LSD Planning Meeting

Klystron Maintenance and RF Recovery Planning

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Background

Concerns for Recovery

- Tube failures
  - ❑ Shelf life vacuum degradation
  - ❑ Old tube cathode aging, limited emission, etc.
- Other start-up problems (recall the load resistor water leaks)

Inventory

- Number of tubes installed – 338, with about 15 crippled units (low power)
- Number of spares tubes – ~16
- Lead time to procure ~1 year ARO for first new unit, a little less for rebuilds

Last Shutdown

- How long were the tubes unpowered? – at least 4 months, LCW was off
- Number of tube failures on start-up – 1-2
- Types of failures – Non vacuum related (low emission, mod anode current high)

Questions to be addressed

- What should be checked
- When to begin check out
- Are periodic checks necessary, and how often – tube vacuum, “pumping”
- What does it take to perform checks
- What can be inferred from the testing

Options and Issues

So far:

- Tubes have been unpowered for 3-1/2 months to date
- PSS System scheduled to become operational about Dec.1, 2012, about 3 months from now

Option 1 and Issues:

- Early turn on of High Voltage to the tubes, with cathode current for pumping. No RF output.
- Issues –
  - ❑ Waveguide pressure interlocks – protects from open WG – active
  - ❑ Configuration Control needed – details TBD, jumpers, locks, etc.
  - ❑ Interferences with other activities, scheduling
  - ❑ Significant time and resources required, will impact other 12 GEV work
  - ❑ What we learn – it's a Pass/Fail test and establishes a baseline at best. No real indication of future problems but allows an early start for getting spares

Options and Issues

Option 2 and Issues:

- Wait for PSS system to be completed, do as part of other PM work
- Issues –
  - ❑ Configuration Control easier, tunnel locked up, normal interlocks in place
  - ❑ Interferences with other activities, perhaps reduced, less diverted labor for set-up
  - ❑ Still a Pass/Fail test and establishes a baseline at best. No real indication of future problems but delays the start for getting spares a couple of months
  - ❑ No indication that a 3 month delay will cause additional failures
- Spares have sat unpowered for upwards of 2 years without problems to date.

Recommendations (for early checks):

1. Test spares on klystron test stand
2. Spot check tubes in situ for vacuum problems with hipotter (does not pump)
3. Remove a sample of tubes for testing on test stand