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

Saturday-May 01, 2004: **PR-201, Yellow Quench: File# = 1083452904**

Permit ID: **(5b-ps1)** Timestamp: **19:08:24 +326945** Beam Permit Fail Timestamp: **19:08:24 +288559**

Quench Detector(s) Trip: (5b-qd1) Y4QDA6_A7VT Int. 1, Tq-23 with no auxiliary trips.
(12a-qd2) Y12QFQ7_VT Int. 1, Tq-12 with no auxiliary trips.

5 Minute: Quench Delay File: (5b-qd1) Y4DSA5_A4VT, Y4QDA6_A7VT
(7b-qd1) Y7QFA4_A5VT
(12a-qd2) Y12QFQ7_VT

Main Magnet Power Status: Steady at Store Energy.
Main Magnet Control Page (4b-ps3): Normal trip conditions.

Beam Loss Monitors (Rads/Hr):
Sector 4, g4-lm7 = 3456.28, g4-lm14=4779.55, g4-lm15=4895.32 for over 0.4sec.
Sector 7; g7-lm15=4614.07.
Sector 12; y12-lm4=3757.83, g12-lm5=4797.95, g12-lm6=4769.79, g12-lm7=4703.92

Postmortems / Snapshot: Power supplies not the cause.

QLI Recovery TAPE / PS On Checks Commenced: **19:33:23** Estimated Delay Time: 25 minutes

Tech Notes / Sequence of Events:
Yellow quench link trip was caused by the 5b-qd1 quench detector. The quench detector tripped because of a real magnet quench at Y4QDA6_A7VT (y4q15). The beam permit tripped prior to the quench link by 0.028seconds. There were multiple losses of beam (see above) that also caused real magnet quenches to occur at y7q15 and y12q7 for a total of three real magnet quenches. There are now 54 beam induced quenches for this run. G. Heppner

From the MCR Log: Shift log: Sat_May_1_2004_191311_PM, OC: T Shrey
RHIC ran for machine development and Jet data taking for 10.9 hours this shift. The only downtime was caused by a beam induced quench of unknown origin. BLIP ran for 8.25 hours.

Quench Analysis: Beam Induced Quench #054

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Monday-May 03, 2004: **PR-202, Yellow Quench: File# = 1083559378**
Permit ID: **(8b-ps1)** Timestamp: **00:42:56 +2149213** Beam Permit Fail Timestamp: **00:42:56 +2149243**

QPAControl / Timing Resolver: QP08-R8BBQF5-y8-q6-qp, No faults indicated.
Quench Detector(s) Trip: (8b-qd2), Y7QFQ6_4VT Int. 5, Tq-25
5 Minute: Quench Delay File: None initiated, Systems running.
Main Magnet Power Status: Injection current
Main Magnet Control Page (4b-ps3): Normal trip conditions.
Beam Loss Monitors (Rads/Hr): N/A
Postmortems / Snapshot: Multiple movements prior to T=zero, appears as though the data may have been corrupted during the store of data.

Tape Message Logs: 1st attempt = #59 of the sequence shows: y8-q6-ps, Local, No PS / Illegal State
0 out of 115 power supplies did NOT match the PS state Chk-statusStrM. Done with Set of PS Check State.

Num ADO Name Yellow Link
1 qdprocess.2b-qd2 Enabled, 2 qdprocess.4b-qd2 Enabled, 3 qdprocess.6b-qd2 Enabled
4 qdprocess.8b-qd2 Tripped (ERROR: Task paused due to an error)
(01:07:10) User invoked retry, 5 qdprocess.8b-qd2 Tripped (ERROR: Task paused due to an error)
(02:57:42) User invoked cancel.

2nd attempt was successful after fuse had been replaced in the housekeeping supply for y8-q6.

QLI Recovery TAPE / PS On Checks Commenced: **03:31:17** Estimated Delay Time: 168 minutes

Tech Notes / Sequence of Events:

From the MCR Log: OC_log_2004 Shift-end Summary, Time Logged: May 3 2004 07:15:20AM:
There was no beam in RHIC this shift. Several problems have prevented beam into RHIC. A quench link interlock in the yellow ring when the housekeeping power supply for y8-q6 failed due to blown fuses for the supply. During the repairs to the housekeeping power supply, the AGS RF tripped off. After CAS investigated the problem,

00:00: Machine Setup. RHIC ramp to flattop is finishing up. Beam was lost up the ramp. RHIC will be ramped back to injection to be refilled.
00:43: Yellow ring quench link interlocked at injection. 8b-ps1 dropped the beam permit.
00:55: Cryo reports no problems after the yellow ring quench link interlock. Running the Quench recovery script for the Yellow Ring.
01:05: CAS is investigating y8-q6 power supply. PSALL shows that the power supply is in local.
01:26: CAS reports that the power supply for y8-q6 appears to be not working.
01:44: D. Bruno is speaking with CAS about fixing or replacing the y8-q6 power supply.
01:58: D. Bruno reports that CAS is going to replace the housekeeping power supply for y8-q6. CAS has a printed procedure and D. Bruno will consult CAS via phone.
02:50: All the AGS RF Stations tripped off. CAS will be sent once they have finished repairing the housekeeping power supply for y8-q6.
03:00: CAS changed out the fuses for the housekeeping power supply for y8-q6

May 3 2004 3:00: y8-q6-ps housekeeping p.s. fuses blew bringing down the yellow link. Don Bruno [rhic ps]

Quench Analysis: Power Supply Fault, HKPS Fuses, y8-q6-ps.

