



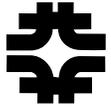
Overview of Accelerator Operations

Steve Holmes

DOE Tevatron Operations Review

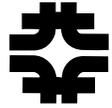
March 21, 2006

http://www.fnal.gov/directorate/DOE_TeVOps06_Review.html



Outline

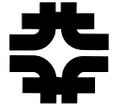
- Accelerator Program Mission
- Goals for FY06-09
- Strategic Approach
- Achievements since March 2005 Review
- Resources



Accelerator Program Mission

- Operations Review:
 - Maintenance and operation of the accelerator complex in support of the HEP research program
 - Improvement of accelerator performance to meet evolving goals
 - Scope:
 - Collider Run II
 - Booster Neutrino Beam
 - NuMI
 - 120 GeV slow extracted beam

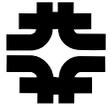
- Program Review:
 - R&D in accelerator technologies aimed at next generation HEP facilities and beyond.
 - Construction of new accelerator facilities



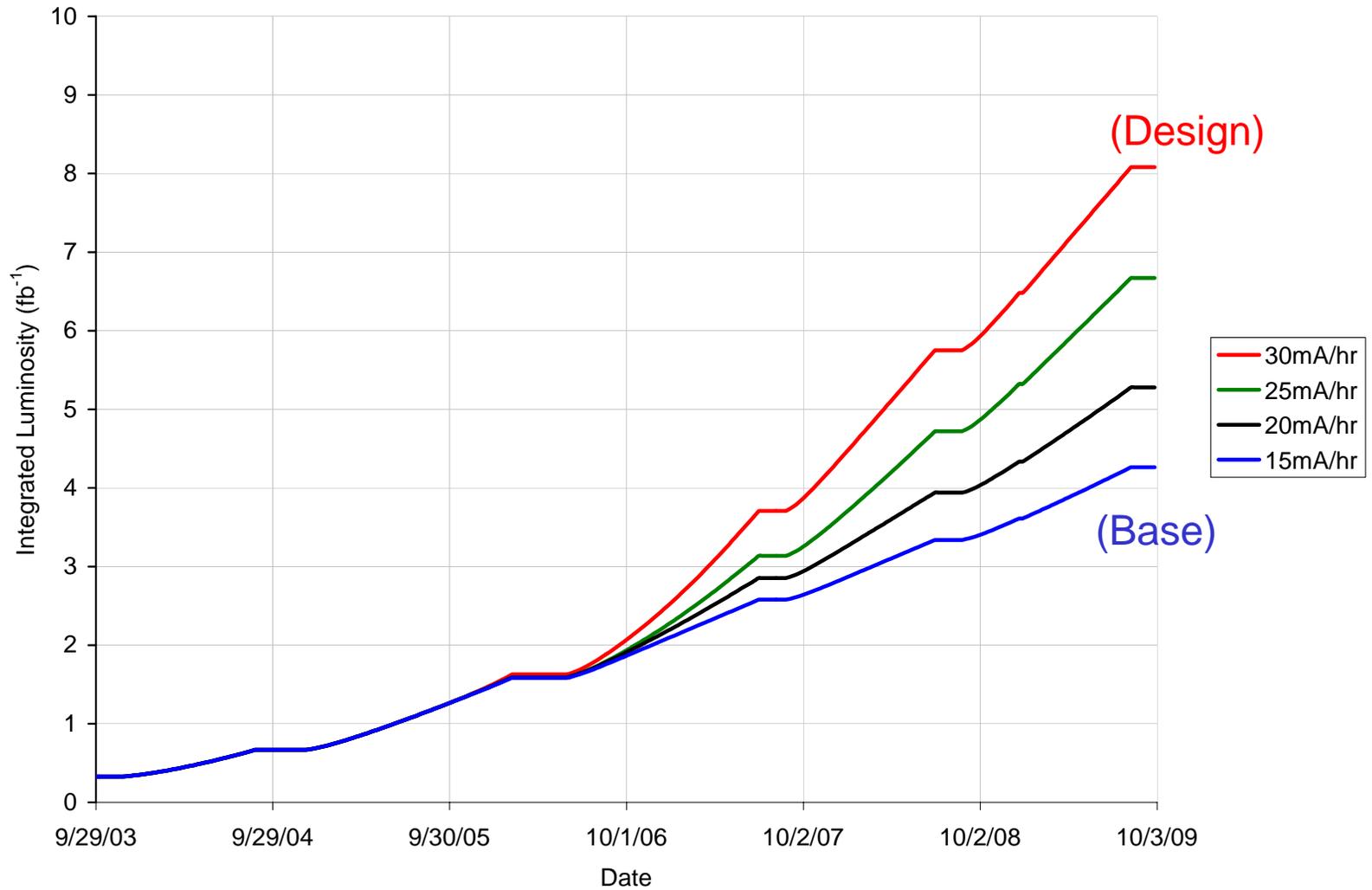
Accelerator Operations Goals

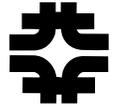
- **Strategic Context**
 - Run CDF and D0 through FY2009
 - Run MINOS (and perhaps MiniBoone or successors) at least through end of decade
 - Improve proton source performance to support Nova goals in post-Run II era (>700 kW)
 - Operate 120 GeV fixed target program in parallel
 - Set stage for the future (ILC or High Intensity Neutrino Source)

 - **FY06-09 Goals**
 - Run II: Complete the Run II Upgrade Program
 - deliver 8 fb⁻¹ (design curve, total)
 - Neutrino Program: Complete the Proton Plan
 - NuMI: Deliver 2-4E20 protons on target/year
 - 8 GeV: Deliver 1-2E20 protons on target/year
 - SY120: Operate in parallel with Run II and ν
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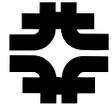
Run II Goals: FY06-09





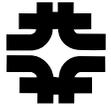
Accelerator Operations Strategy

- Complete Run II Luminosity Upgrade in FY2006
 - Follow-through on implemented improvements will become part of the operating program
 - Resources freed up for Proton Improvement Plan and future accelerator R&D
- Utilization of Run II assets to boost the capabilities of the neutrino program after 2009
- Probable modification of the accelerator organization in advance of FY2009-10 phase transition

