition or status to support ongoing D&D work, these inspections are required by operating instruction on the project and are monitored/verified at the supervisor level.	BGRR Work Controls Procedure, which implements ESH STD 1.3.6, ERD-OPM-2.1, 5.1.1
C.4 Round/Tour Inspection Sheet	Partial	Exception: There are no safety significant systems or components with associated Technical Safety Requirements (TSRs). Inspection and data requirements, if any, for equipment specific to D&D activities are included in the work package or monitoring procedures. Round/tours are focused on systems required to support D&D activities.	ERD-OPM-4.2 BGRR Monitoring Surveillance Procedure
C.5 Personnel Protection	Yes		BSS-SOP4000 FS-SOP-4001 BSS-SOP-4002 Also all the BGRR PM. Work Controls Procedure Implementing ESH STD 1.3.6, ERD- OPM-2.1, 5.1.1
C.6 Response to Indications	No	Clarification: Minimal indicators are used to support D&D work. There are no operating facilities or production lines that require a quick response.	ERD-OPM-4.2 Monitoring and Surveillance Procedure, BGRR Local Emergency Plan
C.7 Resetting Protective Devices	No	No such devices in the complex	NA
C.8 Load Changes	No	Power- and process-rate changes do not apply to the Decommissioning Project	NA
C.9 Authority to Operate Equipment	Yes	Clarification: Minimal facility system operations are required to support D&D activities. There are no ongoing power or operating processes. D&D are performed under supervision.	BGRR-DP Training Plan, ERD-OPM-5.7.1. Use of qualified crane and forklift operators from PE/HEMO.
C.10 Shift Operating Bases	Partial	Exception: The location of shift operating bases will depend on the activity.	NA
C.11 Potentially Distractive Written Material and Devices	Partial	Operations do not involve control room/shift type operation.	BGRR Work Controls Procedure, which implements ESH STD 1.3.6, ERD-OPM-2.1, 5.1.1

DOE 5480.19 ATTACHMENT 1 GUIDELINE	APPLICABILITY (Yes/Partial/No)	BASIS FOR PARTIAL APPLICABILITY/DEVIATION	IMPLEMENTATION PROCEDURES
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**CHAPTER III CONTROL AREA ACTIVITIES**

Guidelines C.1 through C.5	No	There are no activities for which a control area is required, as described in the Order. If an activity requires a control area, it will be described in the specific work-package.	NA
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**CHAPTER IV COMMUNICATIONS**

C.1 Emergency Communication Systems	Partial	Exception: The only separate emergency communications system at Decommissioning Project areas is the site-wide alarm system. There is no PA System override capability. Tone Alert Radios as located in occupied buildings throughout site and Project two-way radios have been issued to all regular field personnel.	
C.2 Public Address System	No	There is no public address systems at the BGRR. Tone Alert Radios are located in occupied buildings throughout site.	NA
C.3 Contacting Operators	Yes		Two-way radio
C.4 Radios	Yes		Project personnel carry two-way radios.
C.5 Abbreviations and Acronyms	Partial	Exception: Abbreviations and acronyms will be defined in procedures or work documents.	NA
C.6 Oral Instructions and Information Communications	Partial	Exception: The low complexity of D&D activities does not require complex oral instructions. Formal communications using repeat backs will only be used when required by specific work documents.	ERD-OPM-2.1, Work Planning and Control System Procedure Implementing ESH STD 1.3.6

**CHAPTER V CONTROL OF ON-SHIFT TRAINING**

C.1 Adherence to Training Program	Yes	Clarification: The training programs for D&D activities are implemented in a graded fashion consistent with the complexity and risks of the activities. The training programs and implementation are described in the implementing documents. As the training requirement development is iterative and coincides with the work planning process, adequate requirements will be established commensurate with the facility hazards, specific task instructions and emergency response requirements. Skill of the craft activities.	BGRR Training Plan ERD-OPM-5.7.1
C.2 On-Shift Instructor Qualifications	Yes		BGRR Training Plan ERD-OPM-5.7.1

DOE 5480.19 ATTACHMENT 1 GUIDELINE	APPLICABILITY (Yes/Partial/No)	BASIS FOR PARTIAL APPLICABILITY/DEVIATION	IMPLEMENTATION PROCEDURES
C.3 Qualified Operator Supervision and Control of Trainees	Yes		BGRR Training Plan ERD-OPM-5.7.1
C.4 Operator Qualification Program Approval	Yes		BGRR Training Plan ERD-OPM-5.7.1
C.5 Training Documentation	Yes		BGRR Training Plan ERD-OPM-5.7.1
C.6 Suspension of Training	Yes		Tracked by BTMS Notification made by Training Coordinator.
C.7 Maximum Number of Trainees	No		NA

