

## **MINOS Operations Notes Jan-Feb-Mar Quarter 1 2007**

**Contents – use PDF Bookmarks to navigate**

**[MINOS Operations, Jan 17, 2007](#)**

**[MINOS Operations, Jan 22, 2007](#)**

**[MINOS Operations, Jan 29, 2007](#)**

**[MINOS Operations, Feb 5, 2007](#)**

**[MINOS Operations, Feb 19, 2007](#)**

**[MINOS Operations, Feb 26, 2007](#)**

**[MINOS Operations, Mar 5, 2007](#)**

**[MINOS Operations, Mar 12, 2007](#)**

**[MINOS Operations, Mar 19, 2007](#)**

## **MINOS Operations, Jan 17, 2007**

Apologies for not posting any reports for.... a month. Holidays, travel, etc. Plus the fact that the main holiday days fell on Fridays and Mondays, which meant no MINOS Ops meetings, no All Experimenters meetings, and neither of the two main Accelerator Ops meetings which normally occur each week.

This report covers main topics during the holidays and to-date.

### **Accelerator Operations**

Accelerator running was smooth for NuMI beam through most of the holiday period. Record POTs delivered on target for 3 weeks in a row.

The P-bar group has agreed to do studies, to increase the MI cycle in Mixed mode from 2.4 to 2.2 seconds. This is part of a move to increase beam power to the NuMI target. Beam power depends on protons per pulse, and how frequently those pulses are delivered. For most of this coming year, protons per pulse is limited to at most 6+2 (6 standard batches plus 2 slipped stacked) and this "best case" is only in NuMI-only mode. The amount of time spent in NuMI-only mode is steadily decreasing, due to the machine people getting more efficient at transferring stores into the Tev. So instead we need to concentrate on what can be done in Mixed-mode to improve NuMI beam power. The first item is to reduce the Mixed-mode cycle time from 2.4 to 2.2 seconds.

MI is ready to use the MI-8 collimators, which is expected to control losses, in particular during slip-stacking running. They will test the use of them slowly over the next couple of weeks.

Mini-Boone turned off just after Xmas, to allow for a cool-down of their decay-absorber area. Their observed drop in neutrino rate was not due to problems in their target, but a problem in their absorber area. They have steel plates hanging by chains in this area; when lowered into the beamline they attenuate the pion spectrum and in turn the neutrino beam spectrum. All these plates had been raised up out of the beam; the chains broke on two of them and these dropped down into the beam. The Sci-Boone enclosure construction had a crane in that area, which allowed removal of the shielding so the problem could be discovered. Sci-Boone expects a non-attenuated neutrino beam, so the plates need to be put back into place - the cool-down plus time required to unstack and re-stack steel blocks might just take all the time between now and when Sci-Boone expects to be ready. There is an investigation into why the support chains failed.

With Mini-Boone off, NuMI gets a bit more beam, and (more important) Booster operations become simpler. On the other hand, the Meson Test Beam area is again open for business, and gets beam - the Main Injector cycle timeline changes when sending beam to Meson, with the effect of a reduction in beam power to NuMI (protons delivered in a given amount of time).

## **NuMI Operations**

There was a problem with the Muon Monitor readout on New Years day, resulting in a loss of data. While the cause is still being investigated it appears that changes made to the Timeline for the purposes of non-NuMI-related studies caused the loss of data because the Muon Monitor read-out modules received the wrong timeline signals to function properly. It appears that only the Muon Monitors were affected by the change, and not any other NuMI devices, nor the timing signals given to the Detectors. Such Timeline changes will not be done in future in an arbitrary way, and not without informing NuMI people (at least that's the plan.....)

See the All Exp Mtg presentation from January 8th for a summary of the previous 3 weeks of NuMI running.

## **Detector Operations**

Both Detectors behaved quite well during the holidays. A build-up of CAPID-error boards in the Near, but still only a dozen or so among 10,000 channels.

The biggest excitement was New Years Day at the Far Detector, when a power supply in a CDMS rack shorted and smoked. Power shut down automatically to the rack and to the Lab as per design, and the Crew got to use all the emergency gear on the initial inspection underground. All safety plans and protocols functioned well. FNAL ES&H is conducting a review of the causes of the problem, but this is a CDMS concern, and not MINOS's. There were a few glitches in getting the detector back up once power was restored, mostly in the DAQ, but everything was back up and running before the end of the day.

