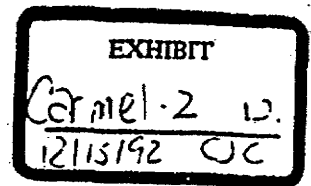


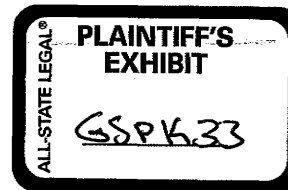
Carmel Industrial Health, Inc.
12 Hoffman Street
Madison, NJ 07040-1114
(201) 378-8011 • FAX: (201) 378-9583



December 10, 1992

Job No. 1323

Mr. Craig Biegel
Tucker, Biegel & Spezial
150 Federal St., 13th Fl.
Boston, MA 02110



Dear Craig:

The following is a report of findings on the asbestos exposure study during simulated historical valve gasket cutting operations performed by Carmel Industrial Health, Inc. during March 1992.

Carmel Industrial Health was asked to measure airborne fiber release from valve gasket cutting operations that simulated to the greatest possible extent the normal work practices of the 1940-60's. It was understood that exact recreation of earlier working conditions was not possible. Special precautions had to be taken to protect the experimenters and environment during testing, something which had not been done during early years of gasket use.

WORK AREA CONFIGURATION AND AIR SAMPLING PROCEDURE

Sampling was performed within an isolated free standing structure assembled by a state licensed asbestos abatement contractor in the fashion of an asbestos abatement containment area. It was framed with 2x4 wood studs and had 1/4" plywood walls and floor. A clean room, equipment room and shower were installed.

Interior framed plywood partitions were installed to create three separate test chambers each with a Plexiglas viewing window for videotaping. Interior surfaces were covered with two layers of 6 mil polyethylene sealed with spray adhesive and duct tape. In between testing, individual chambers were isolated and placed under negative pressure using HEPA filtered ventilation units exhausted to the outside.

Asbestos containing gaskets were tested in an isolated chamber. The test employee was a state licensed asbestos abatement worker who was protected using a Racal PAPR, gloves, Dupont Tyvek disposable coveralls and rubber boots. After testing, gross debris was collected by HEPA filtered vacuuming. Polyethylene was then sprayed with encapsulant and

allowed to dry overnight. Standard aggressive clearance sampling was performed using a leaf blower and 20" pedestal fan prior to dismantling of the work area.

Personal and area samples were collected on AME Lot No. 0292-14 25mm diameter 0.45 micron pore size MCEF filters with extension cowls. Gilian Model HFS 513A personal sampling pumps and Gast Model 0522 high volume sampling pump with a five inlet manifold were used as a source of suction. Sample flowrates ranged approximately 2-10 liters per minute and were calibrated in the field before and after sampling using a Gilmont Model F-1360 Size No. 3 precision rotameter. The rotameter had been calibrated in the laboratory with a bubble burette. The calibration curve was established by linear regression analysis of the calibration data. Samples were analyzed by standard PCM and TEM techniques by an AIHA Accredited, NYS DOH ELAP and NIST NVLAP laboratory.

SIMULATED WORK PRACTICES

Determination of simulated work practices was based upon discussion and direction from a currently employed chemical plant engineer who was contracted to observe and instruct us in historical valve gasket cutting and installation.

Simulated work practices included cutting of gasket sheeting with a large shear into a size appropriate for the valve under consideration. This rough template was placed on a clean valve flange surface and cut by repeated strikes along the inner and outer flange edge with a ball peen hammer. Holes for passing flange bolts were made by use of a hand punch. Also, circular gaskets were cut using a compass-like gasket cutter. Sampling was performed during a triplicate series of gasket cutting operations.

AIR SAMPLE RESULTS

Sample results for the three simulated gasket cutting operations are presented on the attached summary table. The average personal PCM concentration was 0.373 f/cc. The average personal TEM concentration was 5.294 as/cc, indicating a single order of magnitude higher concentration than PCM analysis. This was consistent with the electron microscopes enhanced resolution capabilities and more restrictive fiber counting criteria used in calculation of concentrations. Area samples taken

Mr. Craig Biegel
December 10, 1992
Page 3

within the test chamber indicated significant dispersion of asbestos fibers in the surrounding environment of the test employee work position.

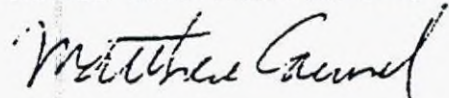
CONCLUSION

Manipulation of asbestos containing gasket material using the work practices of the 1940-60's released airborne asbestos fibers. The concentrations measured during this study likely represent the lower boundary of exposure since each test was performed in an initially clean isolated chamber. This precluded additive contribution from the simultaneous activities of many maintenance employees working in the same area and surface contamination that would be present due to extended gasket cutting and installation periods. Also, the short term sampling periods did not measure the build up of fiber concentrations that would be expected throughout the working day.

Please let us know if you require further explanation of our findings.

Sincerely,

CARMEL INDUSTRIAL HEALTH, INC.



Matthew M. Carmel, MS, CIH, CSP, HSP
President

attachment: Summary table (2 pages)

ASBESTOS EXPOSURE STUDY DURING SIMULATED HISTORICAL VALVE GASKET CUTTING

for
Tucker, Biegel & Speziali
March, 1992

Sample No./ Type	Location or Description	Duration (min.)	Volume (L)	PCM Conc. (f/cc)	TEM Conc. (as/cc)
TB-1/Area	Background	1740	10962.0	<0.005	<0.0006
TB-2/Area	Background	1740	10962.0	<0.005	<0.0006
TB-3/Area	Background	1740	11484.0	<0.005	<0.0006
TB-4/Area	Background	1740	10266.0	<0.005	<0.0007
TB-5/Area	Background	1740	10092.0	<0.005	
TB-6/Blank	n/a	n/a	n/a	0.000	
TB-7/Blank	n/a	n/a	n/a	0.000	
TB-122/Area	Outside containment	87	843.9	0.009	0.0080
TB-123/ Personal	Simulated gasket cutting Garlock 900	40	292.0	0.391	3.7141
TB-124/ Personal	Simulated gasket cutting Garlock 900	40	260.0	0.472	5.4747
TB-125/Area	Simulated gasket cutting Garlock 900	40	324.0	0.210	2.3012
TB-126/Area	Simulated gasket cutting Garlock 900	40	308.0	overloaded	2.4208
TB-127/ Personal	Simulated gasket cutting Garlock 900	32	224.0	0.335	4.5390
TB-128/ Personal	Simulated gasket cutting Garlock 900	32	224.0	0.243	5.1441
TB-129/Area	Simulated gasket cutting Garlock 900	32	249.6	0.378	4.0734
TB-130/Area	Simulated gasket cutting Garlock 900	32	281.6	0.249	2.6477
TB-131/ Personal	Simulated gasket cutting Garlock 900	25	192.5	0.189	5.6338
TB-132/ Personal	Simulated gasket cutting Garlock 900	25	177.5	0.610	7.2555

ASBESTOS EXPOSURE STUDY DURING SIMULATED
HISTORICAL VALVE GASKET CUTTING

for
Tucker, Biegel & Speziali
March, 1992

Sample No./ Type	Location or Description	Duration (min.)	Volume (L)	PCM Conc. (f/cc)	TEM Conc. (as/cc)
TB-133/Area	Simulated gasket cutting Garlock 900	25	192.5	0.579	5.2817
TB-134/Area	Simulated gasket cutting Garlock 900	25	172.5	0.569	6.6799