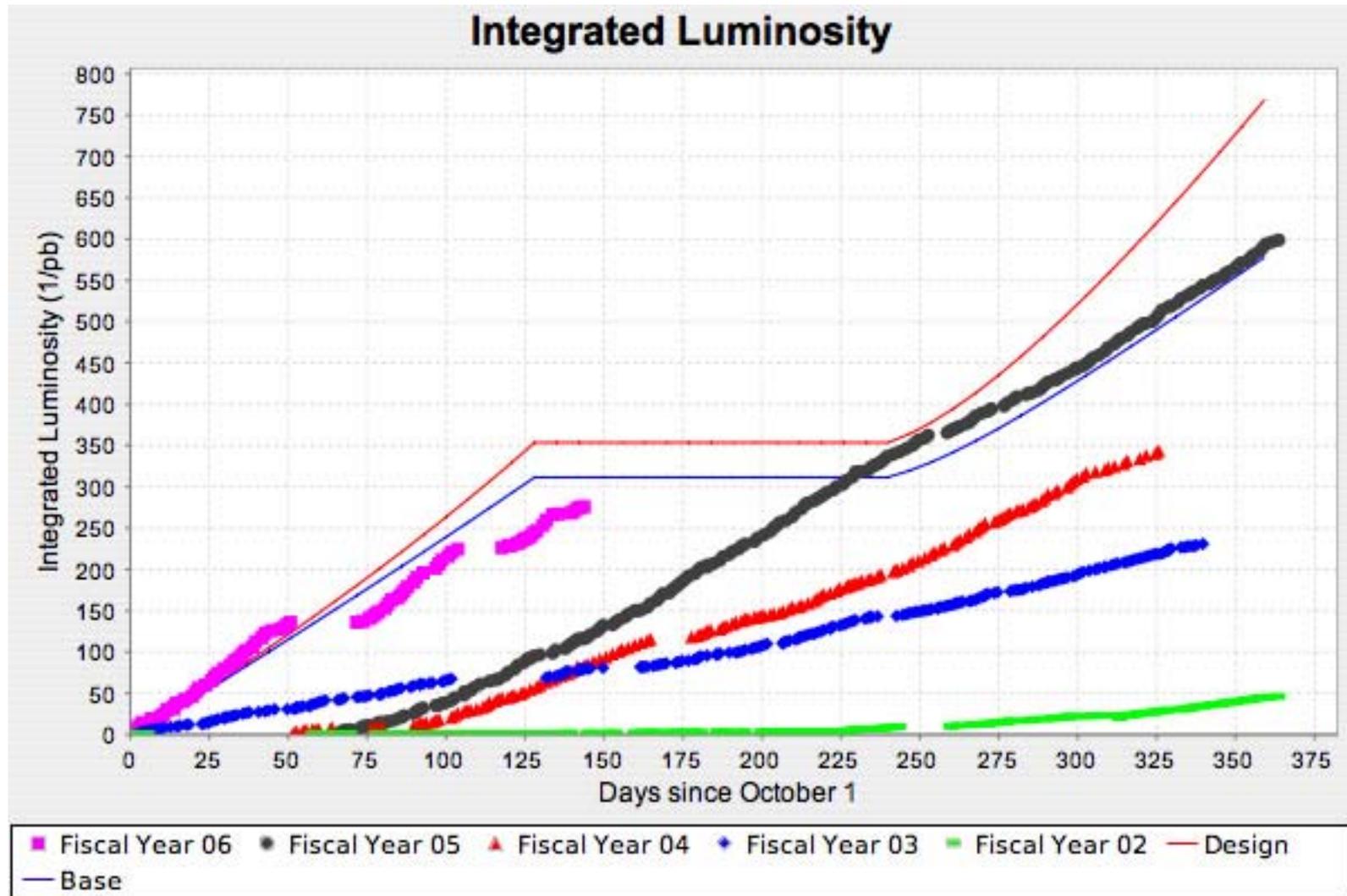


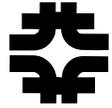
Prior Year Achievements

- Run II
 - Integrated 600 pb^{-1} in FY2005, 280 pb^{-1} FY2006 to date
 - Total delivered to date is 1.5 fb^{-1}
 - Established e-cool operations in the Recycler
 - Operational cooling parameters achieved up to $>400 \text{ E}10$
 - Established "Recycler only" shots as standard
 - Antiproton stacking rate beyond $20 \text{ E}10/\text{hour}$
 - Typical luminosity now $1.5 \text{ E}32$, record $1.72 \text{ E}32$
 - FY06 performance on design curve for instantaneous luminosity, below base curve for integrated
 - Three Tevatron magnet failures resulting in ~ 6 weeks of unscheduled downtime
 - Major (14 weeks) shutdown initiated 2/26/06



