

PART I

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PART I

SECTION C - DESCRIPTION/SPECS./WORK STATEMENT

C.1 - INTRODUCTION

This Performance-Based Management Contract (PBMC) is for the management and operation of the Brookhaven National Laboratory (BNL or the Laboratory). The Contractor shall, using its best efforts, in accordance with the provisions of this contract, accomplish the missions and programs assigned by the Department of Energy (DOE or the Department) and manage and operate the Laboratory. The Laboratory is one of DOE's Office of Science (SC) multi-program national laboratories. The Laboratory is a Federally Funded Research and Development Center (FFRDC) established in accordance with the Federal Acquisition Regulation (FAR) Part 35 and operated under this management and operating (M&O) contract, as defined in FAR 17.6 and DOE Acquisition Regulation (DEAR) 917.6.

This contract reflects the Department's effort to enable the Contractor under a PBMC to achieve highly effective and efficient management of the Laboratory, resulting in a safe and secure environment, outstanding science and technology results, more cost-effective operations, and enhanced Contractor accountability. Toward this end, this contract establishes a process for minimizing the use of unnecessary DOE Orders by tailoring existing and new Orders that will enable the Contractor to propose alternate standards, which rely primarily on state and federal laws and regulations, and management processes based on national standards, certified systems and best business practices. Contractor managers shall be held accountable for maintaining risk mitigation as Laboratory processes and assurance models change.

This contract reflects the application of performance-based contracting approaches and techniques which emphasize results or outcomes and minimizes "how to" performance descriptions. The Contractor has the responsibility for total performance under the contract, including determining the specific methods for accomplishing the work effort, performing quality control, and assuming accountability for accomplishing the work under the contract. Accordingly, this PBMC provides flexibility, within the terms and conditions of the contract, to the Contractor in managing and operating the Laboratory.

Desired results of this contract include improved Contractor operational efficiencies, allocations of Contractor oversight resources to direct mission work, and streamlined and more effective line management focused on a systems-based approach to federal oversight with increased reliance on the results obtained from certified, nationally recognized experts and other independent reviewers.

Under this PBMC, it is the Contractor's responsibility to develop and implement innovative approaches and adopt practices that foster continuous improvement in accomplishing the mission of the Laboratory. DOE expects the Contractor to

produce effective and efficient management structures, systems, and operations that maintain high levels of quality, safety and security in accomplishing the work required under this contract, and that to the extent practicable and appropriate, rely on national, commercial, and industrial standards that can be verified and certified by independent, nationally recognized experts and other independent reviewers. The Contractor shall conduct all work in a manner that optimizes productivity, minimizes waste, and fully complies with all applicable laws, regulations, and terms and conditions of the contract.

To the maximum extent practical, this PBMC shall:

- (a) Describe the requirements in terms of outcome or results required rather than the methods of performance of the work.
- (b) Use a limited number of systems-based measurable performance standards (i.e., in terms of quality, timeliness, quantity, etc.) to drive improved performance and increased effective and efficient management of the Laboratory;
- (c) Provide for appropriate financial incentives (e.g., fee) when performance standards and contract requirements are achieved;
- (d) Specify procedures for reduction of fee when services are not performed or do not meet contract requirements; and
- (e) Include non-financial performance incentives where appropriate.

C.2 – IMPLEMENTATION OF DOE’S MISSION FOR BNL

The Contractor shall propose a comprehensive and compelling plan to implement the DOE’s SC strategic mission for the Laboratory, as defined below in Section C.4.b. “Mission and Major Programs”. Within this plan, the Contractor will map the Laboratory’s core capabilities to this Laboratory mission. The Contractor will highlight the unique roles it proposes that the Laboratory fills in SC’s capability to accomplish its missions and, more broadly, that of the Department. Upon approval and acceptance by the Department, the plan shall be updated and executed in accordance with instructions to be issued by the DOE Contracting Officer.

The Performance Evaluation and Measurement Plan (PEMP), as called for within the clause entitled, “Standards of Contractor Performance Evaluation”, identifies performance goals, objectives, measures, and targets, which are updated and agreed upon by the Parties annually, as standards against which the Contractor's overall performance of scientific, technical, operational, and/or managerial obligations under this contract shall be assessed annually.

C.3 - PERFORMANCE EXPECTATIONS, OBJECTIVES, AND MEASURES

C.3.1 - Core Expectations

C.3.1.1 – General

The relationship between DOE and its national laboratory management and operating contractors is designed to bring best practices for research and development to bear on the Department's missions. Through application of these best practices, the Department seeks to assure both outstanding programmatic and operational performance of today's research programs and the long-term quality, relevance, and productivity of the laboratories against tomorrow's needs. Accordingly, DOE has substantial expectations of the Contractor in the areas of: program delivery and mission accomplishment; laboratory stewardship; and excellence in laboratory operations and financial management.

C.3.1.2 - Program Development and Mission Accomplishment

The Contractor is expected to provide effective planning, management, and execution of assigned research and development programs. The Contractor is expected to execute assigned programs so as to strive for the greatest possible impact on achieving DOE's mission objectives, to aggressively manage the Laboratory's science and technology capabilities and intellectual property to meet these objectives, and to bring forward innovative concepts and research proposals that are well-aligned with DOE missions. The Contractor shall propose work that is aligned with, and likely to advance, DOE's mission objectives, and that is well matched to Laboratory capabilities. The Contractor shall strive to meet the highest standards of scientific quality and productivity, "on-time, on budget, as promised" delivery of program deliverables, and first-rate service to the research community through user facility operation.

The Contractor is expected to demonstrate benefit to the nation from R&D investments by transferring technology to the private sector and supporting excellence in science and mathematics education to the extent such activities are consistent with achieving continuous progress towards DOE's core missions.

C.3.1.3 – Laboratory Stewardship

The Contractor shall be an active partner with DOE in assuring that the Laboratory is renewed and enhanced to meet future mission needs. Within the constraints of available resources and other contract requirements, the Contractor, in partnership with DOE, shall:

- (a) Maintain an understanding of DOE's evolving Laboratory vision and long-term strategic plan and address the evolution of Laboratory capabilities to meet anticipated DOE and national needs.
- (b) Attract, develop, and retain an outstanding work force, with the skills and capabilities to meet DOE's evolving mission needs.
- (c) Renew and enhance research facilities and equipment so that the Laboratory remains at the state-of-the-art over time and is well-positioned to meet future DOE needs.
- (d) Build and maintain a viable portfolio of research programs that generates the resources required to renew and enhance Laboratory research capabilities over time.
- (e) Build and maintain a positive relationship with the broader national and international research community, to enhance the intellectual vitality and research relevance of the Laboratory, and to bring the best possible capabilities to bear on DOE mission needs through partnerships.
- (f) Build a positive, supportive relationship founded on openness and trust with the community and region in which the Laboratory is located.

C.3.1.4 - Operational and Financial Management Excellence

The Contractor shall effectively and efficiently manage and operate the Laboratory through best-in class management practices designed to foster world-class research while assuring the protection and proper maintenance of DOE research and information assets; the health, safety and security of Laboratory staff; and the public and the environment. The Contractor shall operate the Laboratory so as to meet all applicable laws, regulations, and requirements. The Contractor shall manage the Laboratory cost-effectively, while providing the greatest possible research output per dollar of research investment, and, accordingly, develop and deploy management systems and practices that are designed to enhance research quality productivity and mission accomplishment consistent with meeting operational requirements.

C.4 - Statement of Work

- (a) General

The Contractor shall, in accordance with the provisions of this contract, provide the intellectual leadership and management expertise necessary and appropriate to manage, operate, and staff BNL; to accomplish the missions assigned by the DOE to the Contractor; and to perform all other work described in this Statement of Work (SOW). DOE missions are

assigned through strategic planning, program coordination, and cooperation between the Contractor and DOE.

Inasmuch as the assigned missions of the Laboratory are dynamic, this SOW is not intended to be all-inclusive or restrictive, but it is intended to provide a broad framework and general scope of the work to be performed at BNL during the term of this contract. This SOW does not represent a commitment to, or imply funding for, specific projects or programs. All projects and programs will be authorized individually by DOE and/or other work sponsors in accordance with the provisions of this contract.

All work under this contract shall be conducted in a manner that protects the environment and assures the safety, health, and security of employees and the public. In performing the contract work, the Contractor shall implement appropriate program and project management systems to track progress and maximize cost-effectiveness of work activities; develop integrated plans and schedules to achieve program objectives, incorporating input from DOE and stakeholders; maintain sufficient technical expertise to manage activities and projects throughout the life of a program; utilize appropriate technologies and management systems to improve cost efficiency and performance; and maintain Laboratory facilities and infrastructure as necessary to accomplish assigned missions.

