***If you are using a printed copy of this procedure, and not the on-screen version, then you MUST make sure the dates at the bottom of the printed copy and the on-screen version match. The on-screen version of the Collider-Accelerator Department Procedure is the Official Version. Hard copies of all signed, official, C-A Operating Procedures are available by contacting the ESSHQ Procedures Coordinator, Bldg. 911A***

C-A OPERATIONS PROCEDURES MANUAL

(Collider Electrical Power Supply Group Procedure CPS-005)

Note: This document was formerly a C-A Group Procedure. The content of the group procedure was reviewed by the Technical Supervisor. All approvals and/or issue dates of the original group procedure are maintained for present use.

# 15.2.5 Lockout Procedure for the Blue IR Quadrupole Rack Mounted Nested Power Supplies or QPA's During Running Periods when a Power Supply Must be Replaced

Text Pages 3 through 6

Appendix Pages 7 through 14

Hand Processed Changes

| HPC No. | Date | Page Nos. | Initials |
|---|---|---|---|
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Approved: _____***Signature on File***_____ _____
Collider-Accelerator Department Chairman Date

D. Bruno

BROOKHAVEN NATIONAL LABORATORY

Procedure: C-A-CPS-005
Revision: 03
Revision Date: 01/11/07

**COLLIDER-ACCELERATOR DEPARTMENT**

Title: Lockout Procedure for the Blue IR Quadrupole Rack Mounted Nested Power Supplies or QPA's During Running Periods when a Power Supply Must be Replaced

Author: D. Bruno

Group: Collider Power Supply

**Group Leader concurrence indicates procedure is still current.**

Group Leader: Donald Bruno ***Signature on File*** Date: 1/11/07

**This Procedure Must Be Reviewed By The Technical Supervisor Prior to use.**
**If This Procedure Does Not Reflect Current Equipment/Processes**
**Then Immediately Notify The Group Leader**

**Lockout Procedure For the Blue IR Quadrupole Rack Mounted Nested Power Supplies or QPA's During Running Periods When a Power Supply Must be Replaced**

## 1. Purpose

1.1 This procedure provides instructions to the Collider Electrical Power Supply Group (CEPSG) technicians and the Collider-Accelerator Support (CAS) technicians on the proper lockout that must be done before you replace a rack mounted nested Blue IR quadrupole power supply (p.s.) or QPA.

> **Caution**:
> This lockout procedure can only be used in preparation to replace a Rack Mounted Nested Blue IR Quadrupole P.S. or QPA during running periods. See Appendix 1 for a complete list of the sitewide names of these Rack Mounted Nested Blue IR Quadrupole P.S's and QPA's. Yellow P.S.'s are also on this list. If the sitewide name of the Blue p.s. or QPA that must be replaced is on the list in Appendix 1 then you can use this procedure.

1.2 C-A Policy states that the preferred method to protect workers from energy sources is Lockout-Tagout (LOTO). There is no need to place a tag on the lock if the lock will not stay on past 1 shift or overnight as is consistent with standard LOTO Procedures.

1.3 Running Periods are defined as those periods when the C-A Main Control Room (MCR) has a scheduled operator on watch 24 hours a day and beam is being delivered or beam is being prepared to be delivered to RHIC.

## 2. Responsibilities

2.1 Responsibilities of the CEPSG and CAS Technicians

2.1.1 Any CEPSG and CAS Technicians preparing to replace a Rack Mounted Nested Blue IR Quadrupole P.S. or QPA shall apply their lock, as described in section 5, to assure their own safety.

2.2 Responsibilities of System Specialists

2.2.1 System Specialists are responsible for training the CEPSG and CAS Technicians.

## 3. Prerequisites for the CEPSG and CAS Technicians

3.1 The CEPSG and CAS Technicians must be trained in LOTO.

3.2 The CEPSG and CAS Technicians must be trained in the use of this procedure and their name must appear on a list maintained by Don Bruno and Bill Anderson. This list is attached in Appendix 4 and will be updated as more people are trained. The training is valid for 1 year.

