

2008 Safety & Readiness Review Report

- Report finds that
 - *"preparations for the experiment are in good shape at this point: 3 months in advance of beam."*
- Report has a *"number of suggestions and a check-list of reminders"*:
 1. BEAMLINER - M. Jones
 2. BEAM OPERATIONS - M. Jones
 3. TARGET OPERATION - D. Crabb / O. Rondon
 4. DETECTOR OPERATION - Temple - NSU - (NC A&T SU)
 5. WORK PLANNING WITH OUTSIDE GROUPS - M. Jones
 6. GENERAL SAFETY ISSUES - K. Slifer
 7. RADIATION ISSUES - M. Jones

TARGET OPERATION

- 1) The target TOSP should include the list of current target experts.
 - Names for the TOSP period (now until run):
 - D. Crabb
 - D. Day
 - M. Seely
 - C. Keith
 - K. Slifer
 - J. Maxwell
 - J. Mulholland
 - S. Covrig
 - G. Smith
 - Other possible names: M. Jones, P. Bosted, O. Rondon, H. Baghdasayran
 - (Any LabView experts besides Donal, Karl, James and Jonathan?)

TARGET OPERATION

- 2) The collaboration's target group should provide a short-hand version of a target manual in the form of a "How To" list for operating the target. A copy of this list should be available in the Hall C counting house for the duration of the experiment(s) (it would be a good and quick reference for target operators). The version control of the list should be managed by a target expert.
 - We will have a document showing:
 - screen shot of the pol. targ. computers' control screen with items labeled
 - text instructions on :
 - things that need watching: polarization, which target is in beam, dates of baseline and CC constants being used, NMR gain setting(?), cryo fluid levels, ^3He and ^4He T and P , magnet current, witness field, etc.
 - how to move target (call MCC to mask/unmask, watch encoder, etc.)
 - how and when to adjust the microwave frequency

TARGET OPERATION

- 2) (*continued*)
 - text instructions on :
 - how and when change polarization sign
 - what to do if things happen: reboot frozen computer? call experts?
 - ...
 - Existing Target info on the Web
 - wiki http://halleweb.jlab.org/experiments/sane/wiki/index.php/UVa_Polarized_Target
 - Polarized target cryo web page <http://www.jlab.org/~ckeith/GEN/gen.html>
 - recording of charge on target at fixed intervals (need to revive the code that read the EPICs current and integrated it)
 - instructions on what to record in paper logbook
 - The expert in charge of the list: ?

TARGET OPERATION

The screenshot shows the NMR control software interface with several key components highlighted:

- Strip chart:** A plot showing the magnet current over time, with a sharp peak labeled "Instant. value".
- Magnet I:** A panel showing magnet status and controls, including "Magnet Power Supply" and "Superconducting Magnet" sections.
- Cryo levels:** A panel showing cryogenic levels for 3He and 4He, with values like 1.006, 0.988, 9.100, and 0.104.
- Target in beam:** A panel showing target status, including "Top Target 10mm Hole", "Bottom Target Carbon Target", and "Empty Target".
- NMR raw:** A panel showing raw NMR data, including "Raw Signal" and "Baseline".
- NMR fit:** A panel showing the fitted NMR data, including "PolyFit Curve".

Additional interface elements include:

- Buttons:** "Init QCA", "Save Chan List", "Stop NMR Sweep", "Pause", "One Point Data", "Monitor", "Next Update", "HOLD TO SETPOINT TO ZERO", "Heater ON", "Heater OFF", "Unlock Magnet Controls", "Enable Buttons", "New Event File", "New Base File", "Clear Charge".
- Controls:** "Sweeps", "Scan Freq", "Cal. Const.", "RF Freq", "RF Mod", "RF Power", "Gain 1", "Gain 20", "Gain 50", "Yale Gain", "Baseline", "Beam (ns)", "Run Number", "Temp (K)", "Press (Torr)", "3He", "4He", "Current (A)", "Voltage (V)", "Setpoint (A)", "Rate (A/min)", "Witness (T)", "Rate (A/min)", "Persistent Mode".
- Readouts:** "Data for Last Event", "Event Number", "Timestamp", "G-Meter", "Top Proton", "PolyFit Area (arb units)", "Polarization (%)", "Encoder", "Move Target", "Top Target", "Bottom Target", "Empty Target", "FM Amplitude (V)", "FM Offset (V)", "Freq (GHz)", "Power (mW)", "Belongs (kOhm)", "0 Level (V)", "G-Meter Temp", "Top Charge", "Bottom Charge", "8.404E+15".
- Navigation:** "File", "Edit", "View", "Go", "Communicator", "Back", "Forward", "Reload", "Home", "Search", "Netscape", "Print", "Security", "Shop", "Stop".

TARGET OPERATION

- 3) Have a written plan for training target operators.
 - 1-2 hr demo sessions by expert(s) (name(s)?), with perhaps some hands on practice if the target is operational: how many sessions?, approximate dates?
 - Additional training sitting along a trained expert or operator when the beam is on: half a shift long?
- 4) Estimate the energy released in a quench and predict likely scenarios and mitigation strategies.
 - Refer to document detailing modifications to target after the 1998 repair, and to anecdotal evidence of quenches with no adverse effects, including recent one in EEL.

TARGET OPERATION

- 5) Estimate the effect of eddy currents induced by a magnet quench in nearby conductors and mitigate if necessary.
 - Reference to hcllog reports of quenches during GEn98, Gen01 and RSS with no impact on sensitive SEM electronics located very close to the target.
 - See if effects on other nearby devices: forward tracker supports and PMTmagnetic shield box cherenkov PMT's, cherenkov tank(?) can be calculated.

TARGET OPERATION

- 6) Reserve enough time in the run plan for absolute calibration of the target polarization.
 - This is already included in the proposal beam time request
 - one shift for TE calibrations at beginning and end of each insert use
 - at least one intermediate TE
 - TE's during configuration changes / opportunistic beam off periods

	Data				Total
Energy - field angle	4.7	4.7 80°	5.9 80°	5.9	
Run plan calendar days	5	9	21	10	Config. change 3
Run plan PAC hours	60	108	252	120	540
Proposal hours	70	130	200	100	500
Clock hours	120	216	504	240	72 1152
Target dose [e-] at 85 nA	1.1E+17	2.1E+17	4.8E+17	2.3E+17	1.0E+18
Target loads at 9E16 e- / load	1.3	2.3	5.4	2.5	11.5
Insert changes (2 loads/insert)	1	1	3	1	6
TE overhead hours (24 h / insert chan)	16	32	72	24	144

TARGET OPERATION

- 7) Plan for irradiation of new target material
 - Cool down at UVA in August to select existing and possible newly NIST-irradiated material for run: we need a minimum of 4 cup loads that polarize to $> 85\%$ in the lab in < 1 hr.
 - Plan to use up to a shift and a half of beam at 1000 nA midway during commissioning to irradiate, followed by an anneal and TE to measure polarization with some accuracy after irradiation. A 12 h irradiation at 1000 nA would deliver a very uniform dose of $\sim 2.7 \times 10^{17}$ electrons/ 3.6 cm^2 raster area (this might be too a high dose for cold irradiation).
 - If this approach works, assuming we don't have enough material to begin with, we could use the calibrations at $1 \text{ }\mu\text{A}$ to irradiate more material. The run plan includes 120 h of $1 \text{ }\mu\text{A}$ calibration beam, so we could irradiate two full inserts to $\sim 10^{17} / \text{cm}^2$.
 - Contact Phil Cole about other possible irradiation options