The next five years present an important challenge and opportunity for BNL. The Contractor is expected to ensure the successful construction of the National Synchrotron Light Source II (NSLS-II) facility and to present a compelling case for the future of the Relativistic Heavy Ion Collider (RHIC). These facilities are deemed critical to the overall health and vitality of BNL.

(b) Mission and Major Programs

Mission:

The Laboratory's primary mission focus is in high-energy and nuclear physics, condensed matter physics and materials sciences, chemistry, and biology, with additional expertise in environmental sciences, energy technologies, and national security. BNL brings specific strengths and competencies to the DOE laboratory system to produce excellent science and advanced technologies with the cooperation and involvement of the scientific and local communities. In support of its Office of Science (SC) mission, BNL builds and operates major scientific facilities. These facilities serve not only the basic research of the DOE, but they reflect BNL and DOE stewardship of national research infrastructure that is made available on a competitive basis to a wide range of university, industry, and government researchers.

Many of the research activities at BNL are designed and conducted by university and industry users, with BNL maintaining the facilities and ensuring that provisions are in place to perform the activities safely and effectively.

(1) Core Capabilities

Twelve core capabilities that can be grouped into five categories underpin activities at Brookhaven National Laboratory:

1. Nuclear Physics, Particle Physics, Applied Nuclear Science and Technology;
2. Condensed Matter Physics and Materials Science, Chemical and Molecular Science;
3. Applied Materials Science and Technology, Chemical Engineering;
4. Climate Change Science, Biological Systems Science;
5. Accelerator Science, Large Scale User Facilities/Advanced Instrumentation, Systems Engineering and Integration.

These capabilities exist within the Laboratory and provide a foundation to deliver its mission and customer focus, to perform a complementary role in the DOE laboratory system, and/or to pursue its vision for scientific excellence and pre-eminence in the following areas:

- Relativistic heavy ion and spin physics research to understand the essence of nuclear matter.
- Photon sciences for advanced characterization of functional nano-materials for energy technology applications, and more broadly for tackling grand challenge questions in condensed matter, materials, chemical and nano-sciences, as well as in life and environmental sciences, that will lead to breakthroughs needed to address the global energy and climate challenges.
- Energy-related research and development to enable breakthroughs in the effective use of renewable energy through improved conversion, transmission, and storage.
- High energy physics at the energy, precision, and cosmology frontiers, supplemented by theory and advanced accelerator research and development (R&D).
- Understanding the impact of natural phenomena and human activity on climate, the environment, and local ecosystems, including the normal and pathological physiology of plants through imaging.

(2) Program Sponsors

Work under this contract includes basic science and applied technical research programs sponsored by major DOE organizations. The primary sponsor of work at BNL is the SC, DOE. Other DOE organizations that sponsor work at BNL include:

Nuclear Nonproliferation

Environmental Management
Nuclear Energy
Energy Efficiency and Renewable Energy
Energy Delivery and Energy Reliability
Health, Safety and Security
Fossil Energy

Additionally, the Contractor may be authorized to pursue other DOE and non-DOE missions [most notably those of the National Aeronautics Space Administration (NASA), Department of Homeland Security (DHS), Nuclear Regulatory Commission (NRC), the National Institutes of Health (NIH), the Department of Defense, the Department of State, and New York State] that derive from the Laboratory's missions and utilize the Laboratory's core capabilities.

Major Programs:

A summary of major Laboratory programs follows:

(1) Office of Science

(i) Nuclear Physics

The Contractor shall perform frontier research in experimental and theoretical nuclear physics; build, maintain, and operate state of the art user facilities for nuclear physics; perform research and development work in accelerator science, experimental detector design and computing for the SC Nuclear Physics program; operate the National Nuclear Data Center (NNDC) and carry out construction projects in the nuclear physics area as assigned.

In support of this program, the Contractor shall manage and operate large user facilities (RHIC) and conduct forefront research in basic nuclear physics. In addition, BNL provides large scale computing support for RHIC experiments by operating the RHIC Computing Facility (RCF) at BNL. The NNDC at the BNL site collects, evaluates, and disseminates nuclear physics data for basic nuclear research and for applied nuclear technologies. BNL is engaged in the R&D of new accelerator technology, future Electron Ion Collider accelerator concepts, and advanced detectors. The work of the nuclear physics program is also supported through the expertise of BNL's Instrumentation Division, a Lab-wide development organization.

(ii) High Energy Physics

The Contractor shall perform frontier research in experimental and theoretical high energy physics; build, maintain and operate state of the art user facilities for high energy physics; perform research and development work in accelerator science, experimental detector design and computing for the SC High Energy Physics (HEP) program, operate the Accelerator Test Facility (ATF), and carry out construction projects in the high energy physics area as assigned.

In support of this program, the Contractor shall conduct forefront research in high energy physics and detector and accelerator science at the energy, intensity, and cosmology frontiers. BNL is the Host Laboratory for the US ATLAS (A Toroidal LHC Apparatus) collaboration and operates the largest ATLAS Tier-1 Computing Center and an Analysis Center. BNL participates in the intensity frontier where rare processes including neutrino interactions can be studied. The most prominent activity in this area is the fabrication of the Daya Bay Reactor Neutrino experiment. BNL is engaged in the HEP Advanced Technology subprogram that develops new tools for high energy physics research, including new types of particle accelerators and new concepts for particle detectors. The work of the high energy physics program is also supported through the expertise of BNL's Instrumentation Division, a Lab-wide development organization.

(iii) Basic Energy Sciences

The Contractor shall perform frontier research in broad areas of condensed matter and materials physics, chemistry, geosciences, and biosciences. Programs that take advantage of the unique scientific user facilities in materials sciences and related disciplines available at the Laboratory - for example, the National Synchrotron Light Source (NSLS), the Center for Functional Nanomaterials (CFN) – are to be encouraged. The Contractor shall manage all aspects of designated scientific user facilities, which serve the needs of academic, industrial, and government scientists. The Contractor shall manage all aspects of the design and construction of NSLS-II including especially the Environment, Safety, and Health (ES&H) aspects associated with its construction and operation. The Contractor shall manage all aspects of the decommissioning of NSLS once NSLS-II begins operations.

(iv) Biological and Environmental Research

The Contractor shall conduct research programs in areas including foundational genomics, radiochemistry and imaging instrumentation, structural and radiobiology, plant and microbial biochemistry, atmospheric systems, terrestrial ecosystem science and carbon sequestration, earth system modeling, and subsurface movement of

nanoparticles that build on the unique facilities and expertise available at the Laboratory.

(v) Computational and Technology Research

The Contractor shall conduct research in computational and data intensive science. The research shall emphasize both excellence and relevance, such that advances in research help the Department solve its most pressing mission-related problems. Teaming and collaboration, which bring different skills together to focus on common problems, shall be actively encouraged. To this end, the Contractor shall create and maintain an environment that reinforces collaboration with researchers world-wide.

The Contractor shall devote appropriate attention to the management of information systems that support major experiments and other scientific data-intensive resources so as to assure their timeliness, security, utility, cost-effectiveness, and responsiveness to customers.

(vi) University and Science Education Program

The Contractor shall work with educational institutions and organizations that support those institutions to develop a highly qualified scientific, technical, engineering and mathematics (STEM) workforce for the Laboratory. The Contractor shall also contribute to the overall national effort to improve scientific literacy, emphasizing increased participation in STEM careers and education by under-represented populations and institutions.

(2) Environmental Management

Unless otherwise directed by the Contracting Officer, the Contractor shall plan and execute the DOE's Environmental Management Program (EM) activities in accordance with DOE program goals, initiatives, strategies, guidance letters, and approved project baselines in areas such as: (i) Environmental remediation and facility deactivation, decommissioning, decontamination, and demolition in accordance with the site's Comprehensive Environmental Response Compensation and Liability Act (CERCLA) Interagency Agreement and with DOE Orders; and (ii) Construction and maintenance of facilities to provide adequate protection of the public, employees, the environment, and Government-owned materials, facilities, and equipment in support of the overall EM mission.

The Environmental Management Program shall be conducted in a safe and cost-effective manner leading to increasing DOE, regulatory and public confidence in cleanup efforts. Program elements will include: (i) implementing comprehensive project management systems to track progress, maintain regulatory compliance, and increase cost effectiveness of work activities; (ii) developing integrated plans and schedules for involving the participation of DOE, regulators, and other stakeholders in decision

making and priority setting of environmental restoration activities; and (iii) maintaining technical depth to propose and implement cleanup activities commensurate with commercial practices in the areas of cost, implementation, schedule, and public acceptability.

