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PLAINTIFF'S EXHIBIT
ARCO 9

1988

ASBESTOS EVALUATION

ARCO PRUDHOE BAY
ARCO MARINE, INC.
CHERRY POINT, WASHINGTON

AUGUST 24, 1989

Requested By: Mike Jackson
Arco Marine, Inc.
Long Beach, California

Submitted By: Donald R. Olsen, CIH, CSP, MS
September 15, 1989

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INTRODUCTION

At the request of Arco Marine, Inc., Olsen Consulting conducted an air monitoring survey, and visually inspected selected areas in the engine room, quarters, and other occupied areas on the Arco Prudhoe Bay.

The purpose of this evaluation was to determine the presence of asbestos fibers in the air and to determine the level of asbestos contamination if present on the vessel. The floor tile and base had recently been replaced in SR #9, 13, 14, 15, 16, 18, 19, 20 and the crew mess hall. Selected floor tile replacement was also completed in the 2nd cook, mess man, SR #5. In addition, SR #1 and SR #2 were converted into an exercise room. The ceilings and bulkheads were reported by the owner to be a non-friable asbestos-containing material. The deck subflooring was also reported by the owner to be a friable asbestos-containing material which is covered by 1' x 1' vinyl asbestos floor tile. The contractor who performed the repairs was advised of this fact and directed to follow proper asbestos handling precautions while performing these repairs.

The survey was conducted on August 24, 1989, by Donald R. Olsen, a certified industrial hygienist and chemist and, David R. Olsen, a certified asbestos worker and AHERA inspector and management planner.

A summary of the air monitoring data is stated in Table I. The locations of the air monitoring are shown in Drawings A and B.

Laboratory analyses of the samples collected during the survey were completed by Galson Laboratories in East Syracuse, New York. This laboratory is certified by the American Industrial Hygiene Association and participates in the EPA Quality Assurance Program for Bulk Analysis of Asbestos-Bearing Materials. Bulk samples were analyzed using the EPA Polarized Light Microscopy Method.

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AIR MONITORING SURVEY

Sampling Equipment

Dawson high volume sampling pumps were used to collect airborne fiber samples. These pumps were calibrated prior to and after sample collection by a National Institute of Standards and Technology secondary standard. The secondary standard used was a Gilmont Compact Flowmeter Size No. 13.

Sampling Methodology

Airborne asbestos fiber collection and laboratory analyses were conducted by a laboratory utilizing the National Institute for Occupational Safety and Health (NIOSH) Method 7400.

Air samples were collected on 25 millimeter open-face filter cassettes equipped with 0.8 micron mixed cellulose ester filters at a flow rate of 12.0 liters per minute. All samples were analyzed at the laboratory via phase contrast microscopy (PCM). The PCM method counts all fibers with an overall length exceeding five (5) microns and a length to width ratio of 3:1 or greater.

Air Sampling Results

Exercise Room:

The interior of the exercise room was visually inspected for the presence of asbestos-containing debris. No asbestos-containing debris was found. The room has been carpeted.

An air sample, X100-A (Photo 1), was collected in the exercise room. The airborne fiber level in this room was found to be less than 0.01 fibers per cubic centimeter (f/cc).

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Staterooms:

The eight (8) staterooms recently tiled were inspected for the presence of asbestos-containing debris. No asbestos-containing debris was noted in staterooms 9, 13, 14, 15, 16, 18, 19 and 20.

An air sample, X101-A (Photo 2), was collected in SR #18. This sample showed the airborne fiber level to be less than 0.01 f/cc in SR #18.

A second sample was collected in SR #20. This sample, X103-A, showed the airborne fiber level in SR #20 to be 0.01 f/cc.

Air monitoring was also conducted in SR #9 (Photo 3) and SR #15 (Photo 4). Both of these samples, X102-A and X104-A, were determined to contain 0.02 f/cc.

Crew Mess Hall:

The crew mess hall was inspected and no asbestos-containing debris was noted. An air sample, X105-A, was collected in the crew mess hall. This sample was found to contain less than 0.01 f/cc.

