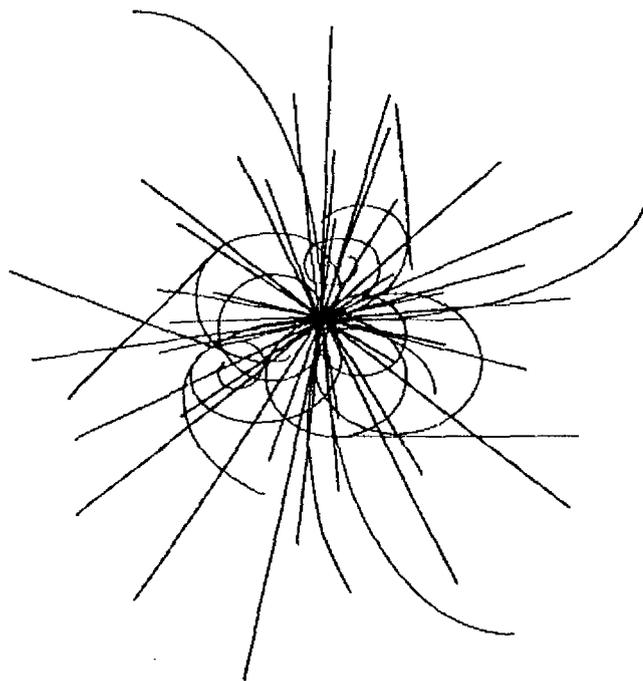


SSC PROJECT
MONTHLY PROGRESS
REPORT
NOVEMBER 1989



SSC PROJECT

MONTHLY PROGRESS REPORT

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EXECUTIVE SUMMARY

The SSCL continued to work on the Site Specific Conceptual Design Report (SCDR), the Baseline Cost Estimate (BCE), the Supplemental Environmental Impact Statement (SEIS) and the Project Management Plan (PMP) during November. The BCE is higher than the cost estimate developed for the 1986 CDR for several reasons. Among these: the 1986 estimate did not include the cost of developing a mass-producible magnet, tooling for cold testing magnets at the manufacturer's facility, and underestimated the cost of labor. Informal reviews of the BCE were held with members of the OSSC. Copies of the SCDR (version 2) and the PMP (Revision 3) were sent to OSSC in late November.

The Request for Proposals for the Cryogenic System has been released. The deadline for proposals was extended to February 19, 1990.

Quench testing of Magnet DD0026 indicated performance at short sample and reasonable training behavior, even though the prestress was low due to the high manganese content of the stainless steel collars.

The RFP for the AE/CM procurement was completed and is ready for release upon concurrence of the Source Selection Official.

Thirty-nine new employees were hired and a similar number of job offers were accepted in November. The Laboratory consolidated almost all of its activities into the Stoneridge Business Park. The Directorate, Accelerator and Conventional Construction all moved into the new Building 4, completing its occupancy. Buildings 1 and 2 are being modified to accommodate the Magnet Division, Finance and Personnel.

Twenty-two detector R&D proposals were considered by an international review panel and fourteen were recommended for at least partial funding. Sixteen additional proposals were received, dealing mainly with data acquisition and computing. These interact strongly with laboratory objectives and will be considered in January by two separate committees.

A Benchmark Working Group has been created to develop a strategy for comparing the performance of various computer systems in areas important to the SSC community.

TECHNICAL SYSTEMS (WBS 1.0)

ACCELERATOR SYSTEMS (WBS 1.1)

(SEE SECTION 4.0 - R&D PRE-OPERATIONS)

MAGNET SYSTEMS (WBS 1.2)

• MANAGEMENT AND SUPPORT (WBS 1.2.1)

Reviewed and scrubbed the Baseline Cost Estimate (BCE) for the SCDR configuration. Compared the BCE with the 1986 CDR cost estimate to identify the variances and the reasons therefore. There has been an increase in the estimate when comparable design configurations are considered. The 1986 CDR cost estimate did not include the development cost of converting a magnet laboratory design into a manufacturing design that is mass-produceable, it used manufacturing labor rates that did not consider the full impact of industrial overheads and profits, it did not contain any tooling for cold testing the superconducting magnets at the contractor's production facility, and it did not allow for sufficient direct support labor to complement the direct touch labor.

• HEB MAGNETS (WBS 1.2.2)

A Conceptual design of these magnets has been completed by a team at Fermilab. This design has been used to support the SCDR and its cost estimate. As a conceptual design, it needs extensive evaluation. These magnets have special requirements such as dipolar operation and rapid cycling that suggest an approach different from the collider particularly in the area of refrigeration and cable construction. An internal review of this design and alternate designs are being prepared.

• COLLIDER MAGNETS (WBS 1.2.3)

TEST

The test program encountered some difficulties in the test stand operation in November which slowed our progress a bit but were resolved by the end of the month. The program has switched to a re-test of magnet DD0019 following the failure of a cryostat transition piece in DD0026 near the end of October; after two quenches (reported last month) resistance developed in the superconducting leads which prevented further testing at that time. Magnet DD0026, which had had its transition pieces replaced, was then re-cooled for further tests. Following quench testing at 4.35K, attempts to run at reduced temperature were hampered by a large temperature gradient across the magnet. Investigation revealed that the source of the problem was a pressure relief valve ('Kautzky valve') at the return end of the magnet which was leaking warm helium gas into the single phase region. A similar valve had previously failed at the feed end of the magnet during a strain gauge run and was replaced. Subsequent investigation also showed that the relief valve at the feed end of magnet DD0019 (stand 5) was leaking and probably the source of the troublesome lead behavior. Replacement of the valve on the return end of stand 4 (magnet DD0026) resulted in the return of the normal temperature difference between the helium inlet and exit ends of the magnet.

• COLLIDER MAGNETS (WBS 1.2.3) - Continued

TEST (continued)

The quench testing of magnet DD0026 during November included two test cycles separated by a brief interval in which the magnet was warmed to ambient temperature. In the first test cycle, the magnet was first operated at 3.5K as part of the ongoing study of conditioning. Unlike magnet DD0019, the first quench of DD0026 occurred at 6493A during the first conditioning cycle. A second quench was then taken at 6552A while the magnet was still at 3.5K. The helium temperature was then raised to a nominal 4.35K and several more quenches were taken.

They reached a plateau of about 6710A, consistent with short sample predictions, at the fourth quench.

The second test cycle was run without a conditioning cycle. The first quench at 4.35K was at a current of 6586A; the second quench was at 6713A consistent with the previous plateau. The 4.35K testing continued for two more plateau quenches and a strain gauge run. The single re-training quench was above the nominal 6500A collide operating current.

Attempts to take quench data at 3.8K were hampered by a heat leak from a pressure relief valve at the return end of the magnet (as described above). Three quenches were taken at currents between 7085A and 7354A in which the temperature of the magnet at the quench origin was not well determined. A final quench was taken at 7408A (at a temperature of 3.5K) following replacement of the failing relief valve.

Analysis of the strain gauge data for magnet DD0026 is proceeding. The warm pre-stress measurements for the inner coil averaged about 8000psi, at the lower end of the desired range. The loss of pre-stress following cooldown to 4.4K was nearly 5000psi, about 25% greater than previous magnets. This is ascribed to the high manganese content stainless steel used in the collars: these collars contract nearly 40% less than the normal collars. The stress versus magnet current data reveals that the clamping force at the operating current is smaller than desirable and hence can help explain the training behavior. Even with pre-stress at levels lower than we are comfortable with, the training and re-training performance of this magnet is quite reasonable.

Efforts with the MAGCOM database were centered on re-establishing the system and network access as the Sun computers were installed and brought into operation at the SSC Lab. A revised magnet naming convention was created that allowed greater flexibility for magnet types and builder codes. A field data entry system was developed in conjunction with the QA/QC Group for use in gathering wire and cable data at the manufacturer. It is PC based; the data are transferred to the main database through use of conversion routines which have been created. The development of online query procedures to allow users to display information about specific cable or magnets is now underway.

Recruiting efforts continued. Four candidates for the position of magnet test physicist were interviewed and offers were made. One refusal has been received while two other offers are still pending.

• COLLIDER MAGNETS (WBS 1.2.3) - Continued

QA

In the Magnet Systems Division Quality Assurance Group, essentially all effort was expended in the area of Collider Magnets.

Database Development continued, primarily concerned at this time with superconducting wire and cable.

Several meetings were held and one trip to Brookhaven was made in connection with development of requirements for the superconducting cable. Several refinements were suggested and some areas require additional study. There was also considerable discussion relative to the imposition of Statistical Process Control requirements on certain suppliers of components, beginning with the wire manufacturers. These stipulations, when developed, will be stated in RFQ's or specifications or both. Each manufacturing process must be given consideration as the amount and type of SPC applied.

Preliminary specification drafts were completed on NbTi superconducting wire. Visits to the wire and cable suppliers are expected to be made in December or January.

Beam Tube quality continues to be a concern. Standards on handling, cleanliness and shipping are needed, as well as improved handling facilities for the completed tubes.

Beam Tube plating standards and specifications are being addressed. Considerable developmental work that is necessary in this area has begun.

MSD QC personnel continued assignments at BNL and FNAL. Several Inspection Requirement Summaries are in process. Significant development of requirements has been accomplished on the Cold Mass Assembly into the Vacuum Vessel and on Cryostat Assembly and Testing, as well as Re-entry Post Assembly. Each QC member has been assigned areas of responsibility for development of inspection data for the SSCL.

MANAGEMENT

Continued efforts with the Collider Dipole Acquisition Plan. A rough draft was reviewed with DOE. Comments are being incorporated for the official submittal in December.

ENGINEERING

The drawing office activities have concentrated on the completion of the cryostat documentation. Completion of these drawings will be achieved by December 5, 1989. Some of the delay has come from the lack of consistent drawing standards which has been resolved. The cold mass drawings have been transferred to SSCL from the CDG in Berkeley. The selection of a laboratory wide CAD system is presently a pacing activity. A draft specification has been reviewed and is being extensively expanded and reorganized.

An analysis of the dipole quench performance has been completed. This analysis indicates that the latest design margin of 0.4K (corresponding to a 6% margin along the load line) promises the magnet performance required. Demonstration of this margin however awaits the return of 1.3:1 strand material into prototype magnets and improvements in the ramp splice.

• COLLIDER MAGNETS (WBS 1.2.3) - Continued

ENGINEERING - continued

Analysis has begun on the stability of the coil winding against buckling particularly during the collaring process. An understanding of the limits of this effect has a direct influence on the evaluation of the higher prestresses being considered.

In order to focus all the issues relating to the cryostat, a project team has been established. This scope of this team includes support post design, dynamic loading, alignment techniques, evaluation of the cross flow cooling technique and thermal stress limits during cooldown. Several alternate support post designs are presently being evaluated. Careful attention is being given to the optimization of the stiffness versus the cryogenic performance. The present design while being very thermal efficient, uses special materials and may be marginal with regards to stiffness.

• MAGNET FACILITIES EQUIPMENT AND TOOLING (WBS 1.2.4)

A plan was developed to establish a magnet "workshop" at the SSC Lab in Dallas. The ultimate objective is to disassemble magnet DD018 to confirm BNL's diagnosis of the location of dielectric faults. However, this task will provide SSC Lab personnel with the opportunity to get "hands on" experience with superconducting magnets early in 1990.

Production Engineers traveled to Fermi Lab to observe equipment and tooling in use during coil wind, cure and collaring, and cold mass skinning.

The collaring press redesign is complete and the RFP will be submitted to procurement in December.

Cure press design work continues with plans to complete in January 1990.

A cost and delivery estimate has been received from Ansaldo for a race track style coil winder. Bob Malnar will visit Ansaldo in December to evaluate the equipment and vendor capability.

Request for quotes on the skinning press were sent out by Purchasing. The bids from vendors are due in on December 7th. It is very likely that site surveys will have to be performed on some vendors to establish their qualifications to build the press (12 of the 22 vendors bidding are unfamiliar to the National Labs).

The RFP for the Cryogenic System was released November 20. A pre-proposal conference was held December 5. The most significant result of the session was the agreement to extend the proposal preparation period 4 weeks to February 19, 1990. The proposal review period will be reduced to minimize schedule impact.

• **MAGNET FACILITIES EQUIPMENT AND TOOLING**
(WBS 1.2.4) - continued

Work continued on the definition of the Magnet Test Laboratory. The first draft layout of the MTL Facility was reviewed on November 30th. As currently planned, the MTL Facility will accommodate the following functions:

Cold Test with Capability for...

- 100% test of preproduction magnets
- 10 to 15% of magnets at peak production
- R&D test of magnets
- Life cycle test
- 1/2 cell test (will require minor modification to facility)

Warm Test with capability for 100% test of magnets at peak production.

Vertical Test including...

- 1 station for short sample test of cable
- 1 station for magnetization test of cable
- 2 stations for R&D test of short magnets

Engineering Test Lab including...

- SEM
- Tensile test
- Metallography
- etc

CONVENTIONAL CONSTRUCTION (WBS 2.0)

DIVISION MANAGEMENT & ADMINISTRATION (2.6.1.1)

Division Mgmt & Admin.

Includes the cost of Conventional Construction Division Management and Administration activities and other associated direct costs.

In addition to ongoing efforts, Invoice 3 activities include technical editing support to SCDR activities and MDL Design Criteria Documents..

PROJECT CONTROLS GROUP MGMT & ADMINISTRATION (2.6.1.2)

Group Mgmt & Admin.

Includes the cost of CCD Project Controls Group Management and Administration activities and other associated direct costs.

Cost Estimating Section

Includes labor for CCD Project Controls Group cost estimating activities.

- Continued Cost Account Planning Sheet data entry to EASYTRAK of the REV. 0 Division Budget.
- Supported Cost Account Managers (CAM's) in preparing Revision 1 of the Division Budget for submittal to Project Management.
- Supported PMRS in continuing CAM Training Workshops.