**CHAPTER VI INVESTIGATION OF ABNORMAL EVENTS**

C.1 Events Requiring Investigation	Yes	ES&H STD 1.1.0, Occurrence Reporting System. ES&H STD 1.1.1, PAAA Compliance Validation and NCR Program	ES&H STD 1.1.0 Occurrence Reporting System ES&H STD 1.1.1 PAAA Compliance Validation and NCR Program
C.2 Investigation Responsibility	Yes	Project Management	BGRR-PMP-ES&H STD 1.1.0 & ES&H STD 1.1.1
C.3 Investigator Qualification	Yes		Trained Accident Investigation/Root Cause Analysis.
C.4 Information To Be Gathered	Yes		Trained Accident Investigation/Root Cause Analysis. ES&H STD 1.1.0 ES&H STD 1.1.1
C.5 Event Investigation	Yes		Trained Accident Investigation/Root Cause Analysis. ES&H STD 1.1.0 ES&H STD 1.1.1
C.6 Investigative Report	Yes		Trained Accident Investigation/Root Cause Analysis. ES&H STD 1.1.0 ES&H STD 1.1.1

DOE 5480.19 ATTACHMENT 1 GUIDELINE	APPLICABILITY (Yes/Partial/No)	BASIS FOR PARTIAL APPLICABILITY/DEVIATION	IMPLEMENTATION PROCEDURES
C.7 Event Training	Yes		Trained Accident Investigation/Root Cause Analysis.
C.8 Event Trending	Yes		Trained Accident Investigation/Root Cause Analysis. BGRR-QAPP ERD-Self-Assessment Plan
C.9 Sabotage	No		NA

**CHAPTER VII NOTIFICATION**

C.1 Notification of Procedures	Yes		ERD-OPM 1.0
C.2 Notification of Responsibility	Yes		ERD-OPM 1.0
C.3 Name and Phone Number	No		ERD-OPM 1.0
C.4 Documentation	Yes		ERD-OPM 1.0 SBMS Subject Area, Document Control
C.5 Communication Equipment	Partial	Exception: Decommissioning Project does not have a main control area. Appropriate communication equipment will be maintained at the operating bases to provide timely notification.	NA

**CHAPTER VIII CONTROL OF EQUIPMENT AND SYSTEM STATUS**

C.1 Status Change Authorization	Partial	Exception: Control areas are not used, and there is no control area operator. Generally, authorization for configuration changes are contained in the work instructions for Decommissioning Project.	BGRR ASA, ERD-OPM-4.4, Safety Evaluations for USID.
C.2 Equipment and System Alignments	Yes	Clarification: Any alignment requirements for systems supporting D&D activities will be contained in system operating procedures or task instructions. Requirements set forth in the TSRs will be performed (no TSRS are identified at this time).	None yet required.
C.3 Equipment Locking and Tagging	Yes		ES&H STD. 1.5.1
C.4 Operational Limits Compliance	Yes		ASA/USI
C.5 Equipment Deficiency Identification and Documentation	No	Not applicable.	NA
C.6 Work Authorization and Documentation	Yes		ERD-OPM Procedures, ERD-OPM-2.1

DOE 5480.19 ATTACHMENT 1 GUIDELINE	APPLICABILITY (Yes/Partial/No)	BASIS FOR PARTIAL APPLICABILITY/DEVIATION	IMPLEMENTATION PROCEDURES
C.7 Equipment Post-Maintenance Testing and Return to Service	No	Not applicable.	NA
C.8 Alarm Status	No	Exception: Alarms on deactivated systems and equipment are not used and their status will not be verified. The operating systems are relatively simple and are not safety <i>significant</i> systems. Where appropriate, alarms installed for the Decommissioning Project will be monitored.	NA
C.9 Temporary Modification Control	Yes	Clarification: Temporary modification control will be limited modifications of those permanent systems required to maintain conditions specified in the authorization basis. Deactivated systems will not be subject to temporary modification control.	ERD-OPM-4.4
C.10 Distribution and Control of Equipment and System Documents	Yes		SBMS Subject Area Document Control.

**CHAPTER IX LOCKOUT AND TAGOUT**

Guidelines C.1 through C.15	Yes		ES&H STD 1.5.1 implemented by PE & or project personnel.
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**CHAPTER X INDEPENDENT VERIFICATION**

Guidelines C.1 through C.3	Partial	Exception: Independent verification only applies to Lockout and Tagout unless specified in the work instructions.	ES&H STD 1.5.1 Implemented by Plant Engineering
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**CHAPTER XI LOGKEEPING**

C.1 Establishment of Operating Logs	Yes		HP Logs, Work logs during Work Package Implementation.
C.2 Timeliness of Recordings	Yes		HP Logs, Work logs during Work Package Implementation.
C.3 Information to Be Recorded	Partial	Exception: The complete list of suggested information to be recorded does not apply. Since there are no operating facilities, no safety systems, no safeguards security, no process chemistry requirements, or criticalities performed items, 3b and 3i are not applicable. Shift requirements, if any, will be identified in specific work-packages.	ES&H STD 1.5.1 SBMS Subject Area for Records.
C.4 Legibility	Yes		ERD-OPM-1.0
C.5 Corrections	Yes		ERD-OPM-1.0