Run II Operations



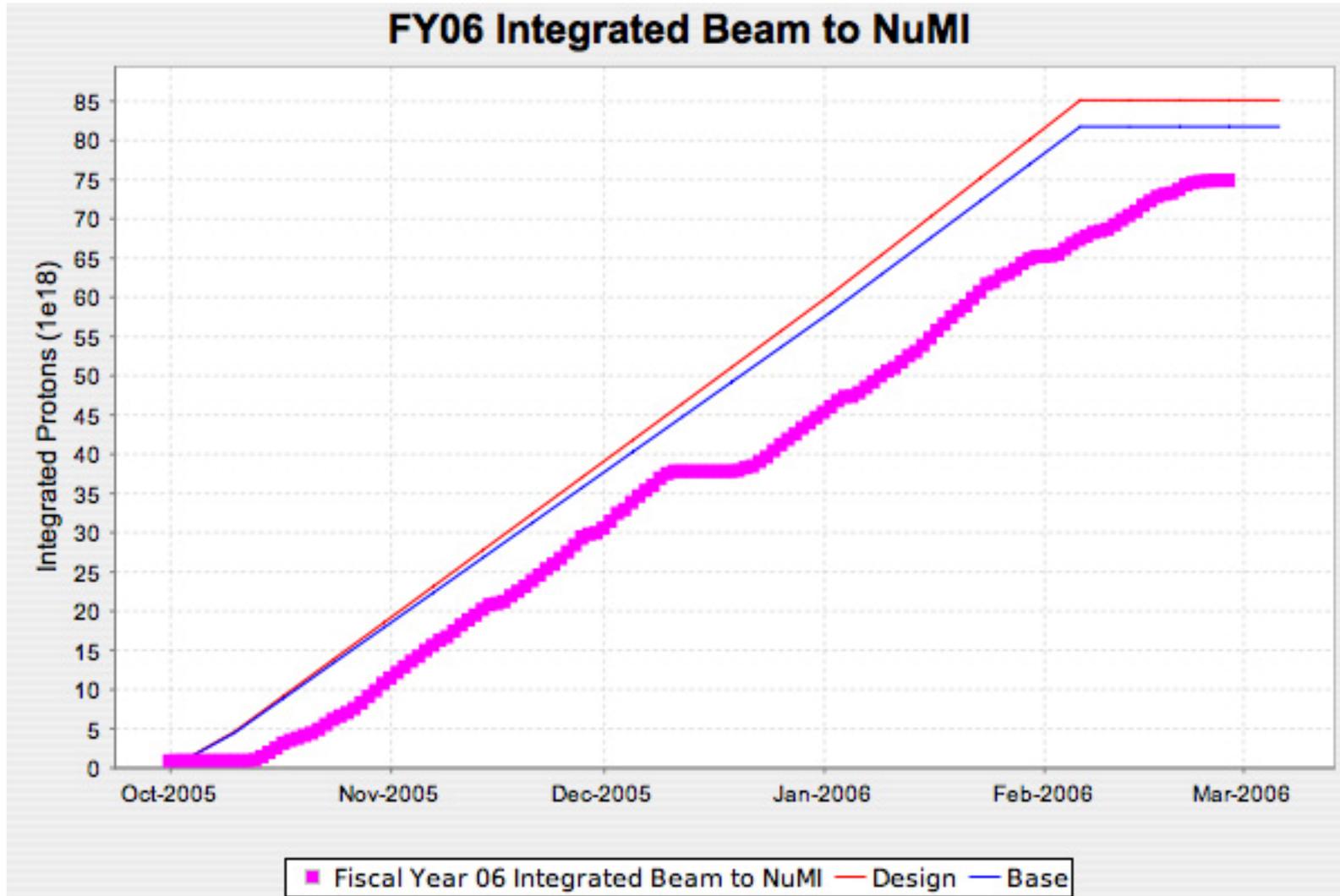


Prior Year Achievements

- **NuMI**
 - NuMI operations in parallel with antiproton production
 - 0.67E20 POT in FY2005, 0.75E20 FY2006 to date
 - Downtime associated with target/horn problems and ^3H investigations
 - Proton Plan baseline established and work initiated
- **MiniBoone**
 - Will deliver 1-2E20 in FY06 in parallel with NuMI operations



NuMI Operations

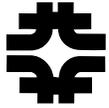




Resources

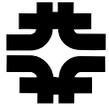
		Accelerator Operations Budget				
		(Dollar amounts in millions, direct costs only)				
		FY05	FY06	FY07 PBR	FY08	FY09
ACCELERATOR M&O		\$39.3	\$36.5	\$38.9	\$37.6	\$33.8
ACCELERATOR UPGRADES - R2LU		\$16.0	\$6.2	\$0.0	\$0.0	\$0.0
ACCELERATOR UPGRADES - OTHER		\$2.4	\$1.8	\$1.4	\$1.9	\$0.0
PROTON PLAN		\$4.3	\$8.4	\$9.4	\$1.6	\$0.0
NEUTRINO DEVELOPMENT PLAN		\$0.0	\$0.0	\$0.0	\$0.0	\$14.0
MINIBOONE, FT EXPS & EXT BEAMS		\$3.2	\$3.2	\$3.6	\$4.0	\$4.1
NuMI / MINOS		\$3.1	\$1.3	\$1.4	\$1.4	\$1.4
OTHER DIRECT SUPPORT		\$22.3	\$23.3	\$23.7	\$24.1	\$24.9
POWER & UTILITIES *		\$16.2	\$18.5	\$23.9	\$27.7	\$28.4
Operations Total, SWF + M&S		\$106.8	\$99.2	\$102.2	\$98.2	\$106.8
	Subtotal SWF	\$64.7	\$58.5	\$54.5	\$53.9	\$51.4
	Subtotal M&S	\$42.2	\$40.8	\$47.8	\$44.3	\$55.4

- * Power budget shown is not supported in the FY07 PBR or flat FY08 scenario.
 - \$2.4M shortfall in FY07 (~6 weeks of operations)
 - \$7.0M shortfall in FY08 (~15 weeks of operations)
