

DOE/IG-0543

AUDIT
REPORT

RELATIVISTIC HEAVY ION
COLLIDER PROJECT



MARCH 2002

U.S. DEPARTMENT OF ENERGY
OFFICE OF INSPECTOR GENERAL
OFFICE OF AUDIT SERVICES



U. S. DEPARTMENT OF ENERGY
Washington, DC 20585

March 6, 2002

MEMORANDUM FOR THE SECRETARY

FROM: Gregory H. Friedman (Signed)
Inspector General

SUBJECT: INFORMATION: Audit Report on "Relativistic Heavy Ion Collider Project"

BACKGROUND

The Relativistic Heavy Ion Collider (RHIC), located at Brookhaven National Laboratory, is the world's newest and largest particle accelerator for nuclear physics research. RHIC was constructed between 1991 and 1999 at a reported cost of \$617 million and is designed to enhance scientific exploration by advancing our understanding of the most basic constituents that make up the matter in our universe. The accelerator features a pair of superconducting magnetic rings, 2.4 miles in circumference, which circulate beams of heavy ions in opposite directions at nearly the speed of light. Where the ions collide at crossing points around the rings, sophisticated detectors are used to help scientists gain insights into the characteristics of quarks and gluons, two fundamental building blocks of matter.

In August 1999, the Office of Science determined that the RHIC project was completed on schedule and within budget, and designated the RHIC as an operating facility. RHIC achieved its first beam collisions in June 2000 and, in July 2001, scientists began operating the facility with beam collisions at full-energy levels. The RHIC is currently operating as a state-of-the-art research facility and represents an accomplishment of which many individuals in the Department and at Brookhaven are justifiably proud.

The objective of this audit was to determine whether the RHIC project met performance and cost expectations when it was designated as an operating facility.

RESULTS OF AUDIT

We determined that when the RHIC project was declared complete and designated as an operating facility in August 1999, beam collisions, which were expected for project completion, had not taken place, and the facility was not ready to begin operations with beam-collision experiments. Also, we noted that the cost of the project exceeded its \$617 million budget by about \$32 million. Consequently, in August 1999, the Department did not have an operational facility and prematurely reported to Congress that the project was complete. In addition, other

Brookhaven projects and activities had to absorb about \$20 million in overhead that should have been charged to the RHIC project.

While the RHIC project's ultimate outcome was positive, the Department's experience offers, in our judgment, a number of important project management lessons learned. In this context, we concluded that, for future projects, the Department should ensure that (i) established performance expectations are met prior to designating facilities as completed and ready for operations; and, (ii) all applicable overhead and other project specific costs are included in total project costs. The audit report includes recommendations to this effect.

MANAGEMENT REACTION

Although management agreed to implement the recommendations, it contended that the RHIC project was completed on time and within budget and that it met Departmental and Congressional expectations and guidance. Thus, on these crucial points, we have a fundamental disagreement. However, the purpose of the audit will be satisfied if the recommendations included in the report are applied to future projects.

A summary of management's comments, along with our response, is presented on page 8 of this report. Additionally, we have included management's comments in their entirety as Appendix 3 and have addressed specific management comments in the body of the report.

Attachment

cc: Deputy Secretary
Under Secretary for Energy, Science and Environment
Acting Director, Office of Science

RELATIVISTIC HEAVY ION COLLIDER PROJECT

TABLE OF CONTENTS

Overview

Introduction and Objective.....	1
Conclusions and Observations.....	1

Project Expectations Not Met

Details of Finding.....	3
Recommendations and Comments	8

Appendices

Scope and Methodology.....	10
Prior Audit Reports.....	11
Management Response	13

OVERVIEW

INTRODUCTION AND OBJECTIVE

The Relativistic Heavy Ion Collider (RHIC) is the world's newest and biggest particle accelerator for nuclear physics research. The RHIC, located at Brookhaven National Laboratory (Brookhaven), is designed to open a new domain of scientific exploration by probing forces acting among the most basic and mysterious constituents that make up the matter in our universe: quarks and gluons. These fundamental particles, trapped inside protons and neutrons, constitute the nuclei of all atoms. RHIC features a pair of superconducting magnetic rings, 2.4 miles in circumference, which can circulate beams of heavy ions in opposite directions at nearly the speed of light. Where the ions collide at crossing points around the rings, sophisticated detectors search for new insight into the characteristics of quark-gluon plasma.