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Monday-May 03, 2004: PR-203, Blue Quench: File# = 1083592848
Permit ID: **10a-ps3.A** Timestamp: **10:00:48 +69740** Beam Permit Fail Timestamp: **09:06:04 +3056534**

QPAControl / Timing Resolver: QP03-R10ABQF21-bi9-qd2-qp, Put supply into Standby then Off.
Quench Detector(s) Trip: None initiated, systems running.
5 Minute: Quench Delay File: None
Main Magnet Power Status: Brought down from Park to Zero Current.
Snapshot Plots: Indicated for May 2, 2004 at 13:39:10 that IrefCurrentRangeError occurred and for the following timestamps at 15:17:24, 16:59:37 and 17:00:06 to indicate WfgRefRangeError. supply Iref bounced causing current to attempt to follow. Even though Error railed at times, error signal was never at trip value long enough to trip the supply.

QLI Recovery TAPE / PS On Checks Commenced: **10:17:14** Estimated Delay Time: 17 minutes

Tech Notes / Sequence of Events:
QLI was caused by the replacement of a current regulator card for bi9-qd2-ps. As the Corrector Team needed ring access as per MCR request for Alcove 1B, time was permitted to view this problem. Tap test on the Current Reg Card showed slight movements in the Iref at 2 amps. Switched the card and the new one is solid. Returned card to shop where there appears to be an internal problem with one of the lands to Relay pins. G. Heppner

12:16: In order to replace the current regulator card for bi9-qd2-ps we had to bring down the blue link. We brought the blue link down by turning OFF bi9-qd2-ps. Don Bruno [rhic ps]

Quench Analysis: Other, Current Reg Card Replaced, Iref Bounce bi9-qd2-ps.

Monday, May 03, 2004, Power Dip - Sequence of the following Quenches:
(PR-204 thru PR-209 and SQ-013 are all victims due to a power Dip that had occurred at 22:17:16 hours.)

Monday-May 03, 2004: PR-204, Blue Quench: File# = 1083637039
Permit ID: **4b-time.B, Blue Main PS** Timestamp: **22:17:16 +3718697**
Beam Permit Fail Timestamp: **22:17:16 + 3680581** (permit.5a-ps1 in the Pink, Loss Communications)
QPAControl / Timing Resolver:
Quench Detector(s) Trip: All fired indicating Positive Tq values.
5 Minute: Quench Delay File: No indications, all systems in Running Mode.
Main Magnet Power Status: Store Energy, Dipole = 1945.76 amps, Quad = 1884.63 amps.
Main Magnet Control Page (4b-ps3): Normal Response.
Beam Loss Monitors (Rads/Hr): Beam Dump appears normal in Sector 10.
DX Heaters: No indications of heaters firing.

Monday-May 03, 2004: PR-205, Yellow Quench: File# = 1083637039
Permit ID: **4b-time.B, Yellow Main PS** Timestamp: **22:17:16 +3718697**
Beam Permit Fail Timestamp **22:17:16 + 3680581** (permit.5a-ps1 in the Pink, Loss Communications)
QPAControl / Timing Resolver: QP02-R03B07-yi3-sxd-qp, Crow, cfe-3b-ps2
Quench Detector(s) Trip: All fired indicating Positive Tq values.
5 Minute: Quench Delay File: No indications, all systems in Running Mode.
Main Magnet Power Status: Store Energy, Dipole = 1946.76 amps, Quad = 1887.44 amps.
Main Magnet Control Page (4b-ps3): Normal Response.
Beam Loss Monitors (Rads/Hr): Beam Dump appears normal in Sector 9.

PR- 204 and PR-205 Tech Notes / Sequence of Events:
Both Blue and Yellow Links tripped at the same time. Verified that a power dip had occurred at 22:17:16 as multiple 280 line voltage monitors indicated a dip from 300vac down to 196vac for approximately 0.10 seconds. Since the power supplies are not on UPS systems, this was the cause of the quench events. G. Heppner

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Spins and Snake Magnets affected by the Power Dip:

Monday-May 03, 2004: SQ-013; Snake Quench Identified, 3C, File# 1083637039
Snake Permit Fail Timestamp: **22:17:16 + 3741505** Beam Permit Fail Timestamp: **22:17:16 + 3680578**

Power Supply yi3-snk7-2.3 Status: = Operating Current of 326 amps.
Power Supply yi3-snk7-1.4 Status: = Operating Current of 100 amps.
Power Supply bo3-snk7-2.3 Status: = Operating Current of 326 amps.
Power Supply bo3-snk7-1.4 Status: = Operating Current of 100 amps.