DOE 5480.19 ATTACHMENT 1 GUIDELINE	APPLICABILITY (Yes/Partial/No)	BASIS FOR PARTIAL APPLICABILITY/DEVIATION	IMPLEMENTATION PROCEDURES
C.6 Log Review	No	Exception: There are no central control areas or control rooms or control room operators. Review requirements for logs are specified in the PMP.	NA
C.7 Care and Keeping of Logs	No	Exception: There are no central control areas or control rooms or control room operators. Review requirements for logs are specified in the PMP.	NA

**CHAPTER XII OPERATIONS TURNOVER**

C.1 Turnover Checklists	No		NA
C.2 Document Review	Partial	Exception: D&D activities are not performed on a multiple shift basis. The Field Superintendent reviews applicable documentation. The POD/Pre-job meetings are used to inform operators and workers of status.	ERD-OPM-2.1
C.3 Control Panel Walkdown	No	Decommissioning projects do not have continuously monitored control-panels for operating systems or processes. Panels installed to support D&D will have monitoring instructions in the work package.	NA
C.4 Discussion and Exchange of Responsibility	Partial	Exception: Discussion and exchange of responsibility is done by the pre-job/POD.	ERD-OPM-2.1
C.5 Shift Crew Briefing	Partial	Exception: Briefings for D&D activities are done at the pre-job and POD meetings.	ERD-OPM-2.1
C.6 Reliefs Occurring During Shifts	Partial	Exception: There are no panel walkdowns required for D&D activities.	ERD-OPM-2.1

**CHAPTER XIII OPERATIONS ASPECTS OF FACILITY CHEMISTRY AND UNIQUE PROCESSES**

Guidelines C.1 through C.4	No	The Decommissioning Project does not operate processes where the close coordination between operations and chemistry or process personnel is essential to protect safety-related components.	N/A
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**CHAPTER XIV REQUIRED READING**

C.1 File Index	Partial	Exception: The Required Reading program only includes procedures and procedure revisions. Lessons Learned are disseminated to a list maintained by the Lessons Learned Coordinator. Safety meetings are used to disseminate pertinent safety information.	BGRR Training Plan ERD-OPM-5.7.1
C.2 Reading Assignments	No	Not applicable.	NA
C.3 Required Dates for Completion of Reading	No	Not applicable.	NA
C.4 Documentation	No	Not applicable.	NA
C.5 Review	No	Not applicable.	NA

DOE 5480.19 ATTACHMENT 1 GUIDELINE	APPLICABILITY (Yes/Partial/No)	BASIS FOR PARTIAL APPLICABILITY/DEVIATION	IMPLEMENTATION PROCEDURES
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**CHAPTER XV TIMELY ORDERS TO OPERATORS**

Guidelines C.1 through C.3	No		ERD-OPM-1.0
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**CHAPTER XVI OPERATIONS PROCEDURES**

C.1 Procedure Development	Yes		ERD-OPM-1.0
C.2 Procedure Content	Yes		ERD-OPM-1.0
C.3 Procedure Changes and Revisions	Yes		ERD-OPM-1.0
C.4 Procedure Approval	Yes		ERD-OPM-1.0
C.5 Procedure Review	Yes		ERD-OPM-1.0
C.6 Procedure Availability	Yes		ERD-OPM-1.0
C.7 Procedure Use	Yes		ERD-OPM-1.0

**CHAPTER XVII OPERATOR AND POSTINGS**

Guidelines C.1 through C.6	No	Not applicable.	NA
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**CHAPTER XVIII EQUIPMENT AND PIPING LABELING**

C.1 Components Requiring Labeling	No	Not applicable.	NA
C.2 Label Information	No	Not applicable.	NA
C.3 Label Placement	No	Not applicable.	NA
C.4 Replacing Labels	No	Not applicable.	NA

## **APPENDIX E**

# **Waste Management Memorandum of Agreement**

BROOKHAVEN NATIONAL LABORATORY

MEMORANDUM

DATE: February 8, 1999

TO: Distribution

FROM: A. MacIntyre *AM*

SUBJECT: Concurrence for Change to BGRR MOU

Reference: Memo from F. Petschauer to A. MacIntyre, "Revision to Memorandum of Understanding (MOU)", February 1, 1999

This memo has been issued in order to document formal acceptance of the recent change to the Memorandum of Understanding (MOU) between WMD and BGRR.

Concurrence: *R Pierce* 2/8/99  
R. Pierce/WMD Date

Concurrence: *M LaBarge* 2/9/99  
M. LaBarge/WMD Date

Concurrence: *A MacIntyre* 2/8/99  
A. MacIntyre/WMD Date

Concurrence: *F Petschauer* 2/9/99  
F. Petschauer/BGRR Date

Please contact me on x 2638 if you have any questions or comments.

Attachments: 1. Memo from A. MacIntyre to Distribution, "Page Change to BGRR MOU", January 21, 1999.

