

RHIC 2003 – 2004 Physics Run
Daily Quench Analysis for the month of February 2004

Sun—February 01 **Blue PR-065 File#=1075694519** (Loc: 4b-time.A) **Timestamp: 23:01:56 +3056338**
Beam Permit Fail Timestamp: 23:01:56 +3056338
Quench Detector(s) Trip: All tripped, indicating positive Tq values.
Postmortem Plots: N/A
5 Minute: Quench Delay File: None initiated.
Beam Loss Monitors (Rads/Hr): Dump areas in Sector 9 and 10 indicate no Beam in the machine.
Main Magnet Power Status: Store Energy.
Qdplots: N/A

Sun—February 01 **Yellow PR-066 File#=1075694519** (Loc: 8b-ps1) **Timestamp: 23:01:56 +3061080**
Beam Permit Fail Timestamp: 23:01:56 +3047755
Quench Detector(s) Trip: All tripped, indicating positive Tq values.
Postmortem Plots: N/A
5 Minute: Quench Delay File: None initiated.
Beam Loss Monitors (Rads/Hr): Dump areas in Sector 9 and 10 indicate no Beam in the machine.
Main Magnet Power Status: Store Energy.
Qdplots: N/A

Technical Notes:

22:58: Dumping Beam and ramping down **Sequencer**

23:11: In preparing to ramp down, we observe that 3b-ps1 shows a *No Heartbeat* alarm. Attempts to reset the front-end computer fail, and, after contacting A. Marusic, he is also unable to reset the computer. After beam is aborted, we are forced to perform an AC reset to restore the FEC. This causes a quench link interlock in both rings from which we are working to recover. **LH**

QLI Recovery TAPE / PS On Checks Commenced:

Blue **23:16:39** start but aborted.

Estimated Delay Time: (see PR-067)

Yellow: **23:45:57**

Estimated Delay Time: 45 minutes

Quench Analysis: Controls: AC Reset to the 3b-ps1 FEC.

Sun—February 01 **Blue PR-067 File#=1075695940** (Loc: 4b-time.A) **Timestamp: 23:25:40 +259617**
Beam Permit Fail Timestamp: Down from previous QLI; PR-065 & 66
Quench Detector(s) Trip: Running
Postmortem Plots: N/A
5 Minute: Quench Delay File: None initiated.
Beam Loss Monitors (Rads/Hr): Dump areas in Sector 9 and 10 indicate no Beam in the machine.
Main Magnet Power Status: Park Current
Qdplots: N/A
QLI Recovery TAPE / PS On Checks Commenced: 23:37:57 Estimated Delay Time: 37 minutes

Technical Notes:

Bo3-qb8-ps did not recover, indicating Standby-Error. Most likely the Auxiliary contactor needs to be replaced as the supply rest on the next attempt.

Quench Analysis: bo3-qb8-ps, Auxiliary Contacts.

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Mon—February 02 **Blue PR-068 File#=1075755374** (Loc: 2b-ps1) **Timestamp: 15:56:12 +2790015**
Beam Permit Fail Timestamp: 15:54:16 +3541489 (1 minute and 41 seconds before)
Quench Detector(s) Trip: (2b-qd1) B2/1DX_DX, Int. 5, Tq= -20.
DX Heaters Fired: 2b-ps2.A2 and 2b-ps2.B2 (b1DX Magnet)
QPA Control / TR 1st Alarm: b-QD QLI BI1, no faults initiated.
Postmortem Plots: Both dhX and dhO indicate a change in the voltage signal approximately -0.4 seconds prior to T=zero.
5 Minute: Quench Delay File: (2b-qd1) B1DRDX_VT
Beam Loss Monitors (Rads/Hr): No beam in sector 1 or sector 2. B5-lm3.1 pulled the permit approximately 1 minute and 41 seconds prior to the 2b-ps1 QLI.
Main Magnet Power Status: Sitting steady at Store Current.
Qdplots: B1DRDX_VT indicates a real magnet quench took place.
QLI Recovery TAPE / PS On Checks Commenced: 16:34:31 **Estimated Delay Time: 39 minutes**

Technical Notes:

17:51: Cryo issues clearance to ramp above injection. Ramping for hysteresis. [JLN](#)
18:01: blue quench link trip was caused by 2b-qd1 quench detector. The quench detector tripped because signal in B2/1DX_DX. There was a voltage induced into the b2dx when the Brahms D3 magnet turned on. There was a large current spike when this D3 magnet first turned on. This D3 magnet is said to be next to the b2dx magnet as told to me by a Brahms operator. This turn on spike happened at the same time as the quench detector tripping, to within the resolution of the current being logged in the Brahms' D3 magnet. The beam permit tripped almost 2 min. before the quench link. (This really shows the importance of logging everything !) [Ganetis \[quench \]](#)

Quench Analysis: Power Supply Induce Quench #002: Large Spike from the Brahms D3 Magnet Magnetically coupled to the dhx Magnet.

Wed—February 04 **Yellow PR-069 File#=1075877721** (Loc: 2b-ps1) **Timestamp: 01:55:20 +1985887**
Beam Permit Fail Timestamp: 01:55:20 +1985887
Quench Detector(s) Trip: (2b-qd2) Y2QFQ4_6VT, Int. 20, Tq= -24.
QPA Control / TR 1st Alarm: Y-QD QLI YI1, no faults initiated.
Postmortem Plots: y2-q7-ps, yi2-qf3-ps and y2-q6-ps all show Iref and Current signal jumps that are not normal. Checking Snapshot, the signals are as should be. Possible data had been spoiled during acquisition time?
5 Minute: Quench Delay File: Indications that 2b-qd2 was the only one that fired but nothing presented.
Beam Loss Monitors (Rads/Hr): See 2 second pulses in the triplet to the q6 magnet in sector 2. y2-lm4 magnet BLM with the most significant values at: 1st pulse (169), 2nd pulse (166), 3rd pulse (197) and 4th pulse (273). All pulses shown in the 10-second window frame are slightly greater than two seconds.
Main Magnet Power Status: Sitting steady at Park Current.
Qdplots:
QLI Recovery TAPE / PS On Checks Commenced: 02:08:30 **Estimated Delay Time: 14 minutes**

Technical Notes: **1:46:** set up phase in yi2 done - we will inject now 56 bunches - trying to get the same overall intensity of 50 fp

1:55: Quench Link Interlock in Yellow ring, 2b-ps1 dropped first [Sequencer](#)
1:55: Beam Abort, 2b-ps1 dropped Yellow Quench [Sequencer](#)
1:57: Yellow quench recovery sequence begun [tape](#)

9:59: yellow quench link trip was caused by 2b-qd2 quench detector. The quench detector tripped because of a real magnet quench at Y2QFQ4_6VT. The beam permit tripped after the quench link. The magnets were at injection. There was real quench at y2q4. There was low beam loss at y2-lm4 at 150 Rads/hr. for over 2 sec. There is now 28 beam induced quenches for this run. Also some of the Postmortem data for the yellow IR p.s. is corrupted. [Ganetis \[quench \]](#)

Quench Analysis: Beam Induced Quench #028.

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Scheduled Maintenance, February 4, 2004, 0700 to 1900 hours

Wed—February 04 **Blue PR-070 File#** = 1075897138 (Loc: 4b-time.A) **Timestamp: 07:18:56**
Wed—February 04 **Yellow PR-071 File#** = 1075897144 (Loc: 4b-time.A) **Timestamp: 07:19:04**

Beam Permit Fail Timestamp: Down prior to bringing the links down.
Quench Detector(s) Trip: No negative Tq values.
Main Magnet Power Status: MCR brought power supplies to zero current.