3.3 The CEPSG and CAS Technicians must be trained in Electrical Safety.

3.4 The CEPSG and CAS Technicians must wear leather gloves, safety glasses, natural fiber long sleeve shirt and natural fiber long pants when using this procedure for class 0+ hazards. If the hazard is a class 2 then the CEPSG and CAS Technicians must wear cotton underwear, fire retardant long-sleeve shirt and long pants, hardhat with arc rated face shield, safety glasses, leather gloves, leather shoes and hearing protection. If the hazard is a class 4 then the CEPSG and CAS Technicians must wear cotton underwear, FR long-sleeve shirt and FR long pants, hardhat, safety glasses, leather gloves, leather shoes and hearing protection plus multilayer flash suit, and flash suit hood.

## 4. Precautions for the CEPSG and CAS Technicians

4.1 The CEPSG and CAS Technicians should be aware that there are no partitions between the power supply racks.

## 5. Procedure

5.1 If you must replace a Rack Mounted Nested Blue IR Quadrupole P.S. or QPA then write down the name of this p.s. here:_____

5.2 Next consult the Appendix 1 and make sure the name is in the appendix. You have now confirmed that this p.s. or QPA is a Rack Mounted Nested Blue IR Quadrupole P.S. or QPA

**Warning**:
If this p.s. does not appear in Appendix 1 then STOP and consult the engineer.

5.3 Make sure the Blue link is down before performing this lockout. MCR can tell you if the link is down. If MCR says the link is not down then tell them you will bring the link down.

5.4 Get a lock and go out and look at the p.s. or QPA that must be replaced. See Appendix 1 to find out which building the p.s. or QPA is in and which rack the p.s. or QPA is in. Write down the building and rack number here:
Building_____
Rack Number_____

5.5 If the Blue link is not down then tell MCR you will be bringing the link down but they must run all of the p.s.'s to zero current first.

5.6 Once the p.s.'s are at zero current you should put the p.s. that must be replaced into LOCAL and STANDBY from the front panel controls. Now put it in the OFF state. Use the OFF pushbutton on the front of the p.s. to do this. The Blue link will now come down if it is not down already. If a QPA is being replaced do the same thing to its associated p.s.

5.7 If there is another Blue p.s. in the rack then put it in into STANDBY and then OFF as well.

5.8 If there is another Yellow p.s. in the rack then tell MCR that the Yellow link must also come down. Tell them to run all of the Yellow p.s.'s down to zero current first. Once all of the Yellow p.s.'s are at zero current you should put this Yellow p.s. into LOCAL and STANDBY from the front panel controls. Now put it in the OFF state. Use the OFF pushbutton on the front of the p.s. to do this.

**Caution:**

5.9 If there is a Yellow p.s. in the rack then you must also lockout the Yellow main quadrupole p.s.'s. This will come up later in the procedure.

5.10 Now that both p.s.'s are in the OFF state you can turn OFF the circuit breakers on the front of the p.s.'s in this rack. Turning off this 208VAC circuit breaker is considered a class 0+ hazard.

5.11 Lockout the 208VAC disconnect that feeds this rack. Check off that it has been locked out here (class 2):
_____ (Locked out 208VAC Disconnect)

5.12 Go to service building 1004B and turn off the following Blue main quadrupole power supplies control switches (class 0+) (next step is lockout):
PBQR_____ (CHECK AFTER TURNED OFF)
PBQFT_____ (CHECK AFTER TURNED OFF)

5.13 You turn off these main p.s.'s out by turning the red front panel switch to the left. Watch that the lights on the control chassis go off. See Appendix 2 Figure 1 for a photo of the switch.

5.14 Before locking out the 480V disconnects observe 480V on all three line to line voltages on the volt meters on the front of the power supplies. Next, make sure all of the lights are flashing on the voltage monitor gauges on the back of the p.s. After you lock out the 480V disconnect switch make sure all three line to line voltages on the volt meters on the front of the power supplies read zero. Next make sure all of the lights are flashing are OFF on the voltage monitor gauges on the back of the p.s.

