

Brookhaven National Laboratory/Photon Sciences Directorate			
<b>Subject:</b>	<b>Controlled Access to the VUV Ring</b>		
<b>Number:</b>	LS-ESH-0013	<b>Revision:</b>	D
		<b>Effective:</b>	5/17/2012
			<b>Page 1 of 8</b>
Prepared By:	M. Buckley	Approved By:	B. Chmiel
		Approved By:	E. Zitvogel

\*Approval signatures on file with master copy.

[Revision Log](#)

## 1.0 PURPOSE

Controlled access to the NSLS VUV ring is necessary for maintaining personnel safety and stability to the accelerator beam and equipment.

## 2.0 SCOPE

The NSLS VUV ring area is a controlled area that has several personnel hazards. These hazards primarily consist of radiation and electrical. All persons entering the VUV ring need to be aware of these hazards prior to entry.

Personnel requiring access to the VUV Ring during non-maintenance periods must follow the Controlled Access requirements within this procedure. Controlled access is the monitoring and controlling of personnel entering and exiting the VUV Ring when the ring is secured. This may occur during ring operations, studies, power supply/RF testing, or when the ring is simply secured. Controlled access to the VUV Ring does not apply during maintenance periods or interlock testing unless any of the aforementioned conditions exist. Personnel are not permitted in the VUV ring during VUV injection unless approved by the ESH Group Leader.

## 3.0 RESPONSIBILITY

*Person(s) Accessing VUV Ring:* Training for access to the VUV ring must be completed prior to requesting entry. Access to the ring must only be via the main entrance gate. All rules and instructions stated in this document must be followed to maintain beam stability, equipment stability and personnel safety.

*Control Room Operator(s):* The Control Room Operator may only permit trained personnel or visitor(s) escorted by trained personnel to enter the VUV ring. Record all entries in the Control Room VUV Ring Access Log with use of the VUV access stamp. The Operator may only permit a maximum of 5 persons in the VUV ring at a given time. The Operator must follow all specified instructions mentioned below.

## 4.0 PROCEDURE FOR CONTROLLED ACCESS TO THE VUV RING

- 4.1 Any Controlled Access to the VUV ring must be controlled by the person who is acting as Control Room Operator (CRO) at that time. Persons qualified for this position include the NSLS Operators and the NSLS Operations Coordinators.
- 4.2 Every entry and exit under a controlled access must be logged in the Control Room VUV Access log in the following format:



<b>Subject:</b>	<b>Controlled Access to the VUV Ring</b>					
<b>Number:</b>	LS-ESH-0013	<b>Revision:</b>	D	<b>Effective:</b>	5/17/2012	<b>Page 3 of 8</b>

- 4.3 The maximum number of people inside the VUV ring on controlled access at one time is FIVE. In other words, there should never be more than five empty cells in the "Time Out" column for the names listed in the log.
- 4.4 The people who enter the VUV ring area on controlled access must complete the training for "Controlled Access to the VUV Ring"; Course: PhoSci VUV Ring Access (SOP LS-ESH-0013).
- a) A person may become qualified for access by reading the procedure "Controlled Access to the VUV Ring" located through the BTMS web course website (<http://training.bnl.gov/demo/courses/index.html>). The training requires that the trainee read the procedure "Controlled Access to the VUV Ring."
  - b) A list of personnel qualified for controlled access is maintained in the BTMS database.
  - c) If there is reason to take a visitor into the ring, this may be done by an escort who is qualified for access. The escort is responsible for the visitor's safety during the access.
  - d) The refresher training frequency for this course is every 2 years.
- 4.5 The controlled access process consists of the following steps: (Refer to [Fig 1](#) to view the VUV Access Control Panel and [Fig 2](#) to view the VUV Ring Gate area).
- 4.5.1 The person(s) requesting access to the VUV ring make the request and give the name(s) to the Control Room Operator (CRO). This may be done ahead of time or when the party is ready to enter at the gate.
  - 4.5.2 The CRO verifies that the proposed access is acceptable with the current machine Operation mode, then stamps the header in the logbook and enters the names.
  - 4.5.3 The access party calls the control room using the gate intercom and informs the CRO that they are ready for access, and repeats the names.
  - 4.5.4 The CRO turns the mode switch to "Access" and verifies that there is satisfactory surveillance by TV and that the named people are at the gate.
  - 4.5.5 The CRO turns the "Lock Energize" switch and holds it in position and informs the access party that they have permission to enter.
    - a) The switch must be held until the gate is closed, as confirmed by the "gate closed" pilot light on the control panel, otherwise the interlock will be dumped.
    - b) The access party must close the gate behind them after entry in order to satisfy the interlock system.
  - 4.5.6 The CRO enters the entry time for each person in the logbook and initials each entry. There must be an entry for each person since they may exit at different times.
  - 4.5.7 When any person wishes to exit, they call the CRO on the intercom at the gate and request to exit.

