

# INTERFACES WITH OPERATIONAL SYSTEMS

## APS Upgrade Project Removal and Installation

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### ABSTRACT

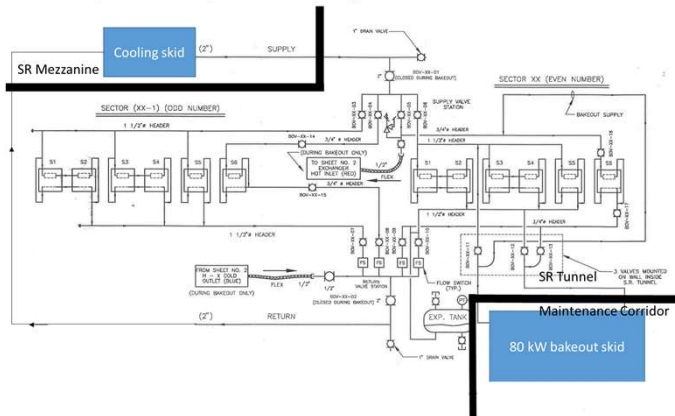
A critical time for the APS Upgrade Project is the twelve month dark period in which the current accelerator, front ends, and insertion devices will be removed and the new MBA will be installed. In addition to the technical interfaces, there are a number of operational support systems and utilities that will be affected. For the dark period to be a success, all of these interfaces need to be described and their interaction with the removal and installation processes defined. This poster describes some of these systems and their interfaces.

### ASSEMBLY, REMOVAL, AND INSTALLATION

The APS-U project will have an extended pre-installation phase where the 200 magnet modules will be assembled and tested prior to being placed in storage. The dark period will be kicked off with an extensive Lock Out Tag Out procedure prior to the removal of the current accelerator. The current plan calls for installation of all tray, cabling, fibers, and any other modifications to the tunnel to be complete prior to installation of the new magnet modules. Once installed, all necessary connections will be made up and testing without beam can commence.

### COOLING WATER AND BAKEOUT SYSTEM

Cooling water for the APS storage ring is routed via two different headers and piped in parallel to the accelerator components. During the removal phase the connectors to the components will be severed after the headers are drained. The APS-U configuration has yet to be fully engineered

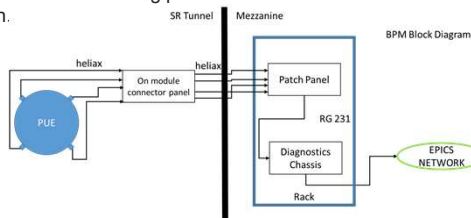


The current storage ring at the APS has dedicated, hot water based, bakeout systems. For the 40 storage rings sectors of the APS, there are 20 independent bakeout systems and cooling systems, located in the even sectors. The baking skid is typically located in the maintenance corridor on the inboard of the SR tunnel while the cooling skids are on the mezzanine. These systems are planned to be reused for the new MBA, so how they are disconnected during the removal phase, and how much work there will be during the installation to bring these systems will need to be sorted out during the removal and installation planning.

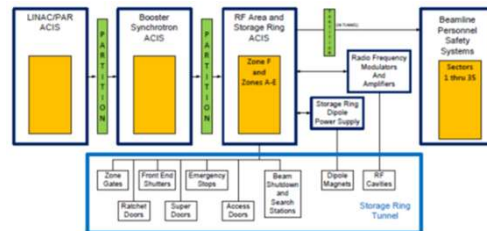
### BPM

The Beam Position Monitoring system of the APS-U will utilize new, dedicated racks mounted at the mezzanine for each of the 40 sectors. Matched heliax cable bundles for each of the 570 BPMs will be pulled from the mezzanine to the SR tunnel via the shielding penetrations and connected to the on module connector panel during installation.

The current BPM system will be completely removed.



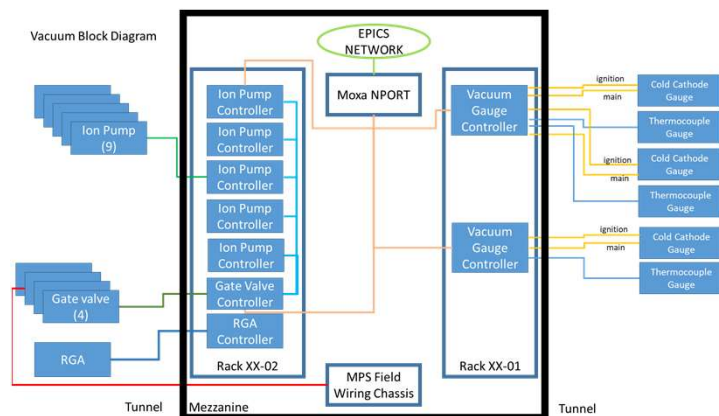
### ACIS



The Access Control Interlock System (ACIS) of the APS consists of control systems, shutters, physical personnel gates and barriers, and associated control and sensor cabling. Entering the tunnel via various penetrations, the cabling in the tunnel runs in dedicated conduit or in shared cable trays. In order to facilitate the removal and installation work, a majority of the physical barriers and gates that are part of the ACIS will be removed at the beginning of the dark period. The sensors and interlocks that are conjoined with this equipment will need to be accounted for in that period. The current plan is that the physical barriers will be reinstalled at the same locations after the installation of the new MBA.

### VACUUM SYSTEM

The APS-U storage ring vacuum system for each sector will consist of a pair of racks with controllers located on the mezzanine, and vacuum components in the tunnel. The vacuum components will be installed on the magnet modules during the pre-installation phase.



The of high voltage and control cabling will need to be pulled from the mezzanine to the tunnel during the dark year through the shielding penetrations, before being connected to the components. The current vacuum system will be completely removed, with only the racks remaining.

### CONCLUSIONS

- The details for all of the interfaces will be necessary to make the removal and installation of the APS-U a success. While this work has started, there is a significant amount of work remaining to be done.

### ACKNOWLEDGEMENTS

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