Quench Status: Power dip while Magnets running at Store Energy Currents. **(Real Magnet Quench)**

Monday-May 03, 2004: SQ-013; Rotator Quench Identified, 5C, File# 1083637039
Spin Permit Fail Timestamp: **22:17:20 +876614** Beam Permit Fail Timestamp: **22:17:16 +3680541**

Power Supply yo5-rot3-2.3 Status: = Zero Current.
Power Supply yo5-rot3-1.4 Status: = Zero Current.
Power Supply bi5-rot3-2.3 Status: = Zero Current.
Power Supply bi5-rot3-1.4 Status: = Zero Current.

Quench Status: Not a real magnet quench, running at zero currents.

Monday-May 03, 2004: SQ-013; Rotator Quench Identified, 7A, File# 1083637039
Spin Permit Fail Timestamp: **N/A** Beam Permit Fail Timestamp: **N/A**

Power Supply yi6-rot3-2.3 Status: = Zero Current.
Power Supply yi6-rot3-1.4 Status: = Zero Current.
Power Supply bo6-rot3-2.3 Status: = Zero Current.
Power Supply bo6-rot3-1.4 Status: = Zero Current.

Quench Status: Not a real magnet quench, running at zero currents.

Monday-May 03, 2004: SQ-013; Rotator Quench Identified, 7C, File# 1083637039
Spin Permit Fail Timestamp: **N/A** Beam Permit Fail Timestamp: **N/A +28387**

Power Supply yi7-rot3-2.3 Status: = Zero Current.
Power Supply yi7-rot3-1.4 Status: = Zero Current.
Power Supply bo7-rot3-2.3 Status: = Zero Current.
Power Supply bo7-rot3-1.4 Status: = Zero Current.

Quench Status: Not a real magnet quench, running at zero currents.

(Snakes and Spins Continued)

Monday-May 03, 2004: SQ-013; Rotator Quench Identified, 9A, File# 1083637039
Spin Permit Fail Timestamp: **N/A** Beam Permit Fail Timestamp: **N/A**

Power Supply yo8-rot3-2.3 Status: = Zero Current.
Power Supply yo8-rot3-1.4 Status: = Zero Current.
Power Supply bi8-rot3-2.3 Status: = Zero Current.
Power Supply bi8-rot3-1.4 Status: = Zero Current.

Quench Status: Not a real magnet quench, running at zero currents.

Monday-May 03, 2004: SQ-013; Snake Quench Identified, 9C, File# 1083637039
Snake Permit Fail Timestamp: **22:17:16 + 3752950** Beam Permit Fail Timestamp: **22:17:16 + 3680550**

Power Supply **yo9-snk7-2.3** Status: = Operating Current of 326 amps.
Power Supply **yo9-snk7-1.4** Status: = Operating Current of 100 amps.
Power Supply **bi9-snk7-2.3** Status: = Operating Current of 326 amps.
Power Supply **bi9-snk7-1.4** Status: = Operating Current of 100 amps.

Quench Status: Power dip while Magnets running at Store Energy Currents. **(Real Magnet Quench)**

Tech Notes / Sequence of Events:
Qdplots: Unable to view plots as there had been a change in the software and graphs at the present time are not displayed for auxiliary quenches.

Tape Recovery Sequence:
22:58:44, Start of the TAPE sequence for Blue Snake and Spin recovery.
23:24:28, Start of the TAPE sequence for Yellow Snake and Spin recovery.
23:39:56, TAPE commenced one final time.

Spin / Snake Tape Recovery Commenced: **23:39:56** Estimated Delay Time: 83 minutes

Affected systems:
Linac: Mods 2, 4, 5, and 7.

Booster: BMMPS, injection bumps, extraction bumps, RF A3 and B3, low field correctors, vertical tune quad.

BTA: DH1, DH2-3, DH4, DH5, QV3, QH4, QV5, QH6, QV7, QH8, QV9, QH10, QV11, QH12, QV13, QV15, and the L20 septum.

AGS: AMMPS, RF Station KL, low field correctors, Gamma Tr E17 and G17, G10 kicker, H10 septum, G9 extraction bump, and several vacuum valves closed.

ATR: all ATR supplies tripped and several vacuum valves closed.

RHIC: blue and yellow main quench links, all of the snakes and most of the rotators, RF, blue injection kicker, two correctors, and yi3-sxd.
FECs: cfe-5b-ps2, cfe-4a-acdipole, cfe-929-rf, cfe-5e-inst1, cfe-7w-inst1, cfe-4a-rsc.

Quench Analysis: Power Dip at 22:17:16.

Monday-May 03, 2004: **PR-206, Yellow Quench: File# = 1083642181**

Permit ID: **10a-ps3.B** Timestamp: **23:43:00 +1140898** Beam Permit Fail Timestamp: **Still down.**

QPAControl / Timing Resolver: QP05-R8BBQF1-yo8-qd1-qp, Fan, cfe-8b-ps2
Quench Detector(s) Trip: No indications, all systems in Running Mode.
5 Minute: Quench Delay File: No indications, all systems in Running Mode.

