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C-A OPERATIONS PROCEDURES MANUAL

6.1.2 Responding to Chipmunk Interlocks

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Hand Processed Changes

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Approved: _____ Signature on File _____
Collider-Accelerator Department Chairman Date

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6.1.2 Responding to Chipmunk Interlocks

1. Purpose

- 1.1 The purpose of this procedure is to provide the Operations Personnel with instructions on responding to chipmunks that disable beam to a primary area.
- 1.2 Acronyms and Definitions:
 - 1.2.1 ACS: Access Controls System.
 - 1.2.2 AGS Chipmunk – All chipmunks with names in sequence from NM001-NM223.
 - 1.2.3 Chipmunk: Device used to monitor radiation levels, in millirem/hour.
 - 1.2.4 Chipmunk Alarm Level – Dose Rate at which an alarm will be generated in the MCR.
 - 1.2.5 Chipmunk Interlock Level – Dose Rate that will disable a critical device.
 - 1.2.6 DATACON ERROR: Controller is reporting, but device status is abnormal (i.e. DNA).
 - 1.2.7 DEVICE READ ERROR - Applications code is unable to get a controller report for a device.
 - 1.2.8 Diagnostic Studies: Conducted when the Chipmunk Interlocks are caused by source other than a known fault or approved tuning. Normally done at reduced intensity.
 - 1.2.9 Disable Beam: Make area secure from beam using appropriate critical device.
 - 1.2.10 Dose Rate: Magnitude of radiation field, normally reported in millirem/hour.
 - 1.2.11 DOSE RATE HIGH: When the calculated Dose Rate exceeds the assigned Alarm Level.
 - 1.2.12 DNA: Does Not Answer - no communication with a device.
 - 1.2.13 HP/RCT: Health Physics Technician
 - 1.2.14 Interlock: Action by the ACS, which disables the beam. (i.e. critical devices).
 - 1.2.15 Liaison Physicist: Knowledgeable and Responsible in setup and diagnosis of problems in assigned areas.
 - 1.2.16 LOW COUNT: Device is not reporting minimum counts generated by an internal “keep alive” source.

- 1.2.17 MCR: Main Control Room
- 1.2.18 OC: Operations Coordinator
- 1.2.19 Parity Error: Bad transmission of data. For this procedure, Chipmunk data.
- 1.2.20 Security P.C.: A computer dedicated to monitoring and recording ACS relay logic activity.
- 1.2.21 RHIC Chipmunk: Chipmunks named NM224 or greater.
- 1.2.22 RSC: Radiation Safety Committee
- 1.2.23 RS LOTO: Radiation Safety Lockout/Tagout, performed by an authorized person that prevents beam from being transported to a given area by disabling a critical device.
- 1.2.24 PASS: Particle Accelerator Safety System

2. Responsibilities

- 2.1 Operations personnel are responsible for investigating interlocks not caused by known faults or approved tuning.
- 2.2 MCR Operators are responsible for monitoring the Chipmunk's dose rates and ensuring that the average level does not exceed the Alarm Limit in any hour under normal conditions.
- 2.3 The on-duty OC is responsible for approving and documenting tune and other configuration changes in response to Chipmunk Alarms and Interlocks.
- 2.4 The on-duty HP Technician is responsible for performing surveys called for in this procedure.

3. Prerequisites

- 3.1 The ACS shall be certified for all areas not otherwise locked out by RS LOTO.
- 3.2 The security PC and "Security" application should be operational during operation.
- 3.3 Ability To generate and display alarms (i.e. ADT and related software running).
- 3.4 On duty OC trained in [C-A OPM 10.1, "Occurrence Reporting and Processing of Operations Information"](#).
- 3.5 Qualified and trained MCR, CAS and HP Personnel.

4. **Precautions**

4.1 Booster injection shall be permitted if the security PC or “Security” application are unable to function under the following conditions.

4.1.1 an Access Control group member is called in to fix the problem,

4.1.2 no injector chipmunks interlock.

Note:

The Security PC can report changes that occurred while the “Security” application was in “pause” state (i.e. transferring/copying files). If this application is stopped, THEN the system can only report changes that have occurred after it has been re-started.

5. **Procedures:**

5.1 Problems associated with the chipmunk system:

5.1.1 Ensure that the security PC is scanning.

5.1.1.1 IF the Security PC is not scanning, THEN continue to operate and

5.1.1.1.1 Contact the Access Controls Group to install the back-up security PC.

5.1.1.1.2 IF a Chipmunk interlock occurs, then determine which chipmunk(s) interlocked by using the Chipmunk viewer to determine which chipmunks were above their alarm limits. Record the interlocking Chipmunk in the OC log.