Scheduling Section

Includes labor for CCD Project Controls Group scheduling activities.

CSCS Reporting Section

Includes labor for CCD Project Controls Group CSCS reporting activities.

- Continued CAP sheet data entry to EASYTRAK. Tested and evaluated various methods of data entry, file structuring and organization. Further developed logic for construction activities.
- Revised CAP sheets and budget planning to transfer Project Master Schedule responsibilities to PMRS Group.

CONVENTIONAL CONSTRUCTION (WBS 2.0)

(CONTINUED)

- **DESIGN OVERSIGHT GROUP MGMT & ADMINISTRATION (2.6.1.3)**

Group Mgmt & Admin.

Includes the cost of CCD Design Oversight Group Management and Administration activities and other associated direct costs.

- Work on engineering standards committee to develop A Laboratory plan for document control, title blocks, etc. - ongoing.
- Work on Project Procedures Manual for Book 3, Design Management - a plan for interface and coordination in design-related areas between SSC Lab Divisions and A-E/CM - ongoing.
- Maintaining continuity on activities within design oversight, including participation at meetings and intermittent review of on going work; interfacing with TNRLC on regional planning activities; representing the Laboratory for presentations to certain outside groups.

- **CONSTRUCTION OVERSIGHT GROUP MANAGEMENT & ADMINISTRATION (2.6.1.4)**

Group Mgmt & Admin.

Includes the cost of CCD Construction Oversight Group Management and Administration activities and other associated direct costs.

Activities include reconfiguration of the Conventional Construction Project Procedures Manual.

- **MAJOR STUDIES (2.6.2)**

Building Space Requirements

Identification of operational stage SSC building population levels and building space program requirements.

- Surface Facilities Update Memorandum Report was issued October 18, 1989.
- Completed full documentation report on Surface Facilities Programming to an 85% level.
- Additional refinement will carry this work element well into December.

CONVENTIONAL CONSTRUCTION (WBS 2.0)

(CONTINUED)

Utility Requirements

Identification of SSC utility requirements (water, sewage, electrical, HVAC, communication, natural gas, compressed air, and solid waste).

Work was in progress this period on the following elements:

- The draft report on SSC Water and Sanitary Sewer Study was circulated for Division review and revised to incorporate comments and current estimates of flows. This report was revised to incorporate new input data on SSC water demand estimates from the SCDR draft.
- Studies addressing SSC electrical supply requirements continued and a Memorandum Report on construction power requirements was issued for review and comment.

Overall Site Development Plan

Prepare an overall Site Development Master Plan Report for the entire SSC fee simple land area which will serve as guidance to the A-E/CM contractor and the DOE 4300.1B Site Development Planning requirement.

Preliminary site development studies and general planning guidelines are currently under development and will continue until March 1990.

Vegetative Stabilization Program

Will involve site specific study and design of revegetation and stabilization of SSC spoils disposal sites located at service areas and the east and west campus sites.

This element will be primarily accomplished by a subcontractor who has not yet been selected. During this period contractor proposals were evaluated. Final approval of the procedure to be followed in selecting a contractor is currently underway.

Study Management

Provides for the CCD Special Studies Manager's oversight and direction of all 2.6.2 major study assignments.

Work accomplished during this period consisted of the Special Studies Manager oversight and direction.

Metrication Impact Study

The study of the impacts of engineering and constructing the SSC conventional facilities within the metric (SI) system of units was made and a report issued.

CONVENTIONAL CONSTRUCTION (WBS 2.0)

(CONTINUED)

- **DESIGN CRITERIA (2.6.3)**

This account covers work for the SCDR, Baseline Cost Estimate, and preparation of design criteria for use by the A-E/CM, all associated with conventional construction facilities.

Baseline Cost Estimate

Baseline Cost Estimate effort completed in November as budgeted. Ongoing updates and revisions are budgeted and will be charged under Control Division B03.

Design Criteria

- The second draft of the SCDR was reviewed to coordinate writing for conventional facilities with that of technical systems.
- Coordinated facility requirements with cost estimates.
- Developed format for giving outline criteria and program data to A-E/CM.

- **CONFIGURATION MGMT & INTERFACE CONTROL (2.6.6)**

Configuration Management

Establishment of the format of Interface Requirements Drawings and Interface Control Drawings and coordination with the Design Criteria effort.

This effort is not anticipated to begin until December, 1989.

Interface Control

Configuration Control Board activities and Change Proposal evaluation.

This effort is not anticipated to begin until April, 1990.

- **GEOTECHNICAL PROGRAM (2.6.8)**

Program Oversight

CCD program development and oversight of Geotechnical Site Investigations.

- Geotechnical field activity began again on November 10. Testing will begin with the delivery of samples. This effort has continued into December. The corings for the east cluster were completed, and work continues at the injector area, thence proposed shaft locations.
- CCD has provided representation and input in planning for the First Tunnel Segment, and instrumentation shaft, and associated geotechnical exploration and testwork.

CONVENTIONAL CONSTRUCTION (WBS 2.0)

(CONTINUED)

- Work has proceeded in planning for a UTAP meeting in December, including preparation of a checklist status report of prior UTAP recommendations.

- **A-E/CM SELECTION & CONTRACT ADMINISTRATION SUPPORT (2.6.10)**

Activities include:

- Administrative support for the A-E/CM Selection Board
- Support in development of A-E/CM contract Scope of Work.

Division Mgmt & Admin

Activities include administrative assistance to the A-E/CM Selection Board.

Construction Oversight Group

Activities include support to the A-E/CM Evaluation Board as Technical Advisor.

- **SEIS SUPPORT (2.6.12)**

SEIS Support Management

This element provides for the CCD SEIS Support Manager's oversight and direction of all 2.6.12 SEIS Support assignments and also creates a fund for yet to be assigned FY90 SEIS support tasks.

- Meetings were held with ANL to answer questions about the CCD Supplemental Environmental Impact Statement Data Requirements submittal to ANL (Volumes I, II, III, and IV) dated October 20, 1989 and transmitted by the SSCL/EA) on October 25, 1989. Additional refinement and checking of ANL October 25, 1989 submittal was accomplished.

SEIS Spoils Management

This element has been authorized by the SSCL/EAO as a needed study to define SSCL policy and design approach for Spoils Management/Visual Landscape Enhancement for the E and F Service Sites, Experimental Hall sites, and the east and west campus sites. The study is an environmental based approach which assures minimal environmental impacts and identifies appropriate mitigation.

- A draft report was issued October 20, 1989 and was included as Volume II of the Supplemental Environmental Impact Statement Data Requirements submitted to Argonne National Laboratory (ANL) on October 25, 1989 by the SSCL/EAO. Additional refinement and checking of ANL October 25, 1989 submittal was accomplished.

CONVENTIONAL CONSTRUCTION (WBS 2.0)

(CONTINUED)

SEIS Ecological Data

This element responds to ANL's requirement that the SSCL be responsible for assembling all available ecological base data on the SSC site area with respect to certain endangered plant or animal species and other concerns.

- The SSCL/CCD submittal to ANL dated October 20, 1989 and transmittal October 25, 1989 provided all available data on this subject. Additional refinement and checking ANL October 25, 1989 submittal was accomplished.
- Outstanding work may involve a field walk-over survey scheduled to occur when property access authorization is granted by the TNRLC.

SEIS Infrastructure Data

This element responds to ANL's requirement that the SSCL be responsible for assembling data on the location and environmental consequence of all off-site infrastructure elements required to provide needed services to the SSC.

- The SSCL/CCD submittal to ANL dated October 20, 1989 and transmitted October 25, 1989 provided preliminary data on off-site infrastructure routing to serve the SSC. Additional refinement and checking of ANL October 25, 1989 submittal was accomplished.

SEIS Construction Planning

This element responds to ANL's requirement that the SSCL be responsible for providing details of the SSC construction process and schedule as a means of evaluating potential air, noise, or other environmental impacts during the construction stage.

- The SSCL/CCD submittal to ANL dated October 20, 1989 and transmitted October 25, 1989 provided preliminary data on the SSC construction process and schedule. Additional refinement and checking of ANL October 25, 1989 submittal was accomplished.

- **MISCELLANEOUS RTK SUPPORT (2.6.13)**

Miscellaneous RTK support other than geotechnical and survey activities have included continued effort in working the collider ring and profile, and experimental hall modeling. These activities will continue.

PROJECT MANAGEMENT AND SUPPORT

(WBS 3.0)

PROJECT MANAGEMENT (WBS 3.1)

• PROJECT MANAGEMENT OFFICE (3.1.1)

During the month of November, the major emphasis in the Project Office was continuing effort on the Supplemental Environmental Impact Statement, Site-Specific Conceptual Design Report, the Cost Estimate and the Project Management Plan.

On the Project Management Plan, we revised the project control milestones into three levels consistent with the current overall project schedule. The level one milestones are controlled by OSSC, the level two milestones are controlled by OPO, and the level three milestones are controlled by the SSCL Project Management Office. There are 18 level 1 milestones, 53 level 2 milestones, and 100 level 3 milestones. Because of continuing work and review of the cost estimate, that section was not revised from the Draft, Revision 3. The Draft, Revision 4, was released on November 30.

During the month of November, work continued on the cost estimate. Informal reviews were held with members of the OSSC on November 6-7, 1989, and there was a briefing at headquarters on November 9. Major emphasis for the month has centered around reviewing the cost of various elements of the current estimate and understanding the changes from the CDR estimate.

On the Site-Specific Conceptual Design Report, the second draft was completed on November 22, 1989. Several copies of this draft were sent to OSSC on November 30, 1989.

During the month of November, work continued on the Supplemental Environmental Impact Statement. A meeting was held with DOE, ANL, and the SSC on November 13-14, to discuss the data released by SSCL and other data requirements to complete the draft. Additionally, we have arranged for and held the ecological "windshield walkover" of the area impacted by the new footprint with U.S. Fish and Wildlife Service and Texas Parks and Wildlife. This meeting was held November 28.

Additionally, the first draft of the Document Control Management Plan was reviewed and issued November 15. The final draft of the Document Numbering System was issued to and discussed with the Engineering Standards Committee. It is currently anticipated this system will be issued Laboratory wide in December.

• PMRS DEVELOPMENT (3.1.2)

A training schedule for C/S² was developed and approved by SSCL management. Courses were started with SSCL management and will continue through all Cost Account Managers starting in November. EASYTRAK training will continue with the necessary SSCL Managers in December.

The majority of the activities for the month centered around scheduling. The goals of this activity is to orient all schedules around the approved WBS so that they can be summarized upward and show all milestones. It is anticipated that low level detail scheduling will continue

PROJECT MANAGEMENT (WBS 3.1)

- **PMRS DEVELOPMENT (3.1.2) Continued**

through December and January. However, based on the previous scheduling activities, a level 4 summary schedule has been developed which will be used to calculate funding profiles and escalation. This current schedule shows an eight year, one month construction duration on the current footprint. With the issuance of this schedule, some interference problems with CCD were discovered. Previous to this schedule, CCD had scheduled the main tunneling by the types of soil. With a change of the CCD Work Breakdown Structure, all tunneling is scheduled by sectors. This is consistent with the other Laboratory Divisions at lower levels of the project WBS.

During the month, the Draft War Room Implementation Plan was revised and issued. With the approval of this plan, implementation is scheduled to commence in December. We would like to have the War Room up and operational by the end of February. Several locations for the War Room are being considered. When Project Management moved to the new building, a conference room was reserved for this purpose. Since that move, it appears this room will be too small for a full War Room and is currently used as a Project Management Conference Room.

- **QA MANAGEMENT SYSTEM (3.1.3)**

No activity for the month of November.

- **CONSTRUCTION CONFIGURATION MGMT. SYSTEM (3.1.4)**

Construction Configuration Management was involved primarily with tunneling aspects and revision of the Site-Specific Conceptual Design during November. The tunneling work involved definition of the High Energy Booster lampshade tunnel profile. Other tunneling work involved refinements in the general site geotechnical data and investigation requirements and definition of the first tunnel segments.

Other work included definition of the surveying requirements. The primary survey will be the responsibility of TNLRC and the high precision master survey will be the responsibility of RTK. Our desire is for the surveying to commence as soon as possible after the release of the footprint by DOE. The initial surveying is required for land acquisitions and the tunnel first segment planning.

- **COST ESTIMATING (3.1.5)**

The major emphasis for November centered around completing the Site-Specific Conceptual Design Review Cost Estimate and understanding the cost differences from the 1986 Conceptual Design Report. Additionally, exercises were completed for determining the funding profiles and budgets for the various scenarios studied. Early costs and schedules were discussed with DOE on November 6-7, 1989. Since that discussion, numbers have been refined and several other less costly cases analyzed.

PROJECT MANAGEMENT (WBS 3.1)

- **COST ESTIMATING (3.1.5) - continued**

Additional work has included the start and revision of a Work Breakdown Structure Dictionary. This Dictionary, at WBS level 4 and above, discusses the various elements and requirements for each project element.

- **SYSTEMS ENG. & INTEG . (WBS 3.2)**

- **SYSTEMS ENGINEERING MANAGEMENT (3.2.1)**

During November, the lower level Work Breakdown Structure of WBS 3.2 was completed to reflect support for the technical divisions. Also, work continued on the SSCL Configuration Management Plan and the System Engineering Management Plan (SEMP). The first draft of the SEMP was distributed for review on November 20. The first draft of the Configuration Management Plan is scheduled to be released on December 8. System Integration support is also given to PMRS in assisting with critical path scheduling. Specifically, the System Engineering effort is with interfaces and logistics.

