



## 3.A-1.5.18.2

### Procedure for User Operation of the ARCS IPPS System

Before using a printed copy, check the *last modified date and revision number* against the **OFFICIAL COPY** on the SNS-OPM website.

Signed archival copies are maintained by the SNS Document Control Center.

#### Hand Processed Changes

<u>HPC No.</u>	<u>Date</u>	<u>Page Nos.</u>	<u>Initials</u>

Approved: \_\_\_\_\_ **Signature on File** \_\_\_\_\_  
 NSSD ARCS Lead Instrument Scientist Date

Approved: \_\_\_\_\_ **Signature on File** \_\_\_\_\_  
 NSSD Instrument Group Leader Date

Approved: \_\_\_\_\_ **Signature on File** \_\_\_\_\_  
 NSSD Instrument Support Group Leader Date

Approved: \_\_\_\_\_ **Signature on File** \_\_\_\_\_  
 SNS Protection Systems Team Leader Date

Approved: \_\_\_\_\_ **Signature on File** \_\_\_\_\_  
 NSSD ES&H / Operations Manager Date

Contacts: [D. L. Abernathy](#) (ARCS Lead Instrument Scientist)  
[Mark Loguillo](#) (ARCS Scientific Associate)  
[SNS-OPM Editor](#)

### 3.A-1.5.18.2

## Procedure for User Operation of the ARCS IPPS System

### 1. Purpose

- 1.1 The Instrument Personnel Protection System (IPPS) is a credited engineering control designed to prevent personnel exposure to radiation fields and oxygen deficiency hazards. The purpose of this procedure is to detail the operation of the ARCS IPPS for users to ensure that PPS controlled areas at ARCS are clear of all personnel prior to opening of the neutron beam. This procedure must be executed in order to place the system into Beam Permit and open the Primary Shutter.

### 2. Responsibilities

- 2.1 Personnel performing this procedure are responsible for reading, understanding, and following this procedure, and for reporting problems encountered with this procedure to the ARCS Lead Instrument Scientist (or designee).
- 2.2 Instrument Hall Coordinators responding to a request for a re-enable of the IPPS system must follow SNS-OPM 7.U-I.1 Instrument Hall Coordinator Key Control Procedure.
- 2.3 The ARCS Lead Instrument Scientist (or designee) is responsible for posting and maintaining an operator aid on this procedure near the ARCS IPPS panel.