5.1.2 If Chipmunk monitoring or alarming hardware or software are not operational, then the AGS may continue to deliver beam until an interlock occurs.

5.1.2.1 This operational requirement includes the following device controllers (CDC), control stations (CST), and front end computers (cfe):

CDC.911.CHIP.SIS	CST.911.DTCN_AC		CDC.ADSTN.CHIP.SIS	CST.912.AD_STN.INS
CDC.914.CHIP.SIS	CST.914_DN.VME		CDC.ADSTN.CHIP.SIS2	CST.912.AD_STN.INS
CDC.921.CHIP.SIS	CST.921.VME		CDC.TALCOV.CHIP.SIS	CST.TALCOVE.VME
CDC.921.CHIP.SIS2	CST.921.VME			
sisScalar.10a-ps3.1	cfe-10a-ps3		sisScalar.8b-ps2.1	cfe-8b-ps2
sisScalar.12a-ps2.1	cfe-12a-ps2		sisScalar.8b-ps2.2	cfe-8b-ps2
sisScalar.2b-ps2.1	cfe-2b-ps2		sisScalar.8b-ps2.3	cfe-8b-ps2
sisScalar.2b-ps2.2	cfe-2b-ps2		sisScalar.957-ps1.1	cfe-957-ps1
sisScalar.4b-ps5.1	cfe-4b-ps5		sisScalar.957-ps1.2	cfe-957-ps1
sisScalar.4b-ps5.2	cfe-4b-ps5		sisScalar.957-ps1.3	cfe-957-ps1
sisScalar.4b-ps5.3	cfe-4b-ps5		sisScalar.957-ps1.4	cfe-957-ps1
sisScalar.4b-ps5.4	cfe-4b-ps5		sisScalar.957-ps1.5	cfe-957-ps1
sisScalar.6b-ps2.1	cfe-6b-ps2		sisScalar.957-ps1.6	cfe-957-ps1
sisScalar.6b-ps2.2	cfe-6b-ps2		sisScalar.957-ps1.7	cfe-957-ps1
sisScalar.6b-ps2.3	cfe-6b-ps2		sisScalar.957-ps1.8	cfe-957-ps1
sisScalar.6b-ps2.4	cfe-6b-ps2		sisScalar.957-ps1.9	cfe-957-ps1
sisScalar.6b-ps2.5	cfe-6b-ps2		sisScalar.wh-ps1.1	cfe-wh-ps1
sisScalar.6b-ps2.6	cfe-6b-ps2		sisScalar.wh-ps1.2	cfe-wh-ps1
sisScalar.6b-ps2.7	cfe-6b-ps2		sisScalar.wh-ps1.3	cfe-wh-ps1

5.1.2.2 This operational requirement also includes the application ADT and the servers ART (AGS/RHIC) and the chipmunk monitoring system in PASS.

5.1.3 If a non-PASS Chipmunk interlock is generated during a period when the Security PC is not scanning (i.e. “Security application not running”):

5.1.3.1 DO NOT reset the fault until it is scanning again.

5.1.3.2 Note the Chipmunk(s) that generated the interlock by looking at which one(s) reset by observing the security PC or reading the security log.

5.1.4 If three interlocks occur in any one-hour period due to Chipmunk device failures (i.e. interlocks determined NOT to have been generated by elevated radiation levels), then it is considered to be malfunctioning. IF an interlocking Chipmunk is found to be malfunctioning, THEN disable the beam to the affected area.

5.1.4.1 Restore beam to the affected area only after the malfunction has been cleared.

5.2 AGS(Injectors) Chipmunk Interlocks:

5.2.1 IF an AGS(Injectors) Chipmunk interlock occurs for a reason other than approved tuning or a known fault, THEN Operations will attempt to find the cause.

- 5.2.1.1 If the cause is determined, THEN correct the problem.
 - 5.2.1.1.1 Record the corrective action in the OC Logbook.
 - 5.2.1.1.2 If there were no accompanying alarms, THEN restore beam and continue the program.
 - 5.2.1.1.3 If alarms(s) did accompany the interlocks, then determine the dose as seen by (each of) the Chipmunk(s) in the last hour.
 - 5.2.1.1.3.1 The Chipmunk's dose is recorded by applications code in 5-minute intervals (i.e. 12 times an hour), [wait for last interval to be completed], therefore summing the last 12 measurements from "Chipmunk Viewer" and dividing by 12 will produce the last hours average.
 - 5.2.1.1.3.2 Beam must be reduced or left off until hourly average is below the Alarm Limit for any of the Chipmunks.
 - 5.2.1.1.3.3 The calculated averages above should be recorded in the OC logbook.

