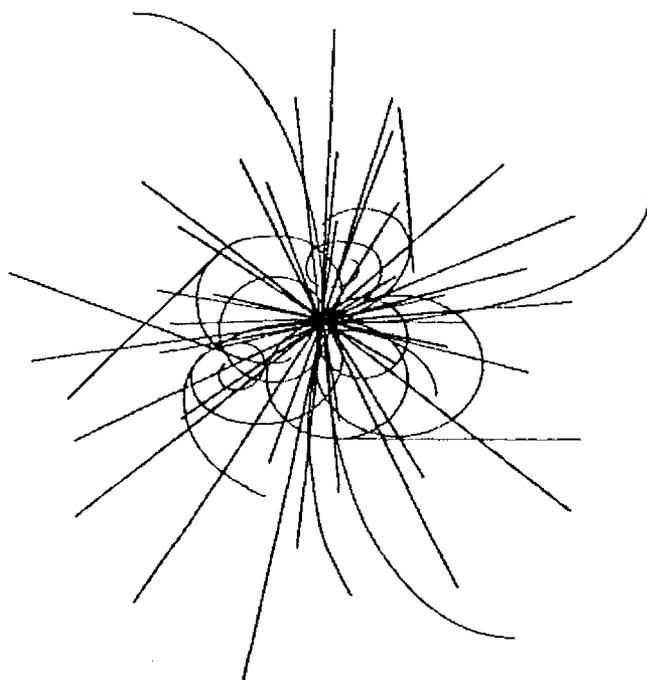


**SSC PROJECT**  
**MONTHLY PROGRESS**  
**REPORT**  
**MARCH 1990**



**SSC**

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**LABORATORY**

# SSC PROJECT

## MONTHLY PROGRESS REPORT

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# EXECUTIVE SUMMARY

On March 16, the Department of Energy released the SSCL "footprint", an exact description of the land needed to build the laboratory, and asked the State of Texas to begin acquiring the land. This process is now beginning and is expected to take about two years.

Helen Edwards, formerly head of the Accelerator Systems Division, has been appointed Technical Director of the SSC project. Paul Reardon will act as head of the Accelerator Systems Division. Richard Briggs, formerly Deputy Director and Project Manager, will devote full time to his duties as Deputy Director. Douglas Pewitt will serve as Acting Project Manager.

The first annual SSC Fellowships were selected. Ten junior faculty members and ten postdoctoral research associates will spend the next academic year working at their home institutions on research related to the SSC, supported by funds from the Texas National Research Laboratory Commission.

Preliminary design criteria have been established for the High Energy Booster dipole. Dynamic beam modelling suggests that a 70mm aperture would be better than a 50mm aperture.

The magnet DSHIP was delivered to SSCL by truck from Fermilab. It was instrumented with strain gauges in order to test the shipping of magnets over the roads and will also be used for vibration tests in the Magnet Evaluation Lab.

Critical current and short sample training have been studied at LBL for the new 30-strand cable to be used in the 50mm dipole magnets. No degradation due to cabling was observed, and only one training quench.

DSS019, a 1.8 meter dipole, was tested at BNL. It uses low epoxy content (18%) on the outer coil, the latest type of ramp splice, and anti-ovalized collars. The results indicate that these features can be used with no adverse effects on training.

DSV016, reassembled as a low prestress magnet, showed better initial quench performance than it had at high prestress.

The Magnet Research and Development Plan defining the R&D efforts through FY92 was completed and distributed. The Collider Dipole Magnet Request for Proposal was completed and forwarded to DOE for review.

Work is in progress on writing or revising many other plans and documents: the Site-Specific Conceptual Design Report, the Project Work Breakdown Structure, the Engineering Guidelines Manual, the Engineering Document Management System, the Project Management QA Plan, the Supplemental Environmental Impact Statement (a preliminary draft has been released), the Configuration Management Plan, the Working Requirements Notebook, the Personnel Policy Manual, 28 Materiel Management Standards, and the Field Task Proposals, to name a few.

Planning is underway for assembling and installing the large experiments. Most large (up to 2,000 tons) subsystems of detectors may have to be assembled at the surface, placing heavy demands on the design of experimental hall structures.

As of March 31, the laboratory had a total of 536 employees. The staff is now growing at about 25 per month.

*Ted Kozman*  

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Ted Kozman  
Deputy Project Manager  
SSC Laboratory

# **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)**

The Magnet Research and Development Plan, which defines the R&D efforts to be accomplished through FY 92 and leading to preproduction of 50mm Collider Dipole Magnets (CDM), was completed and released to distribution.

The CDM Request For Proposal (RFP), and the Statement of Work (SOW) for procurement of CDM full scale engineering development (FSED) effort were completed and forwarded to DOE for review.

Key personnel participated in and supported the Magnet Systems Integration meeting held at SSCL 14-15 March. Action items generated during the meeting are presently in work.

Inputs summarizing the Magnet Research and Development Program were provided for the Field Technical Plan.

### **• HEB MAGNETS (WBS 1.2.2)**

#### ***HEB Dipole Program***

The HEB dipole development team met to review specifications provided by the Accelerator Group which are based on dynamic beam modeling. Modeling based on a 50mm versus a 70mm aperture indicates a significant margin for the 70mm aperture during beam injection and survival. Future modelling of the effects of slow extraction are planned. The Accelerator Group plans to complete definitive HEB magnet specifications by September 1990.

A magnetic field harmonic optimization program has been completed and has produced coil 2-dimensional cross-sections for the 65mm HEB dipole and test cases for the 50mm dipole with options on the number of wedges to be used.

Studies on the AC loss issues and the helium cooling schemes that may be used have been initiated. Estimates on hysteresis and other AC losses were provided to the HEB dipole task team to facilitate design decisions. We concluded that the AC losses are manageable for all designs. Based on initial findings, preliminary design criteria will be established and the design team will proceed with elementary 2D cross-section designs. The present position is that the magnet will use 2.5 micron filaments and have an aperture of 65mm. The plan calls for the investigation of a variety of possible design solutions early in the program.

The program to develop the short magnet and cable test facility is moving forward. Preliminary layouts for the test facility have been produced and the facility requirements have been established. Test equipment and work stations have been ordered and the start up of the development laboratory is scheduled for mid-May. The delays in hiring personnel and in establishing a development lab may

delay the operational date for the two HEB test systems. The full impact of the delay is being evaluated to identify ways to pick up the time lost.

## • COLLIDER MAGNETS (WBS 1.2.3)

### *QA*

The Quality Assurance Group provided support services to various laboratory activities including review and comment on draft copies of the Supplementary CDR, the laboratory reliability plan, the laboratory QA plan and the CDM RFP. We participated on Magnet Task Teams and in the Collider Dipole Magnet Design Review. We also investigated and reported on requests for waiver on one billet (SSC-IGC-14RD) of outer cable and on one coil (DCI-43).

Various applications of QC measuring equipment were examined, including non-contact video measuring equipment for magnet end pieces, laser interferometry and ultrasonic monitoring of cable production. An in-plant demonstration of ultrasonic cable inspection was provided by an interested vendor. It appears that, with minimal further development, it will be possible to detect standoffs, crossovers and foreign material at the fastest required cable winding speeds.

Two members of the QA Group visited SLAC to compare their quality systems and requirements with the future needs of the SSCL. A preliminary briefing on Taguchi methods was attended in Detroit. Three members of the QA Group were represented at the IISSC.

### *ENGINEERING*

A conceptual design review was held for DSX-201 with the design documentation package prepared for release to industry with the CDM RFP. Revisions to the DSX yoke, collar and cryostat drawings have been incorporated. The Magnet Research and Development Plan supports the need for a working CDM prototype magnet to be produced at FNAL by February 1991. Analysis on the baseline DSX201 cross section (including Lorentz force) and the vertically split yoke design (the Fermi 50mm dipole design) is continuing.

The outer diameter for the 50mm aperture CDM has been defined at 340mm.

Work on coil end design continues in conjunction with work being performed at Fermilab. A trial order for G-10 coil end parts is being prepared for release. Efforts for the end part design and fabrication for 50mm magnets have been initiated.

Modifications to the Lopez quench program and comparative cases for the 40mm vs. 50mm designs have been accomplished. Results suggest that the 50mm is much more protected than the 40mm design because of the reduction in current density.

An ANSYS stress analysis on the effect of antiovalization in collars is nearing completion.

The Field Quality Study to assess the sensitivity of the field quality to manufacturing tolerances and material variables is continuing. The field quality team is currently performing harmonic analysis on asymmetric shifts in coil alignment for the 50mm design. Members of the engineering staff met with representatives of FNAL to gather additional data essential to performance of the study.

Members of the MSD engineering staff visited LBL last week to review the passive corrector analysis and design, and to migrate magnetization related codes to SSCL.

## **CRYOSTAT DESIGN**

Effort associated with design of the cryostat for the 50mm inner coil diameter long dipole magnet continues. A concerted effort is being made to maintain a 669.4mm outer diameter for the cryostat and an assessment of the impact of applying ASME codes and standards to the design continues.

Trade studies of alternate cold mass support concepts utilizing Ultem 2100 with 10% glass fiber reinforcement have been completed. Documentation of the results is in work. Activity associated with utilization of the structural dynamic analysis models of the 17m dipole magnet (40mm aperture) continues.

Design for fabrication of prototype magnet stands continues.

## **QUENCH PROGRAM**

The area of quench detection, modeling, and protection has been included in the development plan. Work has begun on development of a quench modeling program that will bring together more factors in the model than previously have been used. The program will be structured to add various quench acceleration phenomena as well as expected pressure rises within the cold mass. Responsibility for the future quench development work has been transferred to the Cold Mass Design Section within the Magnet Engineering Group.

## **COMPUTER AIDED DESIGN SYSTEM (CADS)**

CADS support continued in the development of drawing/documentation packages for the 50mm baseline design and in support of the pending CDM RFP.

We released procurement packages for the purchase of additional software licences and workstations to support MSD and FNAL 50mm program needs. Efforts continue in the development of a CAD/CAE specification to define MSD requirements for competitive procurement of the hardware and software needed to support total program requirements.

## **SYSTEMS ENGINEERING**

The preliminary CDM Prime Item Development specification to define magnet performance requirements has been completed and following sign-off by MSD and Accelerator Systems Division, was released for review. Development of the detailed specification will continue with participation during the full scale engineering development program by the selected CDM vendor.

Development of the Quadrupole Magnet specification has been initiated and a review of the SSCL Reliability Plan was completed with comments provided to Project Management.

## **• MAGNET FACILITIES EQUIPMENT AND TOOLING (WBS 1.2.4)**

### **MAGNET EVALUATION LAB (MEL)**

Magnet DSHIP arrived from Fermilab on March 14, 1990. A media event was staged to coincide with its arrival.

The MEL facility will be completed early next month. All tooling is available and ready for disassembly of DD0018.

### ***MAGNET DEVELOPMENT LAB (MDL)***

Conceptual designs for the long magnet curing press and collaring press were reviewed and approved March 22nd. Detailed design has begun.

The RFP for the 60-ton hydraulic cylinders for the skinning press was submitted for approval.

The long coil winder RFQ was issued March 23, 1990. Bids are due within 30 days.

A training program for MDL technicians is being established in cooperation with local community colleges.

### ***MAGNET TEST LABORATORY (MTL)***

Facility design is progressing on track with the next review scheduled for the last week of April.

### ***FNAL CDM Activities***

A priority effort for locating and hiring engineers and other support personnel to be involved in the dipole effort at Fermilab was begun in March. This effort is proceeding rapidly and is on schedule, with the first offers scheduled to be mailed April 12, 1990. Some contract employees should be on board prior to that date.

### ***Miscellaneous***

Work is in progress on a "bottoms up " cost estimate for production of Collider Dipole Magnets.

Efforts leading to the development of a cable and short magnet test facility continues. The development plan and schedule include a discussion of the efforts leading to the prototyping and operation of a short sample cable test facility and a short magnet test facility. Assessment of the approach for procurement of a cabling machine and its location is under way.

# **CONVENTIONAL CONSTRUCTION (WBS 2.0)**

## **DIVISION MANAGEMENT & ADMINISTRATION (2.6.1.1)**

The FY92 FTP/A was completed for Conventional Construction, and input to the updated SCDR was completed. Reorganization and consolidation of the CCD staff, integrating Sverdrup and URA personnel, was accomplished. Planning and management continued in preparation for the ICE, the DOE validation visit, and direction of the pre-design activities for the Accelerator Systems String Test (ASST) and Prototype Installation Facility (PIF). Joint infrastructure planning with TNRLC continued.

## **PROJECT CONTROLS GROUP MGMT & ADMINISTRATION (2.6.1.2)**

The documentation of supporting detail for the January Baseline Cost Estimate in preparation for the ICE continues. Schedules are being developed and revised in close coordination with the Accelerator Division.

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

Work continued on plans for interfacing CCD with the future SSC architect engineer/construction manager (A-E/CM). Meetings were held with TNRLC staff to discuss the exact nature of the "inducements" set forth in the Texas proposal regarding the design and construction of infrastructure serving the SSC. At the end of the month, these issues were still to be clarified.

## **MAJOR STUDIES (2.6.2)**

### ***Surface Transportation Study***

Review and editing of the final draft report was completed and it was submitted to TNRLC and ANL. TNRLC's comments were incorporated and the final draft circulated for the Associate Directors' comments and the Project Manager's approval.

### ***Building Space Requirements***

The SSC Surface Facilities Programming Report is being utilized as a reference document for ongoing campus surface facilities programming by consultants. Since the January, 1990 baseline presentation the population has been reconfigured with a loss of 500 personnel. This drastically altered space needs, which are being reanalyzed.

### ***Utility Requirements***

The SSC Water and Sanitary Sewer Study was reviewed to confirm water requirements and to reflect changes in the technical requirements for the SSC. Studies addressing SSC electrical supply requirements continued. Utility requirements are currently being formatted into a technical requirements report for transfer to TNRLC.

### ***Regional Planning Support***

CCD staff met with TNRLC's selected planning consultant for a general discussion, and to provide background information.

