



TITLE CLEAN ROOM WEARING APPAREL FOR BEAM TUBE ACCESS DURING CONSTRUCTION & INSPECTION ACTIVITIES PRODUCT LIGO BEAM TUBE MODULES CALIFORNIA INSTITUTE OF TECHNOLOGY		IDENTIFICATION CRWA-1 L190-8950065-03-B			
		REFERENCE NO. 930212		SHT 1 OF 8	
		OFFICE CHG		REVISION 3	
		MADE BY SDH	CHKD BY KHF	MADE BY SDH	CHKD BY RAJ
DATE 3/3/94	DATE 3/3/94	DATE 3/7/97	DATE 3/7/97		

1.0 SCOPE:

This procedure protective wearing apparel for Beam Tube Access through the Clean Room. All personnel entering the beyond the Change Room into the Ante and Clean Room shall be properly clothed and protected as noted in the following instructions.

All personnel entering the clean room and beam tube shall be instructed in the control of body perspiration, body fluid discharge (spitting, running nose, etc.) and airborne control of coughing, sneezing and running nose. Eating, chewing gum, and drinking within the three rooms of the clean room will not be allowed.

2.0 PURPOSE:

2.1 The foremost importance of CBI's work is the personal safety of its employees. Standard safety precautions including eye protection, head & foot protection, and limited access procedures will be followed during these activities. In addition, proper personnel protection is required when handling solutions during the cleaning process affiliated with the LIGO final spot cleaning activity.

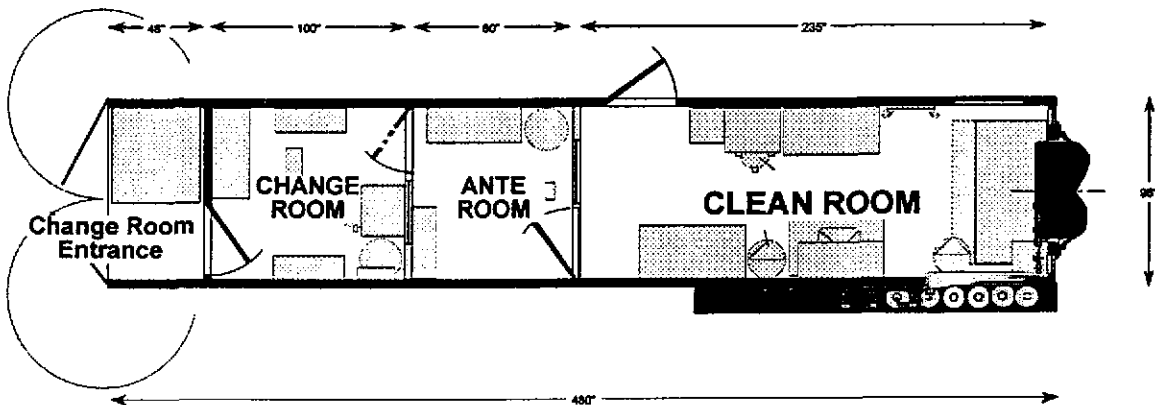


Figure 1.1

APPROVED

[Signature] 3/19/97
 CBI DATE
[Signature] 7/25/97
 LIGO DATE



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2.3 It is critical for the personnel entering the beam tubes to take every precaution in avoiding contamination. These instructions are provided to assure all body surfaces be covered in order to prevent contact with the inner beam tube surfaces.

3.0 **REFERENCES:**

- 3.1 Summary of concepts and Reference Design for a Laser Gravitational-Wave Observatory, CAL TECH; Feb-92.
- 3.2 Chicago Bridge & Iron Safety Manual for L.I.G.O. Project.
- 3.3 CL3N Cleaning Procedure.

4.0 **EQUIPMENT & MATERIALS:**

4.1 The following is a listing of Safety Equipment and Wearing Apparel required for access into the Clean Room only(No access or contact with the interior of the beam tube.

