HIRES Dewar Upgrade

Project Monthly Report – Apr 20/4

Progress

Detectors

The Hires dewar was cleaned as per established procedures then pumped and cooled with all thermal circuitry installed except for the backplane and CCDs. The RGA was attached to the dewar via the input window flange. After being allowed to achieve thermal equilibrium (~30 hours), the RGA was used to test for various species of residual gases. The results were indicative of a very clean and dry dewar. H2O, which had been very high before the cleaning process, is now a few parts in 10E-09. H2 and N2 are now the dominant species in the dewar. All other species are now more then a factor of 50 below these two partial pressure gases. It should be noted that H2 does not freeze out on the cold LN2 thermal circuitry, so the high H2 level is expected.

The dewar was allowed to warm up and the engineering mosaic with the its attendant copper blocks (temp diodes and heater resistors) were installed. The CCD video was checked for all six amplifiers and found to be reasonable for warm, saturated video. The diodes all read approximately the right values. The dewar was then pumped and cooled again with the RGA attached in place of the input window. After ~24 hours, the video was checked (only dark exposures could be made because of the RGA head at the input window). All CCD video appeared normal except for CCD #2, amplifier A which appeared very weak. Also, the temperature diodes did not seem to be producing reliable values. After some subsequent testing, the dewar was allowed to warm up. The dewar head was removed from the dewar and testing began in the clean room.

Video from CCD 2A was confirmed to be faulty. A Lot 10 CCD (engineering device) was then used to test the electrical circuitry for all three positions on the backplane. This test confirmed that the electronics for all three channels are working and stable. CCD #2 was removed from the backplane and replaced with the aforementioned Lot 10 CCD. Further testing with the engineering array showed all 6 amplifiers appear to be functioning normally.

The temperature diodes are being replaced and recalibrated before the next phase which is to reinstall the engineering backplane with the thick input window. It is not clear why the diodes have failed. They had all been cleaned in solvent and baked at 50C for 24 hours. The baking had not ever been done before so perhaps the baking had some deleterious effect on them. The new diodes will be cleaned in solvent as before but will not be baked. Also, the copper blocks were not put in the ultrasonic cleaner as some previous tests with torr-seal on copper blocks showed torr-seal delaminating from the copper after only five minutes in the cleaner.

In parallel with this effort, science detector 17-7-6 has been in the CCD lab undergoing more testing in dewar #7. Over the last week, this device has been in the dewar with no zeolite and no O2 treatment. Initial QE results indicate the same trend as we have seen in the past, i.e., the blue QE (3200A) is going down and the red QE (4500A) is going up at about the same rate as previous experiments. Richard has been monitoring the progress of this test so he can give more details if required.

Issues and Concerns

The variable QE of chip 17 7 6 remains the biggest concern.

Schedule

The Pre-Ship review, shipping, installation and commissioning schedules are delayed pending resolution of the contamination problem in the dewar. The earliest installation date is in August 04.

Budget and Spending Profile

To the end of March 04 the project has spent $810,370 or 99% of the project cost estimate, not including contingency. A summary of the budget is attached. We expect to overspend the budget, including contingency, but have no plans to bill beyond the total agreed-to price, which includes contingency.