

**HAZARDOUS EXPERIMENTAL EQUIPMENT COMMITTEE
PRE-OPERATIONAL APPROVAL**

Case No. **98-8**

Date of Issue: September 23, 1998
Date of Expiration: January 31, 1999

Description: BaBar Drift Chamber Gas System	Location: IR2
Person in Charge: Yannis Karyotakis	Group Leader: Dave MacFarlane/ A.J.S. Smith
Area Manager: Bob Byers	Safety Officer: Frank O'Neill
Building Manager: Fred Catania	System Engineer: Patrick Petitpas
Operations: Roger Erickson	System Safety Engineer: Christopher Hearty
Others Concerned: Bob Bell, Richard Boyce, Dave Hitlin, Bob Messner,	

The Hazardous Experimental Equipment Committee approves the equipment named above for check out operations in the experimental area if the following conditions are met:

Testing and checkout may proceed provided that the restrictions listed below are adhered to. A list of these restrictions must be placed near the apparatus, and at the apparatus control panel.

Restrictions

Conditions for Pre-Operational Approval:

- 1) All relevant corrections to the Gas Shack as specified in the September 17, 1998 Pre-Operational Approval must be completed.
- 2) A flow restrictor must be added to the helium security line to prevent any chance of overpressurization
- 3) Perforated panels must be installed on the gas mixing racks in the Gas Shack.
- 4) The HAD and O₂ sensors must be installed in the return line and calibrated.
- 5) The complete safety system must be checked and signed off by the responsible DCH personnel.
- 6) SIAM interlock connections to the LV must be completed.
- 7) A procedure must be implemented which guarantees the following:
 - a) A full recertification of all safety systems is required when the Nanoautomate controllers are reprogrammed.
 - b) A recertification using the test box is required when a Nanoautomate is changed.
 - c) The Nanoautomates must be labeled with the version number of the currently installed program.

Conditions for Operational Approval:

- 1) All conditions listed above as Conditions for Pre-Operational Approval shall be met.
- 2) Procedures must be finalized and approved by HEEC.
- 3) When magnets are installed the backward end is considered to be a Permit Confined Space. Appropriate warning signs and procedures should be posted. This is to be regulated by ES&H (Joe Kenny).
- 4) The copper zeolite filters in the gas racks are sealed only with a valve when removed for regeneration. These valves must be equipped with caps, which are permanently chained to the valves.
- 5) Simplified instructions for gas system non-experts must be written. This must include daily checklists, normal operating ranges and required responses to alarms.
- 6) A procedure must be in place and approved by HEEC that guarantees all safety sensors are rezeroed and inspected quarterly, and all safety sensors are recalibrated at least annually. The quarterly safety sensor inspection may be extended if operational experience provides sufficient proof of safety and HEEC approves of the change.
- 7) HEEC must approve the DCH proposal to fix the incorrect sealing of the secondary flammable gas routing barrier or it must be demonstrated to be unnecessary.
- 8) **HEEC must inspect and review the complete experimental setup and give operational approval.**

COMMENTS: Christopher Hearty presented the BaBar Drift Chamber (DCH) Gas Mixing System safety analysis to HEEC on September 17, 1998. This follows several previous meetings and a formal HEEC review on June 15, 1998. The DCH contains 5000 liter of a flammable (He 80%/Isobutane 20%) mixture and operates at 2000 V which represents a potential fire hazard and ODH. A gas system failure leading to over pressurization or under pressurization of the DCH could cause injury or significant damage to BaBar. Thus a redundant fail-safe system is mandatory. HEEC feels that in general terms the DCH group has a well prepared design, which will ensure a reliable and safe operation.

Corrections and additions requested by HEEC at the June 15 meeting have been implemented. In particular, extra HAD and O₂ sensors have been added to the return line in the Gas Shack. This replaces the EPICS sampling which was a previous concern.

The Nanoautomate controllers are judged to be satisfactory for use in the DCH safety system as implemented. Normally, software based protection systems are not permitted for use as a primary safety system. However, there is a certification and testing program in place. Reprogramming these devices requires a specially configured PC and is only connected when loading a tested version of the ladder logic. These controllers are industrially rugged type controllers.

The secondary Mylar seal to the DCH was sealed incorrectly at the Forward End where escaping flammable gas was supposed to be routed and could dissipate through gaps at the Forward End Cap Calorimeter. It is possible that routing escaping gas back along the inside of the DIRC to the Forward End or an air pump could be a solution. The current DCH leak rate is a very small 80 cc/min.

The DCH will be filled with air and, therefore treated as a No Permit Required Confined Space, when a DCH wire must be pulled. This is in accordance with ES&H which oversees these issues.

HEEC permits a small test chamber to be installed in the return line at the Gas Shack or rack #9 as requested by the DCH group.

W. Innes, Chairman

by W. Craddock, Secretary

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