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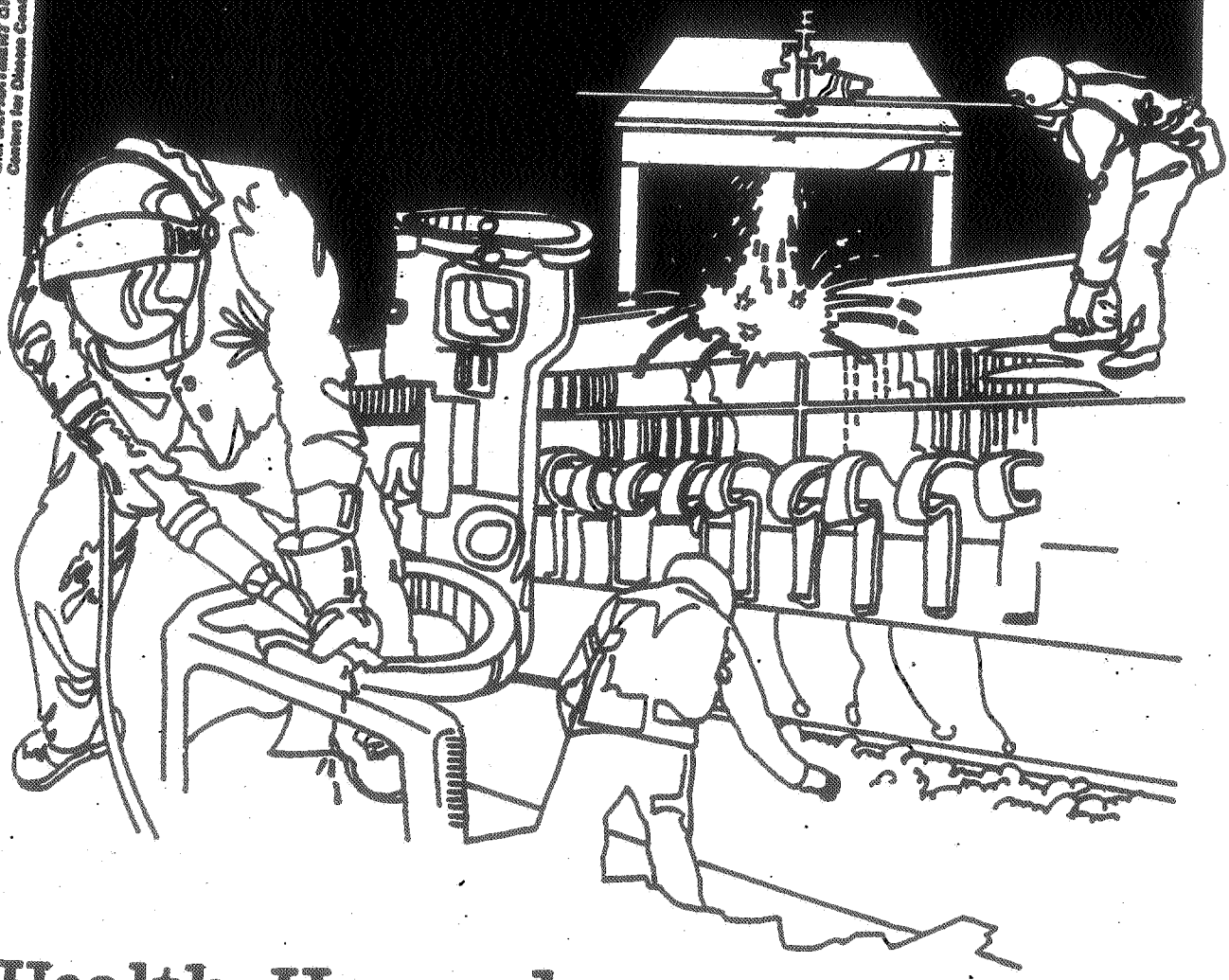

Health Hazard Evaluation Report

HETA 85-268-1641
PRODUCTS RESEARCH CHEMICAL CORP.
GLOUCESTER CITY, N.J.

PREFACE

The Hazard Evaluations and Technical Assistance Branch of NIOSH conducts field investigations of possible health hazards in the workplace. These investigations are conducted under the authority of Section 20(a)(6) of the Occupational Safety and Health Act of 1970, 29 U.S.C. 669(a)(6) which authorizes the Secretary of Health and Human Services, following a written request from 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.

The Hazard Evaluations and Technical Assistance Branch also provides, upon request, medical, nursing, and industrial hygiene technical and consultative assistance (TA) to Federal, state, and local agencies; labor; industry and other groups or individuals to control occupational health hazards and to prevent related trauma and disease.

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PRODUCTS RESEARCH CHEMICAL CORP.
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I. SUMMARY

On March 25th, 1985, the National Institute for Occupational Safety and Health (NIOSH) received a request for a Health Hazard Evaluation from workers at Products Research Chemical Corporation (PRC) in Gloucester City, NJ. The request cited concern about the potential health effects of chemical exposures at the plant, including solvents, silica-containing dusts, and polythioether polymers.

Approximately 80 employees work at PRC manufacturing polymeric adhesive sealants and caulking compounds. Potential for significant chemical exposure was felt to exist only for the approximately 24 employees in the Compounding Department. The NIOSH investigation included a literature review of selected chemicals used in the Coumpounding Department, a brief health interview with exposed employees, measurement of solvent exposures in the Compounding Department and observation of work practices.

Field visits were made on May 21, July 10 and July 23, 1985. Exposure measurements indicated only minimal exposure (less than 4.0 ppm TWA) to several solvents on all jobs except one. The Pot Washer was exposed to a mean of 50.2 ppm TWA of methyl ethyl ketone; however, the job requires the use of air supplied-respiratory protection. No significant health effects were reported by the workers. The literature review revealed significant inherent toxicities of numerous chemicals at the plant; however, it was concluded that exposure controls currently used at the plant preclude any significant health risks. Recommendations to improve exposure control and minimize employee concerns are included.

On the basis of environmental measurements and work practice evaluation, it was concluded that no significant health hazard exists at the facility. Continued exposure control and employee education is required to maintain safe conditions.

Key Words: SIC 2891, Adhesives and Sealants, caulking compounds, adhesives, solvents, methyl ethyl ketone

II. INTRODUCTION

On March 25, 1985, the National Institute for Occupational Safety and Health (NIOSH) received a request for a Health Hazard Evaluation from workers at Products Research Chemical Corporation (PRC) in Gloucester City, NJ. The request cited concern for the effects of exposure to chemicals at the plant, including silica-containing compounds and polythioether polymers. The request also mentioned concern about reproductive effects due to these exposures.

On April 2, 1985, the request was assigned to the New Jersey State Department of Health (NJDOH) for investigation in accordance with a cooperative agreement between NJDOH and NIOSH. On May 21 an initial walkthrough of the plant was conducted. On July 10 an environmental evaluation of exposures and control technology was made at the plant, and on July 23 a return visit was made to evaluate protective equipment and policies. This report constitutes the first written communication of the findings.

III. BACKGROUND

PRC produces a large variety of polymeric adhesive caulking compounds and sealants in their Gloucester City facility. The plant employs about 80 production workers on two shifts. The plant is divided into four departments: Warehousing, Compounding, Laboratory and Offices. Production takes place in the Compounding Department, which has approximately twelve employees per shift.

The caulks and sealants are made in two components, a base and an accelerator. The bases are made by combining a polymer (polythioethers) with fillers, solvents and adhesives. The accelerators are made by combining a plasticizer with a metal dioxide. Manganese dioxide is the primary metal used; occasional batches require lead dioxide.

To start a batch, the Batch Make-up Operator weighs out quantities of additives and adhesives in the batch make-up area into paper bags or plastic containers. The Pot Charger charges the mixing vessels with base polymers, plasticizers and solvents as required for the particular batch. The Compounders then place one mixing vessel in the "BB" mixer and add the preweighed additives to the batch while mixing. For the accelerators, metal charging is done by pouring the powdered metals from a fork lift truck drum apparatus.

After mixing, the base compounds are either drummed for shipping or held for further processing on a homogenizer. Certain accelerators are processed further on a roll mill. The final products are drummed for shipping or warehousing.

After the mixers are emptied, the mixer containers are cleaned with solvent by the Pot Man. Local exhaust ventilation is present on most operations involving potential contaminant release. All materials in the plant are coded with a letter indicating hazard level and required protective equipment and procedures.

An inspection by the Occupational Safety and Health Administration (OSHA) in 1983 found no health standards violations. Short- term (15 minute) sampling was conducted for manganese during the charging operation and four samples were all well under the OSHA standard of 5 mg/m3 (range 0.48-0.72 mg/m3).

The company conducts personal air sampling over a full shift (7 hours) each time a lead batch is charged. Lead containing batches are formulated only about four times per year. Results of the 19 samples the company collected in 1983 indicated a mean TWA air lead concentration of 41 ug/m3, with 8 of 19 (42%) above the OSHA limit of 50 ug/m3. Thirty one samples collected in 1984 had a mean of 46.5 ug/m3 with 12 of 31 (39%) over 50 ug/m3. The 13 samples collected in 1985 had a mean of 28 ug/m3 with 2 of 13 (15%) over the standard.

Blood lead levels are measured twice per year on Compounding Department employees, who are required to wear respiratory protection when lead batches are being mixed; all blood lead results reviewed were consistently below 20 ug/100 ml, a level comparable to that in the general population.

IV. MATERIALS AND METHODS

A. Environmental

An assessment of five workers' exposures to mixed solvents (including methyl ethyl ketone, 111 trichloroethane, toluene, ethyl benzene and xylene) in the Compounding Area and Batch Make-Up Area was conducted on July 10, 1985. The five included the Batch Make Up Man, Pot Charger, Centrifuge Operator, Pot Washer and one Compounder (mixer operator). Personal air samples were collected over a full shift using NIOSH Method P&CAM 127 with a flow rate of 50-100 ml/min. Analysis was conducted by the NJDOH Laboratories.

Evaluation of the local exhaust ventilation was conducted by measurement of face velocities of air on several key pieces of equipment using an Alnor Velometer. Observation of work practices in several areas was also conducted.

B. Medical

During our initial plant walk-through, a brief questionnaire was administered to 21 individuals from the first shift, including all 12 Compounding Room workers, 3 maintenance employees and 6 laboratory and miscellaneous job titles. The questionnaire was broad and open-ended in order to elicit any adverse health symptoms present in the group, but specific questions were also asked concerning skin, central nervous system, gastrointestinal, peripheral nervous system and reproductive system complaints.

In order to assess the potential chronic health effects of materials used at the plant, literature reviews were conducted on all chemicals used in large quantities or frequently in the plant. For compounds with little information available in standard sources, computer literature searches were also conducted.

V. EVALUATION CRITERIA

As a guide to the evaluation of the hazards posed by workplace exposures, NIOSH field staff employ environmental evaluation criteria for assessment of a number of chemical and physical agents. These criteria are intended to suggest levels of exposure to which most workers may be exposed up to 10 hours per day, 40 hours per week for a working lifetime without experiencing adverse health effects. It is, however, important to note that not all workers will be protected from adverse health effects if their exposures are maintained below these levels.