### ***Overall Site Development Plan***

Activity continued to be delayed during March pending management/DOE direction on the desired scope.

### ***Vegetative Stabilization Program***

This site-specific study and design of revegetation/stabilization of SSC spoils disposal sites at service areas and the east and west campuses will be primarily accomplished by a subcontractor who has not yet been selected.

## **• DESIGN CRITERIA (2.6.3)**

Work continued in March to develop programming requirements for both surface and underground structures for the prototype installation facility (PIF) tunnel segment and the Accelerator Systems String Test (ASST) facility. This work includes defining space requirements, plausible structural shapes, and usage for all the typical structures that were identified.

Sketches and CADD drawings continue to be developed which define the relationship of these structures with the collider ring alcoves, niches, shafts, and shaft connections. Magnet transport and delivery considerations required a 55-ft F shaft at E-7. Space requirements were defined well enough to allow for preliminary design of the PIF facilities. Preliminary design is being done by RTK with CCD providing the laboratory interface with RTK.

Work continued on updating the SCDR to represent the basis for the recommended cost estimates, and to finalize coordination with technical division requirements. The conceptual designs for the EMPACT and BCD detector halls were further developed. Alternative collision hall concepts were studied in an effort to reduce costs.

Programming for the Linear Accelerator (linac) continued. Incorporated into this study was the relationship of the depth of linac to LEB, MEB, and HEB relative to radiation shielding needs. This analysis was completed and presented to the Accelerator Division for their analysis and final determination in April.

Study continued in March on the design and construction of the ASST facility. Programming requirements were clarified in greater detail for the structure's associated cryogenic systems, technical systems, and surface facilities. The ASST structure, as currently envisioned, will consist of a surface structure approximately one-half kilometer in length, in which strings of magnets can be assembled and tested. It will share surface facilities for the PIF which will subsequently be utilized for the E-1 site to support the collider ring. Based upon cost modeling and personal safety issues, the envelope of the string was determined to be on-grade concrete pipe to match the 12-ft inside diameter of the tunnel with exterior insulation and expansion joints at appropriate intervals expressed as concrete "boxes" which incorporate HVAC on top and egress on the sides. Site configuration of surface facilities was analyzed and returned to RTK with SSC input for final schematic configuration.

Input was provided to the new baseline scheduling effort and to the Engineering Standards Committee. Scheduling input took the form of estimating contract packaging for the collider tunnel construction contracts.

Architectural space programming of nontechnical campus administrative and support facilities was initiated based upon the January 90 population baseline. Management of the consultant primarily takes the form of setting interviews in advance for SSC personnel and attending interviews to verify the baseline data utilized.

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

*Interface Control*

Initiation of work on interface requirements of CCD with the A-E/CM awaited receipt and review of the draft SSC configuration management plan.

- **GEOTECHNICAL PROGRAM (2.6.8)**

*Program Oversight*

Geotechnical field and laboratory activities continued into March. By the end of March only two borings from the characterization program remain to be started, and they are hampered by wet site conditions caused by heavy rains. Two borings were completed at the collider ring service area shaft locations, and four borings were completed at experimental hall locations. Three borings were completed at the HEB/collider transfer tunnel area. Borings to explore specific geologic features were completed at fourteen fault locations and two were completed at bentonite seam locations. Five borings were completed to explore geologic contacts, including three between F-1 and E-2 to further define the chalk/shale interface.

Technical planning for the large diameter drilled (LDD) hole, which will be used for geotechnical instrumentation and exploration was completed in March. Assembly of contract documents and contractor procurement can begin once a final go ahead is received. The LDD hole will provide information on in-situ properties of both the Austin Chalk and the Eagle Ford Shale. This information will be directly applicable to the design/construction of the experimental halls and the tunnels.

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

The PB/MK team was issued the SSCL's Request for Cost Proposal on March 16, and the SSCL's negotiating team was organized to prepare for pre-negotiation and contract negotiation meetings.

- **SEIS SUPPORT (2.6.12)**

*SEIS Support Management*

We provided additional data to the SSC Environmental Affairs Office for the SEIS preparation.

# **PROJECT MANAGEMENT AND SUPPORT**

## **(WBS 3.0)**

- **PROJECT MANAGEMENT (WBS 3.1)**

- **PROJECT MANAGEMENT OFFICE (3.1.1)**

There was significant effort made by the entire Project Management organization on details and coordination of the effort necessary for the Validation Review scheduled in early June. There were two separate meetings held with the DOE Validation Working Groups on March 7-8, and March 28-29. Additionally, there was a site tour and meeting with members of the Inspector General's Office on March 6.

- **PROJECT PLANNING (3.1.2)**

In our scheduling effort, work on the bottom level details is continuing. There has been sufficient work accomplished to define the major interfaces between divisions and requirement need dates by the Accelerator Division from the Magnet Division and Conventional Construction. Additional requirement need dates by the Physics Division for the experimental halls and surface facilities have been coordinated with the Conventional Construction Division. The first draft of the high level (Category 1) milestones has been issued for review based on these details. The low level schedule details and their recommended milestones will be completed before the next DOE Validation Working Group Meeting, April 17.

The FY90, FY91, and FY92 budgets for each division, by fund type, were finalized for the FY92 FTP/A submittal in April. Additionally, \$23.9M was removed from the FY90 construction budget for conventional tunnel construction.

In Cost Estimating, the primary effort continues to be finalizing the cost estimate database and supporting details. The process of putting the cost estimate on the network was completed during March. This process has now been successfully demonstrated and is menu driven for ease of use by the engineers and cost estimators.

The summary cost data that the ICE staff collected for evaluating the collider dipole magnets is being evaluated in detail. The details they have presented are being compared by our estimators with our current details. The list of materials required for the 50mm dipole magnet is being checked against the current design to ensure that accurate quotations can be obtained for the various parts and components. Trips to Fermilab and SLAC were made to review their administrative costs. The information developed will be used to review our costs of these groups.

Additionally, during March detailed changes were made to the Project Work Breakdown Structure. These changes include adopting a sector numbering system that can be used by both the Accelerator and Conventional Construction Divisions. Additionally, the engineering, design, and inspection estimate is now more divisible by machine and major subsystem.

- **PROJECT MANAGEMENT AND REPORTING SYSTEMS**  
**(3.1.3)**

The plans were finalized to reestablish the Document Review Committee. This committee is being expanded into a PMRS C/SCSC systems integration team, which will be responsible for both C/S documentation reviews as well as functioning as the group responsible for ensuring that each division's C/S software requirements are defined, working, and integrated with the central PMRS system for reporting purposes.

A draft revision of the Project Management Office charge number structure was accomplished according to the Work Breakdown Structure (WBS) discussed in the February report. These changes along with changes from other divisions were incorporated into Easytrak. Since major Project scheduling effort is done using Open Plan, a fullup test bringing Open Plan data into Easytrak for monthly reporting was successfully accomplished. The schedule (BCWS) data can be satisfactorily transferred via the WBS. Several options are being considered for the flow of earned-value (BCWP) data from Open Plan to Easytrak.

- **ENGINEERING STANDARDS (3.1.4)**

Work has started on the Engineering Guidelines Manual (Engineering Process, Standards, and Guidelines). The outline has been finalized and the organizational guidelines chapter has been completed in draft form. Sections in both the Engineering Process Guidelines and Design/Development Engineering Chapters have been completed. However, these chapters are the most complex (and most important as standards) and therefore won't be complete for several more months.

In the Document Control System, a first draft of an overall system description for the Engineering Document Management System has been started. Discussion in this system description includes document workflow and user requests. Additionally, drafts of the SSCL Engineering Drawing Policy and the Document Control Center Operating Procedures have been prepared for review by the Engineering Standards Committee.

Work continued on the Project Management QA Plan and the first rough draft was submitted to the Deputy Project Manager for review and comments. This plan started as a "Total Quality Management" approach. However, because of DOE QA requirements, there will be some mandatory requirements, with each line organization being responsible for the quality of their own products and services. Each organization will develop and implement the appropriate QA/QC plans and procedures tailored to their individual operations. Quality Assurance is working with personnel in the Laboratory Technical Services Division in the initial planning of the metrology laboratory to provide accurate requirements to meet the long term needs of the SSC Laboratory.

- **ENVIRONMENTAL AFFAIRS (3.1.5)**

CCD has been requested to provide updated information to Argonne as soon as possible for their use in preparing the SEIS because there are sixteen significant differences between the SSCL Environmental Data Report (10/20/89) and the latest SCDR (2/21/90).

The release of the footprint has triggered the official DOE consultation process. Formal consultation letters have been prepared and issued by DOE-CH as follows:

- 3/20/90 to U.S. Fish & Wildlife Service (Robert M. Short, Field Supervisor, Ft. Worth Office)--coordination on threatened and endangered species and critical habitat relative to siting the SSC.
- 3/20/90 to U.S. Army Corps of Engineers (David Madden, Permits Section, Ft. Worth Office)--coordination on wetlands and floodplain considerations for siting the SSC.
- 3/22/90 to the USDA Soil Conservation Service (Harry W. Oneth, State Conservationist, Temple Office)--Form AD-1006 Farmland Conversion Impact Rating for the DOE SSC Project.
- 3/22/90 to the Texas Parks and Wildlife Department (Charles Travis, Executive Director, Austin Office)--official footprint maps and revisions to species list.
- 3/22/90 to the Texas Historical Commission (James E. Bruseth, Deputy State Historic Preservation Officer, Austin)--Section 106 Consultation.

On March 14, 1990 the preliminary draft SEIS was released by ANL with the notations "DO NOT CITE" and "DO NOT DISTRIBUTE."

## • SYSTEMS ENG. & INTEG. (WBS 3.2)

### • SYSTEMS ENGINEERING MANAGEMENT (3.2.1)

The Configuration Management Plan was briefed to the Technical Director. The plan was rewritten to reflect the Laboratory organization change and will be issued in early April.

We generated a development plan for the engineering policies, standards, and practices in a briefing format. The idea was to get more help in generating these documents and to continue working on the documents. Job and qualification descriptions for the engineers needed to assist in preparation of the Laboratory-wide standards and practices manuals were written. A rough first draft of the policy addressing the use of the metric system at the SSC was completed, as were drafts of policies addressing technical plans, the systems engineering process, and technical performance measurement. We are still finding problems associated with using the metric system, e.g., the standards for designing the cryogenics which flow down to magnets, spool pieces, etc. are in English units; to force them on industry could be costly in tooling, etc.

A draft of the Accelerator, Physics Research, and Conventional Systems hierarchy was prepared for coordination. A more detailed outline of the Conventional Systems requirements, and a matrix identifying the specification in which they should appear, was also prepared.

### • SE SUPPORT TO ASD (3.2.2)

We completed four major sections (less figures) of cryogenic plumbing sections for the mechanical design manual. We now have to determine the codes/standards that apply to the procurement of the cryogenic plant and the dipole magnets.

We are developing the systems specification and using the Accelerator WBS to determine the interface control points, test plan requirements and integration plan requirements.

We firmed the logic for bringing collider sectors on line. The schedule for sector delivery to Accelerator is under review by the Associate Directors. Top level milestones for the injectors were established and placed in a schedule package for review. The system specification has been reformatted and will be used as a guide to develop a boilerplate specification for "fill in the blanks" for all the other specifications.

The Working Requirements Notebook is being done on a priority basis, second only to the major scheduling items. A plan is being developed to detail the approach to expanding the scope of the book to support the cost estimate.

### • SE SUPPORT TO MSD (3.2.3)

Work continued on two versions of the dipole magnet specifications; one version is a higher level performance requirements document, and the other is a more detailed specification which contains added physical requirements.

Work also continues on reliability issues, i.e., allocation of reliability of the individual IR components and determination (for individual items) of the numbers of items which should be tested in order to be confident of the test results.

Discussions with LBL have resulted in their agreement to provide assistance in working on the collider quadrupole specification.

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

The first draft of a division document control procedure for archiving and controlling detector cost and schedule data was prepared. As a result of initial comments, this draft will be expanded to include cataloging and archiving of physics design data of general interest to all Collaboration participants.

We started preparation of a management plan for development of physics experiments, i.e., how the Physics Research Division will do business with the Collaboration groups. The initial draft will present three alternatives, but only one will be developed in detail.

# **PROJECT ADMINISTRATION AND SUPPORT**

## **(WBS 3.3)**

### **• ADMINISTRATION SYSTEMS & SUPPORT (WBS 3.3.1)**

Considerable progress was made on the project to change the URA pension plan to allow SSCL to shorten the waiting period for contributions from two years to six months for new employees. URA has approved the proposed change, final drafting is underway, and an effective date has been approved by the Associate Directors.

A records retention activity was begun at the request of the Lab Director and the Associate Directors. Responsibilities were agreed upon between Staff Support Services and the Library for this new activity.

We received final approval from DOE on relocation package enhancements and a change to applying the package to key employees only. Eligibility and retroactivity questions were addressed and initial implementation occurred.

Lab-wide and division level data regarding employment of minorities was presented to the Associate Directors for discussion.

### **• FINANCE (3.3.2)**

The Budget Office spent the entire month of March working on the FY90 Re-Forecast and the FY91/92 FTP/A. This involved working with the Division Budget people, reiterating their data and compiling it into Lab-wide totals for review by the FTP/A Committee and the Associate Directors prior to final submission to DOE.

The Accounting and Financial Control Section accomplished the following objectives:

- a. Implemented new Travel Expense Report forms and trained Lab personnel in their use.
- b. Implemented an electronic funds reimbursement system for travel expense reimbursements.
- c. Developed and published new capitalization policy and procedures.
- d. Developed a draft of the Lab's capital lease policy for submission to management for approval.
- e. Completed an audit of cafeteria operations.
- f. Determined the tax implications and established procedures for the handling of employee tuition reimbursements.
- g. Researched the tax implications of foreign nationals' honoraria payments and made recommendations.

In addition, Accounting managed the routine functions of processing payroll for 325 URA employees and 2,773 payment vouchers.

