

February 21, 1991

File
PASADENA

FEDERAL EXPRESS DELIVERY

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Dear Dave:

Enclosed is our draft report, *Audit of the Industrial Hygiene Programs at the Occidental Chemical Corporation PVC Resins Plant, Pasadena, Texas*. Please review the report and provide any comments to me so that we may finalize and release the report.

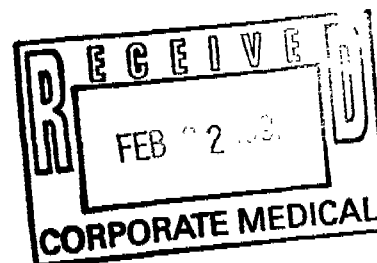
Thank you for your assistance.

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Sincerely,


Edward A. Guida, PE, CIH
Manager, Occupational Health Services
RiskFocus®, Virginia Office

Enclosure



OCC 10376

AUDIT REPORT - PRIVILEGED & CONFIDENTIAL

**AUDIT OF THE INDUSTRIAL HYGIENE
PROGRAMS AT THE
OCCIDENTAL CHEMICAL CORPORATION
PVC RESINS PLANT,
PASADENA, TEXAS**

**Prepared for
Corporate Industrial Hygiene
Occidental Chemical Corporation
360 Rainbow Boulevard South, Box 728
Niagara Falls, NY 14302**

**Prepared by

RiskFocus®
VERSAR Inc.
Springfield, Virginia**

February 1991

Foreword

This report was prepared under the management and supervision of the **RiskFocus** Division of VERSAR Inc., located in the Washington, D.C. metropolitan area. **RiskFocus** provides comprehensive *stewardship* for product integrity and registration, worker safety, waste disposal, regulatory interpretation and compliance, and risk communication.

Authorship of this report is credited to Edward A. Guida, PE, CIH. Quality assurance is credited to Robert G. Tardiff. Further information about this report may be obtained by writing directly to the Director, **RiskFocus** Division, or by calling (703) 642-6884.

Robert G. Tardiff, Ph.D., ATS
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Contents

Foreword	i
I. Executive Summary	1
II. Introduction	4
III. Findings and Discussion	6
A. OSHA Vinyl Chloride Standard Requirements	6
1. Employee Exposure Monitoring	7
2. Medical Monitoring	8
B. Hazard Communication	9
1. Hazardous Material Information System (HMIS)	10
2. MSDSs	10
3. Training	10
4. Hazardous Chemical Inventory	10
5. Hazards of Non-Routine Tasks	11
6. Contractor Policy	11
7. Hazard Evaluation System	11
D. Facial Hair Policy	13
E. Compressed Breathing Air Quality	13
F. Confined Space Entry	13
G. New Process Review	14
H. Radiation Safety	14
I. Equipment Calibration	15
J. General Safety Practices	16
K. Hearing Conservation	17
L. Safety Meeting Minutes	18
M. Emergency Brigade Procedures	18
IV. Conclusions and Recommendations	19
A. OSHA Vinyl Chloride Standard Requirements	19
B. Hazards Communication (HazCom)	20
C. Respiratory Protection	21
D. Compressed Breathing Air Quality	22
E. Confined Space Entry	22
F. Radiation Safety	22
G. IH Equipment Calibration	23
H. General Safety Practices	23
I. Hearing Conservation	23
V. References	24
APPENDICES	25

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**Audit of the Industrial Hygiene Programs
at the
Occidental Chemical Corporation
PVC Resins Plant,
Pasadena, Texas**

I. Executive Summary

RiskFocus accomplished an audit of the industrial hygiene (IH) programs at the Occidental Chemical Corporation (OxyChem) PVC Resins Plant, Pasadena, Texas, during the week of December 10, 1990. The purpose of this audit was to identify areas of improvement in existing IH programs, and not to duplicate an OSHA Voluntary Protection Programs (VPP) audit conducted in November 1990. OSHA had determined that the Pasadena Plant IH programs met regulatory requirements. However, documentation was incomplete in some programs, and some minor administrative flaws existed in a few programs.

Generally, the IH programs were good, high quality programs. The programs exceeded OSHA minimum compliance requirements. Employees were observed to be as supportive and aggressive about plant safety and health as management. The OSHA VPP does not require meticulous program documentation when safety and

health program effectiveness can be determined through a program audit and employee interviews.

This audit consisted of a review of the OSHA Vinyl Chloride Standard requirements, the Pasadena Plant Safety Manual, the Hazards Communication Manual, and the Guidelines for Managing Contractor Safety. The Manager - Safety, Security, and Loss Prevention, was interviewed to obtain information on unwritten safety and health practices. ~~The written procedures were extensive but incomplete.~~

^{ALTHOUGH SOME} Where written procedures were absent, the safety and health practices appeared to be effective. However, without adequate documentation, the success of unwritten programs cannot be assured in the absence of the managers responsible for implementing the programs.

*Take out
or make
a new PP
about this
statement.*

The OSHA Vinyl Chloride standard was being implemented in several programs conducted at the Pasadena Plant. Employee exposure monitoring was being accomplished according to a schedule established by Tenneco (the previous owner of the plant), and the schedule is periodically reviewed for currency according to personal air sampling data records. The medical monitoring program was designed by the Mayo Clinic, and the content of medical monitoring includes the OSHA requirements plus other medical tests to monitor employee health. Documentation for both the exposure and medical monitoring programs was noteworthy, and appropriate reporting was accomplished.

New process review and hazard evaluation procedures are outstanding. Procedures are described in both the Hazards Communication manual and the Safety Manual. The checklists for new process review in the Safety Manual are extremely comprehensive, and provide the basis to identify potential safety and health problems and possible solutions should such problems surface.

Minor administrative flaws existed in the Hazards Communication manual. Written procedures were not available at the time of the audit for hearing conservation and compressed breathing air quality despite the fact that Corporate IH had distributed the corporate procedures at a regional meeting of OxyChem industrial hygienists about a month earlier. *These documents were forwarded to the plant upon this discovery.*

The following recommendations are provided to improve the affected programs:

- As a quality assurance measure, collect duplicate or split personal air samples for vinyl chloride monomer analysis at an AIHA-accredited laboratory; +
- Establish a procedure to annually, or as required when new OSHA regulations are issued, review the Hazards Communication manual to ensure its currency; such reviews should be documented; +
- Prepare standard operating procedures to select respirators, train respirator wearers, monitor work places where respirators are worn, fit-test respirators, and provide quality assurance in the respiratory protection program; +
- Review the minimum self-contained-breathing-apparatus (SCBA) minimum tank pressure. The minimum pressure should be increased from 1500 psig to 1800 psig; ~
- For rescue contingency, establish minimum levels of personal protection for watch personnel who must enter confined spaces; +
- Establish and document the calibration frequency for the oxygen/explosivity meters; and +
- Establish and document the procedure to select chemical protective gloves. +

II. Introduction

At the request of OxyChem's Corporate Industrial Hygiene (IH), **RiskFocus** was retained to accomplish an audit of the IH programs at the OxyChem's PVC Resins Plant, Pasadena, Texas, during the week of December 10, 1990. Corporate IH desired an independent, comprehensive review of the Pasadena Plant IH programs to assess the overall quality of the programs to determine their possible use as models at other OxyChem plants developing their IH programs.

The following 13 IH programs were audited:

- Compressed Breathing Air Quality;
- Confined Space Entry;
- Emergency Brigade Procedures;
- Equipment Calibration;
- Facial Hair Policy;
- General Safety Practices;
- Hazard Communication;

- Hearing Conservation;
- New Process Review;
- OSHA Vinyl Chloride Standard Requirements:
 - Medical Monitoring,
 - Employee Exposure Monitoring,
 - Employee Notification;
- Radiation Safety;
- Respiratory Protection; and
- Safety Meeting Minutes.

The purpose of this audit was to identify areas of improvement in existing IH programs. The goal of the audit was not to duplicate an OSHA Voluntary Protection Programs (VPP) audit conducted in November 1990, but to compliment the OSHA audit. OSHA determined that compliance with its regulations was evident. The Manager - Safety, Security, and Loss Prevention (Safety Manger), was consulted to clarify industrial hygiene activities in written programs, and to describe those activities for which written programs were absent at the time of the audit.

*This is
a better
statement
than TP or
abstract.*

This report contains the results of the audit of the Pasadena Plant IH Programs. Individual programs are discussed in Section III, Findings and Discussion. Where program inadequacies were found, regulatory requirements and improvement options are identified. Conclusions regarding program quality, recommended IH program amendments, and additional program needs are provided in Section IV, Conclusions and Recommendations. The appendices to this report contain copies of the Pasadena Plant employee exposure monitoring notification form and the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

III. Findings and Discussion

Generally, the IH Programs were good, high quality programs. The programs exceeded OSHA minimum compliance requirements. The employees were observed to be as supportive and aggressive about plant safety and health as management. Not all IH Programs were described in writing and there were some minor administrative flaws in other programs. (The OSHA VPP does not require meticulous program documentation when safety and health program effectiveness can be determined through a program audit and employee interviews.) The following comments will discuss the individual programs audited, their attributes and regulatory basis, and, based on regulatory need and sound IH practice, where improvements would be beneficial.

Good!

A. OSHA Vinyl Chloride Standard Requirements

The Pasadena PVC Plant uses vinyl chloride monomer (VCM) in the production of the PVC resins. OSHA issued the VCM standard in October 4, 1974, as amended in May 23, 1980, in 29 CFR 1910.1017. This standard includes the OSHA requirements to limit employee airborne exposure to vinyl chloride to the established

PEL and STEL, limiting direct contact with VCM, monitoring the work place, reducing overexposure of specific employees by appropriate means, providing protective equipment for hazardous operations, planning for emergency operations, training workers in the potential hazards of VCM and protective procedures, providing medical surveillance to all employees exposed above the action level, posting signs at areas where VCM is being used, putting labels on VCM containers and vessels, and generating and maintaining records and reports of such operations. The provisions of this standard are being followed in several safety and health programs established at the Pasadena Plant.