- **SE SUPPORT TO ASD (3.2.2)**

People on assignment to the Accelerator Division are reviewing hardware requirements and parameters for each of the subsystems to ensure it is consistent with the Site-Specific Conceptual Design Report. This work will lead to the generation of a requirements matrix whereby we can determine the hardware and software specification and interface control documents required for the system. Additional work added to this requirement at the end of the month was system software analysis and specifications.

- **SE SUPPORT TO MSD (3.2.3)**

Work in the Magnet Division has included reviewing the differences between the current draft collider dipole specification and the 1986 version. This work will ensure that all necessary requirements are included in the current draft and lead to an understanding of the differences. Other work includes reliability assessment for collider dipole magnets.

- **SE SUPPORT TO PHYSICS (3.2.4)**

No activity for the month of November.

PROJECT ADMINISTRATION AND SUPPORT

(WBS 3.3)

• ADMINISTRATION SYSTEMS & SUPPORT (WBS 3.3.1)

In addition to management of the ongoing activities in Administration Systems and Support, considerable effort went into preparing for and negotiating with the DOE Contracting Officer regarding relocation issues. We also requested the shortening of the retirement contribution waiting period from two years to six months. DOE has similar requests from other labs and is working on an overall solution.

We reviewed and critiqued lab salary survey. We will probably forward this to DOE-Chicago with requests for specific actions in December. Reviewed Procurement Department organization and management structure in an effort to enhance performance.

• ACCOUNTING AND FINANCE (3.3.2)

The Financial Systems Integration Office revised the method with which to transfer costs. The first draft of the procedures manual was completed. The monthly report package was reviewed and a list of major reports for inclusion in the Procedures manual was prepared. The office continued to assist in refining the Budget/Procurement interface, and worked on finalizing the Capitalization Policy. Implementation of Electronic Funds Reimbursement for travel expense was begun.

The Accounting Operations Office successfully completed the first month end closing process; including CS² interface. The Electronic Banking link was completed. The methodology for proposed G/A allocations was determined. The preliminary work to establish ACH with Provident Bank Corporation of Texas was completed. 1200 accounts payable vouchers were processed. The direct deposit of payroll checks was set up. The laboratory policy for capitalization of plant and capital equipment and the laboratory policy to account for purchases of computers were finalized. These policies are to be presented to the Deputy Director on Monday, December 4, 1989. The percentage markup necessary to establish a reserve sufficient to stock expendable supplies at the optimum level was prepared. Direction was given to Property Management on the inventory of capital items scheduled for mid-December.

The Budget Office published the first set of monthly Deltek reports. High level budget planning worksheets were developed and published for laboratory wide use in budget iterations.

• PROCUREMENT (3.3.3)

The Request for Proposal (RFP) for the AE/CM procurement was completed and is ready for release upon concurrence of the Source Selection Official of the short list recommended by the Source Evaluation Board.

PROJECT ADMINISTRATION AND SUPPORT

(WBS 3.3)

• PROCUREMENT (3.3.3) - continued

The RFP for the MDTL Cryogenic System was released to industry as well as the RFP for Special Tooling. The Food Services RFP was issued to eight DBE's in a set aside procurement. Travel services agencies were surveyed for interest to provide service to the SSCL and sufficient DBE's were identified to set aside the procurement for DBE's.

The basic system level Advanced Procurement Plan was completed as well as templates for individual contract annexes to the plan.

Preparation of standard procurement practices is proceeding on schedule along with preparation of standard contract terms and conditions.

• TRAVEL DEPARTMENT (3.3.4)

During the month of November the Travel Department completed the following:

- Transferred all expense vouchers to the Accounting Department
- Trained new accounting clerks
- Worked with Accounting to set up procedures for expenses
- Helped to write the RFP for the travel agency with Procurement

• PERSONNEL (3.3.5)

The Personnel Department went through a major restructuring during November. As a result, each division now has an inhouse Personnel Administrator assigned from the Personnel Department. By working closely with the functional experts in the Personnel Department, the Personnel Administrator acts as a key link to the divisions. While primarily involved in the ongoing recruiting efforts, the Personnel Administrator is exposed to general personnel issues and brings such issues to the attention of the appropriate functional staff in the Operations, Compensation, Benefits and Employee Relations areas. This new approach has resulted in more timely responses to specific divisional needs.

During November, recruiting continued well with 36 job offers accepted and the hiring of an additional 39 employees laboratory-wide. The Personnel Department staff continues its development of the Personnel Policy and Procedures Manual and expects to submit the document to DOE for approval in January. Progress also continues in developing broader health-care options for SSCL employees, and a new performance appraisal system which is to be implemented in early 1990. We are also working closely with the Directorate on a more refined program for recruiting scientists into the laboratory.

PROJECT ADMINISTRATION AND SUPPORT

(WBS 3.3)

- **PERSONNEL (3.3.5) - continued**

The approval for joining the Argonne Credit Union is taking longer than expected due to bureaucratic delays in Illinois and the agreements that must be reached with Texas. We project a start date of mid-January for employees to join the Credit Union.

This month was also marked by intensive interaction with DOE on many personnel issues with particular focus on compensation and relocation. As a result, new internal procedures and policies are being developed to provide concrete answers to managers and staff in a more timely manner.

- **STAFF SUPPORT SERVICES (3.3.6)**

The Support Services Department's major thrust for the month of November was the relocation of employees to centralized laboratory locations. These moves put divisions in two central locations at 2550 Beckleymeade Avenue and 8901 Autobahn. Procurement and DOE are housed in the DeSoto Bank Bldg. at 1801 N. Hampton.

We continue to address security needs for the laboratory in the area of equipment security and safety services, as well as formulating a disaster plan for the laboratory as related to public affairs. There has been ongoing coordination with Procurement and the food vendors to secure a food service for the cafeteria. We have had interaction with the North Texas Commission on special events planning for laboratory employees. Policies and standardized practices have been developed for maintenance, general services and security of all vehicles.

- **MINORITY AFFAIRS (3.3.7)**

The Office of Minority Affairs continued its aggressive outreach program by making minority procurement presentations at the SSC vendor seminars in DeSoto, Waxahachie and Southern Dallas (approximately 1000 attendees). Continued extensive meetings scheduled with community, state and national DBE/WBE representatives including major keynote addresses and meetings with minority chambers and other organizations.

The director traveled to Washington, D.C. for meetings with DOE officials on goals, subcontracting plans, schedules, and also met with the EEOC Commissioner to review EEO/AAP policy monitoring. While in Washington, the director also participated in the DOE/SSC Socioeconomics Committee session held at DOE offices.

Hiring of the EEO Manager was completed and an early December startup for hiring and monitoring is anticipated. The director will meet with the District Director, Office of Federal Contract Compliance Programs (Department of Labor) to review SSC/AAP program. Training for SSC management will begin in December. The Small and Disadvantaged Business Utilization Manager will also be hired in December. All of these planned activities were conducted throughout the month.

PROJECT TECH SUPPORT (WBS 3.4)

• TECHNICAL SUPPORT MANAGEMENT (3.4.1)

Laboratory Technical Services completed it's management staffing for activities projected through FY90. Program Management Plans are now being written for several on-going operational activities including: Facilities Engineering and Maintenance, Materiel, Administrative Computing, Management Information Systems and Engineering Design Support Management.

In addition to the WBS functions discussed below, Laboratory-wide support continued in the areas of the Supplemental Environmental Impact Statement, the Planning Monitoring Reporting System, Cost Estimating, Document Control, Engineering Support to the Technical Divisions, and support to Administration.

The SSC Laboratory consolidated almost all of it's activities in the Stoneridge Business Park in about 171,000 square feet of space. Space for Procurement and the DOE/SSC Project Management Office are located in the DeSoto Bank Building in about 9,000 square feet of space.

• FACILITIES ENGINEERING SERVICES (3.4.2)

The Directorate, Conventional Construction, and Accelerator all relocated to Stoneridge Building No.4 thus completing the occupancy of Building No. 4. Modifications to Stoneridge Buildings No.1 and No. 2 were begun to accommodate the programmatic requirements of the Magnet Division, Finance and Personnel. These moves are scheduled for completion mid December. Occupancy of the four office trailers and the warehouse in Stoneridge Building No. 2 were completed as planned and the temporary facilities on Executive Way, Ezell, and Osprey were all vacated as planned. Action was initiated to lease the remaining 9,100 square feet of the third floor of the DeSoto Bank Building. This space would be used to house DOE On-Site Project Office and the expanding Procurement function. Action was also initiated to lease an additional 5,600 square feet in Stoneridge Building No. 2 to house a temporary Magnet workshop.

• PROPERTY MANAGEMENT (3.4.3)

Equipment for the "Bar Code" Property Management System has been ordered and is scheduled for delivery in early December. Upon the arrival of the equipment we plan to complete our first audit of capital and sensitive property by 31 December 1989. In pursuit of this goal we have worked closely with EG&G, EMI division in Las Vegas Nevada and the Sandia Corporation in Albuquerque, New Mexico. Coordinating with the Property and Accounting groups within URA was a primary goal of this effort. An evaluation period of our inventory system is scheduled to take place from January 1990 through March 1990. The system we are developing is an off shoot of systems used successfully by other DOE contractors.

PROJECT TECH SUPPORT (WBS 3.4)

(Continued)

• FABRICATION SHOPS (3.4.4)

A plan was presented management to consolidate all fabrications shops under Lab Technical Services Division. This effort is designed to save time, space, and manpower in future years.

Efforts were initiated to identify and place a manager of this effort. It is anticipated that he will be on board by mid January 1990. His initial effort will be directed towards assembling a staff and a facilities plan for this area.

• GENERAL COMPUTING (3.4.5)

ADMINISTRATION

The VAX 6310-based Administrative Computer System (SSCAD1) has been installed and is fully operational. The DELTEK and EASYTRAK administrative software packages have been migrated to this system from their temporary residence on the scientific VAX.

A survey of desired MAC training was conducted and the response was very favorable. Over 65 employees expressed an interest in 'Introduction to MAC' while nearly 175 would attend 'Microsoft Word' training. More than 100 employees would sign up for each of the other classes available, including FileMaker I/II, Canvas I/II and Wingz I/II.

The SSCL has applied for membership in the Open Software Foundation, an international organization devoted to defining software specifications and developing leadership software. The goal is to share the benefits of an open, portable software environment.

MIS SOFTWARE SUPPORT

The procedure to extract the EG&G savings plan information from the DELTEK database is complete. The EG&G program, which will convert the data into the necessary format to transfer the plan to tape, will be tested and finalized to satisfy the requirements of Boston Savings Deposit & Trust Co.

An extract file for the direct deposit of checks for URA employees has been generated using DELTEK. Provident Bank has sent the ACH file to the Federal Reserve to determine if the pre-note test has been successful in properly crediting the test accounts.

The Accounts Payable cash disbursement application software is installed and data has been transferred to the Provident Bank (DeSoto State Bank) for check balancing prior to installation of the Mirror communications software on the personal computers which will be linked with the bank.

In the Property Management area temporary solutions have been developed to alleviate existing problems. Buyers will not authorize shipment until two days after an order is placed to ensure that shipments do not arrive at the warehouse before a purchase order.

PROJECT TECH SUPPORT (WBS 3.4)

MIS SOFTWARE SUPPORT (continued)

An on-line inventory system has been installed and will be tested before an SSC-wide "scan" for in-house property is conducted. A manual walk-through is scheduled to update existing paper files before the on-line system is implemented.

A program designed to generate employee time sheets has been completed and is currently in the test phase.

TECHNICAL SUPPORT

A Benchmark Working Group has been created to develop a strategy for comparing the performance of various computer systems by obtaining and presenting coherent and traceable benchmark data. The committee will use an index to quantify system performance in areas that are meaningful to the SSC community. Their approach will involve benchmarks derived from three sources: "Industry Standard" benchmarks; measurements for some of the existing SSC Laboratory physics codes (These test cases will represent the unique physics problems of each division); and a specific laboratory benchmark designed to provide required information not uncovered using the previous two categories.

The benchmark committee has worked informally to create source files for small benchmarking routines, to develop in-house test cases and to identify potential difficulties. A list of potential benchmarks was compiled and the actual source code was obtained for many of these benchmarks. A preliminary selection of industry standard benchmarks was chosen and circulated for review.

LTS is seeking integrated software tools that enhance computer user productivity in the following areas; integration of data management (including ad hoc query and reporting), applications development and information exchange. This must be accomplished in a multi-vendor environment that includes but is not limited to: Macintosh, IBM PC, SUN Apollo, NeXT, DEC, and others. A preliminary investigation of Database system requirements was begun. Coordination with other user groups at the Lab was established. Vendor data was acquired and reviewed. The decision was made to fully investigate Sybase and Oracle for their suitability as primary Database standards with LTS.

ADPE

Input to the current SSCL design review, with emphasis on detector design and simulation requirements for Physics Research Division, was consolidated using data from two earlier studies as well as projected staffing levels prepared through FY98.

Guidelines for the development of the SSCL Strategic and Short Range Plans have been prepared. Responsibility for coordinating input to these plans will be shared by three committees which will identify ADP, AOSS, CAD/CAM and Telecommunications requirements for the project through FY96. This information will be used to justify immediate computing needs to DOE/Chicago Operations and to develop long-range plans for submission in the annual Information Technology Resources Plan.

PROJECT TECH SUPPORT (WBS 3.4)

ADPE (continued)

Representatives from the General computing Group of Laboratory Technical Services met with DOE officials to agree on the best means to implement the approval process governed by DOE/Chicago Operations. Specific items discussed included interpretation of DOE guidelines, settling existing requirements, and long-term ADP Telecommunications plans.

USER SERVICES

A QuickMail system, which permits MACs and IBM compatible PCs to exchange E-mail across the Appletalk/Ethernet network, has been evaluated within LTS. A software bridge, which will allow the QuickMail server to use the Internet and BITNET connectivity of the VAX 6310 (SSCVX1), has been ordered to provide E-mail capability throughout the SSC.