The Contractor shall establish and maintain systems to effectively manage and implement an environmental restoration program in accordance with goals and objectives set forth by the Department. The systems must ensure that the technical approach is consistent with DOE cleanup strategies to complete all Records of Decision in accordance with the current approved baseline; to implement an overall system to effectively and efficiently manage all groundwater and contaminated soil cleanup activities; to expedite final disposition of facilities awaiting decommissioning and decontamination; and to achieve delisting from the National Priority List. Contractor support shall be provided to DOE as directed by the Contracting Officer.

(3) Technology Transfer

The Contractor shall contribute to U.S. technological competitiveness through research and development partnerships with industry that capitalize on the Contractor's expertise and facilities. Principal mechanisms to effect such contributions are: cooperative research and development agreements, access to user facilities, reimbursable work for non-DOE activities, personnel exchanges, licenses, and subcontracting.

The Contractor shall cooperate with industrial organizations to assist in increasing U.S. industrial competitiveness, by assisting in the application of science and technology R&D. Such cooperation may include the development of new integrated programs covering the spectrum from basic discoveries to applied research that lead to an early transfer of information to industry by arranging for the active participation by industrial representatives in the Contractor's programs. Cooperation with industrial partners may include long-term strategic partnerships aimed at commercialization of Laboratory inventions or the improvement of industrial products. The Contractor shall respond to specific near-term technological needs of industrial companies with special emphasis given to working with the types of businesses identified in the Small Business Subcontracting Plan clause of this contract. The Contractor may also capitalize on its location in the Northeast by developing productive relationships with regional and local companies and through forums such as conferences, workshops, and traveling presentations. It is anticipated that these organizations will be particularly effective participants in the Laboratory's technology transfer activities in promoting a mutually beneficial relationship between DOE and the communities surrounding the Laboratory

Cooperation may also include use by industrial organizations of Laboratory facilities and other assistance as may be authorized, in writing, by the Contracting Officer.

(4) International Collaboration

In accordance with DOE policies, and in consultation with DOE, the Contractor shall maintain a program of international collaboration in areas of research of interest to the Laboratory and to DOE.

(5) Other Programs

The Contractor is responsible for the conduct of such other programs and activities as the Parties may mutually agree, including: (i) The providing of the facilities of the Laboratory to the personnel of public and private institutions for the conduct of research, development, and demonstration work, either within the general plans, programs, and budgets agreed upon from time to time between DOE and the Contractor or as may be specifically approved by DOE. The Laboratory facilities shall be made available on such other general bases as DOE may authorize or approve; (ii) The conduct of research and development work for non-DOE sponsors which is consistent with and complementary to the DOE's mission and the Laboratory's mission under the contract, and does not adversely impact or interfere with execution of DOE-assigned programs, does not place the facilities or Laboratory in direct competition with the private sector and for which the personnel or facilities of the Laboratory are particularly well adapted and available, as may be authorized, in writing, by the Contracting Officer; (iii) The dissemination and publication of unclassified scientific and technical data and operating experience developed in the course of the work; (iv) The furnishing of such technical and scientific assistance (including training and other services, material, and equipment), which are consistent with and complementary to the DOE's and Laboratory's mission under this contract, both within and outside the United States, to the DOE and its installations, Contractors, and interested organizations and individuals.

(6) Major Laboratory and User Facility Operations

The Laboratory shall manage and operate major Laboratory and user facilities and develop other user facilities important to DOE missions such as:

(i) The Relativistic Heavy Ion Collider (RHIC) facility complex, which consists of:

A. Relativistic Heavy Ion Collider Ring

A high energy accelerator in which two beams of ions or polarized protons are brought into collision in order to study the state of matter formed in the first microseconds of the Universe and to study the spin structure of the proton.

- B. Alternating Gradient Synchrotron (AGS)
The AGS is the final stage of the accelerator injector chain which accepts beam from the Booster and then accelerates ions and polarized protons to the minimum RHIC energy. The AGS then injects the beam into the two accelerator rings that comprise RHIC.
- C. Booster Accelerator
The Booster accepts ions from the Tandem Van de Graaffs and protons from the LINAC, which then accelerates the beam to the minimum AGS energy before injecting the beam into the AGS. The Booster also supplies beam to the NASA Space Radiation Laboratory (NSRL).
- D. Linac
A linear accelerator, fed by the Tandem, supplies beams of protons and polarized protons for the RHIC injector system, the Booster for NSRL, and the production of medical isotopes at the Brookhaven Linac Isotope Producer (BLIP) facility.
- E. Tandem Van de Graaff
The Tandem Van de Graaff electrostatic accelerators are the sources of ions for the RHIC accelerator injector chain, starting with the Booster. They are also used to supply ions for radiation testing of electronic components and for manufacturing of industrial items.
- F. Electron Beam Ion Source (EBIS)
EBIS is a new compact state-of-the-art pre-injector system being constructed for the RHIC and NSRL science programs and will replace the Tandem Van de Graaffs.
- G. NASA Space Radiation Laboratory (NSRL)
NASA is working with BNL to understand the risks to human beings exposed to space radiation through the study of radiobiological effects, using beams of heavy ions that simulate the cosmic rays found in space. NSRL features its own beam line dedicated to radiobiology research, as well as state-of-the-art specimen-preparation areas

(ii) National Synchrotron Light Source (NSLS)

The NSLS operates two electron storage rings: an X-Ray ring and a Vacuum UltraViolet (VUV) ring which provide intense light spanning the electromagnetic spectrum from the infrared through x-rays. Each year over 2300 scientists from universities, industries, and government labs perform research at the NSLS. Users of NSLS and a select set of NSLS beamlines will transition to NSLS-II, once complete.

(iii) National Synchrotron Light Source II (NSLS II)

NSLS-II is a new state-of-the-art storage ring designed and being constructed to replace NSLS and will deliver world leading brightness and flux with top-off operation for constant output. The facility will be able to produce x-rays up to 10,000 times brighter than those produced at the NSLS. Operations are expected to begin in 2015.

(iv) Center for Functional Nanomaterials (CFN)

This Center provides researchers with state-of-the-art capabilities to fabricate and study nanoscale materials. Work at the Center has the potential to form the basis of new technologies.

(v) Other facilities:

A. New York Center for Computational Sciences (NYCCS)

NYCCS is a joint venture of [Stony Brook University](#) (SBU) and BNL that was formed to foster high performance massively parallel computing. Its hardware consists of an 18 rack IBM Blue Gene/L and a 2 rack Blue Gene/P supercomputer owned by SBU and located at BNL.

B. High-Field Magnetic Resonance Imaging (MRI) Facility

The MRI Facility is used in the development of new instrumentation and biological imaging techniques.

C. Accelerator Test Facility (ATF)

The Accelerator Test Facility is used to explore new ideas on particle acceleration and the production of brighter x-ray beams for research applications.

D. Positron Emission Tomography (PET) Facility

The PET facility is used in the development of new radiotracers and instrumentation for biological imaging.

E. Laser Electron Accelerator Facility (LEAF)

The LEAF is a picosecond laser-electron accelerator facility at BNL's Center for Radiation Chemistry Research.

F. Cyclotron

The EBCO TR19 cyclotron is used for the production of radiotracers for PET studies.

G. Institute for Advanced Electron Microscopy (IAEM)

The IAEM is a cutting-edge transmission electron microscopy facility that is affiliated with both the CFN and the Condensed Matter Physics & Materials Science Department.

H. Scanning Transmission Electron Microscope (STEM)

This custom-built electron microscope is optimized for imaging unstained biological molecules with minimal radiation damage.

I. Joint Photon Sciences Institute

This joint SBU/BNL initiative will serve as an intellectual center for development and application of the photon sciences and as a gateway for users of NSLS-II. It is expected to enable advances in fields that include materials design and function, energy, and health/drug design.

(c) Administration and Operation of the Laboratory

The Contractor is responsible for the operation and management of the Laboratory, including the planning in consultation with DOE and the making of recommendations to DOE for new buildings, facilities and utilities and alteration of existing buildings, facilities, and utilities on the Laboratory site and elsewhere, including the furnishing of all necessary basic design and operating criteria. When requested by DOE, the Contractor shall provide for the design, engineering, construction, and alteration, by subcontract or otherwise, of such buildings, facilities, and utilities on the Laboratory site and elsewhere as authorized or approved, in writing. Where appropriate, the Contractor shall include proposals for the alternative financing of such projects. Before proceeding with other than design aspects of any project which the Contractor, acting in good faith, considers may reasonably be within the coverage of the Davis-Bacon Act (40 U.S.C. 276a and following), the Contractor shall obtain a written determination by the Contracting Officer as to the applicability of the Davis-Bacon Act to such project. When it is determined that the Davis-Bacon Act does cover a particular work project, the Contractor shall procure by subcontract the covered work in accordance with DOE approved procedures, except as otherwise provided in Clause H.43 or as otherwise authorized by the Contracting Officer.