5.2.2 IF four interlocks in the same area occur in any one hour period for reasons other than a known fault or approved tuning, THEN:

- 5.2.2.1 Calculate the dose seen by the Chipmunk(s) using the method from 5.2.1,
- 5.2.2.2 Begin Diagnostic Studies:
 - 5.2.2.2.1 Have the HP technician perform a survey as near to the location of the offending Chipmunk as possible.
 - 5.2.2.2.2 The HP technician shall ensure the Chipmunk reading is representative of the actual rate in the area.

Note:

All accessible or occupied area 10 to 100 feet around the problem Chipmunk should be checked. Chipmunks are positioned to see the highest dose rate in the representative area. If Chipmunk appears to be shadowed by nearby shielding, then a survey should be taken on the opposite side.

- 5.2.2.2.3 If the Chipmunk is located in an AGS Fan house, then use [C-A-OPM 4.46](#) "Procedure for Accessing AGS Fan Houses..." to gain access.
- 5.2.2.2.4 If the dose rate 10 to 100 feet away from the chipmunk is higher by a factor of two or more than that measured

by the Chipmunk, then:

5.2.2.2.4.1 Print out the magnet settings for the affected area.

5.2.2.2.4.2 Reduce the beam until the highest reading in the area is lower than the alarm level for the Chipmunk.

5.2.2.2.4.3 Printout the losses and Chipmunk records for the area.

5.2.2.2.4.4 Inform Liaison Physicists for the affected area what has transpired.

5.2.2.2.4.5 Record actions in the OC Log.

5.2.2.2.5 If the hourly average dose rate of the chipmunk is higher than the Alarm limit, then OC shall:

5.2.2.2.5.1 Instruct the HP technician to control access to the affected area, or

5.2.2.2.5.2 Reduce the intensity in the area until the Chipmunk reads below the Alarm level.

5.2.2.3 Continue investigation of the problem. IF seven additional interlocks occur within two hours for unknown reasons, then suspend Diagnostic Studies and:

5.2.2.3.1 Contact the Liaison Physicist for the affected area,

5.2.2.3.2 Consult the Chair of RSC, or designee.

5.2.2.3.3 If one of the above is able to resolve the problem, then record corrective actions in the OC Log.

5.2.3 If, within 5 seconds, three or more Chipmunks interlock simultaneously, then reduce the intensity to the area by 50% and attempt to find the cause:

5.2.3.1 If the cause is not found:

5.2.3.1.1 Follow the steps outlined in 5.2.2 for each Chipmunk.

5.2.3.2 If no cause is found:

5.2.3.2.1 Contact the Liaison physicist for the affected area and report what has transpired.

5.2.3.2.2 Call the C-A ESHQ Associate Department Chair, or

representative, and report what has transpired.

5.2.3.2.2.1 Initiate [C-A OPM 10.1](#) if directed to do so by the C-A ESHQ Associate Chair, or representative

5.3 RHIC Chipmunks

Note:
RHIC chipmunk statuses are displayed by the RHIC Panel View at MCR_2-4.

5.3.1 If ONE interlock from a RHIC Chipmunk occurs in any one-hour period, DO NOT RESET UNTIL INVESTIGATION BELOW IS COMPLETED.

5.3.1.1 Determine the last hourly rate average using the application “Chipmunk Viewer”.

5.3.1.1.1 Wait 5 minutes for the last integration to complete (the program integrates in 5 minute intervals).

5.3.1.1.2 Add the last 12 entries (including the one with the interlock) and divide by 12 to obtain the hourly average dose rate.

5.3.1.2 If the average is below 24 millirem/hour:

5.3.1.2.1 Attempt to determine the cause with no beam.

5.3.1.2.2 Follow all of the steps outlined in 5.2 for AGS(Injectors) Chipmunk Interlocks.

5.3.1.2.3 Restore beam until another interlock occurs.

5.3.1.3 If this average is greater than 24 millirem/hour:

5.3.1.3.1 Attempt to determine the cause.

5.3.1.3.2 Contact RSC Chair, or designee, for instructions.

5.3.1.3.3 Resume operation only after instructed to do so by the RSC Chair, or designee.

5.3.2 If more than one interlock occurs,

5.3.2.1 Leave the beam off.

5.3.2.2 Calculate the dose seen by the methods of 5.3.1.1.

5.3.2.3 Follow 5.3.1.3 of this procedure.

5. Documentation

5.1 OC Logbook

6. References

6.1 [C-A-OPM 10.1, "Occurrence Reporting and Processing of Operations Information"](#).

6.2 [C-A-OPM 6.1.3, "Responding to Chipmunk Alarms"](#).

6.3 [C-A-OPM-ATT 9.1.16.b "RS LOTO Log Sheet"](#)

6.4 [C-A-OPM-ATT 9.5.1.a, "ALARA Program Organization for C-A"](#).

7. Attachments

None