- 1) Pull-Over Hood - 100% Dacron.
- 2) CBI supplied Safety Glasses with side Shields meeting CBI Safety Standards.
- 3) Washable Lab Coat made of Dacron® Polyester Herringbone and Taffeta Weaves. Coat length shall be adequate to hang below boot covers.
- 4) Cloth, Lint-free gloves.
- 5) Soft Sole, Steel Toe Shoes rated for ANSI Z41, PT83FC-71 1-75 and CBI Safety Standards. Shoes shall be high or low top athletic style.
- 6) High Top Boot length Shoe Covers.

4.2 The following is a listing of Safety Equipment and Wearing Apparel required for access into the Clean Room and access and/or contact with the interior of the Beam Tube.

- 1) Bump Cap. Not required except when installing serrated baffles.
- 2) Pull-Over Hood - 100% Dacron with Snap In Facemask.
- 3) CBI supplied Safety Glasses with side Shields meeting CBI Safety Standards.



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- 4) Washable Coverall meeting Clean Room Class 100 specifications. Dacron® Polyester Herringbone and Taffeta Weaves. Vent panels and other features may be added to the coveralls to reduce body heat build-up and decrease the threat of perspiration.
- 5) Nitril Powderless Gloves.
- 6) Cloth, Lint-free inner liner gloves.
- 7) Soft Sole, Steel Toe Shoes rated for ANSI Z41, PT83FC-71 1-75 and CBI Safety Standards. Shoes shall be high or low top athletic style.
- 8) Disposable Boot length Shoe Covers.
- 9) Delete.

4.3 Storage of Clean Room Garments shall be in the Ante Room in containers labeled as follows:

- | | |
|--------------------------|-------------------------------|
| 1. Clean Coveralls Bin | 2. Clean Frock Bin |
| 3. Inner Glove Liner Bin | 4. Clean Frock Boot Cover Bin |
| 5. Nitril® Glove Bin | 6. Clean Hood Bin |
| 7. Clean Shoe Cover Bin | 8. Clean Face Mask Bin |
| 9. Soiled Clothing Bin | |

5.0 APPAREL INSTRUCTIONS FOR CLEAN ROOM & BEAM TUBE ENTRY

5.1 The following is a detailed set of instruction for wearing clean room compatible clothing for access into the Beam Tube. See Figure 5.1 for graphic description. Note that these procedures must be followed before entering the Clean Room.

1. Personnel shall remove street shoes, jackets, hard hats in addition to any soiled clothing when inside the Change Room. A lockable compartment(locker) is available for storing personal affects in the Change Room. Locks are the responsibility of the locker user. Clean sock feet or disposable booties are adequate for moving into the Ante Room.
2. Personnel shall then move into the Ante Room and suit up with clean Dacron® Herringbone coveralls. Coveralls may be re-used when they are not soiled and are in good repair. All soiled garments shall be stored in a designated soiled storage bin in the Change Room and each week forwarded to the cleaning service for cleaning. Damaged garments shall be tagged with a description of the location and extent of tears, ie:: broken zipper, torn sleeve, missing snap, etc. The damaged garments shall be placed in the "Soiled Clothing Bin" in the Change Room.