The Department of Energy (Department) reported that the RHIC was constructed between 1991 and 1999 at a cost of \$617 million. The Department built the RHIC using abandoned facilities (ring tunnel, experimental areas, support buildings, and liquid helium refrigerator) that remained from the partially completed ISABELLE/Colliding Beam Accelerator (CBA) Project, which was terminated in 1983. These facilities were used to house the RHIC's two beam rings, four detectors, and support areas.

In August 1999, the Department's program office responsible for project oversight, the Office of Science, determined that the RHIC Project was completed on schedule and within budget, and designated the RHIC as an operating facility. The facility achieved its first beam collisions in June 2000. Thirteen months later, in July 2001, scientists took the RHIC to a new level by operating with beam collisions at full-energy levels. The RHIC is currently operating as a state-of-the-art research facility.

The objective of this audit was to determine whether the RHIC Project met performance and cost expectations when it was designated as an operating facility.

CONCLUSIONS AND OBSERVATIONS

The RHIC Project did not fully meet performance and cost expectations when it was designated as an operating facility. Specifically, we determined that expected beam collisions were not achieved and the project's budget was exceeded. When the project was declared complete and designated as an operating facility, beam collisions, which were expected for project completion, had not taken place, and the facility was not ready to begin operations with beam-collision

experiments. Also, while project costs were reported to be within budget when the project was declared complete, the cost of the project exceeded the budget by about \$32 million. Project expectations were not fully achieved because the Department did not adhere to project plans that called for beam collisions to be achieved before project completion and did not ensure that all costs specifically incurred for the project were included in total project costs. As a result, the Department did not have an operational facility in August 1999 and prematurely reported to Congress that the project was completed. In addition, other Brookhaven projects and activities had to absorb about \$20 million in overhead that should have been charged to the RHIC Project.

The Office of Inspector General has issued several reports in recent years that have made recommendations to enhance the Department's management of major projects. These reports are summarized in Appendix 2.

This audit identified issues that management should consider when preparing its year-end assurance memorandum on internal controls.

(Signed)
Office of Inspector General

PROJECT EXPECTATIONS NOT MET

Planning Documents Anticipated Beam-Collisions at Completion, and Department Policy Required That Project Costs Include All Costs Specific to a Project

Project plans should identify the point at which a project is complete and clearly delineate a project's end product and the specific parameters of project completion. The requirement to clearly define project completion was stated in Department Order 4700.1, *Project Management System*, which was in effect at the start of the RHIC Project. Likewise, Department Order 430.1, *Life Cycle Asset Management*, which replaced Order 4700.1 during the RHIC Project, also called for a plan with clear technical performance measures in place in order to test and evaluate performance and verify operational readiness. Department policy states that the project completion milestone (CD-4) occurs when a project has demonstrated that it has the capability to meet its approved technical performance goals. Additionally, Department policy states that total project costs should include all costs specific to a project that were incurred through startup of the facility, but prior to the operation of the facility.

For the RHIC Project, planning documents anticipated that beam collisions would occur at project completion. The Project Plan, prepared at the start of the project, stated that the first collisions of energy beams were expected to be available for experimenters at project completion and start of operations. Additionally, the Project Management Plan stated that the RHIC Project's startup and commissioning process would ultimately include tests of colliding beams and, at the end of the project's startup phase, the collider would be ready to perform experimental research. Also, an "end-game" study, added to the Project Management Plan in 1995, stated that the commissioning period would demonstrate high-energy beam collisions. Further, a revised end-game study, dated January 1998, stated that demonstration of gold ion beam collisions would constitute the completion of the RHIC Project. Then, in January 1999, the Department approved a project completion definition that included the demonstration for commissioning of the injection, capture, and acceleration of gold or proton beams as well as storage and collision of beams at one or more collision points. Finally, in February 1999, Brookhaven prepared a commissioning plan that anticipated the collisions of gold beams would occur during a planned June 1999 commissioning run.