<b>Subject:</b>	<b>Controlled Access to the VUV Ring</b>		
<b>Number:</b>	LS-ESH-0013	<b>Revision:</b>	D
		<b>Effective:</b>	5/17/2012
			Page 4 of 8

- a) The CRO verifies on the TV, then holds the "Lock Energize" switch and gives permission to exit, releasing the switch when the gate shows closed.
- b) The person(s) exiting the ring must not push or pull on the entrance door until permission is given.
- c) The CRO puts the exit time in the log and initials it, thus closing out that person's entry/exit cycle.
- d) If that person goes in again, there must be a new line in the log record.

4.5.8 When all people are out, the CRO confirms that the log record of the controlled access has been reconciled, and then turns the key switch to "Normal" mode. A warning alarm will sound in the VUV area for 10 seconds upon switching from "Access" to "Normal" mode.

#### 4.6 Control Room Priorities:

Servicing requests for entry or exit from the VUV area may be delayed if there is something more important going on in the control room, although requests for exit should be accommodated as soon as possible. However, once an entry or exit process has been initiated, that action must be completed, including the record in the logbook. The logbook entries are particularly important since decisions affecting personnel safety may be made based only on that record.

## 5.0 VUV RING ACCESS SAFETY ORIENTATION



### Caution



**In the event the Injection Warning Alarm Sounds when personnel are in the VUV ring under operating conditions, personnel in the ring must immediately press an Emergency Stop Button and then call the control room (X2550).**

5.1 There are three primary considerations involved in ring access to the VUV when there is stored beam: Radiation safety, Electrical safety and avoiding disturbance to the stored beam. These risks can be controlled at acceptable levels, but careful attention to procedures and knowledge of storage ring systems is necessary.

#### 5.1.1 Radiation

When there is stored beam in the ring, the radiation level in contact with the ring vacuum chamber in some locations can be higher than 100 mR per hour.

- a) Shielding inside the ring reduces the level to below 5 mR/hr in places where a person can stand, and in most places the radiation is much lower than that.
- b) The restrictions on work locations noted below will keep possible radiation exposures well below the 5 mRem/hour level.
- c) The total radiation caused by an accidental beam dump will also be below 5 mrem in the areas where access is allowed.
- d) During injection into the ring the radiation levels can be as much as 10 times higher and the hot spots may move around as adjustments are made on injection.

<b>Subject:</b>	<b>Controlled Access to the VUV Ring</b>					
<b>Number:</b>	LS-ESH-0013	<b>Revision:</b>	D	<b>Effective:</b>	5/17/2012	<b>Page 5 of 8</b>

- e) Occupation of the VUV ring area is not permitted during injection. The radiological interlock system and configuration control system/procedures are designed to prevent this from occurring.

#### 5.1.2 Electrical Safety

A notable electrical hazard in the ring is from the high current and high energy associated with the ring magnets.

- a) The magnet BUS can carry up to 2,000 amps at 80 Vdc. Personnel entering the ring must not come in contact with the bus work ([fig 4](#)) and connections for these magnets.

- b) The work rules listed below are designed to avoid these hazards.

#### 5.1.3 Stored Beam Stability

Workers in the VUV ring must be aware that seemingly innocuous actions could dump or disturb the stored beam.

- a) These include changing the range on a vacuum or other gauge, creating electrical noise, or loading circuits.