Tape Message Logs:
1st attempt = Timestamp = 23:24:11, qdprocess.8b-qd2, (User Issued TAPE Cancelled)
Yellow 6KA Quench Switch Ready
2nd attempt = Timestamp = 23:42:57, Yellow 6KA Quench Switch pulls link because it is told to go off.
At 23:47:58, qdprocess.8b-qd2, (User Issued TAPE Cancelled)

Tech Notes / Sequence of Events:
The quench link trip was caused by the Yellow 6KA Quench Protection Switch located in 1010A. TAPE had been run to recover the previous quench event from the power dip. The Yellow 6KA Switch was sequenced through to the Ready Position before a user invoked cancel had been issued. The user cancel was issued due to a qdprocess.8b-qd2 Tripped fault. The Recovery program was run again from the beginning and issued an off command to the Yellow 6KA causing the 10a-ps3.B to trip the link. G. Heppner

Quench Analysis: Counters = Other.
TAPE Program does not know when 6KA switches are already in the Ready State.

Monday-May 03, 2004: **PR-207, Blue Quench: File# = 1083642974**

Permit ID: **10a-ps3.B** Timestamp: **23:56:12 +2738026** Beam Permit Fail Timestamp: **Still Down**
QPAControl / Timing Resolver: QP03-R4BQT2-bi4-tq4-qp, Fan, cfe-4b-ps4
Quench Detector(s) Trip: No indications, all systems in Running Mode.
5 Minute: Quench Delay File: No indications, all systems in Running Mode.
DX Heaters: No indications of heaters firing.

Tape Message Logs:
1st attempt = Timestamp at 23:36:08, shows QP03-R4BQT2-bi4-tq4-qp, On = NO, (User Issued TAPE Cancelled)
Blue 6KA Quench Switch Ready
2nd attempt = Timestamp at 23:56:10, command was given to turn off the 6KA switches.
Blue 6KA Quench Switch pulls link because it is told to go off.
At 00:04:48, Step #30indicates bi4-tq4-ps = Stby-Error, so at 00:06:50, May 4, 2004, User invoked cancel issued.

Tech Notes / Sequence of Events:
The quench link trip was caused by the Blue 6KA Quench Protection Switch located in 1010A. TAPE had been run to recover the previous quench event from the power dip. The Blue 6KA Switch was sequenced through to the Ready Position before a user invoked cancel had been issued. The user cancel was issued due to bi4-tq4 not on. The Recovery program was run again from the beginning and issued an off command to the Blue 6KA causing the 10a-ps3.B to trip the link. G. Heppner

Quench Analysis: Counters = Other.
TAPE Program does not know when 6KA switches are already in the Ready State.

Tuesday-May 04, 2004: **PR-208, Yellow Quench: File# = 1083646731**

Permit ID: **8b-ps1** Timestamp: **00:58:48 +3444670** Beam Permit Fail Timestamp: **Still Down**

QPAControl / Timing Resolver: QP05-R8BBQF1-yo8-qd1-qp, no faults listed
Quench Detector(s) Trip: No indications, all systems in Running Mode.
5 Minute: Quench Delay File: No indications, all systems in Running Mode.

Tech Notes / Sequence of Events:
Strange, but there is no TAPE message Log of the Link being restored as of the last quench event, PR-206, 10a-ps3.B whereas the 2nd attempt = Timestamp = 23:47:58, qdprocess.8b-qd2, shows a User Invoked Cancel. The 3rd attempt was started at 01:14:52. This attempt followed through to the PS On Checks completing the recovery at 01:24:33, Yellow Link is up. Yo8-qd1-qpa Fan Fault required two fan switches to be replaced. G. Heppner

QLI Recovery TAPE / PS On Checks Commenced: **01:24:33** Estimated Delay Time: 187 minutes

Quench Analysis: Yo8-qd1-qpa, Fan Fault (Two Switches Replaced)

Tuesday-May 04, 2004: **PR-209, Blue Quench: File# = 1083646784**

Permit ID: **10a-ps3.B** Timestamp: **00:59:44 +719690** Beam Permit Fail Timestamp: **Still Down**
QPAControl / Timing Resolver:
Quench Detector(s) Trip: No indications, all systems in Running Mode.
5 Minute: Quench Delay File: No indications, all systems in Running Mode.

Tape Message Logs:
3rd attempt = Timestamp = 00:47:42, User invoked cancel issued, appears they only looked at the following section of TAPE:
*** Running Task RHIC::Quench::QPAs::CheckState ********
4th attempt = Timestamp = 00:53:41, *** Running Task RHIC::Quench::QPAs::SetState ********
0 out of 18 QPA's could NOT have command Reset sent. Done with QPA command.
5th attempt = Timestamp = 01:00:02, the following occurs, pulling the link.
1 B9DQPSW, Reset = NO, Discharge, Open Contactor, Remote On, ERROR: Task paused due to an error 01:00:53, User invoked resume
2 B10DQPSW, Reset = YES, Open Contactor, Remote On, at 01:00:59, User invoked cancel issued.
6th attempt = Timestamp = 01:13:52, #3 bo3-qd1-ps to On = Stby, ERROR: Task paused due to an error, User invoked retry, Systems are restored, Blue Link is up.