Performance and Costs Expectations Were Not Achieved at Project Completion

The RHIC Project did not fully meet performance and cost expectations when it was designated as an operating facility. Specifically, expected beam collisions were not achieved and the project's budget was exceeded. When the project was declared complete and designated as an operating facility, beam collisions, which were expected for project completion, had not taken place, and the facility was not ready to begin

operations with beam-collision experiments. Also, while project costs were reported to be within budget when the project was declared complete, the cost of the project had exceeded the budget by about \$32 million.

Beam Collisions Were Not Achieved at Project Completion

Although beam collisions were not yet achieved, the Office of Science approved completion of the RHIC Project and designated the RHIC as an operating facility in August 1999. At that time, Brookhaven had achieved capture, storage, and acceleration of ions in only one of the RHIC's two rings, and therefore, beam collision had not taken place. Thus, the RHIC Project was not ready to begin experimental research using colliding beams.

After August 1999, Brookhaven continued readying the RHIC for beam collisions and routine operations. Beam collisions were not achieved until June 2000, which was 10 months after the approval of project completion. Brookhaven did not request approval to begin routine operations until September 2000, and the Department subsequently approved routine operations to begin in November 2000. During the period from August 1999 to June 2000, Brookhaven expended \$66 million in RHIC operating funds. We could not determine the portion of the \$66 million expended to achieve beam collisions because these expenditures included maintenance, enhancements, repairs, and other tasks to ready RHIC for routine operations. In our opinion, a significant portion of the \$66 million was expended to obtain beam collisions.

Overhead, GPP, and Maintenance Costs Were Omitted from Total Project Costs

Also, when the RHIC Project was declared complete, the Office of Science and Brookhaven reported that total project costs were within the project's \$617 million budget. However, we determined that the cost of the project had exceeded the budget by about \$32 million, which consisted of about \$20 million of overhead costs and at least \$12 million of general plant projects (GPP) and maintenance costs that were omitted from the total project cost.

During the startup phase, Brookhaven undercharged about \$20 million of overhead costs to the RHIC Project. Specifically, Brookhaven charged overhead to the startup phase of the RHIC

Project using an incremental rate of 1.6 percent rather than the full overhead rates, which ranged between 35 and 45 percent during the startup phase. Total reported costs for the startup phase were about \$65 million.

Overhead is the indirect type expense that is not directly identifiable with a project or activity, but provides benefit to multiple projects and activities. Overhead is generally allocated to all projects and activities on some equitable basis, such as a percentage applied to direct labor or to total direct cost, in order that all projects and activities bear an equitable share of overheads. If any project is charged less than its equitable share of overhead, other projects or activities are, in effect, supplementing the cost of that project.

The Department's policy required that a project should receive its full share of contractor overhead during the research and development and startup phases. However, during the construction phase, projects were permitted to receive a smaller, incremental overhead rate that resulted only from construction activity. Despite the Department's policy, Brookhaven charged overhead to the RHIC Project during the startup phase using the incremental rate, which should have been charged only during the construction phase. As a result, the RHIC Project was undercharged about \$20 million at the expense of other Brookhaven projects and activities.

Additionally, total project costs did not include at least \$12 million of GPP and maintenance funds used for refurbishing and upgrading the abandoned ring tunnel and the experimental and support areas in which the RHIC was constructed. The refurbishments and upgrades included replacing or repairing components and infrastructure that had deteriorated or needed to be upgraded. For example, Brookhaven spent \$3.1 million to upgrade the electrical distribution, emergency ventilation, and fire alarm systems throughout the RHIC tunnel enclosure; and about \$400,000 to install earth shielding, membrane liners, and fencing at RHIC beam crossing points.