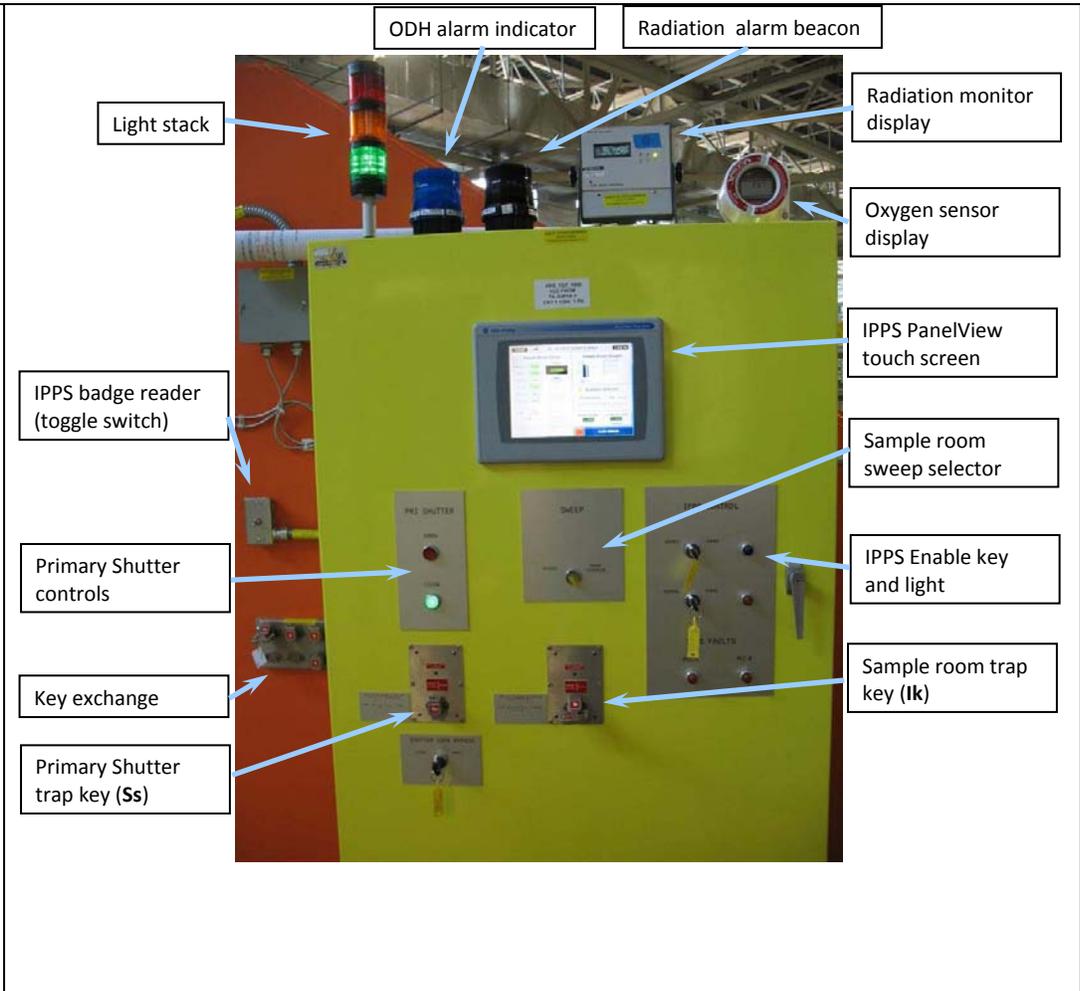
### 3. Prerequisites

- 3.1 Before a user of the ARCS Instrument can perform this procedure unsupervised, a member of the ARCS Instrument Staff must train them on this procedure as part of the ARCS Instrument Training.
- 3.2 Definitions and descriptions of systems used in this procedure:

**Mezzanine Level IPPS Panel**

This panel is located on the mezzanine level near the ARCS instrument. It contains the control button for the primary shutter, and the IPPS enable.

The key exchange panel is located on the left side of this panel as shown in the figure.



A beam shutdown station (see Fig. 1) is located at the rear of the ARCS Sample Room. This station has a light stack like the one on the Main IPPS Panel shown above to indicate the IPPS status and a switch to initiate the sweep of the Sample Room. Also located on the beam shutdown station is the emergency “Push to Safe” button, which is used to stop a sweep in progress if the event that someone is present in the Sample Room unexpectedly.

The ARCS IPPS is controlled by an Allen and Bradley PanelView touch screen system. The main screen is label “BL\_18 ARCS OVERVIEW”, and it provides a quick view of the system status. All user control operations can be accomplished from the “BL-18 ARCS SAMPLE AREA” screen, which is entered by touching the “Sample Area” display box in the overview screen. Touching the box label “MAIN” at the lower right corner of the sample area screen returns the system to the overview screen. Note that often the touch screen requires an initial touch to place the screen in an active mode.

### 3.3 Keys used in user operation of the IPPS Main Panel

Key Name	Function/Purpose
IPPS Enable Control Key	This key controls operation of the IPPS Main Control Panel. This key will remain under the control of personnel who have the authority to Enable or Disable the IPPS panel. <i>Users will not use this key.</i>
<b>Ik</b> Trap Keys	There are five of these trap keys. They individually correspond to portions of the instrument which must be swept for personnel prior to release of the <b>Ss</b> primary shutter trap key. When not in their corresponding area keyholes, all keys will be in the key exchange board adjacent to the IPPS Panel. All five keys are required to release the <b>Ss</b> key which enables opening the primary shutter. When the <b>Ss</b> key is released, the <b>Ik</b> keys are trapped to ensure that the sample room cannot be opened while the beam is on. The only <b>Ik</b> key available for users is the key corresponding to sweeping the ARCS sample room.
<b>Ss</b> Trap Key	This is the primary shutter trap key. It must be in its trapped (horizontal) position in the Primary Shutter keyhole in the IPPS Main Control Panel to operate the Primary Shutter. Alternatively, when located in the trap key exchange panel it becomes trapped if one or more of the <b>Ik</b> keys are removed from the key exchange panel.

