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 HHE 78-119-637

TEXACO, INC.
BAYONNE TERMINAL
BAYONNE, NEW JERSEY

DECEMBER 1979

I. TOXICITY DETERMINATION

On March 20-22, 1979, NIOSH conducted a Health Hazard Evaluation at the Texaco Bayonne Terminal in order to determine 1) whether or not the current employees in the Compound Department were being exposed to toxic concentrations of chemical contaminants, and 2) whether or not a causal relationship existed between past chemical exposures and diagnosis of "diffuse encephalopathy" in a worker. The results of these determinations follow:

1. The compounders and compound helpers at the terminal are potentially exposed to a myriad of chemicals with varied toxicologic characteristics. The nature of their exposures varies according to the lubricating oils and additives which are being blended at a particular time. These workers were not exposed to toxic airborne concentrations of organic chemicals during the period of the industrial hygiene survey. However, complaints by five compound helpers indicate that they may be experiencing a toxic exposure to the additive Lubrizol (a trademark for diacetone acrylamide) which is characterized by skin irritation.

2. A NIOSH physician reviewed the available medical records of the employee allegedly diagnosed as having evidence of "diffuse encephalopathy". The available medical information concerning the employee with alleged encephalopathy was insufficient to determine either the nature or cause of the employee's problem.

Recommendations are made (pages 6-8) for improved training of workers and for improved housekeeping at the plant.

II. DISTRIBUTION AND AVAILABILITY OF DETERMINATION REPORT

Copies of this Determination Report are currently available upon request from NIOSH, Division of Technical Services, 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, Publication Office at the Cincinnati address.

Copies of this report have been sent to:

a) Texaco, Inc., Bayonne Terminal, Bayonne, New Jersey 07002
b) Authorized Representative of Oil, Chemical, and Atomic Workers, Local 8-623, Bayonne, New Jersey 07002
c) U.S. Department of Labor, OSHA, Region II
d) Regional Program Consultant, NIOSH, Region II

For the purpose of informing approximately "twenty affected employees" the employer shall promptly "post" for a period of 30 calendar days the Determination Report in a prominent place(s) near where exposed employees work.

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 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.

On August 7, 1978 the National Institute for Occupational Safety and Health (NIOSH) received a request for a Health Hazard Evaluation from an authorized representative of the Oil, Chemical, and Atomic Workers International Union, Local 8-623 regarding exposures to various chemicals by "compounders" and "compound helpers" involved in the compounding and blending of lubricating oils and additives. It was evident from the request that a September 13, 1977 incident was a primary contributing factor for the decision to submit the Health Hazard Evaluation request. In this incident the exhaust ventilator for compound kettle 3566 was reversed to cool the work area, thus, ventilating the 2nd floor of the Compound Department with contaminated air from compound kettle 3566. At the time of the incident, a product named "Algol" composed of napthenic mineral oils was being blended. The acutely-exposed "compounder" reported symptoms of dizziness, nausea, headache and loose bowel movement to the Texaco physician. Subsequently, this worker was diagnosed (by a Mt. Sinai School of Medicine neurologist) as having evidence of "diffuse encephalopathy" allegedly of occupational origin relating to past acute and chronic exposures to undetermined chemical toxicants.

Interim Reports I and II presented the results of the industrial hygiene surveys conducted by NIOSH at Texaco Bayonne Terminal on October 18-19, 1978 and March 20-22, 1979, respectively.

IV. HEALTH HAZARD EVALUATION

A. Process Description - Conditions of Use

The Bayonne facility of Texaco is a terminus for petroleum products arriving by barge and pipeline for transhipment to various parts of Eastern United States. The facility is also involved with the blending and packaging of petroleum products. The Health Hazard Evaluation focused on the Compound Department.

The Compound Department operates three shifts per day, 40-hours per week. The Department employs 20 persons consisting of 2 supervisors and 18 operating personnel. Four of the 18 operators are compounders and 14 are compound helpers.

