InterCAT Technical Working Group Meeting
February 15, 2001

Agenda Review and TWG Activity Summary: (Mark Beno)
Mark called the meeting to order and reviewed the agenda.

APS Report

PSS Version 2 / Soft Panel User Interface: (Jon Hawkins and Roy Emerson, APS)
Jon told the group that testing and safety considerations regarding the PSS are driven by two main factors: the DOE accelerator safety order and the safety assessment document. He noted that the experiment hall floor is very "fluid," and hutches and beamline equipment are always being modified. A couple years ago, the APS began to track requests for modifications to the PSS. Greater than 95% of the requests were for either front-end shutter opening or for door operation, which are not core PSS functions. Less than 1% of the requests were for actual changes of the core safety code. Jon described the proposed changes that would separate command and control functions from the core safety code. These changes would make it quicker and easier for users to request changes to the PSS and keep up with the evolution of hutches and beamlines.

Roy reported that the new system has been running on sector 4-ID for over a year. Version 2 has increased system capacity to handle more hardware and increases system flexibility. Only the user interface portion of the system will be unique from CAT to CAT. Roy reviewed the capacity of PSS 2 in terms of numbers of stations, doors, user panels, search boxes, etc. The experience with PSS 2 in sector 4 has shown that the hardware is reliable. However, in the software on chain C of chains A, B, and C, Roy noted that one portion of the software is problematic due to supplier problems. Much testing of this software has been done in the lab, but no alternatives have been found and the software will have to be changed. By the May 1 start up, the new software will have been implemented and validated. This system will be used on all new stations built. Existing stations could be retrofitted and various scenarios were discussed.

CAT Report

The USAXS Instrument at UNI-CAT 33-ID-D: (Pete Jemian, UNI-CAT)
Pete identified the collaborators involved with this state-of-the-art instrument. He then gave a brief review of why SAXS is a valuable technique and then described several advantages and disadvantages of USAXS. He showed a schematic of the 33-ID-D set up and reviewed the major components. Special features of the system include an automated sample stage and a detector stage that also has a motorized x-y translation stage to change out detectors. These allow an adjustable sample-detector distance.

Pete reviewed the detectors used in the USAXS instrument. The counting chain for most experiments was shown; key components include a photodiode and femto current amplifier. The dynamic range of the photodiode is 8 orders of magnitude from $\sim 10^2$ to 10^{11} photons/sec. The entire system covers three decades in Q. The instrument can also be operated with a CCD detector (Photonic Science) for preliminary sample radiography. This detector is used, for example, to access sample quality and determine if cracks or bubbles are present. USAXS data for an Fe-Ti alloy were shown an example of this application. The concept of the "absolute SAX cross section" was introduced to explain to data scaling using standards.

Pete also reviewed the instrument software. He discussed the three stages of data collection. Instrument setup is done with EPICS and EPICS-TCL tools. Data acquisition is done with SPEC on a Unix workstation. The data collection produces ASCII data files with header records containing a large number of instrument parameters. Data analysis is done using an Igor macro package. One advantage of this package is that it is accessible to both Windows and Mac users. NSF file access is possible while

the data collection is in progress so that a previous file can be analyzed while data is collected. At this point in the development of the data analysis software, desmearing corrections and a size distribution package are available to users.

Questions related the detector were answered:
- An uncooled photodiode is used a cooled photodiode gives approximately a factor of 2 lower noise but introduces all the complications of the cooling mechanism.
- A question about the flux on sample was answered: Approximately 10^{12} photons/sec in 1 mm^2

Next Meeting
The meeting will be held Thursday, March 15, 2001, in Building 401, room B4100.