(1) Strategic Planning

The Contractor shall conduct a strategic planning process and develop institutional business plans and strategic facility plans in consideration of DOE provided planning guidance and strategic planning material to assure consistency with DOE missions and goals and with due regard for ES&H issues.

(2) Protection of the Worker, the Public and the Environment

The safety and health of workers and the public and the protection and restoration of the environment are fundamental responsibilities of the Contractor. The Contractor shall establish an environment, safety and health program operated as an integral, but visible, part of how the organization conducts business, including prioritizing work and allocating resources based on risk reduction. Accordingly, the Contractor shall establish a DOE-approved Integrated Safety Management System to ensure all work activities are performed in a manner that prevents disruption of the Laboratory's missions by minimizing injuries and illnesses, preventing fatalities, minimizing exposures to hazardous substances and materials, preventing environmental releases in excess of established limits, and preventing property loss.

The Contractor shall maintain an organization that supports effective ES&H management by ensuring appropriate levels of ES&H staffing and competence at every level within BNL. Specifically, the Contractor shall assure that employees are trained, qualified, and involved in aspects of the organization's activities, including providing input to the planning and execution of work, and identification, mitigation, or elimination of workplace hazards. The Contractor shall, similarly, assure that subcontractor employees are trained and qualified on job tasks, hazards, DOE and BNL Departmental safety policies, expectations and requirements, and shall freely communicate applicable ES&H requirements down to subcontractors.

Finally, the Contractor shall promote effective environmental program management, through continued maintenance of ISO 14001 registration.

(3) Community Involvement

The Contractor shall maintain a systematic approach and commitment to involving the community in all aspects of the Laboratory. Accordingly, the Contractor's overall community involvement program is expected to maintain the following objectives:

- (i) Maintenance of organizational and cultural change regarding community involvement, (i.e., implementation of a strong, integrated, and proactive community involvement and communications program).

- (ii) Continued indications of agreement within the community that their substantive concerns (e.g., environmental remediation, scientific research, etc.) have been or are being adequately addressed.
- (iii) Continued indications of the community's increased awareness of and appreciation for the importance of the long-term basic research supported by DOE and the SC.
- (iv) Continued indications from the community of positive and multiple relationships with the Laboratory and expressions of confidence in the Laboratory's decision-making processes.
- (v) Evidence of constructive external partnerships in support of DOE's overarching mission and strategic objectives.

(4) Business Management

- (i) Human Resources Management.

The Contractor shall have an HR system designed to attract and retain outstanding employees in accordance with DOE expectations, policies, and procedures. The Contractor shall maintain a market based system of compensation and benefit plans to motivate employees to achieve high productivity in scientific research and laboratory operation.

The Contractor also shall create and maintain at the Laboratory an environment that promotes diversity and fully utilizes the talents and capabilities of a diverse workforce. The Contractor shall seek to recruit a diverse workforce by promoting and implementing DOE and Laboratory goals. Special consideration will be given to Historically Black Colleges and Universities/Minority Institutions as potential resource pools. The Contractor shall also strive to promote diversity in all of the Laboratory's subcontracting efforts with emphasis on the use of the types of businesses identified in the Small Business Subcontracting Plan clause of this contract.

- (ii) Financial Management.

The Contractor shall maintain a financial management system responsive to the obligations of sound financial stewardship and public accountability. The overall system shall include an integrated accounting system suitable to collect, record, and report all financial activities; a budgeting system that includes the formulation and executions of all resource requirements needed to accomplish projected missions and formulate short-

and long-range budgets; an internal control system for all financial and other business management processes; and a disbursements system for both employee payroll and supplier payments. The internal audit group for the Laboratory shall report to the most senior governing body of the Contractor's parent organization(s).

(iii) Purchasing Management.

The Contractor shall have a DOE-approved purchasing system to provide purchasing support and subcontract administration. The Contractor shall, when directed by DOE, enter into subcontracts for the performance of any part of the work under this Contract. The Contractor may also enter into subcontracts for the performance of any part of the work under this Contract when authorized by DOE.

(iv) Property Management.

The Contractor shall have a DOE-approved property management system that provides assurance that the Government-owned, contractor-held property is accounted for, safeguarded, and disposed of in accordance with DOE's expectations and policies. The Contractor shall perform overall integrated planning, acquisition, maintenance, operation, management, and disposition of Government-owned personal and real property, and Contractor-leased facilities and infrastructure used by the Laboratory.

(v) Other Administrative Services.

The Contractor shall provide other administrative services, including logistics support to the DOE Brookhaven Site Office.

(5) Safeguards and Security (S&S)

The Contractor shall provide a safeguards and security program to ensure that S&S interests and activities are protected from theft, diversion, terrorist attack, industrial sabotage, radiological sabotage, chemical sabotage, biological sabotage, espionage, unauthorized access, compromise, and other acts that may have an adverse impact on national security; the environment; or pose significant danger to the health and safety of DOE Federal and contractor employees or the public. S&S programs must be based on the results of vulnerability and risk assessments which are used to design and provide graded protection in accordance with an asset's importance or the impact of its loss, destruction, or misuse.

The Contractor shall establish and maintain uniform requirements for Protective Force personnel and firearms operations, to include the firearms qualification and re-qualification of Federal Officers, Federal

Agents, Special Agents, and Security Police Officers by certified Federal and contractor firearms instructors.

(6) Cyber Security

The Contractor shall ensure the development, operation, management, and integration of an ongoing program for cyber security management consistent with the DOE SC requirements. The Cyber Security Program must assess the environmental, natural, and man-made risks associated with computer and network security from both external and internal perspectives. The Contractor shall develop and maintain a structured Cyber Security risk management process to ensure that priorities are established and cyber security risks are managed through a process of identifying and assessing threats, vulnerabilities, asset value, and existing protection measures; developing and implementing appropriate policies and controls; promoting awareness of those policies and controls; and monitoring, evaluating, and improving the effectiveness of policies and controls.

(7) Legal Services

The Contractor shall maintain legal support for all contract activities including, but not limited to, those related to patents, licenses, and other intellectual property rights; subcontracts; technology transfer; environmental compliance and protection; employee and labor relations; contractor ethics; and litigation and claims.

(8) Emergency Management

The Contractor shall maintain an emergency management system in accordance with DOE requirements including, but not limited to, emergency preparedness plans, procedures, response, drills and exercises, occurrence notification and reporting, and operation of an Emergency Operations Center.

(9) Radiological Assistance Program

Under existing agreement between BNL and the National Nuclear Security Administration (NNSA), the Contractor commits to continue to provide health physics and radiological protection expertise and capability in support of the NNSA Region 1 Radiological Assistance Program (RAP). The RAP mission is to provide 24-hour first response radiological assistance to protect the health and safety of the general public and the environment. RAP assists Federal, State, Tribal, and local agencies in the detection, identification, analysis, and response to events involving the release of radiological materials in the environment. NNSA Region 1 includes the States of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont.

As coordinated and directed by the NNSA Region 1 Regional Response Coordinator, the Laboratory will establish DOE-led RAP teams made up of

Laboratory personnel who have volunteered for this duty. The Laboratory will possess and maintain advanced radiation detection equipment, communications equipment, protective gear, and other necessary equipment and supplies to achieve the RAP mission. The Laboratory is to ensure that team members are fully trained in the use of detection equipment and the hazards of radiation materials. RAP services rendered by the Laboratory are reimbursed by the NNSA.

(10) Information Resources Management

The Contractor shall maintain information systems for organizational operations and for activities involving general purpose programming, data collection, data processing, report generation, software, electronic and telephone communications, and computer security. The Contractor shall provide computer resource capacity and capability sufficient to support Laboratory-wide information management requirements. The Contractor also shall conduct a records management program.

(11) Waste Management

Based on DOE funding guidance and other guidance documents, all waste management activities shall be managed in an integrated manner such that waste is managed consistently and in compliance with all applicable regulatory requirements. Plans for all waste generated by site clean-up activities shall be fully implemented to provide appropriate characterization, treatment, storage, transportation, disposal, and technology development. Waste management activities include: (A) timely characterization, consolidation, segregation, and storage of waste; (B) treatment that complies with storage and/or disposal criteria; (C) efficient shipment of waste for treatment, storage, and/or disposal; (D) maintaining sufficient and compliant waste storage space at the Laboratory to accommodate waste generation and waste backlog; and (E) implementation of an effective waste minimization and pollution prevention programs.

Based on DOE funding guidance and other guidance documents, the Contractor shall provide responsive and complete waste management services for characterization, treatment, and storage through the appropriate use of existing facilities, new facilities, other DOE facilities, and private sector capabilities. Additionally, the Contractor shall implement control systems which integrate research and waste management programs to assure DOE that hazardous and radiological waste will not be stockpiled at the site.

