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**CALIFORNIA INSTITUTE OF TECHNOLOGY**  
Laser Interferometer Gravitational Wave Observatory (LIGO) Project

To/Mail Code: John Worden  
From/Mail Code: Albert Lazzarini   
Phone: 626-395-8444  
Email: lazz@ligo.caltech.edu  
Refer to: LIGO-E990109  
Date: February 12, 1999

Subject: Approval of proposed procedure for removing VE spool pieces

The proposed method for removal of certain Vacuum Equipment spool pieces (see email text at end of this memorandum) was reviewed and deemed acceptable.

However, the Vacuum Review Board requests that a suitable method be devised to ensure an over-pressure at all times within the VE during the procedure. This is needed to keep the risk of particulate airborne contamination to a minimum.

Text of John Worden's referenced email:

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Date: Wed, 03 Feb 1999 10:15:43 -0800  
To: lazz@ligo.caltech.edu  
From: John Worden <worden@ligo.caltech.edu>  
Subject: Vacuum Board issue

Albert; please forward for comments.  
Thanks

RE: Spool removal at BSC 2 and BSC 4.

The only access to these two BSCs is via a spool. All other chambers are accessible via doors which are readily removed. I would like to propose that the spool removal/replacement occur outside of the clean rooms. These spools weigh more than 2000 lbs and are being hemmed in by seismic support structures and cable trays. The actual lifting of a spool by the overhead crane is possible - however, to move the spool clear and set it down on the floor all within the clean room is now impossible. The spool is too big to lift through the top of the clean room as this hole is largely plugged by the BSC dome.

I propose the following:

Prior to placement of the clean room the spool is hooked to the crane and the flange bolts loosened and removed at one end only. At this time the bellows portion of the spool is compressed with 3 large screws. Once the gap has opened to ~ 1 inch, a dust cover can be inserted to seal the chamber again. The spool end can also be covered with a dust cover. Bolts at the other end of the spool would then be removed and covers placed there. The spool is lifted clear and set down out of the way. Additionally, while the gap is exposed and prior to installation of dust covers, a temporary cover can be placed over the flanges to catch particles falling from overhead. Chamber surfaces are cleaned prior to these actions. The clean room can now be placed over the chamber and dust covers removed to allow access.

John

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Al:al

cc:

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