In addition, some hazardous substances may act in combination with other workplace exposures, the general environment, or with medications or personal habits of the

worker to produce health effects even if the occupational exposures are controlled at the level set by the evaluation criterion. These combined effects are often not considered in the evaluation criteria. Also, some substances are absorbed by direct contact with the skin and mucous membranes and thus potentially increase the overall exposure. Finally, evaluation criteria may change over the years as new information on the toxic effects of an agent become available.

The primary sources of environmental evaluation criteria for the workplace are: 1) NIOSH Criteria Documents and recommendations, 2) the American Conference of Governmental Industrial Hygienists (ACGIH), Threshold Limit Values (TLV's), and 3) the US Department of labor (OSHA) occupational health standards. Often, the NIOSH recommendations and ACGIH TLV's are lower than the corresponding OSHA standards. Both NIOSH recommendations and ACGIH TLV's usually are based on more recent information than are the OSHA standards. The OSHA standards also may be required to take into account the feasibility of controlling exposures in various industries where the agents are used; the NIOSH-recommended standards, by contrast, are based primarily on concerns relating to the prevention of occupation disease. In evaluation the exposure levels and the recommendations for reducing these levels found in this report, it should be noted that industry is legally required to meet the levels specified by an OSHA standard.

A time-weighted average (TWA) exposure refers to the average airborne concentration of a substance during a normal 8 to 10 hour workday. Some substances have recommended short-term exposure limits or ceiling values which are intended to supplement the TWA where there are recognized toxic effects from high short-term exposure.

Organic solvents detected in the plant on the sampling day included methyl ethyl ketone (MEK), 1,1,1-trichloroethane, toluene, xylene and ethylbenzene. Information on the toxicity of these compounds is given in Appendix I. The OSHA standards and NIOSH recommended exposure limits for these compounds are given in Table I. The PEL is the "Permissible Exposure Limit" and is defined as the air concentration of a chemical, averaged over a full work day, which must not be exceeded. The STEL is a "Short Term Exposure Limit" and is the concentration which must not be exceeded over a short period of time, usually fifteen minutes.

TABLE I
Organic Solvent Exposure Standards
(parts per million)

Compound	OSHA PEL	NIOSH TWA	NIOSH STEL
MEK	200	200	---
111Trichloroethane	350	---	350 (15 min)
Toluene	200	100	200 (10 min)
Xylene	100	100	200 (10min)
Ethylbenzene	100	---	---

VI. RESULTS

A. Environmental

1. Work Practice Observations and Local Exhaust Ventilation

The Batch Make-Up Man weighs specified amounts of both liquid and dry ingredients for batches into one gallon or smaller containers, or paper bags. The area is equipped with an adjustable exhaust vent which can be moved into position for an individual pouring or weighing job. Some of the dry materials are scooped out of drums by the operator with the use of gloves and a disposable dust respirator. Other dry chemicals are scooped out of bags using the adjustable exhaust vent for dust control as well as gloves and a dust respirator. Many of the liquids are handled on a work bench which has no local exhaust ventilation.

Some liquid materials are poured out of drums mounted on a drum dolly in the center of the area. The materials are poured into one gallon containers and then moved to the bench for weight adjustment. The adjustable exhaust vent is used over the mouth of the drum and a rag is placed on the floor to catch spillage. After the operation is completed, sand is spread on the floor to adsorb any spilled material. The small spill and drips occurring during the operation give rise to some airborne exposure. In addition, significant spillage is possible during this operation, and could result in high exposures to the worker.

The adjustable exhaust vent in the Batch Make-Up Area has an elliptical face opening of approximately 1.4 ft^2 and an average face velocity of 725 fpm (feet per minute). At this flow a capture velocity of 50 fpm would be found at approximately 1.4 feet from the face. According to standard ventilation guidelines (ACGIH), a velocity less than 50 fpm would be ineffective at capturing any contaminant released from the process. Therefore, dust beyond 1.4 feet from the vent would be released into the work room air.

Compounders mount covers on the mixing pots and apply exhaust ventilation by attaching an elephant hose to the mixing pot cover when charging or mixing a batch (See Figure 1). Three-fourths closed covers are used for charging lead or manganese oxides, and full covers with smaller charge ports are used for most other materials. Charging of dry materials is done through the charge ports and there is no visible release of dust.

The face velocity on the 1/4 open mixing pots is highly variable with about 200 fpm near the mixer axle and no detectable air flow near the perimeter of the vessel. The face velocity on an open charge port of a full cover was measured at about 200 fpm over an area of 1.4 ft^2, or about 300 cfm (cubic feet per minute). However, it was noted that significant leakage is caused by slight gaps between the halves of the lid. If the lid is tightly sealed, an air flow of about 500 cfm is obtained.

Compounders are supplied with MSA half mask respirators and organic vapor cartridges as well as rubber gloves.

In addition to mixing, Compounders also scrape mixed materials out of the mixing pots by hand, and occasionally clean the pot lids using solvents. Certain batches also require mixing a slurry of hydroquinone and MEK or methanol in a drum for addition to a batch.

The Pot Washer is responsible for washing out the mixing pots between batches. A few gallons of either MEK or 1,1,1 trichloroethane is added to the pot and the Washer uses

brushes and scrapers to clean all the residual material out of the pot. At times the Washer must enter the pot to reach the bottom.

Approximately once per week the Pot Washer also washes smaller pieces of equipment in a MEK containing basin which is moved in from outside. No ventilation is provided on this operation.

The Pot Washer is supplied with rubber gloves and an air supplied respirator. In addition, two adjustable local exhaust vents are available in the area and can be placed on the edge of the pot during cleaning. One of them provides face velocities of approximately 1100 cfm and the other approximately 300 cfm. Ventilation and respiratory protection equipment was not being consistently used during our inspection.

2. Air Monitoring

Results of exposure measurements are given below in Table II.

TABLE II
Air Sampling Results, 7/10/85
(results in parts per million, ppm)

Job Title	Sampling Time(min)	1,1,1 TCE	MEK	Toluene	Ethyl-benzene	Xylene
Pot Washer	408	1.20	50.18	1.20	0.02	0.37
Centrifuge Operator	398	1.34	3.96	0.41	0.09	0.39
Pot Charger	375	0.77	3.65	0.58	0.79	3.38
Compounder	393	0.84	3.12	0.17	0.04	0.15
Batch Maker	382	1.61	0.37	--	--	--

The results indicate minimal solvent exposures. The one exception was the MEK exposure of the Pot Washer whose exposure level of 50 ppm was one-fourth of the current OSHA PEL and the NIOSH recommended TWA standard. Although MEK was being used on the day of sampling, 1,1,1 trichloroethane is also used in the same way on this job. Comparable results may be expected when this solvent is used.

3. Protective Equipment

All production employees are provided with work uniforms. The uniforms are washed regularly by a contractor. Employees are provided with individual lockers and shower facilities are available.

A respiratory protection program has been developed at the plant. MSA Comfo II dual cartridge respirators are used during all solvent handling processes except for those

requiring the use of supplied air respirators. Air supplied respirators are required only for the Pot Washer when he leans into a pot containing solvent. At our recommendation, a clean storage box was set up to prevent contamination of the full face mask used.

Replacement cartridges are available at the request of the employee. Lockers are provided for each individual's respirator. A washing machine is also available for washing masks between uses. Nevertheless, some respirators were observed hanging in potentially contaminated areas and some employees expressed lack of knowledge about the necessary frequency of cartridge replacement.

PRC is currently providing additional training and is designating two people per shift to be responsible for respirator maintenance and washing. With these improvements, the Respiratory Protection Program should be quite effective and meet OSHA Standards Requirements.

4. Emergency Procedures

Twice in the history of the plant, including once during the period of our investigation, batches of accelerator containing manganese dioxide have heated up spontaneously. In these cases, the batch must be dumped and quenched with water.

An emergency and fire procedure has been developed by the company. Compounders monitor the temperature of the batch. If it exceeds a specified temperature, the batch is poured out of the mixer into drums and the temperature is continuously monitored. If it continues to rise, the drums are brought outside on a fork truck. Some exposure to volatilized phthalate esters from the batch may take place during this period. Operators are instructed to set off the fire alarm in cases such as this; however, they reported some hesitancy to do so in this most recent case.

B. Medical

Brief interviews were conducted with 21 individuals. The only positive response concerned skin rashes. A total of five individuals reported skin rashes. Two noted dry skin associated with solvent exposure, especially in winter. The other three noted problems with specific agents. Their condition improved with proper use of protective clothing and discontinuation of use of the offending agent.

Two men reported that their wives had miscarried once in the past--an incidence not greater than might be expected in this population. Several individuals noted irritation from exposure to solvents, hydroquinone, tetramethyl guanidine, noise and cited the need for additional education about the hazards of materials in the plant and safe work practices.

Information regarding the health hazards of chemicals used at the plant is given in Appendix I. Many of the materials used at PRC have significant toxic properties including eye, skin and respiratory system irritation; sensitization; nervous system effects; and evidence of reproductive and carcinogenic potential. Little or no information was available for several of the chemicals used.

VII SUMMARY AND CONCLUSIONS

Based on a review of the toxicity of materials used at PRC, interviews with employees and measurement of solvent exposures, it was determined that no significant health hazards exist at the plant. Employees reported few health problems and most of those that were noted had occurred in the past. No significant reproductive toxin exposures were identified. The inherent toxicity of many materials used in the plant is significant; however the ways in which the materials are used in the plant and the protective equipment and policies in place prevent hazardous exposures from occurring. Nevertheless, since some of the materials present significant potential health hazards, and, for some agents, only very limited toxicity information is available, exposures should be kept as low as possible.

VIII. RECOMMENDATIONS

1. MSDS sheets should be updated annually to provide the plant with accurate and complete information about potential health hazards. The information should be readily available to employees. Additional education and training concerning health hazards, appropriate protective equipment and work practices would be helpful.

2. The Pot Washer should be educated and fully trained in the importance of full respiratory and skin protection when high concentrations of solvents may be expected. The full face mask and air line equipment, including the CO monitoring equipment, should be inspected daily by the department supervisor to ensure its proper condition and maintenance.

3. Employees should receive additional training on the use of cartridge respirators and a cartridge replacement policy should be established. High use cartridges should be replaced daily, and low use respirators should receive new cartridges weekly.

4. In the Batch Make-up Area, pumps should be installed in each drum for weighing out desired quantities of liquid chemicals. Pumping the materials instead of pouring them would reduce the chance of a spill and prevent the release of contaminants into the air.

