ACCEPTANCE SUMMARY FOR LHC MAGNETS BUILT AT BNL
Magnet D3L102

Date of this summary: April 5, 2006

This document contains a short summary of the acceptance status (in italics, just below), the minutes of the acceptance meeting, and actions taken after the acceptance meeting [in square brackets within the text of the minutes, or as footnotes].

Acceptance status:
The BNL Acceptance Committee met on June 30 and on August 18, 2005. The field quality and quench performance were approved on June 30. The remaining items needed for approval were reviewed on August 18. The approvals needed for acceptance were completed on August 31. The field quality data have been loaded into the LHC database. The survey data have been sent to R. Ostojic, who has approved it. (See discussion of survey data below.)

In January, CERN reported that D3L102 failed hipot during incoming inspection. This failure was traced to abrasion of the kapton insulation of the leads, abraded by the inside wall of the end dome during transit. A plan was developed to cover the region of abrasion with additional insulation in all three D3's (waiver M0345). CERN requested that BNL verify that the repaired magnet would satisfy CERN requirements for magnet lifetime. Documentation of this work is appended to the D3L103 minutes, notes [2], [3]. D3L102 and D3L101 were repaired by T. Dilgen at CERN on April 27.

MINUTES OF ACCEPTANCE MEETINGS
Present on June 30: Jain, Muratore, Pilat, Wanderer
Present on August 18: Cozzolino, Escallier, Jain, Wanderer

Quench Data: For the test of the D3's, the forced flow helium was designed to be divided into two equal parts (i.e., half the flow for each cold mass). The flow was satisfactory for D3L101. However, a problem apparently related to the division of the flow limited the quench performance of the right cold mass in D3L102. (The thermal cycle was made to check for obvious problems such as placement of the superinsulation.) In order to separate flow rate issues from magnet performance, the flow was changed so that it all went through the right cold mass (entry #20 in the quench plot) and then all through the left cold mass (entry #21). Thus, both cold masses reached the acceptance limit, 6500A, without additional quenching when the full flow was used to cool them. Problems of flow did not affect magnet operation in liquid. When powered together in liquid, both cold masses reached 6500A without added quenching (entry #22). The magnet was operated in liquid for magnetic field measurements, and its quench performance was quite good even with the added heat leak from the open warm bore tubes (entries #23, #24). It was concluded that the magnet's quench performance was acceptable. Muratore's slides are available at www.bnl.gov/magnets/LHC_Acceptance

Field Quality: Jain showed the warm and cold data from the magnet. (His talk is available at the address given above.) As discussed at the acceptance meeting of D3L101, there are differences between the integral transfer functions (ITF) of the six cold masses in the three D3 magnets compared to the five D1's. For D3L102, the difference between the normal sextupoles in the two apertures is larger than expected (~2.5 sigma) but both are within 1.4 sigma of the expected mean (slide 10). Jain also showed time decay and snapback measurement data. Pilat approved the field quality data.

Engineering: Escallier said that the electrical performance of the magnet was satisfactory for shipment. He noted that some of the level probe measurements are outside of tolerance but that they have not changed in some time. He has provided instructions for correct labeling of the leads (i.e., changed from D3L101). Cozzolino said that the construction of the magnet was satisfactory. His discussion of the interconnect piping is below.

QA: Hocker reported informally (Aug. 31) that there were no major outstanding issues in documentation. His list of Open Documentation Issues (Sept. 1) contained three items affecting acceptance: signoff of a DR, signoff of a DW on pipe positions (data already at CERN), and documentation of the procedure to ship the magnet with pressurized nitrogen.

Safety: Durnan reported by email that the documentation for the magnet met the safety specifications [1].

Survey: Cozzolino reported that the magnet would be shipped pressurized with dry N_2, as agreed between CERN and BNL, to prevent high hipot leakage currents at CERN. He has written an informal version of the procedure for accomplishing this. A formal procedure will follow. In order to accommodate shipment with positive N_2 pressure, certain of the interconnect pipes were not cut to length at BNL, making the measurement of their positions inaccurate. Cozzolino said that, for positions that were accurately measured, there were only minor out-of-tolerance values in the locations, with one exception. The exception is the heat shield return line at the LE (PE21). The mounting plate has not been welded and it rests at an angle against the right edge of the m/c conflat. He proposed that we ship it this way with the recommendation that CERN personnel secure it after flange removal at their facility. A photo, with this explanation, was sent to Ostojic, who agreed to the plan (email 17 August).

These notes written by P. Wanderer

[1] Email from Durnan to Wanderer, 18 August 2005:
I have no Safety Issues with magnet D3102.
Jim Durnan