QLI Recovery TAPE / PS On Checks Commenced: **01:14:15** Estimated Delay Time: 177 minutes

Tech Notes / Sequence of Events:
The quench link trip was caused by the Blue 6KA Quench Protection Switch located in 1010A. TAPE indicates a problem, see 5th attempt above. No action taken, the 6th attempt was completed, bringing the Blue Link back up. G. Heppner

Quench Analysis: Counters = QPA Faults.
B9DQPSW failed to Reset, causing an error.

Thursday-May 06, 2004: SQ-014; Snake Quench Identified, 3C, File# 1083845901

Snake Permit Fail Timestamp: **08:18:20 +1788567** Beam Permit Fail Timestamp: **08:18:20 +1726357**

Power Supply **yi3-snk7-2.3** Status: = Operating Current of 321.46 amps.
Snapshot Plots: Yi3-snk7-2.3-ps quenched 1st at 8:18:21.700
Power Supply **yi3-snk7-1.4** Status: = Operating Current of 100.36 amps.
Snapshot Plots: Yi3-snk7-1.4-ps quenched 2nd at 8:18:24.333, perturbation occurred 2.633 seconds later
Beam Loss Monitors (Rads/Hr): g3-lm9=923.53, y3-lm7.2-snk=2040.83, b3-lm7.2-snk=2013.21, g3-lm6=4565.44
Qdplots: Data stored but files not found, unable to view plots as there had been a change in the software and graphs at the present time are not displayed for auxiliary quenches.

Tech Notes / Sequence of Events:
8:18: Beam Abort, 10a-ps3.A dropped {Loss Monitor 1} Sequencer
8:56: Yellow snake quench in 3C. gjm

9:30: Snake trip was caused by 3c-qd1 quench detector. The quench detector tripped because of a real quench in yi3-snk7-2.3 coil 3 inner. The beam permit tripped .062 sec. before the snake trip. There was beam losses at y3-lm7.2 snk. Magnet yi3-snk7-1.4 also quenched due to warm gas from the yi3-snk7-2.3 quench. There is now 4 beam induced snake quenches for this run. Ganetis [quench

Spin / Snake Tape Recovery Commenced: **09:53:01** Estimated Delay Time: 95 minutes

Quench Analysis: Beam Induced #004.

Friday-May 07, 2004: PR-210, Blue Quench: File# = 1083957793

Permit ID: **(8b-ps1)** Timestamp: **15:23:12 +1479392** Beam Permit Fail Timestamp: **15:23:12 + 1468346**

QPA Control / Timing Resolver: b-B1 QLI; BI4, DX-QLI Out; BI3, b-A1 QLI; BI2, b-QD QLI BI1
Quench Detector(s) Trip: (8b-qd1), B7QFQ2_VT Int. 1, Tq-24, No auxiliary trips.
5 Minute: Quench Delay File: No indications, all systems running.
Main Magnet Power Status: Injection Current, Dipole = 473 amps, Quad = 457 amps.
Main Magnet Control Page (4b-ps3): Normal trip fault responses.
DX Heaters: None fired.
Beam Loss Monitors (Rads/Hr): Sector 7: g7-lm20=632.70, g7-lm11=1059.77, g7-lm10=602.68, g7-lm7=604.58, g7-lm5=4179.05, b7-lm3.1=48.88 and g7-lm1=11.86
Postmortems / Snapshot: bo7-qf2-ps Iref took off from 5.94 amps to 149.99 amps instantly. Wfg's remained constant, not commanding the supply, sudden change in current is probable cause for pulling the quench detector.

QLI Recovery TAPE / PS On Checks Commenced: **15:53:25** Estimated Delay Time: 30 minutes

Tech Notes / Sequence of Events:
Multiple IR supplies in sector 8 show current values moving prior to T=zero, Beam loss is seen minimal to a high level at g7-lm5 throughout this sector most likely due to the sudden magnetic field changes caused by bo7-qf2 and its nesting supplies. Even though the Iref had told this supply to go to maximum output value, supply was reset and Beam Operations continued with no further investigation which may lead to a faulty Fiber Optics card. G. Heppner

15:23: Quench Link Interlock in Blue ring, 8b-ps1 dropped first Sequencer
23:48: Blue quench link trip was caused by 8b-qd1 quench detector. The quench detector tripped because of a sudden jump in current on bo7-qf2-ps. The reference jumped to full current and the power supply tried to follow. Ganetis [quench]

Quench Analysis: Power Supply, bo7-qf2-ps

Tuesday-May 11, 2004: **PR-211, Blue Quench: File# = 1084319850**

Permit ID: **(7b-ps1)** Timestamp: **19:57:28 +2701153** Beam Permit Fail Timestamp: **19:57:24 +2280914**

QPA Control / Timing Resolver:
Quench Detector(s) Trip: 7b-qd1, B6DSA4_A3VT, Int. 100, Tq-24, No Auxiliary trips.
5 Minute: Quench Delay File: None indicated, all systems running.
Main Magnet Power Status: At Store Energy, ramping down had begun, tripping at the following current values:
Dipole = 1926.64 amps, Quad = 1864.53 amps.
Main Magnet Control Page (4b-ps3): Normal trip responses.
DX Heaters: None fired.
Beam Loss Monitors (Rads/Hr): Beam had been dumped prior to this event.
Postmortems / Snapshot: Nothing unusual, supplies not the cause.

