U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
CENTER FOR DISEASE CONTROL
NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH
CINCINNATI, OHIO 45226

HEALTH HAZARD EVALUATION DETERMINATION
REPORT NO. 75-186-302

Martin Marietta Company
Baltimore, MD

JUNE 1976

I. TOXICITY DETERMINATION

It has been determined that employees were not exposed to toxic concentrations of mercury vapor in the refractories' laboratory during the evaluation of the workplace on January 8 and March 3, 1976. This determination was based on an analysis of air samples and observations of work practices.

II. DISTRIBUTION AND AVAILABILITY OF DETERMINATION REPORT

Copies of this hazard evaluation determination are available upon request from NIOSH, Division of Technical Services, Information Resources and Dissemination Section, 4676 Columbia Parkway, Cincinnati, Ohio 45226. Copies have been sent to:

A. Martin Marietta Corporation - Cement and Lime Division
B. Authorized representative of employees
C. U.S. Department of Labor - Region III
D. NIOSH - Region III

For the purpose of informing approximately eight employees, this report shall be posted for a period of at least 30 days in a prominent place readily accessible to workers.

III. INTRODUCTION

Section 20(a)(6) of the Occupational Safety and Health Act of 1970, 29 U.S. Code 669(a)(6), authorizes the Secretary of Health, Education, and Welfare, following a written request by an employer or authorized representative of employees, to determine whether any substance normally found in the place of employment has potentially toxic effects in such concentrations as used or found. The National Institute for Occupational Safety and Health received such a request from an authorized representative

of the employees of Martin Marietta Corporation to evaluate the potential hazard of mercury vapor at the refractories' laboratory during mercury penetration porosity tests.

IV. HEALTH HAZARD EVALUATION

A. Plant Process - Conditions of Use

This facility provides technical and developmental services for the Cement and Lime Division of Martin Marietta Corporation. Until recently, bulk specific gravity tests (BSG's) were run manually using a mercury penetration porosimeter. Presently, the same basic BSG's are run automatically using a Micrometrics Instruments Corporation mercury penetration porosimeter, Model 910.

B. Evaluation Design

An initial survey at the Martin Marietta refractories' laboratory was conducted by NIOSH on January 8, 1976. During this evaluation, direct reading determinations and charcoal tube samples were taken. Subsequently, it was determined that an inadequate air volume was used for the charcoal tube samples. A revisit was scheduled for March 3 and air sampling was repeated.

C. Methods of Evaluation

Employee exposures to mercury vapor were evaluated during the initial survey using both personal air sampling equipment and a J & W Model MV 12 mercury sniffer. Air samples collected utilizing activated charcoal were analyzed for mercury vapor using the Tantalum boat methodology. The limit of sensitivity for this method is 0.3 micrograms per sample. Readings obtained while using the J & W mercury sniffer were made on the 0 to 0.2 milligrams per cubic meter (mg/m^3) scale.

D. Evaluation Criteria

The recommended safe exposure level, per the criterion presented in the NIOSH criteria for a recommended standard - Occupational Exposure to Inorganic Mercury, 1973, is 0.05 mg of mercury per cubic meter of air, based upon an eight-hour time-weighted average workday exposure.

The U.S. Department of Labor, OSHA, legally enforceable standard for inorganic mercury is 0.1 mg/m^3. This is a ceiling concentration and should never be exceeded.

E. Evaluation of Results and Discussion

General air samples collected during the January visit, using a direct reading meter, indicated a potentially excessive condition due mainly to contaminated pump traps and discharges from vacuum equipment. (See Table 1.) Personal samples collected on charcoal tubes were not allowed to run long enough to validate results. Because of this, all samples except one indicated less than 0.3 micrograms per sample (the lower limit of detection). The figures listed in Table 2 for the January date were calculated using the 0.3 micrograms and the sample air volumes to extrapolate into milligrams per cubic meter. No useful conclusions can be drawn from the January information, since values may be greater than or less than the NIOSH recommended limit of 0.05 mg/m^3. A revisit was made on March 3, 1976, to collect additional personal samples, and the results are presented as part of Table 2.

Conditions present during the second visit differed somewhat in that corrective action had been initiated to reduce exposures, i.e., the use of a mercury depressant and cleaning of vacuum traps. As expected, personal exposure values were considerably reduced and in all cases less than the NIOSH recommended limit. Direct reading measurements gave positive results in two areas: the main sink at the drain and trap and the trash can used for disposal of mercury-contaminated objects.

V. CONCLUSIONS AND RECOMMENDATIONS

In view of the findings of the March visit, conditions present are considered to be in compliance with the more restrictive NIOSH recommended standard. In keeping with good industrial hygiene practices, however, the following recommendations are made:

A. Continue the practice treatment of floors and work areas with a mercury vapor depressant in accordance with the manufacturer's directions.