The Financial Information Systems (FIS) section created an SSC Laboratory employee database. This system consists of the Deltek payroll databases for URA and EG&G employees plus a stand alone

database for subcontractors and consultants. Reports showing all employees on the SSC program can be prepared in a more timely fashion. Also, we continued the implementation of the TRACS travel system, automating real-time interfaces between Diner's Club Citicorp and the Deltek systems.

FIS is assisting the MIS Support Team in scheduling and staffing all financial interim programming tasks. These include:

- a. Pre-printed timesheet system.
- b. Field Task Proposal system.
- c. Automatic Purchase Requisition Reduction system.
- d. Upgrade to Deltek Advanced Payroll.
- e. Transfer the Asset Accounting system to the VAX.
- f. Transfer of Subcontract tracking to the VAX.
- g. Online summary to detail cost reporting.
- h. Electronic Funds Transfer from Deltek Accounts Payable.

The Unbooked Receipts Accrual System, a Deltek modification, was installed for the March close. This system automatically books the costs of materials and services as soon as they are received and/or accepted. Before, only the costs of major subcontractors were accrued using a manual system.

### • PROCUREMENT (3.3.3)

During March the Procurement and Contracting Department made awards totaling \$4,372,227, of which \$825,036 was to Small Business and \$355,057 of which was to Small Disadvantaged Business as defined in PL 101-101, Section 301(a).

Independent review was completed of twelve contract provisions/clause draft packages and they were prepared for submittal to the DOE Contracting Officer. URA Procurement Policies (originally submitted to the Contracting Officer on September 1, 1989) were revised and completed for submittal to the DOE Contracting Officer. URA standard procurement practices are still undergoing independent review and, upon completion of independent review, will be submitted to the DOE Contracting Officer.

The Dipole Magnet RFP received "Red Team" and outside independent review and will be submitted to DOE for review after incorporation of all review comments.

The A-E/CM request for cost proposal was sent to PB/MK on March 16, 1990. The cost proposal, due on or about April 15, 1990, will be submitted to audit, cost/price, and prenegotiation analysis prior to negotiations, which are tentatively slated to begin June 1, 1990.

The Magnet Lab finishout RFP was issued to Trammel Crow on March 26, 1990.

A new travel agency subcontract was awarded to TrameX/Travel, Austin, Texas. The new firm commences operations on April 2, 1990.

A new security service subcontract was awarded to Fort Knox Security Inc., DeSoto, Texas. The new firm commenced operations March 26, 1990.

The Magnet Test Lab Cryogenics RFP closed for receipt of proposals on March 26, 1990. Competition was obtained and award is anticipated in late September.

The RFP to definitize the Sverdrup Letter Subcontract was issued March 26, 1990. A definitized subcontract is scheduled for June 1, 1990.

The Procurement and Contracting Department participated in seven outreach programs during the month, reaching several hundred business people representing all classifications of business from Small-Disadvantaged to Large. These programs, which focused on doing business with the Laboratory, were sponsored by civic and business organizations. The FY90 Small and Small Disadvantaged Business Plan was recently revised to respond to DOE comments and has been resubmitted to the DOE Contracting Officer for approval. The Department submitted two special reports to DOE, one on Small Disadvantaged Business Subcontracting and one on subcontract awards by state.

#### • TRAVEL DEPARTMENT (3.3.4)

Tramex Travel, an Austin based minority firm, signed a three year contract with the SSC Laboratory to provide travel services. The head of Travel Services spent three weeks training the agency in Austin and Dallas to the Laboratory's policies and requirements.

#### • PERSONNEL (3.3.5)

We experienced a major upswing in recruiting in the technical divisions. Our staff coordinated over 107 interviews with hiring managers. In March, 27 job offers were accepted and 25 new employees joined the Laboratory staff. As of March 31, 1990, the Laboratory had a total of 536 employees.

Representatives of the Personnel Department attended each meeting of the newly formed Engineering Staffing Committee. The committee's actions have been well coordinated with the offer letter process so that a minimum of delay has been experienced.

Major efforts in the Compensation and Benefits area resulted in a successful Laboratory-wide mid-year review of Laboratory salaries. Additionally, we have received URA concurrence to our effort to change the pension plan waiting period. Our proposed changes will be submitted for Department of Energy approval in early April.

We have also focused major effort on our Affirmative Action program at the Laboratory. Each division has established affirmative action goals for the remainder of FY90 and an active outreach program is well under way. We worked closely with EG&G Human Resources and SSCL Minority Affairs in preparing for the site visit of the OFCCP, which will be conducted in early April.

#### • STAFF SUPPORT SERVICES (3.3.6)

During the month of March concentrated efforts were accomplished in the areas of medical, security, records retention and support facilities.

In the medical area, a statement of work was issued for an Interim Staff Physician. Interviews have been conducted for an occupational nurse.

In the security area, a new Security Officer was hired for the Laboratory.

A visit was made to a DOE location to tour their records facility. Work has begun on writing procedures for central files.

In the area of facilities support, a meeting was held with a DOE representative to negotiate the transfer of furniture/equipment/computers from another DOE project.

### • **MINORITY AFFAIRS (3.3.7)**

The Director of the Office of Minority Affairs participated as the keynote speaker at the Dallas Inter-Tribal Center. The Dallas-Fort Worth Federal Executive Board and the American Indian Employment Council is a newly formed organization to inform American Indians about job and business opportunities in the Dallas Metroplex area. The council is made up of equal employment specialists from various government agencies. The Director, in conjunction with the Director of Procurement, made a presentation at a vendor seminar sponsored by Oklahoma Business Development Center, Inc., and Oklahoma Consortium for Minority Business Development. The Director and Small and Disadvantaged Business Utilization (SADBU) Manager developed a response for DOE on the status of encouraging minority participation in the SSC project. This office had several meetings with Procurement to review and revise the FY90 Small Business and Small Disadvantaged Business Subcontracting Plan which was submitted to DOE on March 27, 1990.

We continue to receive a large number of SB/DBE capability statements, SSC procurement forms for entry into the SSC database, and a large number of requests for registration applications. Office visits by potential contractors and other SB/DBEs continue to increase and the volume of telephone activity related to procurement activities remains at a very high level. Our procurement database of SB/DBE/WOB contractors now contains about 1,000 registrants.

The SADBU Manager is now on board. The staff attended the SADBU training session sponsored by DOE.

The OFCCP has notified URA and EG&G that their agency intends to conduct compliance reviews. The URA review will begin on April 5, 1990. Letters of notification were sent to Dr. Schwitters and the EEO/AA Manager. This office notified the URA Personnel Department of this review and have asked for their assistance in gathering the information. The EEO/AA Manager attended the National Society of Black Engineers Conference held in Orlando, Florida.

The Tetra Group is finalizing its report on how they will implement their contract with URA.

### • **INTERNAL AUDIT (3.3.8)**

A review of the Personnel Policy Manual has been initiated to determine if all pertinent areas of Appendix B of the contract have been addressed. Other SSCL policies and procedures will be reviewed in the same manner. Audits will then be performed to determine compliance to those policies and procedures.

## **PROJECT TECH SUPPORT (WBS 3.4)**

### **FACILITIES ENGINEERING SERVICES (3.4.2)**

The Laboratory currently has 185,830 square feet of office, laboratory, shop, and warehouse space. The status of additional space planned for FY90 is as follows:

- 8,440 SF, Provident Bank Building - additional office space for the DOE. Revised requirements, awaiting revised proposal from Lessor.
- Parking Lot - awaiting DOE approval.
- 7,800 SF, Stoneridge Building #1 - awaiting DOE approval.
- 12,700 SF, Stoneridge Building #2 - awaiting proposal from Lessor.
- 10,000 SF, Warehouse - awaiting DOE approval.
- 50,000 SF - solicitation for offers issued on March 26; offers are due by April 16 and occupancy is planned for October 1, 1990.

A position paper on the use of trailers for additional office space at the Interim Campus was developed which will be expanded to help management make decisions concerning space requirements until the permanent Ellis County facilities are available.

Requirements were developed for the Magnet Evaluation Lab and negotiation of a construction contract was initiated. Construction should begin next month. A fence was installed to improve the security of GSA vehicles. A master list of laboratory and shop requirements for the Interim Campus was generated. Action is proceeding with the development of laboratories and shops.

### **PROPERTY MANAGEMENT (3.4.3)**

A group of fourteen Materiel Management Standards were submitted through the SSCL Director's office to the DOE for review and approval. A second group of fourteen standards is in work, with submittal expected around May 1, 1990.

Equipment shortages from LBL to SSCL transfers are still being resolved, but the recovery rate is low. All capital items have been located; some items are at other DOE labs without proper transfer documentation.

Additional warehouse space is being procured, primarily for furniture storage. Approximately 34,000 sq. ft. will be added by the end of FY90 based on current planning. We requested a GSA truck to replace the leased truck now in use because GSA rates are about 20% of commercial lease rates.

### **FABRICATION SHOPS (3.4.4)**

Work has begun on defining the scope and operational philosophy for the SSCL central shops. Subsequent to the general meeting held in February, the plans for interim shops to be located at our temporary location in Dallas were put on hold because of budget limitations and programmatic

changes. We plan to shift the start of this program to FY91. Continued development of facility and equipment plans will proceed with this new schedule in mind.

## • GENERAL COMPUTING (3.4.5)

### **ADMINISTRATION**

Meeting the essential laboratory computing needs and future requirements poses a very complex challenge because the laboratory's requirements are immense and varied. Formalized methodologies that are DOE compliant must be established and followed in order to realize our objectives in a timely manner.

In order to implement the kinds of resources people need, General Computing support is currently:

- Staffing quality programmers, analysts, computer specialists, and other support personnel.
- Adopting an approach which addresses short-term management information systems (MIS) issues while concurrently defining and addressing long-term MIS solutions.
- Developing the capability to help organizations specify their functional and detailed requirements.
- Developing expertise in the use of the fourth generation language (4GL) PowerHouse which is currently in the purchasing process.
- Developing the requirements for a Relational Database Management System to support MIS.

### **MIS SOFTWARE SUPPORT**

The MIS Interim Solutions Support Group and MIS User Projects Coordination Committee have been coordinating the following requests in support of SSC Management Information Systems:

<u>Area</u>	<u>Requests</u>
MIS	<ol style="list-style-type: none"><li>1. Modification of Deltek/VMS security system menu screen structures.</li><li>2. Evaluation and acquisition of a Fourth Generation Language (4GL) software tool.</li></ol>
Finance	<ol style="list-style-type: none"><li>1. User design review of (and enhancements to) the TIAA-CREF tape.</li><li>2. Revised ECD in the invoice tracking and receipt accrual areas of DELTEK.</li></ol>
Personnel	<ol style="list-style-type: none"><li>1. Revised ECD related to defining the Human Resources personnel system.</li></ol>
Procurement	<ol style="list-style-type: none"><li>1. Began production of the VAX requests status log.</li><li>2. Completed user acceptance of the Small/Disadvantaged Business Report.</li></ol>

The TIAA-CREF project is in the final phases of enhancement modifications and user training. The initial transmission of data will be the first pay period in April. The request list for the MIS User Projects committee continues to grow. The DELTEK data dictionary has been converted to the Powerhouse dictionary and will be ready for use on other projects the first week of April. The professional services of one person with Powerhouse background have been acquired and two programmers have received introductory Powerhouse training.

A field analysis trip was made to Princeton University's Plasma Fusion Research Lab to review their finance/accounting and budgeting systems. A follow up trip may be planned to acquire additional

information regarding the Procurement and Project Management systems and their interfaces to finance and budgets. Problems with the new version of DELTEK 3.2 software required a visit to DELTEK in Washington, D.C., where several problems were resolved.

An emergency report to DOE was produced for Procurement regarding vendor contracts summarized by state and small and disadvantaged business statistics. Equipment specifications were reviewed and approved for the URA Personnel Department. An initial work breakdown structure was created for tracking the work involved with the interim support plan.

Significant progress has been made in creating the Powerhouse front end to DELTEK and Powerhouse modules. The user representatives will provide a security map of users who will have access to screen and menu items. DELTEK training was set up for the first week in April for users in Procurement, Finance and Personnel. The acquisition proposal for the Cognos Powerhouse software is near completion.

### ***TECHNICAL SUPPORT***

The LTS Division is seeking integrated software tools to enhance computer user productivity in the following areas: integration of data management (including ad hoc query and reporting), and applications development and information exchange. This must be accomplished in a multi-vendor environment that includes Apple Macs, IBM PCs, Sun, Apollo, NeXT and DEC. The final draft of the Relational Database Management System was completed. The procurement of this software tool is awaiting approval of the long-range strategic MIS Plan.

The MIS Strategic Implementation Program has been tasked with identifying and implementing all MIS required at the SSCL. The SSCL has the unique opportunity to implement a tightly integrated array of MIS systems which will lower costs and optimize critical resource utilization. A draft of the long-range MIS Strategic Plan and an initial project plan are complete. The project plan includes a summary implementation narrative, a WBS, a project task network with schedules and Gantt charts and a detailed task and milestone list. An initial draft statement of work for consulting services to perform requirements documentation has also been completed.

### ***USER SERVICES***

In the User Support area, Deltek training has been confirmed for selected Procurement and Personnel staff members to get them acquainted with its features and benefits. There has been steady support involving TelNet/VAX/E-mail activity. Surveillance of the PC-based viruses continues in the effort to eradicate the strains which earlier plagued the Laboratory's personal computing resources. The potential for wide-area E-mail distribution with other research laboratories and universities has been under investigation for the SSCL Directorate.

In the training room, a VT340 terminal has been connected to the Barco projector to display VMS-based graphics tools in the classroom environment. In addition to the regularly scheduled classes offered by the Computer Training group, the training room was used for EASYTRAK classes presented by Project Management. In an effort to accommodate the growing number of users, redesign of the counter work space has been proposed to Facilities Management.

Hardware and software activities centered around the acquisition of MacX for X-Windows access related to the 500 MIPS resource acquisition. This effort is designed to promote X-Windows access from the Macintosh operating system. In addition to that activity, a 30-day loan of a Mac IIfx (50mHz) has been arranged to evaluate its potential for promoting systems integration to improve portability of data created on widely different machines.