1. Employee Exposure Monitoring

Personal monitoring of airborne VCM levels is accomplished monthly using the Reiszner diffusion monitor. A Quality Control (QC) and Environmental Laboratory technician, trained in IH techniques by NATLSCO, accomplished the monitoring and the laboratory analysis of the diffusion monitors. A previous audit of the monitoring program indicated that the Reiszner diffusion monitor provides the accuracy required for the Vinyl Chloride Standard.¹

The Reiszner monitor uses activated charcoal in a single chamber to adsorb vinyl chloride. The compound is desorbed from the charcoal with carbon disulfide, and the samples are analyzed using a Gas Chromatograph with a Flame Ionization Detector. All semi-permeable membrane calibrations are accomplished according to a schedule established by the Reiszner Environmental Analytical Laboratory (REAL) (the developer of the monitor), and all monitoring records are maintained in the QC and Environmental Laboratory. In fact, the same monitors are returned by REAL to maintain a "running calibration" record on each monitor.

¹ OxyChem Environment and Safety Memo from J. W. Swanson to M. W. Handler, Draft Industrial Hygiene Assessment, September 29-30, 1986, dated December 8, 1986.

The employee monitoring schedule was established by Tenneco Chemicals, Inc., the previous owner of the Pasadena Plant. Based on current results, the monitoring plan is unchanged. The IH technician selects those employees with the greatest opportunity for potential exposure to VCM for monitoring. Results are reviewed to confirm the selection of employees.

Air samples are analyzed at the Pasadena Plant QC and Environmental Laboratory, a facility not accredited by the American Industrial Hygiene Association (AIHA) to analyze IH samples. No QA program is in place to duplicate or split samples for analysis at an AIHA accredited laboratory for confirmation of the quality of air sample data generated at the Pasadena Plant. QA is extremely important in ensuring the quality and validity of Industrial Hygiene samples. Therefore, collecting duplicate or split samples for analysis by an AIHA accredited laboratory (e.g., NATLSCO) is prudent and an accepted QA procedure.

All employee monitoring documentation is maintained at the QC and Environmental Laboratory. The IH technician annually prepares and maintains tables of air sample results exceeding the PEL. Monitoring results are reported to employees using a locally generated form. Copies of the reports are forwarded to the appropriate plant managers as listed on the distribution list on the form itself (see copy of the form in the Appendix A to this report).

2. Medical Monitoring

The medical monitoring of employees for possible vinyl chloride exposure is accomplished in accordance with the OSHA Vinyl Chloride Standard using protocols developed for OxyChem by the Mayo Clinic. All program documents and data management procedures have been provided by the Mayo Clinic. The Mayo Clinic data-base generates the reports for distribution to employees and for retention in the Pasadena Plant Medical Department.

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Leave this section w/ VCM, but make a "Medical Monitoring" section out of the following 2 pp.
~~It is the section "C" since this was left off the TOC.~~

Medical monitoring at the Pasadena Plant also includes spirometry, audiometry, chest X-rays, electrocardiograms (EKGs), blood pressure screening, and vision screening. The scope of this medical monitoring program is limited to full-time OxyChem employees. Management of the contract employees has been provided a copy of the medical monitoring protocols used by the Pasadena Plant. The Pasadena Plant occupational health nurse reported that the contract employees are given equivalent medical monitoring by a commercial occupational medicine service.

The spirometer, audiometer and hearing test room, and blood pressure device are maintained according to Mayo Clinic procedures, and are calibrated daily. The audiometer is calibrated annually at the Mayo Clinic, and the audiometer test room is calibrated annually by a consultant. Calibration records are maintained in the Medical Department. Records of maintenance, repair, and equipment replacement are also maintained in the Medical Department.

B. Hazard Communication

The hazard communication program (HazCom) is well documented, and the HazCom manual is comprehensive. The basic text for each section is dated in 1985, and some sections have supplementary procedures dated in 1987. No documented evidence demonstrates that the HazCom program has been reviewed and updated since 1987. Some editing is needed to correct some exhibit designations and page numbers. The HazCom manual appendix, which contains the OSHA HazCom standard (29 CFR 1910.1200), was out of date. A current copy of the standard is enclosed at Appendix B to this report. *and can be substituted into the Pasadena Haz Com Proc.*

The HazCom program includes the hazardous material information system (HMIS), maintenance of material safety data sheets (MSDSs), employee training,

hazardous chemical inventory, hazard assessment of non-routine tasks, contractor policy regarding safe operations, and a hazard evaluation system.

1. Hazardous Material Information System (HMIS)

The HMIS is used to communicate personal protection requirements to employees. Material is labelled with potential hazard information and the personal protection code. HMIS charts showing the protection codes and the corresponding protective equipment requirements are posted throughout the plant. Employees are also issued HMIS wallet cards, which contain the same information as the charts, for ready reference. Replacement wallet cards are provided to employees as needed.

2. MSDSs

MSDSs are maintained on chemicals used in the plant, and MSDSs are prepared by a consultant for products shipped from the plant. The plant also uses the Corporate MSDS Management Computer System which has been operational since 1986. Hazard information on chemicals is readily available for immediate reference when the need arises.

3. Training

Employees are given multi-media initial training on the potential hazards of their work, the safety equipment, and safety procedures. Refresher training is provided as needed, and during the "tool box" safety meetings. A supplementary information handout is available for interpreting the toxicity section of the MSDS.

4. Hazardous Chemical Inventory

A hazardous chemical inventory is maintained. It is reviewed and updated annually, as necessary. The inventory is not dated, but verbal assurances were given that it was current. An MSDS is maintained on each chemical on this inventory.

5. Hazards of Non-Routine Tasks

Standard operating procedures (SOPs) have been prepared for known non-routine tasks. Employees assigned to non-routine tasks are briefed by their supervisor on the potential hazards of the task and safe task accomplishment.

6. Contractor Policy

if this includes chemical exposure, then how about proposing some air sampling

The Pasadena Plant uses the OxyChem "Guidelines for Managing Contractor Safety." Potential hazards and health and safety procedures are verbally communicated to contractors. These briefings are documented.

7. Hazard Evaluation System

This section is outstanding. It systematically addresses the evaluation of hazards and the methods of hazard prevention or control.

C. Respiratory Protection

The respiratory protection program, dated June 18, 1989, establishes program responsibilities, respirator selection, use of respiratory protection, maintenance and care of respirators, and respiratory protection requirements for plant emergencies; it also provides informational appendices specifying OSHA Respiratory Protection requirements.² However, no standard operating procedures were evident for quality assurance (QA), fit-testing of wearers of respirator, work place monitoring, respirator selection, and training. The respiratory protection program did not address medical monitoring requirements for employees who must wear respirators.

The Safety Manager determines the specifications for air purifying respirator use. The Safety Manager has taken a week-long course on respiratory protection

² Occupational Safety and Health Administration, "Respiratory Protection," 29 CFR 1910.134, June 27, 1974 as amended in October 24, 1978, February 10, 1984, and April 30, 1984.

which included respirator selection and other respiratory protection program issues. The selection procedure is not documented by standard operating procedure. The NIOSH Respirator Decision Logic (DHHS (NIOSH) Publication No. 87-108), the NIOSH Pocket Guide to Chemical Hazards (DHHS (NIOSH) Publication No. 90-117), and other references to identify chemical warning properties should be used in the respirator selection process.

Two respiratory protection initiatives were on-going at the time of the audit: fit-testing of respirator wearers and NFPA 1981 upgrade of all self-contained-breathing-apparati (SCBAs). The qualitative fit-test (QLFT) is being used to identify the best fitting respirators. The management objective was to complete the qualitative fit-testing initiative within 90 days (of the audit).

The NFPA 1981 SCBA upgrade retrofits pressure-demand regulators to the respirator compressed air management system plus other modifications to improve respirator utility and protection. SCBA upgrade will continue until all SCBAs have been modified. SCBAs with pressure-demand regulators provide the highest respiratory protection possible.

During a plant walk-around, one SCBA tank was found with low air pressure (about 1400 psig). A routine, monthly SCBA inspection program exists at the Pasadena Plant; this SCBA had not yet been inspected. The respiratory protection procedure requires that the tank pressure be maintained above 1500 psig. A full tank contains about 2000 psig. The service life of a SCBA depends directly on tank pressure; a full tank should last about 30 minutes depending on level of wearer exertion. A tank pressure of 1500 psig would reduce the service life by 25%. While no standard exists for minimum SCBA tank pressure, a pressure of at least 1800 psig should be maintained to minimize service life reduction and to retain the ability to fill SCBA tanks from "cascade bottles."

D. Facial Hair Policy

The facial hair policy provides guidance to assure a proper seal of a respirator face-piece to the face. OSHA, in the Respiratory Protection Standard, 29 CFR 1910.134, has identified facial hair as a cause of inadequate facial seal, thereby reducing the protection provided by the respirator. The policy is applicable to employees and visitors who must enter areas where tight-fitting respirators are required personal protection.

E. Compressed Breathing Air Quality

At the time of the audit, the Safety Manager had no written procedure from Corporate IH for quality control of compressed breathing air. However, the Safety Manager was meeting the provisions of the corporate procedure for checking compressed air from vendors and compressed air generated at the plant. Appendix A of the Pasadena Plant respiratory protection procedure requires that compressed breathing air meet the Compressed Gas Association's Commodity Specification Grade D. Corporate Industrial Hygiene was to provide the corporate procedure as soon as possible.

F. Confined Space Entry

Although OSHA has not yet issued the "Permit Required Confined Spaces" standard, a confined-space entry procedure has been established at the Pasadena Plant. The Pasadena Plant's Confined Space Entry Procedure contains the steps necessary to safely enter and work in a confined space. The Procedure also defines a "confined space." The process includes specific tasks: blank, blind, tag, and try systems; empty the vessel; purge the confined space environment; test the

environment; and have the Entry Permit signed prior to operations. The Safety Department can be requested to assist in the issuance of the permit.

The Pasadena Plant procedures specify personal protective equipment for employees entering the confined space depending on the material contained in the space and the results of the environmental tests. The protective equipment available for use by "watch personnel," who are assigned to rescue personnel inside the confined space who been overcome by contaminants or heat, are implied. The procedure does not make this a requirement.