5.15 In 1004B lockout the following Blue main quadrupole power supplies 480V disconnect switches (class 4). These 480V switches are located along the building parking lot wall. See Appendix 2 Figure 2. These have kirklocks so take the key with you after the switch is locked out:
SBQR_____ (CHECK AFTER LOCKED OUT)
SBQFT_____ (CHECK AFTER LOCKED OUT)

5.16 IF THERE WAS a Yellow p.s. in the rack with the Blue p.s. then you must turn off the following Yellow main quadrupole power supplies control switches (class 0+) (next step will be lockout):
PYQR_____ (CHECK AFTER TURNED OFF)
PYQFT_____ (CHECK AFTER TURNED OFF)

5.17 IF THERE WAS a Yellow p.s. in the rack with the Blue p.s. then you must lockout the following Yellow main quadrupole power supplies 480V disconnect switches (class 4). These 480V switches are located along the building parking lot wall. These have kirklocks so take the key with you after the switch is locked out. If there was NOT a Yellow p.s. in the rack with the Blue p.s. then you do not have to lock out these Yellow p.s.'s.
SYQR_____ (CHECK AFTER LOCKED OUT)
SYQFT_____ (CHECK AFTER LOCKED OUT)

5.18 You can now consult the proper procedure for replacing the p.s. or QPA See Appendix 3 for the procedure titles.

5.19 After you have completed replacing the p.s. or QPA you can now unlock the 208VAC disconnect (class 2) for the rack you were working in and turn ON the circuit breakers on the rack mounted p.s.'s (class 0+).

5.20 Next, you can now unlock the main p.s.'s and then restore the regulator to operational conditions. Restore the main p.s. regulator by following this procedure:
http://www.c-ad.bnl.gov/ceps/files/pdf/Unlock%20and%20Restore%20MPS.pdf

5.21 If there is a problem getting the above link to work in 5.20 then the procedure in 5.19 is called "Unlocking and Restoring Main PowerSupplies". It can be found by going to this web page:
http://www.c-ad.bnl.gov/ceps/Mains.htm

5.22 Once you are done restoring the regulator for the main p.s.'s, tell MCR that they can now bring up the Blue link up. If the Yellow link is down, because there was a Yellow p.s. in the rack as well, then they can also bring the Yellow link up.