However, the Department and Brookhaven believed that the costs of refurbishing and upgrading the abandoned CBA facilities should not be included in total project costs. In responding to the draft report, management stated that the decisions to use GPP and special maintenance funds were made in accordance with the Department's project management and budget requirements and the project scope with full knowledge and agreement of Department management in

the field and at Headquarters. Management also stated that the RHIC line-item project scope included completion of the unfinished portions of the CBA facilities as well as new conventional construction work, and that the Department expected Brookhaven to accomplish all work necessary to deliver the CBA facilities in good working order for use by the project.

Despite management's contention, none of the Congressional budget requests or project planning documents indicated that GPP and maintenance funds would be used for this effort, or that upgrades to the CBA facilities would be excluded from the total project cost. This work was performed specifically for the RHIC Project and would not have been performed if the CBA facilities were not needed for the project. Therefore, the cost for this effort should have been included in the total cost for the RHIC Project.

Department Did Not Adhere to Planned Expectations for Project Completion and Ensure All Costs Were Charged to the Project

Project expectations were not fully met because the Department did not adhere to project plans that called for beam collisions to be achieved before project completion. In August 1999, after the project passed its June 1999 planned milestone date for completion, and as the project's funding limit was being reached, the Department determined that sufficient progress had been made to designate the RHIC Project as completed. At that time, the Department and Brookhaven stated that the level of performance achieved in only one of RHIC's two rings was sufficient to demonstrate that the collider was completed and would ultimately realize its long-range technical objectives.

In responding to the draft report, management stated that for the RHIC Project, the Office of Science had the discretion to define and modify the evidence required for determining when a facility has demonstrated its capability to meet its technical performance goals, and thus be declared a completed project. In August 1999, the Office of Science concluded that the RHIC's achievements were a clear demonstration of its capability to meet technical performance goals, and thus declared the project complete. Management contends that the validity of this decision is demonstrated by the subsequent technical performance of the RHIC.

We recognize that the RHIC has demonstrated performance that should ultimately lead to achieving its technical goals as an operating facility. However, the RHIC had not achieved expected beam

collisions and was not ready to begin experimental research when it was declared complete in August 1999. Department policy, consistent with sound project management principles, requires that project plans identify the point at which a project is complete and define the specific parameters for project completion.

Additionally, the Department's oversight of the RHIC did not ensure that all project specific costs were accurately charged to the RHIC Project. Specifically, the Department did not periodically review project costs to ensure that overhead was accurately charged to the startup phase of the project. Consequently, Brookhaven charged overhead to the RHIC Project during the startup phase using the incremental rate, which should have been charged only during the construction phase.

However, management contends that the \$65 million reported as startup costs was for pre-operational testing of project components in the construction phase, and not for startup costs. Thus, they were appropriately charged with the 1.6 percent incremental overhead rate established for the construction phase. In addition, management stated that no specific funds were provided for startup until Fiscal Year (FY) 1999, when Brookhaven was provided \$22.5 million for commissioning activities following approval of CD-4.

We disagree with management's interpretation that the \$65 million was not a startup cost. Project documents, including the Congressional Data Sheets, identified the \$65 million as startup cost and, as such, should have been charged with full overhead. For example, the Final Project Acceptance Report described the \$65 million as startup costs for training of operating crews; operation of subsystems upon completion of individual systems, or separable parts thereof; and, integration of all subsystem operations for the final goal of completing the construction project. This description is consistent with the definition of startup contained in Order 2200.6A. Moreover, these project costs were funded with operating funds, as is appropriate for startup activities. In our opinion, if these costs were not startup costs and were for pre-operational testing of project components in the construction phase, they should have been funded with construction funds in accordance with Department policy. Furthermore, in establishing its construction phase incremental overhead rate, Brookhaven did not consider these costs to be part of the construction phase.

We did not review the \$22.5 million for commissioning activities identified in management's response to the draft report. However, if these costs were also incurred for startup activities, they should have also been included in total project costs.