G. New Process Review

The following procedures are part of a new process review: Loss Prevention Review of Capital Projects, Hazard Identification Committee, and Capital Project Safety Planner. These procedures were outstanding for ensuring that health and safety problems are considered before construction starts. Consequently, environmental controls can be included in the construction of new process facilities.

The checklists in the procedures systematically guide the reviewer through the process of assessing potential health and safety problems, and provide the mechanism to identify potential problems and possible solutions. The procedures and checklists of the Hazard Identification Committee are noteworthy in their thoroughness and comprehensiveness.

H. Radiation Safety

The Pasadena Plant possesses a Texas Department of Health Radioactive Material License (number L02257) to use 18 level-measurement sealed radioactive

sources as large as 4 Curies (Ci). The Safety Manager is designated as the Radiation Safety Officer. All provisions of the license were being followed.

The license requires semi-annual inventory of the sealed sources to ensure the integrity of the shielding. The license does not require that any area radiation measurements be taken. The 4 Ci source must be checked for leaks every six months; the other sources are checked for leaks only if they are transferred, received, repaired, etc. All tests have been accomplished as required.

A Texas Nuclear Model 2652 radiation survey meter is on-hand to accomplish radiation monitoring. It has been calibrated every six months.

I. Equipment Calibration

Three types of instrumentation are commonly used in the conduct of the IH programs: oxygen/explosivity meters, the VCM fixed monitoring system, and the Reiszner badges used for VCM employee exposure monitoring. This equipment is regularly calibrated. However, there was no evidence of written procedures for IH equipment calibration.

The oxygen/explosivity meters are calibrated at the time of repair by Safety Department personnel. The meters are repaired frequently and the calibration intervals are reasonable, based on repair frequency. No established calibration schedule has been established in the absence of repair.

The VCM fixed monitoring system is calibrated every six months by the I & E Shop personnel.

Are they qualified?

The IH technician in the QC and Environmental Laboratory maintains sampling pumps, some sampling media, and calibration devices (bubble tubes) in addition to the Reiszner badges used for VCM monitoring. However, the only sampling devices used routinely are the Reiszner badges discussed in Section A1 (pages 7 and 8) of this report.

J. General Safety Practices

General safety practices include two procedures: General Safety Practices and New & Transferred Employee Safety Indoctrination. These two procedures address the safety and health issues in a general manner to provide basic familiarization with the OxyChem and Pasadena Plant safety policies.

The General Safety Practices procedure establishes the safety equipment and special procedures required at the Pasadena Plant. Safety glasses, safety hats, safety shoes, hearing protection, other protective clothing, and procedural specifications are described. Specialized safety equipment and policies, such as respiratory protection, facial hair, and hand protection, are cross-referenced to other safety procedures.

The "Hand Protection Procedure" specifies protective gloves according to task. Where chemical gloves are needed, compatibility of the glove material with the chemical is determined by the Safety Manager. The procedure does not delineate this selection process and compatibility charts are not provided.

The Indoctrination establishes the basic orientation of employees to the specialized and general safety and health requirements of the job. This procedure includes checklists and a personal equipment record to ensure that each employee receives the proper orientation training and personal protective equipment. Each

employee is also given a copy of the OxyChem *General Safety Rules and Practices* pamphlet.

K. Hearing Conservation

The Safety Manager did not have the OxyChem Corporate Hearing Conservation Procedure at the time of the audit. ←

A hearing conservation program is in place at the Pasadena Plant. Hazardous noise areas were posted, and hearing protection was worn by employees and visitors. Many forms of hearing protection were available including several kinds of ear plugs, semi-insert hearing protectors, and ear muffs. The employees carried hearing protection as a part of their safety equipment ensemble, and consistent use of hearing protection in the designated hazardous noise areas was observed. [Corporate IH was to provide the corporate hearing conservation procedure as soon as possible.]

The available hearing protection devices were judged to be adequate to protect employees from the adverse effects of the high intensity noise at this location. The lowest noise reduction rating (NRR) noted on a hearing protection device (the semi-insert hearing protector) equalled 22 dBA. Using the OSHA method to estimate protection,³ the adjusted NRR equalled 15 dB. The highest time-weighted-average (TWA) noise level measured was 97 dBA on a PVC Rail Car Loader during a 12-hour night shift.⁴ Reducing this exposure by 15 dB results in a level of 82 dBA, or 5 dB

³ Which involved subtracting 7 dB from the NRR before subtracting the NRR from the measured noise exposure from OSHA, *Occupational Noise Exposure*, Appendix B, Title 29 Code of Federal Regulations Part 1910.95, US Department of Labor, Occupational Safety and Health Administration, 1983.

⁴ RiskFocus Report, "Employee Exposure Monitoring at the Occidental Chemical Corporation PVC Resins Plant, Pasadena, Texas," January 1991, prepared for Corporate Industrial Hygiene, Occidental Chemical Corporation.

below the adjusted
below the OSHA permissible exposure limit for a 12-hour TWA exposure (PEL-TWA₁₂) of 87 dBA.

Hearing tests are administered to employees at the Pasadena Plant as part of the medical monitoring program described in Section A2 (pages 8 and 9) of this report.

L. Safety Meeting Minutes

Departmental and "tool box" safety meetings are held regularly. The meetings are documented on the Safety Meeting Record form. Each employee attending the meeting, the person conducting the meeting, the meeting date and time, the department, the meeting topic, and the significant questions expressed are recorded. Meeting topics are provided by the Safety Manager. The meeting presentations are multi-media including the use of video tapes.

M. Emergency Brigade Procedures

The emergency brigade procedures included in the Pasadena Plant Safety Manual for response and team formation are excellent. Checklists are being developed for brigade procedures, respiratory protection, and other personal protective equipment for response, rescue, stabilization, and recovery actions.

IV. Conclusions and Recommendations

Conclusions regarding the Pasadena Plant IH program audit are presented here by exception. Where noteworthy programs were found, no further comments are provided. Recommendations to amend or develop programs are provided, where needed.

A. OSHA Vinyl Chloride Standard Requirements

VCM personal air samples are analyzed at the Pasadena Plant QC and Environmental Laboratory which is not AIHA accredited. No QA program has been established to duplicate or split samples for analysis at an AIHA accredited laboratory.

Recommendation: Either duplicate personal VCM air samples must be collected or air samples must be split for analysis at an AIHA accredited IH laboratory to validate the quality of VCM personal air concentration data generated at the Pasadena Plant.

B. Hazards Communication (HazCom)

The HazCom program was well documented and appeared to be effective. The HazCom manual is comprehensive. No evidence exists that this manual has been reviewed or updated since 1987. The OSHA HazCom standard in the manual's appendix was out of date.

Recommendation: A procedure should be established to review the HazCom manual annually or whenever new OSHA regulations are issued. Each review should be documented with the date of review, the reviewer's name, and the reviewer's signature or initials.

Some administrative flaws were found in the HazCom manual including exhibit designation and page numbering errors.

Recommendation: Correct administrative errors as a part of the reviews.

The hazardous material inventory is maintained and updated annually. The inventory is not dated.

Recommendation: The hazardous material inventory should be dated. Review of this inventory and certification of the review can be accomplished in conjunction with the routine HazCom manual review described above.

C. Respiratory Protection

No standard operating procedures (SOPs) for key respiratory protection program elements have been established.

Recommendation: SOPs should be established for the following respiratory protection program elements:

- Selection of respirators;
- Training of respirator wearers;
- Monitoring of the work places where respirators are used;
- Fit-testing of respirator wearers; and
- QA.

The respirator selection process should be formalized in a SOP that uses the NIOSH Respirator Decision Logic, the NIOSH Pocked Guide to Chemical Hazards, and other references. Respirator selection should be validated by a Certified Industrial Hygienist.

Low tank pressure was noted on one SCBA. The respiratory protection procedure in the Pasadena Plant Safety Manual specifies a minimum tank pressure of 1500 psig. Tank pressure at 1500 psig would reduce service live by about 25%.

Recommendation: The minimum tank pressure requirement should be increased to 1800 psig. Specifying a minimum tank pressure of 1800 psig would control the service-life reduction and retain the capability to fill SCBA tanks from a "cascade bottle" system.

D. Compressed Breathing Air Quality

The Safety Manager had not received the OxyChem Corporate procedure for QC of compressed breathing air at the time of the audit. QC practices at the plant that are consistent with the corporate procedure had been established.

Recommendation: If the Pasadena Plant Safety Manager has not yet obtained the corporate procedure for quality control of compressed breathing air, a copy should be sent as soon as possible.

E. Confined Space Entry

Specific procedures have not been established for the protection of watch personnel when attempting to rescue workers from inside confined space who have been overcome by environmental stress or other problem.

Recommendation: A minimum level of protection, including respiratory protection, must be established for watch personnel, and this equipment must be readily available to the watch person attempting rescue operations. A procedure to alert the Safety Manager and other appropriate officials should also be established.

F. Radiation Safety

The semi-annual inventory of the sealed radioactive sources includes physical inspection of shield integrity. No area radiation monitoring is required.

Recommendation: Area radiation monitoring should be accomplished in conjunction with the semi-annual inventory/inspection to ensure that 5 mR/hr at 1 foot from the radioactive material is not exceeded.

G. IH Equipment Calibration

Oxygen/explosivity meters are calibrated at the time of repair. No calibration schedule has been established; calibration frequency has been satisfactory because of the frequency-of-repair record of the instruments.

Recommendation: A calibration frequency procedure should be established. Each calibration should be certified by date of calibration, calibrator's initials, and date next calibration is due.

H. General Safety Practices

The Hand Protection Procedure established the requirement to ensure chemical glove compatibility with chemicals be accomplished. No compatibility charts or selection process are included in the Procedure.

Recommendation: The Hand Protection Procedure should be amended to include a chemical glove compatibility chart or make reference to a compendium of chemical glove compatibilities. The glove selection should be described in a SOP and glove selections should be documented.

I. Hearing Conservation

The Safety Manager did not have the Corporate Hearing Conservation procedure at the time of the audit. A viable hearing conservation program was in place at the Pasadena Plant, and included hazardous noise warning signs, hearing protection use, and monitoring audiometry.