An AppleTalk/Ethernet network has been designed for the SSC directorate to serve as a prototype for the rest of the SSC divisions. This isolated/secure LAN exceeds the capabilities of the existing CERN network. The network's design promotes connectivity to the rest of the SSC; provides access to shared peripherals and other network resources; defends against unauthorized intruders (Liaison); and features a secure dial-in capability.

Efforts are being made with the vendors to correct problems created by communications boards which are not supported by available network software. Foremost have been difficulties experienced between Ethernet boards and NCSA and PC-NFSTelnet software.

User Support Services has set up 81 new personal computers, installed over 300 pieces of software, and has responded to an average of 15 troubleshooting phone calls per day. Configuration of Novell servers has been a primary focus of systems analysis efforts.

The LTS Training Room conducted its first week-long course, a PMRS EASYTRAK seminar, using interactive terminals for hands-on training and a projected screen for the instructor. Several pieces of equipment are available for evaluation in the Demo area while related software products are issued from an adjoining secure area. Other ongoing support of end user's needs includes the following: E-Mail for VMS, Internet and BITNET; Macintosh NCSA Telnet for VAX access and file transfer; and additional MAC-based productivity tools. A controlled access public bulletin board has been created to disseminate general computing related news and information to SSCL personnel.

The current design of the SSCL's Novell servers is under study by two support personnel. Courses in Novell system management, service and support will be undertaken by both.

CERNlib (Version 196) has been installed and tested except for the graphics routines which will require minor revisions to mesh with GKS used in the SSC computing environment. GKS has been used to create graphics on various graphic devices. A .COM file has been created to link a user's program with the proper .OLB file base on the value of a global symbol. This global symbol is also used in a FORTRAN routine to return to the correct workstation type and file required by GKS.

PROJECT TECH SUPPORT (WBS 3.4)

• DESIGN SUPPORT (3.4.6)

Meetings were held this month with representatives of two firms that specialize in providing CAE/CADD temporary technical personnel and other services. One firm provides technical expertise to solve computing and operational problems and the other also provides this service alone with outside CAE/CADD support using their equipment and personnel or using their equipment and "our" personnel.

Engineering Design Support provided design and drafting and plotting services support to the Accelerator Division, Facilities Coordination group, and the Document Control Standards committee this month.

Acquisition of the CAE/CADD hardware and software continues as a priority item. Evaluation of Intergraph and Unigraphics software has been underway since September. A product demonstration of AutoCAD on a Sun Sparcstation was presented during November. It's operational capabilities were very impressive.

• COMMUNICATIONS (3.4.7)

TELEPHONE SYSTEMS

All long distance services have been moved over to MCI and have appropriately modified our line routing tables.

VIDEO/AUDIO SYSTEMS

Admiral Watkins visit to the SSC facility was video taped and broadcast to SSC DOE personnel in the Germantown and Forestal facilities.

We have made several contacts with DOE regarding the establishment of Video teleconferencing. We will be working on a proposal to establish a system once we have established an understanding of our goals with DOE.

A TV antenna has been installed for Lab use to distribute special events to TV's on our campus. We designed our basic bi-directional CATV system this past month and ordered all of the basic equipment. Delivery of this equipment is anticipated by the end of December.

RADIO COMMUNICATIONS

A formal request has been submitted with DOE for frequencies for a paging system. A tentative frequency allocation has been granted and a system acquisition proposal will be written as soon as formal permission has been granted. A request for radio trunking frequencies has been submitted from DOE-CH to DOE-HQ per our requirements for dispatching and other communications. An informal response is expected from DOE-HQ by the end of December.

PROJECT TECH SUPPORT (WBS 3.4)

• ENGINEERING SUPPORT/STANDARDS (3.4.8)

Several collider system concepts were received this month, each causing changes to the spool length. The final version for the SCDR fixed the slot length of the standard spool at 5.575 meters. This new length allows for a defined mid cell corrector element of .05 meters. The location of this mid cell unit is after the second dipole magnet in the half cell configuration allowing for cryogenic isolation every sixth cell.

The ALGOR FEA program was received and installed. Many analysis features of the program are being reviewed for use in analysis of the spool components. FLOWNET analysis software was received and will be installed next month.

A meeting was held to discuss the requirements for the Accelerator Divisions Cryo/Vacuum lab to be setup in Building No.4. Several tests were discussed that could be conducted during the early setup and development of this facility.

• METROLOGY LABS (3.4.9)

No activity planned this month.

SSC LAB DIRECTORS OFFICE (WBS 3.5)

In November, the Director's Office continued its analysis and evaluation of program costs, reviewed technical options for the project, continued the establishment of a functioning office of external affairs, and continued to concentrate on recruitment of scientific and technical staff. In addition, the Director's Office planned for December meetings of the Scientific Policy Committee, the Machine Advisory Committee and the Citizens Advisory Committee.

Members of the Directorate staff serve as members and technical advisors on the Evaluation Board for the Architect-Engineer/Construction Manager contract procurement. In November, that board reviewed and evaluated 14 responses to a Commerce Business Daily announcement (published in September), determined a short list of most highly qualified offerors, and issued a Request for Proposal to those firms on the short list. The Laboratory Director, as selection official for this procurement, concurred in the composition of the short list. As required in the procurement plan, DOE was notified about the board's decision.

R&D AND PRE-OPERATIONS (WBS 4.0)

Accelerator Pre-Ops (4.1)

No activity for this report.

Research and Development (4.2)

Accelerator R&D (4.2.1)

- **Management Services (4.2.1.1)**

Cost estimates for technical components have been improved with the input of more detailed backup information. It was decided to use D-baseIII+ as the main software tool for further cost projections for the laboratory. The technical components estimate will be transferred to this system.

The impact of projected lower FY90 funding levels is being studied.

The Accelerator Division staff on board has increased from 73 to 80 during November. This meets projected goals.

Our contribution to the second draft of the SCDR is in work.

- **LINAC (4.2.1.2)**

The conceptual design and the first pass at the cost estimate were completed. It appears that the SSC requirements can be met by a 600-MeV, 25mA H-linac system. It consists of a 35-keV source, tube linac, and 500 MeV of side-coupled linac. The parameters have been constrained to provide a flexible, reliable, and cost-effective injector for the SSC boosters.

- **LEB (4.2.1.3)**

Ramping cycle studies continued and were refined so that the bunch occupies a smaller fraction of the bucket than in previous simulations. Although this implies a slight (3%) increase in peak voltage, it has the advantage of eliminating slow particle losses during the ramp.

- **MEB (4.2.1.4)**

MEB work concentrated on design improvements and cost estimating, with much help from FNAL on both of these fronts. Included were designs and cost estimates for the main dipoles and quadrupoles, correction elements (dipoles, quads, sextupoles, skew quads), and the injection/extraction channels and kickers; power supply systems for the above items; vacuum system components; RF system components, and beam dump systems.

R&D AND PRE-OPERATIONS (WBS 4.0) **(continued)**

- **HEB (4.2.1.5)**

Work continued in November on the design and specifications of the HEB for the conceptual design report. Part of this effort included detailed examination of the cryogenic, power supply, and vacuum systems. Also determined were the rf waveform requirements for the HEB - collider transfer and test -beam operation cycles.

- **COLLIDER (4.2.1.6)**

Tracking studies using the NEC SCZ at HARC were initiated, to supplement those underway using the Cray Z at the MFE Center. Corrector specifications for the SCDR were completed. Testing of Corrector dipole models continued at LBL, with one model reaching 2.8T on the first quench, 0.3T above specification.

MAGNET R&D (WBS 4.2.2)

FERMI LAB (4.2.2.1)

Magnet DD0027 assembled at BNL will be brought to Fermilab for testing.

Modifications to the outer winding mandrel are nearly complete. Test winding and curing of outer coils will begin in early December. In about mid-December conductor shortage will interrupt the tooling shake down.

A review of the Fermilab magnet program was held on November 9. The concerns and recommendations of the review panel are now being addressed.

Dipole Cryostat

Work is continuing on the Heat Leak Test Facility in preparation for 80K to 4.5K MLI measurements.

The data reduction on the shipping of DD0018 to Brookhaven is in progress.

A study of stainless steel to aluminum transition joints was started due to a joint failure on DD0026. We plan to develop a comprehensive thermal, mechanical, and leak check specification to accompany these transitions.

Negotiations are continuing with a vendor of laser alignment equipment toward the purchase of a system for use in cryostat and tooling assembly, setup, and adjustment.

We are beginning a development program with one of our composite tube vendors (Structural Composites Industries) (SCI) to study the feasibility of redesigning the support posts with wound-in ends as opposed to shrink fit joints. We are also working SCI to develop a composite material with increased shear modulus as a means of increasing the lateral support stiffness. This work will likely result in a procurement of prototype development pieces and/or assemblies. We are readying the SSC dipole axial shipping restraint for shipment to Brookhaven for use on DD0027. We will ship two vacuum vessels to Brookhaven in mid-December and bring DD0027 back on the same truck.

We are preparing a cost estimate for the cryostat on DD0016.

Magnetic Measurements

Details of magnet testing at FNAL are reported under Section 1.2.6.

An investigation into the source of the heat leak in test stand 5 which resulted in the premature termination of the test run of magnet DD0019 revealed another leaking relief valve actuating bellows, and repairs have been completed. Both DD0019 and DD0026 are ready for a final cooldown and magnetic measurements, scheduled to occur during the January test period. In preparation for magnetic measurements, the new power supply system has been tested and tuned to reduce current ripple and overshoot to desirable levels.

FERMI LAB (4.2.2.1) - continued

Long Magnet Fabrication

Cryostat Area

DD0017

Magnet DD0017 is waiting on disposition decision.

DD0026

Magnet DD0026 is being tested at MTF.

The new cold masses are not expected until next year.

Miscellaneous

The 80K shorting strap lugs on the support posts were reworked in order to avoid interference of the lugs and the 80K shields.

The vendor built vacuum vessels were received on 11/13/89 and 11/21/89. A weld leak on the first vessel was repaired and certified. The second vessel is now being leak checked. Surveying of the vacuum vessels will not be done until the tooling balls have been received.

Cold Mass Area

Curing Press

The insertion table drives are being worked on. The tensioners for the chain have been installed. The stops for the molds are being installed. The brackets for the LVDT's have been installed on the molds. The end pushers have been installed on the press and the manifolds attached.

Collaring Press

The collaring mold is continuing to be assembled. The wheels and the guide arms for the mold are being installed.

Yoke/Skinning Press

The automatic welding heads have been installed. Equipment debugging is underway as well as weld program development.

Winding Table

Modifications to the winder are now taking place. Improved roller horseshoe supports have been received and are being aligned. The radial drive motor has been lowered to clear the larger outer winding mandrel. The larger motor for the cable spool holder is on order. The original motor is not strong enough to lift the full spool of cable.

FERMI LAB (4.2.2.1) - continued

Miscellaneous

The shim material for sheathing of the outer winding mandrel is due 11/28/89. The sheathing will be formed on short tooling and then transferred to the long mandrel. Final assembly of the outer winding mandrel can then be completed. The outer mandrel should be ready for coil winding about 12/6/89.

Maintenance walkways for both the curing and collaring presses are due to be installed this week by an outside vendor. The walkways will allow easy and safe access to the hydraulic components.

Magnet Development

Magnetic Measurement

Material has been ordered for a new warm bore to allow magnetic measurements of SSC magnets at Lab 2. (A new warm bore is necessary because the old bore tube does not clear the voltage taps on the inner coil.) Brookhaven is shipping to us short sections of SSC beam pipe and warm bore tube material used for the long magnets. Other parts are currently being fabricated. Design work has begun on a new measuring coil.

F Series Model Program

The one-meter model F5 has passed post test electrical checks and is being readied for disassembly. The disassembly plan includes extensive tests of coil and turn-to-turn insulation both in the body of the magnet and in the ends.

Checking the coil end insulation properties.
Checking for damage in the insulation against laminations.
Examining the mechanical structure for the clamped coil end.
Providing potted cross sections for further 2-D analysis.

Magnet F6 (NC9 Cross Section) has been cancelled. Parts for this magnet have been stored. All parts necessary to make the magnet (including the coils) are complete.

DS0307 outer coils were wound on the new "sheathed" outer coil mandrel. No problems with the mandrel were encountered. The short outer coil mandrel will be used to make sheathing for the long mandrel.

DS0307 was ground insulated the week of November 27. Collaring will take place the first week of December. The coil return end will be hipotted turn-to-turn the first week of December.

Beginning with magnet DS0308, all coils will be wrapped with glass tape with a lower epoxy content that has traditionally been used (14-16% by weight as opposed to the traditional 24%).

FERMI LAB (4.2.2.1) - continued

All end parts for winding DS0308 are expected to be received by December 4. Winding of DS0308 coils will begin at that time. Designed on "grouped, developable surface" end parts for SSC short models will begin December 1.

Accelerator

A program for multi-purpose energy deposition calculation with fine resolution at SSC energies is in the final debugging stage on the VAX.

BERKELEY LAB (WBS 4.2.2.2)

Superconducting and Cable

Cable Development

The first billets of new superconductor for FY90 dipoles are beginning to arrive for cabling. IGC delivered one billet of inner wire in early November and one billet of outer wire in late November. The inner wire had $J_c(7T)$ value of 1720 A/mm^2 , compared with the minimum spec. value of 1650 A/mm^2 . The outer layer wire had a $J_c(5.6T)$ value of 2600 A/mm^2 , compared with a spec. value of 2420 A/mm^2 . The inner layer wire was cabled at N.E.E.W. and sent to BNL for use in two 17 m-long dipoles. The outer cable will be made in early December.