RHIC Was Not Operational and Completion Was Prematurely Reported

At the time the RHIC Project was designated as complete in August 1999, the Department did not have a fully operational facility. In fact, the facility did not meet its established goal of beam collisions until June 2000, and did not begin routine operations until FY 2001. Additionally, the Department prematurely reported to Congress that the RHIC Project had met its performance measures to be completed and to begin operations in FY 1999. These performance measures were established in accordance with the Government Performance and Results Act of 1993. Also, other Brookhaven projects and activities had to absorb about \$20 million in overhead that should have been charged to the RHIC Project, and total RHIC Project costs were understated.

RECOMMENDATIONS

We recommend, for current and future Department projects, that the:

1. Acting Director, Office of Science require that projects meet established performance expectations prior to designating facilities as completed and ready for operations; and,
2. Chicago Operations Office and Brookhaven Area Office ensure that all applicable overhead and other project specific costs are included in total project costs.

MANAGEMENT REACTION

The Office of Science agreed with the recommendations, but did not agree with the report's conclusions. Management contended that the RHIC Project was completed on time and within budget, met Departmental and Congressional expectations and guidance, and delivered on Congressional commitments with no misrepresentations. Management also maintained that the Chicago Operations Office and Brookhaven Area Office, which carried out the day-to-day oversight of the project, adequately performed their responsibilities with respect to the RHIC Project. Additionally, management stated that all applicable overhead and other project costs were included in total project costs. The Office of Science acknowledged, however, that the clarity of RHIC Project documentation could have been improved, and stated that it is committed to improving the quality of project documentation for ongoing and future projects.

AUDITOR COMMENTS

We appreciate management's commitment to improving project documentation; however, the Office of Science did not offer specific corrective actions that would be taken in response to our recommendations. Management comments on the validity of the finding, along with our responses, have been incorporated into the text of this report. We have also included management's comments in their entirety as Appendix 3.

Appendix 1

SCOPE

The audit was performed from March 2001, to November 2001, at the Brookhaven National Laboratory (Brookhaven) and the Department's Brookhaven Area Office, located in Upton, New York; and the Office of Science, Headquarters, in Washington, D.C. The audit covered the Relativistic Heavy Ion Collider (RHIC) Project, which started in 1991 and ended in 1999, and focused on the performance expectations established for project completion and use of non-RHIC funds on the project.

METHODOLOGY

To accomplish the audit objective, we:

- Researched applicable laws, regulations, contract terms, policies, procedures, and guidance relevant to the RHIC Project;
- Reviewed project planning documentation and the process for project acceptance and completion;
- Analyzed supporting documentation for tasks related to refurbishing the abandoned CBA facilities at Brookhaven;
- Evaluated accounting records and supporting documentation for overhead costs charged to the RHIC Project;
- Interviewed Department and Brookhaven personnel regarding the determination of project completion, the allocation of overhead costs, and use of General Plant Project and maintenance funds; and,
- Assessed compliance with the Government Performance and Results Act of 1993.

The audit was performed in accordance with generally accepted Government auditing standards for performance audits. It included tests of internal controls and compliance with laws and regulations to the extent necessary to satisfy the audit objective. Because our audit was limited, it would not necessarily have disclosed all internal control deficiencies that may have existed at the time of our audit. In performing this audit, we did not rely significantly on computer-generated data.

An exit conference was held with representatives of the Office of Science and the Brookhaven Area Office on January 28, 2002.

Appendix 2

PRIOR OFFICE OF INSPECTOR GENERAL REPORTS RELATING TO PROJECT MANAGEMENT

Progress of the Spallation Neutron Source Project (DOE/IG-0532, November 2001). The project's technical scope was reduced to allow the cost and schedule components to be met. The July 2001 baseline for the project did not provide for instruments to address the initially planned areas of science, complete user facilities, and critical spare parts to be available at the end of the construction project. This condition existed because the Department decided to meet the approved budget rather than ask Congress for additional funding. As a result of the scope reductions made to the project at this early stage, the facility will not provide all of the intended leading-edge user facilities and capabilities to meet the needs of the scientific community at the end of the construction project.