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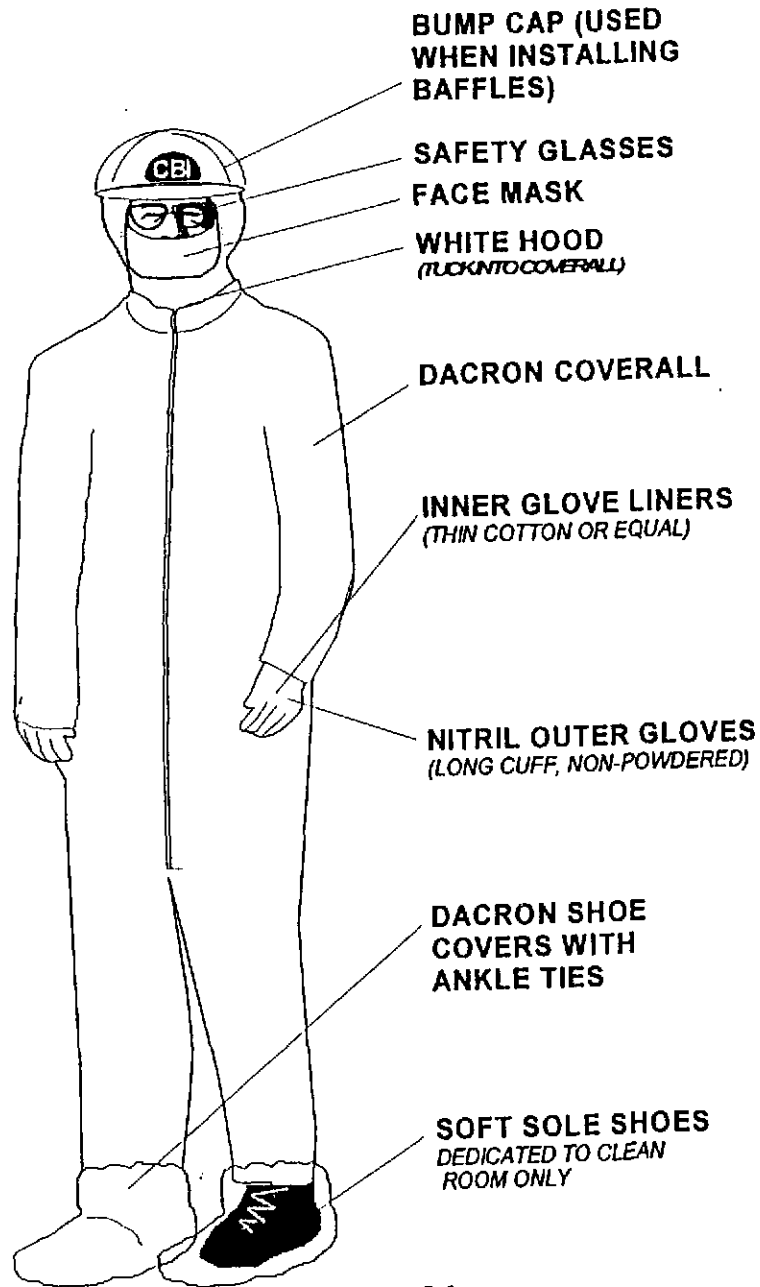


Figure 5.1



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3. Remove disposable foot covers(if worn in from the change room) and place in waste container. Put on designated soft soled, steel toed shoes. Snap coverall cuffs tight around leg.
 4. Install dacron washable boots over shoes and snap top cuff tight around leg. Tie ankle straps around feet.
 5. Inspect safety glasses to assure that all screws and shields are tight. Clean Glasses before entering clean room.
 6. Personnel shall put on pull-over hood. Tuck hood into coverall collar and fasten top collar snap. Do not allow hair to extend outside face opening.
 7. Install a clean face mask to the pullover hood using the snaps.
 8. All bump caps shall be inspected for cleanliness. Install the bump cap before entering the Beam Tube when installing serrated baffles.
 9. Two layers of gloves are required for beam tube access. The inner liner glove shall be white, lint-free cloth. The outer glove shall be Nitril® and the cuff shall be pulled over the coverall sleeve. The outer Nitril Glove shall be secured to the coverall sleeve using clean room tape or other approved methods.
- 5.2 The following is a detailed set of instruction for wearing clean room compatible clothing for access into the **Clean Room ONLY** (Contact with the interior surfaces of the Beam Tube and/or tools and materials bound for the clean room is prohibited in this dress). See Figure 5.2 for graphic description.
1. Personnel shall remove street shoes, jackets, hard hats in addition to any soiled clothing when inside the Change Room. A lockable compartment(locker) is available for storing personal affects in the Change Room. Locks are the responsibility of the locker user. Clean sock feet or disposable booties are adequate for moving into the Ante Room.
 2. Personnel shall then move into the Ante Room and suit up with clean Dacron® Herringbone Lab Coat(frock). Frocks may be re-used when they are not soiled and are in good repair. All soiled garments shall be stored in a designated soiled storage bin in the Change Room and each week, forwarded to the cleaning service for cleaning. Damaged garments shall be tagged with a description of the location and extent of tears, ie: torn sleeve, missing snap, etc. The damaged garments shall be placed in a designated storage bin in the Change Room.
 3. Remove disposable foot covers(if worn in from the change room) and place in waste container. Put on designated soft soled shoes.
 4. Install dacron washable boot covers over shoes and snap top tight around leg. Buckle ankle straps around feet.



