



Fermilab

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September 02, 2003

To: Roger Dixon

From: Sergei Nagaitsev

Subject: Review of the vacuum work for the upcoming Recycler

Dear Roger,

Below you will find my responses to the committee recommendations.

1. We are proceeding with the shutdown plan, as described in the review presentations, including the instrument and other upgrades that require opening the beam pipe, and especially including the bake out of the entire ring.
2.
 - a. To our great relief, the technical teams are populated with people who are well trained in vacuum work and familiar with the Recycler. The procedural changes have been already discussed with bake-out group leaders. The Recycler shutdown vacuum work specification #1304-ES-296406 has already been distributed to all involved personnel.
 - b. We are currently not considering any additional portable power. We will bake all ion pumps at a higher temperature (above 170C).
 - c. The leak-checking time allocation has been doubled in our schedule. The duration of the shutdown has not changed.
3. All of the beam-based experimental suggestions were good and we are vigorously pursuing several of them. We have already determined that the electron trapping in a coasting proton beam does not exist because the potential well is too shallow at these currents. Also, the antiproton zero-current lifetime and emittance growth appear to be identical to that of a proton beam, which is yet more evidence that the trapping of secondary particles in the beam potential is insignificant. The latest most promising development with beam-based measurements is our

- successful commissioning of an ion clearing current monitor. This has a potential to be a useful diagnostics for vacuum pressure measurements in the beam pipe.
4. We are continuing to carry out a well-defined program of off-line vacuum-related measurements using the Recycler mock-up at E4R. This involves the pumping speed and outgassing rate measurements. We are currently not planning any tests with baking out by hot air or nitrogen in the beam tube.
 5. The procedural suggestions from the committee were excellent and we are implementing them.
 6. The modeling of the Recycler vacuum system with a Monte-Carlo code has not started yet. We are still looking for suitable computer codes.

Best regards,
Sergei Nagaitsev