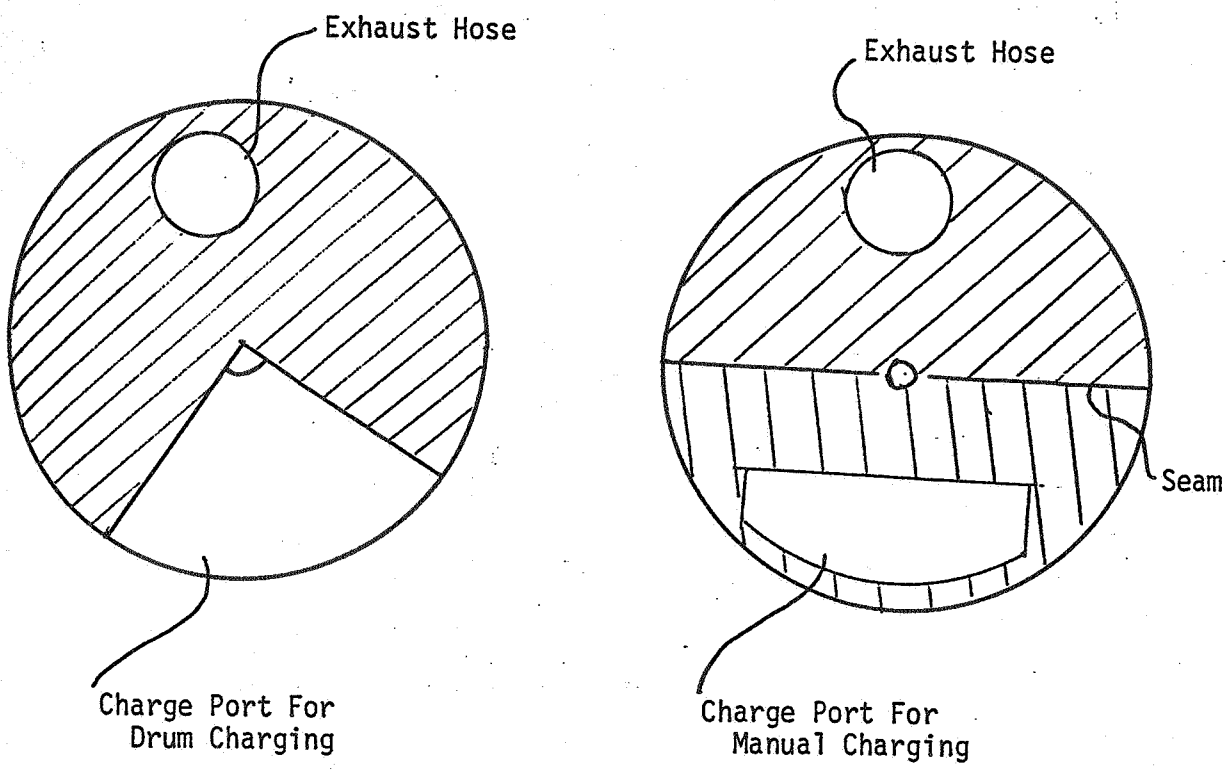
5. A laboratory-type hood or a back draft slot vent should be installed at the work bench of the Batch Make-up Area to reduce the potential airborne exposures during weighing and pouring of the toxic materials used in the area.

6. A vented work station similar to a small paint spray booth should be constructed either in or adjacent to the Compounding area for use during jobs presenting potentially hazardous exposures. The hood should be designed to take into account the size of equipment and movement required during operation such as the cleaning of mixing equipment in the solvent wash basin, slurrying of hydroquinone and any other high solvent use operation conducted in the compounding department. It may be possible to construct a vented work station for this purpose using the existing exhaust system at the pot washing station.

7. The current biologic monitoring of lead (i.e., blood lead levels) provides inadequate information on absorption of lead in relation to exposure. To be more meaningful, each mixer's blood lead level should be determined within a week after the batch is mixed.

FIGURE 1

Configuration of Ventilation For Mixing Vessel Charge Ports



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XII. DISTRIBUTION AND AVAILABILITY OF REPORT

Copies of this report are currently available upon request from NIOSH, Division of Standards Development and Technology Transfer, Publications Dissemination Section, 4676 Columbia Parkway, Cincinnati, Ohio 45226. After 90 days, the report will be available through the National Technical Information Service (NTIS), 5285 Port Royal, Springfield, Virginia 22161. 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. Products Research and Chemical Corporation
   Gloucester City, NJ 08030
2. Requestors
3. NIOSH, Region II
4. OSHA, Region II

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

Appendix I

Toxicity Review for Selected Materials Used At Products Research Chemical Corporation

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Toxicity Review for Selected Materials Used At
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The HHE request submitted by PRC employees sought general information concerning the health hazards of the chemicals to which workers have potential exposure.

Agents used in the production process were identified by means of material safety data sheets (MSDS's) provided by one of the HHE requestors and lists compiled by the PRC. The PRC lists included material code, chemical description, hazardous component, number of batches per year in which substance is used, pounds charged per batch, maximum charge time, batches per year, and types of protection to be used for approximately 50 substances.

Agents were selected for literature review if, on the basis of inherent toxicity or frequency of use, they were felt to consititute a potential health hazard.

It should be noted that much of the information provided below is based on experimental data using exposures high above those anticipated under normal working conditions at PRC. Chemical names are provided when they are reported on the MSDS. In instances where the chemical constituents are proprietary information of the manufacturer, this is so noted. In two cases (silane compounds and epoxy resin solution), chemical names were included in the MSDS's but have been left out of this report at the request of PRC on account of proprietary concerns. Because the information available on these compounds was limited, it was determined that specific identification of the chemical names would not improve the effectiveness of this literature review. A definition of OSHA PEL's and NIOSH recommended PEL's is contained in the main body of this report.

SILANES (L-242, L-275, L-291, L-309, and L-5291)

Multiple silane compounds were used at PRC during the past year. The MSDSs from these compounds were dated 1980-1982. All reported that the agents were skin and/or eye irritants and that none has a TLV. L-242 was listed as a weak animal carcinogen in a single species (mice).

A literature search yielded no information on the particular compounds used at PRC. Information provided to PRC by the manufacturer of L-309 described a 14-week rat inhalation study which resulted in adverse effects to the larynx (chronic inflammatory reaction) from inhalation of mist.

According to PRC officials, gloves and respirators are to be worn when these agents are used.

GUANIDINES (L-294, 1,1,3,3-tetramethylguanidine; D-10, diphenylguanidine)

L-294 is listed on the MSDS (dated 1982) as a severe skin and eye irritant without a TLV. PRC reports a policy requiring respirator and glove use when this compound is utilized. No additional data were found through the literature search.

The MSDS for D-10 (1976) reports eye burns as an effect of overexposure and notes that no TLV has been established. PRC reports a TLV of .5 mg/m3. The literature review indicated that in two recent studies this compound, diphenylguanidine, was found to induce sperm abnormalities and infertility in

exposed mice and hamsters[1] and to cause malformation of exposed chicken embryos[2]. PRC material given to NIOSH indicates that respirators and gloves are to be worn when this agent is used.

HYDROQUINONE (D-537)

The MSDS for this substance (1979) notes that repeated prolonged exposure may results in pigment changes of the conjunctiva and cornea with possible visual effects. The TLV is 2 mg/m3, with a tentative STEL (short-term exposure limit) of 4 mg/m3. A review of the literature revealed numerous reports of skin problems with this agent. Hydroquinone is used in skin bleaching creams and thus may cause pigmentary changes in the skin as well as the eyes. It has also been reported to cause allergic contact dermatitis when used in medications[3]. A single report suggested that hydroquinone is a hemotoxic (toxic to blood-forming elements) metabolite of benzene in mice[4]; no data were found to confirm this or to suggest that exposure to hydroquinone itself causes hemotoxic effects in mice or any other species. According to PRC officials, respirators and gloves must be worn when this material is used.

2,4,6-TRI (DIMETHYLAMINO) METHYL PHENOL (L-48)

The MSDS for this compound (1980) states that it is a high health hazard due to eye and skin damage resulting from direct contact with liquid. The TLV is 5 ppm. The agent is also noted to be a skin allergen. A literature search covering material from 1980-85 yielded no further information. PRC reports that respirators and gloves are required when this substance is handled.

DIBUTYLTIN DIACETATE (L-703)

The MSDS for this agent (1982) reports eye and skin irritation and, if fumes are inhaled, respiratory irritation as adverse effects of exposure. The TLV for all organotin compounds is .1 mg/m3. Literature review yielded no further information on this particular compound. Other organotin compounds have been reported to cause adverse effects on the nervous and reproductive systems in animals and/or humans, but these compounds differ significantly in structure from dibutyltin diacetate, which has not been implicated as toxic to these organ systems.[5] PRC reports that respirators and gloves are required when this substance is handled.

DIMETHYLFORMAMIDE (L-66)

1Bemong MA, Hall EV: Reproductive toxicology of 1,3-diphenylguanidine: analysis of induced sperm abnormalities in mice and hamsters and reproductive consequences in mice. J Toxicol Environ Health 1983 Apr-Jun: 869-78.
2Korhonen A, Hemminki K, Vainio H: Embryotoxic effects of acrolein, methacrylates, guanidines and resorcinol on three day chicken embryos. Acta Pharmacol Toxicol (Copenh), 52(2), 1983: 95-9.
3Wnfaawe PJG, Maiback HI: Cosmetic and dermatology: bleaching creams. dJ Am Acad Dermatol 5(2): 143-7, 1981.
4Tunek A, Hogstedt B, Olofsson T: Mechanism of benzene toxicity. Chem Biol Interact 39(2): 129-38, 1982.
5WHO: Tin and organotin compounds: a preliminary review, Environ Health Criteria 15:68-92, 1980.

Health hazard information included on the MSDS (1982) describes irritation from local exposure and nausea, abdominal pain and possible liver damage from absorption via skin or lungs. It notes that embryotoxicity (harm to a developing fetus) may result from overexposure. The OSHA TWA is 10 ppm.

A data sheet on this product obtained from the manufacturer (DuPont) describes the rodent studies which showed that very high skin exposure of pregnant rats caused fetal death. After noting that no embryotoxicity has been observed with dose levels comparable to that potentially absorbed by a pregnant woman exposed to the OSHA standard level, DuPont concludes that women may work in air exposures within the OSHA limit but should avoid skin contact (and subsequent absorption) of the agent. The data sheet also reports the possibility of skin flushing if alcohol is drunk soon after exposure to this chemical.

PRC reports that employees are required to use respirators and gloves when this agent is used.

EPOXY RESIN SOLUTION (L-129)

This solution contains methyl ethyl ketone (see below) and a very small amount of epichlorhydrin. The MSDS (1982) describes some of the adverse effects of MEK and also notes that epichlorhydrin is an animal carcinogen and has been shown to produce mutations in both human and animal cells. A review of the literature confirms the mutagenic and animal carcinogenic potential of epichlorhydrin exposure levels above the current standard; thus far studies looking for epichlorhydrin-induced cancer among exposed workers have been negative.[6] The OSHA PEL for epichlorhydrin is 5 ppm; the manufacturer (Shell) has adopted an internal standard of 1 ppm.

Some epoxy resins have been identified as skin allergens; no information was found concerning the allergenic potential of L-129.

According to PRC officials, employees are required to wear respirators and gloves during potential exposure to this substance.

PHENOL-FORMALDEHYDE RESINS (L-5, L-37, L-825, D-12)

The toxicity of these compounds derives primarily from its phenol, formaldehyde, and, in one case (L-825), MEK content. The MSDS's for L-825 and D-12 (both undated) allude to dermatitis potention. The MSDS's for L-5 and L-37 (both from 1981) emphasize the severe irritant potential to skin and eyes and the possibility of allergic reaction. The OSHA PEL for phenol is 5ppm; the formaldehyde PEL is 3 ppm.

Skin contact with the resin may result is irritation or sensitization reactions; unless the resin is heating, air levels of phenol and formaldehyde are unlikely to reach hazardous levels.

