RHIC Retreat 2011
Operations Session Summary

P. Ingrassia

Friday 22 July

SUPPORT AND MAINTENANCE

P. Sampson

Shutdown '10 and Start up '11

- Very ambitious, large amount of work (typical)
  - Many jobs continued through the run
  - Very short Booster window (NSRL)
- Despite challenges, machines were available on schedule

Maintenance Days

- Scheduled to support both experimental, facility and accelerator needs.
- "Maintenance" work encompasses :
  - Installation, testing, commissioning
  - New installs
  - System repair
  - Access for PM of systems and infrastructure
- Planning for recovery:
  - Included formal procedure for return to operation
  - Configuration, controls and instrumentation changes are common and must be reviewed
  - Component change and repair was followed by system check out and return to operation

Continued Maintenance Improvements

- Large reduction in preventable delays following maintenance periods
  - Contingency and recovery plans part of Job Request
- Un-reviewed work (mostly) eliminated
- Excellent team work:
  - CAS, MSG, MCR, ESF, IFM and CAD Groups
- Scheduling Meeting and Web Sites
  - Crucial for planning
  - Most groups are sending representation to the meetings, reducing "surprises"
  - All are informed of schedules via email and web pages…

Run 11: Maintenance Days

- Complex running conditions
  - Ions from Tandem and EBIS, Polarized Protons from LINAC
  - BLIP, NSRL running
  - Polarized, EBIS and Au Intensity development
- Major commissioning, repair and upgrade work
  - 9 MHz and associated system commissioning
  - Stochastic cooling
  - Polarimeters
  - PHENIX VTX detector installation and repair
  - AGS PP Jump quads
  - Others…

Recovery following Maintenance

- A strong focus was on improving recovery to full running parameters
- Tiered approach to Maintenance:
  - Injectors off early, recovered early
  - Structured turnaround, well defined machine states
  - Work coordination and timing reduced delays associated with area sweeps, resets etc.
- Prioritization
  - Approval process helped to reduce elective work and associated delays
- Scheduling of APEX on different weeks FY11 removed potential impact on recovery

Present and Future Focus

- Explore potential preventable failure and address during shutdown
- Emergency/backup power and UPS system assessment, review and recommendations
- Single point and critical system failure scenarios, potential for emergency response
  - Portable high power generators
  - Multiple or switchable power feeds
  - Procedural solutions
- Improvement and maintenance to infrastructure
  - Working with IFM and others to improve procedures, methods and execution of upgrades PM, PPM
  - Improving response: minimize duplicate work planning…

Conclusions:

- Though start up this year was complicated by many factors, early injector start up proved to be an asset
- Careful scheduling and execution of shutdown jobs is essential for a successful start up.
- The present methods for Maintenance Days during the run have minimized their affect on the program
- There may be room for improvement while recovering from maintenance by reducing setup, tuning, development and tests before returning to Physics

Conclusions II:

- With the advances in tools and methods for maintenance, the associated negative impact has been greatly reduced during the run
- By preparing opportunistic maintenance schedules, unexpected down periods can be utilized to our advantage
- Cooperation and participation of all parties is essential for continued success in the CAD Maintenance Program
- Thanks to all for a very successful Maintenance Program during the FY11

Effectiveness of the RHIC Dry Run

2011 RHIC Retreat

Thursday, July 21

Joseph Piacentino, Jr.

Thanks to:
J. Laster, J. Morris, M. Minty,
S. Nemesure, T. D'Ottavio,
H. Huang, M. Bai, L. Hoff, G. Marr

What is the Dry Run?

- Essentially, the testing of the Operational Software with the underlying infrastructure
  - An opportunity to raise warning flags about systems that may not be ready for run start
  - An opportunity to setup and retest systems that have not changed since the previous run
  - An opportunity to update configurations
  - A semi-final integration test for systems that are new or that have changed

- A testing process where the effects of possible failures are intentionally mitigated

Dry Run Planning

- 74 Systems Identified for inclusion in the Dry Run

  (8 Systems had No Recorded Check-Out Plan)

  - 59 Completed
  - 13 Required more time to complete*
  - 1 Delayed*
  - 1 Not recorded*

    * No additional information recorded

Infrastructure - Day 1 (Dec 6)

Abort System (J Mi, L Ahrens)

Alarm System (G Marr, S Nemesure)

BERT (S Nemesure, G Marr)

Beam Loss Accounting System (J Laster, ...)

Call In Lists (G Marr)

...

Operations, Inst & Systems - Day 2 (Dec 7)

AGS IPM (S Jao, L Hoff)

AGS Online Model (V Schoefer)

AtR (V Schoefer)

AtrMagMan (B Olsen, G Marr)

Backups (J Piacentino)

10Hz Feedback (R Michnoff, M Minty)

...