Recommendation: If the Safety Manager has not yet received the corporate hearing conservation procedure, a copy should be sent as soon as possible.

V. *References*

Occupational Safety and Health Administration, "General Industry Standards," 29 CFR 1910.

RiskFocus Report, "Employee Exposure Monitoring at the Occidental Chemical Corporation PVC Resins Plant, Pasadena, Texas," prepared for Corporate Industrial Hygiene, Occidental Chemical Corporation, January 1991.

APPENDICES

Appendix A: Employee Exposure Monitoring Results Notification Form

Appendix B: OSHA Hazard Communication Standard

DRAFT - 1

APPENDIX A:
EMPLOYEE EXPOSURE MONITORING RESULTS
NOTIFICATION FORM

OCCIDENTIAL CHEMICALS

PASADENA PLANT

TO:

DATE: 00-00-90

FROM: J. R. Clark / J. Oliver / M. Ackel

SUBJECT: VINYL CHLORIDE MONOMER EXPOSURE

EMPLOYEE NOTIFICATION # - 90

Measurements of Vinyl Chloride Monomer (VCM) concentration as determined by passive organic monitor indicate that you were exposed to ppm VCM in the PVC _____ area on / /90.

Your individual self-reporting monitor card shows that a supplied air respirator was / was not used.

Please read the "Engineering Program" which is posted on the bulletin board. There you will find information covering plans aimed at alleviating vinyl chloride exposure.

A copy of this letter has been sent to your immediate supervisor so that he may be aware of the test results.

Please sign and date this letter and return it to the commodities laboratory. Retain the copy for your personal records.

Signature of employee: _____

Date: _____

Copy:	D. R. Boucher	w/worksheet
	G. W. Bridges	"
	L. K. Burman	"
	J. F. Robins	"
	C. R. Grimes	
	Files	

OCC 10406

APPENDIX B:
OSHA HAZARD COMMUNICATION STANDARD

**HAZARD
COMMUNICATION
STANDARD**

Prepared by

**RiskFocus®
A Division of VERSAR Inc.**

February 1991

Contents

(a)	Purpose.	1
(b)	Scope and application	2
(c)	Definitions	6
(d)	Hazard determination	14
(e)	Written hazard communication program	17
(f)	Labels and other forms of warning	19
(g)	Material safety data sheets	21
(h)	Employee information and training	27
(1)	Information	27
(2)	Training	27
(i)	Trade secrets	28
(j)	Effective dates	34
Appendix A:	Health Hazard Definitions (Mandatory)	36
1.	Carcinogen	37
2.	Corrosive	37
3.	Highly toxic	38
4.	Irritant	38
5.	Sensitizer	39
6.	Toxic	39
7.	Target organ effects	39
Appendix B:	Hazard Determination (Mandatory)	42
1.	Carcinogenicity	42
2.	Human data	42
3.	Animal data	43
4.	Adequacy and reporting of data	43
Appendix C:	Information Sources (Advisory)	44
Appendix D:	Definition of "Trade Secret" (Mandatory)	49

NOTE: This document is an illustration of the facility of our obtaining current and authoritative regulatory documentation.

HAZARD COMMUNICATION STANDARD

1910.1200 Hazard communication.

(a) *Purpose.*

- (1) The purpose of this section is to ensure that the hazards of all chemicals produced or imported are evaluated, and that information concerning their hazards is transmitted to employers and employees. This transmittal of information is to be accomplished by means of comprehensive hazard communication programs, which are to include container labeling and other forms of warning, material safety data sheets and employee training.
- (2) This occupational safety and health standard is intended to address comprehensively the issue of evaluating the potential hazards of chemicals, and communicating information concerning hazards and appropriate protective measures to employees, and to preempt any legal requirements of a state, or political subdivision of a state, pertaining to the subject. Evaluating the potential hazards of chemicals, and communicating information concerning hazards and appropriate protective measures to employees, may include, for example, but is not limited to, provisions for: developing and maintaining a written hazard communication program for the workplace, including lists of hazardous chemicals present; labeling of containers of chemicals in the workplace, as well as of containers of chemicals being shipped to other workplaces; preparation and distribution of material safety data sheets to employees and downstream employers; and development and

implementation of employee training programs regarding hazards of chemicals and protective measures. Under section 18 of the Act, no state or political subdivision of a state may adopt or enforce, through any court or agency, any requirement relating to the issue addressed by this Federal standard, except pursuant to a Federally-approved state plan.

(b) Scope and application.

- (1) This section requires chemical manufacturers or importers to assess the hazards of chemicals which they produce or import, and all employers to provide information to their employees about the hazardous chemicals to which they are exposed, by means of a hazard communication program, labels and other forms of warning, material safety data sheets, and information and training. In addition, this section requires distributors to transmit the required information to employers.
- (2) This section applies to any chemical which is known to be present in the workplace in such a manner that employees may be exposed under normal conditions of use or in a foreseeable emergency.
- (3) This section applies to laboratories only as follows:
 - (i) Employers shall ensure that labels on incoming containers of hazardous chemicals are not removed or defaced;
 - (ii) Employers shall maintain any material safety data sheets that are received with incoming shipments of hazardous chemicals,

and ensure that they are readily accessible to laboratory employees; and

- (iii) Employers shall ensure that laboratory employees are apprised of the hazards of the chemicals in their workplaces in accordance with paragraph (h) of this section.
- (4) In work operations where employees only handle chemicals in sealed containers which are not opened under normal conditions of use (such as are found in marine cargo handling, warehousing, or retail sales), this section applies to these operations only as follows:
- (i) Employers shall ensure that labels on incoming containers of hazardous chemicals are not removed or defaced;
 - (ii) Employers shall maintain copies of any material safety data sheets that are received with incoming shipments of the sealed containers of hazardous chemicals, shall obtain a material safety data sheet for sealed containers of hazardous chemicals received without a material safety data sheet if an employee requests the material safety data sheet, and shall ensure that the material safety data sheets are readily accessible during each work shift to employees when they are in their work area(s); and
 - (iii) Employers shall ensure that employees are provided with information and training in accordance with paragraph (h) of this section (except for the location and availability of the written hazard communication program under paragraph (h)(1)(iii)), to the extent necessary to protect them in the event of a spill or leak of a hazardous chemical from a sealed container.

- (5) This section does not require labeling of the following chemicals:
- (i) Any pesticide as such term is defined in the Federal Insecticide, Fungicide, and Rodenticide Act (7 U.S.C. 136 et seq.), when subject to the labeling requirements of that Act and labeling regulations issued under that Act by the Environmental Protection Agency;
 - (ii) Any food, food additive, color additive, drug, cosmetic, or medical or veterinary device, including materials intended for use as ingredients in such products (e.g., flavors and fragrances), as such terms are defined in the Federal Food, Drug, and Cosmetic Act (21 U.S.C. 301 et seq.) and regulations issued under that Act, when they are subject to the labeling requirements under that Act by the Food and Drug Administration;
 - (iii) Any distilled spirits (beverage alcohols), wine, or malt beverage intended for nonindustrial use, as such terms are defined in the Federal Alcohol Administration Act (27 U.S.C. 201 et seq.) and regulations issued under that Act, when subject to the labeling requirements of that Act and labeling regulations issued under that Act by the Bureau of Alcohol Tobacco, and Firearms; and
 - (iv) Any consumer product or hazardous substance as those terms are defined in the Consumer Product Safety Act (15 U.S.C. 2051 et seq.) and Federal Hazardous Substances Act (15 U.S.C. 1261 et seq.) respectively, when subject to a consumer product safety standard or labeling requirement of those Acts, or regulations issued under those Acts by the Consumer Product Safety Commission.

(6) This section does not apply to:

- (i) Any hazardous waste as such term is defined by the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended (42 U.S.C. 6901 et seq.), when subject to regulations issued under that Act by the Environmental Protection Agency;
- (ii) Tobacco or tobacco products;
- (iii) Wood or wood products;
- (iv) Articles;
- (v) Food, drugs, cosmetics, or alcoholic beverages in a retail establishment which are packaged for sale to consumers;
- (vi) Foods, drugs, or cosmetics intended for personal consumption by employees while in the workplace;
- (vii) Any consumer product or hazardous substance, as those terms are defined in the Consumer Product Safety Act (15 U.S.C. 2051 et seq.) and Federal Hazardous Substances Act (15 U.S.C. 1261 et seq.) respectively, where the employer can demonstrate it is used in the workplace in the same manner as normal consumer use, and which use results in a duration and frequency of exposure which is not greater than exposures experienced by consumers; and

- (viii) Any drug, as that term is defined in the Federal Food, Drug, and Cosmetic Act (21 U.S.C. 301 et seq.), when it is in solid, final form for direct administration to the patient (i.e. tablets or pills).

(c) Definitions.

- (1) "Article" means a manufactured item:
 - (i) Which is formed to a specific shape or design during manufacture;
 - (ii) Which has end use function(s) dependent in whole or in part upon its shape or design during end use; and
 - (iii) Which does not release, or otherwise result in exposure to, a hazardous chemical, under normal conditions of use.
- (2) "Assistant Secretary" means the Assistant Secretary of Labor for Occupational Safety and Health, U.S. Department of Labor, or designee.
- (3) "Chemical" means any element, chemical compound or mixture of elements and/or compounds.
- (4) "Chemical manufacturer" means an employer with a workplace where chemical(s) are produced for use or distribution.
- (5) "Chemical name" means the scientific designation of a chemical in accordance with the nomenclature system developed by the International Union of Pure and Applied Chemistry (IUPAC) or the Chemical Abstracts Service (CAS) rules of nomenclature, or a name which will clearly identify the chemical for the purpose of conducting a hazard evaluation.