Engine Room:

The area around the atmospheric drain tank on the lower deck was inspected for the presence of asbestos-containing debris. No asbestos-containing debris was noted. The new insulation on the atmospheric drain tank is covered with a fiberglass cloth.

An air sample, X106-A, was collected on top of the atmospheric drain tank shown in Photo 6. The airborne fiber level in this area was found to be less than 0.01 f/cc.

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DISCUSSION OF AIR MONITORING

The air monitoring results show the airborne fibers to be 0.02 f/cc or less. These samples were collected while the vessel was docked at Arco's Cherry Point Dock and do not necessarily represent the airborne fiber level when the vessel is sailing.

Furthermore, the air samples were analyzed using the NIOSH Method 7400. This Phase Contrast Microscopy method does not distinguish between asbestos and non-asbestos fibers. All fibers greater than 5 microns in length with a length to width ratio of 3:1 or greater are counted. Therefore, some of the fibers counted may be cotton, synthetic, fiberglass cellulose or other organic fibers.

Transmission electron microscopy (TEM) is specific for asbestos fibers and may be appropriate for any future studies. TEM was not used during this survey because the cost of analysis is much greater than phase contrast microscopy and the laboratory turnaround is longer.

CONCLUSION

The ambient fiber levels were all 0.02 f/cc or less. These levels are well below the permissible exposure limit of 0.2 f/cc and the action level of 0.1 f/cc regulated by the Occupational Safety and Health Administration and slightly higher than the 0.01 f/cc level which the United States Environmental Protection Agency currently considers as an acceptable background level for the general population.

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MATERIALS COLLECTED BY CREW MEMBERS

The paper towels (sample #1) and hand towels (sample #2) used to cover the air vents in staterooms 15 and 14, respectively, were collected by John Pitts of the Seaman's Union. These towels were not submitted to the laboratory by the consultant. The dust on the towels could be analyzed for the presence of asbestos fibers but is not possible to determine the asbestos fiber levels during the repair period.