- ~650 FTE associated with this program in FY2006
 - Will decrease to about ~580 FTE in FY09



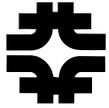
Resources

- Long Term Issues
 - Primary issue: Managing the transition at the end of Tevatron operations.
 - We have to understand the skills mix required in 2010 and beyond.
 - People have to know ahead of time where they are going to land, otherwise key staff may evaporate.
 - A significant accelerator project will be necessary on the timescale of 2010 to keep our critical capabilities intact.



Summary

- It's been a very good year.
 - Run II Luminosity Upgrade program is nearly complete, and has provided nearly all the anticipated performance improvements.
 - Success of electron cooling removes a major uncertainty in our projections through FY2009.
 - The antiproton stacking rate is the primary remaining variable impacting luminosity performance.
 - Significant progress in the last year
 - Rate required ($30E10/\text{hour}$) to support the design curve is achievable
 - The luminosity base curve is likely to be exceeded, and the design curve remains achievable.
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Summary

- NuMI is off to a very good start.
 - >200 kW on target
 - Proton Plan baseline established and aiming for 400 kW in FY07-08
- We have been able to sustain operations of MiniBoone in parallel with Run II and NuMI.
- Resources are being managed effectively in support of the program.
 - Transition to the post-Run II era is a challenge