## 4. Precautions

- 4.1 When the primary shutter is open, IPPS-controlled areas could have elevated radiation levels. The IPPS has been designed to ensure that these areas cannot be accessed while the primary shutter is open and that operation of the primary shutter is prohibited until successful completion of this procedure.
- 4.2 In normal operation, the equipment in controlled areas may have been exposed to a neutron beam and be activated. Be aware that this is a controlled area that may contain un-labeled radioactive materials. Carefully read and observe all postings prior to entry into this area. Follow all procedures and job hazard analyses.
- 4.3 If the steps in this procedure are not followed accurately, the IPPS system may go into a fault state requiring an enable of the system before work can proceed. This state is indicated by the blue IPPS Enable light on the Main IPPS panel not being illuminated,

and by the “IPPS EN” box being red on the PanelView “BL-18 ARCS OVERVIEW” screen. If an enable is required, the Instrument Hall Coordinators must be contacted.

## 5. Procedure

To sweep the ARCS sample room and open the primary shutter follow steps in 5.1.

To close the ARCS primary shutter and gain access to the sample room follow steps in 5.2.

### 5.1 Sweeping the ARCS sample room and opening the primary shutter

*(This portion of the procedure will ensure that no personnel are present in the ARCS sample room, and allow one to open the primary shutter).*

**5.1.1** Verify the light stack at the beam shutdown station in the ARCS sample room and/or the IPPS Main Control Panel is illuminated green (Access), as shown in Figure 1.



Figure 1.

**5.1.2** Announce to the local area that a sweep of the ARCS Sample Room is about to begin and that all personnel must leave the sample room immediately.

**5.1.3** Request an IPPS sample room sweep by cycling the search switch in the Sample Room clockwise, as shown in Figure 2. The light stack should now be illuminated yellow, and an announcement commences telling everyone to immediately leave the ARCS sample room.



Figure 2.

**5.1.4** Search the sample room again to ensure that no one is inside the sample room. Leave the sample room, and ensure that the sample room access door is closed.

**5.1.5** Rotate the Sweep selector switch on the IPPS front panel to the “SWEEP COMPLETE” position as shown in Figure 3. This step must be completed within three minutes of initiating the IPPS sample room sweep (step 3). Otherwise step 3 will need to be repeated.



Figure 3. Sample room sweep selector.

**5.1.6** Complete the sweep of the sample room by activating the IPPS badge reader to the left of the IPPS mezzanine panel (shown in Section 3.2). This is currently a manual single position toggle switch. Push the switch downward to complete the

sweep. The IPPS “BK-18 SAMPLE AREA” touch screen also reminds you to complete this step.

- 5.1.7 Verify that the light stack is illuminated red indicating that the sample room sweep is complete (see Figure 4).



Figure 4.

- 5.1.8 Release the sample room interlock key from the IPPS panel by pressing the “KEY RELEASE” button (shown in Figure 5) which has appeared on the touch screen panel after completion of the sample room sweep. This will allow one to rotate the **Ik** key to the horizontal position and remove it from the IPPS panel. Once the **Ik** key is turned to the horizontal position, a loud buzzer sounds. If you are in the sample room, and you hear this buzzer, press the “Push To Safe” button at the bottom of the beam shutdown station (shown in Figures 1 and 2), and exit the sample room immediately.