QLI Recovery TAPE / PS On Checks Commenced: **(see Blue Quench PR-213)**

Tech Notes / Sequence of Events: (see Yellow Quench PR-212, 9b-ps1, File# = 1084319852 below)

Quench Analysis: Wrong Ramp Factor used, Operator/Controls.

Tuesday-May 11, 2004: **PR-212, Yellow Quench: File# = 1084319852**

Permit ID: **(9b-ps1)** Timestamp: **19:57:32 +469352** Beam Permit Fail Timestamp: **19:57:24 +2280915**

QPA Control / Timing Resolver:
Quench Detector(s) Trip: 5b-qd1, Y4DSA4_A3VT, Int. 100, Tq-24
9b-qd1, Y9DSA3_A2VT, Int. 100, Tq-23
No Auxiliary trips.
5 Minute: Quench Delay File: None indicated, all systems running.
Main Magnet Power Status: At Store Energy, ramping down had begun, tripping at the following current values:
Dipole = 1926.64 amps, Quad = 1864.53 amps.
Main Magnet Control Page (4b-ps3): Normal trip responses.
Beam Loss Monitors (Rads/Hr): Beam had been dumped prior to this event.
Postmortems / Snapshot: Nothing unusual, supplies not the cause.

QLI Recovery TAPE / PS On Checks Commenced: **21:01:05** Estimated Delay Time: 64 minutes

Tech Notes / Sequence of Events:
19:45: smoke alarms in PHENIX are continuing to alarm, we are preparing to dump the beam for an access mcr
21:00: Several HSSD Lo Smoke or Malfunction alarms were received from PHENIX. RHIC beams were dumped to access the IR. Charlie Pearson came in and investigated the cause. Charlie determined that the A/C heaters had activated due to high humidity. The alarms were cleared. The Fire Department was present at PHENIX.
21:30: Blue and Yellow quench links came down during the emergency ramp down for PHENIX. Blue QLI recovery script hangs up. Wing Louie and Roger Lee are investigating.
22:15: Wing informs us that if the recovery script has been in an out of sequence state during the rerun of the script. He brought the link down and started the sequence again.

May 12 2004 00:13: Both blue and yellow link trips were caused by the down ramps going to fast. The wrong slow factor was used. This should be controlled by the WFG manager and this should not have happened. Someone from controls should look into this. Ganetis [quench]

Quench Analysis: Wrong Ramp Factor used, Operator/Controls.

Tuesday-May 11, 2004: PR-213, Blue Quench: File# = 1084327180

Permit ID: **(2b-ps1)** Timestamp: **21:59:40 +327644** Beam Permit Fail Timestamp: **21:59:40 +327673**

QPA Control / Timing Resolver: QP05-R2BQD1-bo2-qf8-qp, no faults listed.
Quench Detector(s) Trip: None, all systems running.
5 Minute: Quench Delay File: None indicated, all systems running.
Main Magnet Power Status: Zero Currents
DX Heaters: None fired.
Beam Loss Monitors (Rads/Hr): Beam had been dumped prior to this event.
Postmortems / Snapshot: Nothing unusual, supplies not the cause.

QLI Recovery TAPE / PS On Checks Commenced: **22:11:29** Estimated Delay Time: 134 minutes

Tech Notes / Sequence of Events:

This event is a continuation related to the two previous Quench Events (PR-211 and PR-212) G. Heppner

21:46: R. Lee and W. Louie are looking into the problem with the blue recovery

22:15: Wing informs us that if the recovery script has been in an out of sequence state during the rerun of the script. He brought the link down and started the sequence again. MCR

May 12 2004 00:15: Blue link trip was caused by bo2-qf2-ps. This p.s. had an error and AC phase faults. It looks like these faults happened when the p.s. was turned on. There also was a problem when turning on the blue main quad p.s. Ganetis [quench]
May 12 2004 9:20: Tape had been run and it halted at 21:07:56 due to an error when checking 2b-qd1. After this at 21:12:02 Tape tried to turn on the dipole when it was in the wrong state due to many of the Tape steps being skipped, including setting the state of the mains to OFF. CS

Quench Analysis: Tape Sequence Out of Order, Operator/Controls

Wednesday-May 12, 2004: **PR-214, Blue Quench: File# = 1084380434**

Permit ID: **(8b-ps1)** Timestamp: **12:47:12 +2486808** Beam Permit Fail Timestamp: **12:47:12 +2468857**

QPA Control / Timing Resolver: b-QD QLI BI1
Quench Detector(s) Trip: 8b-qd1, B7QFQ2_VT Int. 1, Tq-24, no Auxiliary trips.
Minute: Quench Delay File: 8b-qd1, B7QFQ3_VT and B8QFQ3_VT
Main Magnet Power Status: Store Energy.
Main Magnet Control Page (4b-ps3): Normal trip responses.
DX Heaters: None fired.
Beam Loss Monitors (Rads/Hr): Scattered Beam in Sector 7 and 8, most significant to the Magnets taps list above: B7-lm3.1 = 4617, g7-lm1 = 4859, b7-lm0 = 4613, b8-lm3.1 = 4919, b8-lm3.2 = 4799 and Spin Rotator b8-lm-srt.mc=2866
Postmortems / Snapshot: Supplies in seen in a Ramping condition, bo7-qf2-ps Iref took off from 5.75 amps to 149.99 amps instantly. Current tried to follow, maximizing out at 122.74 amps, most likely the cause for pulling the quench detector.