Audit of Renovation and New Construction Projects at Lawrence Livermore National Laboratory (WR-B-97-06, June 1997). Three projects were being pursued despite the fact that management had not demonstrated that the proposed approaches for the projects were the best alternatives for meeting the Department's missions while minimizing the cost to the Government.

Special Report on the Audit of the Management of Department of Energy Construction Projects (DOE/IG-0398, November 1996). The Department's construction plans were not always updated to reflect emerging program and mission changes resulting in the potential construction of unneeded or oversized facilities. We recommended that the Department's field project managers, in coordination with program offices and field elements, perform effective evaluations of the Department's current and future mission needs as part of the annual approval process for ongoing and planned construction projects.

Summary Audit Report on Lessons Learned from the Superconducting Super Collider Project (DOE/IG-0389, April 1996). Instruments for a new facility are difficult to estimate due to rapidly evolving technology. Therefore, a phased approach to baseline instruments was recommended. Specifically, the facility should be baselined first with an allowance for instruments. Scientific instrumentation costs should not be baselined until later when better information is available.

Audit of Construction Management at the Idaho National Engineering Laboratory (WR-B-96-03, October 1995). Seven ongoing construction projects were either not needed or larger than needed.

Audit of Construction of an Environmental, Safety, and Health Analytical Laboratory at the Pantex Plant (WR-B-96-02, October 1995). A new environmental, safety, and health laboratory was planned even though mission requirements were already being satisfied either at onsite laboratories or commercial laboratories.

Audit of Construction of Protective Force Training Facilities at the Pantex Plant (WR-B-95-06, May 1995). Construction of a physical training facility was not necessary to fulfill mission needs, and viable alternatives to constructing a weapons tactics and training facility were not considered.

Audit of the Department of Energy's Environmental Molecular Sciences Laboratory (DOE/IG-0371, April 1995). All practical alternatives were not evaluated before deciding to proceed with the construction of a new research laboratory.

Audit of Management Controls Over Selected Energy Research Major System Acquisition (CR-B-95-02, November 1994). "Other management costs" for major system acquisitions were not adequately included in the project management system and received less management attention than construction costs. Also, certain management practices did not ensure that the objectives of enduring accountability, traceability, and visibility of decisions at all levels were met.



Department of Energy

Washington, DC 20585

JAN 3 1999

MEMORANDUM FOR PHILLIP L. HOLBROOK
DEPUTY INSPECTOR GENERAL
FOR AUDIT SERVICES
OFFICE OF INSPECTOR GENERAL

FROM: JAMES F. DECKER
ACTING DIRECTOR
OFFICE OF SCIENCE

SUBJECT: Comments on Draft Report, "Relativistic Heavy Ion Collider Project"

The Office of Science (SC) has reviewed the Office of Inspector General's (IG) draft report entitled, "Relativistic Heavy Ion Collider Project." SC does not agree with the conclusions reached in the draft report. It is SC's position that:

- The Relativistic Heavy Ion Collider Project (RHIC) project was completed on time, was within budget, and met Departmental and Congressional expectations and guidance.
- The Department maintained proper oversight of the project and delivered on Congressional commitments with no misrepresentations.

SC appreciates the IG's comments and agrees with the recommendations. SC recognizes that the clarity of RHIC project documentation could have been improved and is committed to improving the quality of project documentation for ongoing and future projects to eliminate ambiguity and ensure that they fully reflect project decisions.

The decision to designate RHIC as an operating facility was fully compliant with Departmental regulations and policies:

The report states that, "...the Department did not have an operational facility in August 1999 and inaccurately reported the status of the project to Congress." since beam collisions had not yet been demonstrated as called for in project management documentation. The primary objective of the RHIC Project was to build a 100 GeV/nucleon colliding beam facility at Brookhaven National Laboratory (BNL) within the funding and schedule guidelines established by DOE. The DOE commitment to Congress was to deliver a facility capable of achieving this technical objective. The RHIC project team successfully delivered this capability in August 1999 thus fulfilling DOE's commitment to the Congress.