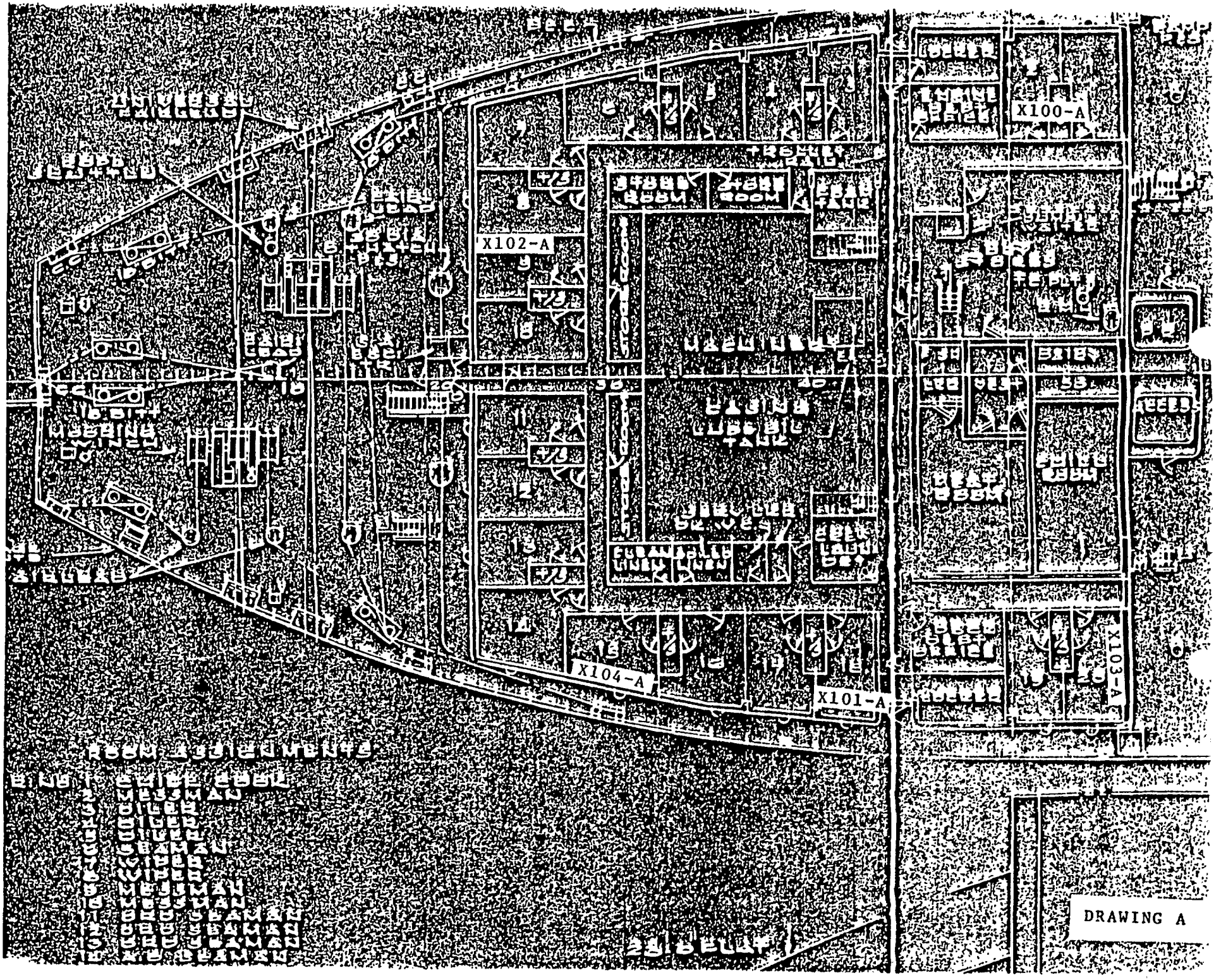
The overhead material collected by the crew (sample #3) was examined by the consultant and is non-friable. This sample was analyzed by the laboratory and was found to contain 25% chrysotile asbestos. This material is visible and is used extensively throughout the quarters. This non-friable material is not likely to release asbestos fibers under normal conditions. It will, however, release asbestos fibers if is is mechanically disrupted by breaking, drilling, sanding or grinding.

The underlayment sample (sample #4) was examined by Olsen Consulting and was found to be friable. Laboratory analyses of this material showed the material to contain 45% amosite asbestos. This underlayment is currently covered by the 1' x 1' floor tile and, therefore, is well contained.