Formaldehyde is an animal carcinogen and has been classified as a probable human carcinogen.

Material provided by PRC officials notes that respirators and gloves are required during potential exposure to L-5, L-825 and D-12; gloves are required for L-37.

6Sram RJ, Tomatis L, Clemmensen J, Bridges BA: An evaluation of the genetic toxicity of epichlorhydrin; Mut Res 87 (1981), 299-319.

SILICATES (D-191, hydroxylated silicon dioxide; D-171, silicon dioxide; D-540, complex hydrous calcium magnesium silicates; D-612, hydrous magnesium silicate)

Silicates are a very large family of minerals. Some silicates, including asbestos and crystalline silica, have been associated with serious lung disease.

Hydrated amorphous silica (D-191) has not been clearly associated with lung disease. The MSDS for this substance (dated 1981) notes the acute effects of drying of skin and mucous membranes. It is regulated as a nuisance dust, with an OSHA PEL of 80 mg/m3 TWA, although the manufacturer has established its own internal standard of 6.5 mg/m3 TWA. Material provided by PRC notes that respirators and gloves should be worn when this substance is handled.

The MSDS (undated) for D-171 does not provide enough information to evaluate the toxicity of this substance. No PEL is listed, respiratory protection is specified, and the substance is listed as "non-hazardous". PRC reports that respirators and gloves are required when this substance is used.

Talc (D-540) has been reported to cause lung disease after many years of high exposure. It is not yet clear whether the disease is caused by talc itself or by contaminants. D-540 contains crystalline silica, which is known to be associated with lung disease. The manufacture provides warnings of possible lung injury from prolonged inhalation. PRC reports that respirators and gloves are required when this substance is used.

SOLVENTS (L-6, methyl ethyl ketone; L-303, methanol; L-168, 1,1,1-trichloroethane; L-289, oil modified polyurethane; L-41, toluene; L-92, calcium 2-ethylhexanoate solution; L-7, methyl isobutyl ketone; L-28, isopropanol; L-69, trichlorethylene; L-123, tung oil varnish)

Much toxicity literature is available concerning the three major solvents used at PRC: methyl ethyl ketone (L-6), methanol (L-303), 1,1,1-trichloroethane (methylchloroform, L-168). Recent reviews of the toxicity data on these substances are included in the Fact Sheets prepared by the New Jersey Department of Health and included in Appendix II.

Solvents also constitute the most hazardous component of several other materials used at PRC, including L-289 (containing xylene, OSHA PEL 100 ppm) and L-41 (toluene, OSHA PEL 200 ppm, NIOSH recommended PEL 100 ppm), methyl isobutyl ketone (L-7, OSHA PEL 100 ppm), isopropyl alcohol (L-28, OSHA PEL 400 ppm), trichlorethylene (L-69, OSHA PEL 100 ppm), petroleum distillate (a mixture of chemicals constituting 44% of L-92, no standard available), and mineral spirits (a mixture of chemicals constituting 11% of tung oil varnish, L-123, no standard available.) all possess the general adverse effects of solvents

Like most solvents, these agents can cause skin irritation and can affect the nervous system in a manner similar to alcohol, producing dizziness, headache, nausea and, with very high exposure, unconsciousness and death.

Chronic effects of toluene exposure include irritation of eyes and nose, euphoria, headaches, dizziness, loss of appetite and alcohol intolerance. Glue-sniffing, which involves inhalation of very high doses of toluene, has been associated with brain damage, liver and kidney damage, and sudden death.

Chronic effects of high exposure to xylene produces similar adverse effects. In addition, xylene exposure has been associated with damage to the cornea. Both agents are reported to cause menstrual

problems in exposed women and have been associated with effect on the bone marrow; the bone marrow effects most likely have been caused by benzene contamination. Toluene and xylene are both readily absorbed through the skin as well as through the lungs.

Material provided by PRC notes that gloves and respiratory protection are to be worn when these agents are being used.

LEAD DIOXIDE (D-369, D-372)

Health hazard data from the MSDS's for these materials (undated) notes only abdominal cramping and muscular weakness as adverse health effects of overexposure.

More accurate and detailed health hazard information for lead has been summarized in OSHA's lead standard; a copy of this material, from Appendix A of the OSHA standard, is contained in Appendix III of this report.

Under the conditions of lead usage at PRC, where each individual employee mixes lead batches less than 30 days per year, air levels are required to be less than 200 micrograms per m3 TWA and engineering, work practice and respiratory controls may be used to reduce employee exposure to lead to a maximum of 50 micrograms per m3. Sampling results provided by PRC showed air levels consistently less than 200 micrograms/m3 TWA, based on seven-hour personal samples of batchmixers working the lead batches. Most samples were less than 100 micrograms/m3 TWA. At these levels, required respiratory protection consists of a half-mask, air-purifying respirator equipped with high efficiency filters.

According to the OSHA lead standard, workers whose blood lead exceeds 50 micrograms/100 g must be removed from lead exposure until their blood levels have decreased.

According to material provided by PRC, employees are required to wear respiratory protection and gloves when working with lead.

MANGANESE DIOXIDE (D-292, D-358, D-493, D-5402)

In the MSDS's for these compounds (one dated 1979, one dated 1985, and two undated), one mentions "manganese intoxication" (otherwise unexplained) as the effect of chronic overexposure, three mention central nervous system damage, two mention lung effects, and one also notes the possibility of "metal fume fever" (a temporary flu-like illness) as an effect of acute overexposure to manganese. The OSHA PEL is 5.0 mg/m3 as a ceiling value (a value never to be exceeded).

Manganese compounds are minor irritants to the eyes, mucous membranes and skin. Chronic lung exposure may cause increased risk of respiratory infections. In addition, these compounds have long been recognized as causing damage to the nervous system when absorbed through the lungs. This nervous system toxicity starts with vague, non-specific symptoms of fatigue and irritability, but may progress to severe psyciatric and movement problems and, ultimately, a picture identical to Parkinson's disease. If detected early, these symptoms are reversible. The exposure durations and levels associated with these adverse effects shows great individual variability.

Material provided by PRC notes that respirators and gloves are to be worn when manganese is used.

Appendix II

New Jersey Department of Health Factsheets

Methyl Ethyl Ketone

Methanol

Methyl Chloroform

New Jersey Department of Health

HAZARDOUS SUBSTANCE FACT SHEET

COMMON NAME: METHYL ETHYL KETONE

CAS NUMBER: 78-93-3 **DOT NUMBER:** UN 1193

HAZARD SUMMARY

* Methyl Ethyl Ketone can affect you when breathed in and by passing through your skin.
* The chemical should be handled as a teratogen--with extreme caution.
* Exposure can cause dizziness, headache, blurred vision, and cause you to pass out. Repeated exposures, along with other solvents, can damage the nervous system.
* The liquid can severely burn the eyes and may irritate the skin. Repeated exposure can cause drying and cracking of the skin. The vapor can irritate the eyes, nose, mouth, and throat.
* It is a FLAMMABLE LIQUID.

IDENTIFICATION

Methyl Ethyl Ketone is a clear colorless liquid with a fragrant, mint-like, odor. It is used as a solvent and in making plastics, textiles, and paint.

REASON FOR CITATION

* Methyl Ethyl Ketone is on the Workplace Hazardous Substance List because it is regulated by OSHA.
* Definitions are provided on page 5.

WORKPLACE EXPOSURE LIMITS

OSHA: The legal airborne permissible exposure limit (PEL) is 200 ppm averaged over an 8-hour workshift.

NIOSH: The recommended airborne exposure limit is 200 ppm averaged over an 10-hour workshift.

ACGIH: The recommended airborne exposure limit is 200 ppm averaged over an 8-hour workshift and 300 ppm as a STEL (short term exposure limit).

* The above exposure limits are for air levels only. When skin contact also occurs, you may be overexposed, even though air levels are less than the limits listed above.
* Methyl Ethyl Ketone may be a teratogen. All contact with this chemical should be reduced to the lowest possible level.

HOW TO DETERMINE IF YOU ARE BEING EXPOSED

* Exposure to hazardous substances should be routinely evaluated. This may include collecting air samples. Under OSHA 1910.20, you have a legal right to obtain copies of sampling results from your employer. If you think you are experiencing any work-related health problems, see a doctor trained to recognize occupational diseases. Take this Fact Sheet with you.
* ODOR THRESHOLD = 5.4 ppm.
* The odor threshold only serves as a warning of exposure. Not smelling it does not mean you are not being exposed.

WAYS OF REDUCING EXPOSURE

* Where possible, enclose operations and use local exhaust ventilation at the site of chemical release. If local exhaust ventilation or enclosure is not used, respirators should be worn.
* Wear protective work clothing.
* Wash thoroughly immediately after exposure to Methyl Ethyl Ketone.
* Post hazard and warning information in the work area. In addition, as part of an ongoing education and training effort, communicate all information on the health and safety hazards of Methyl Ethyl Ketone to potentially exposed workers.

This Fact Sheet is a summary source of information for workers, employers, and community residents. Health professionals may also find it useful. If this substance is part of a mixture, this Fact Sheet should be used along with the manufacturer-supplied Material Safety Data Sheet (MSDS).

HEALTH HAZARD INFORMATION

Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to Methyl Ethyl Ketone:

* Contact may irritate the skin, causing a rash or burning feeling.
* The liquid can severely burn the eyes, leading to permanent damage.
* Exposure to the vapor can irritate the eyes, nose, mouth, and throat.
* Exposure to high concentrations can cause dizziness, lightheadedness, headache, nausea, and blurred vision. Higher levels may cause you to pass out.

Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure and can last for months or years:

Reproductive Hazard

* There is limited evidence that Methyl Ethyl Ketone is a teratogen in animals. Until further testing has been done, it should be treated as a possible teratogen in humans.

Other Long-Term Effects

* Repeated exposure, in conjunction with certain other solvents, can damage the nervous system, causing numbness and weakness in the hands and feet.
* Long-term skin exposure can cause drying and cracking of the skin.

MEDICAL TESTING

If symptoms develop, or overexposure is suspected, exam of the nervous system is recommended. Special tests for nerve damage called nerve conduction studies, may be useful.

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are <u>not</u> a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under OSHA 1910.20.

Mixed Exposures

* Methyl Ethyl Ketone in combination with Methyl Butyl Ketone and possibly other solvents can damage the nervous system.

WORKPLACE CONTROLS AND PRACTICES

Unless a less toxic chemical can be substituted for a hazardous substance, ENGINEERING CONTROLS are the most effective way of reducing exposure. The best protection is enclosing operations and/or providing local exhaust ventilation at the site of chemical release. Isolating operations can also reduce exposure. Using respirators or protective equipment is less effective than the controls mentioned above, but is sometimes necessary.

In evaluating the controls present in your workplace, consider: (1) how hazardous the substance is; (2) how much of the substance is released into the workplace, and (3) whether harmful skin or eye contact could occur. Better controls should be in place for highly toxic chemicals or when significant skin, eye, or breathing exposures are possible.

In addition, the following controls are recommended:

* Where possible, automatically pump liquid Methyl Ethyl Ketone from drums or other storage containers to process containers.
* Specific engineering controls are recommended for this chemical by NIOSH. Refer to the NIOSH criteria document: *Ketones # 78-173*.