## Appendix 1
## NESTED RHIC IR Quadrupole Power Supplies

| BUILDING 1002B | | | | | |
|---|---|---|---|---|---|
| **P.S. Name** | **Rack Number** | **P.S. Name** | **Rack Number** | **P.S. Name** | **Rack Number** |
| YO1-QD1-PS | R2BYQF1 | BO2-QF8-PS | R2BQD1 | BI1-QF1-PS | R2BBQF1 |
| YI2-QF1-PS | " | B2-Q89-PS | " | BO2-QD1-PS | " |
| YO1-QF2-PS | R2BYQF2 | YO1-QF8-PS* | R2BQD2 | BI1-QD2-PS | R2BBQF2 |
| YO1-QD3-PS | " | BI1-QF9-PS* | " | BI1-QF3-PS | " |
| YI2-QD2-PS | R2BYQF3 | YI2-QF9-PS | R2BQD3 | BO2-QF2-PS | R2BBQF3 |
| YI2-QF3-PS | " | Y2-Q89-PS | " | BO2-QD3-PS | " |
| Y2-Q6-PS | R2BYQF4 | | | B2-Q6-PS | R2BBQF4 |
| Y2-Q7-PS | R2BYQF5 | | | B2-Q7-PS | R2BBQF5 |
| **BUILDING 1004B** | | | | | |
| **P.S. Name** | **Rack Number** | **P.S. Name** | **Rack Number** | **P.S. Name** | **Rack Number** |
| BI4-QF9-PS | R4BQDF1 | BO3-QD1-PS | R4BBQF1 | YI3-QF1-PS | R4BYQF1 |
| B4-Q89-PS | " | BO3-QF6-PS | " | YI3-QD6-PS | " |
| YI3-QF9-PS* | R4BQDF2 | BO3-QF2-PS | R4BBQF2 | YI3-QD2-PS | R4BYQF2 |
| BO3-QF8-PS* | " | BO3-QD3-PS | " | YI3-QF3-PS | " |
| YO4-QF8-PS | R4BQDF3 | BI4-QD2-PS | R4BBQF3 | YO4-QF2-PS | R4BYQF3 |
| Y4-Q89-PS | " | BI4-QF3-PS | " | YO4-QD3-PS | " |
| BQTRIM-PS | R4BOFF1 | BI4-QF1-PS | R4BBQF4 | YO4-QD1-PS | R4BYQF4 |
| YQTRIM-PS | R4BOFF2 | BI4-QD6-PS | " | YO4-QF6-PS | " |
| | | BO3-QD7-PS | R4BBQD7 | YI3-QF7-PS | R4BYQF5 |
| | | BI4-QF7-PS | R4BBQF6 | YO4-QD7-PS | R4BYQF6 |
| **BUILDING 1006B** | | | | | |
| **P.S. Name** | **Rack Number** | **P.S. Name** | **Rack Number** | **P.S. Name** | **Rack Number** |
| BO6-QF8-PS | R6BQD1 | BI5-QF1-PS | R6BBQF1 | YO5-QD1-PS | R6BYQF1 |
| B6-Q89-PS | " | BO6-QD1-PS | " | YI6-QF1-PS | " |
| YO5-QF8-PS* | R6BQD2 | BI5-QD2-PS | R6BBQF2 | YO5-QF2-PS | R6BYQF2 |
| BI5-QF9-PS* | " | BI5-QF3-PS | " | YO5-QD3-PS | " |
| YI6-QF9-PS | R6BQD3 | BO6-QF2-PS | R6BBQF3 | YI6-QD2-PS | R6BYQF3 |
| Y6-Q89-PS | " | BO6-QD3-PS | " | YI6-QF3-PS | " |
| | | B6-Q6-PS | R6BBQF4 | Y6-Q6-PS | R6BYQF4 |
| | | B6-Q7-PS | R6BBQF5 | Y6-Q7-PS | R6BYQF5 |
| **BUILDING 1008B** | | | | | |
| **P.S. Name** | **Rack Number** | **P.S. Name** | **Rack Number** | **P.S. Name** | **Rack Number** |
| BI8-QF9-PS | R8BQD1 | BO7-QD1-PS | R8BBQF1 | YI7-QF1-PS | R8BYQF1 |
| B8-Q89-PS | " | BI8-QF1-PS | " | YO8-QD1-PS | " |
| YI7-QF9-PS* | R8BQD2 | BO7-QF2-PS | R8BBQF2 | YI7-QD2-PS | R8BYQF2 |
| BO7-QF8-PS* | " | BO7-QD3-PS | " | YI7-QF3-PS | " |
| YO8-QF8-PS | R8BQD3 | BI8-QD2-PS | R8BBQF3 | YO8-QF2-PS | R8BYQF3 |
| Y8-Q89-PS | " | BI8-QF3-PS | " | YO8-QD3-PS | " |
| | | B8-Q6-PS | R8BBQF4 | Y8-Q6-PS | R8BYQF4 |
| | | B8-Q7-PS | R8BBQF5 | Y8-Q7-PS | R8BYQF5 |

* Denotes racks with Blue and Yellow supplies together on the same wall fused disconnect.