The operations in the Compound Department consist of blending chemical additives with lubricating oils. The blending process takes place in kettles (with capacities ranging from 1300 to 5100 gallons) at temperatures between 100 to 200°F. Agitation of the blend is effected by air movement through the kettles. During the workday, operators may add different numbers of additives to different kinds of lubricating oils. The chemical additives impart special properties to the lubricating oil. Included are low viscosity index (butene polymers), detergent and suspended properties (metallic stearate soaps), oxidation stability (calcium stearate), and reduced foaming tendency (silicone compounds). Many of the antioxidants used are substituted phenolic compounds such as 2,6,-di-tert-butyl-4-methyphenol.

B. Evaluation Design and Methods

On October 18, 1978 the NIOSH Project Officer met privately with the employee diagnosed as having evidence of "diffuse encephalopathy" to discuss the nature of the Health Hazard Evaluation request. (Hereafter, this employee will be referred to as "Employee X".) On October 18 and 19 the NIOSH Project Officer met with OCAW (Local 8-623) and Texaco representatives to discuss the nature of the request and to conduct a walk-through survey of the Bayonne Terminal. It was concluded from these discussions that the Health Hazard Evaluation request had two independent aspects. The first aspect related to determining whether or not the current employees were being exposed to toxic concentrations of chemical contaminants. The second aspect related to determining whether a causal relationship existed between past chemical exposures and a worker diagnosis of "diffuse encephalopathy".

On March 20-22, 1979 a follow-up survey was conducted to determine whether the current employees in the Compound Department were exposed to toxic concentrations of chemicals under the conditions used or found. Airborne exposures by "compounders" and "compound helpers" to multiple vaporous organic contaminants were evaluated during the blending of additives and lubricating oils. Air sampling was conducted during the 3:00 p.m. to 11:30 p.m. work shifts on March 20 and 21. (The workers reported that maximum exposure occurred during this shift.) Air sampling also was conducted during the 7:00 a.m. to 3:30 p.m. work shift on March 22. The air samples were collected using calibrated personal sampling pumps operating at 0.05 or 0.1 L/min and 150 mg activated charcoal tubes. The charcoal tubes were desorbed with carbon disulfide and analyzed using gas chromatography. The samples determined by gas chromatographic analysis to be most concentrated with organics also were analyzed using gas chromatography/mass spectrophometry (GC/MS) to permit specific identification of these compounds. A confidential medical questionnaire was completed on "compounders" and "compound helpers". These employees were interviewed concerning past occupational histories and present or recent health problems.

Concerning the second aspect, where records are insufficient to document an employee's past environmental exposures, it is difficult to establish a cause-effect relationship. Past excessive exposures can not be proven by current environmental assessment and measurements. This is particularly applicable to the heterogenous exposure situation at the Bayonne Terminal, where numerous additives and lubricating oils are blended. Some of the additives and lubricating oils blended today are different from those of past years. Consequently, chemical(s) which may have caused illness seen today may no longer be in use and thus can not be evaluated by current environmental measurements. In some cases, however, medical records may be used in conjunction with a work history to diagnose an occupational-related illness. Medical records were requested from "Employee X", Mount Sinai Medical Center, and Texaco in an attempt to determine the basis of the diagnosis of encephalopathy and to evaluate the evidence that it was caused by toxic chemicals.

Exposure to vapors of lubricating oils and additives can cause varying degrees of anesthesia, with minimal levels causing headache, and greater exposures causing light-headedness, and even unconsciousness. Additionally, they may have a somewhat disagreeable odor and be irritating to eyes, nose and throat. Skin contact with these substances (particularly the phenolic type compounds) may result in irritation or rash on exposed area(s).

C. Results and Discussion

1. Environmental

Analysis was completed on nine personal breathing zone samples and one area sample. Except for two samples (CT-13 and CT-11), only very low concentrations of organic compounds were detected. Table I presents these results as total weight of hydrocarbons.

