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

ATTACHMENT

11.4.3.b STAR Power Supply START-UP Check Off List

C-A-OPM Procedures in which this Attachment is used.		
11.4.3		

Hand Processed Changes

HPC No.	Date	Page Nos.	Initials
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

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

P. Rosas

STAR Power Supply START-UP Check Off List

1. Request permission from the **STAR Experimenter Power Supply Operator** to energize the STAR Main Magnet Power Supplies [ ]

Authorized By: _____, Time: _____, Date: _____.

2. Request permission from **C-AD Main Control Room Coordinator** to energize the STAR Main Magnet Power Supplies [ ]

Authorized By: _____, Time: _____, Date: _____.

3. Verify that the following pages are online, if any page is not online turn on the required computer and software. Should any problem persist contact the system expert.

   - Pet Page Online [ ]
   - Graphics Control Page Online [ ]
   - RSView Page Online [ ]

4. Verify that each power supply output is at zero on the Pet Page. Should any difficulties arise contact the system expert

   - Space Trim East power supply at zero [ ]
   - Space Trim West power supply at zero [ ]
   - Pole Tip Trim East (PTT-EAST) power supply at zero [ ]
   - Pole Tip Trim West (PTT-WEST) power supply at zero [ ]
   - Main Magnet power supply at zero [ ]

5. Review the Hazard Risk categories of the power supply room when the Main Magnet Power supply is in the **ON** state. See Fig.1 [ ]

6. Set all power supplies Local/Remote switches to the **LOCAL** position

   - Space Trim East PS Local/Remote switch to **LOCAL** [ ]
   - Space Trim West PS Local/Remote switch to **LOCAL** [ ]
   - Pole Tip Trim East PS Local/Remote switch to **LOCAL** [ ]
   - Pole Tip Trim West PS Local/Remote switch to **LOCAL** [ ]
   - Main Magnet PS Local/Remote switch to **LOCAL** [ ]

7. Verified that the RSView Page is Online on the power supply room computer, if the page is not online turn on the computer and the RSView software. Should any difficulties arise contact the system expert.

   - RSView Page Online [ ]

8. Visually inspect the AC ground fault status from the AC Ground Fault Indication & Interface box. If the light be on, an AC ground fault is present.

    - AC power light on YES [ ]
      NO [ ]
    - AC Ground Fault Indication light is ON YES [ ]
      NO [ ]
    - Should an AC Ground Fault Indication be found, **STOP** and call the system expert and the Power Distribution Engineer.

9. Test the AC Ground Fault Indication & Interface box by pressing the "Lamp Test" button. The AC ground fault light will come on and an indication will be sent to the ground fault web site. Contact the C-AD MCR and inform them of the test.

    - Press the "Lamp Test" button
    - AC Ground Fault Indication light is ON YES [ ]
      NO [ ]
    - Should the AC Ground Fault Indication light not come on **STOP** and call the system expert and the Power Distribution Engineer.

10. Verified the power supply water system state by checking the flow gauge at the power supply water pump. The gauge should read an excess of 100 psi

    - Water system is ON - Proceed to step 12 [ ]
    - Water system is OFF - Proceed to step 11 [ ]

11. Request the **Pump Room Operator** to turn on the ***STAR*** power supply water system [ ]

12. Review the power supply logbook for any work done on the power supply system. Verify that if any system was tagged or locked, these tags or locks have been properly removed from these systems [ ]

13. Should the review of the power supply logbook showed that work was done on the transformer section of the power supplies, during the last log entry then a visual inspection of the transformers must be done to ensure that any shorting bus place on the output tabs were removed from them

    - No work done on transformers - Proceed to step 14 [ ]
    - Work done on transformer [ ]
    - Visual inspection of transformer yard [ ]
    - Output tab clear of bus - Proceed to step 14 [ ]
    - Output tab busses shorted - **STOP** and call the system expert and the Power Distribution Engineer. [ ]

14. Inspect that all power supplies doors and the external capacitor bank door are locked and securely bolted, return door Kirk lock keys to each power supply transfer locks:

- Main Magnet PS: Lock and secure all PS doors and return Kirk lock keys (**4 each, 1D**) to Transfer Lock **' D '** [ ]
- Lock and secure External Capacitor Bank door and return Kirk lock key (**1 each,1D**) to Transfer Lock ' **D** ' [ ]
- Remove Kirk lock key **1B** from Transfer lock **'D'** and insert the **1B** key into transfer lock **' B '** [ ]
- Pole Tip Trim East PS: Lock and secure all PS doors and return Kirk lock keys (**3 each, 2C**) to Transfer Lock **'C'**. [ ]
- Remove Kirk lock key **2B** from Transfer lock **'C'** and insert the **2B** key into transfer lock **' B '** [ ]
- Pole Tip Trim West PS: Lock and secure all PS doors and return Kirk lock keys (**3 each, 3E**) to Transfer Lock **'E'** [ ]
- Remove Kirk lock key **3B** from Transfer lock **'E'** and insert the **3B** key into transfer lock **' B '** [ ]
- Space Trim East: Lock and secure PS door and return Kirk lock key **5B** to Transfer Lock **' B '** [ ]
- Space Trim West: Lock and secure PS door and return Kirk lock key **4B** to Transfer Lock **' B '** [ ]
- Turn **1B** key and release Kirk lock key **7X** from Transfer Lock **' B '** and insert the key into transfer lock **' A ' 7X** position [ ]

15. The STAR power supplies 480 VAC Main Breaker Panel and the 13.8KV Main Breaker cabinet have been equipped with remotely operated controls. The Personal Protective Equipment (PPE) required for the operations of these controls shall be category 2.

- 100% Natural Fiber Short Sleeve T-Shirt [ ]
- 100% Natural Fiber underwear [ ]
- Fire Retardant Long Sleeve Shirt (Sleeves rolled down and buttoned, shirt buttoned and tucked in pants) [ ]
- Fire Retardant Pants [ ]
- Hard Hat [ ]
- Arc-Rated Face Shield [ ]
- Safety Glasses with Side Covers [ ]
- All Leather Gloves [ ]
- Leather Work Shoes [ ]
- Hearing Protection [ ]

16. Visually inspect that the 120 VAC circuit breakers are energize on the **PUPS1** panel for each of the following. Should any breaker not be on, use the appropriate PPE to energize the circuit.

- Pole Tip Trim West Power Supply Breaker No. 12 [ ]
- Pole Tip Trim East Power Supply Breaker No. 14 [ ]
- Fiber Optic PLC Module Breaker No. 16 [ ]
- Space Trim SLC Rack Breaker No. 18 [ ]
- Main Magnet Power Supply Breaker No. 20 [ ]

17. Visually inspect that the 120 VAC circuit breakers are energize on the **PUPS2** panel for each of the following. Should any breaker not be on, use the appropriate PPE to energize the circuit.

    - 13.8KV Main Breaker No. 4 [ ]
    - Soft Start Breaker No. 8 [ ]

18. Visually inspect that the internal 120VAC breakers are energize on each of the following power supplies. Should any breaker not be on, use the appropriate PPE to energize the circuit.

    - Main Magnet Power Supply breaker energized [ ]
    - Pole Tip Trim East Power Supply breaker energized [ ]
    - Pole Tip Trim West Power Supply breaker energized [ ]

19. Main Magnet Power Supply 13.8 KV Circuit Breaker run position: Should there be any difficulties, **STOP** and contact the system expert, and see **NOTE 1** for further information on require PPE.

    - Verify 13.8KV AC voltage using the Panel meters and menu in front of the 13.8KV Breaker MicroShield O/C Meter Rear 51 [ ]
      MicroShield O/C Meter Front 51 [ ]
      Should the 13.8KV **NOT** be present contact the Line Crew Electricians for support, inform STAR MCR and C-AD MCR and proceed to Step 20 of the procedure
    - Turn on the Circuit Breaker cabinet light switch [ ]
    - Remove the Kirk lock **1A** key from the **'A'** Transfer lock [ ]
    - Unlock the 13.8 KV Circuit Breaker with Kirk lock **1A key**, the **1A** key will now remain captive in the **1A** lock [ ]
    - Pull out the mechanical interlock to release the breaker [ ]
    - Connect the motor drive shaft to the 13.8KV Circuit Breaker Pin [ ]
    - Connect the remote control box to the 13.8 KV Circuit Breaker Motor Drive [ ]
    - Connect the AC line of the 13.8 KV Circuit Breaker Motor Drive [ ]
    - Clear all personnel from the power supply area [ ]
    - Both CAS members to stand outside the exit door [ ]
    - Using the remote control box for the 13.8KV Circuit Breaker turn the selector switch to the IN position [ ]
    - View the breaker motor drive shaft on the monitor [ ]
    - Push the selector switch until the 13.8 KV Circuit Breaker is in the run position and the motor clutch spins free, (fully inserted) [ ]

- Visually inspect through the breaker cabinet bottom door window that the breaker has moved to the run position [ ]
- Disconnect the AC line of the 13.8 KV Circuit Breaker Motor Drive [ ]
- Disconnect the remote control box to the13.8 KV Circuit Breaker Motor Drive [ ]
- Retract the motor drive shaft from the 13.8KV Circuit Breaker Pin using the motor thumbwheel control, visually inspect that the yellow tape is seen on the drive shaft [ ]
- Turn off breaker cabinet light switch [ ]

20. Pole Tips and Space Trims 480VAC Main Breaker: The Main Breaker must be in the OPEN position before any other breakers in the panel can be operated. Inspect the state of the main breaker and the line monitor: Should any difficulties arise **STOP** and contact the system expert, and see **NOTE 1** for further information on require PPE.