## **MINOS Operations, Jan 22, 2007**

### **Accelerator Operations**

Very good beam running last week, until the weekend when several things broke and caused downtimes. The worst of these is the Proton Source. Over the weekend the current (in place) Source started to fail. The output current (amperage) is way down. The spare Source, which was the in-place Source until removal before the Xmas holidays, is not yet ready - it needs parts which are still being fabricated. Until that device is ready the machine complex just has to limp along with reduced proton intensity. The Linac and Booster had downtimes during the weekend but do not need any tunnel work as of now. MI ran pretty well through the past week. Pbar also ran OK and reports continuing efforts on 2.2s cycle studies. In fact, they propose to continue running at the 2.2s cycle because it allows them to keep up with p-bar production in spite of the reduced proton intensity due to reduced Source current.

The TeV is currently in access. Sparking in the TeV separators is causing problems with shot setup and retention of stores during the past several days - they had much more downtime than we did. SY120 is commissioning this week, which will result in ~5% reduction in beam to NuMI when it is running.

Today's Plan - finish the current TeV access. When TeV is back up, get the next shot of accumulated p-bars into the TeV. Then accesses or other work can be done on any of the upstream machines. Then continued running at reduced intensity until parts for Source are ready for installation.

--> at 11:30am MCR calls to say that around noon the Source will spend 2 hours to do a bit of hardware work on the in place Source, to attempt to increase its output for the next several days. Beam off to NuMI for 2hrs.

--> when beam returned the Source intensity had indeed increased a bit, but not up to "normal".

### **NuMI Operations**

NuMI had ramp control problems on Sunday which affected the Lambertsons, but fixed very quickly. There is a water leak in the NuMI beamline LCW - location unknown but has been narrowed down to the portion of the beamline located in the Main Injector tunnel. While the LCW level monitors are difficult to interpret, it appears that there should be a 100 gal or so puddle somewhere - but there has not been a Main Injector access for some weeks.

No further news on the Muon Monitor readout problems which occurred on New Years Day.

### **Detector Operations**

Both Detectors have behaved quite well over the past week. The monthly Far Det LI gain curve took the entire weekend to run, which made the Singles plots useless for

diagnosis, which meant we could not monitor a particular noise channel as requested by Far Det on Friday.

## **MINOS Operations, Jan 29, 2007**

### **HV101-1 Replacement Schedule**

The following is the replacement schedule as proposed by AD Mechanical (some break/lunch times factored in). The next Store was expected to be ready between 00:00-02:00 Tuesday. Based on that - the MI access would begin 04:00 Tuesday. This schedule will be adjusted as the work proceeds.

Actual	Plan	
10:00	04:00	Tuesday - As-found Survey of HV101-1 - duration 6hrs * Startup delay was due to TeV problems during the night - the Store did not get in until 07:30; MI tunnel radiation survey took from 08:00 - 09:30
15:30	10:00	Remove Interlock fence at HV101-1 location - duration 2hrs
17:00	12:00	start of shield plate removal - duration 14hrs * This did not take as long as the estimate
02:00	Wednesday	disconnect HV101-1 water & electrical - duration 2hrs
05:00	04:00	move magnet out of the tunnel to MI-60 - duration 5hrs
10:00	09:00	move replacement from MI-60 to MI tunnel - duration 5hrs
11:30	***	The TeV Store is lost, due to a device fault within the TeV; they were planning to keep it spinning through Thursday 07:00. This puts a bit of pressure on the HV101 work crew to "move along", as no anti-protons can be made until they are done - the colliders won't be taking data for about 8hrs AFTER NuMI comes back up, as that's the time needed to generate antiprotons for the next Store
12:30	14:00	Survey to set magnet - duration 4hrs
	18:00	hook up water & electrical and test - duration 8hrs
18:00		Electrical connections complete; water connections in progress
22:00	02:00	Thursday - start of shield plate installation - duration 16hrs. Again, this didn't take as long as the original estimate
07:00	18:00	Survey HV101-1 with plating attached and make any necessary adjustments - duration up to 5hrs
10:25	23:00	replace Interlock fence and test safety system - duration 3hrs
13:00	Thursday	HV101 replacement complete. Start to turn MI and NuMI beam back on