Copy: M. La Barge  
S. Moss  
F. Petschauer  
R. Pierce  
E. Richards  
M. Schlender

OE4020.99

Memorandum of Understanding  
For Storage of BGRR Wastewater at the Waste Management Facility (Bldg. 855)

**Purpose**

The purpose of this MOU is to summarize the management responsibilities between BGRR Project Management and the Waste Management Division (WMD) related to the ongoing and continued maintenance of the BGRR wastewater. The MOU will provide guidelines designed to clarify the roles and responsibilities associated with the storage, inspection, transfer and shipment of the BGRR wastewater.

It is understood that while WMD bears the primary responsibility for the effective and safe maintenance of this temporary water storage facility, BGRR is responsible for funding those activities, personnel and purchase of material needed to facilitate safe and effective storage. In short, BGRR owns the waste and WMD agrees to manage it.

This MOU shall remain in effect until superceded or cancelled. At a minimum, the MOU shall be reviewed (and updated if appropriate) every six months.

**WMD Responsibilities**

The Waste Management Division has the responsibility for maintenance and operation of the temporary BGRR wastewater storage facility which is defined as the controlled area surrounding the Frac tanks adjacent to Bldg. 855. The critical components of this storage facility under WMD's immediate control are as follows: Frac tanks, secondary containment systems, freeze protection systems (heaters, recirculating pumps), temperature controls, electrical supply panel, and low temperature alarms. WMD agrees to ensure or provide the following:

**Administrative Functions (administered or coordinated through WMD):**

- Inventory Controls (maintain compliance with previous limits as stated in USQD and other documents)
- Work Controls (use of Technical Work Documents [TWD] and Radiation Work Permits, as appropriate)
- Occurrence Reporting
- Notifications (in the event of a spill, leak or other emergency)
- Safety Evaluations

**Maintenance Functions:**

- ~~Am 1/20/99~~ Daily inspections and monitoring of Frac tank levels
- ~~Am 1/20/99~~ Daily inspections and monitoring of containment systems and   *ONCE PER WEEK, MINIMUM*
- ~~Am 1/20/99~~ Daily check of freeze protection systems *Am 1/20/99*
- Weekly Inspections
- Sampling Tank Contents as necessary or as directed

**Support Functions:**

- Security and Access Controls
- Response to alarms and abnormal conditions
- Equipment maintenance, replacement or modification
- Radiological Controls (through Facility Support)

**Additional Responsibilities:**

- Regulatory Compliance
- Worker Safety
- Decontamination (due to equipment defects or failure)
- Decontamination of the AGS Tanker
- Construction and maintenance of a weather protection enclosure (tent) for Frac tanks.
- Reference the attached schedule for more detail on this sub-task.*

## **APPENDIX F**

# **Memorandum of Agreement and Project Charter for the Brookhaven Graphite Research Reactor Decommissioning Project**

# MEMORANDUM OF AGREEMENT FOR THE BROOKHAVEN GRAPHITE RESEARCH REACTOR DECOMMISSIONING PROJECT

## *A. Introduction:*

The purpose of this Memorandum of Agreement (MOA) is to document agreements between DOE Chicago Operations Office (CH) and DOE Brookhaven Group (BHG) for the execution of the decontamination and decommissioning (D&D) of the Brookhaven Graphite Research Reactor Decommissioning Project (BGRR-DP).

## *B. Roles and Responsibilities:*

1. The DOE Manager of BHG is responsible for the BNL site, which includes within its geographic boundary BGRR; therefore BHG retains institutional responsibility for the BGRR facility(ies). The Manager of BHG has the primary responsibility for program execution, contract administration, environmental management, safety and health, and emergency response activities at the BNL site. BHG will provide functional support to the BGRR-DP as needed and when requested by the DOE BGRR-DP Project Office (BGRR-PO). BHG has the primary responsibility for negotiating and executing the BNL Interagency Agreement (IAG) compliance agreements with regulatory agencies. BHG recognizes that such agreements may effect activities at BGRR-DP and that EPG has a significant and substantial role in the development and progress of the agreements. BHG has the responsibility to inform BGRR-PO of issues or concerns that impact the BGRR project. EPG will have approval authority for those portions of the agreement that impact the BGRR-DP.
2. The DOE EPG has line management responsibility for the BGRR facility and D&D project execution activities, including permitting and regulatory compliance functions for facilities and operations specific to BGRR-DP. EPG has delegated line management authority to the DOE BGRR-DP Office (BGRR-PO). BGRR-PO is accountable and responsible to EPG for the performance of the BGRR-DP major project deliverables, including scope, cost, and schedule performance, major milestone deliverables, fiscal accountability, ESH oversight, and contractor performance evaluations. BGRR-PO is responsible to inform BHG of facility conditions and project progress and shall notify BHG of activities, issues and concerns that may impact the BNL site or its activities.