Inner layer wire from Supercon should be complete in early December and inner layer wire from OST should be complete in late December.

Cable Machine Development

This month we made some 15,000 feet of 36 strand of cable. This activity is independent of SSCL activities but it is an opportunity to improve our knowledge of cabling techniques and make some improvements to the process. For example, this month we incorporated a nozzle for dispersion of vanishing oil, designed an alignment tooling for Turkshead-mandrel position, and selected an improved heat treatable steel for use in Turkshead rollers.

Cable Test Facility

Cable Test Facility Magnet

LBL is supporting the development of a cable test facility for the SSCL. All the coils and yoke parts for D16B1 are now completed and we are now assembling a 10-inch long mock up section of the magnet to verify our assembly procedure and ensure that the coil prestress is maintained on cooldown.

A new magnet design with lower current and reduced cable dimensions is now in progress. The octagonal die for the sample holder was received and successfully tested.

Quadrupole Magnets

The focus of LBL activities in support of SSCL is the development and testing of prototype quadrupole magnets for the collider ring.

Quadrupole QA-2

Quadrupole QA-2 was retested at 4.3K after a room temperature thermal cycle. The magnet required retraining. There was little ramp rate sensitivity with the 16A/s quench level of 7700A being reduced to 7340A at 250 A/s, to 6455A at 1000 A/s, and to 5360A at 2000 A/s.

Quadrupole QA-3

This model has been collared using collar packs. This provides a continuous support at the coil pole conductor as well as eliminating the need to handle loose collar laminations during

BERKELEY LAB (WBS 4.2.2.2) - continued

assembly of the magnet. The ends are being clamped using S.S. split calms which are stiffer than the type used on model QA-2 and QA-1. The collared coil is self-supporting, with no clamping or interference from the iron yoke. This model also should be ready for test in early December.

Quadrupole OC-1 m Models

The coil winding and curing tooling fabrication is complete. Assemble of the curing cavities is complete and the mandrels are being assembled. All coil end and filler pieces for the first model are designed and being fabricated. These parts are 75% completed; the wedges are ready and are expected to be delivered in the first week of December; the coil winding will then be started. Our current design efforts are concentrated on the details of the end plates, splice plates, yoke and shell. The first samples of the collar stampings have been delivered and inspected at both LBL and FNAL. The vendor is being notified of any corrections which need to be made. The stamping order will then be completed and the collars delivered towards the end of December. The magnet coils should be assembled and ready for collaring in the beginning of January, with completion of the magnet in mid February.

Long Quadrupole Tooling

Orders have been placed for the main press platens and for the coil molding cavity laminations. Main press design and coil winding mandrel design is nearing completion.

Ends Design

At this time a 3-D model of the coils without iron has been made and forces and field inside the coils have been computed. The next step will be to add the iron yoke to the model. The aim is eventually to compute the magnetic field in the coils, and the multipoles with a finite length iron yoke (if possible taking into account also the saturation effect).

The analysis of a new end design with reduced integrated harmonics is in progress.

BROOKHAVEN LAB (WBS 4.2.2.3)

MODEL MAGNETS

Long Magnets

End plate work on DD0020 was completed early in the month, bullet gauges were installed, and coils were preloaded. The rest of the month was devoted to interconnection assembly operations.

Cryostat assembly operations were completed on DD0027.

Inner cable for DD0028 was received, mechanically tested, and insulated. Preparations were underway for start of coil winding in the last week of November.

DDA010 was installed in Bay B of the Horizontal Test Facility, and work began on the multifarious mechanical and electrical connections.

Short Magnets

Having been installed in the vertical dewar, the dewar instrumentation for DSS018 was checked and cooldown of the magnet began on November 28.

DSS019 was installed in a top hat and wiring began.

Collaring of DSS021 continued.

Beam Tubes and Trim Coils

As noted in last month's report, the distributed trim coil R&D Program has been placed on hold. Meanwhile, documentation is nearing completion on the various recent beam tube assemblies for long or short magnets, with or without trim coils.

Forty beam tubes were delivered to the Silvex Co. Thus far three of these have been internally copper plated with excellent adhesion properties. Work was started in the shops on the beam tube strongback for Silvex.

Warm Bore Tubes

Work has started on the second SSC warm bore tube for use in cold magnetic measurement.

Correctors

Cost estimates for corrector packages were reviewed and delivered to SSCL. Discussions are underway on how to utilize Multiwire technology in the various corrector schemes under consideration.

Insulation Development

Cold compression tests are starting. Design of a helium permeability test fixture has been completed, and it will soon be released to the shops.

TOOLING AND EQUIPMENT

Coils

Outer coil production continued for DC0201 and DC0202, as well as inner coil production for DD0028. Work continued on the curing of inner DSS coils with all-Kapton cable insulation at temperatures up to 230°C. Thus far, following extensive heating tests on the 1.8-m curing press, three inner coils have been produced with apparently good results by this technique. (A report will be forthcoming on this work as soon as outer coil testing has been completed and results analyzed.)

Test Equipment

Testing of mole DI revealed problems with its long-term gravity sensor reproducibility and in the field analysis; these problems are currently under review. Assembly of mole DII continues. Its encoder was found to be defective and was returned to the shop for repair. Work is progressing in the shops on parts for moles DIII and DIV.

Long Magnet Test Facility

Ongoing work is concentrating on various modifications of the feed and end cans for Bay B. Certain parts required to modify Bay A were released to the shops.

Magnet Cooling

An alternative means of directing the transverse helium flow through the 17-m magnets is being investigated. Termed the "cross-flow cooling" method, it is designed to direct the full 100 g/s helium flow around the coil package and to directly absorb the heat from synchrotron radiation into the helium.

SUPERCONDUCTOR

Cable Procurement

During the month of November, inner cable SC13-00003 was received from the New England Electric Wire Corporation who cabled the wire for Intermagnetics General Corporation. Discrepancies were found between the cable's mean thickness as measured on the cabling machine's cable measuring machine and NEEWC's ten stack fixture. Small discrepancies were also found between NEEWC's ten stack fixture and Brookhaven's. At SSCL's request, Brookhaven undertook a detailed investigation comparing the measurements of the two ten stack fixtures. SSCL will be designing a new ten stack fixture which they will produce and supply to the laboratories and vendors requiring this device. Brookhaven's incoming inspection revealed the presence of very small "slivers" and "folds" similar to those found in the past on outer cable. Cable samples were sent to the SSCL for evaluation. It was decided that these defects will not adversely affect the performance of the cable in a magnet and the cable was accepted. The cable has been insulated and wound into coils.

Tooling

BNL personnel attended the Dour wrapping line review held at the SSCL in Texas. The review went quite well with only a few items requiring Dour clarification.

Miscellaneous

The insulating films test program continued with additional cable wrapped for short test coils. Testing was started to determine the reason(s) for the "drift" of the second layer of Kapton in relation to the first layer. No conclusions were reached and the testing is to continue after modifications to the wrappers. No major problems were encountered. The film continues to wrap quite well with no wrinkles or imperfections.

TESTS AND MEASUREMENTS

Initial testing and DSS018 began. At 4.35K all quenches occurred above 6.6.T. One training quench was observed at 6562A; subsequent quenches were at the conductor limit, 6780A. At 3.85K, no additional training was needed to reach the conductor limit. Testing at 3.35K was slated for the first week in December.

• SUPERCONDUCTING CABLE R&D (WBS 4.2.2.4)

Activity in this area has concentrated on 1) expediting wire orders to fill the need of the prototype magnets, 2) issuance of new orders to support FY91 activities and 3) activation of the 14" scale-up program. Only 8600 ft of the cable was made this month. This quantity is insufficient to cover the needs of the program. It still appears that relief from this conductor shortfall will not occur before January as projected several months ago. However this shortfall puts into focus the critical status of new orders for next years production. All efforts are being made to issue purchase orders for next year's requirements before the end of the calender year. The 14" billet program is still progressing nicely. The results from the first complete billet processed met the specification and indicated that further improvement and optimization was easily attainable.

• MAGNET R&D PHYSICS (WBS 4.2.2.5)

No report this month.

• MISCELLANEOUS LABS AND UNIVERSITIES
(WBS 4.2.2.6)

No report this month.

EXPERIMENTAL SYSTEMS (WBS 5.0)

• EXPERIMENTAL SYSTEMS R&D (WBS 5.1)

Thirty-eight detector proposals were received on October 2 requesting a total of \$44M to perform R&D on major detector subsystems for the SSC. Twenty-two of these proposals were sent to the members of the international review committee and were considered for funding during their November 13-15 meeting that took place at the SSC Laboratory. The other proposals, dealing mostly with data acquisition and computing, will be considered in January by two separate committees that will include Laboratory personnel as these topics interact strongly with future Laboratory objectives.

The committee recommended approval, or partial approval, of 14 proposals, amounting to a total of \$13.5M in R&D funding after including money set aside for the deferred proposals and for contingencies. They rejected 8 proposals. A list of the 38 proposals and the recommended actions are given in the accompanying table

MEETINGS

11/13-15 Detector R&D Advisory Panel 20 People SSCL

SSC DETECTOR R&D REVIEW COMMITTEE

Dr. Douglas Bryman
TRIUMPF

Dr. H. H. Williams (chairman)
University of Pennsylvania

Dr. Chris Fabjan
CERN

Dr. Robert Kephart
FERMILAB

Dr. Takahiko Kondo
National Laboratory for
High Energy Physics (KEK)

Dr. Stanley Majewski
University of Florida

Dr. Shigeki Mori
University of Tsukuba

Dr. David Nygren
Lawrence Berkeley Laboratory

Dr. Lawrence Price
Argonne National Laboratory

Dr. Veljko Radeka
Brookhaven National Laboratory

Dr. Pier-Giorgio Rancoita
Universita di Milano

Dr. Rafe Schindler
Stanford Linear
Accelerator Center (SLAC)

Dr. Abe Seiden, Director
University of California at Santa Cruz

Dr. Peter Sharp
Rutherford Appleton Laboratory

Professor Albrecht Wagner
CERN

DETECTOR SUBSYSTEMS PROPOSALS

Contact Person	Prop.	Topic	Recommend.
Ting	PC-001	Muon Chambers	approve
Avery	PC-002	RISC Processors	defer
Van Peteghem	PC-003	High Speed Elec.	reject
May	PC-004	Computer Tests	defer
Thaler	PC-005	High Speed DAQ	defer
Youssef	PC-006	Det. Simulations	defer
Dibitonto	PC-007	Electrs.for Warm Cal.	combine
Heller/Errede	PC-008	Muon Det.	resubmit
Morfin	PC-009	Particle Identific.	reject
Whitaker	PC-010	Trans.Rad.Det.	approve
Chen	PC-011	LXe Calor.	generic
Kreisler	PC-012	High Speed DAQ	defer
Gladney	PC-013	Computer Farm	defer
Onel	PC-014	Position Sens. PMT	reject
Rehak	PC-015	Si Drift Vtx Det.	approve
Reidy	PC-016	Simulations and DAQ	defer
Newman	PC-017	BaF Calor.	reject
Campbell	PC-018	Fast Trigger	defer
Marx	PC-019	Air Core Toroids	approve
Sulak/Para	PC-020	Scint. Based Calor.	approve
Bugg	PC-021	Si Endcap EM Calor.	resubmit
Seiden	PC-022	Si Tracking	approve
Atac/Elias/Ruchti	PC-023	Scint. Fiber Tracking	approve
Hanson	PC-024	Wire Tracking	approve
Nygren/Arens	PC-025	Pixel Vtx Det.	resubmit
Pripstein	PC-026	Warm Liq. Calor.	approve

Loken	PC-027	Software Dev.	defer
Walker	PC-028	Rad. Hard Scint. Fi.	reject
McDonald	PC-029	Straw-Tube Tracking	approve
Womersley	PC-030	CAE/CAD Det. Dev.	defer
Williams	PC-031	Front-end Electrs.	approve
Gordon	PC-032	Liq. Argon. Calor.	approve
Atiya	PC-033	Trigger and DAQ	defer
White	PC-034	Fiber Tower Calor.	reject
Goshaw	PC-035	Tracking Chamber	approve
Spinka	PC-036	Scint. Plate Calor.	approve
Schlein	PC-037	Si Microvtx Detector	reject
Karchin	PC-038	B Physics Vtx. Det.	reject

 Note approval may only be partial, and in some cases proposers were asked to combine efforts to avoid duplication.

LAB OPERATIONS SUPPORT (WBS 6.0)

PHYSICS PROGRAM SUPPORT (WBS 6.1)

DIVISION OFFICE (6.1.1)

Visitor areas for visiting physicists were constructed. VT240s were ordered to provide VAX access for visitors and should be in place soon. A xerox was installed for visitor use. The division hosted several small meetings and has multiple groups calendared for January.

A permanent division office receptionist was hired.

Mail boxes for staff physicists were installed.

Applicants for a Secretary III position were interviewed with a view toward a mid-January hire date.

THEORY (6.1.2)

No activities are anticipated in this group until 1990.

EXPERIMENTAL PHYSICS AND FACILITIES (6.1.3)

The EMPACT group met at the SSC Laboratory to formulate their ideas prior to writing an Expression of Interest. The group displayed substantial progress in addressing the physics and engineering problems faced by the detector. Detector simulations with regard to calorimetry and tracking were discussed for this toroid spectrometer design. They also have made agreements with Martin Marietta to form an engineering base for the detector. We anticipate many such meetings will take place in the next few months as detector collaborations begin to form, and the Expressions of Interest are written.

The division worked on the experimental systems portion of the SCDR, especially with regard to integration of facilities and utility requirements with other parts of the project. For example, the cooling water requirements were integrated with the accelerator systems requirements.

