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. 79-130-645

CRAIG POWER PLANT
CRAIG, COLORADO

DECEMBER 1979

I. TOXICITY DETERMINATION

A health hazard evaluation was conducted by the National Institute for Occupational Safety and Health (NIOSH) at the Craig Power Plant, Craig, Colorado, on September 26, 1979. Breathing zone air samples were taken for acetone, styrene, and 2-butanone (methyl ethyl ketone/MEK). Airborne concentrations of these contaminants were not detected by the sampling/analytical methods used; however, the odors characteristic of these were easily observed at the time of this survey.

All workers were interviewed. The interviews were directed towards exposures to acetone, MEK, and styrene. At the time of this evaluation several of the workers, as well as NIOSH investigators, reported complaints such as narcosis, burning eyes, and upper respiratory tract irritation.

Based on employee interviews, a potential health hazard exists even though all air samples taken during this survey were below laboratory detection limits.

II. DISTRIBUTION AND AVAILABILITY

Copies of this determination report are currently available upon request from NIOSH, Division of Technical Service, Information Resources and Dissemination Section, 4676 Columbia Parkway, Cincinnati, Ohio 45226. After 90 days the report will be available through the National Technical Information Service (NTIS), Springfield, Virginia. Information regarding its availability through NTIS can be obtained from NIOSH, Publications Office, at the Cincinnati address.

Copies of this report have been sent to:

1. Craig Power Plant.
2. Cement Mason Local Union #577.
3. U.S. Department of Labor/OSHA - Region VIII.
4. NIOSH - Region VIII.

For the purpose of informing all employees, a copy of this report shall be posted in a prominent place accessible to the employees for a period of 30 calendar days.

III. INTRODUCTION

Section 20(a)(6) of the Occupational Safety and Health Act of 1970, 29 U.S.C. 669(a)(6), authorizes the Secretary of Health, Education, and Welfare, following a written request by any 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.

NIOSH received such a request from the Cement Mason Local Union #577 to evaluate potential hazards associated with the use of fibrous glass and acetone during the coating of cement structures such as scrubbers and drainways during the construction of a power plant.

IV. HEALTH HAZARD EVALUATION

A. Processes Evaluated

A fibrous glass mixture is applied by hand to the inside of large scrubbers that are approximately sixty feet high and fifty feet in diameter. During this application the odor of acetone, styrene, and MEK was strong. All employees, as well as management, were monitored for possible exposures to acetone, styrene and MEK.

B. Evaluation Design

All workers were monitored for acetone, MEK, and styrene. The workers were also questioned on any health problems they were having while at work.

. Evaluation Methods

All air samples were collected on organic vapor charcoal sampling tubes using vacuum pumps operated at 50-200 cc's per minute. Samples were analyzed by gas chromatography by NIOSH Method S127.

D. Criteria for Assessing Workroom Concentrations of Air Contaminants

Three sources of criteria are generally used to assess workroom concentrations of air contaminants: (1) NIOSH criteria for recommended standards; (2) recommended Threshold Limit Values (TLVs) and their supporting documentation as set forth by the American Conference of Governmental Industrial Hygienists (ACGIH), 1979; (3) Occupational Safety and Health Administration (OSHA) standards (29 CFR 1910.1000), January 1978. ACGIH TLVs represent the most recent and relevant recommendations for the three chemicals evaluated and are given prominence in this evaluation.

Substance	Permissible Exposures 8-Hour Time-Weighted Exposure Basis (mg/M^3) NIOSH Criteria for Recommended Standard	TLV	Current OSHA Standard
Acetone.....	---	2400	2400
MEK.....	---	590	590
Styrene.....	---	215*	420

mg/M^3 = milligrams of substance per cubic meter of air
* = Intended Change for 1979.

Occupational health standards are established at levels designed to protect individuals occupationally exposed to toxic substances on an 8-hour per day, 40-hour per week basis over a normal working lifetime.

E. Toxicology

Acetone -- Acetone may be ingested and inhaled. It is a mucous membrane irritant and a depressant to the central nervous system (CNS). Overexposures may produce eczema, conjunctivitis, and corneal erosion. Headaches, dizziness, mental confusion, weakness, and narcosis are the most frequent findings when a worker is exposed to levels exceeding 2400 mg/M^3. (Reference 1)

2-Butanone (MEK) -- Inhalation is the most common route of MEK exposure. Eye irritation is the most common complaint. Headache, dizziness, nausea and vomiting, and dermatitis are also common complaints. There have been no permanent effects reported as long as the worker's exposure is below 590 mg/M^3 for an 8-hour time weighted average (TWA) exposure. (Reference 2)

Styrene -- Styrene is toxic by inhalation, ingestion, and skin absorption. It is a strong irritant, depresses the CNS, may cause weakness, drowsiness, defatting dermatitis, and anxiety. Maintaining a worker's exposure below 215 mg/M^3 should protect the worker from any adverse effects. (Reference 3)

F. Environmental Results and Discussion

The results of 24 breathing zone air samples with 72 analyses show that there were no exposures. All samples were below laboratory limits of detection. This is probably due to the fact that workers were in the open air with some air movement. The odor of acetone and MEK was very evident. The odor thresholds of these contaminants are detectible at very low levels, well below recommended toxic exposure criteria. Even though air sampling methods failed to detect significant levels of airborne contaminants, NIOSH investigators experienced symptoms of burning eyes and nose and narcosis. Workers reported similar symptoms.

A table showing environmental data was not prepared since all levels were below laboratory detection limits. The potential for a health hazard does exist since workers had experienced symptoms compatible with exposures to the organic solvents present during this evaluation.

G. Conclusions

Results of the environmental data shows that at the time of this survey workers were not overexposed since there was no contaminant present in the breathing zone air samples.

A hazard may have existed at an earlier date since workers had many complaints that were compatible with overexposures to MEK, acetone, and styrene.

V. RECOMMENDATIONS

1. No eating, drinking or smoking should occur at the work station.

2. Employees should be educated on the hazards of acetone, MEK, and styrene.

3. Workers should report any symptoms such as narcosis, burning and irritated eyes, irritated upper respiratory system, and dermatitis.

4. Workers should have a hand cleaner that will remove the fibro. glass and should never wash their hands in acetone and other organic solvents.

VI. REFERENCES

1. Plunkett, E.R., Handbook of Industrial Toxicology, Chemical Publishing Company, New York, 1976, pp. 5-6.

2. Ibid., p. 269.

3. Ibid., pp. 380-381.

VII. AUTHORSHIP AND ACKNOWLEDGMENTS

Reported Prepared By:

Bobby J. Gunter, Ph.D.
Regional Industrial Hygienist
NIOSH - Region VIII
Denver, Colorado

Originating Office and Evaluation Assistance:

Jerome P. Flesch, Acting Chief
Hazard Evaluation and Technical Assistance Branch (HETAB)
NIOSH, Cincinnati, Ohio

G. Edward Burroughs
Industrial Hygienist
Hazard Evaluation and Technical
Assistance Branch (HETAB)
NIOSH, Cincinnati, Ohio

Report Typed By:

Marilyn K. Schulenberg
NIOSH - Region VIII
Denver, Colorado