Good WORK PRACTICES can help to reduce hazardous exposures. The following work practices are recommended:

* Workers whose clothing has been contaminated by Methyl Ethyl Ketone should change into clean clothing promptly.
* Contaminated work clothes should be laundered by individuals who have been informed of the hazards of exposure to Methyl Ethyl Ketone.

* Eye wash fountains in the immediate work area should be provided for emergency use.
* On skin contact with Methyl Ethyl Ketone, immediately wash or shower to remove the chemical.
* Do not eat, smoke, or drink where Methyl Ethyl Ketone is handled, processed, or stored, since the chemical can be swallowed. Wash hands carefully before eating or smoking.

PERSONAL PROTECTIVE EQUIPMENT

WORKPLACE CONTROLS ARE BETTER THAN PERSONAL PROTECTIVE EQUIPMENT. However, for some jobs (such as outside work, confined space entry, jobs done only once in a while, or jobs done while workplace controls are being installed), personal protective equipment may be appropriate.

Clothing

* Avoid skin contact with Methyl Ethyl Ketone. Wear solvent-resistant gloves and clothing. Safety equipment suppliers/manufacturers can provide recommendations on the most protective glove/clothing material for your operation.
* All protective clothing (gloves, footwear, headgear) should be clean, available each day, and put on before work.
* ACGIH recommends the use of Butyl rubber materials in protective clothing.

Eye Protection

* Wear splash-proof chemical goggles and face shield when working with liquid, unless full facepiece respiratory protection is worn.

Respiratory Protection

IMPROPER USE OF RESPIRATORS IS DANGEROUS. Such equipment should only be used if the employer has a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing, and medical exams, as described in OSHA 1910.134.

* Where the potential exists for exposures over 200 ppm, use an MSHA/NIOSH approved full facepiece respirator with an organic vapor cartridge/canister. Increased protection is obtained from full facepiece powered air purifying respirators.
* If while wearing a half-mask or a full facepiece respirator, you can detect Methyl Ethyl Ketone, you are being exposed. Check that the respirator-to-face seal is good. If it is, you may need to change the filter, cartridge, or canister. If the seal is no longer good, you may need a new respirator.
* Because you may be potentially exposed to a mixture of chemicals or forms (vapor or mist, particulates) you may need a combination of filters, prefilters, cartridges, or canisters, to protect yourself.
* Where the potential for high exposures exists, use a MSHA/NIOSH approved supplied-air respirator with a full facepiece operated in the positive pressure mode or with a full facepiece, hood, or helmet in the continuous flow mode.
* Exposure to 3,000 ppm is immediately dangerous to life and health. If the possibility of exposures above 3,000 ppm exists use an MSHA/NIOSH approved self contained breathing apparatus with a full facepiece operated in continuous flow or other positive pressure mode.

HANDLING AND STORAGE

* Prior to working with Methyl Ethyl Ketone you should be trained on its proper handling and storage.
* Methyl Ethyl Ketone must be stored to avoid contact with STRONG OXIDIZERS (such as CHLORINE, BROMINE, and FLUORINE), since violent reactions occur.
* Store in tightly closed containers in a cool well-ventilated area away from HEAT, SPARKS, or FLAME.
* Sources of ignition such as smoking and open flames are prohibited where Methyl Ethyl Ketone is used, handled, or stored in a manner that could create a potential fire or explosion hazard.
* Metal containers involving the transfer of 5 gallons or more of Methyl Ethyl Ketone should be grounded and bonded. Drums must be equipped with self-closing valves, pressure vacuum bungs, and flame arresters.
* Use only non-sparking tools and equipment, especially when opening and closing containers of Methyl Ethyl Ketone.

QUESTIONS AND ANSWERS

Q: If I have acute health effects, will I later get chronic health effects?

A: Not always. Most chronic (long-term) effects result from repeated exposures to a chemical.

Q: Can I get long-term effects without ever having short-term effects?

A: Yes, because long-term effects can occur from repeated exposures to a chemical at levels not high enough to make you immediately sick.

Q: What are my chances of getting sick when I have been exposed to chemicals?

A: The likelihood of becoming sick from chemicals is increased as the amount of exposure increases. This is determined by the length of time someone is exposed and the amount of material they are exposed to.

Q: Is the risk of getting sick higher for workers than for community residents?

A: Yes. Exposures in the community, except possibly in cases of fires or spills, are usually much lower than those found in the workplace. However, people in the community may be exposed to contaminated water as well as to chemicals in the air over long periods. Because of this, and because of exposure of children or people who are already ill, community exposures may cause health problems.

Q: Are pregnant women at the greatest risk from reproductive hazards?

A: Not necessarily. Pregnant women are at greatest risk from chemicals which harm the developing fetus. However, chemicals may affect the ability to have children, so both men and women of child-bearing age are at high risk.

Q: Should I be concerned if a chemical is a teratogen in animals?

A: Yes. Although some chemicals may affect humans differently than they affect animals, damage to animals suggests that similar damage can occur in humans.

The following information is available from:

New Jersey State Department of Health
Occupational Disease Prevention and Information Program
CN 360
Trenton, NJ 08625
(609) 984-1863

Right to Know Information Resources

The Right to Know Hotline (609) 984-2202 can answer questions about the identity of chemicals, the preparation of the workplace surveys, education and training programs, labeling requirements, and general information regarding the Right to Know Act. Violations of the law should be reported to (609) 984-5627.

Public Presentations

Presentations and educational programs on occupational health or the Right to Know Act can be organized for labor unions or trade associations, and other groups.

General References

A list of educational materials in occupational health and references used to prepare the Fact Sheets are available upon request.

Industrial Hygiene Information and Surveys

Industrial hygienists are available to answer your questions regarding the health effects of chemical substances present in your workplace. In response to requests, a field investigation, including a walk-through, air monitoring, measurements of temperature and humidity, and evaluation of existing engineering controls, can be provided.

Medical Evaluation

If you think you are becoming sick because of exposure to chemicals at your workplace, you can call to make an appointment at the Occupational Health Clinic to be examined by our physicians. The only fees are for laboratory tests. The clinic is located at the Helene Fuld Medical Center in Trenton but we can refer you to another center if you cannot travel. In addition, if a large number of individuals need to be screened, a mobile screening van can be brought to your workplace for the examinations and testing.

DEFINITIONS

ACGIH is the American Conference of Governmental Industrial Hygienists. It recommends upper limits (called TLVs) for exposure to workplace chemicals.

CAG is the Carcinogens Assessment Group of the federal EPA.

A carcinogen is a substance that causes cancer.

The CAS number is assigned by the Chemical Abstracts Service to identify a specific chemical.

A combustible substance is a solid, liquid or gas that will burn.

A corrosive substance is a gas, liquid or solid that causes irreversible damage to human tissue or containers.

DEP is the New Jersey Department of Environmental Protection.

DOT is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

EPA is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

A fetus is an unborn human or animal.

A flammable substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The flash point is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

IARC is the International Agency for Research on Cancer, a scientific group that classifies chemicals according to their cancer-causing potential.

A miscible substance is a liquid or gas that will evenly dissolve in another.

mg/m^3 means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

MSHA is the Mine Safety and Health Administration, the federal agency that regulates mining. It also evaluates and approves respirators.

A mutagen is a substance that causes mutations. A mutation is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

NCI is the National Cancer Institute, a federal agency that determines the cancer-causing potential of chemicals.

NFPA is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

NIOSH is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

NTP is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

OSHA is the Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

ppm means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

A reactive substance is a solid, liquid or gas that can cause an explosion under certain conditions or on contact with other specific substances.

A teratogen is a substance that causes birth defects by damaging the fetus.

TLV is the Threshold Limit Value, the workplace exposure limit recommended by ACGIH.

The vapor pressure is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.

EMERGENCY INFORMATION

Common Name: METHYL ETHYL KETONE

DOT Number: UN 1193
NFPA Flammability: 3
NFPA Reactivity: 0

WARNING

FLAMMABLE LIQUID
POISONOUS GAS IS PRODUCED IN FIRE
CONTAINERS MAY EXPLODE IN FIRE
Health hazards on front page

FIRE HAZARDS

* Methyl Ethyl Ketone is a FLAMMABLE LIQUID.
* Use dry chemical, CO_2, or alcohol foam extinguishers. Water should be used to keep fire-exposed containers cool.
* POISONOUS GAS IS PRODUCED IN FIRE.
* CONTAINERS MAY EXPLODE IN FIRE.
* If employees are expected to fight fires, they must be trained and equipped as stated in OSHA 1910.156.

SPILLS AND EMERGENCIES

If Methyl Ethyl Ketone is spilled or leaked, take the following steps:

* Restrict persons not wearing protective equipment from area of spill or leak until cleanup is complete.
* Remove all ignition sources.
* Ventilate area of spill or leak.
* Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.
* Keep Methyl Ethyl Ketone out of a confined space, such as a sewer, because of the possibility of an explosion, unless the sewer is designed to prevent the build-up of explosive concentrations.
* It may be necessary to contain and dispose of Methyl Ethyl Ketone as a HAZARDOUS WASTE. Contact the NJ Department of Environmental Protection (DEP) or your regional office of the federal Environmental Protection Agency (EPA) for specific recommendations.

FOR LARGE SPILLS AND FIRES immediately call your local Fire Department. You can also request emergency information from the following:

DEP HOTLINE: (609) 292-7172
CHEMTREC: (800) 424-9300

FIRST AID

Eye Contact

* Immediately flush with large amounts of water for at least 15 minutes, occasionally lifting upper and lower lids. Seek medical attention.

Skin Contact

* Quickly remove contaminated clothing. Immediately wash area with large amounts of soap and water. Seek medical attention.

Breathing

* Remove the person from exposure.
* Begin rescue breathing if breathing has stopped and CPR if heart action has stopped.
* Transfer promptly to a medical facility.

NJ POISON INFORMATION 1-800-962-1253

PHYSICAL DATA

Vapor Pressure: 70.6 mm Hg at 68°F
Flash Point: 21°F
Water Solubility: Soluble

OTHER COMMONLY USED NAMES

Chemical Name: MEK; 2-Butanone
Other Names: Ethyl Methyl Ketone; Butanone

HANDLING AND STORAGE (See page 3.)

New Jersey Department of Health
CN 368 Trenton, NJ 08625
(609) 984-2202

Date prepared: August, 1985
Revision:
OES-16
AUG 84

New Jersey Department of Health

HAZARDOUS SUBSTANCE FACT SHEET

COMMON NAME: METHYL ALCOHOL

CAS NUMBER: 67-56-1 **DOT NUMBER:** UN 1230

HAZARD SUMMARY

* Methyl Alcohol can affect you when breathed in and by passing through your skin.
* Exposure can cause blindness.
* It may damage the liver.
* Exposure to high concentrations can cause headaches, nausea, vomiting and dizziness. It can cause death.
* Repeated or prolonged contact can cause dryness and cracking of the skin.
* Methyl Alcohol is a FLAMMABLE LIQUID and a FIRE HAZARD.

IDENTIFICATION

Methyl Alcohol is a colorless liquid with a strong odor. It is used as a solvent and cleaner.