The proposals for detector subsystem R&D were evaluated and recommendations made to the director. Agreements will be written with the groups leading the approved R&D proposals.

Tim Thurston joined the Experimental Facilities group as a Mechanical Engineer.

Additional meeting notices that could be added:

12/8 - 12/9 Collaboration meeting for the Bottom Collider Detector (BCD) group
12/12 - 12/13 Computing Committee
12/13 Electronics (R&D)

- **EXPERIMENTAL PHYSICS AND FACILITIES (6.1.3)**
(continued)

- 12/17 First collaboration meeting of the SDE Group at Fermilab
- 1/3 - 1/6 DPF Meeting (Houston)
- 1/9 - 1/19 Simulation
- 1/10 - 1/17 GEANT Workshop
- 1/15 - 1/16 Ad Hoc Computing Com.
- 1/23 - 1/24 DAQ
- 2/19 - 2/23 Tucson Workshop
- 3/5 - 3/6 Radiation Task Force

- **COMPUTING AND DATA ANALYSIS (6.1.4)**

The SSCL has applied for membership in the Open Software Foundation, an international organization devoted to defining software specifications and developing leadership software. The goal is to share the benefits of an open, portable software environment.

A Benchmark Working Group has been created to develop a strategy for comparing the performance of various computer systems by obtaining and presenting coherent and traceable benchmark data. The committee will use an index to quantify system performance in areas that are meaningful to the SSC community. Their approach will involve benchmarks derived from three sources: "Industry Standard" benchmarks; measurements for some of the existing SSCL physics codes. (These test cases will represent the unique physics problems of each division); and a specific laboratory benchmark designed to provide required information not uncovered using the previous two categories.

The benchmark committee has worked informally to create source files for small benchmarking routines, to develop in-house test cases and to identify potential difficulties. A list of potential benchmarks was compiled and the actual source code was obtained for many of these benchmarks. A preliminary selection of industry standard benchmarks was chosen and circulated for review.

CERNlib (Version 196) has been installed and tested on the VAX except for the graphics routines which will require minor revisions to mesh with GKS used in the SSC computing environment. GKS has been used to create graphics on various graphic devices. A .COM file has been created to link a user's program with the proper .OLB file base on the value of a global symbol. This global symbol is also used in a FORTRAN routine to return to the correct workstation type and file required by GKS.

IMAGEN print servers have been ordered to support Physics Research and Finance. Since Magnet Division will also acquire an IMAGEN, all major SSC divisions will have compatible printer hardware and software. These printers appear as TCP/IP nodes on the Local Area Network to provide services for all VAXs, SUN and other workstations.

- **COMPUTING AND DATA ANALYSIS (6.1.4)** - continued

VMS support for scheduled and unscheduled visits by scientists to Physics Research had significant impact on computing and personnel resources during the month. In order to alleviate problems created by visiting groups, the following strategies have been initiated: Appointment of a coordinator for future visits; development of an abbreviated user's guide showing types and locations of services; and procurement of ten extra VT240 terminals.

The UNIX support group is providing support to the Physics Research Division in porting the CERN library software to Apollo and SUN. This support consists of building the software and conversion of some routines. This work will become rather extensive in the future and will require additional manpower in the UNIX group.

Magnet Division SUN computers at SSCL are supported now. Operators are using a remote workstation to perform the system backups on 8 mm tape. The systems have been integrated into the network environment.

The month of November was another month dominated by moving personnel from many different locations into building 4, 2, 1 and the trailers. In all of these moves we were able to have most everyone functioning with network connections and telephones within 24 hours of moving. In most cases, we had communications connections wired before the person moved into the new office. We have developed a few lingering problems with grounding and wiring configurations that will have to be resolved.

- **LIBRARY SERVICES (6.1.5)**

The Library has accomplished some major acquisitions activity: receiving a comprehensive set of specifications and standards on microfiche and CD-ROM; placing the first order to serial subscriptions and mailing out over 1,500 requests to laboratories and institutions to receive their preprints. In one week, the Head of Technical Services will be on board full-time and we have placed ads in national journals for several other key positions.

- **TECHNICAL INFORMATION AND PUBLICATIONS (6.1.6)**

Worked with local GPO office to set up a direct deal contract with local printers, that are capable of handling the printing needs of the lab. Second draft (100) copies of the SCDR was published and distributed within the laboratory on time. Continued to work on the Standards and Procedures for Supporting the Laboratory. Continued interviewing process for filling supervisory positions within the group.

MEETINGS/CRITICAL EVENTS

<u>Date</u>	<u>Meeting Subject</u>	<u>Participants</u>	<u>Location</u>
12/15-16	SSCL Scientific Policy Committee Meeting		SSCL
12/17	First Collaboration meeting of the SDE Group	SDE Group	Fermilab
1/8-9	Program Advisory Committee	23 Attendees	SSCL
1/19-20	US HEP Research Program for 1990's	100 or more attendees	SSCL
2/1-2	SSC Machine Advisory Committee	14 members	SSCL

SAMPLE ONLY - NOT ACTUAL DATA

SUMMARY COST/SCHEDULE NARRATIVE

LEVEL 2 WBS

1.0 TECHNICAL SYSTEMS

ACCELERATOR SYSTEMS

MAGNET SYSTEMS

2.0 CONVENTIONAL FACILITIES

3.0 MANAGEMENT AND SUPPORT

4.0 LAB OPERATIONS

5.0 EXPERIMENTAL SYSTEMS

SAMPLE ONLY

MANAGEMENT CONDITION SUMMARY

<u>ACCELERATOR SYSTEMS</u>	<u>CUR/CUM COST</u>	<u>CUR/CUM SCHEDULE</u>
1.1.1 ACCEL. MGMT. & SUPPORT	G	G
1.1.2 LINAC	G	G
1.1.3 LEB	G	G
1.1.4 MEB	G	G
1.1.5 HEB	G	G
1.1.6 COLLIDER	G	G
1.1.7 TEST BEAMS	G	G

<u>MAGNET SYSTEMS</u>	<u>COST</u>	<u>SCHEDULE</u>
1.2.1 MANAGEMENT & SUPPORT	G	G
1.2.2 HEB MAGNETS	G	G
1.2.3 COLLIDER MAGNETS	G	G
1.2.4 MAGNET FAC. EQUIP/TOOLING	G	G

<u>CONVENTIONAL CONSTRUCTION</u>	<u>COST</u>	<u>SCHEDULE</u>
2.1.1 CAMPUS	G	G
2.1.2 INJECTOR	G	G
2.1.3 COLLIDER	G	G
2.1.4 EXPERIMENTAL HALLS	G	G
2.2.1 CENTRAL LAB OFFICE	G	G
2.2.2 HEAVY WORKS BLDGS.	G	G
2.2.3 SHOPS	G	G
2.2.4 SUPPORT BLDGS.	G	G
2.3.1 LINAC	G	G
2.3.2 LEB	G	G
2.3.3 MEB	G	G
2.3.4 HEB	G	G
2.3.5 TEST BEAM AREA	G	G

MANAGEMENT CONDITION SUMMARY

<u>CONVENTIONAL CONSTRUCTION</u>	<u>CUR/CUM COST</u>	<u>CUR/CUM SCHEDULE</u>
2.4.1	NORTH ARC	G
2.4.2	SOUTH ARC	G
2.4.3	WEST CLUSTER	G
2.4.4	EAST CLUSTER	G
2.5.1	WEST CLUSTER	G
2.5.2	EAST CLUSTER	G
2.6.1	MGMT/ADMIN/REPORTING	G
2.6.2	MAJOR STUDIES	G
2.6.3	DESIGN CRITERIA & REPORT	G
2.6.4	DESIGN OVERSIGHT	G
2.6.5	CONSTRUCTION OVERSIGHT	G
2.6.6	CONFIG. MGMT/INTERFACE CONT.	G
2.6.7	SPACE PLNG/DESIGN SUPPORT	G
2.6.8	GEOTECHNICAL PROGRAM	G
2.6.9	SURVEY PROGRAM	G
2.6.10	A/E-CM SEL/CONT SUPPORT	G
2.6.11	RESERVED	G
2.6.12	SEIS SUPPORT	G
2.6.13	MISC. RTK SUPPORT	G
2.7.1	ARCHITECT ENGR.	G
2.7.2	CONSTRUCTION MGMT.	G
<hr style="border-top: 1px dashed black;"/>		
<u>MANAGEMENT AND SUPPORT</u>	<u>COST</u>	<u>SCHEDULE</u>
3.1.1	PROJECT MANAGEMENT OFFICE	G
3.1.2	PMRS	G
3.1.3	Q/A MANAGEMENT	G
3.1.4	CONFIGURATION MGMT.	G
3.1.5	COST ESTIMATING	G
3.2.1	SYSTEMS ENG. MGMT.	G
3.2.2	SE SUPPORT TO ASD	G
3.2.3	SE SUPPORT TO MSD	G
3.2.4	SE SUPPORT TO PHYSICS	G
3.3.1	ADMIN SYS. AND SUPPORT	G
3.3.2	ACCTG. AND FINANCE	G
3.3.3	PROCUREMENT & SUBCONTRACT	G
3.3.4	TRAVEL SERVICES	G
3.3.5	PERSONNEL	G

MANAGEMENT CONDITION SUMMARY

<u>MANAGEMENT AND SUPPORT</u>	<u>CUR/CUM COST</u>	<u>CUR/CUM SCHEDULE</u>
3.3.6 STAFF SUPPORT SERVICES	G	G
<u>3.3.7</u> MINORITY AFFAIRS	G	G
3.4.1 TECH SUPPORT MANAGEMENT	G	G
3.4.2 FACILITIES ENG. SERVICES	G	G
3.4.3 PROPERTY MANAGEMENT	G	G
3.4.4 FABRICATION SHOPS	G	G
3.4.5 GENERAL COMPUTING	G	G
3.4.6 DESIGN SUPPORT	G	G
3.4.7 COMMUNICATIONS	G	G
3.4.8 ENG. SUPPORT/STANDARDS	G	G
<u>3.4.9</u> METROLOGY LABS	G	G
3.5.1 DIRECTORATE	G	G
3.5.2 EXTERNAL AFFAIRS	G	G
3.5.3 LEGAL SERVICES	G	G
3.5.4 RESEARCH AND TECH ASSMT.	G	G
3.5.5 USERS OFFICE	G	G
3.5.6 ENVIRON. HEALTH & SAFETY	G	G
3.5.7 PLANNING	G	G
3.5.8 INTERNATIONAL COORDINATION	G	G
3.5.9 MANAGEMENT FEES	G	G
<hr/>		
<u>R&D AND PRE-OPERATIONS</u>	<u>COST</u>	<u>SCHEDULE</u>
4.2.1 ACCELERATOR R&D	G	G
4.2.2 MAGNET R&D	G	G
4.2.3 PHYSICS R&D	G	G
<hr/>		
<u>EXPERIMENTAL SYSTEMS</u>	<u>COST</u>	<u>SCHEDULE</u>
5.1.1 GENERIC R&D	G	G
5.1.2 MAJOR DETECT. & SUBSYSTEMS	G	G
<u>5.1.3</u> APPROVED EXPERIMENTAL R&D	G	G
5.2.1 DETECTOR 1	G	G
5.2.2 DETECTOR 2	G	G
5.2.3 DETECTOR 3	G	G
5.2.4 DETECTOR 4	G	G
5.2.5 DETECTOR 5	G	G
5.2.6 DETECTOR 6	G	G

MANAGEMENT CONDITION SUMMARY

<u>LAB OPERATIONS SUPPORT</u>	<u>CUR/CUM COST</u>	<u>CUR/CUM SCHEDULE</u>
6.1.1 PHYSICS ADMIN/SUPPORT	G	G
6.1.2 PHYSICS THEORY	G	G
6.1.3 EXPER. PHYSICS & FACILITIES	G	G
6.1.4 COMPUTING & DATA ANALYSIS	G	G
6.1.5 PHYSICS LIBRARY SERVICES	G	G
6.1.6 TECHNICAL INFO. & PUBS.	G	G
6.2.1 MANAGEMENT	G	G
6.2.2 ADMIN. SYSTEMS & SUPPORT	G	G
6.2.3 PROJECT TECH. SUPPORT	G	G

SAMPLE ONLY - NOT ACTUAL DATA

MANAGEMENT CONDITION ANALYSIS

DIVISION:	MAGNETS	VARIANCE		
		COST	SCHEDULE	
LEVEL 3 WBS:	HEB MAGNETS	CURRENT	(167)	(98)
		PRIOR 1 MO. (cum)	(1768)	(1433)
CURRENT ASSESSMENT:	COST: RED	PRIOR 2 MO. (cum)	(1555)	(1159)
	SCHEDULE: RED	PRIOR 3 MO. (cum)	(1266)	(798)

PROBLEM:

CAUSE/EFFECT:

CORRECTIVE ACTION:

CURRENT STATUS:

CONTACT/PHONE EXT.:

NOT ACTUAL DATA
SAMPLE ONLY

SAMPLE ONLY
NOT ACTUAL DATA

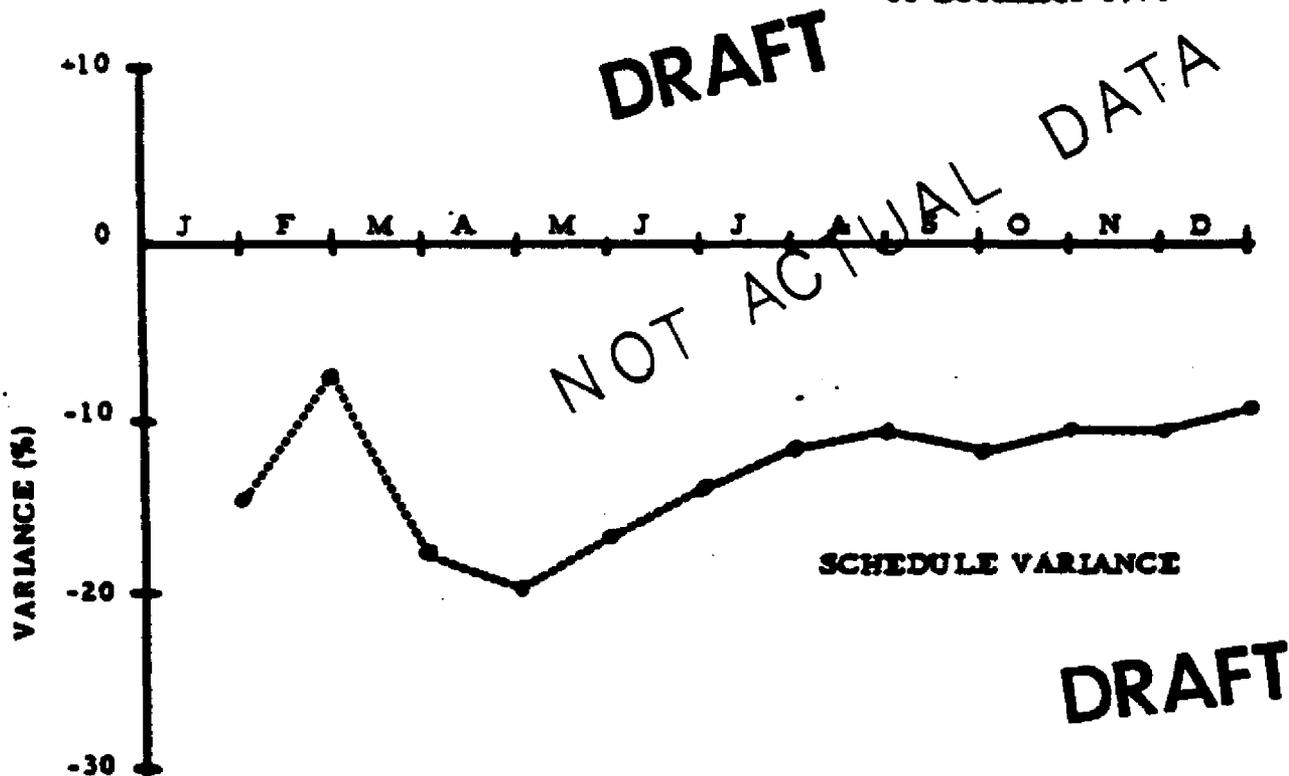
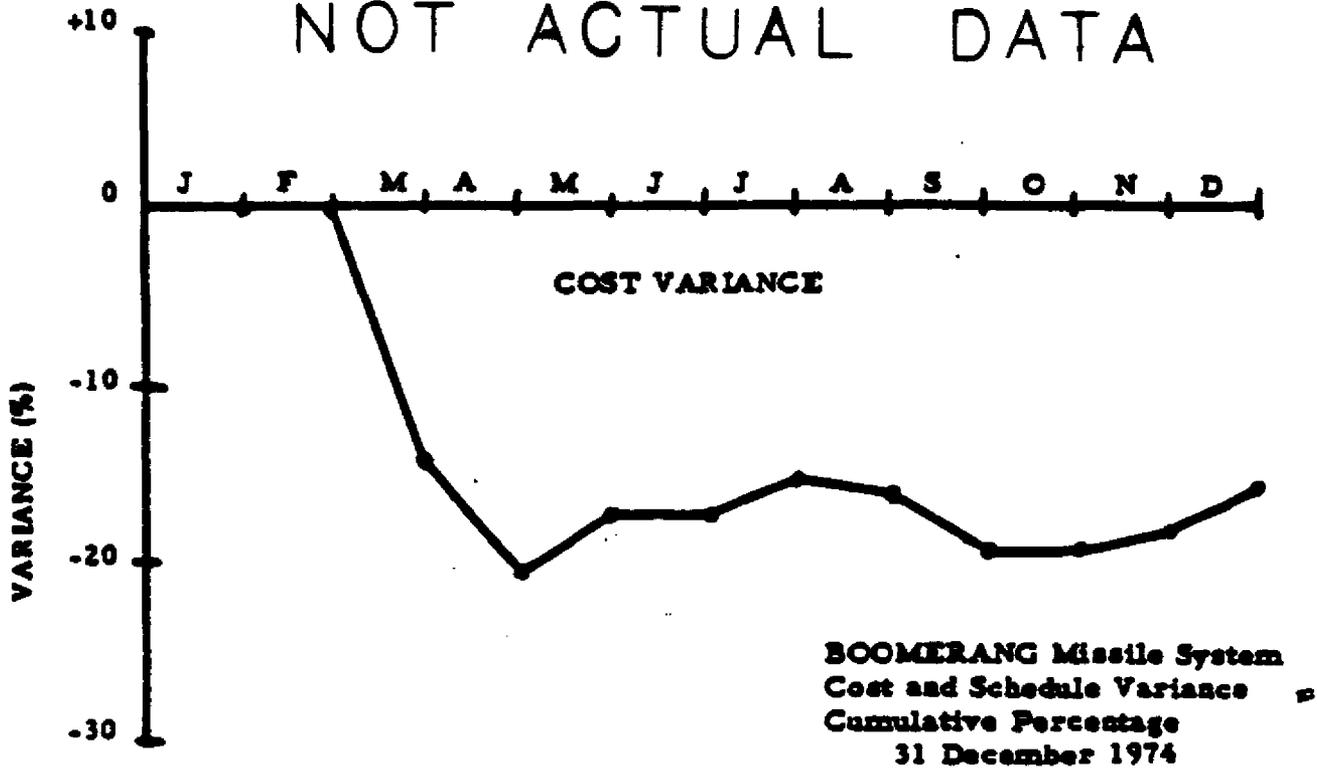


FIGURE VII. 5
PERCENTAGE VARIANCE TREND CHARTS

COST PERFORMANCE REPORT - BY OBS													
REPORT PERIOD										FROM: 10/30/89		\$ IN 000'S	
										TO: 11/26/89			
CURRENT PERIOD						CUMULATIVE TO DATE						FY90	
BCWS	BCWP	ACWP	VARIANCE	BCWS	BCWP	ACWP	VARIANCE	BAC	LRE	VARIANCE			
SCHEDULE COST				SCHEDULE COST									
CONTRACT													
D - DIRECTOR		493		854		5,780							
B - PROJECT MANAGER		505		948		8,647							
A - ACCELERATOR SYSTEMS		1,099		1,820		24,560							
C - CONVENTIONAL CONSTRUCTION		1,314		2,157		26,220							
T - TECHNICAL SERVICES		1,941		2,934		13,520							
G - ADMINISTRATIVE SERVICES		979		1,642		11,020							
P - PHYSICS RESEARCH		521		789		20,580							
M - MAGNET SYSTEMS		2,454		5,015		86,400							
TOTAL SSC LABORATORY		9,306		16,159		196,727							

COST PERFORMANCE REPORT - BY PARTICIPANT												
REPORT PERIOD										FROM: 10/30/89		\$ IN 000'S
										TO: 11/26/89		
CURRENT PERIOD					CUMULATIVE TO DATE					FY 90		
BCWS	BCWP	ACWP	VARIANCE		BCWS	BCWP	ACWP	VARIANCE		BAC	LRE	VARIANCE
			SCHEDULE	COST				SCHEDULE	COST			
CONTRACT												
BROOKHAVEN NATIONAL LAB										16,700		
FERMILAB										13,000		
LAWRENCE BERKELEY LAB										3,500		
LOCKHEED										2,500		
RTK										6,300		
TEXAS ACCELERATOR CENTER										2,247		
SUBTOTAL										44,247		
SSCL/OTHER										152,480		
TOTAL										196,727		

CONTRACTOR: UNIVERSITY RESEARCH	CONTRACT TYPE/NO:	PROGRAM NAME/NUMBER:	REPORT PERIOD:	SIGNATURE, TITLE & DATE:
LOCATION: DALLAS, TE, 75237	DEACO289ER40486	SSC LABORATORY	FROM: 26DEC88 TO: 30NOV89	DRAFT
RDT&E _____	PRODUCTION _____			

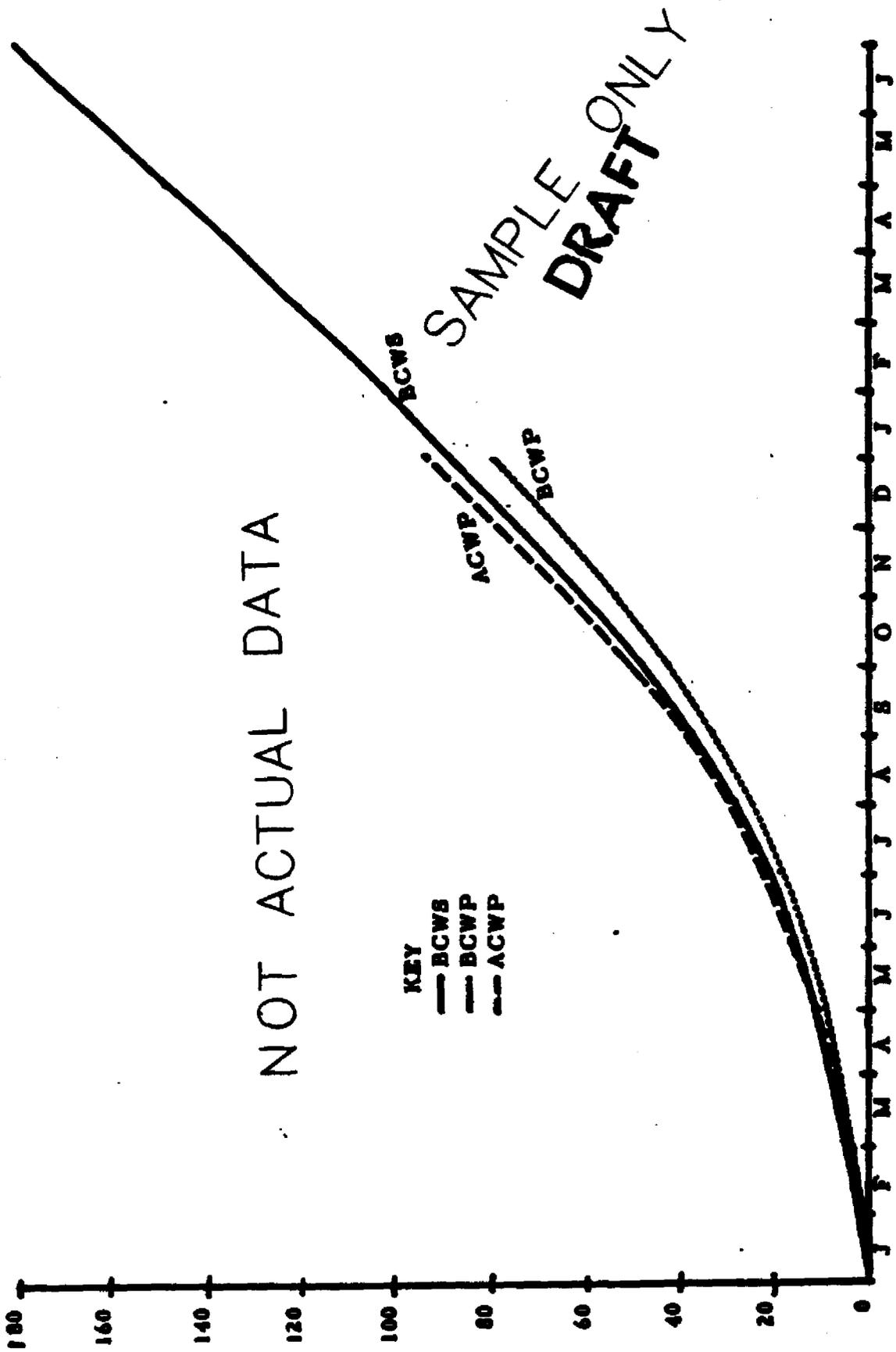
QUANTITY	NEGOTIATED COST	EST COST AUTH, UNPRICED WORK	TGT PROFIT/FEE%	TGT PRICE	EST PRICE	SHARE RATIO	CONT CEILING	EST CONT CEILING
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SAMPLE

WORK BREAKDOWN STRUCTURE ITEM	CURRENT PERIOD					CUMULATIVE TO DATE					REPROGRAMMING ADJUSTMENTS		AT COMPLETION			
	BUDGETED COST		ACTUAL COST		VARIANCE	BUDGETED COST		ACTUAL COST		VARIANCE	COST VAR	BUDGET	LATEST REVISD	EST	VAR	
	WORK SCHED	WORK PERF	WORK SCHED	WORK PERF	SCHED	COST	WORK SCHED	WORK PERF	WORK SCHED	WORK PERF						SCHED
1 TECHNICAL SYSTEMS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0	0.0
2 CONVENTIONAL CONSTRU	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0	0.0
3 PROJECT MGMT & SUPPT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0	0.0
4 R&D PRE-OPERATIONS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0	0.0
5 EXPERIMENTAL SYSTEMS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0	0.0
6 LAB OPERATIONS SUPP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0	0.0
TOTAL DIRECT COSTS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0	0.0
INDIRECT COSTS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0	0.0
COST OF MONEY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0	0.0
GEN & ADMIN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0	0.0
UNDIST BUDGET	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX			0.0	0.0	0.0
SUBTOTAL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0	0.0
MGMT RESERVE	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX			0.0	0.0	0.0
TOTAL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0	0.0

RECONCILIATION TO CONTRACT BUDGET BASE

VARIANCE ADJUSTMENT	XXXXXX															
TOTAL VARIANCE	XXXXXX															



SAMPLE ONLY
DRAFT

LEVEL 3 WBS
PERFORMANCE MEASUREMENT CHART

SSC PROJECT

MILESTONE STATUS REPORT

This section includes the following:

- Startup (Near Term) Milestones
- SSC Master Milestones

The Startup (Near Term) Milestones represent key events and objectives associated with management systems implementation and SSC Project startup. These startup milestones were agreed upon by DOE and SSCL Management during August, 1989.