Technical Notes:

7:27: Called MCR to bring both Rings to Zero current then brought Blue and Yellow Links down for maintenance as per Don Bruno. [Heppner \[rhic \]](#)

Scheduled Maintenance work on the Mains and Quench Detectors:

Blue PR-072 File# = 1075908049 = Wed Feb 4 10:20:50 2004 (4b-time.B)

Blue PR-073 File# = 1075908323 = Wed Feb 4 10:25:24 2004 (4b-time.B)

Blue PR-074 File# = 1075909997 = Wed Feb 4 10:53:18 2004 (4b-time.B)

Blue PR-075 File# = 1075918058 = Wed Feb 4 13:07:39 2004 (2b-ps1)

3:24: The blue link came down because a new PLC program was loaded in 1002B. [Don Bruno \[blue \]](#)

Yellow PR-076 File# = 1075918255 = Wed Feb 4 13:10:56 2004 (4b-time.B)

13:27: The yellow link came down because one of the FEC's in 1004B was rebooted while the quench recovery script was running. [Don Bruno \[yellow \]](#)

Blue PR-077 File# = 1075926624 = Wed Feb 4 15:30:25 2004 (4b-time.A)

15:31: The blue quench link came down because 4b-qd1 was restarted. [Don Bruno \[blue \]](#)

Blue PR-078 File# = 1075927786 = Wed Feb 4 15:49:47 2004 (4b-time.A)

15:57: The blue quench link came down because 4b-qd1 was restarted. [Don Bruno \[blue \]](#)

Further Measurements and checks, returned Machine back over to the Physics Program at: 18:30:00

QLI Recovery TAPE / PS On Checks Commenced: **Blue = 16:10:36**

Yellow = 14:26:08

Quench Analysis: Scheduled Maintenance.

RHIC P.S. Maintenance performed today: 1) The DC cables were disconnected and shorted out at the magnet end for the warm dipole p.s.'s. 2) New relays were installed in yo12-qd1, yi11-qf3, y12-q6, b12-dhx and b12-dh0 to test out the new fix for the aux contact problems we have had with the Dynapower P.S.'s. 3) Tees were put in the correct location for monitoring the quench link signals. 4) Known voltages were fed into the quench input signals and verified at the MADC end. 5) The high voltage read back problem on the 6000A quench switches at 1010 were fixed. 6) The trip points on the current monitors for the main p.s.'s were adjusted. 7) Work was done on the regulator error problem for the main blue quad p.s. 8) The main p.s. output circuit compartments main scr's were checked for loose connections. 9) The aux contact was replaced in bo3-qf8. 10) The ac connections of y12-q7 were checked to make sure they were not loose. 11) The isolation buffer card was reseated in bi9-qgt. 12) Inductance tables were changed in 4b-qd1. 13) The fiber optic interface card was swapped out for yi2-qf9. 14) The ac on light was replaced on yi10-qf7. 15) The SSR2 relay was replaced in y8-q7 [Don Bruno \[rhic \]](#)

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Thurs—February 05 Blue PR-079 File#=1075973014 (Loc: 2b-ps1) **Timestamp: 04:23:32 +2385098**
Beam Permit Fail Timestamp: 04:23:32 +2385128
Quench Detector(s) Trip: (2b-qd1) B2/1DX_DX, Int. 5, Tq= -20.
DX Heaters Fired: 2b-ps2.A1 and 2b-ps2.B1 (b2DX Magnet)
QPA Control / TR 1st Alarm: b-QD QLI BI1 (FANIO R2BDXHTR-bqli-tr), no faults initiated.
Postmortem Plots: Supplies not the cause of this event.
5 Minute: Quench Delay File: (2b-qd1) B2DRDX_VT
Beam Loss Monitors (Rads/Hr): Sector 1 and 2, clean. Beam Dump Normal levels.
Main Magnet Power Status: Sitting steady at Store Current.
Qdplots: B2DRDX_VT Signal indicates a real magnet quench took place.
QLI Recovery TAPE / PS On Checks Commenced: 04:43:36 **Estimated Delay Time: 20 minutes**

Technical Notes: Feb 5 2004 5:54: blue quench link trip was caused by 2b-qd1-quench detector. The quench detector tripped because of a high signal level in B2/1DX_DX. This signal was caused by the Brahms D3 magnet turning on. This was not a beam induced quench. The quench heaters for b2dx did fire and that caused the magnet to quench. The Brahms D3 magnet went up to full current in less than 20 sec., Dana told me they usually ramp up much slower in about 120 sec. I did not see any turn on spike in the log data but I still could have been there since the data is taken only once every 10 sec. We now have two trips due to this magnet being turned on. Brahms and MCR are going to have to develop a more formal procedure for operating this magnet at least until some hardware or software modification can be made to prevent this from happening again. Ganetis [quench]

Quench Analysis: Power Supply Induce Quench #003: Large Spike from the Brahms D3 Magnet Magnetically coupled to the dhx Magnet.

Thurs—February 05 Blue PR-080 File#=10755974383 (Loc: 2b-ps1) **Timestamp: 04:46:20 +3449114**
Beam Permit Fail Timestamp: 04:46:20 +3449114
Quench Detector(s) Trip: (2b-qd1) B2DRDX_VT, Int. 23, Tq= -20.
DX Heaters Fired: Recovered from previous quench PR-079
QPA Control / TR 1st Alarm: b-QD QLI BI1 (FANIO R2BDXHTR-bqli-tr), no faults initiated.
Postmortem Plots: Supplies Ramping, not the cause of this event.
5 Minute: Quench Delay File: None listed. However, Qdplots indicate (2b-qd1) B2DRDX_VT
Beam Loss Monitors (Rads/Hr): No beam in the machine.
Main Magnet Power Status: Ramping and tripped at: Dipole = 144.32amps, Quad = 138.37 amps (Qdplots).
Qdplots: B2DRDX_VT indicates a real magnet quench took place.
QLI Recovery TAPE / PS On Checks Commenced: 06:03:46 **Estimated Delay Time: 78 minutes**

Technical Notes: 5:54: blue quench link trip was caused by 2b-qd1 quench detector. The quench detector tripped because of a real magnet quench in b2dx. The magnet was at two high a temperature to be ramped to injection. Cryo should not have given the OK to go to injection. If a DX magnet quenches at top energy you should wait at least one hour before you go to injection. Then wait until Cryo gives the OK to ramp to top energy. Ganetis [quench]

Quench Analysis: Cryo Related, not enough allowed time to recover the Dx magnet quench from the previous QLI: PR-079

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Fri—February 06 **Blue PR-081 File#=1076107037** (Loc: 10a-ps3.A) **Timestamp: 17:37:16 +1938065**

Beam Permit Fail Timestamp: 17:37:16 +1848161

Quench Detector(s) Trip: (10a-qd1) B10QFQ4_6VT, Int. 1, Tq= -25.

DX Heaters Fired: None Fired.

QPA Control / TR 1st Alarm: No faults initiated.

Postmortem Plots: Normal operating parameters, power supplies not the cause of this event.

5 Minute: Quench Delay File: (10a-qd1) B10QFQ4_6VT and (12a-qd1) B11QFQ2_VT

Beam Loss Monitors (Rads/Hr): Sector 10: b10-lm4 = 4970, g10-lm5 = 4620, g10-lm6 = 4739, g10-lm7 = 2417, g10-lm12 = 4860 and g10-lm20 = 3892, Sector 11: g11-lm1 = 1310 and b11-lm3.1 = 91

Main Magnet Power Status: Steady at Store Energy.

Qdplots: B10QFQ4_6VT and B11QFQ2_VT both indicate a real magnet quench took place.

QLI Recovery TAPE / PS On Checks Commenced: 17:59:29 **Estimated Delay Time: 23 minutes**

Technical Notes:

MCR DATA 17:31: Ramping RHIC in 56-bunch mode. 17:36: About half of the beam de-bunched at the RHIC RF re-bucket setup step. 18:41: Cryo has given permission to ramp.

23:53: blue quench link trip was caused by 10a-qd1 quench detector. The quench detector tripped because of a real magnet quench at B10QFQ4_6VT. The beam permit tripped .090 sec. before the blue quench link. There were real magnet quenches at b10q4 and b11q2. There was a high loss at b19-lm4 and moderate loss at g11-lm1. There are now 29 beam induced quench link trips for this run. [Ganetis \[quench \]](#)

Quench Analysis: Beam Induced Quench #029.

Fri—February 06 **Yellow PR-082 File#=1076125115** (Loc: 6b-ps1) **Timestamp: 22:38:32 +3932922**

Beam Permit Fail Timestamp: 22:38:32 +3932952

Quench Detector(s) Trip: All tripped, positive values.

QPA Control / TR 1st Alarm: No faults initiated.

Postmortem Plots: Normal operating parameters, power supplies not the cause of this event.

