SNS-OPM 3.A-8.2
Control of Temporary Hardware Changes/Bypasses for the Following Certified Credited Engineering Control (CEC) Systems: Personnel Protection System (PPS), Oxygen Deficiency Hazard (ODH) System, Transfer Bay Access Control (TBAC), Service Bay Differential Pressure Monitoring System (SBDPMS) and Target Protection System (TPS)

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1. Purpose and Scope

To control and document short term hardware changes/bypasses/ removal from service for the following Credited Engineering Controls (CEC): Personnel Protection System (PPS), Oxygen Deficiency Hazard (ODH) System, Transfer Bay Access Control (TBAC), Service Bay Differential Pressure Monitoring System (SBDPMS) and Target Protection System (TPS).

Several CECs covered by this OPM (TBAC, TPS, etc.) have design features to allow a safety function to be bypassed. This procedure is not applicable to the use of these design features.

1.1 Definitions of Changes

a. Bypass - Temporary defeat of a sensor or system response to a sensor.

b. Temporary Change - Reconfiguration coupled with compensatory measures to ensure adequate protection. The changes shall remain in place for a specified period of time to facilitate operations and shall not evoke a permanent change to the hardware.

c. Temporary Chipmunk Change - Bypass of a Chipmunk interlock function, for a fault study, is **not** in the scope of this procedure and shall be done in consultation with the **SNS Radiation Safety Officer (RSO)** and the **Division Radiological Control Officer (DRCO).** All other non-fault study bypasses are covered by this procedure.

d. Removal from Service – Temporary removal from service of a CEC due to power outages, maintenance or modification.

e. Engineered Change/Bypass – A jumper plug or other similar device specifically designed to be easily installed and removed in a controlled manner.

1.2 Unreviewed Safety Issue Determination
Changes should be referred to SNS-OPM 3.A-8.1. “Configuration Management for Credited Engineering Controls” and in particular checked to see if an Unreviewed Safety Issue Determination (USID) is indicated.

1.3 Possible Effect of Changes

a. Radiation Safety – Change may affect the radiation safety aspects of the CEC (e.g. change/bypass of the AC contactor for a controlled device that can generate radiation).

b. Electrical Safety – Change may affect the electrical safety aspects of the PPS (e.g. jumper to a power supply for a magnet with exposed connections, or disconnection of an RF coaxial cable feed creating an exposed connection).

c. Cryogenic Safety – Change may affect the oxygen deficiency hazard (ODH) safety aspects of the LINAC or CHL ODH System or the ODH functions of the Instrument PPS equipment.

2. Responsibilities

2.1 The operations contact for each system is:

System	Operations Contact
❒ Accelerator PPS ❒ LINAC and CHL ODH	RAD Accelerator Operations Manager or designee
❒ Target PPS ❒ TBAC ❒ SBDPMS ❒ TPS	RAD Mechanical Systems and Operations Group Leader or designee
❒ Instrument PPS/ ODH	RAD SNS Instrument Support Group Leader or designee

2.2 The following persons, or their designees, shall **review and approve** all CEC Temporary Change Requests that may affect **Radiation Safety**:

- The **System Engineer.**
- The **Protection Systems Team (PST) Leader.**
- The **Operations Contact.**
- The **DRCO** or **RSO.**

2.3 The following persons, or their designees, shall **review and approve** all CEC Temporary Change Requests that may affect **Electrical Safety**:

- The **System Engineer.**
- The **Protection Systems Team (PST) Leader.**
- The **Operations Contact.**
- The **RAD ES&H Coordinator** or **appropriate group Electrical Safety Officer (ESO).**

2.4 The following persons, or their designees, shall **review and approve** all CEC Temporary Change Requests that may affect **Cryogenic Safety**:

- The **System Engineer.**
- The **Protection Systems Team (PST) Leader.**
- The **Operations Contact.**
- The **Cryogenic Safety Officer or RAD ES&H Coordinator.**

2.5 The PST Leader or designee shall supervise the execution of the processes described in this procedure to ensure adherence to its requirements.

2.6 The **System Engineer**, or designee shall:

- Supervise the installation and removal of temporary changes/bypasses/ removal from service for their system.
- Produce marked up drawings or sketches when required to support the installation of non-engineered CEC changes/bypasses.
- Provide instructions for validation testing of non-engineered changes/bypasses when required.
- Provide instructions for post maintenance/ modification testing before a system is returned to service.