Printed with soy ink on recycled paper

- Department policy states that Approval to Commence Operations (CD-4) occurs when a project has demonstrated that it has the capabilities to meet its approved technical performance goals (DOE Order 4700.1). Unless otherwise specified, the program office responsible for the project has the discretion to define, and to modify, the evidence required for determining when a facility has demonstrated its capability. In this case, such a change was accepted by the Acquisition Executive as part of the ESAAB process leading to CD-4. The RHIC technical performance goals were documented in the data sheets provided annually to Congress (Section 8. Project Description, Justification and Scope). The data sheets did not specify the evidence required to demonstrate capability.
- Prior to CD-4, all systems were completely installed, connected and pretested. There was also the successful demonstration of cooldown in both rings, with capture, storage, and acceleration of gold ions in one ring (as observed by all four detectors). The Department concluded that this was a clear demonstration of capability to meet technical performance goals, since the rings were essentially identical and construction of the second ring was complete with only punchlist items and startup activities outstanding. No technical barriers or risks were identified that challenged this conclusion. This data provided the basis for the approval of CD-4 by the Acquisition Executive. The validity of this decision has been demonstrated by the subsequent technical performance of the RHIC collider. As the IG report states, "The RHIC is currently operating as a state of the art research facility."
- SC agrees that the project plan and internal project documents should have been modified to better reflect the basis for CD-4 to eliminate ambiguity.

The RHIC Project Met Cost Expectations:

It is asserted in the draft report that "During the startup phase, Brookhaven undercharged about \$20 million in overhead costs to the RHIC Project." It is believed that this conclusion was reached because of a misunderstanding of the costs identified with the "startup phase."

- The RHIC total project cost included the costs for R&D, construction, and pre-operations. The expenditures in these various categories are documented in the annual Congressional Data Sheet.
- In accordance with DOE Order 2200.6A, construction activities generally include pre-operational testing of the project components and shall exclude all non-incremental indirect or overhead costs. It does not indicate any distinction between capital funds or operating funds. Startup costs are defined in DOE Order 2200.6A as "one-time costs incurred by the integrated operating contractor during

the transition between the completion of construction and operation of the facility.”

- The IG has incorrectly identified \$65 million of pre-operations costs, which were incurred as far back as FY 1995, as startup. These costs were incurred before the completion of construction and relate to pre-operational testing of project components in accord with DOE Order 2200.6A. (In 1999, funds were clearly designated by SC for pre-operations activities. Prior to 1999, SC provided funds for pre-operations but inadvertently used the term startup, although the activities described are clearly pre-operational.)
- There were no specific funds provided for “startup” until 1999 when BNL was provided \$22.5 million for “commissioning” activities following approval of CD-4. These operating funds, appropriately, experienced the full overhead charge by BNL.

Based on these facts, we do not agree with the IG’s conclusion that the \$65 million they identified as startup costs should receive the full burdening. These costs were directly related to pre-operational activities and are therefore subject to the incremental rate only.

It is asserted in the draft report that “Total project costs did not include at least \$12 million of GPP and maintenance funds used for refurbishing and upgrading the abandoned ring tunnel and the experimental and support areas in which the RHIC collider and detectors were constructed.” Funding decisions involving the use of GPP and maintenance funds in matters peripheral to the RHIC project were made in accordance with DOE project management and budgeting requirements and the project scope with the full knowledge and agreement of DOE management in the field and at headquarters. In particular, GPP and maintenance funds were appropriately used to refurbish and maintain the ISABELLE/CBA facilities.

- The RHIC line item project scope included completion of the unfinished portions of the ISABELLE/CBA facilities as well as provide for new conventional construction work.
- DOE expected BNL to accomplish all work necessary to deliver the former ISABELLE/CBA facilities in good working order for use by the project. These costs were correctly excluded from the total project cost for RHIC.
- Refurbishment of the tunnels, utilities, and other partially completed infrastructure with GPP and maintenance funding was an up-front programming decision by DOE. The original RHIC Schedule 44 (Congressional Data Sheet) included the use of these existing facilities and provided no funding for their refurbishment reflecting this decision.