5 Minute: Quench Delay File: None initiated.

Beam Loss Monitors (Rads/Hr): N/A.

Main Magnet Power Status: Sitting at Injection Current.

Qdplots: N/A

QLI Recovery TAPE / PS On Checks Commenced: Cancelled at 23:31:53 **Estimated Delay Time:** (see next entry)

Technical Notes:

22:38: Quench Link Interlock in Yellow ring, 6b-ps1 dropped first [Sequencer](#)

Feb 7 2004 00:01: yellow quench link trip was caused by the permit module. We have put new hardware to try to understand what is happening at this permit module, but the software to record the signal has not been done. When will this software get done? The new signals have to be recorded in postmortem. [Ganetis \[quench \]](#)

Quench Analysis: Controls, 6b-permit module.

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Fri—February 06 **Yellow PR-083 File#=1076125914** (Loc: 10a-ps3.A) **Timestamp: 22:51:52 +2982497**
Beam Permit Fail Timestamp: 22:51:52 +2982526

Quench Detector(s) Trip: All tripped, positive values.

QPA Control / TR 1st Alarm: No faults initiated.

Postmortem Plots: Supplies at Park Currents, yi10-q89 appeared to be the only one different in appearance.

5 Minute: Quench Delay File: None initiated.

Beam Loss Monitors (Rads/Hr): N/A.

Main Magnet Power Status: Park Current.

Qdplots: N/A

QLI Recovery TAPE / PS On Checks Commenced: 23:39:46 **Estimated Delay Time: 63 minutes**

Technical Notes:

22:55: Yellow quench link went again during the recovery. Calling Super George. [trav](#)

Feb 7 2004 00:07: yellow quench link trip was caused by yo9-dh0 ps or qpa. The link tripped when the ps was being turned on. The alarm log showed no other fault but a quench fault. The ps did not go into the Off state. A possible cause could be problem with the cable between the ps and the qpa. [Ganetis \[quench \]](#)

Quench Analysis: yo9-dh0 power supply or QPA.

Sat-February 07 **Blue PR-084 File#=1076153339** (Loc: 12a-ps1.A) **Timestamp: 06:28:56 +3637934**
Beam Permit Fail Timestamp: 06:28:56 +3582939

Quench Detector(s) Trip: (12a-qd1) B11QFQ2_VT, Int. 1, Tq= -24.

DX Heaters Fired: None Fired.

QPA Control / TR 1st Alarm: No faults initiated.

Postmortem Plots: Normal operating parameters, not the cause of this event.

5 Minute: Quench Delay File: (6b-qd1) B5QFQ3_VT and B6QFQ2_VT,
(11b-qd1) B10DSA4_A3VT
(12a_qd1) B11QFQ2_VT

Beam Loss Monitors (Rads/Hr): Sector 5: B5QFQ3_VT, b-5-lm3.1 = 4939
Sector 6: B6QFQ2_VT, b6-lm3.1 = 774 & b6-lm3.2 = 4753
Sector 10: B10DSA4_A3VT, Dipole Arc D15 thru D20, g10-lm12 = 4860,
g10-lm13 = 4858, g10-lm14 = 1178, g10-lm16 = 4332, g10-lm18 = 834
and g10-lm20 = 5151
Sector 11: B11QFQ2_VT, g11-lm1 = 3678
Left over from Sector 10 Arc: g11-lm21 = 4838, g11-lm20 = 2689, g10-lm18 = 2912

Main Magnet Power Status: Steady at Store Energy.

Qdplots: B5QFQ3, B6QFQ2, B10DSA4_A3VT, Dipole Arc D15 thru D20 and B11QFQ2 all indicate a real magnet quench took place.

QLI Recovery TAPE / PS On Checks Commenced: 07:39:55 **Estimated Delay Time: 72 minutes**

Technical Notes: **11:44:** blue quench link trip was caused by 12a-qd1 quench detector. The quench detector tripped because of a real magnet quench at B11QFQ2_VT. The beam permit tripped .055 sec. before the blue quench link. There were 4 real magnet quenches at b10 arc dipole, b11q2, b5q3, and b6q2. There where a high loss at b5-lm3.1, b6-lm3.2, g10-lm20, g10-lm16, g11-lm1. There are now 30 beam induced quench link trips for this run. [Ganetis \[quench \]](#)

Quench Analysis: Beam Induced Quench #030.

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Sun-February 08 **Yellow PR-085 File#=1076246205** (Loc: 6b-ps1) **Timestamp: 08:16:44 +1807936**

Beam Permit Fail Timestamp: 08:16:44 +1807966

Quench Detector(s) Trip: All tripped, positive values.

QPA Control / TR 1st Alarm: No faults initiated.

Postmortem Plots: New Software indicates that 6b permit had tripped after T=zero.

5 Minute: Quench Delay File: None initiated.

Beam Loss Monitors (Rads/Hr): N/A.

Main Magnet Power Status: Sitting at Injection Current.

Qdplots: N/A

QLI Recovery TAPE / PS On Checks Commenced: 08:32:13 **Estimated Delay Time:** 16 minutes

Technical Notes: 9:27: yellow quench link trip was caused by the permit module in 6b. We have put new hardware to try to understand what is happening at this permit module, but the software to record the signal has not been done. When will this software get done? The new signals have to be recorded in postmortem. This is the 2nd time in two days this problem has tripped the yellow quench link. [Ganetis \[quench \]](#)

Quench Analysis: Controls, 6b-permit module.

Sun-February 08 **Yellow PR-086 File#=1076248942** (Loc: 6b-ps1) **Timestamp: 09:02:20 +2746466**

Beam Permit Fail Timestamp: 09:02:20 +2746496

Quench Detector(s) Trip: All tripped, positive values.

QPA Control / TR 1st Alarm: No faults initiated.

Postmortem Plots: New Software indicates that 6b permit had tripped after T=zero.

5 Minute: Quench Delay File: None initiated.

Beam Loss Monitors (Rads/Hr): N/A.

Main Magnet Power Status: Sitting at Injection Current.

Qdplots: N/A

QLI Recovery TAPE / PS On Checks Commenced: Cancelled at 08:32:13 **Estimated Delay Time:** (see next entry)

Technical Notes: 9:28: yellow quench link trip was caused by the permit module in 6b. We have put new hardware to try to understand what is happening at this permit module, but the software to record the signal has not been done. When will this software get done? The new signals have to be recorded in postmortem. This is the 3rd time in two days that this problem has tripped the yellow quench link. [Ganetis \[quench \]](#)

14:28: The software is done. See my comment at 14:25. [jtm](#)

Quench Analysis: Controls, 6b-permit module.

Sun-February 08 **Yellow PR-087 File#=1076253293** (Loc: 6b-ps1) **Timestamp: 10:14:52 +1677947**

Beam Permit Fail Timestamp: 09:02:20 +2746496 (Down from previous PR-086)

Quench Detector(s) Trip: All tripped, positive values.

QPA Control / TR 1st Alarm: No faults initiated.

Postmortem Plots: New Software indicates that 6b permit had tripped after T=zero.

5 Minute: Quench Delay File: None initiated.

Beam Loss Monitors (Rads/Hr): N/A.

Main Magnet Power Status: Zero Current.

Qdplots: N/A

QLI Recovery TAPE / PS On Checks Commenced: 10:27:28 **Estimated Delay Time:** 86 minutes

Technical Notes: 10:14: Quench Link Interlock in Yellow ring, 6b-ps1 dropped first [Sequencer](#)

10:19: Yellow quench recovery sequence begun [tape](#)

Quench Analysis: Diagnosing, 6b-permit module.