REASON FOR CITATION

* Methyl Alcohol is on the Workplace Hazardous Substance List because it is regulated by OSHA.
* This chemical is also on the Special Health Hazard Substance List because it is FLAMMABLE.
* Definitions are provided on page 5.

WORKPLACE EXPOSURE LIMITS

OSHA: The legal airborne permissible exposure limit (PEL) is 200 ppm averaged over an 8-hour workshift.

NIOSH: The recommended airborne exposure limit is 200 ppm averaged over an 8-hour workshift and 800 ppm, not to be exceeded during any 15 minute work period.

ACGIH: The recommended airborne exposure limit is 200 ppm averaged over an 8-hour workshift and 250 ppm as a STEL (short term exposure limit).

* The above exposure limits are for air levels only. When skin contact also occurs, you may be overexposed, even though air levels are less than the limits listed above.

HOW TO DETERMINE IF YOU ARE BEING EXPOSED

* Exposure to hazardous substances should be routinely evaluated. This may include collecting air samples. Under OSHA 1910.20, you have a legal right to obtain copies of sampling results from your employer. If you think you are experiencing any work-related health problems, see a doctor trained to recognize occupational diseases. Take this Fact Sheet with you.
* ODOR THRESHOLD = 100 ppm.
* The odor threshold only serves as a warning of exposure. Not smelling it does not mean you are not being exposed.

WAYS OF REDUCING EXPOSURE

* Where possible, enclose operations and use local exhaust ventilation at the site of chemical release. If local exhaust ventilation or enclosure is not used, respirators should be worn.
* Wear protective work clothing.
* Wash thoroughly immediately after exposure to Methyl Alcohol and at the end of the workshift.
* Post hazard and warning information in the work area. In addition, as part of an ongoing education and training effort, communicate all information on the health and safety hazards of Methyl Alcohol to potentially exposed workers.

This Fact Sheet is a summary source of information for workers, employers, and community residents. Health professionals may also find it useful. If this substance is part of a mixture, this Fact Sheet should be used along with the manufacturer-supplied Material Safety Data Sheet (MSDS).

HEALTH HAZARD INFORMATION

Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to Methyl Alcohol:

* Contact may irritate the eyes, and exposure to high concentrations can irritate the eyes, nose, mouth, and throat.
* Breathing the vapor or absorbing the liquid through the skin can cause permanent blindness.
* Exposure to high concentrations can cause headaches, nausea, vomiting and dizziness. It can cause death.

Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to Methyl Alcohol and can last for months or years:

* It may damage the liver.
* Repeated or prolonged contact can cause dryness and cracking of the skin.

MEDICAL TESTING

If symptoms develop or overexposure is suspected, the following are recommended:

* Liver function tests
* Exam of the eyes and vision.

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are <u>not</u> a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under OSHA 1910.20.

WORKPLACE CONTROLS AND PRACTICES

Unless a less toxic chemical can be substituted for a hazardous substance, ENGINEERING CONTROLS are the most effective way of reducing exposure. The best protection is enclosing operations and/or providing local exhaust ventilation at the site of chemical release. Isolating operations can also reduce exposure. Using respirators or protective equipment is less effective than the controls mentioned above, but is sometimes necessary.

In evaluating the controls present in your workplace, consider: (1) how hazardous the substance is; (2) how much of the substance is released into the workplace, and (3) whether harmful skin or eye contact could occur. Better controls should be in place for highly toxic chemicals or when significant skin, eye, or breathing exposures are possible.

In addition, the following controls are recommended:

* Where possible, automatically pump liquid Methyl Alcohol from drums or other storage containers to process containers.
* Specific engineering controls are recommended for this chemical by NIOSH. Refer to the NIOSH criteria document on *Methyl Alcohol # 76-148*.

Good WORK PRACTICES can help to reduce hazardous exposures. The following work practices are recommended:

* Workers whose clothing has been contaminated by Methyl Alcohol should change into clean clothing promptly.
* If there is the possibility of skin exposure, emergency shower facilities should be provided.
* Wash any areas of the body that may have contacted Methyl Alcohol at the end of each work day, whether or not known skin contact has occurred.
* Do not eat, smoke, or drink where Methyl Alcohol is handled, processed, or stored, since the chemical can be swallowed. Wash hands carefully before eating or smoking.

PERSONAL PROTECTIVE EQUIPMENT

WORKPLACE CONTROLS ARE BETTER THAN PERSONAL PROTECTIVE EQUIPMENT. However, for some jobs (such as outside work, confined space entry, jobs done only once in a while, or jobs done while workplace controls are being installed), personal protective equipment may be appropriate.

The following recommendations are only guidelines and may not apply to every situation.

Clothing

* Avoid skin contact with Methyl Alcohol. Wear solvent-resistant gloves and clothing. Safety equipment suppliers/ manufacturers can provide recommendations on the most protective glove/ clothing material for your operation.
* All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.
* ACGIH recommends *Nitrile Rubber* or *VITON* as good to excellent protective materials.

Eye Protection

* Wear splash-proof chemical goggles and face shield when working with liquid, unless full facepiece respiratory protection is worn.

Respiratory Protection

IMPROPER USE OF RESPIRATORS IS DANGEROUS. Such equipment should only be used if the employer has a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing, and medical exams, as described in OSHA 1910.134.

* Where the potential exists for exposures over 200 ppm, use an MSHA/NIOSH approved supplied-air respirator with a full facepiece operated in the positive pressure mode or with a full facepiece, hood, or helmet in the continuous flow mode, or use an MSHA/NIOSH approved self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode.

HANDLING AND STORAGE

* Prior to working with Methyl Alcohol you should be trained on its proper handling and storage.
* Methyl Alcohol must be stored to avoid contact with STRONG OXIDIZERS (such as CHLORINE, BROMINE, and FLUORINE).
* Store in tightly closed containers in a cool well-ventilated area away from HEAT.
* Sources of ignition such as smoking and open flames are prohibited where Methyl Alcohol is handled, used, or stored.
* Metal containers involving the transfer of 5 gallons or more should be grounded and bonded. Drums must be equipped with self-closing valves, pressure vacuum bungs, and flame arresters.
* Use only non-sparking tools and equipment, especially when opening and closing containers of Methyl Alcohol.

QUESTIONS AND ANSWERS

Q: If I have acute health effects, will I later get chronic health effects?
A: Not always. Most chronic (long-term) effects result from repeated exposures to a chemical.

Q: Can I get long-term effects without ever having short-term effects?
A: Yes, because long-term effects can occur from repeated exposures to a chemical at levels not high enough to make you immediately sick.

Q: What are my chances of getting sick when I have been exposed to chemicals?
A: The likelihood of becoming sick from chemicals is increased as the amount of exposure increases. This is determined by the length of time someone is exposed and the amount of material they are exposed to.

Q: Is the risk of getting sick higher for workers than for community residents?
A: Yes. Exposures in the community, except possibly in cases of fires or spills, are usually much lower than those found in the workplace. However, people in the community may be exposed to contaminated water as well as to chemicals in the air over long periods. Because of this, and because

of exposure of children or people who are already ill, community exposures may cause health problems.

The following information is available from:

New Jersey State Department of Health
Occupational Disease Prevention and
Information Program
CN 360
Trenton, NJ 08625
(609) 984-1863

Right to Know Information Resources

The Right to Know Hotline (609) 984-2202 can answer questions about the identity of chemicals, the preparation of the workplace surveys, education and training programs, labeling requirements, and general information regarding the Right to Know Act. Violations of the law should be reported to (609) 984-5627.

Public Presentations

Presentations and educational programs on occupational health or the Right to Know Act can be organized for labor unions or trade associations, and other groups.

General References

A list of educational materials in occupational health and references used to prepare the Fact Sheets are available upon request.

Industrial Hygiene Information and Surveys

Industrial hygienists are available to answer your questions regarding the health effects of chemical substances present in your workplace. In response to requests, a field investigation, including a walk-through, air monitoring, measurements of temperature and humidity, and evaluation of existing engineering controls, can be provided.

Medical Evaluation

If you think you are becoming sick because of exposure to chemicals at your workplace, you can call to make an appointment at the Occupational Health Clinic to be examined by our physicians. The only fees are for laboratory tests. The clinic is located at the Helene Fuld Medical Center in Trenton but we can refer you to another center if you cannot travel. In addition, if a large number of individuals need to be screened, a mobile screening van can be brought to your workplace for the examinations and testing.

DEFINITIONS

ACGIH is the American Conference of Governmental Industrial Hygienists. It recommends upper limits (called TLVs) for exposure to workplace chemicals.

CAG is the Carcinogens Assessment Group of the federal EPA.

A carcinogen is a substance that causes cancer.

The CAS number is assigned by the Chemical Abstracts Service to identify a specific chemical.

A combustible substance is a solid, liquid or gas that will burn.

A corrosive substance is a gas, liquid or solid that causes irreversible damage to human tissue or containers.

DEP is the New Jersey Department of Environmental Protection.

DOT is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

EPA is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

A fetus is an unborn human or animal.

A flammable substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The flash point is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

IARC is the International Agency for Research on Cancer, a scientific group that classifies chemicals according to their cancer-causing potential.

A miscible substance is a liquid or gas that will evenly dissolve in another.

mg/m^3 means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

MSHA is the Mine Safety and Health Administration, the federal agency that regulates mining. It also evaluates and approves respirators.

A mutagen is a substance that causes mutations. A mutation is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

NCI is the National Cancer Institute, a federal agency that determines the cancer-causing potential of chemicals.

NFPA is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

NIOSH is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

NTP is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

OSHA is the Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

ppm means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

A reactive substance is a solid, liquid or gas that can cause an explosion under certain conditions or on contact with other specific substances.

A teratogen is a substance that causes birth defects by damaging the fetus.

TLV is the Threshold Limit Value, the workplace exposure limit recommended by ACGIH.

The vapor pressure is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.

EMERGENCY INFORMATION

Common Name: METHYL ALCOHOL

DOT Number: UN 1230
NFPA Flammability: 3
NFPA Reactivity: 0

WARNING

FLAMMABLE LIQUID
POISONOUS GASES ARE PRODUCED IN FIRE
Health hazards on front page

FIRE HAZARDS

* Methyl Alcohol is a FLAMMABLE LIQUID.
* Use dry chemical, CO_2, or alcohol foam extinguishers and water to keep fire exposed containers cool.
* POISONOUS GAS IS PRODUCED IN FIRE including FORMALDEHYDE.
* If employees are expected to fight fires, they must be trained and equipped as stated in OSHA 1910.156.

SPILLS AND EMERGENCIES

If Methyl Alcohol is spilled or leaked, take the following steps:

* Restrict persons not wearing protective equipment from area of spill or leak until cleanup is complete.
* Remove all ignition sources.
* Ventilate area of spill or leak.
* Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.
* Keep Methyl Alcohol out of a confined space, such as a sewer, because of the possibility of an explosion, unless the sewer is designed to prevent the build-up of explosive concentrations.
* It may be necessary to contain and dispose of Methyl Alcohol as a HAZARDOUS WASTE. Contact the NJ Department of Environmental Protection (DEP) or your regional office of the federal Environmental Protection Agency (EPA) for specific recommendations.