The Contractor's short- and long-range plans and activities for treatment, storage, and disposal must be coordinated and integrated with DOE's national waste management program and applicable DOE Strategic Plans.

The Contractor shall fully integrate all research, environmental remediation, and operations activities so that all regulatory requirements and Federal Facility Agreements or Consent Orders related to the generation,

characterization, treatment, storage, and disposal of hazardous waste are met.

(12) Laboratory Facilities

The Contractor shall manage and maintain Government-owned facilities, both provided and acquired, to further national interests and to perform DOE statutory missions. Recognizing that these facilities are a national resource, these facilities may also be made available, with appropriate agreements, to private and public sector entities including universities, industry, and local, state, and other government agencies. The Contractor shall perform overall integrated planning, acquisition, upgrades, and management of Government-owned, leased, or controlled facilities and real property accountable to the Laboratory. The Contractor shall strive to employ facilities management practices that are best-in-class and integrated with mission assignments and business operations. The maintenance management program shall strive to maintain Government property in a manner that (1) promotes and continuously improves operational safety, environmental protection and compliance, property preservation, and cost effectiveness, (2) ensures continuity and reliability of operations, fulfillment of program requirements, and protection of life and property from potential hazards, and (3) ensures the condition of the assets will be maintained or improved using risk-benefit analysis tools and processes.

(13) Facility Operations and Infrastructure

The Contractor shall assist DOE through direct participation and other support in achieving DOE's energy efficiency goals and objectives in electricity, water, and thermal consumption, conservation, and savings, including goals and objectives contained in Executive Order 13423, Strengthening Federal Environmental, Energy, and Transportation Management. The Contractor shall maintain and update, as appropriate, its Site Plan (as required elsewhere in the contract) to include detailed plans and milestones for achieving site-specific energy efficiency goals and objectives. With respect to this paragraph, the Plan shall consider all potential sources of funds, in the following order: 1) the maximum use of private sector, third party financing applied on a life-cycle cost effective basis, particularly from Energy Savings Performance Contracts and Utility Energy Services Contracts awarded by DOE; and 2) only after third-party financing options are evaluated, in the event that energy efficiency and water conservation improvements cannot be effectively incorporated into a private sector financing arrangement that is in the best interests of the Government, then DOE funding and funding from overhead accounts can be utilized.

(14) Project Management

The Contractor shall maintain a project management system, consistent with DOE project management requirements, to ensure that projects are completed within scope, budget, and schedule.

C.5 - PLANS AND REPORTS

The Contractor shall submit periodic plans and reports, in such form and substance as required by the Contracting Officer. These periodic plans and reports shall be submitted at the interval, to the addresses, and in the quantities as specified by the Contracting Officer. Where specific forms are required for individual plans and reports, the Contracting Officer shall provide such forms to the Contractor. The Contractor shall require subcontractors to provide reports that correspond to data requirements the Contractor shall be responsible for submitting to DOE. Plans and reports which may be submitted in compliance with this provision are in addition to any other reporting requirements found elsewhere in other clauses of this contract. It is the intention of DOE to consult with the Contractor in determining the necessity, form, and frequency of any reports required to be submitted by the Contractor to DOE under this contract.

C.6 – RECOVERY ACT PROJECTS

This section is created to identify individual Recovery Act Projects as follows:

1. Recovery Act Project Category 1: Basic Energy Sciences (BES)
 - National Synchrotron Light Source II (NSLS-II)
 - Nanoscale Science Research Centers
 - Light Source Improvements
 - Early Career Research Program
 - National Center for Research Resources (NCRR) – U.S. National Institutes of Health (NIH) Work for Others (WFO)

2. Recovery Act Project Category 2: Science Laboratories Infrastructure (SLI)
 - Roofing
 - Mechanical & Electrical Upgrades
 - Chemistry Bldg Fire Safety Corrections
 - Interdisciplinary Science Building

3. Recovery Act Project Category 3: Environmental Management (EM)
 - Accelerated Cleanup of Surplus Nuclear Facilities

4. Recovery Act Project Category 4: Nuclear Physics (NP)
 - PHENIX Silicon Vertex MIE
 - PHENIX Forward Vertex Detector MIE
 - Enhanced AIP Funding at NP User Facilities
 - Enhanced Utilization of Isotope Facilities
 - Nuclear Science Workforce

5. Recovery Act Project Category 5: Energy Efficiency and Renewable Energy (EERE)
 - Federal Lab Support for Recovery Act Transactions ARRA FY09
 - EGS R&D

6. Recovery Act Project Category 6: High Energy Physics (HEP)
 - Advanced Technology R&D Augmentation
 - Long Baseline Neutrino Experiment

7. Recovery Act Project Category 7: Advanced Research Projects Agency – Energy (ARPA-E)
 - Brookhaven National Laboratory (BNL) - Reviewer for ARPA-E

**C.6.1 – Recovery Act Project Category 1:
 Basic Energy Sciences (BES)**

- A. The American Recovery and Reinvestment Act of 2009 funds obligated under this Category in FY 2009 and FY 2010 are specified below in Section C.
- B. Clause I.139 DEAR 970.5232-4 “Obligation of Funds” has been adjusted accordingly.
- C. The specific on-going work is funded as follows:

<p><u>1. National Synchrotron Light Source II (NSLS-II) (\$150M)</u></p> <p><u>Statement of Work:</u> These funds provided under 39KC02 are for the construction associated with the NSLS-II, Project Number 07-SC-06. Specifically, this funding is to be used to optimize project execution by acceleration of civil construction and advancement of the designs and procurements of Accelerator System Components as compared to the approved project baseline plan.</p> <p>Rev 02: The revised Work Authorization changes the completion date from September 2010 to May 2013 to reflect the completion date of the NSLS II Recovery Act scope.</p> <p><i>The specific Contractor Recovery Act Statement of Work, Milestones, Outcomes and Measures, and Deliverables funded by this modification are identified in the following referenced Work Authorization:</i></p>	
Work Authorization Number	Work Authorization Title
KC/CH13/9, Rev 01 and Rev 02 Project Code 2005010	Basic Energy Sciences – NSLS-II

2. Nanoscale Science Research Centers (TEC \$5.569M)

Statement of Work: These funds provided under KC020401H EQU to update, upgrade, or expand capabilities of the Center for Functional Nanomaterials to conduct leading edge science and serve users. Specifically, funds are provided as follows:

- Upgrade of JEOL Electron Beam Lithography System
- Mask Aligner for Optical Lithography
- Electron Energy-Loss Spectrometer
- Reactive Ion Etcher for Metals
- Transmission Electron Microscope for Soft Materials
- Reactor Scanning Tunneling Microscope
- High-Resolution Analytical Scanning Microscopy

Rev 02: The revised Work Authorization changes the Expected Completion from March 2012 to March 2013.

The specific Contractor Recovery Act Statement of Work, Milestones, Outcomes and Measures, and Deliverables funded by this modification are identified in the following referenced Work Authorization:

Work Authorization Number	Work Authorization Title
KC/CH13/9/ARRA-1 and Rev 01 and Rev 02 Project Code 2005040	Basic Energy Sciences – Nanoscale Science Research Centers

3. Light Source Improvements (\$3M)

Statement of Work: Equipment funds are provided under KC0204011 EQU provided as follows:

- Transmission X-ray Microscope for In-Situ Study of Materials for Energy and Microelectronics Research at the National Synchrotron Light Source (NSLS)
- Advanced X-Ray Detectors for Enhanced NSLS Capabilities and User Throughput

Rev 01: The revised Work Authorization re-distributes funds and changes the Expected Completion Date from Sept. 2011 to June 30, 2012

Rev 02: In FY12, funds in the amount of \$171.20 were withdrawn to reflect the de-obligation and closeout of all actions provided under Work Authorization #KC/CH13/9/ARRA-2.

Accordingly, the final obligated amount of the project is \$2,999,828.80

The specific Contractor Recovery Act Statement of Work, Milestones, Outcomes and Measures, and Deliverables funded by this modification are identified in the following referenced Work Authorization:

Work Authorization Number	Work Authorization Title
KC/CH13/9 ARRA-2, Rev 01 & Rev 02 Project Code 2005045	Basic Energy Sciences – Light Source Improvements

4. Early Career Research Program (\$2.5M)

Statement of Work: Funds provided under KC020101 are provided in FY 10 as follows:

- Investigation of the role of inhomogeneities and phase segregation on correlated and phase segregation on correlated electron dynamics by optical spectroscopy and nano-imaging

Rev 01 - The revised Work Authorization changes the Performance Period Covered by Funds date to: 02/17/2009 – 09/30/2010 to reflect the correct date Recovery Act funding expires for obligation.