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Sun-February 08 **Yellow PR-088 File#=1076255234** (Loc: 6b-ps1) **Timestamp: 10:47:12 +2215317**
Beam Permit Fail Timestamp: 10:47:12 +2215347
Quench Detector(s) Trip: All tripped, positive values.
QPA Control / TR 1st Alarm: No faults initiated.
Postmortem Plots: New Software indicates that 6b permit had tripped after T=zero.
5 Minute: Quench Delay File: None initiated.
Beam Loss Monitors (Rads/Hr): N/A.
Main Magnet Power Status: Injection Current.
Qdplots: N/A
QLI Recovery TAPE / PS On Checks Commenced: 12:03:27 **Estimated Delay Time: 67 minutes**

Technical Notes: **11:39:** yellow quench link trip was caused by the permit module in 6b . We have put new hardware to try to understand what is happening at this permit module, the software to record the signal is now in PM Viewer. The new signals are now recorded in postmortem. What do the experts say about the signals that were captured? Can the controls group please put some comments in the E-log on what they are doing to troubleshoot or repair this problem. This is the 4th time in two days this problem has tripped the yellow quench link. [Ganetis \[quench \]](#)

12:38: Ed Koropsak is in to examine the scope connections for permit module 6B.
Rob Michnoff and Ed have been working to understand the cause of this problem with the permit module that causes these quench link interlocks for quite a while. The problem manifests itself by bursts of quench link interlocks followed by a week or two of quiescence and then new bursts of problems.
Rob and Ed found that when a scope was hooked up to diagnose the problem, that the problem seemed to go into remission. Apparently, the scope was disconnected on Wednesday, and today, we are finding the same symptoms as before with the permit module.

Quench Analysis: Controls, 6b-permit module.

Sun-February 08 **Yellow PR-089 File#=1076288908** (Loc: 10a-ps3.A) **Timestamp: 20:08:28 +85708**
Beam Permit Fail Timestamp: 20:07:44 +953177
Quench Detector(s) Trip: (10a-qd2) Y10QDQ9_VT, Int. 1, Tq= -24.
QPA Control / TR 1st Alarm: No faults initiated.
Postmortem Plots: yi10-q89-ps signals all falter before T=zero.
5 Minute: Quench Delay File: None initiated.
Beam Loss Monitors (Rads/Hr): N/A.
Main Magnet Power Status: Injection Current.
Alarm Log: Shows: Local, No PS / Illegal State, indicating that the supply had lost AC power.
Qdplots: N/A
QLI Recovery TAPE / PS On Checks Commenced: 21:56:21 **Estimated Delay Time: 109 minutes**

Technical Notes: **21:15:** yellow quench link trip was caused by yi10-q89-ps. The ps status shows Local, No PS/ Illegal State. There were no QPA faults. Don B. will have to investigate this. [Ganetis \[quench \]](#)
20:18: Yellow quench recovery sequence begun [tape](#)
21:01: Quench recovery paused due to an error, calling George.
21:52: yi10-q89 indicated "no ps illegal state" on psall. CAS (Frank and George) went out to look at the ps and saw the circuit breaker tripped. They turned it back on and I was able to bring the link up in that building alone. I was able to run this p.s. to 10A but did not take it any further. I asked MCR to try and bring the whole yellow link up and try to ramp the p.s.. In the meantime I will have CAS bring a spare p.s. up to 1010A. I will get them prepared to swap out this p.s. if the circuit breaker trips again. [Don Bruno \[rhic ps \]](#)
23:19: All the IR q3 wfg were set to above 300 Amps. The ps cannot go above 300 Amps! Why would the wfg manager even allow them to be set this high. Are there checks for this? [Ganetis \[ps \]](#)

Quench Analysis: IR Power Supply at fault: yi10-q89-ps.

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Daily Quench Analysis for the month of February 2004

Tues—February 10 Blue PR-090 File#=1076395980 (Loc: 10a-ps3.A) **Timestamp: 01:53:00 +961673**

Beam Permit Fail Timestamp: **01:53:00 +915727**

Quench Detector(s) Trip: (10a-qd1) B10QFQ4_6VT, Int. 1, Tq= -25.

DX Heaters Fired: None Fired.

QPA Control / TR 1st Alarm: No faults initiated, group 5 = b-QD, QLI X11 was 1st.

Postmortem Plots: Normal operating parameters, Power Supplies not the cause of this event. New Permit signal shows that the beam permit had tripped first.

5 Minute: Quench Delay File: (10a-qd1) B10QFQ4_6VT.

Beam Loss Monitors (Rads/Hr): Sector 10, most significant; y10-lm4 = 4677, b10-lm4 = 4970, g10-lm5 = 4620, g10-lm6 = 4740, g10-lm7 = 4729, g10-lm8 = 3854 and g10-lm12 = 4860

Main Magnet Power Status: Steady at Store Energy.

Qdplots: B10QFQ4_6VT indicates a real magnet quench took place.

QLI Recovery TAPE / PS On Checks Commenced: **02:17:17** Estimated Delay Time: 25 minutes

Technical Notes: 9:08: blue quench link trip was caused by the 10a-qd1 quench detector. The quench detector tripped because of a real magnet quench at B10QFQ4_6VT. The beam permit tripped 46 msec. before the quench link. There was a real quench at b10q4. There was high beam loss at b10-lm4. There are now 31 beam induced quenches for this run.

Ganetis

Quench Analysis: Beam Induced Quench #031.

Scheduled Maintenance for One Hour, February 10, 2004, 1400 to 1500 hours

Tues-February 10 Blue PR-091 File# = 1076440385 (Loc: 6b-ps1) **Timestamp: 14:13:04**

Tues-February 10 Yellow PR-092 File# = 1076440385 (Loc: 6b-ps1) **Timestamp: 14:13:04**

Beam Permit Fail Timestamp: Down prior to both links coming down. **Timestamp: 14:02:52**

Quench Detector(s) Trip: No negative Tq values.

Main Magnet Power Status: Zero Current.

Tues-February 10 Yellow PR-093 File# = 1076445161 (Loc: 6b-ps1) **Timestamp: 15:32:40**

Note for PR-093: Communications problem when bringing the Yellow Link back up with yo1-tq6-qp, after three attempts, the problem cleared itself. Since this was all part of maintenance, it will be included in the Maintenance Related column in the fy04 RHIC Counters.

Technical Notes: Both links had come down not due to scheduled maintenance. Controls group took the opportunity to replace the entire 6b-ps1 Permit Module Chassis and in powering down the unit, both link came down.

QLI Recovery TAPE / PS On Checks Commenced: **Blue = 15:43:02** Estimated Delay Time: 90 minutes
Yellow = 15:59:15 Estimated Delay Time: 106 minutes

Quench Analysis: Scheduled Maintenance exceeded to 1½ Hours.

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Daily Quench Analysis for the month of February 2004

Fri-February13 **Yellow PR-094 File#=1076727631** (Loc: 8b-ps1) **Timestamp: 22:00:28 +3148198**

Beam Permit Fail Timestamp: 22:00:28 +3087527

Quench Detector(s) Trip: (8b-qd2) Y8QFQ2_VT, Int. 1, Tq= -24.

QPA Control / TR 1st Alarm: No faults initiated, y-QD 1st

5 Minute: Quench Delay File: (8b-qd2) Y8QFQ2_VT and Y8QFQ3_VT

Beam Loss Monitors (Rads/Hr): Sector 8, Losses in the Red at the triplet region, g8-lm1 = 4447 and y8-lm3.1 = 4578.

Main Magnet Power Status: Steady at Store Energy.

Qdplots: Y8QFQ2_VT and Y8QFQ3_VT, indicates that two real magnet quenches took place.

QLI Recovery TAPE / PS On Checks Commenced: 22:39:48 **Estimated Delay Time: 40 minutes**

Technical Notes: 23:31: yellow quench link trip was caused by 8b-qd2 quench detector. The quench detector tripped because of a real magnet quench at Y8QFQ2_VT. The beam permit tripped .061 sec. before the yellow quench link. There were two real magnet quenches at y8q2 and y8q3. There were high beam losses at y8-lm3.1 and g8-lm1. There are now 32 beam induced quench link trips for this run [Ganetis \[quench \]](#)

Quench Analysis: Beam Induced Quench #032.

Sun-February 15 **Blue PR-095 File#=1076904099** (Loc: 6b-ps1) **Timestamp: 23:01:36 +3082665**

Beam Permit Fail Timestamp: 23:01:36 +3029056

Quench Detector(s) Trip: (6b-qd1) B5QFQ2_VT, Int. 1, Tq= -24.

DX Heaters Fired: None Fired.

QPA Control / TR 1st Alarm: No faults initiated, b-QD, 1st.

5 Minute: Quench Delay File: (6b-qd1) B5QFQ2_VT

Beam Loss Monitors (Rads/Hr): Sector 5, most significant; g5-lm1 = 1562 (from T-5 to T-3, approximately 2 seconds, a peak value of 98 was present)

Main Magnet Power Status: Ramping to Store Energy, dipole = 4671amps, quad = 4312amps at the time of trip.