Systems - Day 3 (Dec 8)

ARTUS (J Laster, A Drees, R Michnoff)

Collimators (A Drees, W Fu)

Gamma_tr Jump Quads (C Montag)

Gap Cleaner/Collimator (A Drees, W Fu)

Injection Damper (A Drees, R Michnoff)

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Instr and Feedback Systems - Day 4 (Dec 9)

AC Dipole (M Bai, P Oddo, J Aronson, L Hoff)

AGS G5 Wall Cur Monitor for RHIC Inj (P Menga)

AGS Polarimeter (H Huang, K Yip, S Nemesure)

Chrom FB (S Tepikian, A Marusic, M Minty)

Coherence Monitor (R Michnoff, R Hulsart)

Case III of 3: Collaboration Tools

- Dry Run and Run Start Up benefit most from collaboration
  - Communication Tools (EVO)
  - Offsite Access (NX)
- Testing
  - Dry Run – None
  - Post Dry Run - None

Case III: Collaboration Tools

- Run Results
  - Local BNL EVO Server had configuration issues
  - NX Access resulted in garbled fonts for older NX Clients
- Configuration Effort best performed during Dry Run
  - include this in future Dry Runs
- Dry Run Effectiveness
  - this was a missed opportunity

Some Problems Not Caught During the Dry Run

- Yellow ring injection kicker timing cable unplugged (>1 shift down)
- Multiple OptiCalc and RampManager crashes
- Need for changes to RhicInjection to work with 9 MHz system
- BLM events not configured operationally (triggered during DX training)
- Broken STAR ZDCs
- Sequencer not updated with new RF cavity parameters
- RHIC first-turn and ATR BLMs not running synchronously and/or RHIC BLM first turn triggering issues (stale data presented to user)
- Tune window for RhicInjection needed adjustment
- Some problems with IPM manager and beam sync link handshake – waiting too long to trigger measurement

Some Systems Not Included in the Dry Run - But Perhaps Should Have Been

- Beam permit configuration
  - completed 01/12/11
- Snake bump management
  - started run without snakes but with snake bumps
- Vetting of the loaded optics
  - a continual source of downtime
- Stone anchoring schemes
  - snake values were anchored at stone 3 causing a QLI
  - skew quad settings were zeroed and anchored at Store stone (another QLI)
- Initial optics had no “tune swing”

Considerations

- How do we address testing for the change of species?
  - e.g. RF Cavities
- Should Dry Run procedures be executed when a species change occurs (e.g. as in run11, a switch from proton to gold operations)?
- Should Dry Run procedures be mirrored (or extended) to include with-beam checkout?
- Are we motivated for the Dry Run?
- Is the list of systems to test complete?
- How can we quantify the effectiveness of future Dry Runs?

Improvements

- Dry Run planning should start at RHIC retreat
- Keep track of prerequisites for each system test
  - Dry Run Coordinator should manage
- Improved recording tools – Wiki best tool?
  - Content and Ease of Use
- Operations should be included in the planning phase
  - Recognize problem areas to be added to the next Dry Run
- Failure Scenarios
  - is this part of our Dry Run?
  - should this be part of the Dry Run?

THE VIEW FROM MCR

What We Like/What We Didn’t

T. Shrey

Positives

- A good run for Operations
  - Experience level is at an all time high
  - Experts have been letting the Operators get involved and do more than just ‘inject and fill’
- RampStorageServer
  - Universally regarded as a huge upgrade over the ‘try and remember to change TAPE’ method
  - Entries on the page should be maintained by one person for continuity
    - The labeling is not always clear, what makes sense to an expert does not always make sense to an operator
- Al
  - The man was a machine, fixing stuff at all hours and always available

Negatives

- AI – what we did not like
  - A single point failure.
  - Communication between MCR and AI is not always clear due to the vast differences in expertise levels
    - Echo back
- Machine Development where we ‘wing it’
  - We still consistently lack a plan and a single person who is in charge of executing the plan

Negatives

- Feedback checks
  - A computer can surely check the health of the system faster and more accurately than a person
- The new time delay for Ramp changes
  - Technical hurdle, but it *really* needs to be resolved
- Experimental crews aren't consistent on what 'good running' really means

Negatives

- Polarization measurements
  - More time spent during Setup than any other component of a store turnaround
  - Polarization system is consistently a couple runs behind the rest of the machine systems as far as efficiency
    - Feedback system for data rates? Why does an operator have to 'tune' the rate?
    - Application is bug-ridden given the added features
    - We are limited to one plane at a time. There are 3 measurements on every ramp and 3 more throughout the store. Cutting the time in half DIRECTLY results in more time in Physics.
    - The system will not let you start a new measurement until it has fully completed the analysis part..