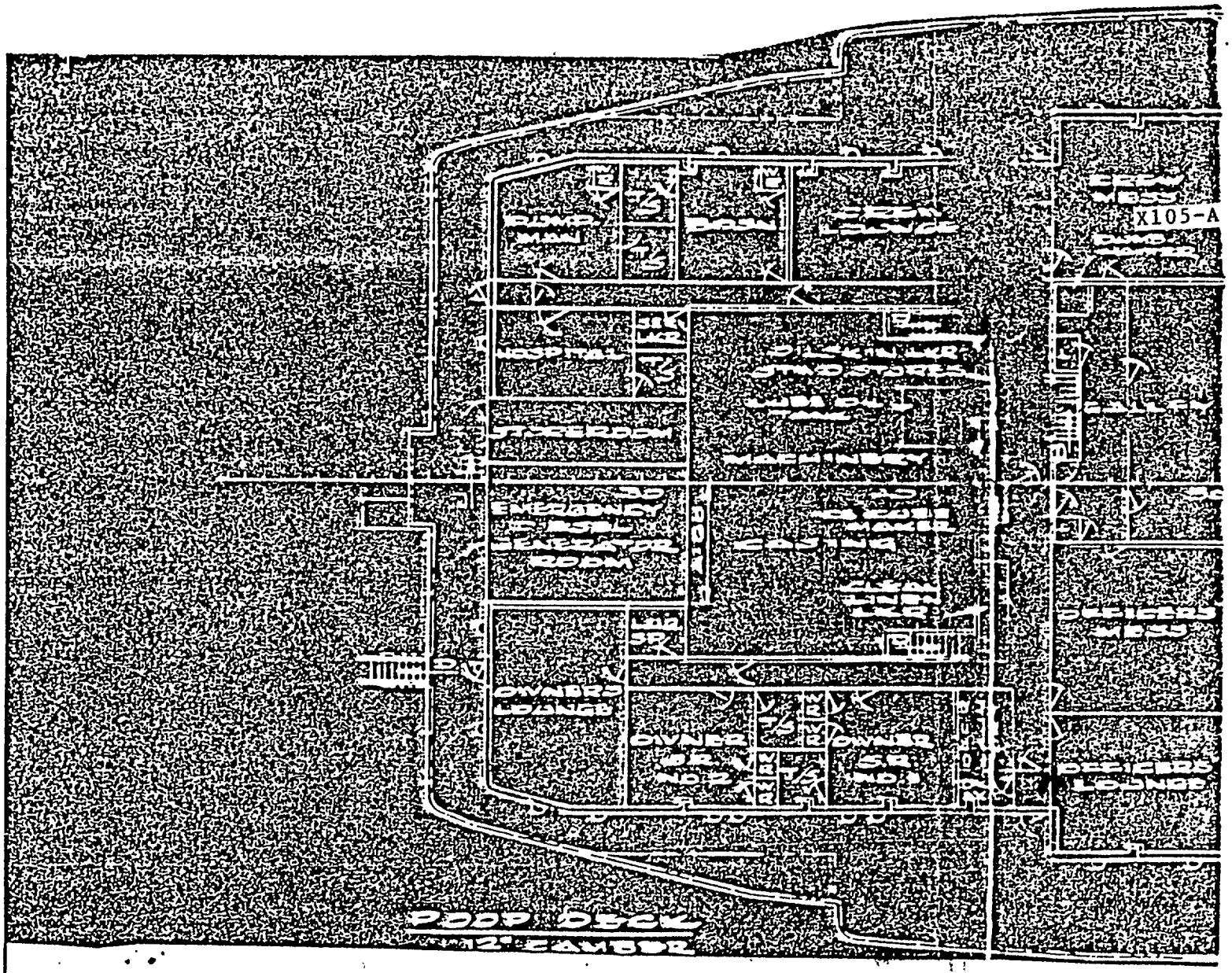
The laboratory data for the samples obtained from John Pitts of the Seaman's Union is stated in Table II.

END REPORT

Attachments: Drawing A and B
Tables I and II
Photographs (6)
Laboratory Report



DRAWING A



DRAWING B

ASBESTOS EVALUATION

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AIR MONITORING DATA
Table I

LOCATION	PHOTO NO.	SAMPLE NO.	SAMPLE PERIOD	SAMPLE VOLUME	RESULT * IN FIBERS/CC
Exercise Room (SR #1 & SR #2)	1	X100-A	12:17 p.m. to 1:57 p.m. (100 min.)	1200 liters	<0.01
SR #18	2	X101-A	12:25 p.m. to 2:05 p.m. (100 min.)	1200 liters	<0.01
SR #9	3	X102-A	12:32 p.m. to 2:12 p.m. (100 min.)	1200 liters	0.02
SR #20	-	X103-A	12:42 p.m. to 2:35 p.m. (113 min.)	1356 liters	0.01
SR #15	4	X104-A	2:01 p.m. to 3:41 p.m. (100 min.)	1200 liters	0.02
Crew Mess Hall	5	X105-A	2:09 p.m. to 3:49 p.m. (100 min.)	1200 liters	<0.01
Engine Room Lower Deck by Atmospheric Drain Tank	6	X106-A	2:32 p.m. to 4:00 p.m. (88 min.)	1056 liters	<0.01
Field Blank	-	X108-A	0	0	0.00

* Method of Analysis:

PCM = NIOSH Method 7400 using Phase Contrast Microscopy. This method does not distinguish between asbestos and non-asbestos fibers. Fibers greater than 5 microns in length with a length to width ratio of 3:1 or greater are counted.