### **NuMI Operations - background story on the magnet replacement**

The water leak in the NuMI beamline LCW - narrowed down to the portion of the beamline located in the Main Injector tunnel - was finally located when power supply HV101 kept tripping off Friday evening. The leak is in/on magnet HV101-1, and the

water path/flow from the leak finally made enough of a connection to ground to cause the magnet's power supply to trip off on a ground-fault. This particular magnet has steel shield plates bolted to it, to "contain" its fringe field and prevent it from affecting the B-field of the Recycler magnets located just 18" above it - Recycler magnets are permanent magnets, not electromagnets, and so there is no current knob to twiddle to compensate for the fields of near-by magnets. The problem with the shield plating bolted to HV101-1 is that it blocks any view of the plumbing connections on the magnet. So there was no way to tell whether the leak was located on the outside or on the inside of the magnet.

A repair attempt was made on Saturday. The shield plating around the leaking end was removed - a 2hr process. The leak was observed in the supply piping just outside the magnet, which meant repair-in-place was possible. And indeed the pipe was re-braided, and the leak fixed. However, 2 hrs later, just as they were nearly finished replacing all that shield plating, the leak started up again, and at an even higher rate than before. The Main Injector dipoles sit immediately below the NuMI beam magnets at this location - the increased leak rate was going to trip-off the Main Injector magnets as well, flowing all over the electrical connections. So they had to valve-off HV101-1 and leave the tunnel, and begin plans for replacing this magnet.

A spare for this magnet was already staged last October, when there were problems with HV101-2, a magnet of the same type in the same "string" (one power supply, called HV101, powers more than one magnet and they all run in series, electrical-wise). The spare was checked out back then, and has since been sitting in MI-60 in a fairly decent environment (meaning, not too humid) and so the expectation is that when they check the spare for electrical integrity (hi-pot) it will be OK. The Accelerator Mechanical Dept spent Sunday doing what preparations they could and making up a schedule and organizing people. The repair is complicated by: space limitations around the magnet; a controlled access fence which spans across the workspace (halves of HV101-1 are on each side of the fence); the fact that this magnet was installed by contract steel-workers during the NuMI Installation period 2.5yrs ago and none of the FNAL techs have done any installation of these NuMI magnets (although FNAL Task Managers oversaw that work 2.5yrs ago - so they know what we are in for).

Monday continued with HV101-1 replacement preparation (testing the spare, fetching the magnet-mover from another tunnel area, assigning people to shifts). During this time, Accelerator Operations will work at accumulating as many anti-protons as the machines allow. If they get a big Store into the Tev, then the colliders can have some data-taking time during the HV101-1 replacement work. HV101-1 can be accessed while there is beam in the TeV, but not when there are any anti-protons in the Recycler (radiation issues because the Recycler magnets are so close by).

The duration for the shield plating removal/replacement is based on the length of time it took to remove the fraction of this shielding for the initial repair attempt. That task removed/replaced a small portion of all the shield plating bolted to this 10-ft long magnet.

### **Accelerator Operations**

Fairly decent uptimes for NuMI before HV101-1 failed. A few RF issues in Linac and Booster. Proton Source intensity a bit better. Pbar continues studies and tune adjustments for making a 2.2s cycle time standard for all modes. SY120 was tending to have a bigger "hit" on NuMI operations than expected, because of a mis-match in cycle times. SY120 insisted on 1 spill every 60 seconds, but this does not fit an integral number of 2.4 or 2.2 second NuMI/PBar cycle times; "rounding up" due to the imposed 60-sec super-cycle introduces an added beam "deadtime" for NuMI. There is no real reason SY has to be at 60-seconds as opposed to  $60 \times 2.2$  seconds - it's just that the 60-seconds has become "standard operations". NuMI folks went to work changing this.

### **Detector Operations**

Both Detectors have been behaving well. The downtime this week will allow for some detailed investigations on specific electronics channels with lower-level but bothersome features.

