1 Introduction

Facility Description

The Next Linear Collider Test Area (NLCTA) is a room-temperature, X-band linear accelerator with a design no-load energy of 630 MeV, which may be increased to 1,096 MeV after future upgrades. Electrons are provided by a thermionic gun with a design maximum current of 3.0 A which may be increased to 4.5 A after upgrade. The maximum pulse length available from the rf system is 225 ns. The maximum gun repetition rate is 10 pps, while the klystrons and modulators are designed to run at 180 pps for the purposes of engineering development. The facility is constructed in the End Station B area of the SLAC Research Yard.

Facility Purpose

SLAC is the site of the first linear collider facility, the SLAC Linear Collider (SLC).

The NLCTA project is an experimental assembly designed to integrate the new technologies of X-band accelerator structures and rf systems being developed at SLAC and elsewhere in the world for the Next Linear Collider (NLC).

The goals of the project include technology integration, measurement of the "dark current" generated by rf field emission in a high-gradient accelerator, demonstration of multi-bunch beam-loading compensation, suppression of higher-order deflecting modes, and measurement of any transverse components of the accelerating field.

Facility Operations

The NLCTA will not be used as a production machine; that is, it is not likely that it will ever be used as a source of charged particles. It will, rather, be used as a developmental tool and will operate for relatively short periods of time to study properties of various new technologies incorporated into the design. The shielding analysis is based upon the expectation that the facility will be operated for not more than 1,000 hours per year.

It is planned to be operated in a staged manner, with the injector being commissioned first in 1995, and the accelerator commissioned in 1996. An upgrade is planned at a future date which will increase the accelerating gradient, and hence the maximum power capability. The maximum[1] power capabilities are expected to be as follows:

Configuration	Date	Max. Credible Power
Injector only	8/1/95	669 Watts
Linac	8/1/96	3,233 Watts
Upgrade	Future	5,745 Watts

1.4 Hazard Classification and Safety Analysis

A proposal to classify the NLCTA as a Low Hazard Facility was filed with the DOE on March 23, 1995.

The Director of the Office of Energy Research approved the classification of the NLCTA as a Low Hazard Radiological Facility on June 16, 1995.

A safety analysis is presented in Chapters 7 and 8 of this document. The summary results of the safety analysis are shown in the attached Table 1.1.

[1] This assumes that a system failure allows a higher than normal repetition rate transmitted to the gun, such that the average gun current is limited by the charging rate of the gun pulser circuits. See Section 9, "Accelerator Safety Envelope," for further discussion of maximum credible power.

Table 1.1: Hazard Identification and Risk Determination Summary

Note: The hazards reviewed and listed here are only those which arise as a consequence of the operation of the facility concerned. Hazards which arise in the course of production of parts of the facility, or involving on-site transportation of materials or personnel, are not considered here. Normal and customary hazards typical of light industrial operations are not considered.

Item	Hazard	Causes	Prevention/Mitigation Means	Potential Impact	Consequence	Probability
7.3.1	Ionizing radiation exposure, outside housing	Personnel error, interlock failure	Formality of design, maintenance, and functional testing of radiation safety systems, formal procedures for system use and to assure configuration control, training of operations staff and users	Personnel injury	3 — Low	A — Extremely Low
7.3.2	Ionizing radiation exposure, inside housing	Personnel error, interlock failure	Formality of design, maintenance, and functional testing of radiation safety systems, formal procedures for system use and to assure configuration control, training of operations staff and users	Personnel injury	2 — Medium	A — Extremely Low
7.3.3	Exposure to residual activity inside housing	Procedural error, personnel error	*SLAC Guidelines for Operations*, training, Radiation Work Permits	Personnel injury	1 — Extremely Low	A — Extremely Low
8.1	Fire; accelerator housing, equipment and control areas	Equipment failure	Sprinklers, fire alarms, exit routes, training, on-site fire department	Personnel injury, property loss	3 — Low	B — Low
8.3	Electric Shock	Personnel error, interlock failure	NEC compliance, interlocks, training, lock and tag	Personnel injury, fatality	2 — Medium	B — Low
8.4	Non-ionizing radiation exposure	Personnel error, interlock failure	Safety procedures, design of interlock systems, training	Personnel injury	3 — Low	B — Low
8.7	Seismic Hazards	Earthquake	Building and structural codes and standards, field inspection	Personnel injury, property loss	3 — Low	