3. Prerequisites

3.1 SNS-OPM 2.H-13, "Hold for Radiation Safety (RS Hold)", shall be followed as appropriate for Radiation Safety.

3.2 SNS (LOTO) "Lock-Out Tag-Out of Hazardous Energy Sources" (SNS 104070400-PR0007) shall be followed as appropriate for Electrical Safety.

3.3 When possible inert gas sources shall be administratively locked when ODH system functionality is comprised.

4. Precautions

WARNING:
HAZARDOUS VOLTAGES MAY BE PRESENT.
Wiring changes and testing may involve close proximity to hazardous voltages. Appropriate electrical **Lock-Out/Tag-Out (LOTO)** shall be implemented.

WARNING:
Some tests require the use of **jumper wires** to reduce testing to manageable steps. Failure to remove jumper wires may result in unacceptable radiation exposure and injury.

WARNING:
Some tests require the use of **Radiation Hold Tags and Locks** to prevent radiation exposure when the PPS is changed or bypassed. Removal of the associated RS Hold while the PPS change/bypass is in place may result in unacceptable radiation exposure and injury.

4.1 All bypasses shall comply with the SNS Accelerator Safety Envelope (ASE).

5. Procedures

5.1 **Review and Approval:**
The **PST Leader**, or designee, shall review and approve all CEC Temporary Change Requests and shall direct the use of SNS-OPM-ATT 3.A-8.2.a. "CEC Temporary Change/Bypass Request Form", SNS OPM 3.A-8.2a, by the **System Engineer** to gather the required review and approvals and record information on the above form as follows:

5.1.1 **Type of change request**:
Indicate Bypass, Temporary Change, or Removal from Service.

5.1.2 **Affected System:**
Note on the form the CEC affected by the change.

5.1.3 **Possible Effect(s) of Change**:
Determine if the change/bypass will have possible Radiation, Electrical or ODH safety effect. Consult with the System Engineer, Operations Contact, RSO, Electrical or Cryogenic Safety Officer as necessary.

5.1.4 **Request No**., **Date**, and **Requested By**:
Assign a request number, using the format "A", "T" or "I" for Accelerator, Target or Instrument respectively, "year" followed by a consecutive number starting at 1 for each new calendar year (e.g. A2011-1 would be the first Accelerator request of 2011). Also date the request and list the requestor.

5.1.5 **Drawings/Spec/Other**:
Copies of marked up drawings, specifications or other relevant documentation are attached to the CEC Temporary Change Request.

5.1.6 **Description of Change/Bypass**:
Enter a description of Change/Bypass with expected expiration date:

NOTE:
Normally change/bypasses are only issued for 90 days or less. PPS bypasses may be issued for more than 90 days if the equipment providing continued safety functionality (e.g. shielding, critical devices) is controlled by two or more RS-Hold locks – one from PST or Operations and one from the SNS RSO.

5.1.7 **Explanation of continued Safety Functionality:**
Enter an explanation of continued Safety Functionality and ASE compliance after change/bypass is incorporated, and list any additional requirements (e.g. RCT coverage, etc.)

5.1.8 **Description of Change/Bypass validation test/ Post Maintenance Test**:
For any non-engineered change/bypass, enter a description of the validation tests performed to ensure the desired functionality and ASE compliance. Enter NA for engineered change/bypasses.
When a system is removed from service, post maintenance testing (PMT) shall be performed before the system is returned to service. List PMT requirements. For additional information see Post Maintenance Testing for Credited Engineering Controls, SNS-RAD-ICS-PR-0012.

5.1.9 **List of equipment used for change/bypass**:
List equipment used (jumpers, engineered changes/bypass, etc.) including type and serial numbers when applicable (see Section 5.3 "Installation of Changes/Bypasses").

5.1.10 **Technical Review and approval**:
Obtain the System Engineer, PST Leader and Operations Contact technical review and approval signatures.

5.1.11 **RS Hold required**:
Consult with the **Operations Contact** to determine the equipment modifications (locked beamline shutters, RF waveguide shorting plates, etc.) and RS Hold Tags and Locks that are required to prevent radiation exposure while the CEC change or bypass is in place. The **PST Leader** shall answer the question "RS Hold Required" either YES or NO.