The Far Det had a surface power-outage about midnight Sunday (late Saturday night), which tripped off part of the water pumping system underground. The CR shifter saw the warning on the DCS web page and called Bill Miller. They called in people and went underground, as it was difficult to tell from the surface exactly which parts of the system were off (and getting underground was complicated by the power outage causing glitches with the hoist). As it turned out everything was just happily humming along on the Detector, and the coil cooling would not have been affected by this particular pump outage for some hours. Bill has asked if the DCS folks can provide more info from the DCS web page as to which parts of the pump system have tripped, as this can determine the necessary level of response.

The Near Det has finally had a CAPID error on one of the modified boards which has re-settable fuses. But power cycling did NOT clear the error. Recall that about 25% of Minders with CAPIDs have a "real" problem with the MENU card, and not just a blown fuse. But this is the first one to have any problem since we started to install them, giving us some info for failure rates on the modified boards vs rates on the un-modified boards.

## **MINOS Operations, Feb 5, 2007**

### **Accelerator Operations**

Not a very good weekend for the machine complex.

The replacement of NuMI's HV101 was completed ahead of the projected schedule, but while that work was going on, problems were found in the TeV vacuum system. Beam returned to the Main Injector and NuMI, but work was still in progress for the TeV, and problems there continued into Saturday. A Store was finally injected Saturday midnight (Sunday early AM), but was lost 12 hours later due to a spurious vacuum abort signal (no real problem existed).

There were very few anti-protons in place, because starting late Saturday, ACNET readout problems in NuMI and Main Injector caused the Main Injector to be turned off from 02:00 Sunday to 05:00 Monday. Very cold weather (about -15F last night) has caused additional problems around the machine complex. None of these problems are currently in the NuMI beamline or in Main Injector, but may require accesses to areas which will cause MI downtimes.

\*\*\* Wednesday Update \*\*\*

Problems in the Booster RF, which started appearing Monday, got bad enough that a tunnel access was scheduled for Wednesday morning to perform repairs. These Booster RF problems caused a drop in the proton intensity that the Booster could accelerate without higher-than-tolerable losses. 6am to 11am was initially requested. However the access will last "as long as it takes" to get things working, and in fact this repair period lasted much of the working day. Beam returned at 16:00.

### **NuMI Operations**

The new HV101 was placed in nearly the exact location as the magnet it replaced, and the B-field vs current was also a near exact match. Initial scans showed that only the smallest tweaks were required to put the beam on target as before, although AutoTune did "thrash" for a bit after being re-enabled.

Saturday afternoon, about 13:00, NuMI started to see occasional loss of ACNET data, in particular the Toroid data which gives us Protons-On-Target (POT). Sometimes more than POT was lost, and when any ACNET device used by the NuMI Beam Permit had no data, then the NuMI beam was held off. These intermittent problems became more extensive, and by 02:00 Sunday the Main Injector was turned off because of ACNET Controls problems. Many experts came in and spent time tracking the problem down - the process took 27 hrs. The problem was eventually isolated to a bad crate in the MI-62 service building.

Some data has been recorded which has no accompanying Beam Data.

More important, some data has been recorded which DOES have the Beam Data but we may decide, upon later investigation, that the POT information is WRONG. The Run Coordinator has decided to include a "Bad Data" listing under "Special Runs"

to alert people that data belonging to certain runs may be questionable. The Farm Reconstruction group has advised people in the past to re-acquire Beam Data for their final analysis, as there have been previous instances when the Beam Data was corrected after events were reconstructed.

### **Detector Operations**

Both Detectors have been behaving well. The downtime last week allowed for some detailed investigations on specific issues.

The Far Det folks spent time in detailed debugging of a couple of electronics channels. Both were fixed when the phototube involved was replaced. They will go through their data-checks, and see if there are other channels which appear to be showing symptoms similar to these.

Near Det - no word back on the bad board which had the re-settable fuses - Gary has not yet picked it up. During the downtime, Dave Pushka inspected the MINOS LCW system, made a few adjustments and did a "quick and easy" back-flow of the sump-water side of the heat exchanger to flush out any crud. The flushing seems to have had some effect, as the system was able to keep the cooling water temperature about 5-deg F lower afterward - but not quite at the temperatures when it was brand-new back in late 2004 (this data can still be obtained from the ACNET data-loggers, and plots have been made). This tells us that we need better filtering on the sump water side, and that the heat exchanger probably needs a more thorough flushing. Dave is setting this up.

