Temporary Operational Safety Procedure (TOSP)

FOR TESTING THE PVDIS DAQ IN HALL A DURING THE 5-PASS BEAM TEST

1 Introduction

The PVDIS experiment (E08-011) is scheduled to run in Hall A from November to December 2009. This experiment requires a new, fast-counting data acquisition (DAQ) system. The new DAQ system has been installed in the Right HRS in November 2008 and its electron detection efficiency has been tested during the May-June 2009 running at a counting rate of a couple of kHz. However, the performance of this DAQ in rejecting the pion background, and its electron counting efficiencies at high counting rates (up to 1 MHz) – which are crucial for the success of the experiment – have not been tested yet. It is forseen that the accelerator will perform a 2-day beam test in mid June in order to achieve a 6 GeV beam (called "5-pass test" hereafter). The 5-pass test will last for two days and so far no experiment is scheduled to run in Hall A during this time. In this document we describe procedures that will allow us to use this beam time to further test the PVDIS DAQ.

2 Description of Target

The current (May-June) experiments in Hall A utilize a polarized ^{3}He target. This target will be de-installed as soon as this run period ends, before the 5-pass test. A single carbon foil target (thickness 100 mg/cm^2) and its support system have been designed and assembled and can be attached to the target motion system after the $^3\vec{\mathrm{He}}$ cell and the target ladder is taken out. The target enclosure will be reinstalled after the 3He target cells have been removed and the helium atmosphere will be restored along the target beam line. This will minimize radiation and the chance of damaging the Be windows at the entrance and exit of the target area. The de-installation of the $^3\vec{\mathrm{He}}$ target and installation of the carbon foil will be performed by the polarized ^{3}He target group. All target operators for the current $^3\vec{\mathrm{He}}$ experiment will need to take a training before participating in the test run. The training will be brief due to the simplicity of the new target. General precautions for operating the target motion system will be observed, such as requesting the MCC to mask the target motion system. A 4×4 mm^2 raster is required when the carbon foil target is in beam at a current of higher than 5 μA. Raster can be turned off if the current is less than 5 μA.

3 Description of the Test Run

The DAQ test can be viewed as a continuition of the current experiments and the run coordinator will remain the same. Shifts will be manned during this period. The COO for the current experiment (E05-102) will apply.

3.1 Kinematic settings

The kinematics settings for the two HRS, from higher to lower priorities, are shown in Table 1. The rate estimations are shown in Fig. 1. Here, the Left HRS "electron test run" settings are close to the experiment.

Table 1: Kinematic settings for the PVDIS test run for June 15-16, 2009.

Beam energy (GeV)	Left HRS angle	Left HRS momentum (GeV/c)	Time	purpose
6.0	14.0°	3.6 (L)	24 hours	electron test run
6.0	18.0°	2.63	24 hours	electron test run
6.0	14.0°	1.0	3 hours	pion test run
6.0	18.0°	1.0	3 hours	pion test run
Beam energy (GeV)	Right HRS angle	Right HRS momentum (GeV/c)	Time	purpose
6.0	18.0°	3.0	24 hours	electron test run
6.0	18.0°	1.0	3 hours	pion test run

We avoid Left HRS angles below 14° which requires special tech support. And the LHRS acceptance above 18° is blocked by the target coils. For the Right HRS, we will keep it at the current 18° for the survey for the current experiment to carry out. The RHRS acceptance below 16° is also blocked by the target coils. The BigBite spectrometer will not be needed and will be turned off during the test.

Since the goal of the 5-pass beam test is to investigate the possibility of delivering a 6 GeV beam at high currents, we will utilize whatever beam available. The maximal possible running time and current (two calendar days of 100 μA on the 100 mg/cm^2 carbon foil target) will be used to evaluate the radiation dosage.