5.1.11.1 If YES, then the System Engineer shall ensure that a RS HOLD(s) is applied and note on the RS hold form that the RS hold may not be removed as long as the change request is in effect (normally the "CEC Bypass" stamp shall be used).

5.1.11.2 The **PST Leader** (or designee) shall verify the RS Hold has been placed in accordance with the above before proceeding with the installation of the change/bypass, and then note the RS HOLD Tag number and name of applier on the PPS Change/Bypass Form.

5.1.12 **Radiation Safety Review and Approval**:
If the "Possible Effects of change" (see above) includes Radiation Safety, obtain the RAD DRCO or SNS RSO Radiation Safety approval signature.

5.1.13 **Electrical Safety Review and Approval**:
If the "Possible Effects of change" includes Electrical Safety, obtain the ESO or RAD ES&H Officer approval signature.

5.1.14 **Cryogenic Safety Review and Approval**:
If the "Possible Effects of change" includes Cryogenic Safety, obtain the Cryogenic Safety Officer or RAD ES&H Officer approval signature.

5.2 **Non-Availability of Approvers:**
During non-weekday, holiday operation or other times when the approvers are not available to sign in person, approvals may be obtained by the following steps:

5.2.1 In lieu of signatures, the **Control Room Shift Supervisor (Chief)** shall obtain approvals - by means of telephone, fax or e-mail - from the responsible persons listed in Section 2.

5.2.2 After talking with approvers (preferably by conference telephone call), the Chief shall sign the CEC Temporary Change Request form with his/her own signature "for the approver".

5.3 **Installation of CEC Changes/Bypasses:**
The **System Engineer** shall install the change/bypass as follows:

5.3.1 Produce any documentation, such as marked up wiring drawings, to clearly show the location of the change/bypass. Enter the information on the CEC Change/Bypass Form in the **Drawings/Spec/Other** Section.

5.3.2 PPS only: If an engineered change/bypass (such as a jumper plug for RF interface) is used, obtain it from the PPS Bypass Storage Cabinet, and install the change/bypass. A validation test is not required for an engineered bypass. Enter the information on the CEC Change/Bypass Form in the **List of Equipment used for Change/Bypass** Section.

5.3.3 If a non-engineered change/bypass is used (such as temporary wire jumpers for Front End equipment) clearly flag that change/bypass so that it can be easily identified for removal. Enter the information on the CEC Change/Bypass Form in the **List of Equipment used for Change/Bypass** Section.

5.3.4 Attach a tag to each change/bypass with the following information:

CEC Temporary Change/Bypass

Request No. _____

Date Applied: _____
Date Expires: _____

By:_____ _____
Name Badge No.

Extended Expire Date :_____
By:_____ _____
Name Badge No.

5.3.5 Check that the CEC Change/Bypass Form has been completely documented.

5.3.6 Place the paper original copy with signatures and all information into the "Active" section of the CEC Change/Bypass Logbook in the Control Room. Attach any other documentation (generated in Section 5.1 above) to the form.

5.3.7 Make an Electronic Logbook entry.

5.4 **Transfer of RS HOLD:**

If a RS HOLD associated with a change/bypass needs to be removed, an alternate RS HOLD shall be applied that provides the same level of protection as the original RS HOLD. After the new RS HOLD is applied the **System Engineer** shall revise the change/bypass form with the new RS HOLD information and annotate the new RS HOLD with the change/bypass information. When complete, the original RS HOLD information is deleted from the change/ bypass form and the original RS HOLD form is marked to indicate that the RS HOLD is no longer required for the change/ bypass.

5.5 **Removal of CEC Change/Bypass:**

If the change/bypass is no longer required, the **System Engineer** shall remove the change/bypass as follows:

5.5.1 The **PST Leader** (or designee) will check the request form to see if an associated RS HOLD was required. If so, then the PPS change/bypass shall be removed prior to the removal of the RS HOLD. Inform the person who applied the RS Hold that the CEC change/bypass has been removed, and update the RS Hold CEC Bypass Stamp or remove the RS Hold if no longer required.