## **MINOS Operations, Feb 19, 2007**

!!! \*\*\*\* Record POT Thursday ~5pm \*\*\*\* !!!!

Beam to the NuMI target recorded at 4.05 e13 during 11-batch slip-stacking studies in the Main Injector - 90% acceleration and transport efficiency. See Friday Update under NuMI Operations, below, for details.

### **Accelerator Operations**

The machine complex had a fairly good weekend. A record Store was recorded on Sunday. Beam to NuMI was steady. The Booster access, moved from last Friday, will occur today after the next Shot Setup (which occurred about noon). Booster needs 2hrs to work on RF issues which came up last week and caused a slight reduction in intensity, and also removed all backup capacity in the RF system. In parallel, a Main Injector access will be done to repair the Recycler horizontal dampers which went belly up on the weekend. Loss of the dampers causes some instability in the Recycler beam, which is why it took longer than usual to do the Shot Setup this morning.

\*\*\* Thursday Update \*\*\*

A glitch in the electrical grid early Wed morning tripped off various things, and the TeV Store was lost. The source of the glitch was off-site. MI operations recovered quickly and beam to NuMI was only briefly interrupted, but it took much of the day for the rest of the complex to recover fully.

### **NuMI Operations**

NuMI ran well through the weekend. A 2.2 second cycle study in the Accumulator was done last Thursday evening, and the results show the reduction from 2.4 to 2.2 has little impact on p-bar Stacking, and about a 10% increase in intensity to NuMI. See the All Experimenters Meeting slides for plots and details. These results are from the raw logged data, and there may be corrections which the PBar group is privy to. An analysis of losses during the study also has yet to be done.

\*\*\* Tuesday Update \*\*\*

Another brief period of slip stacking studies was very successful - reached 3.7e13 and 89% acceleration efficiency in the Main Injector.

\*\*\* Wednesday Update \*\*\*

There is a problem with the MI Toroids - a software calibration was done recently, and during that process a mis-cabling was found and fixed. But afterward, E:TOR101 and (I or E?):I9SUM3 took a jump downward. Is it software? Is it a problem now, or is it correct now and too high before? This has an effect on the estimated intensity and losses reported during yesterday's slip-stacking studies.

### \*\*\* Thursday Update \*\*\*

The difference in reported intensities from different devices in the MI tunnel was found to be due to the software update - which was apparently not propagated to all the devices that it should have. The update was pushed to all pertinent devices again and now the ratios between all those devices is much closer to 1. The adjustment was small, and makes little noticeable effect on the reported POT to NuMI.

### \*\*\* Friday Update \*\*\*

Beam to the NuMI target recorded at  $4.05 \times 10^{13}$  during 11-batch slip-stacking studies in the Main Injector.

Accelerating beam of this intensity in the Main Injector is not at all trivial. The study concentrates not just on the mechanics and timing of the slip-stacking, but also on accelerating this amount of beam to 120 GeV once it is all in the machine, and then extracting it to the NuMI target without losing much of it. The MI group reports, for example, having to turn off and on different RF stations during the acceleration process to keep the beam orbit stable. There is hardware planned for installation during the summer Shut Down specifically designed to help handling of higher intensities (dampers and collimators); it is a technical success to achieve  $>3 \times 10^{13}$  with  $>90\%$  efficiency without this hardware installed.

The 11-batch test was halted due to concerns about BPM performance and concerns about damaging the target (the BPM data is fed into AutoTune, which depends on having good data to keep the beam stable on target). Losses, as recorded by the NuMI Total Loss Monitor, did go up somewhat, but the major contributions to all losses recorded on Thursday did not occur during the slip-stacking study. Losses recorded in the Lambertson area were higher than the NuMI group would like, and in fact the NuMI Beam Permit tripped during the study due to losses at the Lambertsons. However, losses of a similar magnitude have been recorded with  $2.5 \times 10^{13}$  pulses on target, and there were some RF problems in the Main Injector during the study period; so the observed losses are not necessarily entirely due to the increased intensity, but also the effects of RF on the beam tune stability. The spot size on the target also changed as the intensity increased, but again some of the changes may have been due to orbit and tuning in the Main Injector. Spot sizes generally increase with higher intensity (remember, like charges repel) but the spot sizes on the NuMI target were smaller as well as larger during the study. All of these items will be looked at more carefully.