A server has been ordered for the Physics Library and Recruiting office. These groups will share a single platform with separate hard drives and tape backup units. Each group's data will reside and run separately and both will be running on Ethernet to improve their response time.

An IBM-AST/486 machine featuring AST's architecture unit was technically evaluated for possible use as a personal computer, file server, UNIX-type workstation or CAD/CAM workstation.

The Project Management Tickler Database project was initiated. This is proposed as a database of information regarding the status of projects laboratory-wide. It will be designed to enable SSCL management to make decisions about day-to-day operations and assign priorities to scheduled projects.

A nondisclosure meeting and demonstration of new products was held at the Laboratory during which representatives from Apple discussed announcements as well as future plans. Testing of QuickMail connectivity continued and several new connectivity tools were ordered. Special purpose projects, such as disk data recovery and system/printing problems, were settled.

Testing began on a Beta version of Apple's A/UX 2.0 for the Macintosh. This software has the potential for providing crucial LaserWriter printing capabilities for other Unix machines on the network. Arrangements have been made for a beta copy of X-Windows software for the Mac.

### ***ADP PLANNING, STANDARDS AND PROCEDURES***

Initial review comments have been incorporated into the draft policy for handling ADP equipment. The LTS Associate Director has requested a further review of the policy by the other Associate Directors.

A two-day meeting was held at DOE/Washington with Chuck Langford and the Headquarters ADP Management personnel. We learned that the laboratory must begin providing input to the ADPE/ES Inventory System database at DOE Headquarters. Suggestions raised for our plan to comply with unclassified computer security guidelines will be implemented by year end. Topics discussed included the Computer Protection Plan, Policy Statement, Manual for Associate Computer Program Protection Managers and Users of Personal Computers, Computer Awareness Training, Risk Assessment, Contingency Planning, Random Sampling of Files and Sensitivity Determination.

The FY90 CADS Plan prepared by the Magnet Systems Division identifies equipment needed immediately to undertake the development of the design and manufacture of the 50mm magnet at the SSCL and at Fermilab. An acquisition plan, which includes the placement of six workstations at Fermilab, and possibly more at Brookhaven and LBL, has been submitted for DOE approval.

Although the laboratory is exempt from providing a complete set of information for the FY90 submission to Information Technology Resources Plan, two Major Items of Equipment (MIE), which are systems exceeding \$1 million in one year, have been identified for the next few years. These requirements for the Accelerator and Physics Research Divisions can be addressed in an MIE implementation submitted to DOE/Chicago in late April. This input will get the laboratory in cycle with this plan and significantly reduce the documentation when the items are acquired.

A preliminary guideline for determining sensitive unclassified information has been drafted for use by all SSCL organizations. Sensitive unclassified information will usually come from either company confidential or Privacy Act data (e.g.; securing employment, insurance, credit, salary and medical records). Files and systems where this information is being processed need to be identified in a survey to determine where protection must be implemented.

The following documents were prepared for transmittal to DOE:

Doc. No. 6235-L90-001: Statement of Strategy for Personal Computers and Workstations

Doc. No. 6235-L90-002: Video Teleconferencing for SSC Laboratory

Doc. No. 6235-L90-004: Acquisition Plan for CAD/CAE for the SSCL Magnet Systems Division

Several other acquisition plans are in final preparation and will be submitted when completed.

### • **DESIGN SUPPORT (3.4.6)**

No design support positions were filled in the Engineering Design Support staff of the MSD. A search has begun for approximately six designers to fill newly opened positions, as it is anticipated that six designers will be temporarily relocated to Fermilab to work on magnet and magnet tooling design. This will probably be a rotational assignment lasting for approximately one year. These positions are being filled at this time due to the accelerated design schedule for the 50mm magnet.

Interviewing of prospective candidates has begun for three new designer positions in the design support area to the Accelerator Division.

Physics Research has one requisition in place for a designer and will begin interviewing for this position soon. An additional 4-8 designers are expected to be in place by the end of FY90.

LTS is currently seeking an additional clerk to support Drawing Control/Reproduction Center operations. This person will assist the current staff with engineering drawing reproduction and other services offered by this organization.

### ***DRAWING CONTROL AND REPRODUCTION***

The Xerox 5080 engineering drawing copier is being used to produce copies as requested. It is operated as an overhead function without charge to individual requestors. The number of copies provided increased significantly this month and is expected to continue growing. As this organization's workload increases, additional reproduction equipment will be needed and a requisition is expected to be issued within the next 60 days.

### ***LTS DESIGN/DRAFTING***

The Engineering Design Support staff provided design and drafting support to the Accelerator and Physics Research Divisions and the Facilities Coordination group. Work was accomplished in support of the Cryogenics Laboratory for the Accelerator Division and the development of part models for the Physics Research Division. Additional work is being done in support of the General Computing organization.

### ***CAE/CAD ACQUISITION***

We have been working with Project Management to develop a strategy for laboratory-wide CAD acquisitions. The FY90 CAD Strategic Plan has been updated to reflect immediate and long-term CAD needs of the SSCL through the end of the fiscal year. Several project-driven needs prompted the efforts to update this document. The change in magnet design and the requirement to test within two years have placed a true urgency on all design work within the Laboratory.

The acquisition of CAD/CAE tools must be accelerated to meet these design needs. At this time Unigraphics II software has been tentatively adopted as the standard for the Laboratory because it meets the technical needs of the SSCL, runs on a variety of UNIX-based workstations, and can be

acquired via GSA contract. Unigraphics will allow us to procure hardware and peripherals through competitive methods. It meets current networking guidelines, will work well with existing equipment and databases, and an existing pool of experienced users is available. There will probably be several other mechanical design software products required for specialty needs in the future. The MSD acquisition proposal has been forwarded to DOE for review and approval.

Physics Research Division personnel are developing a plan for their CAD/CAE requirements after a delay prompted by their late start on hard design work. A limited number of workstations will be sought this year and the number should increase significantly during FY91.

A committee has been studying ECAE/CAD products to establish a working knowledge of the market and how it might fulfill the laboratory's needs for electronic design. This committee has reviewed a list of 20 vendors to recommend a short list of products for further consideration. An ongoing study of potential hardware platforms to facilitate CAD efforts is still underway.

### ***SYSTEM OPERATIONS***

All CAD operations in Building #4 have been linked and are using common peripherals. Backups are being done on the Intergraph server by the LTS CAD system manager. All plotting is also being served by the Intergraph machine. Both pen and electrostatic plotters are available on the network. CAD user training will be conducted soon for engineers and other interested parties.

### ***STANDARDS COMMITTEE***

A team of configuration management and standards personnel have been assembled as the Engineering Standards Committee to address the issues of policies, standards and procedures. The official format for SSCL drawings and other standards is under consideration for approval.

### **• COMMUNICATIONS (3.4.7)**

A meeting with was held with DOE in Germantown, Md., to discuss the video teleconferencing project. The meeting provided an information exchange forum between the SSCL program and DOE CSTM and OSC. As a result of the meeting, a technical proposal was written and submitted to DOE for approval to establish video teleconferencing in support of the laboratory's activities.

A leased video telecommunications system was installed and made operational. This system is part of a pilot project to explore the application of video to the needs of the SSCL. The system is in operation between the SSCL, Fermilab and LBL and is capable of three-way operation.

The CATV system was installed in every conference room in Building #4 of the Stoneridge campus. Additional installations in Building #1 are being planned.

An internal SSCL meeting was held to discuss the application of video as a medium for providing accredited instruction in both accelerator and particle physics. The requirements will be assembled into a document for internal review and comment.

An agreement was reached between Southwest Bell and the SSCL to relocate their local fiber hub in Building #4 which will result in considerably more reliable communications for the laboratory.

A Help Desk has been established in association with the functions provided by the SSCL telephone operators. The Help Desk will log all ADP, network, telephone and A/V service requests. Eventually, electronic logging and dispatching of these services will be implemented.

• **ENGINEERING SUPPORT/STANDARDS (3.4.8)**

Engineering Design Support completed loading the formats into the CAD system. The documents are ready for review by the standards committee.

We completed two procedures for Project Management review; the first prescribes the format and required content for the Bill of Materials portion of a print package, and the second defines who is responsible for engineering design documentation approval. An engineering document release procedure is being drafted and is expected to be released for comment in April.

Our review of drafting manuals from other companies has been completed. Using these manuals as a reference, an outline for the SSCL drafting manual was completed and submitted for comments. The current plan is to break the manual into two major sections:

- 1) the first section will consist of different types of drawings with complete instructions for their preparation; and
- 2) the second section will be an appendix which will consist of detail subject instruction. Rough drafts of three sections of the appendix have been written. These are: a) Drawing Forms; b) Weld Symbols; and c) Nondestructive Examination Symbols (Welds ).

• **METROLOGY LABS (3.4.9)**

A receiving inspection operation should start in April. Once the operation is functioning normally, work will start on a Metrology Lab approval.

## **SSC LAB DIRECTORS OFFICE (WBS 3.5)**

Helen Edwards, formerly head of the Accelerator Systems Division, has been appointed Technical Director of the project. Paul Reardon will act as head of the Accelerator Systems Division. Richard Briggs, formerly Deputy Director and Project Manager, will devote full time to his duties as Deputy Director. Douglas Pewitt will serve as Acting Project Manager.

The Project Manager and Technical Director together will oversee all aspects of SSC design, construction and commissioning. Ted Kozman continues as Deputy Project Manager, Tom Bush as head of the Magnet Systems Division, and Bob Matyas as head of the Conventional Construction Division.

On March 16, the Department of Energy released the SSCL "footprint", an exact description of the land needed to build the laboratory, and asked the State of Texas, through the Texas National Research Laboratory Commission, to begin acquiring the land. This process is now beginning and is expected to take about two years. Some 17,000 acres are required, including two large parcels on the east and west sides of the ring and a number of small parcels spaced along the north and south arcs. For much of the tunnel, which will be located at depths of 50-200 feet, only subsurface rights are needed.

The first annual SSC Fellowships were selected. Ten junior faculty members and ten postdoctoral research associates will spend the next academic year working at their home institutions on research related to the SSC, supported by funds from the Texas National Research Laboratory Commission. The fellows were selected by a national committee chaired by a member of the laboratory directorate.

# **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)**

The current cost estimate for Accelerator Technical Systems was printed on March 19th. Preparations started for the Independent Cost Estimate (ICE) review, which will be held in June. A letter, which requested revisions, updates and changes caused, in particular, by the increase in collider aperture from 4 cm to 5 cm and other factors, was sent to everyone who contributed to the earlier version of the cost estimate. We also requested backup comments and references.

The FTP/A are in second draft form.

Good progress has been made on the SCDR, but the Accelerator contribution to the document cannot be completed until certain technical issues have been settled.

During March the Accelerator staff on board has increased from 106 to 119. This is in line with current projections.

An agreement with Oak Ridge National Laboratory is now in place which provides super computing facilities on the Hypercube.

The machine scheduling process is continuing. Detailed planning schedules have been produced for the Surface and Underground String Test and the Linac construction. Top level schedules have been produced for the entire project. Detailed schedules for the LEB, MEB and Collider first sector are in process.

#### **• LINAC (4.2.1.2)**

The transition energy between the drift-tube linac (DTL) and the side-coupled linac (SCL) has been lowered from 100 MeV to 70 MeV to minimize the cost of the linac. One SCL module can replace two DTL tanks with a cost savings of more than \$1 million. Beam simulations indicate that the beam diameter may be one-half the bore diameter at the front of the SCL at 70 MeV. This is a small risk considering the low operating duty factor. We are also considering eliminating an additional rf system by splitting the power for the RFQ accelerator from the first DTL tank. Preliminary source emittance measurements are starting at TAC.

#### **• LEB (4.2.1.3)**

The newly suggested working point, with vertical tune = 10.75, has been studied in more detail. This new working point is better from the point of avoiding strong depolarizing resonances. However, the main advantage is in having smaller derivatives of the chromaticity, which makes the lattice more easily

correctable. The resonance correction scheme proposed earlier has been updated to reflect the new working point.

- **MEB (4.2.1.4)**

Studies of the placement of higher order harmonic correctors has continued at a low level. An analysis of the MEB impedance has begun.

- **HEB (4.2.1.5)**

The studies on the needed aperture for the HEB continued in March. The studies currently underway are: (1) a detailed simulation of the resonant-extraction process, and (2) a long-term simulation of the dynamic aperture at injection. A preliminary report covering the results found thus far is in preparation.

An analysis of the implications of modifications to the lattice which could reduce the needed aperture is underway. Examples of such modifications would be a decrease in the cell length or more complicated correction schemes, such as the use of mid-cell correctors.

The energy ramp parameters for the HEB were reviewed and modified. These changes are reflected in the SCDR. The ramp modifications include a more realistic treatment of the parabolas, a decrease in the acceleration rate, and some changes in the adiabatic debunching and bunch rotation just prior to injection into the collider. The cycle time remains 2 minutes for transfer into the collider and approximately 3 minutes for test-beam operation.

- **COLLIDER (4.2.1.6)**

Continuation of particle tracking studies with the 5cm magnet model showed that an improvement in the aperture could be obtained by splitting the tunes by an integer and, at the same time, compensating both the zeroth and first harmonics of the skew quadrupole moment. In association with the Conventional Construction Division, considerable progress was made in specifying structures for ASST and PIF. It was decided that a limited number of shafts would be used for magnet installation and that these shafts would be sized to permit lowering magnets in a horizontal orientation.

## MAGNET R&D (WBS 4.2.2)

### FERMI LAB (WBS 4.2.2.1)

Magnet DD0027 has been mounted on the MTF test stand. The cold mass for magnet DD0028 has arrived from BNL.

Assembly of the second practice 4cm cold mass has begun. All coils for the first real Fermilab cold mass have been wound. Assembly of several short (40mm aperture) magnets is in progress. Collaring studies are being carried out on a practice coil assembly.