SC Maintained Oversight of Project Activities and BNL Adhered to Project Plans:

It is asserted in the draft report that “Project expectations were not met because the Department did not provide adequate oversight and Brookhaven did not adhere to project plans to ensure that beam collisions would be achieved before project completion.” DOE oversight of the RHIC project was intense.

- A DOE project office was established prior to the start of RHIC construction within the Chicago Operation Office’s (CH) Brookhaven Area Office (BAO).
- The DOE project office, with substantial support from DOE field staff, provided the primary means for day-to-day oversight of the RHIC project. This office conducted weekly meetings, monthly status reviews, and numerous reviews throughout the duration of the project.
- The SC Project Officer was in weekly, and for some periods daily, contact with the project management, and SC conducted comprehensive 3-day, semi-annual project reviews with committees made up of DOE field and headquarters staff and technical consultants.
- *The total program of oversight was robust and adequate to ensure that DOE field and headquarters staff were accurately informed on the status of the project at all times.*
- There was no failure of oversight on this project. Furthermore, there were no misrepresentations made to Congress regarding the RHIC project.

IG Recommendations:

The draft report recommends that the “Acting Director, Office of Science, require that projects meet established performance expectations prior to designating facilities as complete and ready for operations.” While SC takes no exception to this recommendation, it is important that SC’s position is not misunderstood.

- At the beginning of a project, the technical performance goals of the final facility must be clearly and unambiguously stated.
- To obtain CD-4, the facility must demonstrate the capability to achieve all the technical performance goals after operations begin.
- Performance goals considered critical to the demonstration of capabilities should be identified as Milestone (Critical Decision Point) in the Project Plan.

-
- SC will take greater care to exercise change control to assure all project documentation is consistent through the life of the project.
 - SC will continue to take great care in the formulation of facility technical performance objectives described in Congressional Data Sheets. In addition, SC will ensure that the purpose of project performance goals described in project management plans and other documents is clear, i.e., that these goals are defined to ensure that the project can ultimately meet the authorized technical performance objectives.

The draft report also recommends that the "Chicago Operations Office and Brookhaven Area Office ensure that all applicable overhead and other project costs are included in total project costs." SC agrees with this recommendation. SC maintains, as evidenced above, that the Chicago Operations Office and Brookhaven Area Office performed their responsibilities with respect to the RHIC Project. All applicable overhead and other project costs were included in the total project costs, and DOE line management provided the proper oversight and management of this project.

If you have any questions or need additional information, please call Dennis Kovar on (301) 903-3613.

CUSTOMER RESPONSE FORM

The Office of Inspector General has a continuing interest in improving the usefulness of its products. We wish to make our reports as responsive as possible to our customers' requirements, and, therefore, ask that you consider sharing your thoughts with us. On the back of this form, you may suggest improvements to enhance the effectiveness of future reports. Please include answers to the following questions if they are applicable to you:

1. What additional background information about the selection, scheduling, scope, or procedures of the audit would have been helpful to the reader in understanding this report?
2. What additional information related to findings and recommendations could have been included in this report to assist management in implementing corrective actions?
3. What format, stylistic, or organizational changes might have made this report's overall message more clear to the reader?
4. What additional actions could the Office of Inspector General have taken on the issues discussed in this report which would have been helpful?

Please include your name and telephone number so that we may contact you should we have any questions about your comments.

Name _____ Date _____

Telephone _____ Organization _____

When you have completed this form, you may telefax it to the Office of Inspector General at (202) 586-0948, or you may mail it to:

Office of Inspector General (IG-1)
Department of Energy
Washington, DC 20585

ATTN: Customer Relations

If you wish to discuss this report or your comments with a staff member of the Office of Inspector General, please contact Wilma Slaughter at (202) 586-1924.

The Office of Inspector General wants to make the distribution of its reports as customer friendly and cost effective as possible. Therefore, this report will be available electronically through the Internet at the following address:

U.S. Department of Energy, Office of Inspector General, Home Page
<http://www.ig.doe.gov>

Your comments would be appreciated and can be provided on the Customer Response Form attached to the report.