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SAMPLES COLLECTED FOR ASBESTOS CONTENT
Table II

SAMPLE NO. *	LOCATION	RESULT **
1	Paper towel used to cover air vent in Stateroom 15 (Nick Pirie) 6/12/89 to 8/21/89	Not Analyzed
2	Cotton hand towel used to cover air vent in Stateroom 14 (J. Randsdorf) End of July to 8/24/89	Not Analyzed
3	Non-friable Overhead Material	25% Chrysotile
4	Friable underlayment	45% Amosite

* The above materials were collected by crew members and provided to Olsen Consulting by John Pitts of the Seaman's Union on August 24, 1989.

** All samples were analyzed by Polarized Light Microscopy (PLM) at the laboratory.

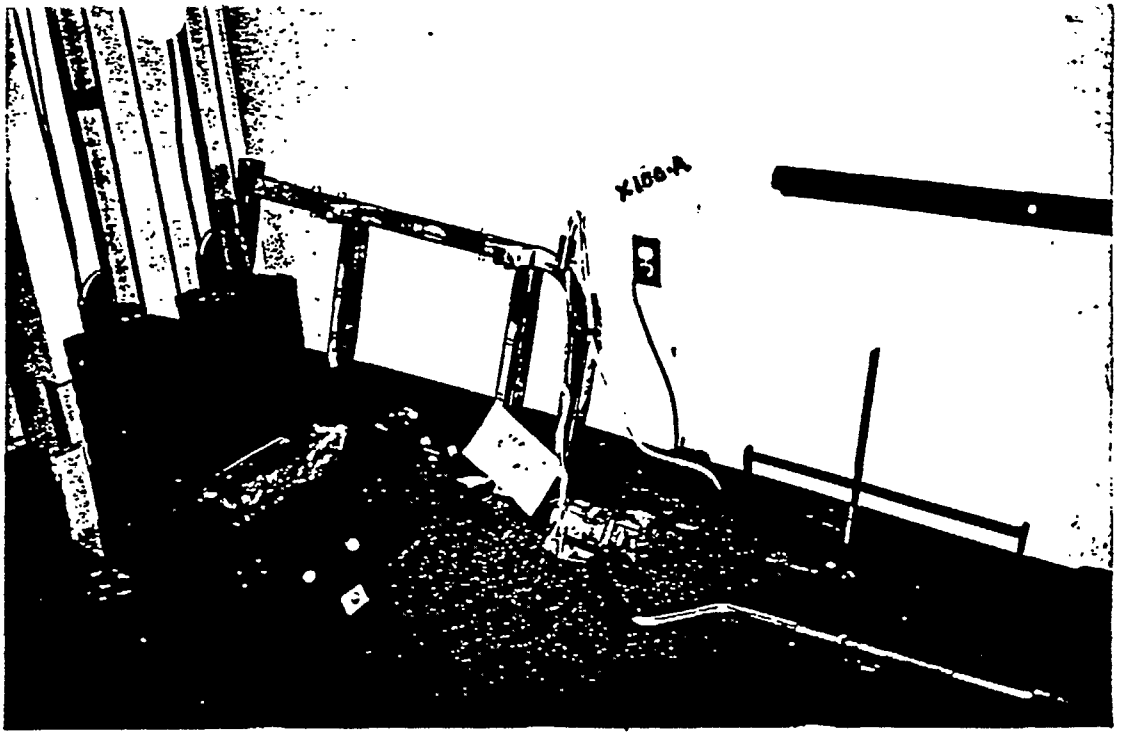


Photo 1: Air monitoring was conducted in the new exercise room which was formerly SR #1 and SR #2. This sample, X100-A, was found to contain less than 0.01 fibers per cubic centimeter of air.