The cross section for the 50mm magnet to be built at Fermilab has been specified. Design work has started on the tooling, magnet and cryostat.

#### *Dipole Cryostat*

Work is continuing on the Heat Leak Test Facility in preparation for 80K to 4.5 K multi-layered insulation measurements.

The laser alignment equipment has arrived. A representative from the vendor instructed FNAL engineering and production staff in the use of this equipment during the week of March 19.

We are beginning a development program with a composite tube vendor to study the feasibility of redesigning the support posts with wound-in ends as opposed to shrink fit joints. We are also working with a vendor to develop a composite material with increased shear modulus as a means of increasing the lateral support stiffness. A purchase order has been issued for fabrication of seven prototype assemblies with wound-in ends. As of March 30, the vendor was completing the analysis and beginning fabrication of prototype assemblies, with delivery of the first prototypes expected in late April or early May.

We issued a purchase order for six composite tubes built to the current support post drawings, but with a modified fiber layup which will increase the shear modulus and thus the lateral stiffness of support post assemblies. These tubes will be assembled into support assemblies and tested for structural comparison with the current design.

We are taking another look at the bore tube shuttle previously developed at FNAL. The current device tends to corkscrew down the pipe. The current work is aimed at eliminating this effect and at reducing the size for use with the warm bore. The present thinking is to float the probe on an air bearing to eliminate the twisting problem.

Preliminary contacts with the local representative from Unigraphics (SSCL's CAD vendor) have been made. We are considering purchasing (or leasing) a modest number of sets of Unigraphics equipment for compatibility with the SSCL's drafting effort. A demonstration of the Unigraphics equipment at their local office will take place early in April.

We are actively working on the redesign of the SSC dipole cryostat to accommodate the 50mm aperture cold mass. Engineering analysis and design work under the leadership of FNAL Technical Support/Engineering is in process at FNAL and the SSCL.

## ***Magnetic Measurements***

Magnet DD0027 was mounted on Test Stand 5 in preparation for cold measurements. Failure of the Mole resulted in termination of the nearly complete measurement program on DD0026 which was warmed up and the removal process begun. Mole repairs and other testing commitments resulted in no cold SSC magnet testing being performed.

## ***Long Magnet Fabrication***

### ***Cryostat Area***

#### **DD0017 and DD0019**

Magnets DD0017 and DD0019 are presently being stored in the Industrial Center Building. Magnet DD0017 has been designated to be used in the string test at "ER."

#### **DD0026 and DD0027**

Magnets DD0026 and DD0027 are being tested at MTF. A vertical plane measurement was done on DD0027 while it was on the test stand.

#### **DD0028**

The cold mass for DD0028 arrived at Fermilab from BNL on 3/21/90. There is no date as yet for assembly to start on DD0028. The magnet has been moved to the warm mole measuring table to make mole measurements.

## ***Miscellaneous***

Two vacuum vessels and three sets of cryostat parts were shipped to BNL on approximately 3/23/90.

Weights were added to the dummy cold mass to be used for the new vacuum vessel survey station.

## ***Cold Mass Area***

### ***Curing Press***

The electronic valves for the heat exchanger are scheduled to be installed on 4/3/90. The electronic valves will enable computer operation of the heat exchanger during curing. New precision needle valves for computer control of pressures are due on 4/3/90.

### ***Collaring Press***

The top section of the mold has now been attached to the upper press platen. The guide rails on the press and insertion table are secured and aligned. A larger motor for the insertion drive has been installed; the old motor did not have enough power. A new right angle gear box is being ordered so that the motor will not protrude into the aisle between the tables.

### ***Yoke/Skinning Press***

We received information from vendors of video equipment relating to video-monitoring of the skin welding process. One vendor has demonstrated equipment at FNAL.

### ***Stripping Station***

Slotting of holes in parts which connect the mandrel to the rollover rings is still in process and are presently being heat treated.

### ***Coil Storage Rack***

The cradles which hold the coils have been received and the coil storage rack is now complete.

### ***Coil Winding and Curing***

RCM #1 Inner #1 (17M-1005) was wound on 3/7/90 and cured on 3/9/90. The measurements of this coil are now in progress.

RCM #1 Outer #1 (17M-2005) was wound on 3/13/90 and cured on 3/19/90. This coil was recured on 3/27/90 because the end saddle was made incorrectly and did not push up against the coil windings. The recure was successful.

RCM #1 Inner #2 (17M-1006) was wound on 3/27/90 and cured on 3/28/90.

RCM #1 Outer #2 (17M-2006) was wound on 3/31/90 and will be cured on 4/4/90.

### ***Miscellaneous***

Coil collar packs are now being made in Industrial Building #2. Delays have been experienced because of a misfit between the rivets and rods holding the packs together. The rivets are being reworked and the vendor notified of the problem.

PCM #2 coils are almost completely assembled and insulated. Precollaring of this coil will start approximately 4/6/90.

### ***Magnet Development***

The F5 body has been sectioned and is being analyzed in the Materials Development Lab.

DS0307 has been collared with three different coil insulation configurations; Kapton only, baseline teflon and teflon applied directly to coils. This was done to study the differences between use of teflon and kapton as a slip plane. Results are available.

DS0308 has been packaged for collaring, which will take place on 4/3/90.

All DS0310 coils have been wound and cured.

Detailing on the "developable surface, grouped" end parts for the lead end of outer coils has been completed. Drawings have been released for manufacturing.

Our tentative short model plan is as follows:

DS0307 - Will be used for experiments related to possible preload loss from kapton extruding into lamination die breaks. After these experiments it will be potted and sectioned.

DS0308 - Will be cold tested in Lab 2. Further testing of this magnet will depend on initial test results.

DS0309 - Will be completed and cold tested with kapton only insulation and higher preload than DS0308.

DS0310 - Will be completed and cold tested. Coil insulation system will depend on results from previous magnets.

DS0311 - Will be built with no coil ends and used for testing various coil insulation systems (similar to DS0307). Will be potted and sectioned.

DS0312 - Will be cold tested. First magnet with grouped ends on outer coils.

## • BERKELEY LAB (WBS 4.2.2.2)

### *Superconductor and Cable*

The two outer cables required for the 4-layer (low current) cable test facility dipole have been made and samples sent to BNL for critical current tests.

Critical current and short sample training results are complete on the 30-strand inner cable being developed for the SSC 50mm bore dipole. The cable degradation due to cabling was 0.2%, i.e., no degradation, and the sample exhibited only one training quench. The initial results on coil winding trials at BNL are also promising, although some changes have been necessary to handle the wide cable. We plan to fabricate more 30-strand cable the first week in April. This cable will be made with a reduced pitch and slightly higher compaction in order to improve coil winding. These changes may result in a slight reduction in cable  $I_c$ , but it appears we have some margin here.

A 2100 ft. length of 30-strand SSC outer cable was produced for use in 5m quadrupole winding tests at LBL.

### *Dipole Magnets*

Additional conceptual design is now being done on a 50mm bore dipole with elliptical collar/iron interface.

### Cable Test Facility

Magnet D16B1 was retested from February 26 to March 6. The first quench, after the second thermal cycle, was at a central field at 4.3K of 7.4 tesla (6367A) and reached the plateau field of 7.6 tesla (6550A) on the fourth quench. A passive superconducting corrector designed for this 50mm core dipole was tested during this run. Extensive magnetic measurements confirmed the effectiveness of the passive corrector installed on the bore tube.

Pulsed, or AC, losses were measured in He II between 1.85K and 1.95K. These data are now being analyzed.

### D15B2

D15B2, a 40mm bore 1m dipole constructed during the last year, has injection-molded, constant-perimeter end parts ("Royet" ends). It was tested from March 20 to March 22, 1990. On March 23, an electrical supply fault resulted in damage to the 400 HP compressor motor of the refrigerator. After complete re-winding of the motor, testing resumed on March 29. The initial testing at 4.3K had the first quench at 6300A, above operating current on the fourth quench at 6648A, and a high plateau

value of 7100A on the ninth quench. The first three quenches are slightly below those of a similar magnet, D15B1.

## ***QUADRUPOLE MAGNETS***

### **1m Models**

Coil winding and curing has been completed for QC 1, the first 1m model of the QC design. All coils have been assembled with voltage taps on the pole turns in each quadrant. One outer coil was replaced because of a short that appeared between turns during coil assembly. Magnet load cells are fabricated and assembled, and are in the process of being calibrated. Collaring of the magnet assembly will commence the first week in April and completion of the assembly is expected during the third week of April.

### **5m Quadrupole Models**

The mechanical assembly of the coil winding table and tensioner is 90% complete and the electrical wiring is underway. The mandrels are assembled and ready for use. The winding of the first practice coil should start the week of April 2.

The curing press assembly is 75% complete. Hook-up of hydraulic pumps, plumbing, hydraulic proof test of the system, and final survey of the press beams remain to be done. Assembly of the loading table has not yet been started. Fabrication of the main top plate is now on the critical path of the first practice coil.

The assembly of the first molding cavity is 90% complete and is going well after some initial fixturing problems.

Fabrication of the fixture for lifting cavities and the mandrel handling and insertion fixtures are 50% complete.

Detailed design of the four-way collaring press is continuing.

Design of the magnet yoke alignment system is continuing, including the yoke, skin, fiducials, and tooling to be used in the main press for clamping the assembly during welding.

### **50mm Quadrupole**

Tentative goals for conceptual design of a 50mm bore quadrupole have been established by SSCL and design studies are proceeding on both the magnetic and the mechanical aspects. The main goal is to increase the aperture enough to accommodate a liner that intercepts synchrotron radiation from the stored beam. (Design of such a liner is now being studied by SSCL).

## **• SUPERCONDUCTING CABLE R&D (WBS 4.2.2.3)**

Activity in R&D for the superconducting wire and cable has concentrated on the following:

1) Expediting wire orders to fill the need of the prototype magnets. 2) Issuance of new orders to support FY 91 activities. 3) Establishment of a detailed development plan for FY90/91.

In the production area, we have nearly completed the requirements for INNER conductor for the 40mm magnet program. Some processing difficulties have been experienced with the 14" diameter OUTER billets. At the present time the IGC billet is completed, meeting all of the SSC specs except Cu/SC ratio. The billet was produced with a 1.6:1 ratio. This conductor has been released for use in

short magnets but will not be used in the long magnets. The OST billet is finished but has very poor piece length. We will cable the long pieces next month, but will only yield approximately one magnet's worth of cable. The rest of the strand will be used to support the 50mm magnet program. The SCN billet test samples are meeting all the SSC specs. The first 100 lbs will be processed next month. Barring any piece length problems we will use this conductor to support the 40mm program. If this is successful we will still be two long magnets short (~1 billet).

To accommodate the shortfall of OUTER conductor an existing IGC order has been modified to divert three INNER billets into three OUTER billets. This conductor will arrive in late July and be used to complete the requirements of the 40mm program and meet the early requirements for the 50mm program. In order to improve our understanding of OUTER conductor processing, a contract change order is being prepared for OST to produce 5 billets in a single batch which will support a controlled experiment to help in understanding vendor variability. OST is the only vendor, at present, with sufficient production capacity to accomplish this task.

A production order has been issued for 5 billets each of INNER and OUTER conductor to meet the demands of the FY91 magnet program. MSD met with IGC to review schedules. The present plan calls for finished conductor to be delivered at the rate of 1 billet/month starting in October, 1990. This is well ahead of the 50mm long magnet build. The production contract for OST was rejected due to problems associated with the original RFP.

### ***Insulation Development Program***

The insulation development program has been initiated to investigate three main areas of concern: prime materials characterization; insulation system characterization; and insulation breakdown and short detection.

### **• BROOKHAVEN LAB (WBS 4.2.2.4)**

**Note:** This report includes both February and March information in combined form.

### ***MODEL MAGNETS***

#### **Long Magnets**

DD0018 was shipped to SSCL during the second week of February.

The first week of February saw completion of electrical preparations for DD0020, including wiring of voltage taps, wiring of beam tube temperature sensors, and electrical testing. The magnet was subsequently installed in the horizontal test facility. The remainder of February and the first two weeks of March were devoted to making interconnections to lead and return end cans, with warm measurements commencing during the week of March 26. Cooldown began at the end of March, with horizontal tests expected in early April.

Assembly operations on DD0028 were completed early in February with yoke assembly and shell welding. Next came leak checking, installation of end plate, strain gauge, "bullets" and voltage tap leads, and interconnect assembly. The magnet was shipped to FNAL on March 19.

Following its successful employment as a test vehicle for checking out the Horizontal Test Facility (see BNL report for January, 1990), DDA010 was removed from the test stand. Final electrical tests were repeated on the warm magnet.

DC0201 was collared during the first half of February, followed by warm measurements during the third week of the month, and then yoke assembly. March was largely devoted to completion of yoke assembly, shell welding, and insertion fixture assembly.

The outer coils were assembled for DC0202. Meanwhile, inner cable was received, and these coils were wound and cured. Final coil assembly began in the second half of March.

Inner and outer coils were wound and cured for DC0203 during February and March. Coil assembly was expected to occur during the first week of April.

Cable for DC0204, 205 and 206 was inspected and insulated, and inner and outer coils for this series of magnets were wound and cured as well.

Approximately 50 tons of 16-gauge magnet steel was scheduled to be shipped back to a vendor for stretcher leveling as of early March. (The vendor agrees with BNL and the standing contractor that the steel has excessive cross bow and edge curling.) By early April a quantity of this material had been returned; one truckload went directly to the standing vendor for evaluation. Meanwhile, 31,000 16-gauge SSC yoke laminations arrived at BNL from the standing vendor in early March. A corresponding amount of the necessary speciality laminations also arrived, enabling yoke assembly to proceed, starting with DSS020.

### Short Magnets

DSSV016 was held in abeyance while DSS019 was prepared for further tests--began in January but interrupted by other testing. Testing of DSS019 occupied most of March (see Tests and Measurements). In the last week of March DSS019 was removed from the vertical dewar, and tests began on DSSV019. Fabrication of yoke blocks for DSS020 and DSS021 began in late February, continuing into early March. Mid-March saw yoke assembly and shell welding for both magnets, and by the end of the month DSS020 was mounted in the top hat.