- (6) "Combustible liquid" means any liquid having a flashpoint at or above 100°F (37.8°C), but below 200°F (93.3°C), except any mixture having components with flashpoints of 200°F (93.3°C), or higher, the total volume of which make up 99 percent or more of the total volume of the mixture.
- (7) "Common name" means any designation or identification such as code name, code number, trade name, brand name or generic name used to identify a chemical other than by its chemical name.
- (8) "Compressed gas" means:
- (i) A gas or mixture of gases having, in a container, an absolute pressure exceeding 40 psi at 70°F (21.1°C); or
 - (ii) A gas or mixture of gases having, in a container, an absolute pressure exceeding 104 psi at 130°F (54.4°C) regardless of the pressure at 70°F (21.1°C); or
 - (iii) A liquid having a vapor pressure exceeding 40 psi at 100°F (37.8°C) as determined by ASTM D-323-72.
- (9) "Container" means any bag, barrel, bottle, box, can, cylinder, drum, reaction vessel, storage tank, or the like that contains a hazardous chemical. For purposes of this section, pipes or piping systems, and engines, fuel tanks, or other operating systems in a vehicle, are not considered to be containers.
- (10) "Designated representative" means any individual or organization to whom an employee gives written authorization to exercise such

employee's rights under this section. A recognized or certified collective bargaining agent shall be treated automatically as a designated representative without regard to written employee authorization.

- (11) "Director" means the Director, National Institute for Occupational Safety and Health, U.S. Department of Health and Human Services, or designee.
- (12) "Distributor" means a business, other than a chemical manufacturer or importer, which supplies hazardous chemicals to other distributors or to employers.
- (13) "Employee" means a worker who may be exposed to hazardous chemicals under normal operating conditions or in foreseeable emergencies. Workers such as office workers or bank tellers who encounter hazardous chemicals only in non-routine, isolated instances are not covered.
- (14) "Employer" means a person engaged in a business where chemicals are either used, distributed, or are produced for use or distribution, including a contractor or subcontractor.
- (15) "Explosive" means a chemical that causes a sudden, almost instantaneous release of pressure, gas, and heat when subjected to sudden shock, pressure, or high temperature.
- (16) "Exposure" or "exposed" means that an employee is subjected to a hazardous chemical in the course of employment through any route of entry (inhalation, ingestion, skin contact or absorption, etc.), and includes potential (e.g., accidental or possible) exposure.

- (17) "Flammable" means a chemical that falls into one of the following categories:
- (i) "Aerosol, flammable" means an aerosol that, when tested by the method described in 16 CFR 1500.45, yields a flame projection exceeding 18 inches at full valve opening, or a flashback (a flame extending back to the valve) at any degree of valve opening;
 - (ii) "Gas, flammable" means:
 - (A) A gas that, at ambient temperature and pressure, forms a flammable mixture with air at a concentration of thirteen (13) percent by volume or less; or
 - (B) A gas that, at ambient temperature and pressure, forms a range of flammable mixtures with air wider than twelve (12) percent by volume, regardless of the lower limit;
 - (iii) "Liquid, flammable" means any liquid having a flashpoint below 100°F (37.8°C), except any mixture having components with flashpoints of 100°F (37.8°C) or higher, the total of which make up 99 percent or more of the total volume of the mixture;
 - (iv) "Solid, flammable" means a solid, other than a blasting agent or explosive as defined in 1910.109(a), that is liable to cause fire through friction, absorption of moisture, spontaneous chemical change, or retained heat from manufacturing or processing, or which can be ignited readily and when ignited burns so vigorously and persistently as to create a serious hazard. A chemical shall be considered to be a flammable solid if, when tested by the method described in 16 CFR 1500.44, it ignites and burns with a

self-sustained flame at a rate greater than one-tenth of an inch per second along its major axis.

- (18) "Flashpoint" means the minimum temperature at which a liquid gives off a vapor in sufficient concentration to ignite when tested as follows:
- (i) Tagliabue Closed Tester (See American National Standard Method of Test for Flashpoint by Tag Closed Tester, Z11.24-1979 (ASTM D 56-79)) for liquids with a viscosity of less than 45 Saybolt Universal Seconds (SUS) at 100°F (37.8°C), that do not contain suspended solids and do not have a tendency to form a surface film under test; or
 - (ii) Pensky-Martens Closed Tester (See American National Standard Method of Test for Flashpoint by Pensky-Martens Closed Tester, Z11.7-1979 (ASTM D 93-79)) for liquids with a viscosity equal to or greater than 45 SUS at 100°F (37.8°C), or that contain suspended solids, or that have a tendency to form a surface film under test; or
 - (iii) Setaflash Closed Tester (see American National Standard Method of Test for Flashpoint by Setaflash Closed Tester (ASTM D 3278-78)) Organic peroxides, which undergo autoaccelerating thermal decomposition, are excluded from any of the flashpoint determination methods specified above.
- (19) "Foreseeable emergency" means any potential occurrence such as, but not limited to, equipment failure, rupture of containers, or failure of control equipment which could result in an uncontrolled release of a hazardous chemical into the workplace.

- (20) "Hazardous chemical" means any chemical which is a physical hazard or a health hazard.
- (21) "Hazard warning" means any words, pictures, symbols, or combination thereof appearing on a label or other appropriate form of warning which convey the hazard(s) of the chemical(s) in the container(s).
- (22) "Health hazard" means a chemical for which there is statistically significant evidence based on at least one study conducted in accordance with established scientific principles that acute or chronic health effects may occur in exposed employees. The term "health hazard" includes chemicals which are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents which act on the hematopoietic system, and agents which damage the lungs, skin, eyes, or mucous membranes. Appendix A provides further definitions and explanations of the scope of health hazards covered by this section, and Appendix B describes the criteria to be used to determine whether or not a chemical is to be considered hazardous for purposes of this standard.
- (23) "Identity" means any chemical or common name which is indicated on the material safety data sheet (MSDS) for the chemical. The identity used shall permit cross-references to be made among the required list of hazardous chemicals, the label and the MSDS.
- (24) "Immediate use" means that the hazardous chemical will be under the control of and used only by the person who transfers it from a labeled container and only within the work shift in which it is transferred.

- (25) "Importer" means the first business with employees within the Customs Territory of the United States which receives hazardous chemicals produced in other countries for the purpose of supplying them to distributors or employers within the United States.
- (26) "Label" means any written, printed, or graphic material, displayed on or affixed to containers of hazardous chemicals.
- (27) "Material safety data sheet (MSDS)" means written or printed material concerning a hazardous chemical which is prepared in accordance with paragraph (g) of this section.
- (28) "Mixture" means any combination of two or more chemicals if the combination is not, in whole or in part, the result of a chemical reaction.
- (29) "Organic peroxide" means an organic compound that contains the bivalent-O-O-structure and which may be considered to be a structural derivative of hydrogen peroxide where one or both of the hydrogen atoms has been replaced by an organic radical.
- (30) "Oxidizer" means a chemical other than a blasting agent or explosive as defined in 1910.109(a), that initiates or promotes combustion in other materials, thereby causing fire either of itself or through the release of oxygen or other gases.
- (31) "Physical hazard" means a chemical for which there is scientifically valid evidence that it is a combustible liquid, a compressed gas, explosive, flammable, an organic peroxide, an oxidizer, pyrophoric, unstable (reactive) or water-reactive.

- (32) "Produce" means to manufacture, process, formulate, or repackage.
- (33) "Pyrophoric" means a chemical that will ignite spontaneously in air at a temperature of 130°F (54.4°C) or below.
- (34) "Responsible party" means someone who can provide additional information on the hazardous chemical and appropriate emergency procedures, if necessary.
- (35) "Specific chemical identity" means the chemical name, Chemical Abstracts Service (CAS) Registry Number, or any other information that reveals the precise chemical designation of the substance.
- (36) "Trade secret" means any confidential formula, pattern, process, device, information or compilation of information that is used in an employer's business, and that gives the employer an opportunity to obtain an advantage over competitors who do not know or use it. Appendix D sets out the criteria to be used in evaluating trade secrets.
- (37) "Unstable (reactive)" means a chemical which in the pure state, or as produced or transported, will vigorously polymerize, decompose, condense, or will become self-reactive under conditions of shocks, pressure or temperature.
- (38) "Use" means to package, handle, react, or transfer.
- (39) "Water-reactive" means a chemical that reacts with water to release a gas that is either flammable or presents a health hazard.

- (40) "Work area" means a room or defined space in a workplace where hazardous chemicals are produced or used, and where employees are present.
- (41) "Workplace" means an establishment, job site, or project, at one geographical location containing one or more work areas.

(d) *Hazard determination.*

- (1) Chemical manufacturers and importers shall evaluate chemicals produced in their workplaces or imported by them to determine if they are hazardous. Employers are not required to evaluate chemicals unless they choose not to rely on the evaluation performed by the chemical manufacturer or importer for the chemical to satisfy this requirement.
- (2) Chemical manufacturers, importers or employers evaluating chemicals shall identify and consider the available scientific evidence concerning such hazards. For health hazards, evidence which is statistically significant and which is based on at least one positive study conducted in accordance with established scientific principles is considered to be sufficient to establish a hazardous effect if the results of the study meet the definitions of health hazards in this section. Appendix A shall be consulted for the scope of health hazards covered, and Appendix B shall be consulted for the criteria to be followed with respect to the completeness of the evaluation, and the data to be reported.
- (3) The chemical manufacturer, importer or employer evaluating chemicals shall treat the following sources as establishing that the chemicals listed in them are hazardous:

- (i) 29 CFR Part 1910, Subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration (OSHA); or,
 - (ii) Threshold Limit Values for Chemical Substances and Physical Agents in the Work Environment, American Conference of Governmental Industrial Hygienists (ACGIH) (latest edition). The chemical manufacturer, importer, or employer is still responsible for evaluating the hazards associated with the chemicals in these source lists in accordance with the requirements of this standard.
- (4) Chemical manufacturers, importers and employers evaluating chemicals shall treat the following sources as establishing that a chemical is a carcinogen or potential carcinogen for hazard communication purposes:
- (i) National Toxicology Program (NTP), Annual Report on Carcinogens (latest edition);
 - (ii) International Agency for Research on Cancer (IARC) Monographs (latest editions); or
 - (iii) 29 CFR Part 1910, Subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration. Note: The Registry of Toxic Effects of Chemical Substances published by the National Institute for Occupational Safety and Health indicates whether a chemical has been found by NTP or IARC to be a potential carcinogen.
- (5) The chemical manufacturer, importer or employer shall determine the hazards of mixtures of chemicals as follows:

- (i) If a mixture has been tested as a whole to determine its hazards, the results of such testing shall be used to determine whether the mixture is hazardous;
- (ii) If a mixture has not been tested as a whole to determine whether the mixture is a health hazard, the mixture shall be assumed to present the same health hazards as do the components which comprise one percent (by weight or volume) or greater of the mixture, except that the mixture shall be assumed to present a carcinogenic hazard if it contains a component in concentrations of 0.1 percent or greater which is considered to be a carcinogen under paragraph (d)(4) of this section;
- (iii) If a mixture has not been tested as a whole to determine whether the mixture is a physical hazard, the chemical manufacturer, importer, or employer may use whatever scientifically valid data is available to evaluate the physical hazard potential of the mixture; and
- (iv) If the chemical manufacturer, importer, or employer has evidence to indicate that a component present in the mixture in concentrations of less than one percent (or in the case of carcinogens, less than 0.1 percent) could be released in concentrations which would exceed an established OSHA permissible exposure limit or ACGIH Threshold Limit Value, or could present a health hazard to employees in those concentrations, the mixture shall be assumed to present the same hazard.