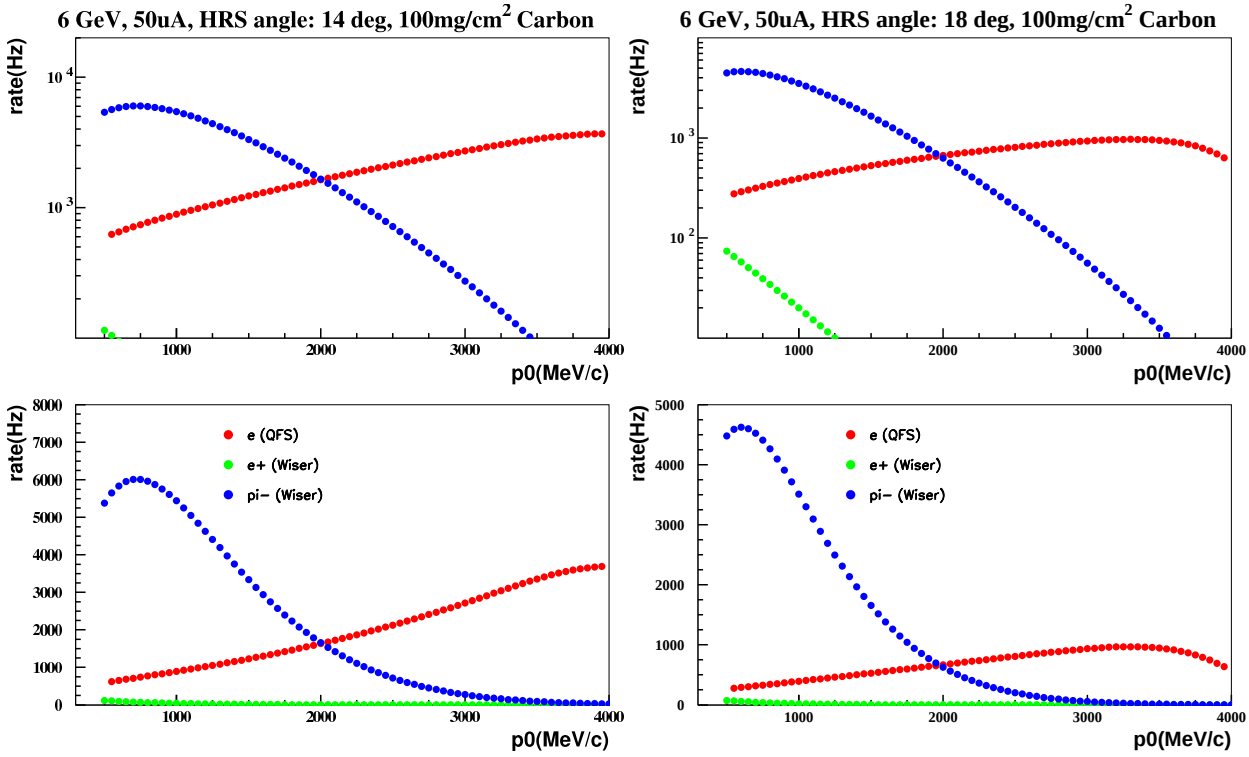
3.2 Accesses

At least one access will be required between the high (electron test runs) and the low momentum (pion test runs) to change the PVDIS discriminator thresholds. Another access might be necessary to add or remove the tagger system used for the deadtime measurement. We will do these opportunitically in coordinate with the MCC and the Hall A Compton crew.

4 Radiological Controls

The test run has been evaluated by RadCon, and the expected impact on the boundary dose budget is small. It is estimated that this run will cause less than 0.05 mrem site boundary dose (less than 0.5% of the annual budget). Since the test involves running high current beam into a target that resides outside a vacuum chamber, the primary radiological consideration is the potential for low level contamination and airborne radioactivity. The target enclosure is equipped with a low-volume HEPA-filtered exhaust system, which is expected to contain any activation products produced in the target housing. However, airborne radioactivity production outside the housing will also increase. RadCon will monitor the airborne radioactivity levels in the hall, and in the event the air activity exceeds the action level noted in section IV.B.6. of the E05-102 RSAD, will evaluate the levels and make recommendations as necessary to minimize potential impact on the upcoming maintenance period from contamination build up. RadCon will conduct surveys as outlined in the RSAD upon access to the target enclosure. Localized activation at target and dump areas will increase during the test. Standard surveys and access controls will be observed, and RadCon will monitor for the presence of contamination around the target enclosure upon cessation of the test and at normal trigger levels during any accesses while the test is underway.

Figure 1: Rate estimations for the PVDIS test run for June 15-16, 2009.



5 Personnel

- Run Coordinator: Vince Sulkosky
- Physics Division Liaison: Doug Higinbotham