To: Dick Cassel 14 February 2002

From: Keith Jobe

cc: D. Schultz, B. McGee, J. Sevilla, P. Bong

Subject: 8-Pack Modulator Safety Systems

The following safety systems have been discussed and are presumed to be part of the 8-Pack modulator design. All systems (except as specifically noted) are expected to be operational prior to the first unattended operation of the modulator system. Also, except as specifically noted, the safety systems for the 150 KW supply and 4-dog modulator is identical to the target 8-pack installation.

Please let me know if there is anything I appear to have overlooked or erred on. Likewise, if a feature is described which may not be prudent or necessary, please let me know. I have also take a stab at assessing divisions of responsibility in areas where there may be some confusion. Again, please let me know if you believe I may have erred.

Fire Suppression System

The 8-pack modulator design briefly had a CO_2 gas flooding fire suppression system. This has been removed from the design following an evaluation of the protection and risk associated with an accidental release. There is no active fire suppression system on the modulator.

Fire Detection System

The modulator stacks (two of them) and the two modulator support racks will be equipped with HSSD (High Sensitivity Smoke Detection) ports (four total) connected to a wall-mounted HSSD sampling head for the 8-pack installation. The vendor has not identified the specific sampling port technology as yet, but it is expected to resemble a drip-irrigation system nozzle with either a rigid or flexible sampling line. Conventional Facilities (Javier et. al.) will be responsible for procuring, coordinating, and installing of the HSSD and its sampling system.

The 150 KW modulator power supply is air cooled and will probably require a connection to the existing NLCTA HSSD sampling system. . Conventional Facilities will be responsible for coordinating the installation of the HSSD and its sampling system.

The 500 KW modulator power supply (not installed at this phase) is nominally sealed, and will have 2-4 ionization smoke detectors installed internally. Conventional Facilities will coordinate the installation of the smoke detectors when the power supply is installed into End Station B.

Additionally, there are smoke detection systems for the 8-pack support racks and under the raised dance floor that are not as directly related to the modulator design, and are not described here.

Fire Prevention System

The Fire Alarm Panel will have an additional dry contact output (normally open), which closes when there are no fire alarms in the 8-pack HSSD and Ionization-detector zones and NLCTA rf rack HSSD zone. This connection will be available in a junction box near to and outside the Fire Alarm Panel (as is done in NLCTA and the Damping Ring Alcoves). Conventional Facilities is responsible for the interlock relay within the Fire System. Power Conversions (Dick Cassel et. al.) will be responsible for the installation of the fire interlock cable from the fire panel to the 8-pack modulator system and the power supply.

a) The fire interlock will be received by the PLC for the 8-pack modulator, and is required before enabling the IGBT power supplies (possibly excepting the PLC and certain low-power power sources), klystron focus and filament power supplies.

b) The fire interlock will directly shut down the modulator's high power supply. This is handled independently from the interlock signal that is read by the 8-pack PLC.

Both of these interlocks must be independently testable. A removable connector, interlock test button, or other method will be required.

High Voltage Systems

A clearly marked red "crash off" button will be installed near the modulator PLC control panel. This must (at a minimum) deactivate all lethal power sources associated with the IGBT modulator system.

A clearly identified crash off button, off switch, or breaker must exist near the high voltage power supply. This switch only needs to de-energize the high voltage power supply.

All doors, latched or unlatched, protecting exposed hazards will be interlocked such that the system de-energizes within a reasonable time. This is in addition to the required administrative LOTO requirements.

LOTO breakers will be available and protocols developed.

A flashing red light will be mounted very near the IGBT modulator, and near the high voltage power supply.

Radiation Systems

The high voltage power supply will require a PPS system enable to activate the primary power systems. The usual "SLAC Standard" protocol is required, which requires two

independent power control systems including at least one mechanical device (vacuum relay, contactor, etc.). Controls (Bong. et. al.) will specify the power supply PPS connector, pinouts, and functions, and be responsible for coordinating the installation of the interlock cable up to the power supply and the connection into the PPS system in the existing NLCTA PPS racks. Power Conversion is responsible for the power supply connector and all internal connections.

Initially, the PPS interlocks will be part of the BSOIC ion chamber system currently installed in the NLCTA. Eventually, the system will be modified and the power supply will be controlled by the full PPS interlock system. Controls and NLCTA Operations will be responsible for the design and operation of this system.

Contrary to established practices, there will not be a yellow-magenta “radiation” light system for the 8-pack until the rf power sources are connected to an accelerating-mode rf structure. This variance was sought to reduce confusion between the accelerator-based and the rf-based sources in the area. This variance has been approved by the Radiation Safety Officer.