- Safety Watch to stand by the Main Breaker Panel remote control box [ ]
- Verify the state of the 480VAC Main Breaker

Main Breaker status:	OPEN	[ ]
	CLOSE	[ ]
AC Line Monitor LED status:	LED OFF	[ ]
	LED ON	[ ]

- Main Breaker status **OPEN** proceed to step 21 [ ]
- Main Breaker status **CLOSE** continue below [ ]
- Clear all personnel from the power supply area [ ]
- Both CAS members to stand by the Main Breaker Panel remote control box [ ]
- Using the Main Breaker Panel remote control box OPEN the Main Breaker [ ]
- Verify the state of the 480VAC Main Breaker

Main Breaker status:	OPEN	[ ]
AC Line Monitor LED status:	LED OFF	[ ]

21. Pole Tip Trim East (PTT-EAST) 480VAC Breaker can now be placed in the ON position

- Remove key **2A** from Transfer Lock **'A'** and insert the key in Pole Tip Trim East 480VAC Breaker Kirk Lock **2A** and unlock the Kirk Lock [ ]
- Move the Pole Tip Trim East Breaker switch handle to the ON position [ ]

22. Pole Tip Trim West (PTT-WEST) 480VAC Breaker can now be placed in the ON position

- Remove key **3A** from Transfer Lock **'A'** and insert the key in Pole Tip Trim West 480VAC Breaker Kirk Lock **3A** and unlock the Kirk Lock [ ]
- Move the Pole Tip Trim West Breaker switch handle to the ON

position [ ]

23. Space Trim West 480VAC Breaker can now be placed in the ON position

- Remove key **4A** from Transfer Lock **'A'** and insert the key in Space Trim West 480VAC Breaker Kirk Lock **4A** and unlock the Kirk Lock [ ]
- Move the Space Trim-West Breaker switch handle to the ON position [ ]
- Switch the control power breaker to the ON position at the power supply [ ]

24. Space Trim East 480VAC Breaker can now be placed in the ON position

- Remove key **5A** from Transfer Lock **'A'** and insert the key in Space Trim East 480VAC Breaker Kirk Lock **5A** and unlock the Kirk Lock [ ]
- Move the Space Trim-East Breaker switch handle to the ON position [ ]
- Switch the control power breaker to the ON position at the power supply [ ]

25. Pole Tips and Space Trims 480VAC Main Breaker: The Main Breaker shall now be placed in the CLOSE position: Should any difficulties arise, **STOP** and contact the system expert, and see **NOTE 1** for further information on require PPE.

- Safety Watch to stand by the Main Breaker Panel remote control box [ ]
- Clear all personnel from the power supply area [ ]
- Both CAS members to stand by the Main Breaker Panel remote control box [ ]
- Using the Main Breaker Panel remote control box CLOSE the Main 480VAC Breaker [ ]
- Verify 480VAC Main Breaker AC Line Monitor LED status changes to the on state

Main Breaker status:	CLOSE	[ ]
AC Line Monitor LED status:	ON	[ ]

26. Verify that each power supply AC Line Monitors LED's is in the ON state:

- Space Trim East PS AC Line Monitor LED ON [ ]
- Space Trim West PS AC Line Monitor LED ON [ ]
- Pole Tip Trim East PS AC Line Monitor LED ON [ ]
- Pole Tip Trim West PS AC Line Monitor LED ON [ ]

Should any of the AC Line Monitors LED not be in the ON state STOP and contact the system expert

27. Verify Magnet Crash switch operation: The Main Magnet power supply has several interlock that can prevent the two Space Trim Power Supplies from resetting their

interlocks, therefore it is necessary to clear all the interlock, on the Main Magnet Power Supply prior to clearing any of the Space Trim Power Supplies interlocks.