## *C. Project Execution:*

The BHG Manager will retain line management responsibility for the BGRR facility until the BGRR Project Management Plan, the Auditable Safety Analysis and Safety Evaluation Report and the FY-1999 BGRR-DP Baseline has been approved. At that time, the EPG Manager will assume line management authority for the BGRR-DP for project execution. The DOE-BHG Manager shall concur on the PMP and the ASA and will approve the FY-1999 Baseline to assure agreement with the principles contained in this MOA and to assure institutional consistency. The

BGRR-PO Project Manager shall be responsible to keep BHG and EPG informed of project progress and issues. These interactions shall be conducted on a weekly basis as a minimum. BHG shall keep BGRR-PO informed of any issues and impacts related to BGRR. The principal coordination Points of Contact will be the BGRR-PO Project Manager and the BHG Senior Environmental Advisor. The BHG coordination POC shall be responsible for keeping the BHG Manager and other BHG staff apprised of project progress and issues. BGRR-PO Project Manager shall be responsible to propose and establish specific protocols or procedures to assure the following boundary management objectives are implemented.

**Physical Site:** The PMP will clearly specify boundaries for the project relative to the physical site and the remaining CERCLA project activities at BNL. BHG will retain DOE line management responsibility for all activities at BNL except those defined as the BGRR-DP as established in the PMP. EPG shall be responsible to assure BGRR-DP activities that may have impacts beyond BGRR are properly managed according to site protocols and procedures and are timely communicated to or coordinated with BHG to minimize adverse external or institutional impacts resulting from BGRR-DP activities and operations. BGRR-PO shall promptly notify BHG of any external impacts or regulatory compliance issues. BHG shall be the sole line management authority over all BNL emergency conditions, including BGRR-DP.

**Contractor Interaction:** The BHG and BGRR-PO POC's shall take precautions to avoid providing any conflicting guidance or directions to BSA. BGRR-PO Project Manager will have lead responsibility for all communications with BSA for activities at BGRR and associated with the BGRR-PO. The BGRR-PO Project Manager will serve as the Contracting Officer's Technical Representative (COTR) for BGRR-DP, and as such shall have limited authority to communicate with and direct the Brookhaven Science Associate's Associate Directorate for Environmental Management to accomplish BGRR-DP project work scope activities as subsequently defined in the BSA Contract modification(s). The BGRR-PO Project Manager is responsible to inform the Contracting Officer of all BGRR-DP communications and/or direction. All communications with BSA requiring Contractor Officer approvals will be executed through BHG.

**Budget:** EPG will annually specify the budget authority for the BNL Site's EM program including the BGRR-DP. BHG shall propose an integrated EM Program budget to EPG that demonstrates compliance with IAG commitments and milestones. BGRR-PO shall have responsibility to manage the BGRR-DP budget and coordinate with BHG and EPG to resolve any issues and/or impacts that BGRR-DP activities may have on the remainder of the site EM budget. EPG will approve all EM programs Current Year Work Plans (CYWP) for the site.

**Regulator Interaction and Coordination:** The BHG Senior Environmental Advisor and the BGRR-PO Project Manager shall take precautions to avoid conflicting messages or commitments provided to regulators. BGRR-PO shall have lead responsibility for communicating with regulators regarding BGRR-DP. BGRR-PO shall ensure communications with regulators are coordinated with BHG to assure institutional consistency. Coordination activities may vary with

the significance of the communications; however, BGRR-PO shall be responsible to assure BHG is fully aware of underlying issues related to any communications before these are made. All formal regulatory correspondence and commitments related to the BGRR-DP shall be done under the signature of the BHG manager. Each office shall promptly provide copies of all correspondence to and from any regulatory agency that may impact the BGRR-DP to the other party.

Prior to initiating contacts with regulatory agencies to discuss, among other things, technical positions or interpretations of regulations, adequacy of permit applications or support documents, etc., the parties shall coordinate regarding the issues to assure consistent positions are being taken. The parties shall promptly notify each other of any oral contacts with regulatory agencies concerning or affecting regulatory interpretations or enforcement actions at BNL or BGRR-DP. BHG may stop any communications with regulators if it finds institutional conflicts provided that related issues or problems are promptly communicated to BGRR-PO and/or EPG for resolution.

BGRR-PO shall provide any site-wide regulatory requested information to BHG for transmittal, or inclusion in a BNL site-wide response. For regulatory requests to visits and/or inspections at BGRR-DP and/or BNL, the Parties shall coordinate each other's participation in such visits.

In the event a regulatory agency should contact BGRR-PO directly concerning requests or issues that refer to areas outside the BGRR-DP boundary or the offsite environment, the matter shall be referred to BHG. Similarly, in the event a regulatory agency should contact BHG directly concerning requests or issues that refer to areas inside the BGRR-DP boundary; the matter shall be referred to BGRR-PO Project Manager.

**Stakeholders:** BHG and BGRR-PO shall take precautions to avoid conflicting messages or commitments provided to stakeholders or the community at large. BGRR-PO shall have lead responsibility for communicating with stakeholders regarding BGRR-PO. BGRR-PO shall coordinate all stakeholder communications with BHG to assure institutional consistency. BGRR-PO shall coordinate with BHG any stakeholder interactions that may impact CERCLA and/or site-wide operations with BHG prior to the interaction taking place. Likewise, BHG will coordinate any related interactions that may impact the BGRR-DP with BGRR-PO before these are made.