## Appendix 1 (continued)
## NESTED RHIC IR Quadrupole Power Supplies

| BUILDING 1010A | | | | | |
|---|---|---|---|---|---|
| **P.S. Name** | **Rack Number** | **P.S. Name** | **Rack Number** | **P.S. Name** | **Rack Number** |
| BO10-QF8-PS | R10AQD1 | BI9-QF1-PS | R10ABQF1 | YO9-QD1-PS | R10AYQF1 |
| BO10-QD9-PS | " | BI9-QD6-PS | " | YO9-QF6-PS | " |
| BI9-QF9-PS | R10AQD2 | BI9-QD2-PS | R10ABQF2 | YO9-QF2-PS | R10AYQF2 |
| BI9-Q89-PS | " | BI9-QF3-PS | " | YO9-QD3-PS | " |
| YO9-QF8-PS | R10AQD3 | BO10-QF2-PS | R10ABQF3 | YI10-QD2-PS | R10AYQF3 |
| YO9-QD9-PS | " | BO10-QD3-PS | " | YI10-QF3-PS | " |
| YI10-QF9-PS | R10AQD4 | BO10-QD1-PS | R10ABQF4 | YI10-QF1-PS | R10AYQF4 |
| YI10-Q89-PS | " | BO10-QF6-PS | " | YI10-QD6-PS | " |
| | | BI9-QF7-PS | R10ABQF5 | YO9-QD7-PS | R10AYQF5 |
| | | BO10-QD7-PS | R10ABQF6 | YI10-QF7-PS | R10AYQF6 |
| **BUILDING 1012A** | | | | | |
| **P.S. Name** | **Rack Number** | **P.S. Name** | **Rack Number** | **P.S. Name** | **Rack Number** |
| BO11-QD1-PS | R12ABQF1 | YI11-QF1-PS | R12AYQF1 | BI12-QF9-PS | R12AQD1 |
| BI12-QF1-PS | " | YO12-QD1-PS | " | B12-Q89-PS | " |
| BO11-QF2-PS | R12ABQF2 | YI11-QD2-PS | R12AYQF2 | YI11-QF9-PS* | R12AQD2 |
| BO11-QD3-PS | " | YI11-QF3-PS | " | BO11-QF8-PS* | " |
| BI12-QD2-PS | R12ABQF3 | YO12-QF2-PS | R12AYQF3 | YO12-QF8-PS | R12AQD3 |
| BI12-QF3-PS | " | YO12-QD3-PS | " | Y12-Q89-PS | " |
| B12-Q6-PS | R12ABQF4 | Y12-Q6-PS | R12AYQF4 | | |
| B12-Q7-PS | R12ABQF5 | Y12-Q7-PS | R12AYQF5 | | |

* Denotes racks with Blue and Yellow supplies together on the same wall fused disconnect.