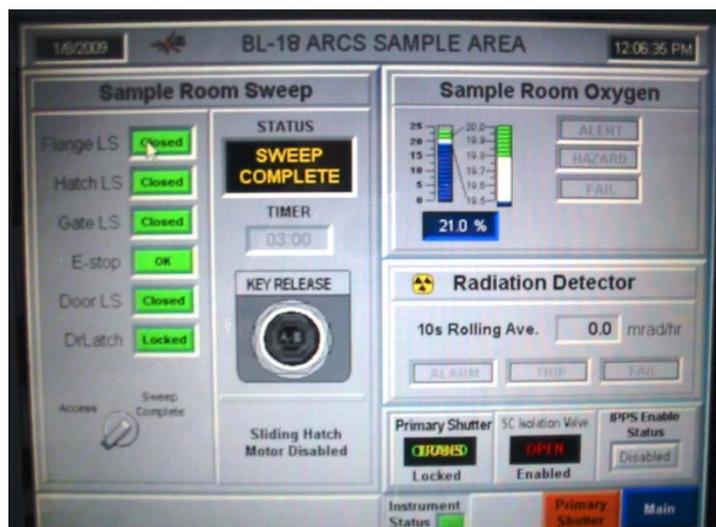


Figure 5. IPPS touch screen panel.

- 5.1.9 Insert the **Ik** key in the key exchange in the vertical position and rotate it to the horizontal position as shown in Figure 6(a) and (b)



Figure 6(a)-(c). ARCS Key exchange.

- 5.1.10 Rotate the **Ss** key to the vertical position and remove it from the key exchange, as shown in Figure 6(c).
- 5.1.11 Insert the **Ss** key in the primary shutter interlock key position on the IPPS panel in the vertical position. Rotate the key to the trapped horizontal position. The primary shutter is now enabled.
- 5.1.12 To open the shutter, press and release the red primary shutter button (labeled as “OPEN”) on the IPPS panel (See figure in section 3.2). The shutter takes ~45 seconds to open or close. Verify that the shutter is open by checking that the red shutter open button is illuminated, and that the Primary Shutter Status indicator on the IPPS touch screen is reading “open”.

**5.2 Closing the ARCS primary shutter and accessing the ARCS sample room**

*(This portion of the procedure will ensure that the primary shutter is closed and the sample room door is unlocked and cleared for access).*

- 5.2.1 To close the ARCS shutter press and release the green primary shutter button on the IPPS panel (labeled as “CLOSE”). The shutter takes ~45 seconds to open or close. Verify that the shutter is closed by checking that the green shutter close button is illuminated, and that the Primary Shutter Status indicator on the IPPS touch screen is reading “closed”.
- 5.2.2 To access the sample room, the primary shutter must first be closed and then the **Ik** interlock key must be returned to the IPPS panel. With the primary shutter closed, press the orange and black “Primary Shutter” button on the lower right of the IPPS “BL\_18 SAMPLE AREA” touch screen panel. This will pop-up a “Key Release” button on the IPPS touch screen. Push the “Key Release” button to release the **Ss** primary shutter key from the IPPS panel.
- 5.2.3 Rotate the **Ss** primary shutter key to the vertical position and remove it from the IPPS panel.
- 5.2.4 Insert the **Ss** key in the key exchange in the vertical position and rotate it to the horizontal position as shown in Figure 6(c) and (b)
- 5.2.5 Rotate the **Ik** key to the vertical position and remove it from the key exchange, as shown in Figure 6(a).
- 5.2.6 Place the **Ik** key vertically in the sample room interlock key position on the IPPS panel and rotate to the horizontal position to “trap” the key. This should change the light stack indicator to yellow.



Figure 7.

**5.2.7** Rotate the Sweep selector switch on the IPPS front panel to the “ACCESS” position as shown in Figure 7. This should change the light stack indicator to green. The sample room is now unlocked and accessible to trained personnel.

## **6. Documentation**

- Failure to follow the procedures above may result in a configuration of the IPPS which requires a “re-enabling” of the IPPS. These events require contacting the Instrument Hall Coordinator, and documentation according to the IHC procedure.

## **7. References**

- [SNS-OPM 3.A-1.5.18.1, Procedure for Staff Operation of the ARCS IPPS System.](#)
- [SNS-OPM 3.A-1.5.18.3, ARCS Key Control Procedure](#)
- [SNS-OPM 7.U-I.1, Instrument Hall Coordinator Key Control Procedure.](#)

## **8. Attachments**

- NONE