If BHG, BGRR-PO, or their contractors intend to respond in writing to any question posed by a member of the public, a public official, or the Press, or intend to issue a press release, the originating office has the responsibility to provide a copy of the document to the non originating office for information and coordination. Both BHG and BGRR-PO will keep each other informed of upcoming public meetings or other stakeholder briefings, including interactions with public officials and their staffs. BHG may stop any communications with stakeholders or the public if it finds institutional conflicts provided that related issues or problems are promptly communicated to BGRR-PO and/or EPG for resolution.

**Environment Safety and Health Oversight:** EPG line management has responsibility to ensure that BGRR-DP activities are conducted in accordance with all statutory and BNL site ES&H policies. This oversight authority has been delegated to the BGRR-PO Project Manager. BGRR-PO staff and/or matrix support will carry out the oversight activities. BHG shall be responsible for ensuring that BSA establish, implement and maintain site wide management systems to ensure all work conducted at the site are completed safely and with due regard for the protection of the environment. BGRR-PO will obtain matrix support from BHG and/or DOE-CH. All requests for BHG matrix support shall be made to the BHG coordination contact. When BGRR-DP resource support cannot be provided by BHG, BGRR-PO will be responsible to seek guidance or further support from EPG for resolution. Both Parties shall keep the other informed of ESH planing actions associated with proposed changes to current operations and proposed future missions in which the other party may have an interest.

**BGRR-PO Supporting Resources:** BHG retains authority to direct non-BGRR-DP related resources at BHG and BNL and will provide supporting resources to the BGRR-PO when requested. All requests for BHG resources shall be made to the BHG Point of Contact. When BGRR-DP resource support cannot be provided by BHG, BGRR-PO will be responsible to seek guidance or further support from EPG for resolution. Except as noted elsewhere agreed to in writing, support services provided to BGRR-PO do not alter BGRR-PO or BHG's respective line management responsibilities associated with BGRR.

**Stop Work Authorities:** BHG retains stop work authority for all activities at BNL. BGRR-PO is delegated concurrent stop work authority from BHG for BGRR-DP only.

**Dispute Resolution:** BHG and BGRR-PO shall strive to resolve conflicts at a site level with minimal impacts on program or project objectives. Any dispute, which cannot be resolved locally, shall be promptly elevated to EPG for resolution.

Approved by:

  
\_\_\_\_\_  
Anibal L. Taboas, Manager  
DOE-CH Environmental Programs Group, (EPG)

7-23-99  
Date

  
\_\_\_\_\_  
George J. Malosh, Manager  
Brookhaven Group (BHG)

7/23/99  
Date

**U.S. Department of Energy  
Chicago Operations Office  
Environmental Programs Group**

**Brookhaven Graphite Research Reactor Decommissioning Project  
Project Charter**

**Revision 4 July 23, 1999**

# Brookhaven Graphite Research Reactor Decommissioning Project Project Charter

**1.0 Project Description.** The BGRR facility consists of the reactor core, reactor building, reactor fuel canal, canal water treatment system, reactor cooling air exhaust system, and other ancillary support structures and systems. The objective of this project is to complete the facility decontamination and decommissioning by September 30, 2003. Decommissioning will entail the removal of radioactive and hazardous material source terms from the graphite reactor, support systems, and structures and the demolition and disposal of these facilities and structures in a manner that is compliant with all federal and state environmental laws and regulations including:

- The Superfund Federal Facilities Agreement (FFA) for Brookhaven National Laboratory, between DOE, the Environmental Protection Agency (EPA), and the New York State Department of Environmental Conservation (NYSDEC).
- The joint EPA/DOE Policy on Decommissioning Department of Energy facilities under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), U.S. Department of Energy, Washington, D.C., dated May 22, 1995, and
- The Atomic Energy Act, CERCLA, the National Environmental Policy Act (NEPA), the Resource Conservation and Recovery Act (RCRA), and other federal, state, and local rules and regulations.

**2.0 Benefits:** This project removes and permanently isolates source terms associated with the Brookhaven Graphite Research Reactor that potentially threaten the underlying soil column and aquifer and achieve approved cleanup standards. This project demonstrates DOE's commitment to visible and significant progress at the Brookhaven National Laboratory (BNL) site in addressing environmental concerns expeditiously and with cognizance of stakeholder values

**3.0 Project Removal Action Objectives** The removal action decisions for the BGRR-DP will be reached through an interactive process involving regulators, the public, and other interested stakeholders. Until the removal action decision has been determined, the Project Management Plan is based on a reference objective of partial removal and a No-Further Action Record of Decision. The assumed future land-use assumption is "industrial" future use after 50-years of DOE site control for all soil remediation and facility demolition and decontamination. These assumptions are interpreted as full removal or decontamination of all structures and systems (real property) up to the reactor pile foundation and remediation of contaminated soil media to a depth of 3-feet below any structures. The planning assumption is the reference case for defining project's scope, cost, and schedule.