## Appendix 1 (continued)
## NESTED RHIC IR Quadrupole QPA's

| BUILDING 1002B | | | | | |
|---|---|---|---|---|---|
| **QPA Name** | **Rack Number** | **QPA Name** | **Rack Number** | **QPA Name** | **Rack Number** |
| YO1-QD1-QP | R2BYQF1 | BO2-QF8-QP | R2BQD1 | BI1-QF1-QP | R2BBQF1 |
| YI2-QF1-QP | " | B2-Q89-QP | " | BO2-QD1-QP | " |
| YO1-QF2-QP | R2BYQF2 | YO1-QF8 – QP* | R2BQD2 | BI1-QD2-QP | R2BBQF2 |
| YO1-QD3-QP | " | BI1-QF9-QP* | " | BI1-QF3-QP | " |
| YI2-QD2-QP | R2BYQF3 | YI2-QF9-QP | R2BQD3 | BO2-QF2-QP | R2BBQF3 |
| YI2-QF3-QP | " | Y2-Q89-QP | " | BO2-QD3-QP | " |
| Y2-Q6-QP | R2BYQF4 | | | B2-Q6-QP | R2BBQF4 |
| Y2-Q7-QP | R2BYQF5 | | | B2-Q7-QP | R2BBQF5 |
| **BUILDING 1004B** | | | | | |
| **QPA Name** | **Rack Number** | **QPA Name** | **Rack Number** | **QPA Name** | **Rack Number** |
| BI4-QF9-QP | R4BQDF1 | BO3-QD1-QP | R4BBQF1 | YI3-QF1-QP | R4BYQF1 |
| B4-Q89-QP | " | BO3-QF6-QP | " | YI3-QD6-QP | " |
| YI3-QF9-QP* | R4BQDF2 | BO3-QF2-QP | R4BBQF2 | YI3-QD2-QP | R4BYQF2 |
| BO3-QF8 – QP* | " | BO3-QD3-QP | " | YI3-QF3-QP | " |
| YO4-QF8-QP | R4BQDF3 | BI4-QD2-QP | R4BBQF3 | YO4-QF2-QP | R4BYQF3 |
| Y4-Q89-QP | " | BI4-QF3-QP | " | YO4-QD3-QP | " |
| B-QTRIM-QP | R4BOFF1 | BI4-QF1-QP | R4BBQF4 | YO4-QD1-QP | R4BYQF4 |
| YQTRIM-QP | R4BOFF2 | BI4-QD6-QP | " | YO4-QF6-QP | " |
| | | BO3-QD7-QP | R4BBQD7 | YI3-QF7-QP | R4BYQF5 |
| | | BI4-QF7-QP | R4BBQF6 | YO4-QD7-QP | R4BYQF6 |
| **BUILDING 1006B** | | | | | |
| **QPA Name** | **Rack Number** | **QPA Name** | **Rack Number** | **QPA Name** | **Rack Number** |
| BO6-QF8-QP | R6BQD1 | BI5-QF1-QP | R6BBQF1 | YO5-QD1-QP | R6BYQF1 |
| B6-Q89-QP | " | BO6-QD1-QP | " | YI6-QF1-QP | " |
| YO5-QF8-QP* | R6BQD2 | BI5-QD2-QP | R6BBQF2 | YO5-QF2-QP | R6BYQF2 |
| BI5-QF9 -QP* | " | BI5-QF3-QP | " | YO5-QD3-QP | " |
| YI6-QF9-QP | R6BQD3 | BO6-QF2-QP | R6BBQF3 | YI6-QD2-QP | R6BYQF3 |
| Y6-Q89-QP | " | BO6-QD3-QP | " | YI6-QF3-QP | " |
| | | B6-Q6-QP | R6BBQF4 | Y6-Q6-QP | R6BYQF4 |
| | | B6-Q7-QP | R6BBQF5 | Y6-Q7-QP | R6BYQF5 |
| **BUILDING 1008B** | | | | | |
| **QPA Name** | **Rack Number** | **QPA Name** | **Rack Number** | **QPA Name** | **Rack Number** |
| BI8-QF9-QP | R8BQD1 | BO7-QD1-QP | R8BBQF1 | YI7-QF1-QP | R8BYQF1 |
| B8-Q89-QP | " | BI8-QF1-QP | " | YO8-QD1-QP | " |
| YI7-QF9-QP* | R8BQD2 | BO7-QF2-QP | R8BBQF2 | YI7-QD2-QP | R8BYQF2 |
| BO7-QF8-QP* | " | BO7-QD3-QP | " | YI7-QF3-QP | " |
| YO8-QF8-QP | R8BQD3 | BI8-QD2-QP | R8BBQF3 | YO8-QF2-QP | R8BYQF3 |
| Y8-Q89-QP | " | BI8-QF3-QP | " | YO8-QD3-QP | " |
| | | B8-Q6-QP | R8BBQF4 | Y8-Q6-QP | R8BYQF4 |
| | | B8-Q7-QP | R8BBQF5 | Y8-Q7-QP | R8BYQF5 |

*Denotes racks with Blue and Yellow supplies together on the same wall fused disconnect.