### 5.2 Rules and Restrictions on Activities in the VUV Ring During Controlled Access

- 5.2.1 Anyone inside the VUV ring on controlled access shall remain at least 3-1/2 feet away from the VUV BUS ([fig 4](#)). A barrier will be placed in position during ring operation to define this boundary, refer to [fig. 5](#). This barrier may only be placed in position or removed by the NSLS Operations Coordinators, Machine Operators, qualified VUV Ring Search personnel and ESH Group.

- 5.2.2 No task may be undertaken which requires work outside the boundary consisting of the ring of pipes and conduit which is below and inside of the magnet ring. This includes work in cable trays above and below the magnets.

Note: There may be tasks which violate these restrictions but can be done safely if proper precautions are taken. Such proposed tasks shall undergo work planning and must be approved by the PS ESH Group. Technical review and/or written procedure may also be required.

- 5.2.3 Any person working in the VUV ring on controlled access is responsible for getting information about the effect of the proposed work on stored beam stability.

- 5.2.4 Workers should not step over or on the RF COAX ([fig 3](#)). Walk around the service racks to go from one side to another of the COAX to prevent damage to the COAX or disruption of the beam.

<b>Subject:</b>	<b>Controlled Access to the VUV Ring</b>		
<b>Number:</b>	LS-ESH-0013	<b>Revision:</b>	D
		<b>Effective:</b>	5/17/2012
			Page 6 of 8

Appendix:



Figure 1: VUV Access Control Panel



Figure 2: VUV Ring Gate

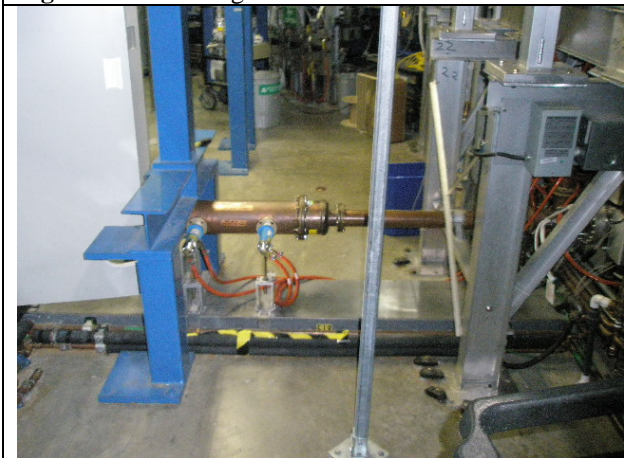
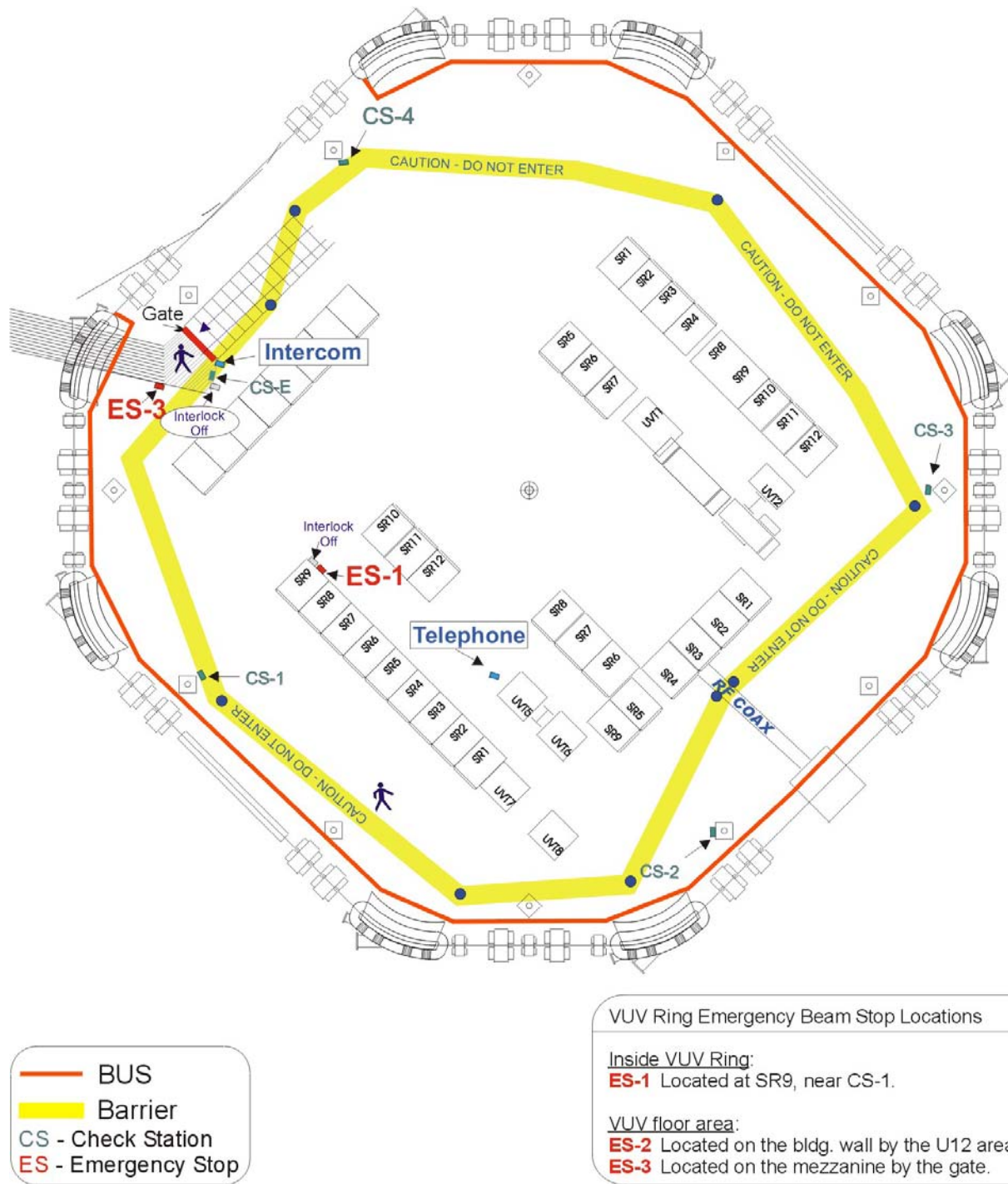