**4.0 Scope Objectives:** The scope of the BGRR Project is to achieve the removal action objectives by performing the following activities: a) characterize and remove or permanently isolate radioactive and hazardous material source terms; b) package, ship, and dispose of source terms removed from the site, c) decontaminate or demolish structures and systems associated with the BGRR; d) remediate soil contamination directly beneath the structures; e) design and construct a 50-year design life containment structure over the reactor graphite block and biological shield, f) release the site for industrial future use for the next 50 years. The BGRRDP work scope will be performed in a manner that is compliant with all applicable DOE, U.S. Environmental Protection Agency and State of New York laws, regulations and orders, and in a manner designed to protect our workers, the public, as well as preventing releases to the environment (air, soil or groundwater).

**5.0 Schedule Objectives:** The overall schedule objective is to achieve the end-state in a safe and cost-effective manner by September 30, 2003. Project planning, staffing and mobilization will be completed by September 30, 1999.

**6.0 Cost Objectives:** The overall cost objective is to achieve the scope and schedule objectives at a total project cost of \$20-million or less, exclusive of cost for DOE management and oversight.

**7.0 Strategy:** Decommissioning of the BGRR is subject to the provisions of Section X of the Federal Facilities Agreement (FFA) as Area of Concern (AOC) 9. Section XIA of the FFA allows the AOC's to be addressed and removed as removal actions. Current AOC's identified in the FFA include 9a (the Canal), 9b (Underground DuctWork), 9c (Spill Sites), and 9d (Pile Fan Sump). All removal actions will be documented in a Final Record of Decision. Maintenance-type activities will be conducted outside the FFA and CERCLA process. The majority of the removal actions will be performed as non-time critical actions. Key (primary) documents for these removal actions will include "action memorandum" and "completion reports." Some activities may be completed as time-critical removals. For such activities, the primary documents will be an Engineering Evaluation/Cost Analysis (EE/CA). Where sampling and analysis are required, DOE will involve such activities with the Environmental Protection Agency and the New York State Department of Environmental Conservation to obtain their input prior to proceeding. A stakeholder involvement plan will be developed for the overall project and will encompass public and stakeholder participation and input on key removal action decisions.

**8.0 Fiscal Guidance:** Funds for this project will be allocated from the DOE's Non-Defense appropriation for Environmental Management to the DOE Chicago Operations Office (DOE-CH). The BGRR Decommissioning Project cost and schedule baseline, once approved by DOE-CH, will be incorporated into the overall BNL Environmental Restoration Project Baseline. Fiscal year work planning will be coordinated by DOE-CH and the DOE Brookhaven Group (DOE-BHG) via the current year work plan process. DOE delineated specific provisions regarding the management of project funds are in a Memorandum of Agreement between DOE-CH and DOE-BHG signed on June 10, 1999.

**9.0 Broad Schedule:** The BGRR Project began in FY 1999 and is planned for completion by September 30, 2004. Development of project planning, end-point determination, regulatory strategy, safety-basis authorization, and execution of initial deactivation actions will be completed by September 30, 1999. Large-scale decontamination and demolition are scheduled for FY 2000-02. Final demolition, soil remediation (as required) and site release will be accomplished by September 30, 2004.

**10.0 Major Participant Responsibilities.** The DOE Environmental Management (EM) organizational structure consists of two levels of management: 1) DOE Headquarters (DOE-HQ) program and 2) the DOE Chicago (CH) Environmental Projects Group (EPG). The DOE-HQ program defines program management and responsibilities assigned to CH. Direction for the BGRR-DP are the responsibility of the DOE-CH Environmental Programs Group. EPG is responsible and accountable to EM for planning, coordinating, integrating, and executing the Chicago Operations Office EM program, which includes the EM activities at Brookhaven National Laboratory. DOE's Brookhaven Group (BHG), under the direction of EPG, provides project management line management oversight for the contractor's EM activities at the site. Because of the high visibility, the BGRR-DP is managed directly by EPG. DOE's BGRR-DP Project Manager is accountable directly to EPG's Group Manager for the planning and execution of the project. As such the BGRR-DP has line authority for safety. DOE-BHG provides technical, budget, contract administration, and safety and health support to the BGRR-DP as delineated in a separate MOA between EPG and BHG. The BSA Associate Laboratory Director for EM has overall responsibility for all environmental restoration projects at the BNL site, including the BGRR-DP. BSA's remediation contractor, Bechtel National, Inc (BNI), performs these projects.

**11.0 Identification of the DOE BGRR-DP Project Manager (PM).** The DOE Project Manager is Mr. James D. Goodenough.

**11.1 Authority and Accountability.** The DOE BGRR-DP PM has line authority directly to Anibal L. Taboas, Group Manager, Environmental Programs Group, and is accountable for the performance of the BGRR-DP major project deliverables, including scope, cost and schedule performance, major milestone deliverables, fiscal accountability, safety and health oversight, contractor performance evaluations, and invoice concurrence.

