

3.15.1 Response to Single PASS Division RHIC ODH Alarms

1. Purpose

- 1.1 The purpose of this procedure is to give instructions to Operations crews to rapidly respond to suspected Oxygen Deficiency Hazard (ODH) alarms in order to prevent costly equipment damage to RHIC experiments, due to automatic fan starting, and to determine if the alarm is real. The alarm shall be assumed real until proven false.
- 1.2 This procedure is applicable only if, for a given detector location (comprised of PASS division A and PASS division B ODH detectors) the detector from one division activates the alarm while the detector from the other division does not activate the alarm.
- 1.3 Job specific work planning required to enter an ODH area after an ODH alarm according to step 5 of the Laboratory's [SBMS ODH "Re-entry" Procedure](#).

2. Responsibilities

- 2.1 The Operations Coordinator (OC) is responsible for the execution of this procedure. During shutdown periods the CAS watchstander is responsible for the execution of this procedure.
- 2.2 The Cryogenic Operations Group (COG) is responsible for verifying the validity of an ODH alarm, for defeating the alarm in order to verify its validity, and for monitoring for ODH while work is done on the "failed" ODH sensor.
- 2.3 The Collider Accelerator Support (CAS) group or MCR Operators are responsible to control access to a RHIC tunnel enclosure or building.
- 2.4 The Access Controls Group (ACG) is responsible for re-calibrating ODH sensors that have been determined by COG to give false readings.
- 2.5 The Radiological Control Technicians (RCTs) are responsible for radiological surveys of the tunnel as required.

Note:

If the conditions stated in paragraph 1.2 are not present, THEN the Accelerator Systems Safety Review Committee (ASSRC) Chair, or designee, is responsible for giving permission to bypass an ODH sensor ([C-A OPM Att 4.92.a](#)).

3. **Prerequisites**

3.1 Tunnel or building entrants shall carry a Personal Oxygen Monitor (POM) and a Self-Rescue Supplied Atmosphere Respirator (SRSAR), when entering an enclosure during the period where a PASS ODH alarm remains un-verified.

3.1.1 Cryo group will provide POMs for tunnel/building entrants.

3.2 Operator/CAS technician acting as gate watch shall carry to the entry gate sufficient CA keys for all entrants if the alarm was in the tunnel.

3.3 COG members shall obtain a "IK056" key (from their keylocker) for the ODH box(es) before an access/entry is made.

3.4 COG shall bring a 900 MHz telephone(s) and/or radio.

Note:

Do not use the 900 MHz phone near the PASS ODH box.

3.5 Members of the Cryogenic Operations and Access Controls Groups, and the Radiological Control Technicians (RCTs) shall have up-to-date training that allows them to enter ODH Class 1 areas.

4. **Precautions**

4.1 Persons shall be assigned in pairs to enter an enclosure or building where an ODH alarm has occurred.

4.2 For tunnel access, Remote Control Access (RCA) is explicitly prohibited. PASS will set the enclosure to SAFE ACCESS (SA). RCA may only be used in Controlled Access (CA). When accessing zone 4z1 during an ODH alarm, the gate watch shall bring sufficient RHIC CA (EB014+ EB010) keys to the gate for all entrants.

4.3 ODH alarms shall be assumed to be real until proven false by the Cryogenic Operations Group.

4.4 No one shall enter a known area in which an oxygen deficient atmosphere exists (<19.5%) without an approved enhanced work permit which includes appropriate Personal Protective Equipment (PPE).

4.5 TWO ODH sensors shall not be bypassed simultaneously in the same PASS ODH box.

5. Procedure

Note 1:

IF EVERY RHIC enclosure is in the No Access (NA) state, THEN the tunnel fans will NOT come on when an ODH alarm is present.

Note 2:

IF any enclosure is in a state other than the NA state, and an ODH alarm is present in that enclosure, THEN the tunnel fans in the affected PASS zone will turn on immediately and, if the alarm condition persists, the tunnel fans in the zones on either side of the affected zone will turn on ten minutes after the first fans turned on.

Note 3:

The following instructions are intended to provide guidance. Real situations may present possibilities that were unforeseen at the time this procedure was written. The OC is encouraged to seek advice during any such situation.

Note 4:

The instructions assume that the alarm is in the RHIC tunnel. The same instructions apply if the alarm is in a service or support building, however, key and entry requirements are simpler since the access to the area is not through a PASS gate.

Note 5:

1. ODH fans will run for at least 90 seconds following an ODH alarm in the area covered by the fans even if the alarm resets during the 90-second interval.
2. If the ODH alarm clears, the fans will automatically stop at the end of the 90-second interval.

Caution

If tunnel or building entrants POM indicates < 19.5% oxygen, immediately evacuate the area to an outdoor location.

5.1 IF an ODH alarm annunciates in MCR, and the affected tunnel zone is in the NA state, THEN

5.1.1 Verify the validity of the alarm as follows:

- a) Using the RHIC PanelView, choose MainMenu/Maintenance.
- b) From the Maintenance page choose P7 (or 9, 11, 13, 15, 17) ODH and "select page".
- c) IF the alarming detector indicates that EITHER division A OR division B reports an alarm, THEN proceed to step 5.1.2 to determine if the alarm condition is real.