Figure 3: RF COAX



Figure 4: VUV Bus



**Figure 5: VUV Ring Layout with BUS and Barrier Location**

<b>Subject:</b>	<b>Controlled Access to the VUV Ring</b>		
<b>Number:</b>	LS-ESH-0013	<b>Revision:</b>	D
		<b>Effective:</b>	5/17/2012
			Page 8 of 8

<b>Document Review Frequency</b>
--------------------------------------

<b>3</b> Years
----------------

Review signatures on file  
with master copy of  
controlled document

### REVISION LOG

<b>Document Number:</b>	LS-ESH-0013	
<b>Subject:</b>	Controlled Access to the VUV Ring (Non-Maintenance Period)	
<b>Rev</b>	<b>Description</b>	<b>Date</b>
B	<ol style="list-style-type: none"> <li>1. Section 4: Identified training course number, included instructions for submitting the form, identified where the qualified list is maintained, and identified the training frequency.</li> <li>2. Revised the Certification form to include course number and instructions.</li> </ol>	6/28/02
C	<ul style="list-style-type: none"> <li>• Added Caution statement to address actions needed if personnel are in the VUV ring and Injection warning alarm sounds.</li> <li>• Added an appendix to include photos of key areas and a layout of the VUV ring.</li> <li>• Changed the distance to stay clear of the ring from 2 ft to 3-1/2 ft and added barrier requirements.</li> <li>• Added statement for personnel no to step on or cross over RF COAX.</li> <li>• Revised numerous sentences to coincide with changes to new Gate Access panel features.</li> <li>• Added work planning as a requirement if certain tasks are requested to be completed.</li> <li>• Document Title was changed to remove "(Non-Maintenance Period)".</li> <li>• Defined Controlled access in section 2.</li> </ul>	9/16/2008
D	<ul style="list-style-type: none"> <li>• Updated name of BNL Training course and made minor changes throughout document.</li> </ul>	5/17/2012

\* \* \*