B. Continue the practice of venting air discharge of mercury porosimeter and vacuum pumps to the outside atmosphere. When equipment is relocated in the near future, this venting procedure should be incorporated as part of the permanent changes.

C. Periodically remove and clean the trap for the sink used for cleaning soiled mercury equipment. As noted during the second visit, even after cleaning, contamination may remain in the trap area. In view of this, it is recommended that modifications to drain pipes be made to prevent accumulation of mercury along fittings.

D. When equipment is relocated, floors should be prepared in such a manner to facilitate clean-up. This would include a surface that is free of cracks, seams and large pores. This may be accomplished in the proposed area by painting the present concrete floor.

E. Analytical samples should be handled in an area designed to contain any spill that might occur and control vapors generated during normal operations. This should include at least:

1. a work surface free of cracks and seams;

2. built-up edges;

3. mechanical exhaust ventilation.

F. The following sanitation requirements should be followed regardless of concentrations present:

1. Food preparation, dispensing (including vending machines) and eating shall be prohibited in mercury work areas.

2. Smoking shall not be permitted in mercury work areas.

3. Employees shall be instructed in the importance of thoroughly washing their hands before eating or smoking.

4. Contaminated clothing shall be stored in vaporproof containers pending removal for laundering.

5. Laundering of work clothing shall be provided by the employer. Persons responsible for laundering mercury-contaminated clothing shall be informed of the hazard of mercury.

It should be remembered that exposure to inorganic mercury is defined as 50 percent (0.02 mg/m^3) of the recommended level in the workplace and would require adherence to additional sections of the recommended standard including: medical monitoring, labeling (posting), personal protective equipment, environmental monitoring, and appraisal of employees of hazards. Levels above 0.05 mg/m^3 would be in excess of the NIOSH recommended standard and should be viewed as a hazardous condition requiring corrective engineering measures to be taken.

ACKNOWLEDGMENTS

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Table 1
Martin Marietta
Rolling Road
Baltimore, MD 21228
Mercury Exposures

Location	mg/m^3* Range	Average	Remarks
Refractories' Laboratory		0.02	General air, background near mercury penetration porosimeter prior to start-up
		0.04	100 ATM after start-up
		0.04	4 ATM after start-up
	0.02 to 0.04	0.03	General air, background near porosimeter 15 minutes after shutdown
	0.04 to 0.08	0.06	General air, background near porosimeter mid-afternoon
	0.03 to 0.04	0.035	General air, Work Desk Area
	0.04 to 0.06	0.05	General air, Work Desk Area
	0.04 to > 1.0	1.0	General air, work bench near Sorbet sandbed with vacuum trap
	0.8 to 1.0	0.9	General air, main cleaning sink near drain
		> 1.0	General air, over sample taken out of porosimeter
		> 1.0	General air, by discharge from vacuum used for clean-up
		> 0.02	General air, by window through which clean-up is vented

*denotes milligrams of mercury per cubic meter of air - Threshold Limit Value based on a time-weighted average exposure for an eight-hour working day as recommended in the NIOSH "Criteria for a Recommended Standard" 0.05 mg/m^3.

> - greater than

Table 2
Martin Marietta
Rolling Road
Baltimore, MD 21228
Mercury Exposures

Location	mg/m^3* 1/8/76	mg/m^3* 3/3/76	Remarks
Refractories	< 0.25 < 0.10 < 0.13	.012	Operator's exposure, Porosimeter operator
	< 0.10 < 0.14 < 0.22	< 0.009	Worker's exposure, chemical grade MGO
	< 0.10 < 0.11	< 0.008	Worker's exposure, MGO sizing
	< 0.10 < 0.12 < 0.22	< 0.011	Worker's exposure, CH 22 fuel oil additive
	< 0.10 < 0.12 < 0.21	< 0.008	Worker's exposure, kerosene work
	< 0.10 < 0.12 < 0.21	0.023	Worker's exposure, Supervisor
		0.011	Worker's exposure, chemical grade MGO
	> 5.3	< 0.04	General air, near Sorbet Sandbed
	< 0.28	0.015	General air, middle work bench
	< 0.27	0.007	General air, near BSG unit
	< 0.24		General air, work bench
	< 0.26		General air, work bench
	< 0.34		General air, main cleaning sink near trap
		> 0.39	Bulk area taken inside contaminated waste can

*denotes milligrams of mercury per cubic meter of air - Threshold Limit Value based on a time-weighted average exposure for an eight-hour working day as recommended in the NIOSH "Criteria for a Recommended Standard" 0.05 mg/m^3.

> - greater than
< - less than