- (6) Chemical manufacturers, importers, or employers evaluating chemicals shall describe in writing the procedures they use to determine the hazards of the chemical they evaluate. The written procedures are to be made available, upon request, to employees, their designated representatives, the Assistant Secretary, and the Director. The written description may be incorporated into the written hazard communication program required under paragraph (e) of this section.

(e) *Written hazard communication program.*

- (1) Employers shall develop, implement, and maintain at the workplace, a written hazard communication program for their workplaces which at least describes how the criteria specified in paragraphs (f), (g), and (h) of this section for labels and other forms of warning, material safety data sheets, and employee information and training will be met, and which also includes the following:
 - (i) A list of the hazardous chemicals known to be present using an identity that is referenced on the appropriate material safety data sheet (the list may be compiled for the workplace as a whole or for individual work areas); and
 - (ii) The methods the employer will use to inform employees of the hazards of non-routine tasks (for example, the cleaning of reactor vessels), and the hazards associated with chemicals contained in unlabeled pipes in their work areas.
- (2) *Multi-employer workplaces.* Employers who produce, use, or store hazardous chemicals at a workplace in such a way that the employees

of other employer(s) may be exposed (for example, employees of a construction contractor working on-site) shall additionally ensure that the hazard communication programs developed and implemented under this paragraph (e) include the following:

- (i) The methods the employer will use to provide the other employer(s) with a copy of the material safety data sheet, or to make it available at a central location in the workplace, for each hazardous chemical the other employer(s)' employees may be exposed to while working;
 - (ii) The methods the employer will use to inform the other employer(s) of any precautionary measures that need to be taken to protect employees during the workplace's normal operating conditions and in foreseeable emergencies; and
 - (iii) The methods the employer will use to inform the other employer(s) of the labeling system used in the workplace.
- (3) The employer may rely on an existing hazard communication program to comply with these requirements, provided that it meets the criteria established in this paragraph (e).
- (4) The employer shall make the written hazard communication program available, upon request, to employees, their designated representatives, the Assistant Secretary and the Director, in accordance with the requirements of 29 CFR 1910.20(e).

(f) Labels and other forms of warning.

- (1) The chemical manufacturer, importer, or distributor shall ensure that each container of hazardous chemicals leaving the workplace is labeled, tagged or marked with the following information:
 - (i) Identity of the hazardous chemical(s);
 - (ii) Appropriate hazard warnings; and
 - (iii) Name and address of the chemical manufacturer, importer, or other responsible party.
- (2) For solid metal (such as a steel beam or a metal casting) that is not exempted as an article due to its downstream use, the required label may be transmitted to the customer at the time of the initial shipment, and need not be included with subsequent shipments to the same employer unless the information on the label changes. The label may be transmitted with the initial shipment itself, or with the material safety data sheet that is to be provided prior to or at the time of the first shipment. This exception to requiring labels on every container of hazardous chemicals is only for the solid metal itself and does not apply to hazardous chemicals used in conjunction with, or known to be present with, the metal and to which employees handling the metal may be exposed (for example, cutting fluids or lubricants).
- (3) Chemical manufacturers, importers, or distributors shall ensure that each container of hazardous chemicals leaving the workplace is labeled, tagged, or marked in accordance with this section in a manner which

does not conflict with the requirements of the Hazardous Materials Transportation Act (49 U.S.C. 1801 et seq.) and regulations issued under that Act by the Department of Transportation.

- (4) If the hazardous chemical is regulated by OSHA in a substance-specific health standard, the chemical manufacturer, importer, distributor or employer shall ensure that the labels or other forms of warning used are in accordance with the requirements of that standard.
- (5) Except as provided in paragraphs (f)(6) and (f)(7) the employer shall ensure that each container of hazardous chemicals in the workplace is labeled, tagged or marked with the following information:
 - (i) Identity of the hazardous chemical(s) contained therein; and
 - (ii) Appropriate hazard warnings.
- (6) The employer may use signs, placards, process sheets, batch tickets, operating procedures, or other such written materials in lieu of affixing labels to individual stationary process containers, as long as the alternative method identifies the containers to which it is applicable and conveys the information required by paragraph (f)(5) of this section to be on a label. The written materials shall be readily accessible to the employees in their work area throughout each work shift.
- (7) The employer is not required to label portable containers into which hazardous chemicals are transferred from labeled containers, and which are intended only for the immediate use of the employee who performs the transfer.

- (8) The employer shall not remove or deface existing labels on incoming containers of hazardous chemicals, unless the container is immediately marked with the required information.
- (9) The employer shall ensure that labels or other forms of warning are legible, in English, and prominently displayed on the container, or readily available in the work area throughout each work shift. Employers having employees who speak other languages may add the information in their language to the material presented, as long as the information is presented in English as well.
- (10) The chemical manufacturer, importer, distributor or employer need not affix new labels to comply with this section if existing labels already convey the required information.

(g) *Material safety data sheets.*

- (1) Chemical manufacturers and importers shall obtain or develop a material safety data sheet for each hazardous chemical they produce or import. Employers shall have a material safety data sheet for each hazardous chemical which they use.
- (2) Each material safety data sheet shall be in English and shall contain at least the following information:
 - (i) The identity used on the label, and, except as provided for in paragraph (i) of this section on trade secrets:

- (A) If the hazardous chemical is a single substance, its chemical and common name(s);
- (B) If the hazardous chemical is a mixture which has been tested as a whole to determine its hazards, the chemical and common name(s) of the ingredients which contribute to these known hazards, and the common name(s) of the mixture itself; or
- (C) If the hazardous chemical is a mixture which has not been tested as a whole:
 - (1) The chemical and common name(s) of all ingredients which have been determined to be health hazards, and which comprise 1% or greater of the composition, except that chemicals identified as carcinogens under paragraph (d)(4) of this section shall be listed if the concentrations are 0.1% or greater; and
 - (2) The chemical and common name(s) of all ingredients which have been determined to be health hazards, and which comprise less than 1% (0.1% for carcinogens) of the mixture, if there is evidence that the ingredient(s) could be released from the mixture in concentrations which would exceed an established OSHA permissible exposure limit or ACGIH Threshold Limit Value, or could present a health hazard to employees; and
 - (3) The chemical and common name(s) of all ingredients which have been determined to present a physical hazard when present in the mixture;
- (ii) Physical and chemical characteristics of the hazardous chemical (such as vapor pressure, flashpoint);

- (iii) The physical hazards of the hazardous chemical, including the potential for fire, explosion, and reactivity;
- (iv) The health hazards of the hazardous chemical, including signs and symptoms of exposure, and any medical conditions which are generally recognized as being aggravated by exposure to the chemical;
- (v) The primary route(s) of entry;
- (vi) The OSHA permissible exposure limit, ACGIH Threshold Limit Value, and any other exposure limit used or recommended by the chemical manufacturer, importer, or employer preparing the material safety data sheet, where available;
- (vii) Whether the hazardous chemical is listed in the National Toxicology Program (NTP) Annual Report on Carcinogens (latest edition) or has been found to be a potential carcinogen in the International Agency for Research on Cancer (IARC) Monographs (latest editions), or by OSHA;
- (viii) Any generally applicable precautions for safe handling and use which are known to the chemical manufacturer, importer or employer preparing the material safety data sheet, including appropriate hygienic practices, protective measures during repair and maintenance of contaminated equipment, and procedures for clean-up of spills and leaks;

- (ix) Any generally applicable control measures which are known to the chemical manufacturer, importer or employer preparing the material safety data sheet, such as appropriate engineering controls, work practices, or personal protective equipment;
 - (x) Emergency and first aid procedures;
 - (xi) The date of preparation of the material safety data sheet or the last change to it; and
 - (xii) The name, address and telephone number of the chemical manufacturer, importer, employer or other responsible party preparing or distributing the material safety data sheet, who can provide additional information on the hazardous chemical and appropriate emergency procedures, if necessary.
- (3) If no relevant information is found for any given category on the material safety data sheet, the chemical manufacturer, importer or employer preparing the material safety data sheet shall mark it to indicate that no applicable information was found.
- (4) Where complex mixtures have similar hazards and contents (i.e. the chemical ingredients are essentially the same, but the specific composition varies from mixture to mixture), the chemical manufacturer, importer or employer may prepare one material safety data sheet to apply to all of these similar mixtures.