Qdplots: B5QFQ2_VT indicates a real magnet quench took place.

QLI Recovery TAPE / PS On Checks Commenced: 23:38:27 **Estimated Delay Time: 38 minutes**

Technical Notes: 23:20: Cryo Control room has requested MCR not to ramp power supplies above zero. Running Blue quench recovery program, skipping the last 3 steps until CCR has reported that we can ramp above zero. They reported elevated temperatures in sextant 4 & 5 after the Star triplet.

23:45: CCR has given the clear to MCR to ramp.

23:53: blue quench link trip was caused by 6b-qd1 quench detector. The quench detector tripped because of a real magnet quench at B5QFQ2_VT. The beam permit tripped .053 sec. before the blue quench link. There was a real magnet quench at b5q2. There was a moderate beam loss at g5-lm1. There is now 33 beam induced quench link trips for this run.

[Ganetis \[quench \]](#)

Quench Analysis: Beam Induced Quench #033.

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Mon-February 16 Blue PR-096 File#=1076948432 (Loc: 6b-ps1) **Timestamp: 11:20:32 +309267**

Beam Permit Fail Timestamp: 11:20:32 +309297

Quench Detector(s) Trip: (6b-qd1) B5QFQ2_VT, Int. 1, Tq= -24.

DX Heaters Fired: None Fired.

QPA Control / TR 1st Alarm: No faults initiated, b-QD, 1st.

5 Minute: Quench Delay File: (6b-qd1) B5QFQ2_VT

Beam Loss Monitors (Rads/Hr): Sector 5, most significant; g5-lm1 = 1132 (approximately 5 seconds loss time prior to T=0, there had been an overall average of 100 present)

Main Magnet Power Status: Almost at Store Energy, dipole = 5034amps, quad = 4608amps at the time of trip.

Qdplots: B5QFQ2_VT indicates a real magnet quench took place.

QLI Recovery TAPE / PS On Checks Commenced: 12:06:03 Estimated Delay Time: 47 minutes

Technical Notes: 11:55: The Cryo Control Room reports that the cryo system is ready. A. Krishock is running Blue Quench Recovery.

16:07: blue quench link trip was caused by 6b-qd1 quench detector. The quench detector tripped because of a real magnet quench at B5QFQ2_VT. The beam permit tripped after the blue quench link. There was a real magnet quench at b5q2. There was a low to moderate beam loss at g5-lm1. The quench happened at the end of the ramp. There is now 34 beam induced quench link trips for this run. [Ganetis \[quench \]](#)

Quench Analysis: Beam Induced Quench #034.

Mon-February 16 Blue PR-097 File#=1076988367 (Loc: 6b-ps1) **Timestamp: 22:26:04 +3049660**

Beam Permit Fail Timestamp: 22:26:04 +3049689

Quench Detector(s) Trip: (6b-qd1) B5QFQ2_VT, Int. 1, Tq= -24.

DX Heaters Fired: None Fired.

QPA Control / TR 1st Alarm: No faults initiated, b-QD, 1st.

5 Minute: Quench Delay File: (6b-qd1) B5QFQ2_VT

Beam Loss Monitors (Rads/Hr): Sector 5, most significant; g5-lm1 = 1142 (Indications of levels above 83 at T-10 seconds, then declining to 14 at T-4.36 seconds then at T-1 second, the level climbs to 1142)

Main Magnet Power Status: Ramping to Store Energy, dipole = 4556amps, quad = 4216amps at the time of trip.

Qdplots: B5QFQ2_VT indicates a real magnet quench took place.

QLI Recovery TAPE / PS On Checks Commenced: 23:52:10 Estimated Delay Time: 87 minutes

Technical Notes: RHIC is ramping. 22:25: Blue QLI. 6b-ps1 pulled the permit. CCR informs us that 6 o'clock DX magnet temperatures are high.

23:19: blue quench link trip was caused by 6b-qd1 quench detector. The quench detector tripped because of a real magnet quench at B5QFQ2_VT. The beam permit tripped after the blue quench link. There was a real magnet quench at b5q2. There was a moderate beam loss at g5-lm1. The quench happened at the end of the ramp. There is now 35 beam induced quench link trips for this run . This is the third beam induced quench at this location in the last 24 hours! [Ganetis](#)

Quench Analysis: Beam Induced Quench #035.

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Daily Quench Analysis for the month of February 2004

Tues-February 17 **Blue PR-098 File#=1077029681** (Loc: 2b-ps1) **Timestamp: 09:54:40 +1073829**

Beam Permit Fail Timestamp: 09:54:40 +263843

Quench Detector(s) Trip: (2b-qd1) B2/1DX_DX, Int. 20, Tq= -20.

DX Heaters Fired: 2b-ps2.A1 and 2b-ps2.B1 Fired.

QPA Control / TR 1st Alarm: No faults initiated, b-QD, 1st.

5 Minute: Quench Delay File: (2b-qd1) B2DRDX_VT

Beam Loss Monitors (Rads/Hr): Sector 2, losses are minimal.

Main Magnet Power Status: At Store Energy.

Qdplots: B2DRDX_VT indicates a real magnet quench took place.

QLI Recovery TAPE / PS On Checks Commenced: 11:03:15 **Estimated Delay Time: 70 minutes**

Technical Notes: 10:05: Here's the sequence of events:

- Dana was investigating the BRAHMS ZDC and background rate signal problems.
- They did an AC reset on the BRAHMS FEC (not good!).
- The BRAHMS magnets tripped.
- We had a real beam quench at the B2/B1 DX magnets. **JPJ, Dana**

10:18: blue quench link trip was caused by 2b-qd1 quench detector. The quench detector tripped because signal in B2/1DX_DX. There was a voltage induced into the b2dx when the Brahms D3 magnet turned off from full current. The FEC that controls this magnet was AC cycled. The beam permit tripped .81 sec. before the quench link. This was not a beam induced magnet quench. **Ganetis [quench]**

11:02: The Cryo Control Room has granted us permission to ramp the RHIC magnets.

Quench Analysis: FEC, AC Reset caused Brahms D3 magnet to turn off at full current, causing an induced voltage spike into the b2dx.

RHIC 2003 – 2004 Physics Run ***Daily Quench Analysis for the month of February 2004***

Tues-February 17 **Blue PR-099 File#=1077034627** (Loc: 2b-ps1) **Timestamp: 11:17:04 +3936036**
Beam Permit Fail Timestamp: 11:17:04 +3936066

Quench Detector(s) Trip: (2b-qd1) B2/1DX_DX, Int. 20, Tq= -20.

DX Heaters Fired: 2b-ps2.A1, 2b-ps2.B1, 2b-ps2.A2 and 2b-ps2.B2 all Fired.

QPA Control / TR 1st Alarm: No faults initiated, b-QD, 1st.

5 Minute: Quench Delay File: (2b-qd1) B2DRDX_VT and B1DRDX_VT

Beam Loss Monitors (Rads/Hr): Sector 1 & 2, losses are minimal.

Main Magnet Power Status: Ramping to Store Energy, dipole = 4784amps, quad = 4404amps at the time of trip.

Qdplots: B2DRDX_VT & B1DRDX_VT indicates two real magnet quenches took place.

QLI Recovery TAPE / PS On Checks Commenced: 13:03:49 **Estimated Delay Time: 106 minutes**

Technical Notes: 12:07: blue quench link trip was caused by 2b-qd1 quench detector. The quench detector tripped because of a real quench in B2/1DX_DX. The b2dx magnet quenched because it did not fully recover from the last quench. The time between quenches was 1 hour and 23 min. The b1dx magnet also quenched after the quench link was tripped. It will take me more time to figure why that happened. The b2dx magnet quenched while ramping to full current. I am strongly recommending a wait of two hours for all DX quenches before they are ramped to high current. [Ganetis](#)

One RHIC store lasted for one hour this shift. It was aborted when BRAHMS experimenters reset cfe-2c-brahms while troubleshooting collision and background signal timing problems. This caused the BRAHMS magnets to trip, and the D3 magnet trip triggered the B2DX quench detector. The eventual hysteresis ramp failed when there was a B2DX quench at full current. As of the end of the shift, the Cryo system temperatures are nearing normal operating levels. Notes to Operators: - G. Ganetis requests that the MCR wait 1.5 hours before starting quench recovery after a DX quench. The magnets should not be ramped up prior to 2 hours after the event. Of course, the MCR should also wait for approval to ramp from the Cryo Control Room before ramping up again. - The automated PHOBOS vertical IR bump steps have been removed from the Up and Down to Park sequences.