### Detector Operations

Both Detectors have been behaving well, as has been typical for some time now. For the Near Det - a Master board made problems early Monday AM; it was replaced

later Monday morning. The Near Hall LCW system continues operating at the reduced (about 5 deg F) temperatures compared to 2 weeks ago; temp reduction achieved after back-flushing the heat exchanger.

Far Det - plan to test a repaired TPC board during the accelerator down time which started about Monday noon. Also checking the grounding on a veto shield rack whose channels show increased noise.

\*\*\* Thursday Update \*\*\*

Updated the OM Checklist Gallery Plots for the Far Detector on Wednesday.

Updated the OM Checklist Gallery Plots for the Near Detector on Thursday.

## **MINOS Operations, Feb 26, 2007**

### **Accelerator Operations**

The machine complex had a good weekend. The Linac and Source output has been steady. The Booster is running well, with it's full complement of RF, including one "in place" spare station, after last week's maintenance work. They are delivering a steady  $4.7e12$  per Batch for both Pbar and NuMI. They have requested a little study time Monday, which will be scheduled later in the day. In the Main Injector, the RF was worked on late Friday although a different RF station Power Supply needed work on Saturday. They continue with an upgrade of BLMs (loss monitors) and expect the final revision to be completed today - a request for some study time today is related to these.

There is another slip-stacking study planned for today, but it will not be allowed to transport more than  $3.8 E13$  to the NuMI target - see below. If the study goes higher, then the beam will be kept in the Main Injector and sent to the abort dump after acceleration.

### **NuMI Operations**

NuMI ran well through the weekend. The only interruptions to beam were a few infrequent horn trips, which always reset with no problem. Sunday morning the Kicker tripped off due to high coolant temperature; it was fixed within an hour by changing out a filter within the cooling system.

\*\*\* Wednesday Update \*\*\*

Horns tripped around 5:30am, perhaps on a ground-fault, but the usual pulsing did not clear off the flakes, if that is what the cause is. Experts investigating, while we take beam in Horns Off mode. New Runs were started for both detectors. By 10:30am the experts had determined that the trip problem is within the Horn power supply system, although it will take some time to figure out exactly where. In the meantime we continue running with Horns Off.

\*\*\* Friday Update \*\*\*

Horn Power Supply fixed, but there were two periods of Horn Off running: Horns Off running occurred between 7am and 5pm, Wednesday February 28; Horns Off running occurred between 6am and Noon, Thursday March 1st

Issues with exactly how much beam we can safely run to our current target are being discussed.

### **MINOS Operations**

Both Detectors have been behaving well, as has been typical for some time now. The usual number of CapID errors. Sure wish we had more of those boards with resettable fuses.

## **MINOS Operations, Mar 5, 2007**

### **Accelerator Operations**

The machine complex had a good weekend. There is another slip-stacking study planned for today, but it will not be allowed to transport more than  $4.0 \text{ E}13$  to the NuMI target - see below. If the study goes higher, then the beam will be kept in the Main Injector and sent to the abort dump after acceleration.

### **NuMI Operations**

NuMI ran fairly well through the weekend. Beam was off for 5hrs Saturday night when the Target Hall Chase air blower tripped off. An access to the Target Hall had to be made to diagnose and correct the problem, which turned out to be an increased level of vibration. The fan speed was turned down slightly which reduced vibrations but which may also now result in a higher level of tritium being left in the Hall.

#### **\*\*\* Target Issues \*\*\***

Issues with exactly how much beam we can safely run to our current target came to light last week. The IHEP engineering group who designed the target was asked last summer to re-examine the design for higher intensities ( $>4.0\text{E}13$ ). They were asked to do this by SNUMI, an upgrade program for NOVA and beyond. In the course of that review the IHEP group found an error in their earlier calculations for the NuMI target design. The results after error correction show an increase in the stresses on the target at  $4.0\text{E}13$ , and as a consequence a lower safety margin. Enlarging the beam spot size does not reduce overall stress but only moves the point of highest stress to different locations on a single target fin. The IHEP report was presented to SNumi at the end of August 2006. It was entered into the SNumi DocDB area, but it was not passed along to any of MINOS management, was not presented in any NuMI Beam meetings, nor was it posted into the MINOS DocDB area. It was brought to the attention of MINOS management only after the 11-batch slip-stacking studies were shown to be capable of delivering  $4.0\text{E}13$  per pulse protons and above to the NuMI target.