Two 1.8m Kapton outer test coils were wound, cured, measured and inspected. Based on all 1.8m Kapton test coil results to date, and immediate Kapton availability, a specific Kapton material type was chosen for use on cable for 1.8m magnet DS0201. Coil curing tests for this all-Kapton magnet occupied virtually all of February. During March, inner coils were wound and cured for it. Overall inspection results were excellent. Winding of outer coils awaits completion of testing of a new 1.8m outer coil formblock with improved cavity uniformity.

Design work continued in February on the yoke for DS0201, the 50mm coil aperture magnet. A contract was awarded for 48 tons of 16 and 18-gauge magnet steel for the 50mm aperture magnet development program at BNL--enough for two long and six short magnets. RFQs were sent out in March for the stamping die and for yoke laminations for the first short magnet. Meanwhile, 50mm collar design work began in February as well. In March the 50mm collar lamination design was released to the vendor for die fabrication, with the balance of collar drawings (end collars, welded collar pairs, etc.) nearing completion.

### *Tooling and Equipment*

#### Coils

Design work continues on tooling for 50mm aperture short magnets, including solid and laminated formblocks, formblock liners, mandrels, pusher blades, and centerposts. Purchase orders for inner and outer formblock laminations were released.

## Collars

Design work continues on the 50mm short pre-production collaring press.

## Cryostat

Relocation of the cold mass insertion fixture was brought to the point of completing the stand mountings in the floor. A dry run was conducted, lifting a cryostat from the new location and positioning it ready for mounting on a transport trailer. Tooling for creating the sagitta of the cold mass in the cryostat was completed, and tooling to measure the sagitta in the cryostat was erected in the shops. Tooling for measuring the cold mass twist before and after cryostat insertion was also assembled in the shops.

## *Superconductor*

### Cable Procurement

During February, Brookhaven received two shipments of cable, one with Cu:SC-1.3:1 and one with 1.5:1. The latter cable was insulated during February and March, and wrapping of the first shipment began in March. Short lengths of wide inner and outer cable for the 50mm program were received in March, and some were insulated. Cable for DS0201, insulated with Kapton only, was successfully wrapped and released for coil winding.

### Tooling

The power train analysis for the modified wrapping line was completed in February, as was the pay-out reel tucking device. The cable guide floating roller device for the new wrapping machines was released to the shops for fabrication. This device, which dampens cable oscillations and registers the wires within the cable, will accommodate the new wider cable for the 50mm program.

The microscope/camera assembly, purchased for the inspection and documentation of cable, has arrived and has been partially assembled. This device should be fully operational within a couple of weeks.

Tooling for the incoming inspection of wide cable has been drawn up and is in the process of being released to the shops for fabrication.

### Miscellaneous

All outer cable for the current batch of magnets, except for DC0206, had been wrapped prior to the arrival of low-epoxy fiberglass (noted in January's report) and affected coils will therefore have fiberglass with the standard 24% epoxy content. All cable being wrapped in the future will have fiberglass with 20% epoxy content. This yields the following forthcoming coil compositions:

<u>MAGNET</u>	<u>INNER COIL</u>	<u>OUTER COIL</u>
DC0201	24%	24%
DC0202	20%	24%
DC0203	20%	24%
DC0204	20%	24%
DC0205	20%	24%
DC0206	20%	24%

The quality control cable kits are on the shop floor and are being implemented. Kits for cables that have already passed through the shop are being put together "after the fact." A review of the kit format will be conducted in April to reduce the possible number of required kits and ease the required paperwork.

### ***Tests and Measurements***

#### **DSS019 Construction and Performance**

The testing of DSS019 was finished in March. (The test of the magnet began in January, but was interrupted by other testing). The novel details of construction in this 1.8m dipole included low epoxy content (18%) of the fiberglass used to insulate the outer coil, the latest revision to the ramp-splice (wherein the inner coil pole turn was epoxied to the adjacent turn for 3/4 in. near the G10 box), and "anti-ovalized" collars. In other respects the dipole was built with the current design features (e.g., DSS016 - DSS018). (The magnet also contained a Multiwire sextupole trim coil. The trim coil had a short and was not tested.)

The quench performance of the magnet was very good, with one or two training quenches initially, after a thermal cycle, and at fields approaching 8 T. All the plateau quenches started within 1/2 in. of the outside edge of the G10 box. This shift in location compared to the origin of plateau quenches in DSS018 (1 to 2 inches beyond the end of the G10 box) is attributed to bonding the pole turn to its neighbor in the region of G10 quench origin. The training quenches were scattered in the usual places (one each in the ramp-splice, turn 13 straight section, turn 16 straight section, and the outer coil near the ramp-splice). Due to schedule complications, high-field testing was done only after thermal cycle. Since the training was "good, as usual", it was concluded that the use of low epoxy content in the outer cable insulation and the anti-ovalized collars had no major effect on training. The comparison with DSS018 is particularly appropriate because the two magnets used inner coil cable from the same spool.

The cold multipoles were in the same general range of values as exhibited by recent magnets, as expected. However, due to the shorted trim coil, the uncertainties in the unallowed terms are larger than usual.

#### **Initial Tests of DSV016**

At the end of the month, test of a low-prestress reassembly of DSV016 began. The initial quench performance of the magnet was better than that of the previous, high-prestress, reassembly. In this test, the magnet was on plateau (6.95 KA) after one training quench at 6.90 KA. With no current, the average cold inner coil prestress was 1.3 kpsi. Above 4 KA - 5 KA, the inner coils were completely unloaded.

## **EXPERIMENTAL SYSTEMS (WBS 5.0)**

### **EXPERIMENTAL SYSTEMS R&D (WBS 5.1)**

A Task Force on Radiation Damage Testing for SSC Detector Components was convened at the SSC Laboratory on March 5-6. This meeting brought together fourteen experts in the field to discuss present and future irradiation facilities needed to develop and test materials to be used in electronics, scintillators and structural members. A final report is being prepared.

In October, 1989 the Laboratory received five detector subsystems proposals dealing with data acquisition and triggering topics. On the advice of an ad hoc committee of experts in the field that met at the Laboratory in January, a set of guidelines was developed to aid in the consideration of these proposals for funding. Subsequently, the SSC Laboratory convened a review committee that met at the SSC on March 20-21 to review the five proposals for technical merit. They recommended four of the projects for funding. We are in the process of writing Memorandums of Understanding with these collaborations in which the work and milestones to be accomplished in FY90 are detailed.

Three SSC detector R&D test beam experiments completed their setup at Fermilab. This work, supported with SSC funding, involved shielding and other beamline modifications. The largest experiment provides a test of Warm Liquid Calorimetry. The Synchrotron Light Electron ID Experiment and the Electromagnetic Calorimeter Test are sharing running time in a tagged photon beam line. The experiments have just begun to receive beam.

Planning is under way for a Symposium on Detector R&D for the SSC to be held October 15-18, 1990 in Fort Worth, Texas. It is anticipated that the meeting will have an attendance near 350, with reports presented on recent results from the SSC detector R&D projects that have received funding in both the Generic and Subsystems programs.

A number of meetings were attended and talks presented by laboratory personnel during the month of March. T. Dombeck presented a talk on the first round of detectors for the SSC at the Texas section of APS/AAPT held March 2-3 at Texas Christian University. He also was part of a panel discussing industrial involvement in the SSC at the IISSC meeting held in Miami, Florida on March 16. T. Dombeck and F. Gilman (ex-officio) were named members of the Detector R&D Review Committee formed by the Texas National Research Laboratory Commission to review proposals to the State of Texas on detector topics. The first organizational meeting was held March 23 in DeSoto, Texas.

# **LAB OPERATIONS SUPPORT (WBS 6.0)**

## **PHYSICS PROGRAM SUPPORT (WBS 6.1)**

### **DIVISION OFFICE (6.1.1)**

The final draft of the Physics Research Division's inputs for the FY92 Field Task Proposal/Agreement (FTP/A) was prepared and submitted for integration into the overall SSCL document. A new section was prepared to be related with the HEP, High Energy Physics, or KA-01 DOE funding/program designations. This section is to identify those activities specifically related to research which do not necessarily involve the SSCL. The section is included in the overall SSCL FTP/A.

Decisions on the FY90 reforecast were not completed in March and it is anticipated further negotiations will be conducted in April.

A database and filing system were established for MOUs, EOIs, and experimental facilities and a database for the HEP mailing list was begun.

The Division Office support staff did coordination, production work and distribution of the SCDR draft.

Three new employees joined the Division: Jheroen Dorenbosch—Physicist; Kate Morgan—Engineer II; and John Liu—UNIX Systems Programmer.

### **THEORY (6.1.2)**

Preparations for the conference on New Topics in Electroweak Physics to be held May 30–June 1 at the SSCL continued in March with approximately 100 invitations sent out. Five to ten theorists will be in residence for approximately a month around the time of the meeting.

### **EXPERIMENTAL PHYSICS AND FACILITIES (6.1.3)**

The Resource Requirements Report is being organized by each of the major detector groups. The Experimental Facilities Group (EFG) has been involved in developing a standard set of tables for each of the major detectors. Preliminary data are being collected. The next important deadline is April 24, when a zeroth order draft will be due. A request for assistance is also being drafted by the EFG which will be directed toward industry in an effort to get outside engineering involved in developing the resource requirements for the major detectors.

Chapter 5 of the SCDR has gone through several editorial revisions in an attempt to make it consistent with the different chapters. The process seems to be converging and a baseline conceptual design has been established for the detectors and calibration beam hall.

The Conventional Construction Division is helping us understand the schedules for detector hall civil construction with work going on at RTK. This should help us better understand the way that the construction of the detector will interact with the availability of the hall. The detector groups favor construction of large subsystems (up to 2000 tons) at the surface in order to remove any dependence

on hall construction and environmental conditions in the hall. This approach makes heavy demands on our design of the hall structures.

The EFG wrote its section of the FTP/A in March. Provision was made for the start of construction of some detector related buildings on the west campus in FY91 and FY92.

The EFG has begun to put together a beamline detector construction lab. Although the lab will be used initially for simple tasks such as construction of scintillation counters, it will ultimately be used for wire chambers and the construction of transition radiation detectors for electron identification.

Exploratory work is in progress on a structural design for one of the detector configurations of the Solenoid Detector Collaboration (SDC). This uses a standard structural approach but is designed around a spaghetti calorimeter. Work will also begin soon on the design of the magnet steel for the SDC.

The bottom collider detector is a forward detector and provides different problems for construction compared to the large central detectors. It is the only detector that seems not to favor construction of large subsystems at the surface. An assembly sequence has been worked out for this detector with all components assembled in the detector hall. The next step will be to design the personnel and equipment shafts and make certain that the flow of activity is well coordinated with the location of the access and construction shafts.

The EFG is making a comparison of costs and schedules for the construction of liquid argon and spaghetti calorimetry for the EMPACT detector. This work is going on at Martin Marietta with support from the EFG.

A new detector hall configuration was received in March for the L\* detector. L\* has undergone a complete change in detector architecture in the last month and the implications for the SSC Lab are being studied.

No work was done in March on the Texas detector, but a preliminary meeting is scheduled for April. The EFG will also begin to study the requirements of the small detectors in April.

## • COMPUTING AND DATA ANALYSIS (6.1.4)

### *VAX Systems*

There were no hardware installations this month and software programming support to the Scientific and Administrative VAX systems has continued as required.

### *UNIX System Management*

The staff of Computer Operations has been accumulating the necessary software tools and experience to assume the responsibilities of UNIX system management by April 1, 1990. This effort has been divided into the following areas:

- Obtaining software tools for the management of UNIX systems
- Acquiring software tools to provide a consistent environment for the end users
- Increasing communications with end users to determine requirements and provide assistance
- Providing general end-user support on UNIX systems
- Establishing hardware and software maintenance contracts

Initiating the hardware maintenance contract with SUN Microsystems was a major component of this month's effort. This contract was activated this month for the SUN workstations in Physics Research, Magnet Division and Cost Estimating.

Other operational hurdles to the implementation effort will be cleared with a purchase requisition for a VMS shell for UNIX systems. This software will also support the High Energy Physics community on future UNIX platforms which will serve as the major compute engines for the SSCL.

Other significant efforts included formal and self-taught UNIX training for all Computer Operations personnel, the development of databases to determine the status of current hardware and software, and the consolidation of backup and recovery responsibilities.

### *Physics Support*

Binaries of the CERN Library for the DECStation 3100 have been tested and backed up to tape. Version 198 of the CERN Library is being installed on the Apollo and the IBM AIX machines. Installation and testing of other CERN Program Library pre-releases has been initiated on other workstations such as the SUN SPARCstation and the IBM RISC machine currently on loan. REDUCE is an interactive program designed for general algebraic computations of interest to physicists, mathematicians and engineers. A purchase order has been placed for this software.

The LUND Monte Carlo programs to be used in simulation efforts in the accelerator group have been brought over from Fermilab. The LUND routines include: JETSET, LEPTO, LUCIFER, PYTHIA and TWISTER.

The Computing and Data Analysis systems development group continued its support of the 500 MIP resource acquisition project. In addition to providing general support, the following tasks have been identified for the systems development group:

- Defining the 500 MIP architecture
- Integration of NCS/UFMulti/ISIS/CPS/PARMAC
- System administration methodology
- Common user interface
- Software tools

The various means for distributed computing presented at the recent SSCL Distributed Computing Conference are being investigated in detail and the results will be presented at the next Computer Acquisition Working Group meeting.

An acquisition proposal for a Silicon Graphics 4D/25G workstation needed for detector simulation support and preparation of the 500 MIP resource acquisition has been prepared for DOE approval.

A systems analysis/integration plan is being prepared to support the 500 MIPS acquisition and implementation. As part of this plan a database has been designed in preparation of a second, more thorough, review of user requirements. Applications are being evaluated and acquired for integration testing and verification of both the 500 MIPS and follow-on purchases.

System specifications has been written and incorporated into the specification document for the 500 MIPS purchase.