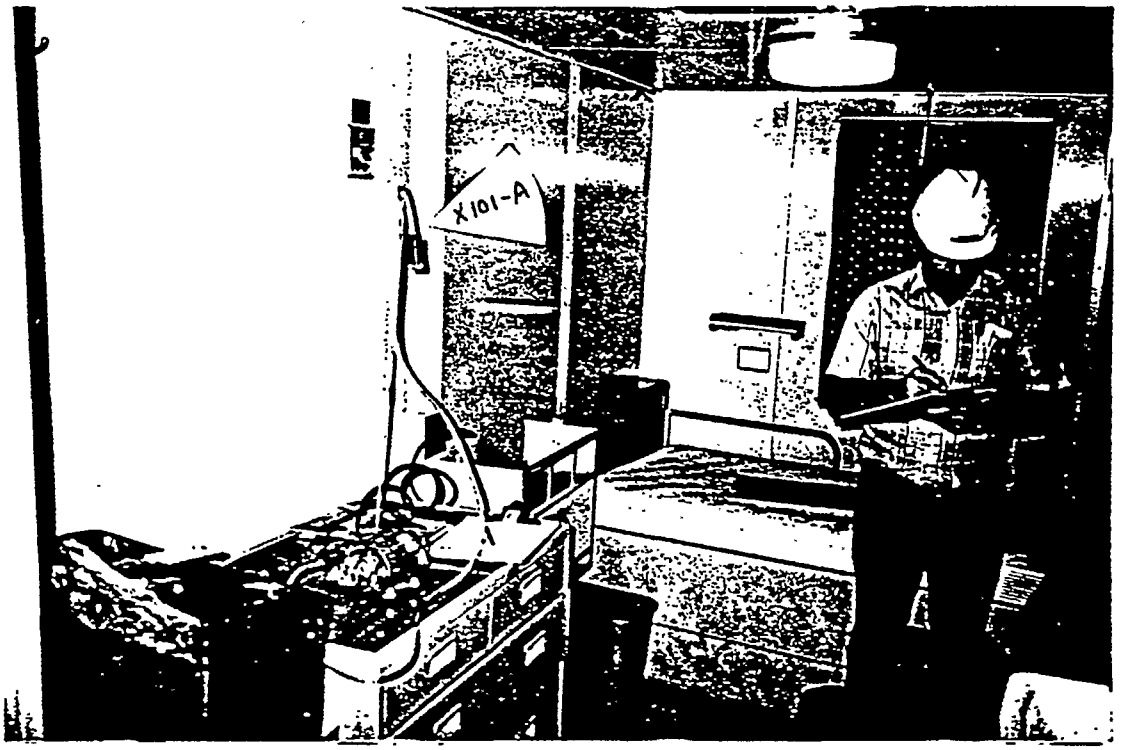


Photo 2: Air monitoring was conducted in SR #18. The 1'x1' vinyl floor tile and base had recently been installed. This sample, X101-A, was found to contain less than 0.01 fibers per cubic centimeter of air.