The specific Contractor Recovery Act Statement of Work, Milestones, Outcomes and Measures, and Deliverables funded by this modification are identified in the following referenced Work Authorization:

Work Authorization Number	Work Authorization Title
KC/CH13/9 ARRA-3 and Rev 01 Project Code 2005410	Basic Energy Sciences – Early Career Research Program

5. National Center for Research Resources (NCRR) – U.S. National Institutes of Health (NIH) Work for Others (WFO) (\$12M)

Statement of Work: Funds are provided under 75-0847 in FY 10 as follows:

The fabrication and installation of three insertion devices (IDs) for beam lines specifically for the NSLS II project:

In accordance with amended Statement of Work (SOW):

The NSLS-II will undertake the fabrication and fabrication and installation of three insertion device (ID) beamlines to be specified by NIH. Two beamlines will support macromolecular crystallography (MX), one of these is identified as AMX for flexible access and highly automated MX and the other is FMX for frontier MX with x-ray beams that can be focused to 1 micron diameter. The third beamline is identified as LIX, and it will be a high brightness x-ray scattering instrument for biological applications.

The specific Contractor Recovery Act Statement of Work, Milestones, Outcomes and Measures, and Deliverables funded by this modification are identified in the following referenced Interagency Agreement (IAA) and Memorandum of Understanding (MOU) :

Interagency Agreement Number:	Memorandum of Understanding (MOU)
DOE - CHAGRY1RR0001 NIH/NCRR – Y1-RR 0001-01 BSA Proposal Number - 10-07	MOU between: NCRR / NIH and SC / DOE: <i>In support of the BNL's NSLS II Project, as Amended in September of 2011</i>

D. The work described above shall be performed using funds obligated under this contract, which have been appropriated under the Recovery Act of 2009, Pub. L. 111-5, and as

such, is subject to the special statutory conditions, the additional contractual terms and conditions that are listed in paragraph E below and the changes made to Sections E and G of the contract pertaining to the Recovery Act. The funds obligated hereunder shall only be used to accomplish the work as set forth in paragraph C. above and may not be used for any other purpose without the prior written consent of the Contracting Officer.

- E. The Contractor shall complete all Recovery Act Work included within this work scope in accordance with Recovery Act requirements, including the required completion dates specified therein, and by the completion date identified in the approved work authorization for the activity.

Note: Paragraph F pertains to the NSLS-II project only.

- F. ACCELERATED WORK: The Contractor shall submit to the CO a revised project baseline that clearly identifies the changes to the baseline due to the acceleration of work to include a detailed description of accelerated work, a budget of estimated costs for the accelerated work, and a schedule for the performance of this work within 60 days of this modification.

**C.6.2 – Recovery Act Project Category 2:
 Science Laboratories Infrastructure (SLI)**

- A. The American Recovery and Reinvestment Act of 2009 funds obligated under this Category in FY 2009 are specified below in Section C.
- B. Clause I.139 DEAR 970.5232-4 “Obligation of Funds” has been adjusted accordingly.
- C. The specific work funded included within this work scope is as follows:

Science Laboratories Infrastructure - General Plant Projects (GPP)

Statement of Work

1. Mission Critical Building Roofing (TEC \$8.710M)

These funds are provided under KG09: this project will re-roof several Mission Critical science and utility buildings. The buildings include Medical (490), Physics (510), Instrumentation (535), Light Source (725), Collider-Accelerator (several buildings), Firehouse (599), and Water Plant (624).

Rev 03: This revised Work Authorization changes the Performance Period Covered by Funds date to: 02/17/09 - 09/30/10 to reflect the correct date Recovery Act funding expires for obligation.

Rev 04: This revised Work Authorization reduces the Mission Critical Roofing by \$290,000.00.

2. Mission Critical Building Mechanical & Electrical Upgrades TEC (\$7.290M)

These funds are provided under KG09; this project will upgrade the HVAC in portions of several Mission Critical buildings used by BNL's science programs. Included will be the replacement of worn-out air handlers and the removal and replacement of highly flammable polystyrene duct insulation to reduce potential fire hazards. Aged and “overdutied” electrical equipment will be replaced. In addition, several elevators will also be rehabilitated and brought up to current standards. The buildings are all Mission Critical and include Biology (463), Physics (510), Central Scientific Computing (515) Instrumentation/NSLS (535), Chemistry (555), and Isotope Research (801).

Rev 03: This revised Work Authorization changes the Performance Period Covered by Funds date to: 02/17/09 - 09/30/10 to reflect the correct date Recovery Act funding expires for obligation. Additionally, the Expected Completion Date changed from 9/30/10 to 11/30/10 which accurately reflects the completion of the project.

Rev 04: This revised Work Authorization transfers \$290,000.00 to the Mission Critical Building Mechanical & Electrical Upgrades.

Rev 05: The revised Work Authorization changes the Expected Completion Date from 11/30/10 to 6/30/12.

3. Chemistry, Bldg 555, Fire Safety Corrections (TEC \$2.5M)

These funds are provided under KG09; the Mission Critical Chemistry building, B/555, will have fire barrier established around required building fire zones, vertical fire separations will be provided, and automatic fire sprinklers will be provided throughout the “unsprinklered” 2/3 of the building.

The specific Contractor Recovery Act Statement of Work, Milestones, Outcomes and Measures, and Deliverables funded by this modification are identified in the following referenced Work Authorization:

Work Authorization Title	Work Authorization Title
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KG/CH13/9 : Rev01, Rev02, Rev 03, Rev 04, Rev 05 Project Code 2005380	Science Laboratories Infrastructure - General Plant Projects (GPP)
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<u>Science Laboratories Infrastructure - SLI Construction, Interdisciplinary Science Building (ISB)</u>	
<u>Statement of Work</u> 1. <u>Interdisciplinary Science Building (ISB), Phase I (TEC \$18.673M)</u> These funds are provided under KG01, the project will begin site clearing work at the ISB-Phase I. Rev 02: This Work Authorization obligates the balance of funding for Line item construction project 09-SC-73, Interdisciplinary Science Building – Phase I. Rev 03: This revised Work Authorization changes the Performance Period Covered by Funds date to: 02/17/09 - 09/30/10 to reflect the correct date Recovery Act funding expires for obligation. Rev 04: In FY12, funds in the amount of \$46.56 were withdrawn to reflect the de-obligation and closeout of all actions provided under Work Authorization # KG/CH13/9/ARRA-4. Accordingly, the final obligated amount of the project is \$18,672,953.44 <i>The specific Contractor Recovery Act Statement of Work, Milestones, Outcomes and Measures, and Deliverables funded by this modification are identified in the following referenced Work Authorization:</i>	
Work Authorization Number	Work Authorization Title
KG/CH13/9/ARRA-4, Rev 01, Rev 02, Rev 03 & Rev 04 Project Code 2005370	Science Laboratories Infrastructure - SLI Construction, Interdisciplinary Science Building (ISB), Ph.I

- D. The work described above shall be performed using funds obligated under this contract, which have been appropriated under the Recovery Act of 2009, Pub. L. 111-5, and as such, is subject to the special statutory conditions and the additional contractual terms and conditions that are listed in paragraph E below and the changes made to Sections E and G of the contract pertaining to the Recovery Act. The funds obligated hereunder shall only be used to accomplish the work as set forth in paragraph C. above and may not be used for any other purpose without the prior written consent of the Contracting Officer.
- E. The Contractor shall complete all Recovery Act Work included within this work scope in accordance with Recovery Act requirements, including the required completion dates specified therein, and by the completion date identified in the approved work authorization for the activity.

- D. The work described above shall be performed using funds obligated under this contract, which have been appropriated under the Recovery Act of 2009, Pub. L. 1115, and as such, is subject to the special statutory conditions and the additional contractual terms and conditions that are listed in paragraphs E through G below and the changes made to Sections E and G of the contract pertaining to the Recovery Act. The funds obligated hereunder shall only be used to accomplish the work as set forth in paragraph C. above and may not be used for any other purpose without the prior written consent of the Contracting Officer.
- E. The Contractor shall complete all Recovery Act Work included within this work scope in accordance with Recovery Act requirements, including the required completion dates specified therein, and by the completion date identified in the approved work authorization for the activity.
- F. **FUNDING CONSTRAINT:** Brookhaven Science Associates (BSA) is to begin work. However, BSA is authorized to incur costs in accordance with the direction provided in the most current Work Authorization which establishes the cost authority amount.

**C.6.4–Recovery Act Project Category 4:
 Nuclear Physics (NP)**

- A. The American Recovery and Reinvestment Act of 2009 funds obligated under this Category in FY 2009 and FY 2010 are specified below in Section C.
- B. Clause I.139 DEAR 970.5232-4 “Obligation of Funds” has been adjusted accordingly.
- C. The specific work funded under this Category is as follows:

1. PHENIX Silicon Vertex MIE (TEC \$.250M)

Statement of Work: These funds are provided under KB-02-01-02-1 EQU to advance funding for equipment purchases for the PHENIX Silicon Vertex Tracker MIE (71RD) project, including data acquisition crates for front-end modules for strip detectors; data collection modules, and installation fixtures and external cooling system.