QLI Recovery TAPE / PS On Checks Commenced: **(See PR-216)**

Tech Notes / Sequence of Events: Called MCR that I wanted to replace the fiber optics card as I saw this same problem and sequence of events that had occurred on Friday May 7, reference to PR-210. At that time they decided to recover and continue without further investigation. However, they had already commenced bringing up the Link and it was decided to complete the recovery and then ramp down to zero so the Fiber Optics card could be replaced. G. Heppner

13:56: blue quench link trip was caused by 8b-qd1 quench detector. The quench detector tripped because the iref. for bo7-qf2-ps jumped up to full current. The beam permit tripped .018 sec. before the quench link due to beam loss. There were two real magnet quenches at b7q3 and b8q3. There were high beam losses at b7-lm3.1 and b8-lm3.1. The beam loss was due to the p.s. sudden change in current. The fiber optic interface card should be replaced. Ganetis [quench]

Quench Analysis: Power Supply Beam Induced #004, bo7-qf2-ps.

Wednesday-May 12, 2004: PR-215, Blue Quench: File# = 1084382171

Permit ID: **(8b-ps1)** Timestamp: **13:16:08 +3602577** Beam Permit Fail Timestamp: **12:47:12 +2468857**

QPA Control / Timing Resolver: QP03-R8BBQF2-bo7-qf2-qp, #7 in Group 1 of A2.
Quench Detector(s) Trip: All systems restored and running.
5 Minute: Quench Delay File: All systems restored and running.
Main Magnet Power Status: Zero Currents
Main Magnet Control Page (4b-ps3): Normal trip responses.
DX Heaters: None fired.
Beam Loss Monitors (Rads/Hr): N/A
Postmortems / Snapshot: N/A

QLI Recovery TAPE / PS On Checks Commenced: **(See PR-216)**

Tech Notes / Sequence of Events:
(Reference to Quench Event PR-214, File# 1084380434 above)

13:56: blue quench link trip was caused by bo7-qf2-ps being turned off. The p.s. was turned off to replace its fiber optic interface card. Ganetis [quench]

Quench Analysis: Replacement of bo7-qf2-ps Fiber Optics Card.

Wednesday-May 12, 2004: PR-216, Blue Quench: File# = 1084387701

Permit ID: **(10a-ps3.A)** Timestamp: **14:48:20 +1405435** Beam Permit Fail Timestamp: **12:47:12 +2468822**

QPA Control / Timing Resolver: QP05-R10ABQF1-bi9-qf1-qp, #8 in Group 1 of A1.
Quench Detector(s) Trip: 10a-qd1, B9QFQ1_VT Int. 1, Tq+1777
5 Minute: Quench Delay File: All systems restored and running.
Main Magnet Power Status: Zero Currents
Main Magnet Control Page (4b-ps3): Normal trip responses.
DX Heaters: None fired.
Beam Loss Monitors (Rads/Hr): N/A
Postmortems / Snapshot: N/A

QLI Recovery TAPE / PS On Checks Commenced: **14:59:18** Estimated Delay Time: 132 minutes

Tech Notes / Sequence of Events:
15:33: bi9-qf1-ps was manually tripped to Off to bring down the link because TAPE had already been started and halted due to the following sequence of events. Bo7-qf2-ps Fiber Optics card was replaced and permission to bring the link up was given. In the process, bi5-tq4-ps would not recover. TAPE was halted once again, the AC Adapter that plugs into the Surge Protector was intermittent causing the QPA to lose power, replaced adapter. Permission to continue with bringing up the link, bi9-tq6-qpa developed an OVC Fault that could not be reset. Replaced the QPA. So, since TAPE now had to be restated, the link was pulled to start from the beginning. Note: Temperature in the service buildings are warm. G. Heppner

Quench Analysis: (Controls) Manual Trip of bi9-qf1-ps to restart TAPE.

Friday-May 14, 2004: SQ-015; Snake Quench Identified, 9C, File# 1084542549

Snake Permit Fail Timestamp: **09:49:08 +1995050** Beam Permit Fail Timestamp: **09:49:08 +1864012**

Power Supply **bi9-snk7-2.3** Status: = Operating Current of 326.43 amps.
Power Supply **bi9-snk7-1.4** Status: = Operating Current of 120.21 amps.
Beam Loss Monitors (Rads/Hr): Sector 9 lost scattered beam up to and affecting: b9-lm7.2-snk=240.42, b9-lm7.1-snk=2003.04, g7-lm7=1876.53
Qdplots: Indicates that bi9-snk7-1.4 had quenched due to perturbation (heat Transfer) 1.95 seconds after bi9-snk7-2.3 quenched.

