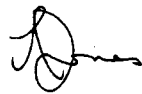


CALIFORNIA INSTITUTE OF TECHNOLOGY  
Laser Interferometer Gravitational Wave Observatory (LIGO) Project

To: File  
From: L. Jones   
Phone: 2970  
Refer to: LIGO-T970008-00-B  
Date: January 29, 1997

Subject: Single source justification for hydrocarbon monitor (B&K 1302)

Construction of the beam tubes for the LIGO facilities involves blowing clean, dust-free air through the tube modules during construction, to provide breathing air for the workers and to maintain cleanliness of the tube interior. The air is supplied by two units that include blower, dryer, and filters (BDF units). Construction time per module is 5-6 months. In the event of a malfunction, this air can contaminate the beam tube modules, and must be monitored for proper quality. Each tube module is over a mile long, and four feet in diameter; cleanup of a module would be very expensive. A hydrocarbon monitor is being procured for installation, which will measure total hydrocarbon content and will turn off power to the BDF in the event of an exceeded threshold.

Several types and models of hydrocarbon monitors were considered, including photo ionization, flame ionization, and photoacoustic infrared. Typically, the ionization units are limited in sensitivity and in the range of gases measured. High sensitivity and a wide range of gases are important to the LIGO application, for the best protection against contamination. Besides having the highest sensitivity, the B&K infrared unit chosen has the capability of canceling the effects of atmospheric variations in methane content, which is not a contaminant for LIGO but could trigger the hydrocarbon alarm and needlessly shut down the BDF unit, causing other problems. B&K offers two less expensive infrared units; neither have the methane cancellation capability and one is not sufficiently sensitive. One other manufacturer offers an infrared unit; it is not sufficiently sensitive.

The B&K unit is a catalogue unit; the price sheet is attached. The Department of Energy has nearly forty of these units in continuous use at Hanford, monitoring tests, so field reliability has been confirmed.

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