Per Work Authorization, Rev 02, Attachment A, Contractor Recovery Act Performance Requirements has been revised.

Per Work Authorization for FY11, Rev 03, Block 13, “Expected Completion Date” is revised to 12/2010 in order to reflect the correct date of project completion.

Per Work Authorization for FY12, Rev 04, Block 13, “Expected Completion Date” is revised from 12/2010 to 09/2012 in order to reflect the correct date of project completion and funds are redistributed.

The specific Contractor Recovery Act Statement of Work, Milestones, Outcomes and Measures, and Deliverables funded by this modification are identified in the following referenced Work Authorization:

Work Authorization Number	Work Authorization Title
KB/CH13/9/ARRA-1, Rev 01, Rev 02, Rev 03 & Rev 04 Project Code 2005200	Nuclear Physics – PHENIX Silicon Vertex MIE

2. PHENIX Forward Vertex Detector MIE (TEC \$.967M)

Statement of Work: These funds are provided under KB-02-01-02-1 EQU to advance funding for the purchase of two silicon end caps for the PHENIX Forward Vertex Detector MIE (81SF)

Rev 03: The revised Work Authorization changes the Expected Completion Date from 6/11 to 12/11.

Rev 04: The revised Work Authorization changes the Expected Completion Date from 12/2011 to 09/2012 in order to reflect the correct project completion date and redistribute funds from EQU to OPE.

The specific Contractor Recovery Act Statement of Work, Milestones, Outcomes and Measures, and Deliverables funded by this modification are identified in the following referenced Work Authorization:

Work Authorization Number	Work Authorization Title
KB/CH13/9/ARRA-2, Rev 01, Rev 02, Rev 03, & Rev 04 Project Code 2005210	Nuclear Physics – PHENIX Forward Vertex Detector MIE

3. Enhanced AIP Funding at NP User Facilities (TEC \$8M)

Statement of Work: These funds are provided under KB-02-02-01-1 for accelerated implementation of the stochastic cooling in both storage rings and implementation of electron lenses for the RHIC (Initial funds of \$7,200,000).

Rev 01: Additional funding in the amount of \$800K is provided in support of the AIP efforts related to the luminosity upgrade of the RHIC beams.

Rev 02: Revises Attachment A of the Work Authorization entitled “Contractor Recovery Act Performance Requirements” to reflect the following:

- The original scope was revised to include the engineering and design of lenses and the manufacture of the components of one lens in order to remain within the ARRA funded amount. The components will be tested and ready for installation in the RHIC accelerator at the completion of this ARRA project consistent with the revised milestones contained in Attachment A.

Rev 03: The revised Work Authorization changes the Expected Completion Date from: 03/2012 to 09/2012.

Rev 04: The revised Work Authorization changes the Expected Completion Date from: 09/2012 to 3/2013.

The specific Contractor Recovery Act Statement of Work, Milestones, Outcomes and Measures, and Deliverables funded by this modification are identified in the following referenced Work Authorization:

Work Authorization Number	Work Authorization Title
KB/CH13/9/ARRA-3, Rev 01, Rev 02, Rev 03 & Rev 04 Project Code 2005220	Nuclear Physics – Enhanced AIP Funding at NP User Facilities

4. Enhanced Utilization of Isotope Facilities (TEC \$1.878M)

Statement of Work: These funds are provided under ST-60-01-03 for procuring and commissioning a new inductively coupled plasma (ICP) mass spectrometer. This funding will enhance isotope production and processing capabilities at BNL to enable the program to better meet the need for isotopes in short supply (Initial funding \$225,000).

Rev 01 provides \$1,316,000 in OPE funding under ST-60-01-02 for:

- FWP #2009-BNL-MO086 for the “Development of Zn-68 targets for improved yields and production of Cu-67” (\$724,000). The project period is October 2009 – October 2011.
- FWP#2009-BNL-MO087 for the “Development of large scale production of PET isotope Yttrium-86 at Brookhaven Linac Isotope Production” (\$592,000). The project period is October 2009 – October 2011.

Rev 02 provides \$337,000 in additional funding :

- OPE (\$25,000) “Brookhaven Linear Isotope Producer” for the development support for accelerator production of actinium-225 (Ac-225).
- EQU (\$262,000) Procurement of new equipment to include a portable contamination monitor (\$123,000), a small portable Ge gamma ray spectrometer (\$89,000) and a lifting device to assist with Model 7 manipulator replacement (\$50,000).
- OPE (\$50,000) Engineering and design of new lifting device for Model 7 manipulator replacement through the roof of the hot cells.

Rev 03 provides a transfer of obligated funds provided in Rev02 as follows:

- EQU (\$312,000) Procurement of new equipment to include a portable contamination monitor (\$123,000), a small portable Ge gamma ray spectrometer (\$89,000) and a lifting device to assist with Model 7 manipulator replacement (\$100,000).
- OPE (\$0.00) Engineering and design of new lifting device for Model 7 manipulator replacement through the roof of the hot cells.

Rev 04 changes the Expected Completion Date of the project from 10/2011 to 10/2012 to ensure completion of the final tasks to develop labeling protocols for the Copper-67 and Yttrium-86 projects as specified in the Work Authorization.

Rev 05 changes the Expected Completion Date of the project from 10/2012 to 09/2013 and redistributes obligated funds as indicated in the Work Authorization. The new totals are as follows:

- OPE \$1,576,049.37
- EQU \$301,950.63

The specific Contractor Recovery Act Statement of Work, Milestones, Outcomes and Measures, and Deliverables funded by this modification are identified in the following referenced Work Authorization:

Work Authorization Number	Work Authorization Title
ST/CH13/9 ARRA-4 and Rev 01, Rev 02, Rev 03, Rev 04 and Rev 05 Project Code: 2005230	Nuclear Physics – Enhanced Utilization of Isotope Facilities

5. Nuclear Science Workforce (\$1.808M)

Statement of Work: These funds (\$1,400,000) are provided under KB-03-01-04-2 for FWP#22675 entitled “Neutron Cross Section Covariances for the ENDF/B-VII Library.” The Principal Investigator is Pavel Oblozinsky. The project period is 09/2009 to 09/2012.

These funds (\$408,000) are provided under KB-04-01-02-2 for FWP#22555 entitled, “Use of Covariances in a Consistent Data Assimilation for Improvement of Basic Nuclear Parameters in Nuclear Reactor Applications: From Meters to Femtometers.” The Principal Investigator is Michael Herman. The project period is 10/2009 to 09/2012.

Rev 01 transfers obligated funds from KB-03 to KB-04 in the amount of \$241,281.55 and authorizes expenditure. The new totals are as follows:

- KB-03 \$1,158,718.45
- KB-04 \$649,281.55

The specific Contractor Recovery Act Statement of Work, Milestones, Outcomes and Measures, and Deliverables funded by this modification are identified in the following referenced Work Authorization:

Work Authorization Number	Work Authorization Title
KB/CH13/9/ARRA-5 and Rev 01 Project Code 2005270	Nuclear Physics – Nuclear Science Workforce

- D. The work described above shall be performed using funds obligated under this contract, which have been appropriated under the Recovery Act of 2009, Pub. L. 111-5, and as such, is subject to the special statutory conditions and the additional contractual terms and conditions that are listed in paragraph E below and the changes made to Sections E and G of the contract pertaining to the Recovery Act. The funds obligated hereunder shall only be used to accomplish the work as set forth in paragraph C. above and may not be used for any other purpose without the prior written consent of the Contracting Officer.
- E. The Contractor shall complete all Recovery Act Work, included within this work scope, in accordance with Recovery Act requirements, including the required completion dates specified therein, and by the completion date identified in the approved work authorization for the activity.

**C.6.5 – Recovery Act Project Category 5:
 Energy Efficiency and Renewable Energy (EERE)**

- A. The American Recovery and Reinvestment Act of 2009 funds obligated under this Category in FY 2009 and FY 2010 are specified below in Section C.
- B. Clause I.139 DEAR 970.5232-4 “Obligation of Funds” has been adjusted accordingly.
- C. The specific work included within this work scope is as follows:

1. Federal Lab Support for Recovery Act Transactions (TEC \$113,950.63K)

Statement of Work:

These funds are for Management and Oversight (Program Direction) to enable the Laboratory to provide project management and technical staff assistance to applicants of DOE’s Office of Energy Efficiency and Renewable Energy.

Funding in the amount of (\$1,050.63) have been withdrawn and distributed to Agreement # 11951.