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5. Inspect safety glasses to assure that all screws and shields are tight. Clean Glasses before entering clean room.
6. Personnel shall put on pull-over hood. Tuck hood into frock collar and fasten top collar snap. Do not allow hair to extend outside face opening.
7. Face mask is not required.
8. Bump caps are not required.
9. White cotton gloves are required for Clean Room access. Use the white, lint-free cloth type glove with cuff under the frock sleeve. Snap the sleeve tight.

6.0 INSTRUCTIONS REQUIRED FOR CLEAN ROOM EXIT

- 6.1 Clean Room exit procedures are described in the procedure CL3N. The following is a detailed set of instructions for the removing, storing and cleaning of clean room compatible clothing and equipment.
 1. When exiting the Clean Room, personnel shall remove all Clean Room clothing in the Ante Room. *Do not remove any clothing while in the clean room.*
 2. Remove Nitril® gloves and discard in the waste container.
 3. Inspect inner liner gloves for moisture, soiled conditions and repair. Put re-usable gloves in the glove bins, discard gloves in poor condition in waste container.
 4. Remove Bump Cap and place on appropriate shelf.
 5. Remove Face Mask and place in container marked "Soiled Clothing Bin."
 6. Remove Pullover Hood and inspect for moisture, soiled conditions and repair. Put re-usable Hoods on "Re-Use Hooks" marked for specific technician's use only, or if one will not be returning to the clean room on a regular basis, place hood into "Soiled Clothing Bin."
 7. Remove Dacron® shoe covers. Shoe covers may be re-used when they are not soiled and are in good repair. Put re-usable shoe covers on "Re-Use Hooks" marked for specific technician's use only, or if one will not be returning to the clean room on a regular basis, place shoe covers into "Soiled Clothing Bin." Damaged shoe covers shall be tagged with a description of the location and extent of tears, ie:: broken tie, torn sleeve, missing snap, etc. The damaged shoe covers shall be placed in container marked "Soiled Clothing Bin."
 8. Remove designated soft soled shoes shall be removed and placed on dedicated shelves.
 9. Remove Dacron® coveralls or frocks. Coveralls and frocks may be re-used when they are not soiled and are in good repair. Put re-usable coveralls on "Re-Use Hooks" marked for specific technician's use only, or if one will not be returning to the clean room on a regular basis, put



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coveralls into "Soiled Clothing Bin." Place re-usable frocks into "Frock Bin." All soiled coveralls and frocks shall be placed in container marked "Soiled Clothing Bin." Damaged garments shall be tagged with a description of the location and extent of tears, i.e.: broken tie, torn sleeve, missing snap, etc. The damaged shoe covers shall be placed in container marked "Soiled Clothing Bin."

- At the end of each week, move the "Soiled Clothing Bin" into the Change Room. The supervisor shall bring the soiled garments to the project offices for shipment to the laundry facilities.

7.0 LAUNDRY SERVICE

Laundry service for clean room garments shall follow the routine noted below:

- CBI shall purchase a quantity of specified coveralls estimated based on CBI/Laundry Service agreed delivery and pick-up schedules. Quantities are based on 6 technicians per clean room operation.
- Repairs required during this service shall be made by the Laundry Service. CBI will inspect and tag areas requiring repair. If damage is caused by the Laundry service, they shall repair or replace coveralls at their expense.
- CBI Services shall ship the soiled garments via UPS to the laundry or the laundry will provide pick-up and delivery at the LIGO site. Cleaning and return schedules will be based on construction needs.
- Cleaning shall be performed using acceptable detergents specific to clean room garment applications.
- A water quality report will be required from the laundry and subject to CBI approval before award of contract.
- The laundry service shall notify CBI of any changes in detergents or cleaning processes. CBI will have the right to review and accept or reject changes.
- At the end of the job, all coveralls found to be in satisfactory condition shall be delivered to CBI at the site, cleaned, packaged, and boxed for shipment.