12:05: George reports that the Blue quench recovery was probably started too early after the initial QLI (QLI to QLI = 1.4 hours). We will wait 1.5 hours to start recovery this time, and 2 hours to ramp back to injection.

Quench Analysis: Cryo Related, not enough allowed time to recover the Dx magnet quench from the previous QLI: PR-098.

Tues-February 17 **Yellow PR-100 File#=1077034628** (Loc: 2b-ps1) **Timestamp: 11:17:08 +557641**
Beam Permit Fail Timestamp: 11:17:04 +3936066

Quench Detector(s) Trip: (2b-qd2) Y2DRD0_D0, Int. 5, Tq= -23.

QPA Control / TR 1st Alarm: No faults initiated, y-QD 1st

5 Minute: Quench Delay File: None initiated, DX Quenches still present.

Beam Loss Monitors (Rads/Hr): Sector 2, Low.

Main Magnet Power Status: Ramping to Store Energy, dipole = 4800amps, quad = 4422amps at the time of trip.

Qdplots: Y2DRD0_D0 indicates normal response, non-real magnet quench.

QLI Recovery TAPE / PS On Checks Commenced: 12:14:43 **Estimated Delay Time: 58 minutes**

Technical Notes: 12:27: yellow quench link trip was caused by 2b-qd2 quench detector. The quench detector tripped because of magnetic coupling of the d0 magnets. When the blue link tripped with both b2 and b1 dx magnets quenching it causes a fast change in current in the blue d0 magnets. This is because of the way the ps are nested for the dx and d0 magnets. The magnetic coupling of the d0 magnets causes the yellow quench detector to interpret the yellow d0 signal as a quench in the d0 magnet. [Ganetis \[quench \]](#)

14:15: RHIC CCR has given permission to ramp magnets to injection.

Quench Analysis: Magnetic Coupling of dhX Magnets to dh0.

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Daily Quench Analysis for the month of February 2004

Scheduled Maintenance, February 18, 2004, from 0700 to 1500 hours

Wed-February 18 **Blue PR-101 File# = 1077105986** (Loc: 2b-ps1) *Timestamp: 07:06:24*

Wed-February 18 **Yellow PR-102 File# = 1077106023** (Loc: 6b-ps1) *Timestamp: 07:07:00*

Beam Permit Fail Timestamp: Down prior to both links coming down. *Timestamp: 07:01:52*

Main Magnet Power Status: Zero Current.

Technical Notes: 07:00: The beam studies have ended and the maintenance period has begun. The RHIC mains are being ramped to zero. All of the RHIC zones except the dump area are being placed on RA. HP is going to survey the RHIC dump areas.

Wed-February 18 **Blue PR-103 File# = 1077131300** (Loc: 4b-time.B) *Timestamp: 14:08:20*

Wed-February 18 **Yellow PR-104 File# = 1077132259** (Loc: 4b-time.B) *Timestamp: 14:24:16*

Notes for PR-103 & 104: Recovering from Maintenance, these were not related to the Main Power Supplies. Since this was all part of maintenance, it will be included in the Maintenance Related column in the fy04 RHIC Counters.

Technical Notes: 16:30: RHIC ps work performed today: [Don Bruno](#)

1. All snakes and spin rotators were put into STANDBY and the DCOC's set to 50A. The qpa for yo9-snk7-2.3-qp was swapped out also.
2. The node card cable for bo11-tv5-ps was swapped out.
3. One fan was plugged in at sector 10 under inner magnets Q3-2.
4. A broken fan was replaced under magnets Q3-1 in sector one.
5. SCR forward voltage monitoring was installed on the blue main dipole OCC.
6. The 6000A quench switches were inspected in 1010A.
7. Relay straps were installed for the new aux relay in p.s.'s yo12-qd1, yi11-qf3, y12-q6, b12-dh0, and b12-dhx.
8. The signal connections between yo9-dh0-ps and yo9-dh0-qp were inspected
9. A k-lock was replaced for one of the quench signals which is monitored by the MADC at 1006B.
10. bo6-qd1-ps fiber optic card was replaced.
11. The error adjust for the snake and rotator p.s.'s was reduced from 1.25V (5V) to 0.75V (3V) and the error delay was reduced from 3.7V (4sec) to 1.67V (1sec).

QLI Recovery TAPE / PS On Checks Commenced: **Blue = 14:48:21**
Yellow = 14:39:51

Estimated Delay Time: 462 minutes
Estimated Delay Time: 452 minutes

Quench Analysis: Scheduled Maintenance

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Thurs-February 19 **Blue PR-105 File#=1077184081** (Loc: 3b-ps1) **Timestamp: 04:48:00 +1500072**

Beam Permit Fail Timestamp: **04:48:00 +1500072**

Quench Detector(s) Trip: (3b-qd1) B3QBA2_A1VT, Int. 1, Tq = 12442273

DX Heaters Fired: None fired.

5 Minute: Quench Delay File: (3b-qd1) Y2DSA5_A4VT | Y2DSA4_A3VT | Y3DSA3_A2VT | Y3DSA2_A1VT | Y2QDA3_A2VT | Y3QDA2_A1VT | Y3QFA4_A5VT | Y2QFA6_A7VT

Beam Loss Monitors (Rads/Hr): Sector 2 & 3 Low, Beam Dumps at Sectors 9 & 10 appears normal.

Main Magnet Power Status: Store Energy.

QLI Recovery TAPE / PS On Checks Commenced: **See PR-107** Estimated Delay Time: N/A minutes

Technical Notes: **8:59:** blue quench link trip was caused by 3b-qd1 quench detector. The quench detector had a hardware fault in its ADC Card. [Ganetis](#)

Quench Analysis: Quench Detector Fault, 3b-qd1 located in Alcove 3B.

Thurs-February 19 **Yellow PR-106 File#=1077184237** (Loc: 3b-ps1) **Timestamp: 04:50:36 +1433874**

Beam Permit Fail Timestamp: **04:48:00 +1500103**

Quench Detector(s) Trip: (3b-qd1) Y2DSA4_A3VT, Int. 20, Tq = 12554545

5 Minute: Quench Delay File: (3b-qd1) Y2DSA5_A4VT | Y2DSA4_A3VT | Y3DSA3_A2VT | Y3DSA2_A1VT | Y2QDA3_A2VT | Y3QDA2_A1VT | Y3QFA4_A5VT | Y2QFA6_A7VT

Beam Loss Monitors (Rads/Hr): Sector 2 & 3 Low, Beam Dumps at Sectors 9 & 10 appears normal.

Main Magnet Power Status: Store Energy.

Qdplots: All signals indicated above are straight line, no magnet quenches.

QLI Recovery TAPE / PS On Checks Commenced: **See PR-107** Estimated Delay Time: N/A minutes

Technical Notes: **10:04:** Yellow quench link trip was caused by 3b-qd1 quench detector. The quench detector had a hardware fault in its ADC Card. [Ganetis](#)

Quench Analysis: Quench Detector Fault, 3b-qd1 located in Alcove 3B.

Thurs-February 19 **Blue PR-107 File#=1077185655** (Loc: 2b-ps1) **Timestamp: 05:14:12 +3331775**

Beam Permit Fail Timestamp: **04:48:00 (Still down from previous QLI)**

Quench Detector(s) Trip: (3b-qd1) Blue Aux 1 Quenched, BO3-SXD-VT, Int. 1, B3QBA2_A1VT, Int. 1, Tq = 12442273

QPA Control / TR 1st Alarm: No faults initiated, b2-dh0-qp, 1st, b-QD QLI = 0.

DX Heaters Fired: None fired.

Beam Loss Monitors (Rads/Hr): No Beam in the machine.

Main Magnet Power Status: Store Energy.