### *Computation and Analysis*

A hardware loan agreement for the IBM equipment for the purpose of evaluation by the SSCL was negotiated with IBM and activated this month for a six-month period. The loaned equipment includes

an IBM RISC System/6000 Model 530 and an RISC System/6000 Model 320 with graphics displays, 1/4" tape drives and ASCII display terminals. The model 530 will be used for evaluation of high energy physics software and the Model 320 will be used for evaluation by the Accelerator Division.

A hardware loan agreement for Sun Microsystems equipment for the purpose of full implementation and support of the CERN Program Library to a SPARCstation 1 with SUN/OS. The loaned equipment includes a SUN SPARCstation 1 with additional external storage and color graphics display.

Starting with Version 198 of the CERN Program Library, to be released at CERN and the SSCL in April 1990, these libraries will be supported at the SSCL Central Computing Facility FAX/VMS, Apollo/Domain, Digital/Unix and SUN/OS/BSD4.3. A beta test version is being installed on IBM RISC/System 6000, Model 530.

An acquisition for a SUN SPARC station 1 for central support of the CERN Program Library is being prepared for DOE approval.

A compendium of all CERN Program Library Long Write-up documents for general distribution from SSCL is being prepared by the Computer Science Library. This compendium will be made available to CERN. The library continues to add and organize computer manuals and periodicals. A special agreement has been negotiated between CERN and SSCL on the purchase of an unlimited number of CERN User Guides and documentation directly from the CERN print shop.

BenchMarks - A FORTRAN function to return walltime or CPU time, either elapsed or total, has been defined for use in the benchmarking suite of routines. It has been tested under the VAX/VMS environment and will be ported to other machines as time goes by. This will allow a consistent interface between the benchmark routines and the timing mechanisms of the various machines. The random number generator acquired with one of the benchmarks had a period of only 4096. A random number generator that uses a "Linear Congruential Sequence" has been written that has a period of 65,536.

### *Networks*

The Energy Sciences Network is being used to provide the linkages to support the SSCL Video Teleconferencing pilot project. Communications channels of 384 Kb exist between LBL/Fermilab and SSCL/Fermilab to support this effort.

Static routing was established between the SSCL and Fermilab. Other static routes will be established as coordination between other sites is established.

## • **LIBRARY SERVICES (6.1.5)**

Collection development continued to be a priority during the month of March. This month approximately 492 new books, 64 back issues of periodicals, 61 conference proceedings and 161 preprints were received, processed and cataloged. Due to the expected increase in the size of the collection, additional shelving was ordered.

Additional activities during this time period included updating the library's accounting records and attending demonstrations of updated reader printers and CD ROM readers. Productive time was spent with DIALOG and Springer-Verlag representatives for information on enhancement of services. Interviews were conducted with three candidates for the Archivist/Records Manager position.

## • TECHNICAL INFORMATION AND PUBLICATIONS (6.1.6)

The head of Technical Information and Publications met with Mr. Joe Freeman (DOE-CH) in Chicago. The discussions focused on implementation of DOE Order 1340.1A, the Chicago Operations amendment to this order, DOE Printing and Publishing Activities (three year plan), and Article 51 of the URA contract with DOE. Discussions were also held concerning the utilization of the Government Printing Office (GPO) for all printing activities that cannot be completed within the Laboratory's duplicating facility.

A meeting was also held with Mr. Joe Drago, (DOE/Washington), who is responsible for ensuring that regulations and laws governing printing and graphics are followed, to discuss the policies and procedures as related to Technical Information and Publications. These discussions included: equipment acquisition , in-house printing for FY90 and FY91, in-house copying, duplicating facility and convenience copier activities, GPO printing activities, including Federal Prison Industries, and Direct Deal printer activities.

Mr. Chuck Booth (GPO Dallas) visited the lab, met with Technical Information and Publications staff members, and provided information on using the GPO to acquire printing. A discussion centered around a Direct Deal contract with a printer . This contract would be for one year and the selected printer would handle black/white printing for the laboratory. A Standard Form 1 (SF-1) was prepared to obtain bids for the printing of the SCDR and for acquiring a Direct Deal contract with a printer. The Direct Deal printer should be selected by May 1990.



SSC LABORATORY - CONTRACT #DEACO289ER40486 - FORMAT I (BY WBS)

COST PERFORMANCE REPORT - BY WBS													
REPORT PERIOD FROM: 02/25/90 TO: 03/31/90 \$ IN 000'S													
WBS ITEM	CURRENT PERIOD					CUMULATIVE TO DATE					**FY90		
	BCWS	BCWP	ACWP	VARIANCE	SCHEDULE	BCWS	BCWP	ACWP	VARIANCE	SCHEDULE	BAC	LRE	VARIANCE
				COST					COST				
1.1.1 ACCEL. MGMT. & SUPPORT	18	18	18	0	0	198	198	198	0	0	7,120	7,120	0
1.1.2 LINAC	0	0	0	0	0	0	0	0	0	0	0	0	0
1.1.3 LEB	0	0	0	0	0	0	0	0	0	0	0	0	0
1.1.4 MEB	0	0	0	0	0	0	0	0	0	0	0	0	0
1.1.5 HEB	0	0	0	0	0	0	0	0	0	0	0	0	0
1.1.6 COLLIDER	0	0	0	0	0	0	0	0	0	0	280	280	0
1.1.7 TEST BEAMS	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>TOTAL 1.1 ACCELERATOR SYSTEMS</b>	<b>18</b>	<b>18</b>	<b>18</b>	<b>0</b>	<b>0</b>	<b>198</b>	<b>198</b>	<b>198</b>	<b>0</b>	<b>0</b>	<b>7,400</b>	<b>7,400</b>	<b>0</b>
1.2.1 MANAGEMENT & SUPPORT	287	287	287	0	0	1,115	1,115	1,115	0	0	10,378	10,378	0
1.2.2 HEB MAGNETS	0	0	0	0	0	0	0	0	0	0	1,110	1,110	0
1.2.3 COLLIDER MAGNETS	1,261	1,261	1,261	0	0	3,762	3,762	3,762	0	0	35,146	35,146	0
1.2.4 MAGNET FAC EQUIP/TOOLING	0	0	0	0	0	0	0	0	0	0	2,650	2,650	0
<b>TOTAL 1.2 MAGNET SYSTEMS</b>	<b>1,548</b>	<b>1,548</b>	<b>1,548</b>	<b>0</b>	<b>0</b>	<b>4,877</b>	<b>4,877</b>	<b>4,877</b>	<b>0</b>	<b>0</b>	<b>49,284</b>	<b>49,284</b>	<b>0</b>
<b>TOTAL 1.0 TECHNICAL SYSTEMS</b>	<b>1,586</b>	<b>1,586</b>	<b>1,586</b>	<b>0</b>	<b>0</b>	<b>5,075</b>	<b>5,075</b>	<b>5,075</b>	<b>0</b>	<b>0</b>	<b>56,884</b>	<b>56,884</b>	<b>0</b>

\*\*BAC REFLECTS FY90 BUDGET ONLY PENDING BASELINE APPROVAL



SSC LABORATORY - CONTRACT #DEACO289ER40486 - FORMAT I (BY WBS)

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COST PERFORMANCE REPORT - BY WBS												
REPORT PERIOD											\$ IN 000'S	
FROM: 02/25/90												
TO: 03/31/90												
CURRENT PERIOD					CUMULATIVE TO DATE					**FY90		
WBS ITEM	BCWS	BCWP	ACWP	VARIANCE	BCWS	BCWP	ACWP	VARIANCE	BAC	LRE	VARIANCE	
				SCHEDULE COST				SCHEDULE COST				
2.3.1 LINAC	0	0	0	0	0	0	0	0	0	0	0	
2.3.2 LEB	0	0	0	0	0	0	0	0	0	0	0	
2.3.3 MEB	0	0	0	0	0	0	0	0	0	0	0	
2.3.4 HEB	0	0	0	0	0	0	0	0	0	0	0	
2.3.5 TEST BEAM AREA	0	0	0	0	0	0	0	0	0	0	0	
<b>TOTAL 23 INJECTOR</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	
2.4.1 NORTH ARC	0	0	0	0	0	0	0	0	0	0	0	
2.4.2 SOUTH ARC	0	0	0	0	0	0	0	0	0	0	0	
2.4.3 WEST CLUSTER	0	0	0	0	0	0	0	0	0	0	0	
2.4.4 EAST CLUSTER	0	0	0	0	0	0	0	0	0	0	0	
<b>TOTAL 24 COLLIDER RING</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	
2.5.1 WEST CLUSTER	0	0	0	0	0	0	0	0	0	0	0	
2.5.2 EAST CLUSTER	0	0	0	0	0	0	0	0	0	0	0	
<b>TOTAL 25 EXPERIMENTAL FACIL.</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	

\*\*BAC REFLECTS FY90 BUDGET ONLY PENDING BASELINE APPROVAL



SSC LABORATORY - CONTRACT #DEACO289ER40486 - FORMAT I (BY WBS)

COST PERFORMANCE REPORT - BY WBS													
REPORT PERIOD											\$ IN 000'S		
FROM: 02/25/90													
TO: 03/31/90													
CURRENT PERIOD					CUMULATIVE TO DATE					**FY90			
WBS ITEM	BCWS	BCWP	ACWP	VARIANCE		BCWS	BCWP	ACWP	VARIANCE		BAC	LRE	VARIANCE
				SCHEDULE	COST				SCHEDULE	COST			
27.1 ARCHITECT ENGINEER	0	0	0	0	0	0	0	0	0	0	7,867	7,867	0
27.2 CONSTRUCTION MGMT.	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>TOTAL 27 AE/CONSTRUCTION</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>7,867</b>	<b>7,867</b>	<b>0</b>
<b>TOTAL 2.0 CONVENTIONAL CONST.</b>	<b>2,503</b>	<b>2,503</b>	<b>2,503</b>	<b>0</b>	<b>0</b>	<b>7,437</b>	<b>7,437</b>	<b>7,437</b>	<b>0</b>	<b>0</b>	<b>26,220</b>	<b>26,220</b>	<b>0</b>

\*\*BAC REFLECTS FY90 BUDGET ONLY PENDING BASELINE APPROVAL.



**SSC LABORATORY - CONTRACT #DEACO289ER40486 - FORMAT I (BY WBS)**

<b>COST PERFORMANCE REPORT - BY WBS</b>												
						<b>REPORT PERIOD</b>		<b>FROM: 02/25/90</b>		<b>\$ IN 000'S</b>		
									<b>TO: 03/31/90</b>			
		<b>CURRENT PERIOD</b>				<b>CUMULATIVE TO DATE</b>				<b>**FY90</b>		
		<b>BCWS</b>	<b>BCWP</b>	<b>ACWP</b>	<b>VARIANCE</b>	<b>BCWS</b>	<b>BCWP</b>	<b>ACWP</b>	<b>VARIANCE</b>	<b>BAC</b>	<b>LRE</b>	<b>VARIANCE</b>
					<b>SCHEDULE COST</b>				<b>SCHEDULE COST</b>			
	<b>WBS ITEM</b>											
	<b>8.8.1 ADMIN SERVICES MGMT.</b>	<b>224</b>	<b>224</b>	<b>224</b>	<b>0 0</b>	<b>1,257</b>	<b>1,257</b>	<b>1,257</b>	<b>0 0</b>	<b>2,520</b>	<b>2,520</b>	<b>0</b>
	<b>8.8.2 ACCTG. &amp; FINANCE</b>	<b>203</b>	<b>203</b>	<b>203</b>	<b>0 0</b>	<b>1,064</b>	<b>1,064</b>	<b>1,064</b>	<b>0 0</b>	<b>1,842</b>	<b>1,842</b>	<b>0</b>
	<b>8.8.3 PROCUREMENT &amp; SCONT.</b>	<b>356</b>	<b>356</b>	<b>356</b>	<b>0 0</b>	<b>1,423</b>	<b>1,423</b>	<b>1,423</b>	<b>0 0</b>	<b>2,688</b>	<b>2,688</b>	<b>0</b>
	<b>8.8.4 TRAVEL SERVICES</b>	<b>23</b>	<b>23</b>	<b>23</b>	<b>0 0</b>	<b>97</b>	<b>97</b>	<b>97</b>	<b>0 0</b>	<b>219</b>	<b>219</b>	<b>0</b>
	<b>8.8.5 PERSONNEL</b>	<b>334</b>	<b>334</b>	<b>334</b>	<b>0 0</b>	<b>1,213</b>	<b>1,213</b>	<b>1,213</b>	<b>0 0</b>	<b>2,152</b>	<b>2,152</b>	<b>0</b>
	<b>8.8.6 STAFF SUPPORT SERVICES</b>	<b>93</b>	<b>93</b>	<b>93</b>	<b>0 0</b>	<b>828</b>	<b>828</b>	<b>828</b>	<b>0 0</b>	<b>1,175</b>	<b>1,175</b>	<b>0</b>
	<b>8.8.7 MINORITY AFFAIRS</b>	<b>40</b>	<b>40</b>	<b>40</b>	<b>0 0</b>	<b>135</b>	<b>135</b>	<b>135</b>	<b>0 0</b>	<b>424</b>	<b>424</b>	<b>0</b>
	<b>TOTAL 8.8 PROJ. ADMIN. &amp; SUPPORT</b>	<b>1,273</b>	<b>1,273</b>	<b>1,273</b>	<b>0 0</b>	<b>6,017</b>	<b>6,017</b>	<b>6,017</b>	<b>0 0</b>	<b>11,020</b>	<b>11,020</b>	<b>0</b>