FOR LARGE SPILLS AND FIRES immediately call your local Fire Department. You can also request emergency information from the following:

DEP HOTLINE: (609) 292-7172
CHEMTREC: (800) 424-9300

HANDLING AND STORAGE (See page 3)

FIRST AID

Eye Contact
* Immediately flush with large amounts of water for at least 15 minutes, occasionally lifting upper and lower lids. Seek medical attention immediately.

Skin Contact
* Quickly remove contaminated clothing. Immediately wash area with large amounts of water. Seek medical attention.

Breathing
* Remove the person from exposure.
* Begin rescue breathing if breathing has stopped and CPR if heart action has stopped.
* Transfer promptly to a medical facility.

NJ POISON INFORMATION 1-800-962-1253

PHYSICAL DATA

Vapor Pressure: 97 mm Hg at 68°F
Flash Point: 52°F
Water Solubility: Miscible

OTHER COMMONLY USED NAMES

Chemical Name: Methanol
Other Names: Wood Alcohol; Carbinol; Methylol

New Jersey Department of Health
CN 368 Trenton, NJ 08625
(609) 984-2202

Date prepared: August, 1985
Revision:
OES-16
AUG 84

New Jersey Department of Health

HAZARDOUS SUBSTANCE FACT SHEET

COMMON NAME: METHYL CHLOROFORM

CAS NUMBER: 71-55-6 **DOT NUMBER:** UN 2831

DRAFT

HAZARD SUMMARY

* Methyl Chloroform can affect you when breathed in and by passing through your skin.
* It may cause mutations. Handle with extreme caution.
* Exposure can cause you to feel dizzy and lightheaded. Higher levels can cause unconsciousness, irregular heartbeat and death.
* Contact can irritate the skin and eyes.
* Prolonged contact can cause thickening and cracking of the skin.

IDENTIFICATION

Methyl Chloroform is a colorless liquid with a chloroform-like odor. It is used as a cleaning solvent.

REASON FOR CITATION

* Methyl Chloroform is on the Workplace Hazardous Substance List because it is regulated by OSHA and cited by ACGIH and NIOSH.
* Definitions are provided on page 5.

WORKPLACE EXPOSURE LIMITS

OSHA: The legal airborne permissible exposure limit (PEL) is 350 ppm averaged over an 8-hour workshift.

NIOSH: The recommended airborne exposure limit is 350 ppm, not to be exceeded during any 15 minute work period.

ACGIH: The recommended airborne exposure limit is 350 ppm averaged over an 8-hour workshift and 450 ppm as a STEL (short term exposure limit).

* The above exposure limits are for air levels only.
* Methyl Chloroform may cause mutations. All contact with this chemical should be reduced to the lowest possible level.

HOW TO DETERMINE IF YOU ARE BEING EXPOSED

* Exposure to hazardous substances should be routinely evaluated. This may include collecting air samples. Under OSHA 1910.20, you have a legal right to obtain copies of sampling results from your employer. If you think you are experiencing any work-related health problems, see a doctor trained to recognize occupational diseases. Take this Fact Sheet with you.
* ODOR THRESHOLD = 120 ppm.
* The odor threshold only serves as a warning of exposure. Not smelling it does not mean you are not being exposed.

WAYS OF REDUCING EXPOSURE

* Where possible, enclose operations and use local exhaust ventilation at the site of chemical release. If local exhaust ventilation or enclosure is not used, respirators should be worn.
* Wear protective work clothing.
* Wash thoroughly immediately after exposure to Methyl Chloroform.
* Post hazard and warning information in the work area. In addition, as part of an ongoing education and training effort, communicate all information on the health and safety hazards of Methyl Chloroform to potentially exposed workers.

This Fact Sheet is a summary source of information for workers, employers, and community residents. Health professionals may also find it useful. If this substance is part of a mixture, this Fact Sheet should be used along with the manufacturer-supplied Material Safety Data Sheet (MSDS).

HEALTH HAZARD INFORMATION

Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to Methyl Chloroform:

* Exposure can cause you to feel dizzy and lightheaded. Higher levels can cause unconsciousness, irregular heartbeat, and death.
* Contact can irritate the skin and eyes.

Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to Methyl Chloroform and can last for months or years:

Cancer Hazard

* Methyl Chloroform may cause mutations (genetic changes) in living cells. Whether or not it poses a cancer or reproductive hazard needs further study.

Other Long-Term Effects

* High exposures may damage the liver and kidneys.
* Prolonged contact can cause thickening and cracking of the skin.

MEDICAL

Medical Testing

If symptoms develop or overexposure is suspected, the following may be useful:

* Liver function tests.

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are <u>not</u> a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under OSHA 1910.20.

Conditions Made Worse By Exposure

* Persons with heart disease may be at an increased risk of irregular heartbeat from very high exposures.

WORKPLACE CONTROLS AND PRACTICES

Unless a less toxic chemical can be substituted for a hazardous substance, ENGINEERING CONTROLS are the most effective way of reducing exposure. The best protection is enclosing operations and/or providing local exhaust ventilation at the site of chemical release. Isolating operations can also reduce exposure. Using respirators or protective equipment is less effective than the controls mentioned above, but is sometimes necessary.

In evaluating the controls present in your workplace, consider: (1) how hazardous the substance is; (2) how much of the substance is released into the workplace, and (3) whether harmful skin or eye contact could occur. Better controls should be in place for highly toxic chemicals or when significant skin, eye, or breathing exposures are possible.

In addition, the following controls are recommended:

* Where possible, automatically pump liquid Methyl Chloroform from drums or other storage containers to process containers.
* Specific engineering controls are recommended for this chemical by NIOSH. Refer to the NIOSH criteria document: *1,1,1-Trichloroethane #76-184*.

Good WORK PRACTICES can help to reduce hazardous exposures. The following work practices are recommended:

* Workers whose clothing has been contaminated by Methyl Chloroform should change into clean clothing promptly.

* Contaminated work clothes should be laundered by individuals who have been informed of the hazards of exposure to Methyl Chloroform.
* On skin contact with Methyl Chloroform, immediately wash or shower to remove the chemical.
* Do not eat, smoke, or drink where Methyl Chloroform is handled, processed, or stored, since the chemical can be swallowed. Wash hands carefully before eating or smoking.
* Do not smoke in the work area. Even a little vapor inhaled through a burning cigarette, cigar, or pipe will be converted into more highly toxic substances.

PERSONAL PROTECTIVE EQUIPMENT

WORKPLACE CONTROLS ARE BETTER THAN PERSONAL PROTECTIVE EQUIPMENT. However, for some jobs (such as outside work, confined space entry, jobs done only once in a while, or jobs done while workplace controls are being installed), personal protective equipment may be appropriate.

The following recommendations are only guidelines and may not apply to every situation.

Clothing

* Avoid skin contact with Methyl Chloroform. Wear solvent-resistant gloves and clothing. Safety equipment suppliers/manufacturers can provide recommendations on the most protective glove/clothing material for your operation.
* Avoid skin contact with Methyl Chloroform. Wear acid-resistant gloves and clothing. Safety equipment suppliers/manufacturers can provide recommendations on the most protective glove/clothing material for your operation.
* ACGIH recommends *Polyvinyl Alcohol*, *Neoprene* or *Leather* as good to excellent protective materials.

Respiratory Protection

IMPROPER USE OF RESPIRATORS IS DANGEROUS. Such equipment should only be used if the employer has a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing, and medical exams, as described in OSHA 1910.134.

* Where the potential exists for exposures over 200 ppm, use an MSHA/NIOSH approved full facepiece respirator with an organic vapor cartridge/canister. Increased protection is obtained from full facepiece powered air purifying respirators.
* If while wearing a filter, cartridge or canister respirator, you can smell, taste, or otherwise detect Methyl Chloroform, or in the case of a full facepiece respirator you experience eye irritation, leave the area immediately. Check to make sure the respirator-to-face seal is still good. If it is, replace the filter, cartridge, or canister. If the seal is no longer good, you may need a new respirator.
* Be sure to consider all potential exposures in your workplace. You may need a combination of filters, prefilters, cartridges, or canisters, to protect against different forms of a chemical (such as vapor and mist) or against a mixture of chemicals.
* Where the potential for high exposures exists, use a MSHA/NIOSH approved supplied-air respirator with a full facepiece operated in the positive pressure mode or with a full facepiece, hood, or helmet in the continuous flow mode.
* Exposure to 1,000 ppm is immediately dangerous to life and health. If the possibility of exposures above 1,000 ppm exists use an MSHA/NIOSH approved self contained breathing apparatus with a full facepiece operated in continuous flow or other positive pressure mode.

QUESTIONS AND ANSWERS

Q: If I have acute health effects, will I later get chronic health effects?
A: Not always. Most chronic (long-term) effects result from repeated exposures to a chemical.

Q: Can I get long-term effects without ever having short-term effects?
A: Yes, because long-term effects can occur from repeated exposures to a chem-

ical at levels not high enough to make you immediately sick.

Q: What are my chances of getting sick when I have been exposed to chemicals?
A: The likelihood of becoming sick from chemicals is increased as the amount of exposure increases. This is determined by the length of time someone is exposed and the amount of material they are exposed to.

Q: Is the risk of getting sick higher for workers than for community residents?
A: Yes. Exposures in the community, except possibly in cases of fires or spills, are usually much lower than those found in the workplace. However, people in the community may be exposed to contaminated water as well as to chemicals in the air over long periods. Because of this, and because of exposure of children or people who are already ill, community exposures may cause health problems.

Q: When are higher exposures most likely?
A: Conditions which increase risk of overexposure include dust-releasing operations (grinding, mixing, blasting, dumping, etc.), heating, large surface areas of chemicals which are able to evaporate (large open containers, spills, pouring, spraying, etc.) and "confined space" exposures (working inside vats, reactors, boilers, small rooms, etc.).

Q: Don't all chemicals cause cancer?
A: No. Most chemicals tested by scientists are not cancer-causing.

DRAFT

The following information is available from:

New Jersey State Department of Health
Occupational Disease Prevention and
Information Program
CN 360
Trenton, NJ 08625
(609) 984-1863

Right to Know Information Resources

The Right to Know Hotline (609) 984-2202 can answer questions about the identity of chemicals, the preparation of the workplace surveys, education and training programs, labeling requirements, and general information regarding the Right to Know Act. Violations of the law should be reported to (609) 984-5627.

Public Presentations

Presentations and educational programs on occupational health or the Right to Know Act can be organized for labor unions or trade associations, and other groups.

General References

A list of educational materials in occupational health and references used to prepare the Fact Sheets are available upon request.

Industrial Hygiene Information and Surveys

Industrial hygienists are available to answer your questions regarding the health effects of chemical substances present in your workplace. In response to requests, a field investigation, including a walk-through, air monitoring, measurements of temperature and humidity, and evaluation of existing engineering controls, can be provided.

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The flash point is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

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A miscible substance is a liquid or gas that will evenly dissolve in another.

mg/m^3 means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

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NFPA is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

NIOSH is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

NTP is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

OSHA is the Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

ppm means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

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A teratogen is a substance that causes birth defects by damaging the fetus.

TLV is the Threshold Limit Value, the workplace exposure limit recommended by ACGIH.

The vapor pressure is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.