QLI Recovery TAPE / PS On Checks Commenced: **See PR-107** Estimated Delay Time: N/A minutes

Technical Notes: Postmortems current levels too low, Alarm Log indicated b2-dh0-ps Quench at 05:14:39, TAPE was user Invoked Cancel at 05:15:51 as it stopped due to b2-dh0-ps did not come out of the Standby Error. Next attempt, it cleared. **10:07:** Blue quench link trip was caused by b2-dh0-ps when the p.s. was being turned on. The p.s. had no faults in the alarm log other than quench fault. This could be a problem with the cable between the ps and qpa. [Ganetis](#)

Quench Analysis: b2-dh0-ps, possible cable between PS and QPA.

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Thurs-February 19 **Blue PR-108 File#=1077188726** (Loc: 3b-ps1) **Timestamp: 06:05:24 +2279750**
Beam Permit Fail Timestamp: 06:05:24 +2278756
Quench Detector(s) Trip: (3b-qd1) Blue Aux 1 Quenched, BO3-SXD-VT, Int. 1
Main Magnet Power Status: Park Current

QLI Recovery TAPE / PS On Checks Commenced: 08:36:59 **Estimated Delay Time:** 228 minutes

Technical Notes:

Continued work on repairing the 3b-qd1 Quench Detector located in Alcove 3B.

10:13: 3b-qd1 was restarted to try to clear the fifo empty problem on the ADC card. [Ganetis](#)

Quench Analysis: Quench Detector Restarted, 3b-qd1 located in Alcove 3B.

Thurs-February 19 **Yellow PR-109 File#=1077188726** (Loc: 3b-ps1) **Timestamp: 06:05:24 +2278725**
Beam Permit Fail Timestamp: 06:05:24 +2278756
Quench Detector(s) Trip: (3b-qd1) Yellow Aux 3 Quenched, YI3-SXD-VT, Int. 1
Main Magnet Power Status: Park Current

QLI Recovery TAPE / PS On Checks Commenced: 08:46:25 **Estimated Delay Time:** 238 minutes

Technical Notes:

Continued work on repairing the 3b-qd1 Quench Detector located in Alcove 3B.

10:13: 3b-qd1 was restarted to try to clear the fifo empty problem on the ADC card. [Ganetis](#)

Quench Analysis: Quench Detector Restarted, 3b-qd1 located in Alcove 3B.

Thurs-February 19 **Blue PR-110 File#=1077249768** (Loc: 12a-ps1.A) **Timestamp: 23:02:48 +918498**
Beam Permit Fail Timestamp: 23:02:48 +910009
Quench Detector(s) Trip: N/A
DX Heaters Fired: None fired.
5 Minute: Quench Delay File: None initiated.
Beam Loss Monitors (Rads/Hr): No beam in the machine.
Main Magnet Power Status: Store Energy.
Qdplots: N/A

QLI Recovery TAPE / PS On Checks Commenced: 23:42:21 **Estimated Delay Time:** 40 minutes

Technical Notes: 3b-ps1 on the quench summary page pink-off line. FitReader indicated that cfe-3b-ps1 had no heartbeat, ping check failed so it had to be rebooted. This caused the Blue and Yellow links to come down.

Note: 12a-ps1.A checked out okay and was the next closest time to register since 3b-ps1 had gone off line during the reboot process.

Quench Analysis: CFE Reset of 3b-ps1

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Thurs-February 19 **Yellow PR-111 File#=1077249768** (Loc: 6b-ps1) **Timestamp: 23:02:48 +923450**

Beam Permit Fail Timestamp: 23:02:48 +909999

Quench Detector(s) Trip: N/A

DX Heaters Fired: None fired.

5 Minute: Quench Delay File: None initiated.

Beam Loss Monitors (Rads/Hr): No beam in the machine.

Main Magnet Power Status: Store Energy.

Qdplots: N/A

QLI Recovery TAPE / PS On Checks Commenced: 23:50:59 Estimated Delay Time: 49 minutes

Technical Notes: 3b-ps1 on the quench summary page pink-off line. FitReader indicated that cfe-3b-ps1 had no heartbeat, ping check failed so it had to be rebooted. This caused the Blue and Yellow links to come down.

Note: 6b-ps1 checked out okay and was the next closest time to register since 3b-ps1 had gone off line during the reboot process.

Quench Analysis: CFE Reset of 3b-ps1

Sat-February 21 **Blue PR-112 File#=1077360835** (Loc: 6b-ps1) **Timestamp: 05:53:52 +3928646**

Beam Permit Fail Timestamp: 05:53:52 +3920185

Quench Detector(s) Trip: N/A

DX Heaters Fired: All running.

5 Minute: Quench Delay File: Files running, none initiated.

Beam Loss Monitors (Rads/Hr): Beam had beam dumped at 05:42:31.

Main Magnet Power Status: Zero Current

Qdplots: N/A

QLI Recovery TAPE / PS On Checks Commenced: 06:15:19 Estimated Delay Time: 23 minutes

Technical Notes: 3b-ps1 on the quench summary page pink-off line. FitReader indicated that cfe-3b-ps1 autocheckout ping check failed, no heartbeat message and that the resets did not work. AC reset was required and then re-booting caused the Blue and Yellow links to come down.

Note: 6b-ps1 checked out okay and was the next closest time to register since 3b-ps1 had gone off line during the reboot process.

Feb 21 2004 5:26: cfe-3b-ps1 lost communication around 03:43. Contacting A. Maurusic to change wfg configuration to permit ramp down. The FEC will be AC reset once the PS reach zero, as an AC reset will pull the Quench links. **Nick L.**

Feb 21 2004 6:08: Quench links were lost when cfe-3b-ps1 was AC reset.

Quench Analysis: CFE Reset of 3b-ps1

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Sat-February 21 **Yellow PR-113 File#=1077360835** (Loc: 8b-ps1) **Timestamp: 05:53:52 +3933685**
Beam Permit Fail Timestamp: 05:53:52 +3920186
Quench Detector(s) Trip: N/A
5 Minute: Quench Delay File: Files running, none initiated.
Beam Loss Monitors (Rads/Hr): Beam had beam dumped at 05:42:31.
Main Magnet Power Status: Zero Current
Qdplots: N/A

QLI Recovery TAPE / PS On Checks Commenced: 06:04:34 **Estimated Delay Time:** 12 minutes

Technical Notes: 3b-ps1 on the quench summary page pink-off line. FitReader indicated that cfe-3b-ps1autocheckout ping check failed, no heartbeat message and that the resets did not work. AC reset was required and then re-booting caused the Blue and Yellow links to come down.

Note: 8b-ps1 checked out okay and was the next closest time to register since 3b-ps1 had gone off line during the reboot process.

Feb 21 2004 5:26: cfe-3b-ps1 lost communication around 03:43. Contacting A. Maurusic to change wfg configuration to permit ramp down. The FEC will be AC reset once the PS reach zero, as an AC reset will pull the Quench links. **Nick L.**
Feb 21 2004 6:08: Quench links were lost when cfe-3b-ps1 was AC reset.

Quench Analysis: CFE Reset of 3b-ps1

Tues-February 24 **Yellow PR-114 File#=1077663701** (Loc: 5b-ps1) **Timestamp: 18:01:40 +1994574**
Beam Permit Fail Timestamp: 18:01:40 +1994605
Quench Detector(s) Trip: (5b-qd1) Y5DSA3_A2VT Int. 20, Tq=-24
5 Minute: Quench Delay File: (5b-qd1) Y5DSA3_A2VT
Beam Loss Monitors (Rads/Hr): Greatest losses occurred in the Dipole Arc Region of Sector 5:
g5-lm20 = 4959, g5-lm19 = 4659, g5-lm18 = 4825 (pulse width of 1.14sec), g5-lm17 = 4839
Main Magnet Power Status: Ramping past Injection, Trip Values of: Dipole = 1090 amps, Quad = 1034 amps.
Qdplots: Comparing associating signals, Dipole Magnet String Y5DSA3_A2 (D20 thru D15) Quenched

QLI Recovery TAPE / PS On Checks Commenced: 18:30:33 **Estimated Delay Time:** 29 minutes

Technical Notes: MCR

17:35: We completely lose the yellow beam at transition. The problem may be related to a faulty network switch and the loss of four front-ends: cfe-3c-qd1, cfe-3c-ps2, cfe-3c-ps1, and cfe-3c-bpm1. We contact A. Marusic for assistance. **LH**
18:16: Beam lost mostly at sectors 3,4 and 5, with 5 getting the worst.
18:18: Cryo reports a small temperature rise in the yellow ring. They will call us when temperatures have stabilized. **LH**
18:21: Yellow quench recovery sequence begun **tape**
18:22: Cryo reports that we can proceed with recovery. **LH**

Feb 25 2004 00:03: yellow quench link trip was caused by 5b-qd1 quench detector. The quench detector tripped because of a real magnet quench at Y5DSA3_A2_VT. The beam permit tripped after the yellow quench link. There were real magnet quenches at y5d19 and y5d18. There were high beam losses at g5-lm20, g5-lm19, g5-lm18 and g5-lm17. There are now 36 beam induced quench link trips for this run. The qdAlarmsblue page was not saved correctly in PostMortem.
Ganetis [quench]

Quench Analysis: Beam Induced Quench #036.