Advice from the target expert (Jim Hylan) is to always stay below  $4.00\text{E}13$  ppp, and when between  $3.5\text{E}13$  and  $4.0 \text{ E}13$ , increase the beam spot size to 1.3mm. This new advice has the effect of limiting the program of slip-stacking studies, not to mention the limitations on NuMI operations after the Summer Shutdown, when slip-stacking will become the standard running mode.

#### **\*\*\* Friday Update \*\*\***

Three periods of slip-stacking studies, which sent us beam tuned for 1.2mm spot size :

Monday March 5 11:30am - 12:30pm

Wednesday March 7 10:30am - 1:00pm

Thursday March 8 - 12:30pm - 4:00pm

## **Detector Operations**

Both Detectors have been behaving well, as has been typical for some time now.

The usual number of CapID errors. Sure wish we had more of those boards with resettable fuses.

## **MINOS Operations, Mar 12, 2007**

### **Accelerator Operations**

A few machine glitches since last Friday, but few which affect MI or NuMI operations.

Two slip-stacking studies were done last week. The MI group has made a request for a slip-stacking study in Mixed Mode instead of NuMI-Only mode - this requires coordination with PBar and may not be done "next". But it is an indication of their advancing understanding of this way of running the machine.

Because of our intensity-on-target limitation, the slip-stacking studies have been done with 8 or 9 Turns per Booster Batch, rather than the usual 12. Also the NuMI beam tune is modified to make the spot size at the target 1.2mm, up from 1.0mm. See last week's Ops Notes for the larger-spot-size Slip-stack study times.

Monday is a maintenance day for the TeV and both Colliders, but explicitly stated NO access to MI or NuMI, so that they can accumulate p-bars and be ready for Shot Setup as soon as the TeV accesses are finished.

\*\*\* Tuesday Update \*\*\*

Pbar had a few glitches during the night.... lost part of it's stash. So they are now behind in their p-bar accumulation totals. As a result, they will run MI all day, no studies, no accesses, so that PBar can keep stacking. That keeps NuMI running too, but we would like to get a look at the area where the water leak is likely occurring.

\*\*\* Wednesday Update \*\*\*

The MI group request 11-batch slip-stacking studies, to both PBar and to NuMI, for this morning. The PBar group reacts in shock, saying they thought this was a couple of weeks off..... didn't I just write on Monday, in the paragraphs above, that MI already announced a "heads up" of it's intentions? These PBar guys were in the same room.... aren't they LISTENING? An obvious case of Selective Perception.

A Booster access being planned for Wednesday afternoon - RF problems need looking at. An opportunity for downtime detector work.

### **NuMI Operations**

NuMI ran fairly well through the weekend. Beam was off for a bit on Saturday due to a Total Loss Monitor problem - the device is part of the Beam Permit, so it has to be functional for us to get beam. It's problem was found to be with it's flow of gas - fixed.

Gordon reports that the water level in the LCW expansion tank for HV101 series continues to drop, slowly. Very likely another leak. This is the same area where we replaced the leaking magnet in January - the water system serves a string of magnets. Gordon has put in an inspection work request to access this area, which is the portion of the Main Injector tunnel which holds the NuMI primary beamline. This access won't happen on Monday however. Or Tuesday.

## Detector Operations

Both Detectors have been behaving well, as has been typical for some time now.

The Soudan gateway machine crashed and would not auto-boot. Had to make an underground access on Sunday morning to get it started again. Dave Saranen says it was a UPS problem - 4 machines were on that UPS and they all rebooted about the same time. Some discussion on security scans, as those might cause a machine to reboot (but wasn't the cause in this case). Alec says he sees security probes from address which trace back to the DOE-Chicago office..... He will email nightwatch and ask if this is really them.

U.S. had the change to DST yesterday (Sunday March 11). Not many problems associated with this, but a few, like the DCS Windows system, which did not update automatically. Art suggests making the "local" time on this machine be Universal Time, and then we don't have to change it for Daylight/Standard time shifts.