- Set all power supplies to the **STANDBY** condition [ ]
- Check RSView Page for any system interlocks [ ]
- Reset and clear all system interlocks [ ]
- All power supply Fault Indication Lights should be off [ ]
- Press the Main Magnet power supply Magnet Crash Button. All power Supply fault indication lights should be on and the Lock-Out Relays tripped

  Main Magnet PS Fault Light ON [ ]
  Space Trim East PS Fault Light ON [ ]
  Space Trim West PS Fault Light ON [ ]
  Pole Tip Trim East PS Fault Light ON [ ]
  Pole Tip Trim West PS Fault Light ON [ ]

  Main Magnet PS Lock-Out Relay Tripped [ ]
  Pole Tip Trim East PS Lock-Out Relay Tripped [ ]
  Pole Tip Trim West PS Lock-Out Relay Tripped [ ]

- Reset and clear all system interlocks [ ]
- Press the Magnet Crash Button on the Magnet Monitoring System enclosure. All power supply fault indication lights should be on and the Lock-Out Relays tripped.

  Main Magnet PS Fault Light ON [ ]
  Space Trim East PS Fault Light ON [ ]
  Space Trim West PS Fault Light ON [ ]
  Pole Tip Trim East PS Fault Light ON [ ]
  Pole Tip Trim West PS Fault Light ON [ ]

  Main Magnet Lock-Out Relay Tripped [ ]
  Pole Tip Trim East Lock-Out Relay Tripped [ ]
  Pole Tip Trim West Lock-Out Relay Tripped [ ]

28. Reset the Magnet Monitoring System [ ]

29. Reset the and clear all system interlocks [ ]

30. Set all power supplies to **STANDBY** [ ]

31. Inspect that the Polarity indicator lights show the same polarity for each power supply, all power supplies are required to be in the same polarity, should a power supply be in a different state **STOP** and contact the system expert

- Main Magnet Polarity Normal Polarity "A" [ ]
  Reverse Polarity "B" [ ]

• Space Trim East Polarity	Normal Polarity	"A"	[ ]
	Reverse Polarity	"B"	[ ]
• Space Trim West Polarity	Normal Polarity	"A"	[ ]
	Reverse Polarity	"B"	[ ]
• Pole Tip Trim EAST Polarity	Normal Polarity	"A"	[ ]
	Reverse Polarity	"B"	[ ]
• Pole Tip Trim West Polarity	Normal Polarity	"A"	[ ]
	Reverse Polarity	"B"	[ ]

32. Set Space Trim East Local/Remote **REFERENCE SWITCH** to the **REMOTE** position [ ]

33. Set Space Trim West Local/Remote **REFERENCE SWITCH** to the **REMOTE** position[ ]

34. Set all power supply Local/Remote switches to the **REMOTE** position

- Space Trim East PS Local/Remote switch to **REMOTE** [ ]
- Space Trim West PS Local/Remote switch to **REMOTE** [ ]
- Pole Tip Trim EAST PS Local/Remote switch to **REMOTE** [ ]
- Pole Tip Trim West PS Local/Remote switch to **REMOTE** [ ]
- Main Magnet PS Local/Remote switch to **REMOTE** [ ]

35. Record completion of the Start-Up in the Power Supply logbook

36. Notify the **STAR Experimenter Power Supply Operator** that the power supplies are ready for remote operation

NOTE: Should it become necessary for the CAS watch to be inside the power supply room when the Main Magnet Power supply is energized, please follow the Hazard Risk categories on Fig. 1.

NOTE: 1

Manual operation of the 13.8KV Main Breaker or the 480VAC Main Breaker Panel as a requirement to meet C-AD Operating Procedure 1. 5. 3 "Procedure to Open or Close Breakers and Switches and Connecting / Disconnecting Plugs". The PPE require for the operator of the any breaker or disconnect switch shall be:

- 100% Natural Fiber Short Sleeve T-Shirt [ ]
- 100% Natural Fiber underwear [ ]
- Fire Retardant Long Sleeve Shirt (Sleeves rolled down and buttoned, shirt buttoned and tucked in pants) [ ]
- Fire Retardant Pants [ ]
- Flash Suit Jacket [ ]
- Flash Suit Pants [ ]

- Hard Hat [ ]
- Safety Glasses with Side Covers [ ]
- Flash Suit Hood [ ]
- All Leather Gloves [ ]
- Leather Work Shoes [ ]
- Hearing Protection [ ]

Never wear meltable fiber clothing (acetate, nylon, polyester, polypropylene, or spandex), underneath any required PPE (exception is incidental amount of elastic on underwear or socks)

The proper PPE requirement for the safety watch when operating the 13.8KV Main Breaker or the 480VAC Main Breaker Panel manually shall be:

- 100% Natural Fiber Short Sleeve T-Shirt [ ]
- 100%Natural Fiber underwear [ ]
- Fire Retardant Long Sleeve Shirt (Sleeves rolled down and buttoned, shirt buttoned and tucked in pants) [ ]
- Fire Retardant Pants [ ]
- Hard Hat [ ]
- Arc-Rated Face Shield [ ]
- Safety Glasses with Side Covers [ ]
- All Leather Gloves [ ]
- Leather Work Shoes [ ]
- Hearing Protection [ ]

The safety watch shall stand at a distance of six (6) feet away from the breaker being operated

NOTES:

Completed By: _____ Date: _____

STAR POWER SUPPLY ROOM HAZARD RISK CATEGORIES WHEN THE MAIN MAGNET POWER SUPPLY IS IN THE ON STATE

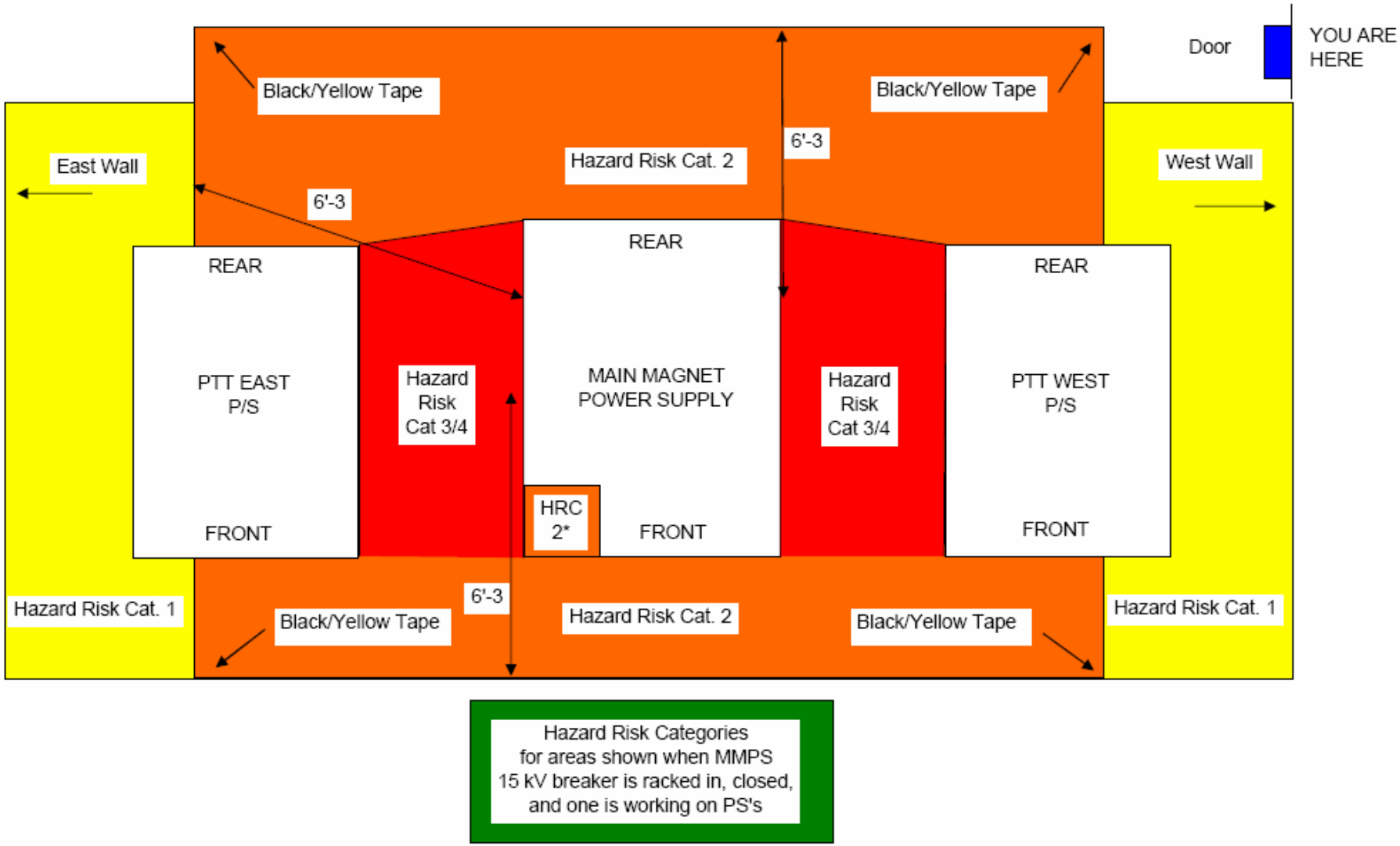

FIGURE 1