- (5) The chemical manufacturer, importer or employer preparing the material safety data sheet shall ensure that the information recorded accurately reflects the scientific evidence used in making the hazard determination. If the chemical manufacturer, importer or employer preparing the material safety data sheet becomes newly aware of any significant information regarding the hazards of a chemical, or ways to protect against the hazards, this new information shall be added to the material safety data sheet within three months. If the chemical is not currently being produced or imported the chemical manufacturer or importer shall add the information to the material safety data sheet before the chemical is introduced into the workplace again.
- (6) Chemical manufacturers or importers shall ensure that distributors and employers are provided an appropriate material safety data sheet with their initial shipment, and with the first shipment after a material safety data sheet is updated. The chemical manufacturer or importer shall either provide material safety data sheets with the shipped containers or send them to the employer prior to or at the time of the shipment. If the material safety data sheet is not provided with a shipment that has been labeled as a hazardous chemical, the employer shall obtain one from the chemical manufacturer, importer, or distributor as soon as possible.
- (7) Distributors shall ensure that material safety data sheets, and updated information, are provided to other distributors and employers. Retail distributors which sell hazardous chemicals to commercial customers shall provide a material safety data sheet to such employers upon request, and shall post a sign or otherwise inform them that a material safety data sheet is available. Chemical manufacturers, importers, and distributors need not provide material safety data sheets to retail

distributors which have informed them that the retail distributor does not sell the product to commercial customers or open the sealed container to use it in their own workplaces.

- (8) The employer shall maintain copies of the required material safety data sheets for each hazardous chemical in the workplace, and shall ensure that they are readily accessible during each work shift to employees when they are in their work area(s).
- (9) Where employees must travel between workplaces during a workshift, i.e., their work is carried out at more than one geographical location, the material safety data sheets may be kept at a central location at the primary workplace facility. In this situation, the employer shall ensure that employees can immediately obtain the required information in an emergency.
- (10) Material safety data sheets may be kept in any form, including operating procedures, and may be designed to cover groups of hazardous chemicals in a work area where it may be more appropriate to address the hazards of a process rather than individual hazardous chemicals. However, the employer shall ensure that in all cases the required information is provided for each hazardous chemical, and is readily accessible during each work shift to employees when they are in their work areas(s).
- (11) Material safety data sheets shall also be made readily available, upon request, to designated representatives and to the Assistant Secretary, in accordance with the requirements of 29 CFR 1910.20 (e). The Director shall also be given access to material safety data sheets in the same manner.

(h) *Employee information and training.*

Employers shall provide employees with information and training on hazardous chemicals in their work area at the time of their initial assignment, and whenever a new hazard is introduced into their work area.

(1) *Information.* Employees shall be informed of:

- (i)** The requirements of this section;
- (ii)** Any operations in their work area where hazardous chemicals are present; and
- (iii)** The location and availability of the written hazard communication program, including the required list(s) of hazardous chemicals, and material safety data sheets required by this section.

(2) *Training.* Employee training shall include at least:

- (i)** Methods and observations that may be used to detect the presence or release of a hazardous chemical in the work area (such as monitoring conducted by the employer, continuous monitoring devices, visual appearance or odor of hazardous chemicals when being released, etc.);
- (ii)** The physical and health hazards of the chemicals in the work area;

- (iii) The measures employees can take to protect themselves from these hazards, including specific procedures the employer has implemented to protect employees from exposure to hazardous chemicals, such as appropriate work practices, emergency procedures, and personal protective equipment to be used; and
- (iv) The details of the hazard communication program developed by the employer, including an explanation of the labeling system and the material safety data sheet, and how employees can obtain and use the appropriate hazard information.

(i) *Trade secrets.*

- (1) The chemical manufacturer, importer, or employer may withhold the specific chemical identity, including the chemical name and other specific identification of a hazardous chemical, from the material safety data sheet, provided that:
 - (i) The claim that the information withheld is a trade secret can be supported;
 - (ii) Information contained in the material safety data sheet concerning the properties and effects of the hazardous chemical is disclosed;
 - (iii) The material safety data sheet indicates that the specific chemical identity is being withheld as a trade secret; and

- (iv) The specific chemical identity is made available to health professionals, employees, and designated representatives in accordance with the applicable provisions of this paragraph.
- (2) Where a treating physician or nurse determines that a medical emergency exists and the specific chemical identity of a hazardous chemical is necessary for emergency or first-aid treatment, the chemical manufacturer, importer, or employer shall immediately disclose the specific chemical identity of a trade secret chemical to that treating physician or nurse, regardless of the existence of a written statement of need of a confidentiality agreement. The chemical manufacturer, importer, or employer may require a written statement of need and confidentiality agreement, in accordance with the provisions of paragraphs (i)(3) and (4) of this section, as soon as circumstances permit.
- (3) In non-emergency situations, a chemical manufacturer, importer, or employer shall, upon request, disclose a specific chemical identity, otherwise permitted to be withheld under paragraph (i)(1) of this section, to a health professional (i.e., physician, industrial hygienist, toxicologist, epidemiologist, or occupational health nurse) providing medical or other occupational health services to exposed employee(s), and to employees or designated representatives, if:
 - (i) The request is in writing;
 - (ii) The request describes with reasonable detail one or more of the following occupational health needs for the information:

- (A) To assess the hazards of the chemicals to which employees will be exposed;
 - (B) To conduct or assess sampling of the workplace atmosphere to determine employee exposure levels;
 - (C) To conduct pre-assignment or periodic medical surveillance of exposed employees;
 - (D) To provide medical treatment to exposed employees;
 - (E) To select or assess appropriate personal protective equipment for exposed employees;
 - (F) To design or assess engineering controls or other protective measures for exposed employees; and
 - (G) To conduct studies to determine the health effects of exposure.
- (iii) The request explains in detail why the disclosure of the specific chemical identity is essential and that, in lieu thereof, the disclosure of the following information to the health professional, employee, or designated representative, would not satisfy the purposes described in paragraph (i)(3)(ii) of this section:
- (A) The properties and effects of the chemical;
 - (B) Measures for controlling workers' exposure to the chemical;
 - (C) Methods of monitoring and analyzing worker exposure to the chemical; and
 - (D) Methods of diagnosing and treating harmful exposures to the chemical;
- (iv) The request includes a description of the procedures to be used to maintain the confidentiality of the disclosed information; and

- (v) The health professional, and the employer or contractor of the services of the health professional (i.e., downstream employer, labor organization, or individual employee), employee, or designated representative, agree in a written confidentiality agreement that the health professional, employee, or designated representative, will not use the trade secret information for any purpose other than the health need(s) asserted and agree not to release the information under any circumstances other than to OSHA, as provided in paragraph (i)(6) of this section, except as authorized by the terms of the agreement or by the chemical manufacturer, importer, or employer.
- (4) The confidentiality agreement authorized by paragraph (i)(3)(iv) of this section:
 - (i) May restrict the use of the information to the health purposes indicated in the written statement of need;
 - (ii) May provide for appropriate legal remedies in the event of a breach of the agreement, including stipulation of a reasonable pre-estimate of likely damages; and
 - (iii) May not include requirements for the posting of a penalty bond.
- (5) Nothing in this standard is meant to preclude the parties from pursuing non-contractual remedies to the extent permitted by law.
- (6) If the health professional, employee, or designated representative receiving the trade secret information decides that there is a need to disclose it to OSHA, the chemical manufacturer, importer, or employer

who provided the information shall be informed by the health professional, employee, or designated representative prior to, or at the same time as, such disclosure.

- (7) If the chemical manufacturer, importer, or employer denies a written request for disclosure of a specific chemical identity, the denial must:
 - (i) Be provided to the health professional, employee, or designated representative, within thirty days of the request;
 - (ii) Be in writing;
 - (iii) Include evidence to support the claim that the specific chemical identity is a trade secret;
 - (iv) State the specific reasons why the request is being denied; and
 - (v) Explain in detail how alternative information may satisfy the specific medical or occupational health need without revealing the specific chemical identity.
- (8) The health professional, employee, or designated representative whose request for information is denied under paragraph (i)(3) of this section may refer the request and the written denial of the request to OSHA for consideration.
- (9) When a health professional, employee, or designated representative refers the denial to OSHA under paragraph (i)(8) of this section, OSHA shall consider the evidence to determine if:

- (i) The chemical manufacturer, importer, or employer has supported the claim that the specific chemical identity is a trade secret;
 - (ii) The health professional, employee, or designated representative has supported the claim that there is a medical or occupational health need for the information; and
 - (iii) The health professional, employee, or designated representative has demonstrated adequate means to protect the confidentiality.
- (10)
- (i) If OSHA determines that the specific chemical identity requested under paragraph (i)(3) of this section is not a bona fide trade secret, or that it is a trade secret, but the requesting health professional, employee, or designated representative has a legitimate medical or occupational health need for the information, has executed a written confidentiality agreement, and has shown adequate means to protect the confidentiality of the information, the chemical manufacturer, importer, or employer will be subject to citation by OSHA.
 - (ii) If a chemical manufacturer, importer, or employer demonstrates to OSHA that the execution of a confidentiality agreement would not provide sufficient protection against the potential harm from the unauthorized disclosure of a trade secret specific chemical identity, the Assistant Secretary may issue such orders or impose such additional limitations or conditions upon the disclosure of the requested chemical information as may be appropriate to assure that the occupational health services are provided without

an undue risk of harm to the chemical manufacturer, importer, or employer.

- (11) If a citation for a failure to release specific chemical identity information is contested by the chemical manufacturer, importer, or employer, the matter will be adjudicated before the Occupational Safety and Health Review Commission in accordance with the Act's enforcement scheme and the applicable Commission rules of procedure. In accordance with the Commission rules, when a chemical manufacturer, importer, or employer continues to withhold the information during the contest, the Administrative Law Judge may review the citation and supporting documentation in camera or issue appropriate orders to protect the confidentiality or such matters.
- (12) Notwithstanding the existence of a trade secret claim, a chemical manufacturer, importer, or employer shall, upon request, disclose to the Assistant Secretary any information which this section requires the chemical manufacturer, importer, or employer to make available. Where there is a trade secret claim, such claim shall be made no later than at the time the information is provided to the Assistant Secretary so that suitable determinations of trade secret status can be made and the necessary protections can be implemented.
- (13) Nothing in this paragraph shall be construed as requiring the disclosure under any circumstances of process or percentage of mixture information which is a trade secret.

(j) *Effective dates.*

- (1) Chemical manufacturers, importers, and distributors shall ensure that material safety data sheets are provided with the next shipment of hazardous chemicals to employers after September 23, 1987.
- (2) Employers in the non-manufacturing sector shall be in compliance with all provisions of this section by May 23, 1988. (Note: Employers in the manufacturing sector (SIC Codes 20 through 39) are already required to be in compliance with this section.)