Negatives

- “Not our problem” attitude
  - If we call an expert for help we genuinely need their help, not a lecture or dismissal
- Retreat attendance
  - Open Retreat to more C-AD staff (like operagtors)

NEW MAIN CONTROL ROOM: PROJECT OVERVIEW AND OPERATIONS IMPACT

L. Hammons

RHIC Retreat 2011

21 July 2011

Project Scope

- Achieve operational integration and upgrade of current control facility
  - Construction of new, modern control room
    - Improved integration of operations groups
    - Improved working capacity within the control room
    - Allow for present and future expansion of department operations
    - Achieve greater productivity
  - Upgrade of technology to support new control room
    - Limited upgrade to controls software and hardware
    - Upgrade to network infrastructure
    - Integration of modern communication technology

Integration of Operations Staff

- More effective communication among groups
  - Cryogenics
  - CAS
  - Siemens
  - MCR Operators
- Coordination of effort
- Higher operational productivity
- Accommodate expansion of facility

Features of New Control Room

- Expanded Physical Space
- Improved Ergonomics
- Upgraded Technology
- Aesthetic Considerations and Usability

Operations Impact - Benefits

- Integration of operations teams
- Accomodates large number and wide variety of users
- More efficient, more productive operations
  - Cross-training
  - Cross-cultural communication
- Modern, functional, attractive facility designed for many years of use and expansion

Operations Impact - Challenges

- Learning curve
  - Changes to applications
  - Changes to workflow
  - Training required to ease transition
- Cross-training
  - Adjustment to new cultures and practices
  - Opportunity for learning and growth
- Dry run planned in early September

MACHINE SETUP: CAN IT BE REDUCED?

2011 RHIC RETREAT

July 21, 2011

Tasha Summers

Motivation

Examine usage of machine setup time, can it be reduced, should it be less broadly defined?

From Jan 8th to end of run June 28th:
4121 total hours
1234 hours in Machine Setup 30%

During Production:
3053 total hours
582 hours in Machine Setup 19%

Pre-production, PP -> Au and Au energy changes
1068 total hours
652 hours in machine Setup 61%

Machine Setup - Protons

Accounted for (but could be better):

- wait at injection for rotators (1-3 mins).
- at injection, delay for prep
- polarization measurements: 5 mins each x 3 before Physics-On
- Up: 40 seconds of setup before accramp
- Often hang on FDA data collection
- 20s delay for gap cleaning start
- Inefficient/repeated polarization measurements

What's the other time used for?

- Failed ramps/fills. Fill… Up … time logged as Setup.
  ~ 45 failed fills (no ramp)
  AGS extract, linac, blms, rf…
  ~ 63 failed ramps
  BLMS, feedbacks, instabilities, QLIs…
- Re-setting up due to injector failures.
  Linac phase jumping, H10…
- Extended injection tuning
  - would benefit from faster ATR tuning, working 'Apply V', tune/coupling feedback
  @ injection
- Troubleshooting/development
  ~ 10 test ramps in setup
  ~ feedbacks, rotator devel, BPM testing ~ 7 accesses in setup

Machine Setup 200 GeV Au

- 4 minutes for fill
- 1-2 mins for setup before accramp
- 9 mins from accramp to lumi
- 4-5 mins from lumi to physics
- 17 mins from lumi-off to newfill
- 1.5 mins from newfill to down.tape done
- ~40 mins per store
  x 162 stores = 108 h
  (183 h setup)

- 27 refills (no ramp)
  - BBQ locks,
  - manager resets prep/re-prep,
  - chipmunk interlocks (bad AGS transfers)
  - source problems (15 documented foil changes during inj setup)
- 50 failed ramps
  - RF
  - kicker prefires
  - store adjustments
  - PS failures
  - QLIs…
- 3 test ramps
- AnDY setup 1 hr
- Post maintenance (YRF)
  - 7.45 hrs:

    orbit fb, yellow vac recovery, wiggles ramp, RF condition…

What's Helped, What's Needed

- RampStorageServer!
- 'Fix Orbit' feedback at injection
- RhicInjection
  - longitudinal correction great (and applyH usually)
- Availability of expert help for troubleshooting/repairs
- Hysteresis flags (avoid 'backToInjection' steps)?
- Optimize tape sequences
- Tune feedback at injection?
- RhicInjection 'applyV' improved
- ATR orbit automate
- Setup vs troubleshooting
- Define setup as leading to physics store, rest failure/development?
- Usual theme: more time for op training could reduce tuning time