



IDENTIFICATION CLSAMP1			
LIGO-8970027-05-B			
REFERENCE NO. 953570		SHT 1 OF 3	
OFFICE LIGO		REVISION 5D	
MADE BY WLR	CHKD BY MLT	MADE BY GPB	CHKD BY SWP
DATE 11/8/94	DATE 11/21/94	DATE 9/20/96	DATE 9/20/96

TITLE **PROCEDURE FOR OBTAINING A CLEANLINESS ASSESSMENT SAMPLE**

PRODUCT **LIGO BEAM TUBE MODULES QUALIFICATION TEST CALIFORNIA INSTITUTE OF TECHNOLOGY**

1.0 SCOPE

1.1 This procedure details the steps to be followed to obtain a liquid alcohol sample from the inside of a 65' long beam tube section after final cleaning to assess the contaminants on the inside surface of the beam tube section. The alcohol sample that is obtained from this procedure will be chemically analyzed by FTIR method to determine the types and amounts of contaminants that have been dissolved in the alcohol from the inside surface of the beam tube section.

A cleaning assessment sample (500 ml of alcohol) shall be obtained from each of the first ten 65' long beam tube sections and from one out of every ten beam tube section cleaned after the first ten. Samples shall be obtained after the beam tube section has been cleaned. The cleaning assessment samples shall be obtained following the steps outlined in section 3.0 of this procedure.

2.0 EQUIPMENT AND MATERIALS

- Isopropyl Alcohol (2-Propanol, ACS certified, 99.9+%, < 2 ppm evaporated residue)
- A funnel. (cleaned per 3.1)
- A 2 liter graduated container to collect the alcohol from each beam tube section that is assessed. Alternatively, use the containers which contained the uncontaminated isopropyl alcohol to collect and store the contaminated samples. (Cleaned per 3.1)
- A 1/2 liter alcohol sample bottle for each beam tube section assessed. Alternatively, use the containers which contained the uncontaminated isopropyl alcohol to collect the clean samples.
- CP STAT 100 static disipative film laminate to cover cleaned collection equipment

3.0 PROCEDURE FOR OBTAINING CLEANING ASSESSMENT SAMPLE

- 3.1 Initial cleaning of the sample handling equipment shall use the following method:
- Prior to the initial use of a collection container and/or funnel, the items shall be cleaned a minimum of four times in accordance with the routine cleaning method described in 3.2 (minimum of eight rinses).
 - After this initial cleaning, a 500ml sample of virgin alcohol shall be poured into the collection container and through the funnel into a sample bottle.
 - A second 500 ml sample of Virgin alcohol will be poured directly into a sample bottle.
 - Both samples will be sent to a chemical laboratory for FTIR analysis.

3.2 Clean the graduated cylinder and funnel just prior to use by the following method:

APPROVED	
<i>M. Jellison</i>	2-7-97
CBI	DATE
CALTECH	DATE



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- Rinse the graduated collection container twice with 200 milliliters of the Isopropyl alcohol described above. Invert the graduated collection container after the second rinse and allow the cylinder to drain and complete dry.
- Use the rinse isopropyl alcohol from the graduated collection container to rinse through the funnel. After rinsing the funnel with isopropyl alcohol from the collection container, wipe the inside surface of the funnel with clean, new rumple cloth. After wiping, rinse the inside of the funnel with 50 milliliters of the isopropyl alcohol described above. Invert the funnel after this final rinse and allow the funnel to drain and completely dry.

Note: The sample bottles, if used, are to be supplied in a clean condition from the laboratory selected for analysis. Sample bottles are to be kept closed and protected from contamination until just before use. Prior to analyzing the first tube sample, pour isopropyl alcohol directly from the source into a clean sample bottle from the laboratory and perform a typical analysis to verify that the sample bottles are free of contamination.

- 3.3 Slope the beam tube section to a 1:20 slope. The expansion joint shall be at the high end of the beam tube section. The pump port, if present, shall not be positioned at the bottom of the tube to prevent interference with the test sample.
- 3.4 Apply permanent identification markings of the tube section being sampled on the collection container and record this identification in the tube cleaning log. Place the 2 liter collection container under the lower end of the beam tube section. The collection container and funnel shall be positioned under the beam tube section such that all the alcohol flowing from the end of beam tube section will be collected into the collection container.
- 3.5 Two (2) liters of isopropyl alcohol shall be used for each beam tube section from which a sample is obtained.
- 3.6 Release the isopropyl alcohol at the upper end of the beam tube section (below the expansion joint when applicable). The width of the of alcohol flowing down the beam tube shall be kept narrow at the bottom of the inside of the beam tube section. A flow rate of approximately ten (10) milliliter per second is acceptable and will develop approximately a 4" wide of flow. This can be maintained by stop/start of flow during the pouring.
- 3.7 Allow the isopropyl alcohol to flow into a cleaned collection container at the low end of the beam tube. Collect all of the sample that flows from the end of the beam tube into the 2 liter collection container. Continue collecting the sample until the continuous flow is stopped and the droplets are more than one second apart.
- 3.8 Do not shake the 2 liter collection container to mix the alcohol. Pour 1/2 liter of the alcohol directly into a 1/2 liter sample bottle and seal. Mark the sample bottle with the sampling date and the identification of the beam tube section from which the sample was taken.



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3.9 Package and ship the 1/2 liter sample bottle to a chemical laboratory for FTIR analysis. The remainder of the sample shall be poured back into 1 liter shipping container using the cleaned funnel. The container will be marked with tube Id number and sample date and stored until the results of the FTIR analysis are obtained and reviewed by Caltech.

3.10 The collection container and funnel shall be covered using a clean piece of CT STAT 100 film laminate to prevent contamination. The collection container and funnel will be stored in a clean location when not in use.

4.0 TEST RESULTS

4.1 The test report for each sample shall contain the following information:

- Sample identification including the tube number and type.
- The dates when the sample was taken and when the sample was analyzed.
- Absorption spectrum (absolute).
- Transmission spectrum.
- Volume of the sample evaporated on the KBr slide in ml. and the area of the layer on the KBr slide in cm².
- Area wetted in the tube in cm².
- Volume of the sample poured into the tube in ml.

4.2 The FTIR laboratory shall datafax it's findings to two locations specified by CBI within one working day of completing the analysis.

4.3 Preparation of slides for analysis

- Evaporate a minimum of 200 ml of sample to residue.
- Determine PPM from weight of residue
- Using reagent grade 150-proponal, re-dissolve sample residue and apply to Kbr slide.