Spin / Snake Tape Recovery Commenced: **10:53:17** Estimated Delay Time: 64 minutes

Quench Analysis: Beam Induced #005.

Friday-May 14, 2004: PR-217, Blue Quench: File# = 1084542551

Permit ID: **(10a-ps3.A)** Timestamp: **09:49:08 +3148333** Beam Permit Fail Timestamp: **09:49:08 +1864014**

QPA Control / Timing Resolver: b-BP QLI BI4; b-A1 QLI BI3; b-A2 QLI BI2; DX-QLI Out BI1
Quench Detector(s) Trip: (10a-qd1), B9QDQ8_VT, Int. 20, Tq-24, No Auxiliary trips.
5 Minute: Quench Delay File: None indicated, all systems running.
Main Magnet Power Status: At Injection Current.
Main Magnet Control Page (4b-ps3): Normal trip responses.
DX Heaters: None fired.
Beam Loss Monitors (Rads/Hr): Beam had been scattered in sector 9, causing the Snake Magnets to Quench, producing a heat wave that caused B9QDQ8 Buss to Quench, pulling the 10a-qd1 Quench Detector.

Postmortems / Snapshot: Nothing unusual, supplies not the cause.

QLI Recovery TAPE / PS On Checks Commenced: **10:49:20** Estimated Delay Time: 60 minutes

Tech Notes / Sequence of Events:
9:51: Oops, the spin flipper certainly is the cause of the snake quench. I was too brave. Mei
9:56: second thought, I am confused about this loss pattern. The loss is so fast. I am not sure whether the spin flipper is capable of generating this kind of fast loss. Mei

11:23: Snake trip was caused by 9c-qd1 quench detector. The quench detector tripped because of a real quench in bi9-snk7-2.3 coil 2 inner. The beam permit tripped .131 sec. before the snake trip. There was beam losses at b9-lm7.1 snk. Magnet bi9-snk7-1.4 also quenched due to warm gas from the yi3-snk7-2.3 quench. There is now 5 beam induced snake quenches for this run. The blue link also tripped due to a bus quench at B9QDQ8_VT. The bus quench was caused by the warm gas from the bi9-snk7-2.3 snake quench. Ganetis [quench]

Quench Analysis: Buss Quench

Saturday-May 15, 2004: **PR-218, Blue Quench: File# = 1084623138**

Permit ID: **(4b-time.A)** Timestamp: **08:12:16 +2649521** Beam Permit Fail Timestamp: **07:46:28 + 2132407**

QPA Control / Timing Resolver: QP06-R4BOFF1-b-qtrim-qp, 1st in Group 1, no faults indicated.
Quench Detector(s) Trip: (4b-qd1), B4IMONBPQ, Int. 1, Tq+948
5 Minute: Quench Delay File: (2b-qd2) Y2QFQ2_VT, listed 7 times.
Main Magnet Power Status: Zero Currents
Main Magnet Control Page (4b-ps3): Normal trip responses.
DX Heaters: None fired.
Beam Loss Monitors (Rads/Hr): No Beam in the Machine.
Postmortems / Snapshot: N/A

QLI Recovery TAPE / PS On Checks Commenced: **(FY05)** Estimated Delay Time: N/A minutes

Quench Analysis: (No Counters) Summer 2004 Shutdown.

Saturday-May 15, 2004: **PR-219, Yellow Quench: File# = 1084623143**

Permit ID: **(4b-time.A)** Timestamp: **08:12:20 +3800745** Beam Permit Fail Timestamp: **07:46:28 + 2132407**

QPA Control / Timing Resolver: QP06-R4BOFF2-y-qtrim-qp, 1st in Group 1, no faults indicated.
Quench Detector(s) Trip: (4b-qd2), Y4IMONBPQ, Int. 1, Tq+912
5 Minute: Quench Delay File: (2b-qd2) Y2QFQ2_VT, listed 7 times.
Main Magnet Power Status: Zero Currents
Main Magnet Control Page (4b-ps3): Normal trip responses.
Beam Loss Monitors (Rads/Hr): No Beam in the Machine.
Postmortems / Snapshot: N/A

QLI Recovery TAPE / PS On Checks Commenced: **(FY05)** Estimated Delay Time: N/A minutes

Tech Notes / Sequence of Events:
All Supplies had been ramped down to zero currents by MCR.
Permission to bring down the Links and secure for the Summer Shutdown was given and carried out. G. Heppner

7:40: Called several PASS experts, either not available or not familiar with the failure mode. This concludes the end of the run. Haixin
7:46: Beam Abort, 4a-bsyn dropped {RF Blue Accel} Sequencer
8:12: Quench Link Interlock in Blue ring, 4b-time.A dropped first Sequencer
8:12: Quench Link Interlock in Yellow ring, 4b-time.A dropped first Sequencer
9:03: Sorry that it has to end this way. Kin Yip

Quench Analysis: (No Counters) Summer 2004 Shutdown.

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