2. Elements of the Plan

2.1 Work Breakdown Structure

Personnel in the Linac, Booster and Main Injector departments will manage and accomplish the programmatic goals outlined in this plan. The following WBS structure is constructed to reflect the presence of this existing Division organization.

WBS	Description	Category
1	**Proton Plan**	
1.1	**Linac Upgrades**	
1.1.1	Linac PA Vulnerability	Reliability
1.1.2	Linac Quad Power Supplies	Reliability
1.1.3	*Linac Instrumentation Upgrade – DESCOPED*	
1.1.4	Low Energy Linac LLRF Upgrade	Stability
1.2	**Booster Upgrades**	
1.2.1	Booster RF Duty Cycle Limits	Study
1.2.2	ORBUMP System	Reliability, Beam Loss Reduction
1.2.3	Corrector System	Beam Loss Reduction
1.2.4	30 Hz Harmonic Upgrade	Beam Loss Reduction
1.2.5	Gamma-t System	Beam Loss Reduction
1.2.6	*Alignment Improvements - DESCOPED*	
1.2.7	Booster RF Cavity Cooling	Increased Repetition Rate
1.2.8	*Booster RF Cavity #20 - DESCOPED*	
1.2.9	Booster Solid State RF PA's	Reliability? Cost Savings?
1.2.10	*Booster Instrumentation Upgrade - DESCOPED*	
1.2.11	Booster Dump Relocation	Beam Loss Reduction
1.2.12	Booster Chopper	Beam Loss Reduction
1.2.13	Booster RF Modifications	Reliability, Stability
1.3	**Main Injector Upgrades**	
1.3.1	Large Aperture Quads	Beam Loss Reduction
1.3.2	Main Injector Collimation System	Beam Loss Reduction
1.3.3	NuMI Multi-batch Operation	Increased Beam to NuMI
1.3.4	Main Injector RF Upgrade	Increased Beam to NuMI
1.4	**Management**	
1.5	**Stage II Study**	Study

TABLE 2.1: WQB Work Breakdown Structure at Level 3

Level 2 managers will be designated by the Department Head for each accelerator. The Level 2 managers are charged with developing and maintaining a cost and schedule plan that is consistent with the resources available. A subproject manager will be assigned to

each WBS element at Level 3. The Level 3 manager is responsible for providing an operating system that meets agreed upon specifications. The Level 3 manager is responsible for cost and schedule control over design, procurement, fabrication, installation, and commissioning. The Proton Plan Project Management Plan contains a more detailed description of roles and responsibilities.

A radiation shielding assessment is conducted prior to approving a new mode of operations for the complex, including the operation of the Booster and Main Injector as described in section 4. It is not expected that significant work will required but this cannot be guaranteed until the assessment is performed. No work for shielding improvements is currently included in this plan.

The Proton Plan relies on the completion of two activities that are outside the scope of the Plan:

- Specific Run II Upgrade subprojects must be completed. We rely on existing management systems in the Run II Upgrade project to accomplish these tasks. They include the Main Injector BPM system and Main Injector and Booster BLM systems - to be upgraded in 2005.
- The Stacking Rapid Response Team must reduce slip-stacking losses in the Main Injector to an acceptable level. It is anticipated that this activity will be completed in the Fall of 2005 and will not affect the Proton Plan schedule.

2.2 Subprojects

This section includes a brief description of the motivation and technical scope for each element of the plan, and the summary description of the cost and schedule estimates. The cost and schedule themselves are documented in the Resource Loaded Schedule (RLS).