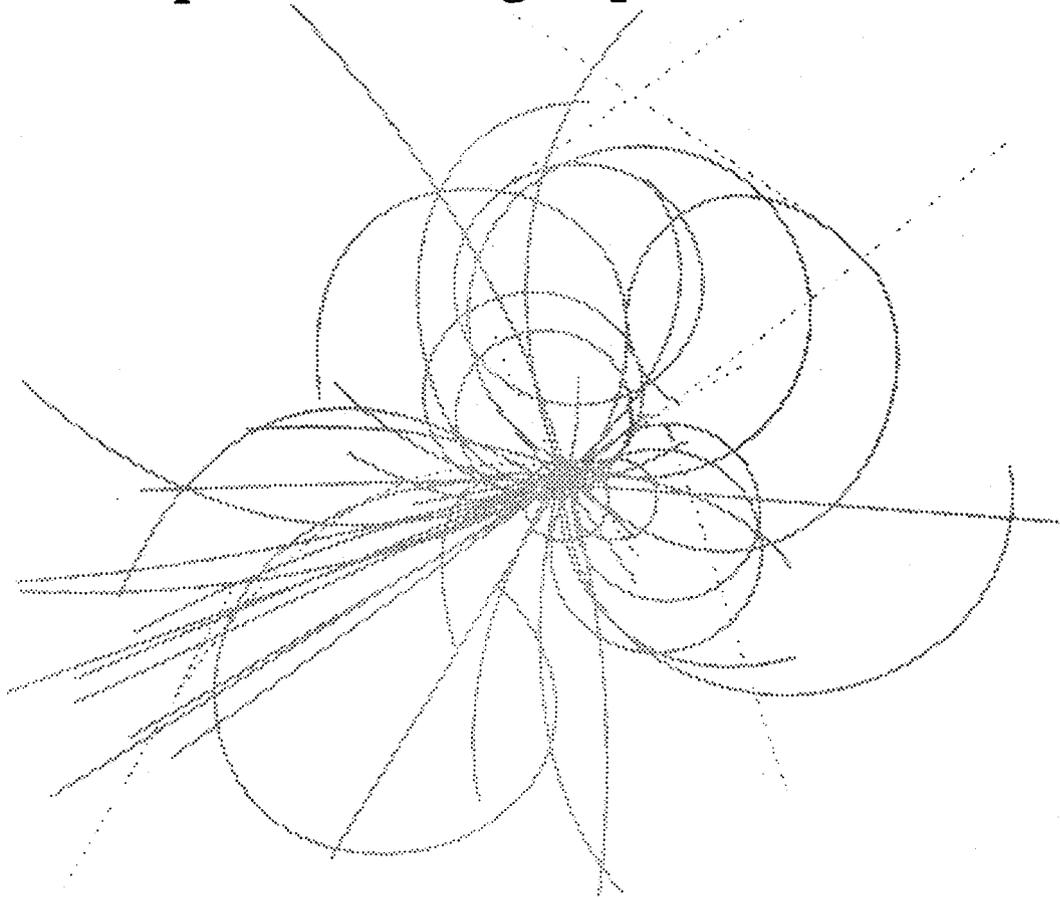


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Superconducting Super Collider Laboratory

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SSCL Quality Program Overview

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SSCL QUALITY PROGRAM OVERVIEW

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ABSTRACT

The Quality Program for the Superconducting Super Collider Laboratory (SSCL) was developed for a number of reasons. The need for a quality program not only is a contractual requirement, but it also makes good economic sense to implement such a program. The quality program is the device used to coordinate the activities of different Laboratory organizations, such as Engineering and Procurement, and to improve operational reliability and safety. To be successful, the QA Program not only must satisfy Department of Energy (DOE) requirements and provide for flowdown of requirements to performing organizations, but must also be flexible enough so that the program is tailored to meet the needs of each internal organization. The keys to success are management support, acceptance by personnel, and cost effectiveness. These three items are assured by involving appropriate management at each step of program development, by personnel training and by feedback, and by programs to reduce defects and improve quality. Equally valuable is involvement of key organizations in program development. We will describe the basic SSCL Quality Program requirements, how the requirements are tailored to the needs of Laboratory organizations, and how the effectiveness of the program is validated.

INTRODUCTION

The SSC Laboratory Quality Assurance Program was established on a lab-wide basis in 1990 and was based on requirements passed down from DOE. It started with the goal defined in the contract with DOE: to successfully create and operate a world-class, high-energy physics laboratory.