**\*\*BAC REFLECTS FY90 BUDGET ONLY PENDING BASELINE APPROVAL**

**SSC LABORATORY - CONTRACT #DEACO289ER40486 - FORMAT I (BY WBS)**

<b>COST PERFORMANCE REPORT - BY WBS</b>													
						REPORT PERIOD				FROM: 02/25/90	\$ IN 000'S		
										TO: 03/31/90			
		CURRENT PERIOD				CUMULATIVE TO DATE					**FY90		
WBS ITEM	BCWS	BCWP	ACWP	VARIANCE		BCWS	BCWP	ACWP	VARIANCE		BAC	LRE	VARIANCE
				SCHEDULE	COST				SCHEDULE	COST			
8.4.1 TECH SUPPORT MANAGEMENT	-41	-41	-41	0	0	608	608	608	0	0	1,747	1,747	0
8.4.2 FAC. ENG. SERVICES	434	434	434	0	0	2,819	2,819	2,819	0	0	3,293	3,293	0
8.4.3 PROPERTY MANAGEMENT	117	117	117	0	0	413	413	413	0	0	641	641	0
8.4.4 FABRICATION SHOPS	22	22	22	0	0	29	29	29	0	0	171	171	0
8.4.5 GENERAL COMPUTING	212	212	212	0	0	1,063	1,063	1,063	0	0	2,375	2,375	0
8.4.6 DESIGN SUPPORT	72	72	72	0	0	219	219	219	0	0	2,271	2,271	0
8.4.7 COMMUNICATIONS	131	131	131	0	0	663	663	663	0	0	2,372	2,372	0
8.4.8 ENG. SUPPORT/STDS	65	65	65	0	0	118	118	118	0	0	479	479	0
8.4.9 METROLOGY LABS	0	0	0	0	0	0	0	0	0	0	171	171	0
<b>TOTAL 8.4 PROJECT TECH SUPPORT</b>	<b>1,012</b>	<b>1,012</b>	<b>1,012</b>	<b>0</b>	<b>0</b>	<b>5,932</b>	<b>5,932</b>	<b>5,932</b>	<b>0</b>	<b>0</b>	<b>13,520</b>	<b>13,520</b>	<b>0</b>

\*\*BAC REFLECTS FY90 BUDGET ONLY PENDING BASELINE APPROVAL



**SSC LABORATORY - CONTRACT #DEACO289ER40486 - FORMAT I (BY WBS)**

WBS ITEM	CURRENT PERIOD					CUMULATIVE TO DATE					**FY90		
	BCWS	BCWP	ACWP	VARIANCE		BCWS	BCWP	ACWP	VARIANCE		BAC	LRE	VARIANCE
				SCHEDULE	COST				SCHEDULE	COST			
<b>4.1 ACCELERATOR PRE-OPS</b>	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>4.2.1 ACCELERATOR R&amp;D</b>	2,034	2,034	2,034	0	0	7,610	7,610	7,610	0	0	17,162	17,162	0
<b>4.2.2 MAGNET R&amp;D</b>	2,655	2,655	2,655	0	0	17,164	17,164	17,164	0	0	37,116	37,116	0
<b>4.2.3 PHYSICS R&amp;D</b>	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>TOTAL 4.1/4.2 PRE-OPS/RES. &amp; DEV</b>	4,689	4,689	4,689	0	0	24,774	24,774	24,774	0	0	54,278	54,278	0
<b>TOTAL 4.0 R&amp;D AND PRE-OPS</b>	4,689	4,689	4,689	0	0	24,774	24,774	24,774	0	0	54,278	54,278	0

**\*\*BAC REFLECTS FY90 BUDGET ONLY PENDING BASELINE APPROVAL**



**SSC LABORATORY - CONTRACT #DEACO289ER40486 - FORMAT I (BY WBS)**

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<b>COST PERFORMANCE REPORT - BY WBS</b>													
						REPORT PERIOD		FROM: 02/25/90		\$ IN 000'S			
									TO: 03/31/90				
		CURRENT PERIOD				CUMULATIVE TO DATE						**FY90	
WBS ITEM	BCWS	BCWP	ACWP	VARIANCE		BCWS	BCWP	ACWP	VARIANCE		BAC	LRE	VARIANCE
				SCHEDULE	COST				SCHEDULE	COST			
6.1.1 PHYSICS ADMIN/SUPPORT	59	59	59	0	0	321	321	321	0	0	1,145	1,145	0
6.1.2 PHYSICS THEORY	0	0	0	0	0	1	1	1	0	0	183	183	0
6.1.3 EXPER. PHYSICS & FACIL.	303	303	303	0	0	968	968	968	0	0	2,613	2,613	0
6.1.4 COMPUTING & DATA ANALYSIS	187	187	187	0	0	1,181	1,181	1,181	0	0	3,776	3,776	0
6.1.5 PHYSICS LIBRARY SERVICES	100	100	100	0	0	387	387	387	0	0	1,385	1,385	0
6.1.6 TECH. INFORMATION & PUBS.	148	148	148	0	0	524	524	524	0	0	1,035	1,035	0
<b>TOTAL 6.1 PHYSICS PROG. SUPPORT</b>	<b>797</b>	<b>797</b>	<b>797</b>	<b>0</b>	<b>0</b>	<b>3,382</b>	<b>3,382</b>	<b>3,382</b>	<b>0</b>	<b>0</b>	<b>10,137</b>	<b>10,137</b>	<b>0</b>
6.2.1 MANAGEMENT	0	0	0	0	0	0	0	0	0	0	0	0	0
6.2.2 ADMIN. SYSTEMS & SUPPORT	0	0	0	0	0	0	0	0	0	0	0	0	0
6.2.3 PROJECT TECH. SUPPORT	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>TOTAL 6.2 GENERAL SUPPORT</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>TOTAL 6.0 LAB OPS. SUPPORT</b>	<b>797</b>	<b>797</b>	<b>797</b>	<b>0</b>	<b>0</b>	<b>3,382</b>	<b>3,382</b>	<b>3,382</b>	<b>0</b>	<b>0</b>	<b>10,137</b>	<b>10,137</b>	<b>0</b>

\*\*BAC REFLECTS FY90 BUDGET ONLY PENDING BASELINE APPROVAL

**SSC LABORATORY - CONTRACT #DEACO289ER40486 - FORMAT 2 (BY OBS)**

<b>COST PERFORMANCE REPORT - BY OBS</b>												
										<b>\$ IN 000'S</b>		
										<b>REPORT PERIOD FROM: 12/31/89</b>		
										<b>TO: 01/24/90</b>		
<b>CURRENT PERIOD</b>					<b>CUMULATIVE TO DATE</b>					<b>**FY90</b>		
	BCWS	BCWP	ACWP	VARIANCE	BCWS	BCWP	ACWP	VARIANCE	BAC	LRE	VARIANCE	
				SCHEDULE COST				SCHEDULE COST				
<b>OBS ITEM</b>												
<b>D - DIRECTORATE</b>	526	526	526	0	0	2,764	2,764	2,764	0	0	5,780	
<b>B - PROJECT MANAGEMENT</b>	864	864	864	0	0	3,374	3,374	3,374	0	0	8,647	
<b>A - ACCELERATOR SYSTEMS</b>	2,052	2,052	2,052	0	0	7,807	7,807	7,807	0	0	24,560	
<b>C - CONVENTIONAL CONSTRUCTION</b>	2,503	2,503	2,503	0	0	7,437	7,437	7,437	0	0	26,220	
<b>T - TECHNICAL SERVICES</b>	1,012	1,012	1,012	0	0	5,932	5,932	5,932	0	0	13,520	
<b>G - ADMINISTRATIVE SERVICES</b>	1,273	1,273	1,273	0	0	6,017	6,017	6,017	0	0	11,020	
<b>P - PHYSICS RESEARCH</b>	856	856	856	0	0	3,619	3,619	3,619	0	0	20,580	
<b>M - MAGNET SYSTEMS</b>	4,203	4,203	4,203	0	0	22,043	22,043	22,043	0	0	86,400	
<b>TOTAL SSC LABORATORY</b>	<b>13,289</b>	<b>13,289</b>	<b>13,289</b>	<b>0</b>	<b>0</b>	<b>58,993</b>	<b>58,993</b>	<b>58,993</b>	<b>0</b>	<b>0</b>	<b>196,727</b>	

**\*\*BAC REFLECTS FY90 BUDGET ONLY PENDING BASELINE APPROVAL**

SSC LABORATORY - CONTRACT #DEAC0288ER10186 - MAJOR SUBCONTRACTORS

MAJOR SUBCONTRACTORS													
REPORT PERIOD										FROM: 02-23-90		\$ IN 000'S	
										TO: 03-31-90			
CURRENT PERIOD					CUMULATIVE TO DATE					FY 90			
	BCWS	BCWP	ACWP	VARIANCE	BCWS	BCWP	ACWP	VARIANCE	BAC	LRE	VARIANCE		
			SCHEDULE	COST				SCHEDULE	COST				
CONTRACT													
<b>BROOKHAVEN LAB - MAGNETS</b>	1,263	1,263	1,263	0	0	8,224	8,224	8,224	0	0	18,722		
<b>FERMILAB - MAGNETS</b>	891	891	891	0	0	6,591	6,591	6,591	0	0	16,000		
<b>LBL - MAGNETS</b>	501	501	501	0	0	2,349	2,349	2,349	0	0	3,500		
<b>LOCKHEED</b>	183	183	183	0	0	719	719	719	0	0	2,530		
<b>RTK</b>	2,285	2,285	2,285	0	0	6,449	6,449	6,449	0	0	7,449		
<b>HARC/TAC</b>	597	597	597	0	0	1,504	1,504	1,504	0	0	2,772		
<b>SUBTOTAL</b>	<b>5,720</b>	<b>5,720</b>	<b>5,720</b>	<b>0</b>	<b>0</b>	<b>25,836</b>	<b>25,836</b>	<b>25,836</b>	<b>0</b>	<b>0</b>	<b>50,973</b>		
<b>SSCL/OTHER</b>	<b>7,569</b>	<b>7,569</b>	<b>7,569</b>	<b>0</b>	<b>0</b>	<b>33,157</b>	<b>33,157</b>	<b>33,157</b>	<b>0</b>	<b>0</b>	<b>145,754</b>		
<b>TOTAL</b>	<b>13,289</b>	<b>13,289</b>	<b>13,289</b>	<b>0</b>	<b>0</b>	<b>58,993</b>	<b>58,993</b>	<b>58,993</b>	<b>0</b>	<b>0</b>	<b>196,727</b>		

\*\*BAC REFLECTS FY90 BUDGET ONLY PENDING BASELINE APPROVAL

## 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>	
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	4/90		
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	Deltex 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	Deltex 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	4/90		
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	5/90		
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	4/90		
32	3.0	Initial Baseline Issued	11/89	5/90		
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		2/90	
36	3.1	PMP - Final Draft Issued	11/89	6/90		
37	3.1	Key QA Staff Hired	11/89		1/90	
38	3.5	ES&H Management Plan	11/89	4/90		
39	3.5	ES&H Final Draft Issued	11/89	4/90		
40	3.1	SSC WBS/WBS Dictionary Complete and Issued	11/89	5/90		
41	1.0	Prototype Dipole Specification Complete	11/89		3/90	
42	1.0	Magnet Criteria Complete	11/89		3/90	

## 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		2/90	
44	3.1	Configuration Management Policy Statement Issued	12/89		2/90	
45	3.4	Document Control Policy Statement Issued	12/89		1/90	
46	2.6	CCD-Procedures Manual Second Draft Issued	12/89		3/90	
47	3.0	Supplemental Site Specific CDR Issued	12/89		12/89	
48	3.0	Start Baseline Validation	1/90		1/90	
49	3.1	QA Policies and Procedures Complete	1/90	4/90		
50	3.1	QA Data Base Requirements Document Issued	1/90	4/90		
51	2.1	AE/CM-Complete Near Term Work Authorization Packages	1/90	4/90		
52	4.0	First Land Tract Available	1/90	7/90		Footprint Approval Req'd.
53	1.0	Award Magnet Prototype Contract	1/90	8/90		
54	2.0	Award MTL/MDL Facilities Cold Test Fabrication Contract	1/90	5/90		
55	3.3	Final AAAP Approved and Issued	2/90	5/90		
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	6/90		
58	2.6	CCD-Procedures Manual Issued	2/90	5/90		
59	3.0	Baseline Validation Complete	2/90	6/90		
60	4.0	Supplemental Environmental Impact Statement Issued	2/90	11/90		
61	2.0	A-E/CM On Board	2/90	6/90		

# SSCL - MASTER MILESTONE STATUS REPORT

As Of: April 18, 1990

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	Feb-90		Feb-90
M1-3	1	3.1.1	PM	Start Construction Project	Oct-89		Oct-89
M1-4	1	1.1	Injection System	Start Design	Mar-90	Mar-90	
M1-5	1	3.1.1	PM	SCDR Issued	Dec-89		Dec-89
M1-6	1	3.0	Footprint	DOE Approval	Feb-90		Mar-90
M1-7	1	3.1.1	PM	Baseline Validation Complete	May-90	Jun-90	
M1-8	1	3.1.1	PM	PMP Approved By DOE	Apr-90	Jun-90	
M1-9	1	3.0	AE/CM	Award of Contract	Jun-90	May-90	
M1-10	1	3.0	SEIS	Record of Decision	Sep-90	Nov-90	
M1-11	1	2.4	Collider Ring	Start First Tunnel Construction	Oct-90	Dec-90	
M1-12	1	2.2	Campus Structures	Complete	May-94		
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		Sep-97		
M1-17	1	1.0	Collider System	Complete Acceptance Tests	Sep-98		
M1-18	1	1.0	SSC Operational		Sep-98		

\* BASELINE VALIDATION SCHEDULED FOR COMPLETION MARCH, 1990.

## MEETINGS/CRITICAL EVENTS

<b>Date</b>	<b>Meeting Subject</b>	<b>Participants</b>	<b>Location</b>
May 4-5	Machine Advisory Committee	25-30	SSCL
May 30 - June 1	New Topics in Electroweak Theory	30-40	SSCL
June 7 - 9	Program Advisory Committee	30	SSCL
June 14-15	Scientific Policy Committee	25	SSCL
July 14-20	Program Advisory Committee	30	Snowmass, CO
Oct 16-18	R&D Symposium	350	Fort Worth, TX
Oct 19-20	R&D Committee	30	SSCL
Nov 1-3	Program Advisory Committee	30	SSCL