The G_E^n Polarized Target
Emergency Procedures

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This write-up is intended as a guide for recognizing and properly reacting to possible failures of the polarized target and its subsystems. It should be read before shift. In case of questions, please contact one of the persons listed in the table given at the end of this write-up.

1 Target Failures

1.1 Power Outage

In case of a power outage, the pumps in the hall will stop, the computers in the counting house will be off, and parts of the controllers and gauges will be non-operational. Call one of the persons listed in the table below.

If you were polarizing, make sure that the microwaves are off. If the pump system stopped, try to restart only the mechanical pumps. If the computer for the cryogenic control system crashed, try to reboot the X-terminal and connect to the computer *cdaqh1*. Open a terminal session on *cdaqh1* and call *medm*.

If necessary, have an access to the hall and switch the control of the cryogenic valves to manual mode and contgrol from there.

1.2 Magnet Filling Problems

In case the magnet cannot be filled, consider the following scenarios. There are generally two possibilities. Either the transfer from the buffer dewar is successful, but the LHe boils off very fast, or no helium is transferred. In the latter, the transfer may be blocked or the pressure gradient is to small.

The transfer line is blocked Try to close the transfer line valve **EV91102** to warm up the valve, if the blockage is caused by ice or some other solid blocking the line. Try to open it again and check the flow.

The magnet pressure is very high Try to open the pump valve **EV91116** more to pump some of the helium gas out. If the pressure does not drop, the back pressure from the recovery line may be high. If necessary, try to went some of the helium gas to the hall. Also try to vent some helium gas from the buffer dewar, if that pressure seems to be high. Unlikely, but possible, is a softening of the isolation vacuum. Check the pressure **IG91131** and check, that the LHe in the target chamber (nose) is not boiling off fast. Call an expert.

If the magnet has to be ramped down, make sure, that the LHe in the magnet is not boiling off too fast. Close the transfer line if possible. Vent some helium gas to the hall. Start this procedure when the level drops below 20% and there is no clear indication of a LHe level recovery.

1.3 Cryogenic Computer Failure

The cryogenic control system regulates automagically the liquid helium (LHe) level in the target magnet, the LHe level of the 500 litre buffer dewar, and the liquid nitrogen (LN) level of the target shield (nitrogen shield). The control system is residing on the right most X-terminal, labeled *Target Cryo-Control*. In the table below, the ranges of the respective fill levels are given.

Device	Control Level
Magnet	75%
Buffer Dewar	55%
Nitrogen Shield	30% – 100%

The LHe level in the magnet is most critical, because the superconducting magnet coil has to be submersed in the LHe. If the LHe level begins to fall below 20%, contact a target person immediately. Try to control the fill valve **EV91102** manually. This is done by pressing the YES button for the *Manual Control* in the *Needle Valve* field. The range can be set between 0 (closed) and 99 (fully open). Given that the buffer dewar is filled to more than 20%, a setting of 99% of **EV91102** should start a fill of the magnet. If necessary, regulate the pressure in the buffer dewar via **EV91104**.

Call Stephen Bueltmann (9-849-5161), Chris Harris (9-849-5040), or Chris Keith (9-849-6063).

2 Target Component Failures

2.1 Cryogenic System

Possible components to fail are pumps, cryogenic valves, temperature and pressure sensors, flow meters, annealing system, and parts of the cryogenic supplies.

In case a pump stopped, that can be the metal bellows compressor pumping on the separator or one of the mechanical pumps or Roots blowers in the refrigerator pump station, call an expert. The mechanical Alcatel pumps in the refrigerator pump station can overheat. In the case, that only one pump overheats, the two other pumps will remain pumping and it is possible to continue polarizing with only two mechanical pumps backing the Roots blowers. If the whole pump stand is off, shut off the circuit breaker on the top right hand side of the control panel mounted to the pump station in the hall. Open the panel, and push the reset buttons of all temperature sensors. Close the panel. Make sure, that sufficient cooling is provided by the Neslab cooler. The light *Coolant Low* should be off and the temperature equal to the setpoint. The setpoint is to be set around 13°C, and can be checked bny pressing the *Set Point* button. Now turn the circuit breaker back on, press the *Anneal* button on the *valve control box*, and open the *main gate valve* **PV91141**. You can start now the mechanical pump set. Please note, that if you control and start the pumps locally from the pump station, they will turn off when you switch to remote control.

If valves are not operational, check whether they are connected electrically, the valve body frozen, or the control system not working. In case the valve is frozen and you have access to the valve, try gently to warm it up with a heat gun.

In almost all cases, please contact an expert.

2.2 Polarization Measurement and Computer

Please refer to the separate write-up describing the Target Polarization System.

2.3 Microwave System

Please refer to The G_{E}^{n} Polarized Target Operation manual.

2.4 Target Mover

If the target mover is stuck in its position, the insert is most likely frozen inside the refrigerator. Call an expert.

3 Telephone Numbers

		Pager	*Home*
Stephen Bueltmann	Coordinator	9-849-5161	9-810-2155
Chris Harris	Co-Coordinator, NMR	9-849-5040	9-881-9370
Dustin McNulty	Target Control, Computer	9-849-7156	
Chris Keith	Cryogenic Control	9-849-6063	