- d) IF the alarming detector indicates BOTH division A AND division B report an alarm, THEN the ODH condition is confirmed. Implement C-A OPM 3.15 [“Response to Low Oxygen Alarm in RHIC and g-2 ODH Class 0 and 1 Areas”](#).
- 5.1.2 The OC shall assemble as many as four persons who are members of the MCR, CAS, Cryogenic, and RCT groups.
- 5.1.2.1 Persons shall be assigned as follows:
- MCR/CAS: One person as gate/door watch and fan switch operator.
 - COG: One person verifies ODH alarm validity and monitors for ODH during sensor re-calibration.
 - RCT: one person to survey tunnel.
- 5.1.3 If the alarm is in the tunnel, the OC shall order the store to be dumped or the cessation of beam operation in RHIC at a convenient time.
- 5.1.4 If the alarm is in the tunnel, the OC shall alert experiments that could be affected by operation of the ODH fans.
- 5.1.4.1 The OC shall ask the users if they can do anything to mitigate a humidity increase or temperature decrease in the hall, such as an increase in the temperature of the cooling water for their spectrometer.
- 5.1.5 The OC shall review the plan with the groups involved to emphasize that speed is important and safety is paramount. The OC shall report which PASS division, A or B, is alarming. The OC shall also give the gate or building phone number to the entry team, from:
<http://www.cadops.bnl.gov/AGS/Operations/QuickPhone/quickphone.html#places>
- 5.1.5.1 IF an ACG group member is available, they may re-calibrate the ODH sensor without defeating the alarm to save time, the OC shall use their judgement when approving or disapproving.
- 5.1.6 The OC shall direct the groups to assemble at the designated entry gate or building doorway with the appropriate personnel protective equipment.
- 5.1.6.1 If entering the tunnel, the gate watch shall fill out the gate log sheet C-A-OPM-ATT. 4.1.a IN THE MCR. They shall enter the names of the persons entering the tunnel enclosure. They will leave the “entrants signature” space blank.
- 5.1.7 If entering the tunnel, when the groups are at the gate, the OC shall order the zone set to CA (fans will come on and PASS will automatically set the enclosure to SA).

5.1.7.1 Once the enclosure is in CA, the gate watch shall remove the required number of CA keys from MCR_2 and drive rapidly to the entry gate.

5.1.8 COG member enters enclosure along with RCT as per [C-A OPM 4.1](#) paragraph 5.2.1.9.1.1.

5.1.8.1 COG unlocks and opens ODH box padlock using IK056 key.

5.1.8.2 COG operates ODH sensor bypass switch A or B to defeat alarm from appropriate sensor. Fans should go off when the switch is thrown.

5.1.8.3 When fans are off, COG verifies (at the sensor) validity of ODH alarm, by using the POM.

5.1.8.4 IF the alarm is caused by a real ODH condition, THEN COG member shall restore ODH sensor bypass switch to its normal position (ODH fans will restart) and all entrants shall immediately leave the enclosure. Attempts to determine the ODH source shall be made only after the enclosure is ventilated and work planned.

5.1.8.4.1 IF the ODH condition is real, THEN follow C-A OPM 3.15, [Response to Low Oxygen Alarm in RHIC and g-2 ODH Class 0 and 1 Areas.](#)

5.1.8.5 IF the COG member determines the alarm is caused by an erroneous signal from the sensor corresponding to ONE PASS division, THEN the alarm is false and this procedure should be followed to completion.

5.1.8.6 COG and RCT members return to the entry gate/building entrance and report to the OC by phone that the alarm is false.

Note:

Do not use the 900 MHz phone near the PASS ODH box

5.1.8.7 OC contacts ACG member to recalibrate sensor. (Crew at the gate may depart if OC agrees that travel time will delay recalibration).

5.1.9 ACG member and one COG member enter the enclosure and proceed to the faulty detector.

5.1.9.1 The COG member shall monitor the area for ODH. IF they detect a hazard, THEN they shall contact the building or gate watch to turn on the fans.

Note:

Do not use the 900 MHz phone near the PASS ODH box.

5.1.9.2 The ACG member shall recalibrate or replace the sensor that caused the alarm.

5.1.9.3 ACG member restores ODH sensor bypass switch to its operating position and padlocks ODH box.

5.1.9.4 ACG member verifies proper operation of the ODH sensor.

Warning:

Verification requires that the ACG member confirms that the ODH sensor bypass switch is in the operating position.

5.1.10 ACG member and COG member return to the gate and report to the OC the “all clear”.

5.1.11 The OC shall order that the ODH alarm be reset on the RHIC PASS panel at MCR_2.

5.1.12 The ASSRC Chair shall be notified by the OC via e-mail that this procedure has been invoked. Pertinent details shall be provided in the notification.

5.2 IF an ODH alarm annunciates in MCR, and the affected zone is NOT in the NA state, THEN

5.2.1 Since the fans are already on, the COG must determine the validity of the alarm and defeat the alarm as soon as possible if the alarm is found to be erroneous.

5.2.1.1 The procedure must be followed. Do not violate the procedure in order to save time.

5.2.2 Proceed in accordance with paragraph 5.1.1 above.

6. Documentation

6.1 Notification of ASSRC Chair by OC.

7. References

7.1 [SBMS – Re-entry into ODH Areas after Alarm.](#)

7.2 [C-A-OPM 3.15, “Response to Low Oxygen Alarm in RHIC or g-2 ODH Class 0 and 1 Areas”](#)

7.3 [C-A-OPM 4.1, “C-A Complex Access Control Procedures for Primary Beam Enclosures”](#)

7.4 [C-A-OPM-ATT 4.1.a, “C-A Gate Security Log Sheet Form”](#)

7.5 [C-A-OPM-ATT 4.92.a “PASS/ACS Temporary Change Request Form”](#)

8. Attachments

None