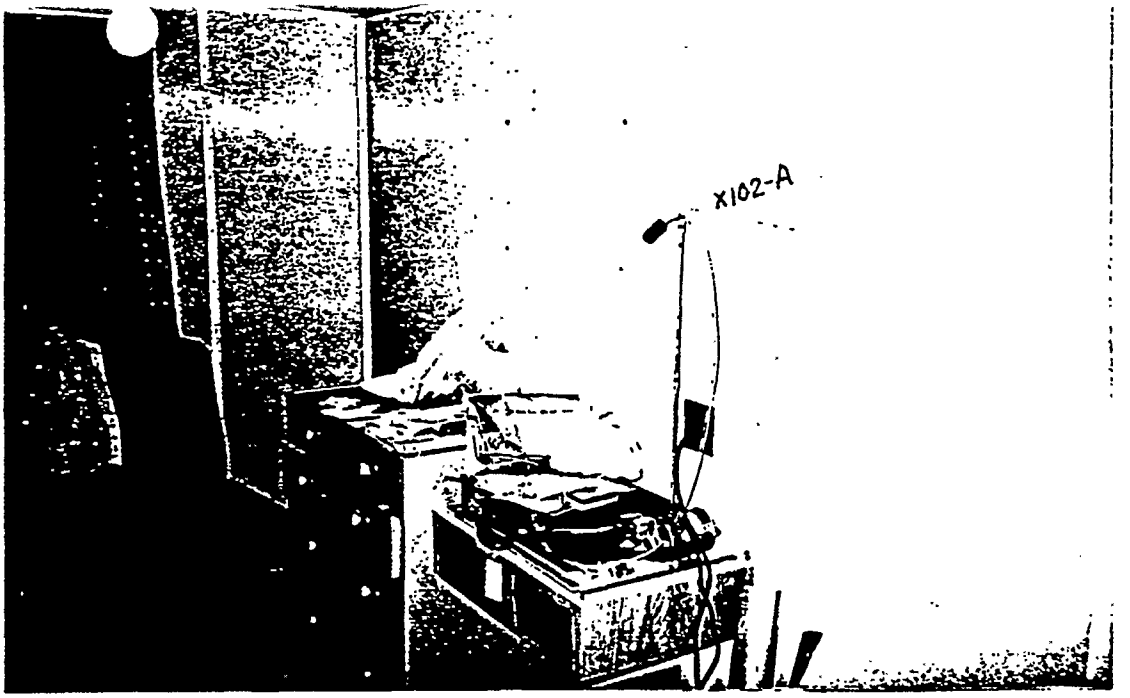


Photo 3: Air monitoring was conducted in SR #9. The 1' x 1' vinyl floor tile and base had recently been installed. This sample, X102-A, was found to contain 0.02 fibers per cubic centimeter of air.