Personal breathing zone sample CT-13 showed the highest total weight of hydrocarbons (0.60 mg). Gas chromatographic/mass spectrophotometric analysis showed that it contained mostly low boiling C_4-C_6 alkanes including butanes, pentanes and hexanes. Lower concentrations of higher molecular weight alkanes (C_7-C_{10}), toluene, xylene, and higher aromatics (such as trimethyl benzenes and dimethyl ethyl benzenes) were present. Some benzene and perchloroethylene (both less than 0.02 mg) and 2,6 di-t-butyl-4-ethyl phenol also were present. Work area sample CT-11 containing the next highest concentration of total hydrocarbons (0.25 mg) also was analyzed using GC/MS. The same compounds reported above were found, except few C_4-C_6 alkanes were present. Since all the charcoal tube samples displayed similar peak patterns, the remainder of the samples were not analyzed by GC/MS.

These air sampling results show that the workers were concurrently exposed to minimal levels of a myriad of chemical contaminants. The chemical exposures measured do not represent a health hazard to the "compounder" or "compound helpers". The nature of the workers' chemical exposures will vary according to the additives and lubricating oils being blended at a particular time. Therefore, these results only represent the nature and conditions of exposure which existed during the March 20-22 environmental investigation.

A bulk powder sample of an additive (phenyl-alpha-naphthylamine) was analyzed for the presence of alpha and beta isomers of naphthylamine. It has not been established whether alpha-naphthylamine is a human carcinogen, per se, or is associated with an excess of bladder cancer due to its beta-naphthylamine content. Beta-naphthylamine is, however, a known human bladder carcinogen with a mean latent period of about 16 years. The bulk powder sample of phenyl-alpha-naphthylamine contained approximately 0.1 ppb alpha-naphthylamine. No beta-naphthylamine was detected.

Four bulk samples (AB-01-04) of insulation were analyzed for the presence of abestos fibers. Two bulk samples (AB-01 and 02) were obtained in the boiler house around the steam drum for boiler number 9. These samples were taken from insulation that had been removed to facilitate repair of a crack in the boiler. Another insulation sample (AB-03) was obtained in the pump house from around the steam line off pump 6. Also, a sample (AB-04) was obtained of the settled dust on the lockers located beneath the steam line off pump 6. Chrysotile asbestos fibers were identified in all four samples.

The dimensions of the fibers were primarily less than 0.54 um in diameter and larger than 5.0 um in length. Amphibole fibers (a type of asbestos) also were identified in sample AB-04. Fiberglass and mineral wool also were identifed in all four samples.

2. Medical

A confidential medical questionnaire was completed by the NIOSH industrial hygienist on two (2/4) "compounders" and seven (7/14) "compound helpers". Five (5/14) "compound helpers" reported skin irritation associated with exposure to Lubrizol 5016-A (a trademark for diacetone acrylamide). Although no toxicological data were available for diacetone acrylamide, related compounds are reported to be strong skin irritants.[1] Four (4/7) workers reported complaints of odor annoyance and mild eye irritation during the momentary exposures resulting from gauging of storage tanks and removal of 55-gallon drums from the "hot box". No other work-related health problems were reported by the workers interviewed.

A NIOSH physician reviewed the available medical records of "Employee X" diagnosed as having evidence of "diffuse encephalopathy" allegedly caused by occupational exposure to chemicals. The medical information that was available was insufficient to determine either the nature or cause of "Employee X's" medical problem.

V. RECOMMENDATIONS

1. Apprisal of Employees of Potential Chemical Hazards: During the October 18-19, 1978 survey informal interviews were conducted with randomly selected employees. The general consensus was that they were not sufficiently apprised of all hazards, relevant symptoms, and proper conditions and precautions concerning use of exposure to the chemicals they are working with. It is recommended that the employer institute an education and training program for all the employees routinely exposed to chemicals and assure, with assistance from OCAW Local 8-623 officials, maximum employee participation. This program may minimize or eliminate the reported problems associated with certain additives such as "Lubrizol".