The SSC Master Milestones include the level one and two milestones for the SSC Project included in the SSC Project Management Plan (PMP). Following approval of the PMP and establishment of the SSC baseline, slippage of any of these milestones by more than three months will require DOE approval. The SSC Master Milestone Status Report will be included in each Monthly Progress Report for the duration of the project.

SSC PROJECT

STARTUP (NEAR TERM) MILESTONES

MIL NO.	WBS NO.	MILESTONE DESCRIPTION	COMPLETION DATE			COMMENTS
			ORIGINAL PLAN	CURRENT PLAN	ACTUAL	
1	2.0	AE/CM Criteria	3/89		4/89	
2	2.0	Start Geotech	5/89		6/89	First Phase Complete
3	3.0	SE/I RFP Issued	6/89		6/89	
4	2.0	Footprint Fixed	8/89		8/89	
5	3.0	SE/I Contract Award	8/89		10/89	
6	3.0	First Draft PMP Issued To DOE	8/89		8/89	Subject of Semi Annual Review
7	4.0	DOE Approval To Proceed With In-House Design For Early Critical A-E/CM Activities	8/89		8/89	Official 10/2
8	2.0	Land Acquisition Footprint Specification Documentation Complete	8/89		9/89	
9	1.0	MIP RFP	9/89	3/90	--	
10	3.3	Key Finance Staff Hired	9/89		9/89	
11	2.0	First Tunnel Section Location Set	9/89		9/89	
12	1.0	Tunnel Cross Section Defined	9/89		10/89	
13	3.0	First DOE Semi Annual Review	9/89		9/89	

SSC PROJECT

STARTUP (NEAR TERM) MILESTONES

MIL NO.	WBS NO.	MILESTONE DESCRIPTION	COMPLETION DATE			COMMENTS
			ORIGINAL PLAN	CURRENT PLAN	ACTUAL	
14	3.3	SSCL Accounting System In WBS Format Shown in August Monthly Report	9/89		11/89	In October Report
15	3.3	Deltek Accounting System Operational	9/89		9/89	October 1 Initialization
16	3.3	Key Procurement Staff Hired	9/89		9/89	All Key Positions Filled
17	3.3	Procurement Policies Procedures Manual Complete and Issued	9/89		9/89	Submitted To DOE-CH For Review And Approval
18	3.3	Deltek Purchasing Module Operational	9/89		9/89	
19	3.4	SSCL Vax Delivered	9/89		10/89	
20	3.1	PMRS Software Installed and Tested	9/89		9/89	
21	3.1	Eng. Mgmt. System Plan - Final Draft Issued	9/89	1/90		
22	2.0	First SEIS Draft Issued	10/89		10/89	
23	2.0	AE/CM Contract	10/89	5/90		
24	3.1	PMRS Implementation Complete	10/89		10/89	Software Implementation
25	3.4	MIS Hardware Operational	10/89		10/89	
26	3.1	Config. Mgmt. Plan Complete	10/89	1/90		
27	3.4	Draft Document Control Plan Issued	10/89		10/89	

SSC PROJECT

STARTUP (NEAR TERM) MILESTONES

MIL NO.	WBS NO.	MILESTONE DESCRIPTION	COMPLETION DATE			COMMENTS
			ORIGINAL PLAN	CURRENT PLAN	ACTUAL	
28	2.6	AE/CM-SSC Performance Objectives & Syst. Requirements Revisions Complete	10/89			
29	3.0	Issue First Funding Directive	10/89		10/89	
30	3.0	First C/SCS Report Test	10/89		11/89	October Data
31	1.0	Collider Dipole Criteria Established	10/89	1/90		
32	3.0	Initial Baseline Issued	11/89	1/90		
33	3.1	First Monthly Report With Automated PMRS	11/89		11/89	Test CPR
34	3.1	Baseline Cost Estimate Complete	11/89	1/90		
35	3.2	SEMP Approved and Issued	11/89	1/90		
36	3.1	PMP - Final Draft Issued	11/89	1/90		
37	3.1	Key QA Staff Hired	11/89	1/90		
38	3.5	ES&H Management Plan	11/89	1/90		
39	3.5	ES&H Final Draft Issued	11/89	1/90		
40	3.1	SSC WBS/WBS Dictionary Complete and Issued	11/89	12/89		
41	1.0	Prototype Dipole Specification Complete	11/89	2/90		
42	1.0	Magnet Criteria Complete	11/89	2/90		

SSC PROJECT

STARTUP (NEAR TERM) MILESTONES

<u>MIL NO.</u>	<u>WBS NO.</u>	<u>MILESTONE DESCRIPTION</u>	<u>COMPLETION DATE</u>			<u>COMMENTS</u>
			<u>ORIGINAL PLAN</u>	<u>CURRENT PLAN</u>	<u>ACTUAL</u>	
43	3.3	Deltak Procurement Interface Program Implemented	12/89			
44	3.1	Configuration Management Policy Statement Issued	12/89			
45	3.4	Document Control Policy Statement Issued	12/89			
46	2.6	CCD-Procedures Manual Second Draft Issued	12/89			
47	3.0	Supplemental Site Specific CDR Issued	12/89			
48	3.0	Start Baseline Validation	1/90			
49	3.1	QA Policies and Procedures Complete	1/90			
50	3.1	QA Data Base Requirements Document Issued	1/90			
51	2.1	AE/CM-Complete Near Term Work Authorization Packages	1/90			
52	4.0	First Land Tract Available	1/90	3/90		Footprint Approval Req'd.
53	1.0	Award Magnet Prototype Contract	1/90	7/90		
54	2.0	Award MTL/MDL Facilities Cold Test Fabrication Contract	1/90			
55	3.3	Final AAAP Approved and Issued	2/90			
56	3.1	DOE/CSCSC Readiness Review	2/90	6/90		Determined by DOE

SSC PROJECT

STARTUP (NEAR TERM) MILESTONES

<u>MIL NO.</u>	<u>WBS NO.</u>	<u>MILESTONE DESCRIPTION</u>	<u>COMPLETION DATE</u>			<u>COMMENTS</u>
			<u>ORIGINAL PLAN</u>	<u>CURRENT PLAN</u>	<u>ACTUAL</u>	
57	3.1	PMP Approved and Issued	2/90	4/90		
58	2.6	CCD-Procedures Manual Issued	2/90			
59	3.0	Baseline Validation Complete	2/90			
60	4.0	Supplemental Environmental Impact Statement Issued	2/90			
61	2.0	A-E/CM On Board	2/90	6/90		

SSCL - MASTER MILESTONE STATUS REPORT

As Of: 12/18/89

NO.	MIL LEVEL	WBS NO.	TITLE		* BASELINE PLAN	CURRENT PLAN	ACTUAL
M1-1	1	3.1.1	PM	First DOE Semiannual Review	Sep-89		Sep-89
M1-2	1	1.1.6	Collider System	Start Design	Jan-90		
M1-3	1	3.1.1	PM	Start Construction Project	Oct-89		Oct-89
M1-4	1	1.1	Injection System	Start Design	Jan-90		
M1-5	1	3.1.1	PM	SCDR Issued	Dec-89		
M1-6	1	3.0	Footprint	DOE Approval	Feb-90		
M1-7	1	3.1.1	PM	Baseline Validation Complete	Mar-90		
M1-8	1	3.1.1	PM	PMP Approved By DOE	Apr-90		
M1-9	1	3.0	AE/CM	Award of Contract	Jun-90		
M1-10	1	3.0	SEIS	Record of Decision	Sep-90		
M1-11	1	2.4	Collider Ring	Start First Tunnel Construction	Oct-90		
M1-12	1	2.2	Campus Structures	Complete	May-94		
M1-13	1	5.1	Detectors	Prototype R&D Complete	Mar-96		
M1-14	1	1.1.6	Collider System	Complete Design	Oct-96		
M1-15	1	2.4	Collider Ring	Complete Conventional Construction	Oct-96		
M1-16	1	1.1	Injection Systems Operational		Aug-97		
M1-17	1	1.0	Collider System	Complete Acceptance Tests	Dec-97		
M1-18	1	1.0	SSC Operational		Mar-98		

* BASELINE VALIDATION SCHEDULED FOR COMPLETION MARCH, 1990.

SSCL - MASTER MILESTONE STATUS REPORT

As Of: 12/18/89

NO.	MIL LEVEL	WBS NO.	TITLE	* BASELINE PLAN	CURRENT PLAN	ACTUAL
M2-1	2	3.1.1	PM	Issue First Draft PMP	Aug-89	Aug-89
M2-2	2	3.1.1	PM	Award SE&I Contract	Oct-89	Oct-89
M2-3	2	3.1.1	PM	First C/SCSC Test Report Issued	Nov-89	Nov-89
M2-4	2	3.1.1	PM	First Land Tract Available	Mar-90	
M2-5	2	2.1.3	Infrastructure	Start Collider Infrastructure Design	Apr-90	
M2-6	2	2.4	Collider Ring	Start Design	Apr-90	
M2-7	2	2.1.1	Infrastructure	Start Campus Infrastructure Design	Jun-90	
M2-8	2	2.1.2	Infrastructure	Start Injector Infrastructure Design	Jun-90	
M2-9	2	2.1.4	Infrastructure	Start Exper Halls Infrastructure Design	Jun-90	
M2-10	2	2.2.1	Campus Labs/Offices	Start Design	Jun-90	
M2-11	2	2.3	Injector Facilities	Start Design	Jun-90	
M2-12	2	3.1.1	PM	Ready For C/SCSC Validation	Jun-90	
M2-13	2	1.2.6.1	Collider Dipole Magnets	Start Preproduction	Aug-90	
M2-14	2	1.2.6.2	Collider Quad Magnets	Start Preproduction	Aug-90	
M2-15	2	2.2	Camp Hv Wks/Shops/Sup.Bldgs	Start Design	Sep-90	
M2-16	2	1.1.6	Collider Components	Start Fabrication	Feb-91	
M2-17	2	2.4.3	Collider Ring	Start West Cluster Tunnel	Mar-91	
M2-18	2	2.5	Experimental Facilities	Start Design	Jul-91	
M2-19	2	2.4.4	Collider Ring	Start East Cluster Tunnel	Mar-92	
M2-20	2	1.1.2	LINAC	Complete Fabrication	Jun-92	
M2-21	2	3.1.1	PM	Land Acquisition Complete	Jun-92	
M2-22	2	1.2.6.1	Collider Dipole Magnets	Start Production	Oct-92	
M2-23	2	1.2.6.2	Collider Quad Magnets	Start Production	Oct-92	
M2-24	2	5.2	Detectors	Start Fabrication	Jan-93	
M2-25	2	2.4.3	Collider Ring	Complete West Cluster Tunnel	Jun-93	
M2-26	2	1.1.2	LINAC	Complete Installation	Oct-93	
M2-27	2	1.1.3	LEB	Complete Fabrication	Oct-93	
M2-28	2	1.1.3	LEB	Complete Installation	Nov-93	

SSCL - MASTER MILESTONE STATUS REPORT

As Of: 12/18/89

NO.	MIL LEVEL	WBS NO.	TITLE		* BASELINE PLAN	CURRENT PLAN	ACTUAL
M2-29	2	1.1.6	Collider System	Complete Acceptance Test Sector A		Dec-93	
M2-30	2	1.1.6	Collider System	Complete Acceptance Test Sector B		May-94	
M2-31	2	2.4	Collider Ring	Complete Design		Jun-94	
M2-32	2	2.4.4	Collider Ring	Complete East Cluster Tunnel		Jun-94	
M2-33	2	5.2	Detectors	Start Installation		Aug-94	
M2-34	2	1.1.4	MEB	Complete Fabrication		Oct-94	
M2-35	2	1.1.4	MEB	Complete Installation		Jan-95	
M2-36	2	1.1.6	Collider System	Complete Acceptance Test Sector K		Feb-95	
M2-37	2	1.1.6	Collider System	Complete Acceptance Test Sector C		May-95	
M2-38	2	2.3	Injector Facilities	Complete Construction		Jun-95	
M2-39	2	2.5.2	Experimental Facilities	Complete Construction		Jun-95	
M2-40	2	1.1.5	HEB	Complete Components Fabrication		Aug-95	
M2-41	2	1.2.5.1	HEB Dipole Magnets	Complete Fabrication		Oct-95	
M2-42	2	1.2.5.2	HEB Quad Magnets	Complete Fabrication		Oct-95	
M2-43	2	1.1.6	Collider System	Complete Acceptance Test Sector J		Dec-95	
M2-44	2	1.1.6	Collider System	Complete Acceptance Test Sector H		Aug-96	
M2-45	2	1.1.5	HEB	Complete Components Installation		Oct-96	
M2-46	2	1.2.5.1	HEB Dipole Magnets	Complete Installation		Oct-96	
M2-47	2	1.2.5.2	HEB Quad Magnets	Complete Installation		Oct-96	
M2-48	2	1.1.6	Collider System	Complete Acceptance Test Sector D		Dec-96	
M2-49	2	1.1.6	Collider System	Complete Acceptance Test Sector F		Mar-97	
M2-50	2	5.2	Detectors	Complete Fabrication		May-97	
M2-51	2	5.2	Detectors	Complete Installation		Oct-97	
M2-52	2	1.1.6	Collider System	Complete Acceptance Test Sector E		Dec-97	
M2-53	2	1.1.6	Collider System	Complete Acceptance Test Sector G		Dec-97	