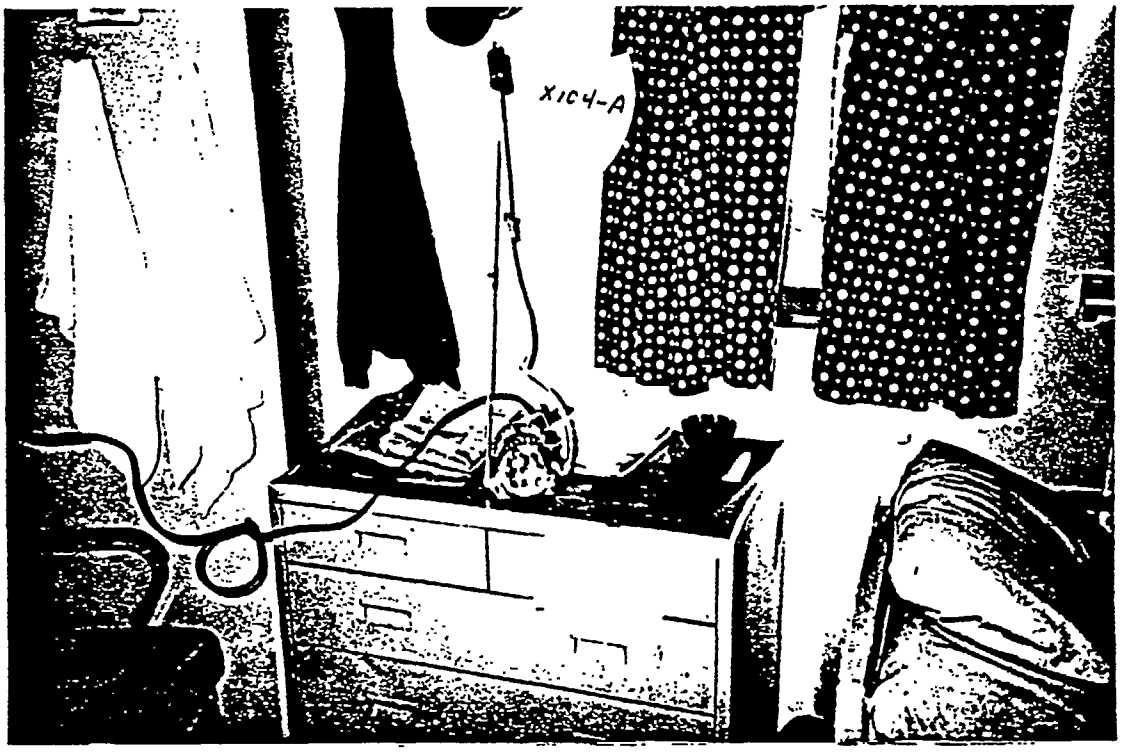


Photo 4: Air monitoring was conducted in SR #15. The 1' x 1' vinyl floor tile and base had recently been installed. This sample, X104-A, was found to contain 0.02 fibers per cubic centimeter of air.

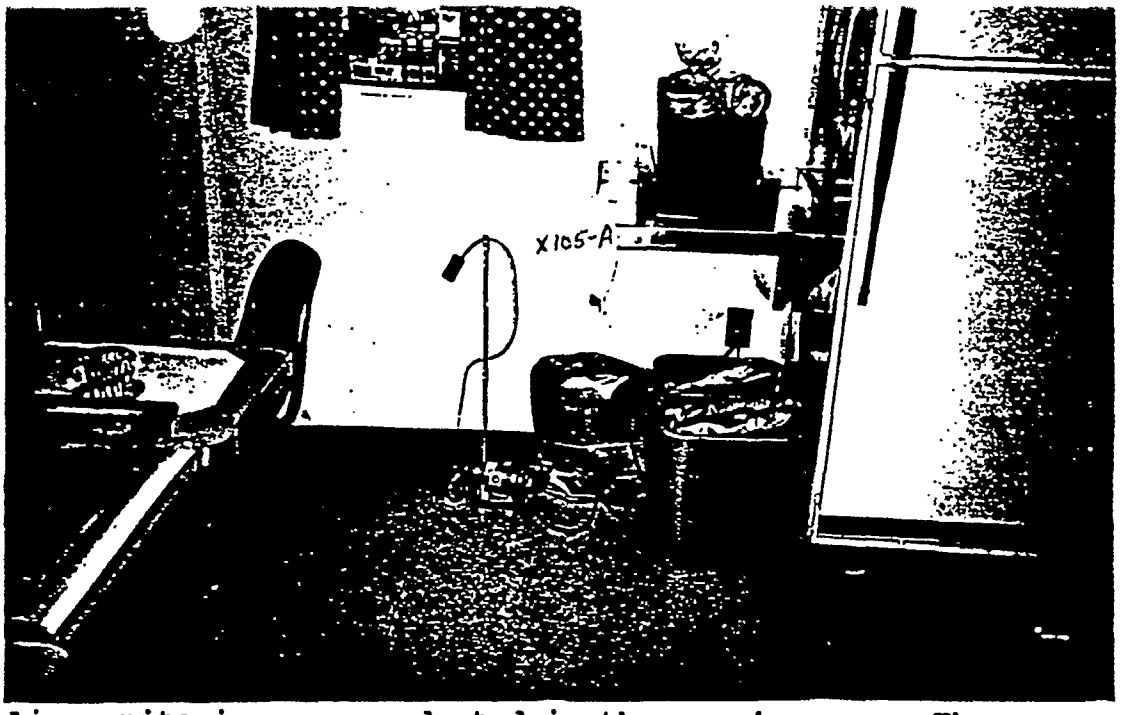


Photo 5: Air monitoring was conducted in the crew's mess. The 1' x 1' vinyl floor tile and base had recently been installed. This sample, X105-A, was found to contain 0.02 fibers per cubic centimeter of air.



Photo 6: Air monitoring was conducted in the engine room on the lower deck by the atmospheric drain tank that had been recently re-insulated. This sample, X106-A, was found to contain less than 0.01 fibers per cubic centimeter of air.

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LABORATORY REPORTS

LABORATORY REPORT HAS NOT BEEN RECEIVED
AS OF 9/18/89