## Appendix 1 (continued)
## NESTED RHIC IR Quadrupole QPA's

| BUILDING 1010A | | | | | |
|---|---|---|---|---|---|
| **QPA Name** | **Rack Number** | **QPA Name** | **Rack Number** | **QPA Name** | **Rack Number** |
| BO10-QF8-QP | R10AQD1 | BI9-QF1-QP | R10ABQF1 | YO9-QD1-QP | R10AYQF1 |
| BO10-QD9-QP | " | BI9-QD6-QP | " | YO9-QF6-QP | " |
| BI9-QF9-QP | R10AQD2 | BI9-QD2-QP | R10ABQF2 | YO9-QF2-QP | R10AYQF2 |
| BI9-Q89-QP | " | BI9-QF3-QP | " | YO9-QD3-QP | " |
| YO9-QF8-QP | R10AQD3 | BO10-QF2-QP | R10ABQF3 | YI10-QD2-QP | R10AYQF3 |
| YO9-QD9-QP | " | BO10-QD3-QP | " | YI10-QF3-QP | " |
| YI10-QF9-QP | R10AQD4 | BO10-QD1-QP | R10ABQF4 | YI10-QF1-QP | R10AYQF4 |
| YI10-Q89-QP | " | BO10-QF6-QP | " | YI10-QD6-QP | " |
| | | BI9-QF7-QP | R10ABQF5 | YO9-QD7-QP | R10AYQF5 |
| | | BO10-QD7-QP | R10ABQF6 | YI10-QF7-QP | R10AYQF6 |
| **BUILDING 1012A** | | | | | |
| **QPA Name** | **Rack Number** | **QPA Name** | **Rack Number** | **QPA Name** | **Rack Number** |
| BO11-QD1-QP | R12ABQF1 | YI11-QF1-QP | R12AYQF1 | BI12-QF9-QP | R12AQD1 |
| BI12-QF1-QP | " | YO12-QD1-QP | " | B12-Q89-QP | " |
| BO11-QF2-QP | R12ABQF2 | YI11-QD2-QP | R12AYQF2 | YI11-QF9-QP* | R12AQD2 |
| BO11-QD3-QP | " | YI11-QF3-QP | " | BO11-QF8-QP* | " |
| BI12-QD2-QP | R12ABQF3 | YO12-QF2-QP | R12AYQF3 | YO12-QF8-QP | R12AQD3 |
| BI12-QF3-QP | " | YO12-QD3-QP | " | Y12-Q89-QP | " |
| B12-Q6-QP | R12ABQF4 | Y12-Q6-QP | R12AYQF4 | | |
| B12-Q7-QP | R12ABQF5 | Y12-Q7-QP | R12AYQF5 | | |

* Denotes racks with Blue and Yellow supplies together on the same wall fused disconnect.