5.5.2 Remove the change/bypass devices and place back in the locked bypass storage cabinet. When removing changes/bypasses, two people are required (the System Engineer or designee and one other competent person; equipment owner or a member of the PST or Operations staff) to verify that the change/bypass has been removed and the CEC functionality is restored. Both should sign the Change/Bypass Form.

5.5.3 Remove any other tags or signs installed in support of the CEC change/bypass.

5.5.4 The System Engineer shall determine what testing is required after the removal of a non-engineered change/bypass to ensure that the functionality of the CEC has been restored. If testing is required, the system engineer shall provide instructions for testing the CEC.

5.5.5 Find the Change/Bypass Form in the logbook and fill in the removal date and sign in the "Status" Section at the bottom of the form. (The competent person and the System Engineer shall both sign the Change/Bypass Form.)

5.5.6 Place form in the Inactive Section of the CEC Change/Bypass Logbook.

5.5.7 Inform the person who applied the RS holds that the CEC change/bypasses have been removed and that they are no longer required for CEC change/bypass purposes.

5.5.8 Make an electronic logbook entry.

5.6 **Periodic Checks and Expiration Date Extensions:**

5.6.1 The **PST Leader**, or designee, shall periodically check the CEC Bypass Logbook for expired changes/bypasses.

5.6.2 If a change/bypass has expired or is about to expire, ask the requestor if the change/bypass is still required and advise that the CEC change/bypass must be reissued or removed.

5.6.3 Verify that any RS Hold required is so identified on the CEC Change/Bypass Form in the "removal requirements" section and contains the proper wording to that effect.

5.6.4 Physically verify that any required RS Hold tags and locks are in place and intact.

5.6.5 If an extension is requested, then the **PST Leader** shall:

5.6.5.1 Notify the **Operations Contact,** the **SNS Radiation Safety Officer** (for Radiation Safety affects) and/or **Electrical Safety Officer (ESO)** (for Electrical Safety), and explain the need. If no objections are raised, then the change/bypass may be extended for another ninety (90) day interval.

5.6.5.2 On the Change/Bypass Form in use, mark through the expiration date, write in the new one, and fill in the "reissue" section at the bottom of the form.

5.6.5.3 Make an Electronic Logbook entry.

5.7 **Changes Becoming Permanent:**

When a CEC Change/Bypass is to be incorporated permanently, the engineering drawings and/or specification shall be revised per SNS-OPM 3.A-8.1 "Configuration Management Procedure for the Following Certified Credited Engineering Controls: Personnel Protection System (PPS), Oxygen Deficiency Hazard (ODH) System, Transfer Bay Access Control (TBAC), Service Bay Differential Pressure Monitoring System (SBDPMS) and Target Protection System (TPS)".

5.8 **Take a CEC Out of Service:**

When it is necessary to take a CEC out of service, the temporary change request shall be used to document the process of taking the system out of service and the return to service. This process will normally be used in conjunction with a permanent change request that requires that the CEC be taken out of service or in cases where a CEC is not operational and maintenance activities extend over one shift.

When the Change Request Form is used to take a CEC out of service the following information shall be provided:

- Reason for removal from service (for a permanent change include the change request document number).
- Method used to provide for continued safety (e.g. RS Hold lock).
- Post maintenance/ modification testing required to return the CEC to service.

6. Documentation

6.1 Copies of the CEC Temporary Change Request, marked up drawings, specifications, or other change/bypass documentation, all with appropriate approvals, shall be kept in the PST Bypass Notebook in the Central Control Room (CCR).

6.2 Electronic copies of the filled in forms shall be kept in the PST folder on the backed-up server disk. Signatures are not required on the electronic form.

7. References

7.1 SNS-OPM 2.H-13, "Hold for Radiation Safety (RS Hold)".

7.2 SNS OPM 3.A-8.1, "Configuration Management Procedure for the Following Certified Credited Engineering Controls: Personnel Protection System (PPS), Oxygen Deficiency Hazard (ODH) System, Transfer Bay Access Control (TBAC), Service Bay Differential Pressure Monitoring System (SBDPMS) and Target Protection System (TPS).

7.3 Creation, Distribution, and Management of Spallation Neutron Source Records (SNS-IO-P01).

8. Attachments

8.1 SNS-OPM-ATT 3.A-8.2.a. "CEC Temporary Change/Bypass Request Form".