To create an environment for achieving this goal, several major quality objectives were established:

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- Meet the needs and expectations of our clients, the DOE and Laboratory users
- Infuse a quality attitude at all levels
- Meet the basic requirements of ASME NQA-1¹ and DOE orders 5700.6B² and 4700.1, Section III, Part D³
- Provide Laboratory-wide quality requirements
- Apply appropriate quality requirements to our suppliers and subcontractors
- Ensure the effectiveness of the SSC Laboratory Quality Assurance Program.

These objectives not only provide the basis for a sound and comprehensive quality program but they also make good business sense in promoting the efficiency and effectiveness of the entire SSCL organization. The SSCL QA Program is intended to provide the catalyst for interface between internal organizations. This is accomplished through integration of project management, technical, and administrative requirements and by defining the lines of communication. By serving as the facilitator, the QA Office promotes dialog between organizations with common interests. Continuation of this effort will serve to increase consistency and to eliminate redundancy between the various functions of the Laboratory.

The ultimate objective of the SSCL QA Program is to establish confidence in the safety and operational reliability of the machine. Infusing a quality attitude at all levels within the Laboratory is intended to ensure the achievement of that objective through pride in workmanship and attention to detail. The main philosophy of the program is "doing the right thing right the first time."

KEY ELEMENTS

The first key element in the design of the SSCL QA Program is meeting DOE contractual requirements, including the guidance contained in DOE Order 5700.6B. In addition, the SSCL has committed to use ASME NQA-1 basic requirements, which is the DOE preferred national consensus standard. These documents, incorporated into the SSC Project Management Plan and the SSCL QA Program Plan, form the basis for a comprehensive program.

To further contribute to the success of the SSCL, the Laboratory is working to form a partnership with DOE. This working relationship is also being carried out with our subcontractors. Through the sharing of resources and cooperation between organizations, the effort to create a world-class laboratory will go much more smoothly and efficiently. This partnership is essential to attaining and improving quality and meeting schedules.

A second key element of the SSCL QA Program is management support. This support starts at the top of the organization and filters down to line supervisors. The Director of the SSC Laboratory has endorsed the QA Program by issuing a Quality Policy that establishes the authority and responsibility for carrying out the program. Although the SSCL Director retains ultimate responsibility for the program, the responsibility for preparing, implementing, and monitoring the program has been delegated to the SSCL General Manager. The SSCL General Manager has assigned the responsibility for development and implementation of the program to the SSCL Quality Assurance Officer. Division Heads endorse the QA Program through concurrence with the Laboratory Quality Assurance Procedures.

Above all, for us to be successful all managers and supervisors need to believe in and adopt the QA Program at every level of work within the SSC Laboratory. Additionally, each employee of the Laboratory must accept quality as his or her responsibility. To achieve this acceptance, the SSCL QA Office has embarked on an aggressive training program designed to ensure that each employee understands his/her responsibility and what it means to achieve

quality. This effort is part of overall quality communication, which is considered to be a third key element of the QA Program.

In summary, through partnership with the DOE and subcontractors, management support, and acceptance by personnel, it is anticipated that the SSC Laboratory can achieve an optimum blend of quality, cost effectiveness, resource allocation, and timeliness that will ensure our success well into the next century.

DEFINITION OF QUALITY

To describe the purpose of the SSCL Quality Assurance Program, the QA Office has adopted two basic definitions of quality: “conformance with requirements” and “customer satisfaction.” In the first definition, we are concerned with accurately describing the requirements for products and services to ensure complete understanding and compliance. With the second definition, we are conveying the philosophy that the requirements are based on what the customer actually wants. In this case the customer is defined as the recipient of our efforts, whether they be products or services.

The ultimate customers of the SSC Laboratory are DOE and the scientific community. The customers of SSCL personnel are their supervisors and the co-workers who receive the output of their work. By adopting the philosophy that we are all customers and suppliers for someone else’s efforts, we are promoting greater teamwork among all Laboratory personnel.

PROGRAM DOCUMENTATION

SSC Laboratory Quality Policy

Establishing the QA Program began when SSCL Director Roy Schwitters issued the SSCL Quality Policy. The policy is a broad-based document that describes the general philosophy of the Laboratory and the overall responsibilities for achievement and verification of quality.

SSC Laboratory Quality Assurance Program Plan

The QA Program Plan is the primary document that describes program requirements and responsibilities. This plan was submitted to DOE and subsequently approved. It expands the responsibilities delineated in the Quality Policy and describes the basis for program development and implementation at the Laboratory-wide level and at the division level. The QA Program Plan describes the 18 elements of the QA Program and requires each division to have a subordinated Quality Implementation Plan.

Divisional Quality Implementation Plans

The Quality Implementation Plan (QIP) describes the division QA Program and tailors the requirements to the division level. The QIPs identify the standards, practices, and procedures that implement the QA Program within the division. This approach allows the flexibility for each division to concentrate on the program elements that are pertinent to division activities.