**11.2 Roles and Responsibilities.** The role of the DOE BGRR-DP Project Manager is to be the primary DOE point of contact for all project activities and to represent the DOE for all DOE-HQ, DOE-CH, DOE-BHG, regulator, stakeholder and public group interactions. The DOE BGRR-DP PM is responsible for line management of all issues regarding the BGRR-DP Project, including, but not limited to:

1. Review and approval of scope, schedule, cost and funding for project activities and any changes that exceed established threshold limits.
2. Monitor and report BGRR-DP cost, schedule and overall project performance.
3. Implementation of program guidance.
4. Review and recommend proposed changes to the scope, cost and schedule through an approved change control procedure.

5. Oversight of contractor, subcontractor and visitor safety and health.
6. Interface with other DOE-BHG organizations, DOE-HQ, the U.S. Environmental Protection Agency, the New York State Department of Environmental Conservation, and interested shareholders of the BGRR-DP Project.

- 12.0 BGRR-DP Project Office Matrix Support.** The DOE Project Office will be staffed with a project manager and a decommissioning engineer. Other DOE technical, programmatic, contracting, safety and health and administrative support will be provided by the BHG on a matrix basis as requested by the BGRR-DP project **manager** in accordance with the Memorandum of Agreement between DOE-CH and DOE-BHG.
- 13.0 Conformance with DOE-Brookhaven Group Policies and Procedures.** The DOE-BGRR-PM will be responsible and accountable to comply with all applicable DOE-BHG policies and procedures that have been established for conducting program, project, safety and health and administrative oversight for the Environmental Restoration and Waste Management programs at the Brookhaven National Laboratory.
- 14.0 Project Management Contractor Roles and Responsibilities.** Bechtel National, Inc. (BNI) will serve as the designated project management contractor for the BGRR-DP. As the project management contractor, BNI has overall responsibility for project planning and implementation. BSA, in its role as the management and operations contractor for the site, is the decision-making authority and is accountable to DOE for the execution of the BGRR-DP. BNI is accountable to BSA for cost, schedule, and scope of the BGRR-DP Project. BNI will review all Project Management Plan activities to ensure that quality work is completed in an efficient, safe, environmentally sound, and cost-effective manner. BNI will coordinate all activities required to meet the BGRR Project objectives, including selection, award, administration and technical control of any subcontractors. BNI will establish sound project management, engineering, administration, contracts administration, worker health and safety, field engineering, field supervision, and work control procedures.
- 15.0 Performance Evaluation.** The DOE BGRR-DP PM will have authority and responsibility to administer the contractor performance evaluation for the BGRR-DP through the DOE Contracting Officer with the BSA Contract Administrator and the Assistant Laboratory Director for Environmental Management.
- 16.0 Contracting Officer Authority.** Bechtel National, Inc. will perform the project under the existing BSA contract. The Contracting Officer (CO) for the BSA contract is Mr. Robert Gordon. The DOE BGRR-DP Project Manager will have limited Contracting Officer Technical Representative (COTR) authority to provide technical direction for BGRR-DP activities.
- 17.0 Financial Accountability and Project Controls.** The DOE BGRR-DP staff will provide financial accountability and project control at the DOE level for the BGRR-DP.

- 18.0 Project Reporting.** The DOE BGRR-DP PM will be responsible to comply with all reporting requirements outlined in the DOE-CH EPG Project Reporting Guidance for the Environmental Management document dated June 24, 1998.
- 19.0 Hazard Classification and Safety Authorization Basis Approval Authority.** The EPG Group Manager is the approval authority for the BGRR-DP Project Hazard Classification and Auditable Safety Analysis Document (BGRR-002). To ensure consistency with institutional policies and programs and to ensure fulfillment of line management responsibilities for the site, the BHG Group Manager concurs with the approval of all safety documentation associated with BGRR-DP. A Safety Evaluation Report, approved by EPG, serves as the necessary approval to the DOE BGRR-DP PM to formally execute the project scope within the commitments and controls established by the Safety Evaluation Report. Additionally, a hazards and safety analyses are performed on each individual subproject elements. Any deviations from the safety authorization basis document will be evaluated through an Unreviewed Safety Issue Determination (USID) process, as noted in BGRR Standard Operating Procedure 0902.

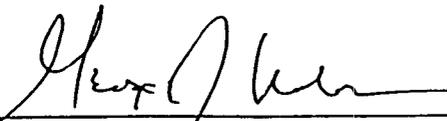
Project Charter Approval for the

Brookhaven Graphite Research Reactor Decommissioning Project

Concurrence:

  
\_\_\_\_\_  
James Goodenough, Project Manager  
BGRR Decommissioning Project, Environmental Programs Group  
Chicago Operations Office, Department of Energy

7/23/99  
Date

  
\_\_\_\_\_  
George J. Malosh, Manager  
Brookhaven Group, Department of Energy

7/23/99  
Date

Approval:

  
\_\_\_\_\_  
Anibal L. Taboas, Manager  
Environmental Programs Group  
Chicago Operations Office, Department of Energy

7-23-99  
Date