

# Run II Upgrades: Stacktail Upgrade Prototype

## $\bar{P}$ Note 697

P.F. Derwent  
AD/ $\bar{P}$  Source

October 28, 2004

### Abstract

The Stacktail upgrade calls for the installation of new pickups and kickers in the 4-6 GHz band. As the microwave cutoff frequency for the pickup aperture is close to this frequency band, a prototype measurement is desired.

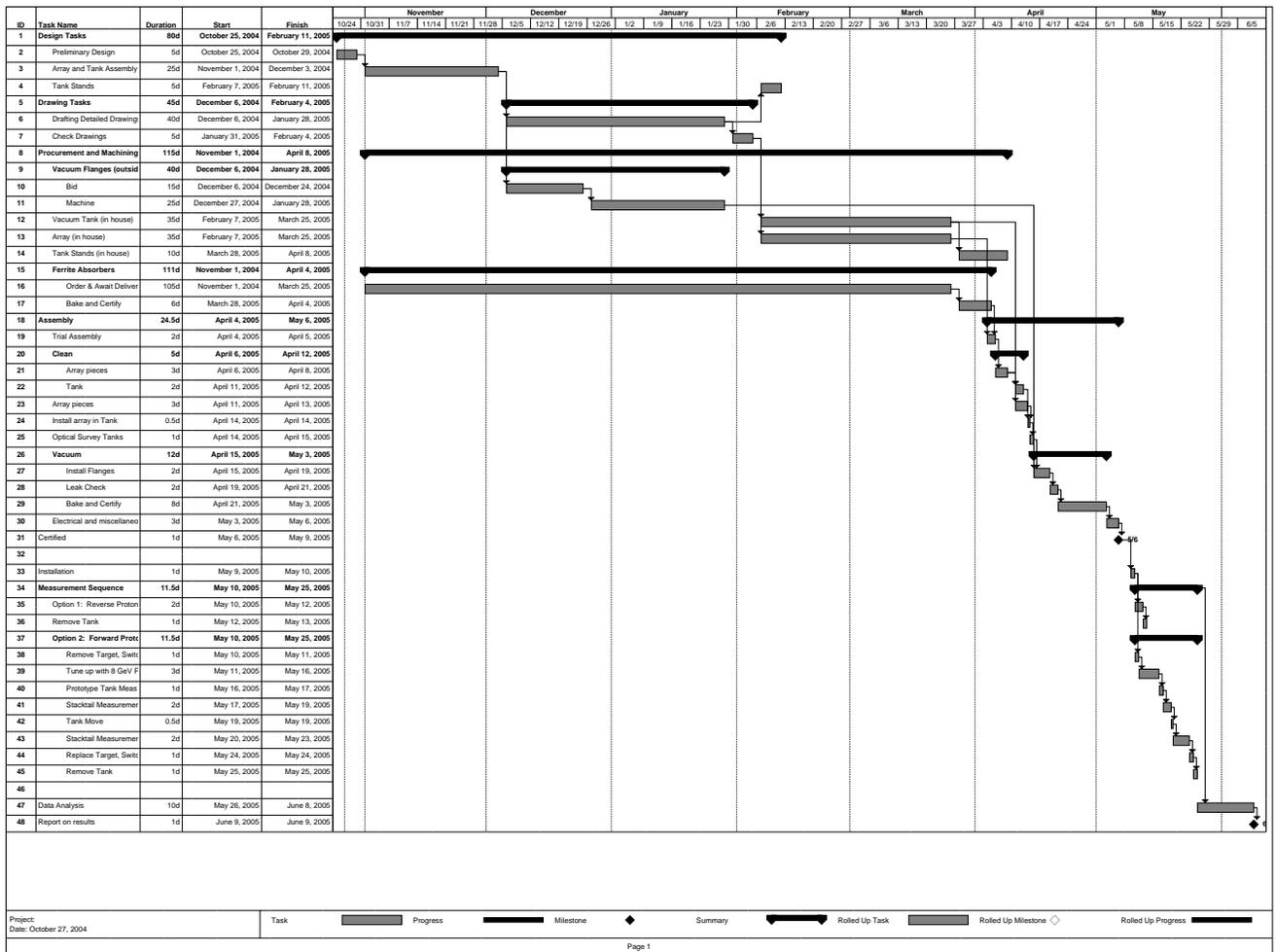
## 1 Why Build a Prototype?

For the Run II Upgrade plan the necessary changes for momentum stacking are detailed in references [1] and [2]. The plan calls for installation of new pickups and kickers in the 4-6 GHz band. With the desired vertical aperture of 3 cm, all modes with frequencies above 5 GHz will propagate. As it is difficult to simulate the effects of these microwave modes, it is desired to measure the response of the pickups in a beam environment. We want to confirm the presence or absence of modes (which would make the design unworkable) before proceeding with the full upgrade.

## 2 The Prototype Plan

The upgrade plan calls for the installation of 3 pickup tanks and 4 kicker tanks. There are two different length pickup tanks, two of approximately 240 cm and one of approximately 170 cm. The long tanks will hold 4 array modules, the short tank 3 array modules. Counting the transition pieces and bellows, the short tank will take up about 250 cm. We propose to build and instrument the short tank and test it in the Debuncher D3Q10 region, where there is one spool piece of 247 cm and one spool piece of 257 cm, with vacuum valves within 5 m. The requirements on Debuncher vacuum are less stringent than the requirements on Accumulator vacuum, so we can install the tank and have it ready for beam measurements with minimal interruption to the program [3].

The array modules installed will have the same aperture as proposed for the Accumulator, 27 cm x 3 cm. The 3 cm vertical aperture will be the limiting aperture in the Debuncher, with an admittance of  $15 \pi$ . Therefore, we will not be able to leave the tank installed but will have to remove it when finished with the measurements. As there are 3 array modules that fit in the tank, we are currently discussing 3 different designs for the pickup loops. The main focus of the measurements is the signal to noise performance vs frequency for the pickups, enabling a measure of the impedance vs frequency. A detailed study plan is being prepared.



As much of the design work for the prototype tank and the installation tanks overlap, we plan on doing as much as possible simultaneously. The prototype tank will be used as the short tank for the full upgrade. We will procure many of the parts (e.g., tanks, ion pumps, gauges, stands) that are required for the full upgrade during this phase of the project.

### 3 The Schedule

A Microsoft Project schedule for the prototype phase has been prepared and is attached to this document. The prototype will be ready for installation in May 2005.

### References

[1] D. McGinnis, "Issues for Antiproton stacking and cooling", Report prepared for Department of Energy Review, July 2003 (unpublished). This document is available at [http://www-bdnew.fnal.gov/doereview03/Current/02\\_Pbar\\_stacking\\_cooling.pdf](http://www-bdnew.fnal.gov/doereview03/Current/02_Pbar_stacking_cooling.pdf)

- [2] P. Derwent and R. Pasquinelli, "Stacktail Cooling System Upgrade", Pbar Note 682 (unpublished), 2003. This document is available at [http://www-bdnew.fnal.gov/pbar/documents/pbarnotes/pdf\\_files/PbarNote682.pdf](http://www-bdnew.fnal.gov/pbar/documents/pbarnotes/pdf_files/PbarNote682.pdf)
- [3] With one shift for installation and one shift to pump down, the Debuncher would be ready for beam measurements on the time scale of one day. A similar amount of time would be necessary to remove the tank. The Accumulator requires a 4 day bake (with out beam) after opening vacuum.