EMERGENCY INFORMATION

Common Name: METHYL CHLOROFORM

DOT Number: UN 2831
NFPA Flammability: No Citation
NFPA Reactivity: No Citation

WARNING

POISONOUS GAS IS PRODUCED IN FIRE
CONTAINERS MAY EXPLODE IN FIRE
Health hazards on front page

FIRE HAZARDS

* Methyl Chloroform is a non-combustible liquid.
* Extinguish fire using an agent suitable for type of surrounding fire. Methyl Chloroform itself does not burn.
* Water can be used to keep fire-exposed containers cool.
* POISONOUS GAS IS PRODUCED IN FIRE.
* CONTAINERS MAY EXPLODE IN FIRE.
* If employees are expected to fight fires, they must be trained and equipped as stated in OSHA 1910.156.

SPILLS AND EMERGENCIES

If Methyl Chloroform is spilled or leaked, take the following steps:

* Restrict persons not wearing protective equipment from area of spill or leak until cleanup is complete.
* Ventilate area of spill or leak.
* Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.
* It may be necessary to contain and dispose of Methyl Chloroform as a HAZARDOUS WASTE. Contact the NJ Department of Environmental Protection (DEP) or your regional office of the federal Environmental Protection Agency (EPA) for specific recommendations.

FOR LARGE SPILLS AND FIRES immediately call your local Fire Department. You can also request emergency information from the following:

DEP HOTLINE: (609) 292-7172
CHEMTREC: (800) 424-9300

HANDLING AND STORAGE

* Prior to working with Methyl Chloroform you should be trained on its proper handling and storage.
* Methyl Chloroform must be stored to avoid contact with STRONG CAUSTICS, such as SODIUM and POTASSIUM HYDROXIDE; ACETONE; STRONG OXIDIZERS, such as CHLORINE, CHLORINE DIOXIDE, and BROMINE; CHEMICALLY ACTIVE METALS, such as POTASSIUM, ALUMINUM, ZINC, and MAGNESIUM, since violent reactions occur.
* Do not allow vapor near sources of ultraviolet light (such as arc welding) because poisonous gases may be produced.
* Store in tightly closed containers in a cool well-ventilated area away from HEAT and MOISTURE. DO NOT USE ALUMINUM CONTAINERS.

FIRST AID

Eye Contact
* Immediately flush with large amounts of water for at least 15 minutes, occasionally lifting upper and lower lids.

Skin Contact
* Remove contaminated clothing. Wash contaminated skin with soap and water.

Breathing
* Remove the person from exposure.
* Begin rescue breathing if breathing has stopped and CPR if heart action has stopped.
* Transfer promptly to a medical facility.

NJ POISON INFORMATION 1-800-962-1253

PHYSICAL DATA

Vapor Pressure: 100 mm Hg at 68°F
Water Solubility: Slightly Soluble

OTHER COMMONLY USED NAMES

Chemical Name: Ethane, 1,1,1-Trichloro
Other Names: Chlorothene NU; Chlorothene VG; Methyltrichloromethane

New Jersey Department of Health
CN 368 Trenton, NJ 08625
(609) 984-2202

Date prepared:
Revision:
OES-16
AUG 84

Appendix III

Appendix A to the OSHA Lead Standard

APPENDIX A TO SECTION 1910.1025--SUBSTANCE

DATA SHEET FOR OCCUPATIONAL EXPOSURE TO LEAD

I. SUBSTANCE IDENTIFICATION

A. Substance: Pure lead (Pb) is a heavy metal at room temperature and pressure and is a basic chemical element. It can combine with various other substances to form numerous lead compounds.

B. Compounds Covered by the Standard: The word "lead" when used in this standard means elemental lead, all inorganic lead compounds are a class of organic lead compounds called lead soaps. This standard does not apply to other organic lead compounds.

C. Uses: Exposure to lead occurs in at least 120 different occupations, including primary and secondary lead smelting, lead storage battery manufacturing, lead pigment manufacturing and use, solder manufacturing and use, shipbuilding and ship repairing, auto manufacturing, and printing.

D. Permissible Exposure: The Permissible Exposure Limit (PEL) set by the standard is 50 micrograms of lead per cubic meter of air (50 ug/m), time weighted average, based on an 8-hour work-day.

E. Action Level: The standard establishes an action level of 30 micograms per cubic meter of air (30 ug/m), time weighted average, based on an 8-hour work-day. The action level initiates several requirements of the standard, such as exposure monitoring, medical surveillance, and training and education.

II. HEALTH HAZARD DATA

A. Ways in which lead enters your body. When absorbed into your body in certain doses lead is a toxic substance. The object of the lead standard is to prevent absorption of harmful quantities of lead. The standard is intended to protect you not only from the immediate toxic effects of lead, but also from the serious toxic effects that may not become apparent until years of exposure have passed.

Lead can be absorbed into your body by inhalation (breathing) and ingestion (eating). Lead (except for certain organic lead compounds not covered by the standard, such as tetraethyl lead) is not absorbed through your skin. When lead is scattered in the air as a dust, fume or mist it can be inhaled and absorbed through your lungs and upper respiratory tract. Inhalation of airborne lead is generally the most important source of occupational lead absorption. You can also absorb lead through your digestive system if lead gets into your mouth and is swallowed. If you handle food, cigarettes, chewing tobacco, or make-up which have lead on them or handle them with hands contaminated with lead, this will contribute to ingestion.

A significant portion of the lead that you inhale or ingest gets into your blood stream. Once in your blood stream, lead is circulated throughout your body and stored in various organs and body tissues. Some of this lead is quickly filtered out of your body and excreted, but some remains in the blood and other tissues. As exposure to lead continues, the amount stored in your body will increase if you are absorbing more lead than your body is excreting. Even though you may not be aware of any immediate symptoms of disease, this lead stored in your tissues can be slowly causing irreversible damage, first to individual cells, then to your organs and whole body systems.

with the onset of seizures, followed by coma and death. There is a tendency for muscular weakness to develop at the same time. This weakness may progress to paralysis often observed as a characteristic "wrist drop" or foot drop" and is a manifestation of a disease to the nervous system called peripheral neuropathy.

Chronic overexposure to lead also results in kidney disease with few, if any, symptoms appearing until extensive and most likely permanent kidney damage has occurred. Routine laboratory tests reveal the presence of this kidney disease only after about two-thirds of kidney function is lost. When overt symptoms of urinary dysfunction arise, it is often too late to correct or prevent worsening conditions, and progression to kidney dialysis or death is possible.

Chronic overexposure to lead impairs the reproductive systems of both men and women. Overexposure to lead may result in decreased sex drive, impotance and sterility in men. Lead can alter the structure of sperm cells raising the risk of birth defects. There is evidence of miscarriage and stillbirth in women whose husbands were exposed to lead or who were exposed to lead themselves. Lead exposure also may result in decreased fertility and abnormal menstrual cycles in women. The course of pregnancy may be adversely affected by exposure to lead since lead crosses the placental barrier and poses risks to developing fetuses. Children born of parents either one of whom were exposed to excess lead levels are more likely to have birth defects, mental retardation, behavioral disorders or to die during the first year of childhood.

B. Effects of overexposure to lead--(1) Short term (acute) overexposure. Lead is a potent, systemic poison that serves no known useful function once absorbed by your body. Taken in large enough doses, lead can kill you in a matter of days. A condition affecting the brain called acute encephalopathy may arise which develops quickly to seizures, coma, and death from cardio-respiratory arrest. A short term dose of lead can lead to acute encephal-opathy. Short term occupational exposures of this magnitude are highly unusual, but not impossible. Similar forms of encephalopathy may, however, arise from extended, chronic exposure to lower doses of lead. There is no sharp dividing line between rapidly developing acute effects of lead, and chronic effects which take longer to acquire. Lead adversely affects numberous body ststems, and causes forms of health impairment and disease which arise after periods of exposure as short as days or as long as several years.

(2) Long-term (chronic) overexposure. Chronic overexposure to lead may result in severe damage to your blood-forming, nervous, urinary and repro-ductive systems. Some common symptoms of chronic overexposure include loss of appetite, metallic taste in the mouth, anxiety, constipation, nausea, pallor, excessive tiredness, weakness, insomnia, headache, nervous irritability, muscle and joint pain or soreness, fine tremors, numbness, dizziness, hyperactivity and colic. In lead colic there may be severe abdominal pain.

Damage to the central nervous system in general and the brain (encephal-opathy) in particular is one of the most severe forms of lead poisoning. The most severe, often fatal, form of encephalopathy may be preceded by vomiting, a feeling of dullness progressing to drowsiness and stupor, poor memory, restlessness, irritability, tremor, and convulsions. It may arise suddenly

diseases. As a result, your PbB is an important indicator of the likelihood that your will gradually acquire a lead-related health impairment or disease.

Once your blood lead levels climbs above 40 ug/100g, your risk of disease increases. There is a wide variability of individual response to lead, thus it is difficult to say that a particular PbB in a given person will cause a particular effect. Studies have associated fatal encephalopathy with PbBs as low as 150 ug/100g. Other studies have shown other forms of diseases in some workers with PbBs well below 80 ug/100g. Your PbB is a crucial indicator of the risks to your health, but one other factor is also extremely important. This factor is the length of time you have had elevated PbBs. The longer you have an elevated PbB, the greater the risk that large quantities of lead are being gradually stored in your organs and tissues (body burden). The greater your overall body burden, the greater the chances of substantial permanent damage.

The best way to prevent all forms of lead-related impairments and diseases--both short term and long term is to maintain your PbB below 40 ug/100g. The provisions of the standard are designed with this end in mind. Your employer has prime responsibility to assure that the provisions of the standard are complied with both by the company and by individual workers. You as a worker, however, also have a responsibility to assist your employer in complying with the standard. Your can play a key role in protecting your own health by learning about the lead hazards and their control, learning what the standard requires, following the standard where it governs your own actions, and seeing that your employer complies with provisions governing his actions.

Overexposure to lead also disrupts the blood-forming system resulting in decreased hemoglobin (the substance in the blood that carries oxygen to the cells) and ultimately anemia. Anemia is characterized by weakness, pallor and fatigability as a result of decreased oxygen carrying capacity in the blood.

(3) Health protection goals of the standard. Prevention of adverse health effects for most workers from exposure to lead throughout a working lifetime requires that worker blood lead (PbB) levels be maintained at or below forty micrograms per one hundred grams of whole blood (40 ug/100g). The blood lead levels of workers (both male and female workers) who intend to have children should be maintained below 30 ug/100g to minimize adverse reproductive health effects the parents and to the developing fetus.

The measurement of your blood lead level is the most useful indicator of the amount of lead being absorbed by your body. Blood lead levels (PbB) are most often reported in units of milligrams (mg) or micrograms (ug) of lead (1 mg = 1000 ug) per 100 grams (100g), 100 milliters (100 ml) or deciliter (dl) of blood. These three units are essentially the same. Sometimes PbB's are expressed in the form of mg% or ug%. This is a shorthand notation for mg or ug per 100g.

PbB measurements show the amount of lead circulating in your blood steam, but do not give any information about the amount of lead stored in your various tissues. PbB measurements merely show current adsorption of lead, not the effect that lead is having on your body or the effects that past lead exposure may have already caused. Past research into lead-related diseases, however, has focused heavily on associations between PbBs and various