



NuMI-MINOS Status Report – Sam Childress

All Exp Mtg
Nov 24, 2008

- **NuMI Beam operation only until Monday morning Nov. 17**
 - **Horn ground fault/current imbalance problem beginning Sat. AM Nov 14.**
 - **After a shift of diagnostic efforts not successful, take horn off beam data for 2 days until Monday morning. [Needed for systematics measurements for electron neutrino analysis]**
- **Diagnostic efforts for horn system during this past week determine problem is with strip line for Horn 2. Also that problem is below the steel shielding**
- **By removal of a shield block at end of horn, lower a camera for further evaluation – see next slide. Find failure of strip-line connection at horn.**
- **Now we are shutdown for horn and strip-line block replacement.**
- **Mike Andrews is shutdown coordinator.**



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New horn strip-line



As seen 11/19/08



Believed Failure Mode:

- **Root cause is embrittlement of high-strength Belleville washers. New strip-line now uses Inconel washers in place of the steel, believed to be much more robust in this environment.**
- **On the strip-line section feeding to Horn 2, two washers apparently failed. Washers were on the bolts holding ceramic spacers between the strip-line sections. When washers failed the bolts had free play of $\sim 1/4$ inch. Continued movement from repeated pulsing caused the nuts to eventually walk off. This also allowed the strip-line segments to repetitively flex from horn pulsing, which produced a fracture at the junction box just below the remote clamp.**
- **The horn is original equipment, functioning for more than 25 Million beam pulses. We are now installing the spare along with a new strip-line block, and believe we have a solution for more robustness going forward.**



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Some recent/near term work efforts:

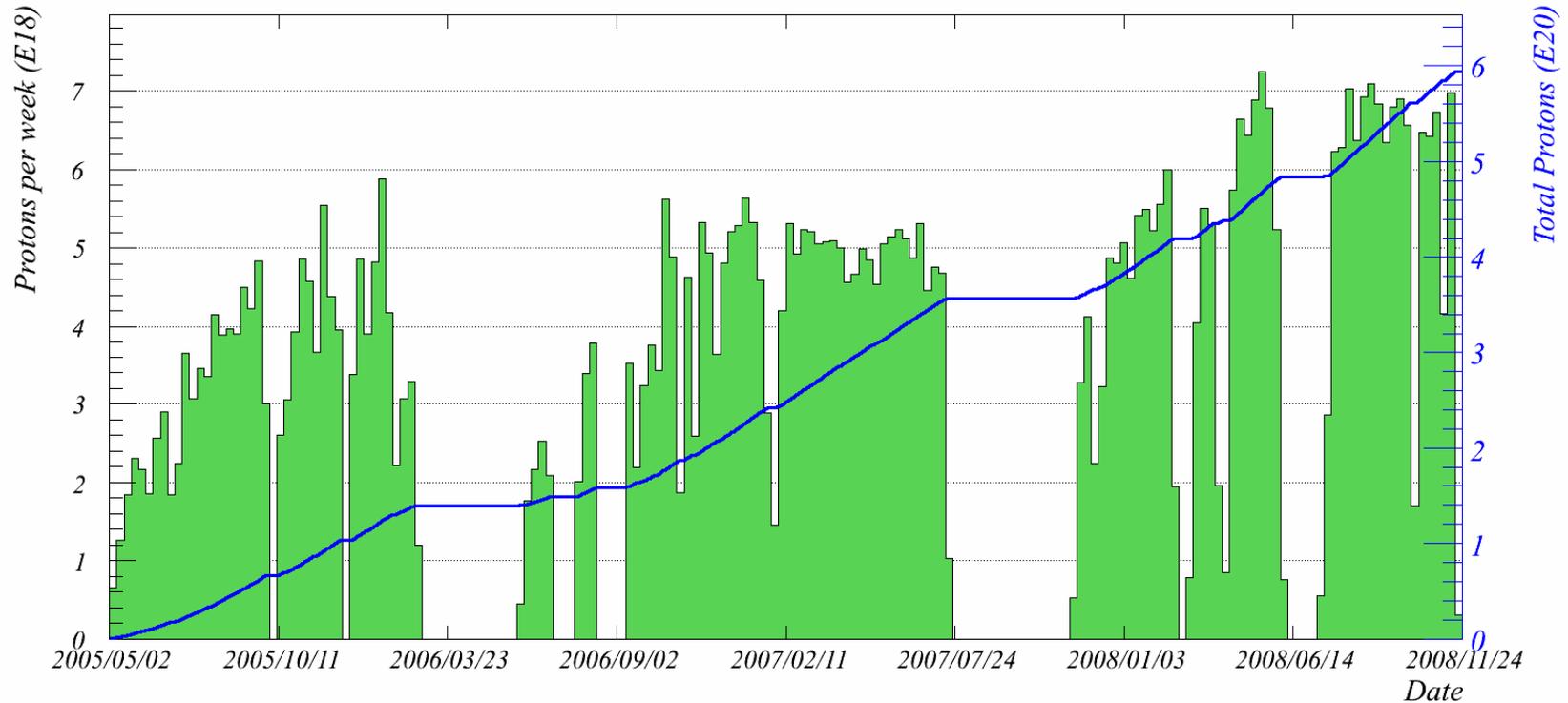
- **Saturday Nov. 22**
 - **Open shield plug door to enable large equipment access into Target Hall**
 - **Final preparations with new strip-line block**
- **Today Nov. 24**
 - **As found survey of damaged Horn 2 in place**
 - **Rigging new shielding into Target Hall for storage of replaced strip-line blocks**
- **Near-Term**
 - **Preparation steps to move horn to work-cell on Wed. Nov. 26**
- **Detailed work schedule calls for completion of horn replacement efforts on Thursday Dec. 11. This will be updated as the work progresses.**



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Total NuMI protons to 00:00 Monday 24 November 2008



Total NuMI Protons on Target = 5.955 E20