## Appendix 2

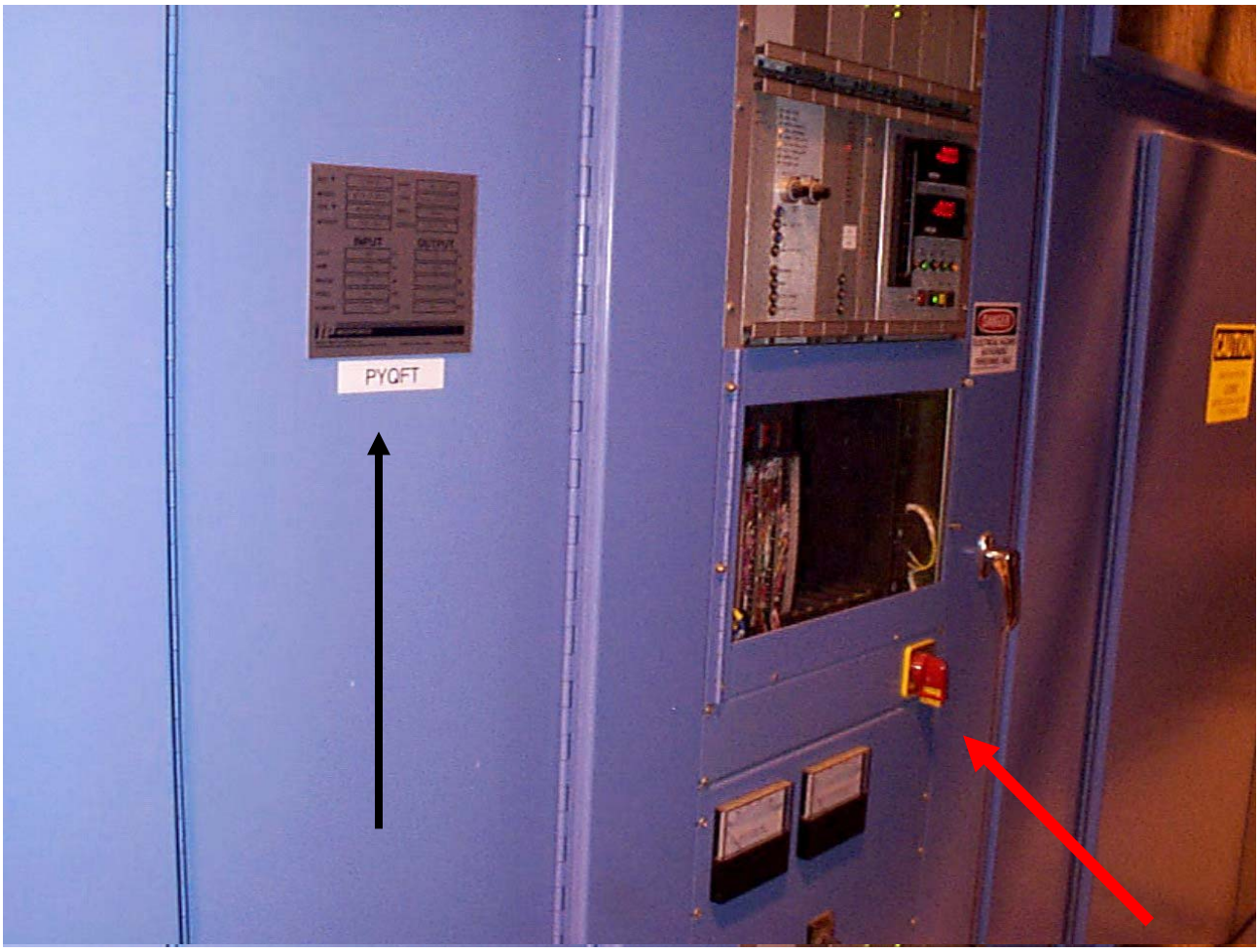


**Figure 1** Photo of one RED Front Panel Switch for the PYQFT Main p.s.

The Red Arrow is pointing to the RED switch you must turn off for the main p.s. PYQFT

The Black Arrow is pointing to the label that tells you which p.s. this is.


**Figure 2:** 480V disconnect switches for main quadrupole p.s.'s along parking lot wall

## Appendix 3
## Table of Procedures for Replacing Nested p.s.'s

| SiteWide Name Contains | Procedure Title |
|---|---|
| Qd2 or qf2 | Nested Suncraft 150A P.S. Replacement Procedure |
| Q89 or qd9 | Nested Suncraft 300A P.S. Replacement Procedure |
| Qd1, qf1, qd3, qf3, qf6, qd6, q6, qf8, qf9 | Nested Rack Mounted Dynapower P.S. Replacement Procedure |
| Qd2, qf2, q89, qd9, qd1, qf1, qd3, qf3, qf6, qd6, q6, qf8, qf9 | Nested Rack Mounted QPA Replacement Procedure |
| Qd2, qf2, q89, qd9, qd1, qf1, qd3, qf3, qf6, qd6, q6, qf8, qf9 | IGBT Card Replacement Procedure For Rack Mounted QPA's Only |

All of these procedures can be found on the following web page:

http://www.c-ad.bnl.gov/ceps/onlinedocs.htm

## Appendix 4

**Lockout Procedure For the Blue IR Quadrupole Rack Mounted Nested Power Supplies During Running Periods When a Power Supply Must be Replaced**

**List of People Trained. Training is valid for 1 year**

| Name | Date Trained |
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