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Daily Quench Analysis for the month of February 2004

Wed-February 25 Blue PR-115 File#=1077729731 (Loc: 8b-ps1) Timestamp: 12:22:08 +3777714

Beam Permit Fail Timestamp: 12:22:08 +3777744

Quench Detector(s) Trip: (8b-qd1) B7QDQ8_VT Int. 100, Tq=-23

DX Heaters Fired: All running.

5 Minute: Quench Delay File: No real quenches initiated.

Beam Loss Monitors (Rads/Hr): Sector 7, low levels, non-effective. Beam Dumps Sector 9 & 10; Normal Abort.

Main Magnet Power Status: Store Energy

Qdplots: Indications that B7QDQ8_VT past the integrator of 100, causing the quench detector to trip.

QLI Recovery TAPE / PS On Checks Commenced: **12:46:29** Estimated Delay Time: 24 minutes

Technical Notes:

Beam Studies in progress, Ramping of IR supplies but not the Mains (constant at Store Energy). B7QDQ8_VT started to move at approximately 15 seconds before T=zero (Qdplots) and past through the Integrator 100 (0.025volts) causing 8b-qd1 to trip. Investigating Slowfactor 8 would be 3.125amps/sec, Qdplots indicated a Slowfactor of 2.62amps/sec for b07-qf8-ps. However, Noise peaks from the booster magnet exceed the Slowfactor 8 approximately 3 to 7 amps/sec. Don't know if this would have an affect on the quench detector. (Heppner)

12:27: So the 5% knob worked. When we tried however 10% the tunes drifted and the beam went bye. Need to figure out what happened from 5% to 10%..... fp ww jvz

12:28: ramp down and start quench recovery. when done, we will ramp 6 bunches for IBS measurements and (careful) beta* measure in parallel. fp

12:37: Blue quench recovery sequence begun tape

12:47: the quench link pulled the permit. however while we were ramping the knobs the tunes were practically constant and Jim did not see large losses in the ring in the post-mortem data. One possibility is that we may have ramped the IR supplies in IR8 too fast (Slowfactor=8). Contacted George and he agreed to look into the data to confirm or dismiss that.... Fulvia

13:06: George had a look at the data and he is not finished. But the recommendation is that if we try to do the knobs again, we should use a Slowfactor of at least 20. Fulvia

16:36: blue quench link trip was caused by 8b-qd1-quench detector. The quench detector tripped because induced signal in B7QDQ8_VT. It looks like a voltage was induced in this voltage tap signal. This voltage is induced only if some faction of the IR power supplies are ramped. b8-q89 seems to have the highest di/dt. When beam studies continued I was able to capture data that confirms this. The most likely place for this to happen is in the spin rotator b7rot3. There is a known problem with the routing of the IR buses and voltage taps through all helical magnets that makes them susceptible to this problem. The only solution is to ramp the magnets slower when doing these types of tests. Ganetis [quench]

15:22: ramped the knob from 0 to 10% (Slowfactor 40). no appreciable difference in Phenix rates - however we only squeezed 10% in blue and nothing in yellow (only 3 bunches). The good news is that we can knob without adverse effect on the machine if we ramp slow enough. we will measure the effect of the knobs with both rings next week. we will need to cross check with George what is the optimal way to change IR supplies for that. Fulvia Walter Johannes

16:59: During the knob test bi8-qf9-ps was powered to 166 amps. This is much higher then this power supply normally goes to. The gas cooled lead that this p.s. uses is only rated for 150 Amps. The lead was starting to go into a thermal run away condition. If you plan to operate like this again then the current should be limited to 150 amps. or I will have to see if we can increase the cooling. Ganetis [other]

Quench Analysis: Beam Studies: Other / Investigation

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Daily Quench Analysis for the month of February 2004

Sat-February 28 **Blue PR-116 File#=1077981590** (Loc: 11b-ps1) **Timestamp: 10:19:48 +2726188**

Beam Permit Fail Timestamp: 10:19:48 +2678931

Quench Detector(s) Trip: (6b-qd1), B5QFQ3_VT Int. 1, Tq = -12
(11b-qd1), B10DSA5_A4VT Int. 1, Tq = -24

QPA Control Alcove 11b: No faults initiated, Sextupole power supplies remained running.

DX Heaters Fired: All running.

5 Minute: Quench Delay File: (6b-qd1) B5QFQ3_VT: Magnets: Blue Sector 5, Quad Q3
(6b-qd1) B6QFQ2_VT: Magnets: Blue Sector 6, Quad Q2
(11b-qd1) B10DSA5_A4VT: Magnets: Blue Sector 10, Dipoles D9, D10, D11, D12, D13 & D14
(11b-qd1) B10DSA4_A3VT: Magnets: Blue Sector 10, Dipoles D15, D16, D17, D18, D19 & D20
(11b-qd1) B10QFA3_A2VT: Magnets: Blue Sector 10, Quads Q10, Q12, Q14, Q16, Q18 & Q20
(11b-qd1) B10QDA6_A7VT: Magnets: Blue Sector 10, Quads Q21, Q19, Q17, Q15, Q13 & Q11

Beam Loss Monitors (Rads/Hr):

Sector 5: y5-lm3.2 = 4659, y5-lm3.1 = 4758, b5-lm3.1 = 4939 (1 sec), g5-lm1 = 4330 & b5-lm0 = 4087
Sector 6: b6-lm3.2 = 4753, b6-lm3.1 = 1343, g6-lm-srt.w = 3642
Sector 10: Dipole Arc Region, g10-lm12 = 4860, g10-lm13 = 4858, g10-lm14 = 4380, g10-lm16 = 4440, g10-lm18 = 3656 & g10-lm20 = 5152 (1/2 sec)
Sector 11: Spillage to g11-lm21 = 2657

Main Magnet Power Status: Store Energy, Qdplots show current changing in the Dipole and Quad prior to T=zero.

Qdplots:

QLI Recovery TAPE / PS On Checks Commenced: 10:47:27 **Estimated Delay Time: 29 minutes**

Technical Notes: 10:17: We encountered the PHOBOS vacuum problem this ramp. jak

10:19: Beam Abort, 10a-ps3.A dropped {Loss Monitor 2} Sequencer

10:19: Quench Link Interlock in Blue ring, 11b-ps1 dropped first Sequencer

11:12: Blue quench link trip was caused by the 11b-qd1 Quench Detector. The quench detector tripped because of a real magnet quench at B10DSA5_A4VT. The beam permit tripped 48 msec. before the quench link. There were at least 6 real quenches. The magnets that quenched were b10d12, b10d16, b10q12, b10q16, b5q3, and b6q2. There were high beam losses at g10-lm12, g10-lm13, g10-lm16, g10-lm20, b5-lm3.1, and b6-lm3.2. There is now 37 beam induced quenches for this run. Ganetis

10:43: Blue abort kicker pre-fire? Looks like both scope pictures show strange timing??? jak

10:53: not strange. Yellow off by one tick (720Hz clock), which is expected - least count. Blue clearly early - 4ms, so probably the time needed by the loss monitor system to pull the permit when hit hard. The scope traces from the blue PFNs show that PFN module #1 was the one that pre-fired, coming 700 ns before the other four, with the other four together at the 100ns level. leif

10:39: Blue quench recovery sequence begun tape

12:20: Cryo has given us the okay to ramp. jak

Quench Analysis: Beam Induced Quench #037.