The specific Contractor Recovery Act Statement of Work, Milestones, Outcomes and Measures, and Deliverables funded by this modification are identified in the following referenced Work Authorization:

Work Authorization Number	Work Authorization Title
480004-20476-09, Rev 01 and Rev 02 Project Code 2004040	Federal Lab Support for Recovery Act Transactions

2. EGS R&D (TEC \$1.8905K)

Statement of Work:

Agreement # 19965: Brookhaven National Laboratory will elucidate comprehensively the carbonation reaction mechanisms between the supercritical carbon dioxide and reservoir rocks in aqueous and non-aqueous environments, and develop chemical modeling of CO₂-reservoir rock interactions. (\$334K + 159.87K FY10) \$493.87K

Rev 07: For FY12 provided under Work Authorization GT-480004-20685-12, changes the the Expected Completion Date of the project from 09/30/2011 to 09/30/2012

Agreement # 19964: Brookhaven National Laboratory, working with Los Alamos National Laboratory and Pacific Northwest National Laboratory, will develop and implement 1) suites of tracers consisting of compounds with different chemical and physical properties that will interact in measurable ways with fractured rock matrix, and 2) single and interwell test designs and corresponding interpretation methods to extract the temperature distribution and surface area information from breakthrough curves. \$375K +155.625K FY10) \$530.625 K

Rev 08: For FY12 provided under Work Authorization GT-480004-20685-12, changes the the Expected Completion Date of the project from 09/30/2011 to 09/30/2012.

Agreement # 19963: Brookhaven National Laboratory will develop and characterize field-applicable geopolymer sealing materials in the laboratory and transfer the developed material technology to geothermal drilling service companies. (\$579K + \$293.41K FY10) \$872.41K

Rev 09: For FY12 provided under Work Authorization GT-480004-20685-12, changes the the Expected Completion Date of the project from 09/30/2011 to 09/30/2012.

Rev 10: For FY12 provided under Work Authorization GT-480004-20685-12, revises Section A of Attachment A entitled: "Contractor Recovery Act Performance Requirements" to reflect the following :

The specific Contractor Recovery Act Statement of Work, Milestones, Outcomes and Measures, and Deliverables funded by this modification are identified in the following referenced Work Authorization:

Work Authorization Number	Work Authorization Title
GT-480004-20685-09, Rev 01, Rev 02, Rev 03 GT-480004-20685-10, Rev 01, Rev 02, Rev 03 GT-480004-20685-10, Rev 04, Rev 05, Rev 06 GT-480004-20685-12, Rev 07, Rev 08, Rev 09 & Rev 10 Project Code 2004190	EGS R&D

D. The work described in this modification shall be performed using funds obligated under this contract, which have been appropriated under the Recovery Act of 2009,

Pub. L. 111-5, and as such, is subject to the special statutory conditions and the additional contractual terms and conditions that are listed in paragraph E below and the changes made to Sections E and G of the contract pertaining to the Recovery Act. The funds obligated hereunder shall only be used to accomplish the work as set forth in paragraph C. above and may not be used for any other purpose without the prior written consent of the Contracting Officer.

- E. The Contractor shall complete all Recovery Act Work funded by this modification in accordance with Recovery Act requirements, including the required completion dates specified therein, and by the completion date identified in the approved work authorization for the activity.

**C.6.6 – Recovery Act Project Category 6:
 High Energy Physics (HP)**

- A. The American Recovery and Reinvestment Act of 2009 funds obligated under this Category in FY 2009 and FY 2010 are specified below in Section C.
- B. Clause I.139 DEAR 970.5232-4 “Obligation of Funds” has been adjusted accordingly.
- C. The specific work included within this work scope is as follows:

<p><u>1. Advanced Technology R&D Augmentation (\$.055M + .047M = Revised TEC \$.102 M)</u></p> <p><u>Statement of Work:</u> These funds are provided under KA-15-02-01-1 for the first year’s work on “A Laboratory-University-Industry Collaboration for the Development of Magnets with Fields > 22 Tesla Using HTS Conductor” program under the direction of Drs. Peter Wanderer and Arup Ghosh as described in the Field Work Proposal (FWP) KACH139 Rev 0 submitted 05/15/2009. Additional funding has been provided to extend work for another year under KACH139 Rev 1 submitted 05/15/2010.</p> <p>Rev 02: The revised Work Authorization in FY12 changes the Expected Completion Date of the project from 12/2011 to 6/2012.</p> <p>Rev 03: In FY12, funds in the amount of \$56.72 were withdrawn to reflect the de-obligation and closeout of all actions provided under Work Authorization # KA/CH13/9/ARRA-1.</p> <p>Accordingly, the final obligated amount of the project is \$101,943.28.</p> <p><i>The specific Contractor Recovery Act Statement of Work, Milestones, Outcomes and Measures, and Deliverables funded by this modification are identified in the following referenced Work Authorization:</i></p>	
Work Authorization Number	Work Authorization Title
KA/CH13/9/ARRA-1, Rev 01, Rev 02 & Rev 03 Project Code 2005170	High Energy Physics – Advanced Technology R&D Augmentation

2. Long Baseline Neutrino Experiment (\$6M)

Statement of Work: \$5,000,000 under KA-11-02-03-3 and \$1,000,000 under KA-11-02-03-4 is provided to support the Long Baseline Neutrino Experiment (LBNE) at Brookhaven National Laboratory for preconceptual R&D and the contributions to the conceptual design of the Long Baseline Neutrino Experiment required for Critical Decision-1. This work is subject to the detailed reporting requirements under Recovery Act.

Rev 02: The revised Work Authorization in FY12 redistributes funds and changes the Expected Completion Date of the project from 11/2010 to 6/2012.

The specific Contractor Recovery Act Statement of Work, Milestones, Outcomes and Measures, and Deliverables funded by this modification are identified in the following referenced Work Authorization:

Work Authorization Number	Work Authorization Title
KA/CH13/9/ARRA-2, Rev 01 & Rev 02 Project Code 2005175	High Energy Physics – Long Baseline Neutrino Experiment

- D. The work described above shall be performed using funds obligated under this contract, which have been appropriated under the Recovery Act of 2009, Pub. L. 111-5, and as such, is subject to the special statutory conditions and the additional contractual terms and conditions that are listed in paragraph E below and the changes made to Sections E and G of the contract pertaining to the Recovery Act. The funds obligated hereunder shall only be used to accomplish the work as set forth in paragraph C. above and may not be used for any other purpose without the prior written consent of the Contracting Officer.
- E. The Contractor shall complete all Recovery Act Work funded by this work scope in accordance with Recovery Act requirements, including the required completion dates specified therein, and by the completion date identified in the approved work authorization for the activity.

**C.6.7 – Recovery Act Project Category 7:
 Advanced Research Projects Agency – Energy (ARPA-E)**

- A. The American Recovery and Reinvestment Act of 2009 funds obligated under this Category in FY 2009 are specified below in Section C.
- B. Clause I.139 DEAR 970.5232-4 “Obligation of Funds” has been adjusted accordingly.
- C. The specific work funded by this work scope is as follows:

**1. Brookhaven National Laboratory (BNL) – Reviewer for ARPA-E
(TEC \$7,917.15)**

Statement of Work: This WAS covers expenses for one (1) BNL employee to review proposals in support of the ARPA-E Program (FOA #DE-FOA-0000065). The employee will work during the performance period as noted on this WAS. The employee will participate in the review of full applications received from the ARPA-E solicitation. The reviews will follow the established procedures, as communicated, and the employee will report his/her review findings to the responsible Assistant Secretary, (acting) Director, or other senior program official.

Funding in the amount of (\$82.85) (balance of uncosted funding) has been withdrawn and distributed under WA 09/CJ000/00/03 to finalize the close out of all actions previously authorized and funded by ARPA-E

The specific Contractor Recovery Act Statement of Work, Milestones, Outcomes and Measures, and Deliverables funded by this modification are identified in the following referenced Work Authorization:

Work Authorization Number	Work Authorization Title
09/CJ000/00/02 09/CJ000/00/03 Rev 01 Project Code 2010000	Brookhaven National Laboratory (BNL) Reviewer for ARPA-E

- D. The work described above shall be performed using funds obligated under this contract, which have been appropriated under the Recovery Act of 2009, Pub. L. 111-5, and as such, is subject to the special statutory conditions and the additional contractual terms and conditions that are listed in paragraph E below and the changes made to Sections E and G of the contract pertaining to the Recovery Act. The funds obligated hereunder shall only be used to accomplish the work as set forth in paragraph C. above and may not be used for any other purpose without the prior written consent of the Contracting Officer.
- E. The Contractor shall complete all Recovery Act Work funded by this work scope in accordance with Recovery Act requirements, including the required completion dates specified therein, and by the completion date identified in the approved work authorization for the activity.