The education and training program should include (as a minimum) the following information:

a. The nature of the operations which could result in exposure to these chemicals as well as any necessary handling or hygiene practices or precautions.

b. The location, properties and acute and chronic health effects of the chemicals to which the employees are routinely exposed in the workplace.

c. An appreciation of the usefulness and limitations of odor threshold limits values. Such an apprisal would enable the worker to respond appropriately to doors detected during his workday.

2. Respiratory Protection: On separate occasions, two workers using a Comfo-II[R] type cartridge respirator stated that they did not have prior training in its mechanics, proper use and necessary maintenance. The employee involved in removal of the asbestos insulation from boiler number 9 on October 20, was wearing a disposal type dust mask - not approved for protection against pneumoconiosis producing dusts such as asbestos. Based on these three experiences, it appears that an effective respiratory protection program does not exist.

It is recommended, therefore, that a formal respiratory protection program be instituted in accordance Federal OSHA Standard 29 CFR Part 1910.134. A NIOSH publication titled "A Guide to Industrial Respiratory Protection" (Publication No. NIOSH 76-189, 1976), will serve as a reference source with information for establishing and maintaining a respiratory protection program which meets the eleven criteria required by 29 CFR Part 1910.134. All respirators used should be those certified under the NIOSH respirator standards, 30 CRF Part 11. Refer to the NIOSH Certified Equipment List as of July 1, 1978 (Publication No. 79-107) for a listing of NIOSH-approved respirators.

3. In order to gauge storage tank number 7622, it is necessary for a worker to stick his head into the tank with resultant exposure to a dense vapor cloud. Until an alternate procedure can be developed, it is recommended that the worker wear a full face chemical cartridge type respirator during the operation.

4. The sample (AB-04) obtained from the settled dust on the lockers in the pump house documents that asbestos fibers are being released from the pipe insulation. Although the available information regarding the toxicity of asbestos fibers via ingestion is non-conclusive, it is recommended that edible items not be stored or eaten in the immediate area. In view of the documented toxicologic properties of asbestos fibers, it is recommended that Texaco, Inc. conduct testing in the lunchroom to determine if airborne asbestos fibers are present in the eating area.

5. Conversation with the workers revealed general ambiguity concerning which insulation contained asbestos. Such a concern prompted NIOSH to obtain the bulk samples in the pump house. In view of the severe human toxicity potential of asbestos fibers, it is recommended that the insulation containing asbestos be identified accordingly. Identification of asbestos containing insulation could prevent unknowing exposure to maintenance personnel and others.

VI. REFERENCES

1. Patty, F. A. Acrylamide and Related Compounds, in Fassett, D. W., Irish, D. D. (eds): Industrial Hygiene and Toxicology. Vol. 2, pp. 1832-1837. Interscience Publishers, Inc., New York (1963).

VII. AUTHORSHIP AND ACKNOWLEDGEMENTS

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TABLE I

Total Hydrocarbon Exposures of Employees Working in the Compound Department
Texaco, Inc.
Bayonne Terminal
Bayonne, New Jersey

March 20-22, 1979

Date	Sample No.	Sample Description	Sample Period	Weight of Total Hydrocarbons-mg/sample
3/20	CT-01	Compound Helper	1501-2219	<0.05*
3/20	CT-02	Compounder	1503-2226	<0.05
3/20	CT-03	Compound Helper	1506-2220	0.05
3/20	CT-04	Compound Helper	1508-2210	<0.05**
3/21	CT-07	Compounder	1501-2215	.0.09
3/21	CT-08	Compound Helper	1503-2208	0.06
3/21	CT-11	Sampler positioned between blending kettles 3606 and 3604	1508-2216	0.25
3/22	CT-13	Gauger	0630-1150 1225-1501	0.60***
3/22	CT-15	Compounder	0702-1435	0.10
3/23	CT-16	Compound Helper	0702-1420	0.10

* Weight (in milligrams) of total hydrocarbons per sample (charcoal tube).
** 1,1,1 trichloroethane was also qualitatively identified on this sample.
*** Predominately C_4-C_6 alkanes including butanes, hexanes and pentanes.