

Scope

Beamline commissioning activities for E163 are expected to take up to 200 hours (approximately 3 weeks), and have two main objectives:

- 1) Establish optimal magnet tuning for extraction of beam into the Experimental Enclosure, and
- 2) Verify the integrity of the radiation shielding.

Electron beam tuning conditions have already been established up to BNDS1140, the dipole that kicks beam into the E163 line. The remaining commissioning involves setting the dogleg correctly, setting the final focus and steering correctly, then powering up the spectrometer. Diagnosing and tuning for the optimum zero-dispersion inverting unit transfer matrix condition for the dogleg will take somewhat longer, but is expected to be a lower-loss activity.

Verifying the integrity of the shielding will be done under the procedures set by and under the supervision of the ES&H Radiation Protection Department. This activity will include dose rate measurements outside the enclosure under a variety of misteering conditions, conducted with a reduced power beam.

Hazards

The primary hazard from beam commissioning is exposure to ionizing radiation outside the shielding enclosure due to elevated beam loss conditions.

Hazard Controls

Beam Shut-Off Ion Chambers (BSOICs) are placed at locations of maximum dose rate, based on ES&H RPD calculations. These devices are interlocked to trip off the beam if the dose rate exceeds 10 mrem/hr. In addition, more sensitive radiation detectors will be temporarily placed at strategic locations and monitored by ES&H RPD personnel, as described in the SLAC Memo to Sayed Rokni, dated 12/13/06.

Commissioning measurements will be performed at 50 mW, significantly below the ASE design value (70 MeV/0.6 W).

Commissioning will proceed downstream from BNDS1140, using profile monitors, BPMs and toroids on each beamline girder. It is expected that the tune up will proceed quickly (within a day) through the high-loss phase of initially “threading” the beam through the beamline.

Commissioning will be done by a team composed of, at minimum:

- 1) An NLCTA EOIC (Janice Nelson [NLCTA EOIC], Keith Jobe [NLCTA EOIC])
- 2) An E163 beamline expert (Eric Colby [Restricted Operator], Jim Spencer[User])

3) A member of the ES&H Radiation Protection Department

Feedback

The initial commissioning survey will be constantly monitored by a member of the ES&H RPD. At the conclusion of each commissioning day, a brief meeting will be held to discuss the findings and to plan the next day's activities accordingly. The initial commissioning survey is expected to take 2 days, once beam conditions are established.

Beam commissioning will terminate immediately should dose rates exceed expected values at any time.

SLAC MEMORANDUM

DATE: December 13, 2006
TO: Sayed Rokni, SLAC Radiation Safety Officer
FROM: Eric Colby, Stan Mao, Henry Tran, Toshiya Sanami
SUBJECT: E163 Commissioning Survey Plan

This procedure outlines specific measurements and conditions to be used to verify the integrity of the E163 Experimental Enclosure shielding. Both nominal and misteering cases are tested in this procedure. All testing will take place at 50 mW beam power or less, so burnthrough and beam heating will not be an issue.

This test procedure is to be conducted once beam power reaches at least 30 mW (5% of the design maximum). Beam conditions are to be 70 MeV, 10 Hz, and at least 43 pC per bunch. A member of the ES&H Radiation Protection Group (“RPG”) will place the detectors and conduct the observations. An NLCTA EOIC and an E163 Operator will assist the RPG member in producing the required beam conditions,

Two BF3 high-sensitivity detector stations shall be placed immediately adjacent to the North and East walls of the E163 experimental enclosure, each centered on the respective wall, and centered at beamline height. Hand-held Geiger-Mueller type survey meters will be used in addition to perform walk-around surveys to look for “hot spots”, the roof, and the laser room, as appropriate for each beam test condition. Measurements at each beam condition listed below are expected to required 20-30 minutes. Total testing time is expected to require two days. E163 and NLCTA representatives will meet with ES&H RPG personnel at the end of each day to review progress, discuss the measurements, and plan subsequent activities accordingly. All measurements will be documented and summarized in a final report.

If ARR approval is granted, and remaining action items require no more than two weeks to close out, these measurements are anticipated to occur in the third week of January, 2007.

Required Measurements

1. Nominal Beam Condition
 - a. Beam parked on Screen 2
 - b. Beam parked on Screen 3
 - c. Beam parked on Screen 4
 - d. Beam parked on Screen 5
 - e. Beam parked on Screen 6
 - f. Beam parked on straight ahead Faraday Cup
 - g. Beam parked on main (bend-line) Faraday cup

2. Misteering Conditions

- a. Beam parked on gate valve GV2
- b. Spectrometer magnet set to 0, 10, 20, 30, and 60 degrees of bend. (90 degrees of bend is the nominal case in 1(g) above).
- c. First and Second dogleg dipoles (in series) swept through full range that transmits at least 50% of the test beam current into the experimental hall.
- d. Quadrupoles 3&4 (in series) swept through $\pm 10\%$ of nominal value
- e. Quadrupoles 2&5 (in series) swept through $\pm 10\%$ of nominal value
- f. Quadrupoles 1&6 (in series) swept through $\pm 10\%$ of nominal value
- g. Quadrupole 8 swept through $\pm 10\%$ of nominal value
- h. Quadrupole 11 swept through $\pm 10\%$ of nominal value
- i. Beam steered to impact beam tube wall near southeast corner of laser room
- j. Beam focused to transport fully to dump, but steered with Q11 steering coils to sweep the entire beam tube aperture.