Standards, Practices, and Procedures

The SSCL QA Program is implemented through the development and use of appropriate standards, practices, and procedures. These documents provide for the achievement of

quality. It is important that these documents be streamlined, easily understood, and flexible to meet the varying requirements of work at the Laboratory. Well-structured procedures can help to ensure that quality is achieved at the greatest level of detail.

QUALITY PROGRAM TRAINING

There is an old adage that says, "It's not what you don't know that gets you in trouble, it's what you think you know that just ain't so."

An effective Quality Assurance Program requires an effective training program. We can put a lot of effort into the development of the quality program. We can do all the planning up front. We can get everyone excited and do effective verifications. But, even with all of this, if we don't effectively communicate and train our personnel with respect to the requirements, the methods, the focus, and the "want to," we will surely fail in our mission.

At the SSCL we are promoting an effective QA training program. Within the first week of employment at the Laboratory, the employee is introduced to the SSCL quality program during orientation. The new employee is shown a video depicting the importance of quality to the success of the Super Collider program; the basis and basic content of the quality program; and support for the Quality Assurance Program by the General Manager. In addition the employee is introduced to the flow-down of requirements from DOE, the quality organization, and communication paths for quality matters at the SSCL.

All employees attend a "Quality Assurance Program and Principles" course that stresses the importance of prevention activities like planning, using Lessons Learned, and training. The financial impact of exercising the Prevention mode in lieu of the Corrective Action mode is conveyed to the employee. In addition the course includes an introduction to the use of Quality Tools for Problem Solving and idea generation. Major requirements contained in the "SSCL Quality Program Plan" are discussed.

These introductory training sessions are supplemented with SSC program-specific courses targeted for specific audiences. Examples of planned or implemented training courses include Quality Auditing at the SSCL, How to be Audited, Quality Procurement Requirements, Problem Solving Using Quality Tools, Design Quality, Corrective Action, and Quality Records.

Each of the SSCL divisions is responsible for identifying requirements and conducting classes to achieve initial proficiency and enhancement of quality skills. These include skills such as non-destructive examination, inspection and test methods, and others as needed within the division. A key element to the success of our efforts centers about providing and receiving effective instruction and training so that we may achieve the SSC objectives.

PROGRAM IMPLEMENTATION

The primary guidance for program implementation at the Laboratory-wide level is provided through Laboratory Quality Assurance Procedures (LQAP). These procedures describe activities affecting quality that are performed Laboratory-wide. Developing procedures at this level will provide for more consistency throughout the Laboratory and will minimize redundancy.

To encourage division participation, all Laboratory Quality Assurance Procedures are distributed for review to each of the Division QA Representatives, and they receive final concurrence by the Division Heads. Where more specific direction is required at the division level, implementing procedures are developed using the LQAPs for guidance. By working together on program development and implementation, the SSC Laboratory can achieve the most efficient use of resources and greater assurance that the QA Program will be effective.

PROGRAM VALIDATION

As previously mentioned, verification activities comprise an important part of the Laboratory-wide Quality Program. The Laboratory QA Organization performs the independent verification function required by most major quality standards. The divisions are responsible for performing verifications within the division.

Program validation activities are focused in a performance-based direction. Our prime interest is that the Laboratory and subcontractors meet the requirements that we have committed to DOE. We are interested not only in verifying compliance, but also in the effectiveness of quality-related activities. Verification efforts are comprised of audits, surveillances, and management assessments.

Surveillances are primarily conducted within the division and are targeted and narrow in scope. Audit efforts are aimed at determining that the Laboratory and subcontractors have programs in place that are effective, meet all requirements, and are effectively implemented.

During audits we strive to evaluate whether the organization is adequately achieving quality. If not, we try to identify specific areas requiring improvement. Our focus is not to play "Gotcha," but to produce items and services that will help us all reach our ultimate objective—assuring that the Superconducting Super Collider is the most successful DOE project. Our objective is to work with the divisions and subcontractors to make this possible.

FUTURE DIRECTION

The annual Management Assessment is currently underway at the Laboratory to assess the effectiveness of the Laboratory Quality Program. We are eagerly awaiting the results of this assessment so that we can address any weak spots in the program. Over the next few years we expect the Quality Program to mature effectively in a continuous improvement fashion. The results of the various tools used to validate the program will provide the data and ideas we need to produce our desired improvement.

REFERENCES

1. American Society of Mechanical Engineers NQA-1, "Quality Assurance Program Requirements for Nuclear Facilities" (1989).
2. U.S. Department of Energy Order DOE 5700.6B, "Quality Assurance" (9-23-86).
3. U.S. Department of Energy Order DOE 4700.1, "Project Management System" (3-6-87).