Some noisy channels in Far. Won't work on it today - find some time this week.

Near electronics - one hot PMT which Alfons says we should replace (has been there for a while). One cold channel (a MENU), which can get changed - but perhaps the experts wish to run some diagnostics before it is changed out. A screaming hot channel, which was non-CAPID problem, was found in crate 7 - identified by this crate's different profile in the SGate timing plot.

## **MINOS Operations, Mar 19, 2007**

### **Accelerator Operations**

Good running from Friday evening through the weekend. The PBar target has a problem which required a couple of hours to fix on Saturday, which meant more-than-the-usual NuMI-only beam during that time.

Slip-Stacking Studies - the MI group would next like to try doing this in mixed mode, where one of the batches goes to PBar. However the request brought up various concerns which had not been discussed in any of the usual accelerator meetings, having to do with losses and the path the beam takes to get to PBar (through part of the TeV areas). Study time is needed just for PBar, not only MI and PBar combined. However because the collider program depends heavily on p-bar production, study time for this machine is seldom approved. MINOS supports study periods which improve machine Operations even when those periods result in a loss of beam-time for the experiment.

\*\*\* Tuesday Update \*\*\*

There is a leak in one of the tunnel areas which transports beam to/from PBar. An access will be made today to repair this, and during that time beam will be off to all other areas.

\*\*\* Wednesday Update \*\*\*

Studies in MI, PBar and Recycler scheduled, but all of them can be performed without disrupting our usual timeline. There will be a few pauses in beam when timeline changes are made, but no actual downtime.

\*\*\* Friday Update \*\*\*

Another downtime in the morning, to access the Booster. A 2nd RF station went down last night (another one has been down since Monday evening, waiting a fix-it opportunity). With 2 stations down, Booster output is reduced. They don't want to run through the weekend this way. About 2hrs of work-time, expect to have beam back in the machines by noon.

### **NuMI Operations**

The suspected beamline water leak was found Friday afternoon. A machine downtime allowed access to the NuMI primary beam tunnel (but not to the Primary beam area within the Main Injector tunnel). The leak and a puddle were observed on a B2 vertical bend magnet in our beam tunnel - a different area and a different magnet type from the January leak. The leak was at a joint in the copper supply piping, and was repaired within hours after being located. There was little beam-time lost, because much of the work was done during a machine access period.

\*\*\* Tuesday Update \*\*\*

For some reason, a week after the CST-->CDT 1hr time change, the devices reading out the Muon Monitors complain because they think the time is 1hr different

from everything else. No one knows what triggered this. Problem traced to the VME crate timing module which holds the Muon Monitor SWIC scanners. The Controls expert who knows how to fix this wasn't around today, and will be called Tuesday morning. --> On Wednesday there was still a bit of running around to find the right software person. Has to do with the portion of software which send data to our JAS program.

\*\*\* Thursday Update \*\*\*

Access to the Target Hall this morning, to perform maintenance on the Hall air handling system. This was decided, between Jim Hylen and Mike Andrews, late Wednesday. Beam off at 7am, access starts at 9am after the required 2hr cool-down. Expect to be finished with work by lunch, and then it will take an hour or so to get things locked back up. Beam returns shortly after lunch.

### **Detector Operations**

The UPS which caused the Soudan gateway machine to crash last week did it again late Saturday. An underground access was made and that UPS was replaced - with a smaller output one, temporarily. A better sized one will become available in about a month - the unit is now in use by CDMS racks in the Surface Building but after some electrical work is completed the 6 UPS units located there will be freed up.

A fuse on Crate-10 started to go bad, reducing voltage on the backplane and causing RPS warnings. The fuse was replaced Monday.

During the fuse replacement, which required the Run to be stopped, the minos-beamdata machine located in MINOS CR was patched and re-booted. The Near Run was also stopped during this reboot. It's OK to have no beam data recorded when no runs are in progress. All the other MINOS CR machines were patched and rebooted in turn, but the other machines can be done (and were done) in parallel with data-taking.

Data Monitoring plots now use a baseline from January 2007, as requested last week. Other additional plots in progress.

No issues to report for the Near Detector.