(Approved by the Office of Management and Budget under control number 1218-0072)

Appendix A

Health Hazard Definitions (Mandatory)

Although safety hazards related to the physical characteristics of a chemical can be objectively defined in terms of testing requirements (e.g., flammability), health hazard definitions are less precise and more subjective. Health hazards may cause measurable changes in the body — such as decreased pulmonary function. These changes are generally indicated by the occurrence of signs and symptoms in the exposed employees — such as shortness of breath, a non-measurable, subjective feeling. Employees exposed to such hazards must be apprised of both the change in body function and the signs and symptoms that may occur to signal that change. The determination of occupational health hazards is complicated by the fact that many of the effects or signs and symptoms occur commonly in non-occupationally exposed populations, so that effects of exposure are difficult to separate from normally occurring illnesses. Occasionally, a substance causes an effect that is rarely seen in the population at large, such as angiosarcomas caused by vinyl chloride exposure, thus making it easier to ascertain that the occupational exposure was the primary causative factor. More often, however, the effects are common, such as lung cancer. The situation is further complicated by the fact that most chemicals have not been adequately tested to determine their health hazard potential, and data do not exist to substantiate these effects. There have been many attempts to categorize effects and to define them in various ways. Generally, the terms "acute" and "chronic" are used to delineate between effects on the basis of severity or duration. "Acute" effects usually occur rapidly as a result of short-term exposures, and are of short duration. "Chronic" effects generally occur as a result of long-term exposure, and are of long duration. The acute effects referred to most frequently are those defined by the American National Standards Institute (ANSI) standard for Precautionary Labeling

of Hazardous Industrial Chemicals (Z129.1-1982) — irritation, corrosivity, sensitization and lethal dose. Although these are important health effects, they do not adequately cover the considerable range of acute effects which may occur as a result of occupational exposure, such as, for example, narcosis. Similarly, the term chronic effect is often used to cover only carcinogenicity, teratogenicity, and mutagenicity. These effects are obviously a concern in the workplace, but again, do not adequately cover the area of chronic effects, excluding, for example, blood dyscrasias (such as anemia), chronic bronchitis and liver atrophy. The goal of defining precisely, in measurable terms, every possible health effect that may occur in the workplace as a result of chemical exposures cannot realistically be accomplished. This does not negate the need for employees to be informed of such effects and protected from them. Appendix B, which is also mandatory, outlines the principles and procedures of hazardous assessment. For purposes of this section, any chemicals which meet any of the following definitions, as determined by the criteria set forth in Appendix B are health hazards:

1. *Carcinogen*: A chemical is considered to be a carcinogen if:
 - (a) It has been evaluated by the International Agency for Research on Cancer (IARC), and found to be a carcinogen or potential carcinogen; or
 - (b) It is listed as a carcinogen or potential carcinogen in the Annual Report on Carcinogens published by the National Toxicology Program (NTP) (latest edition); or
 - (c) It is regulated by OSHA as a carcinogen.
2. *Corrosive*: A chemical that causes visible destruction of, or irreversible alterations in, living tissue by chemical action at the site of contact. For example, a chemical is considered to be corrosive if, when tested on the intact skin of albino rabbits by the method described by the U.S.

Department of Transportation in Appendix A to 49 CFR Part 173, it destroys or changes irreversibly the structure of the tissue at the site of contact following an exposure period of four hours. This term shall not refer to action on inanimate surfaces.

3. *Highly toxic:* A chemical falling within any of the following categories:
 - (a) A chemical that has a median lethal dose (LD50) of 50 milligrams or less per kilogram of body weight when administered orally to albino rats weighing between 200 and 300 grams each;
 - (b) A chemical that has a median lethal dose (LD50) of 200 milligrams or less per kilogram of body weight when administered by continuous contact for 24 hours (or less if death occurs within 24 hours) with the bare skin of albino rabbits weighing between two and three kilograms each; or
 - (c) A chemical that has a median lethal concentration (LC50) in air of 200 parts per million by volume or less of gas or vapor, or 2 milligrams per liter or less of mist, fume, or dust, when administered by continuous inhalation for one hour (or less if death occurs within one hour) to albino rats weighing between 200 and 300 grams each.
4. *Irritant:* A chemical, which is not corrosive, but which causes a reversible inflammatory effect on living tissue by chemical action at the site of contact. A chemical is a skin irritant if, when tested on the intact skin of albino rabbits by the methods of 16 CFR 1500.41 for four hours exposure or by other appropriate techniques, it results in an empirical score of five or more. A chemical is an eye irritant if so determined under the procedure listed in 16 CFR 1500.42 or other appropriate techniques.

5. *Sensitizer.* A chemical that causes a substantial proportion of exposed people or animals to develop an allergic reaction in normal tissue after repeated exposure to the chemical.
6. *Toxic.* A chemical falling within any of the following categories:
 - (a) A chemical that has a median lethal dose (LD50) of more than 50 milligrams per kilogram but not more than 500 milligrams per kilogram of body weight when administered orally to albino rats weighing between 200 and 300 grams each;
 - (b) A chemical that has a median lethal dose (LD50) of more than 200 milligrams per kilogram but not more than 1,000 milligrams per kilogram of body weight when administered by continuous contact for 24 hours (or less if death occurs within 24 hours) with the bare skin of albino rabbits weighing between two and three kilograms each; or
 - (c) A chemical that has a median lethal concentration (LC50) in air of more than 200 parts per million but not more than 2,000 parts per million by volume of gas or vapor, or more than two milligrams per liter but not more than 20 milligrams per liter of mist, fume, or dust, when administered by continuous inhalation for one hour (or less if death occurs within one hour) to albino rats weighing between 200 and 300 grams each.
7. *Target organ effects.* The following is a target organ categorization of effects which may occur, including examples of signs and symptoms and chemicals which have been found to cause such effects. These examples are presented to illustrate the range and diversity of effects and hazards found in the workplace, and the broad scope employers must consider in this area, but are not intended to be all-inclusive.
 - a. *Hepatotoxins:* Chemicals which produce liver damage
Signs/Symptoms: Jaundice; liver enlargement
Chemicals: Carbon tetrachloride; nitrosamines

- b. *Nephrotoxins:* Chemicals which produce kidney damage
Signs/Symptoms: Edema; proteinuria
Chemicals: Halogenated hydrocarbons; uranium
- c. *Neurotoxins:* Chemicals which produce their primary toxic effects on the nervous system
Signs/Symptoms: Narcosis; behavioral changes; decrease in motor functions
Chemicals: Mercury; carbon disulfide
- d. *Agents which act on the blood or hematopoietic system:*
Decrease hemoglobin function; deprive the body tissues of oxygen
Signs/Symptoms: Cyanosis; loss of consciousness
Chemicals: Carbon monoxide; cyanides
- e. *Agents which damage the lung:* Chemicals which irritate or damage the pulmonary tissue
Signs/Symptoms: Cough; tightness in chest; shortness of breath
Chemicals: Silica; asbestos
- f. *Reproductive toxins:* Chemicals which affect the reproductive capabilities including chromosomal damage (mutations) and effects on fetuses (teratogenesis)
Signs/Symptoms: Birth defects; sterility
Chemicals: Lead; DBCP
- g. *Cutaneous hazards:* Chemicals which affect the dermal layer of the body
Signs/Symptoms: Defatting of the skin; rashes; irritation
Chemicals: Ketones; chlorinated compounds
- h. *Eye hazards:* Chemicals which affect the eye or visual capacity
Signs/Symptoms: Conjunctivitis; corneal damage
Chemicals: Organic solvents; acids

Appendix B

Hazard Determination (Mandatory)

The quality of a hazard communication program is largely dependent upon the adequacy and accuracy of the hazard determination. The hazard determination requirement of this standard is performance-oriented. Chemical manufacturers, importers, and employers evaluating chemicals are not required to follow any specific methods for determining hazards, but they must be able to demonstrate that they have adequately ascertained the hazards of the chemicals produced or imported in accordance with the criteria set forth in this Appendix. Hazard evaluation is a process which relies heavily on the professional judgment of the evaluator, particularly in the area of chronic hazards. The performance-orientation of the hazard determination does not diminish the duty of the chemical manufacturer, importer or employer to conduct a thorough evaluation, examining all relevant data and producing a scientifically defensible evaluation. For purposes of this standard, the following criteria shall be used in making hazard determinations that meet the requirements of this standard.

1. Carcinogenicity:

As described in paragraph (d)(4) and Appendix A of this section, a determination by the National Toxicology Program, the International Agency for Research on Cancer, or OSHA that a chemical is a carcinogen or potential carcinogen will be considered conclusive evidence for purposes of this section.

2. *Human data:*

Where available, epidemiological studies and case reports of adverse health effects shall be considered in the evaluation.

3. *Animal data:*

Human evidence of health effects in exposed populations is generally not available for the majority of chemicals produced or used in the workplace. Therefore, the available results of toxicological testing in animal populations shall be used to predict the health effects that may be experienced by exposed workers. In particular, the definitions of certain acute hazards refer to specific animal testing results (see Appendix A).

4. *Adequacy and reporting of data:*

The results of any studies which are designed and conducted according to established scientific principles, and which report statistically significant conclusions regarding the health effects of a chemical, shall be a sufficient basis for a hazard determination and reported on any material safety data sheet. The chemical manufacturer, importer, or employer may also report the results of other scientifically valid studies which tend to refute the findings of hazard.

Appendix C

Information Sources (Advisory)

The following is a list of available data sources which the chemical manufacturer, importer, distributor, or employer may wish to consult to evaluate the hazards of chemicals they produce or import:

- Any information in their own company files, such as toxicity testing results or illness experience of company employees.
- Any information obtained from the supplier of the chemical, such as material safety data sheets or product safety bulletins.
- Any pertinent information obtained from the following source list (latest editions should be used):

Condensed Chemical Dictionary Van Nostrand Reinhold Co.
135 West 50th Street
New York, New York 10020

The Merck Index: An Encyclopedia of Chemicals and Drugs
Merck and Company, Inc.
126 East Lincoln Avenue
Rahway, New Jersey 07065

IARC Monographs on the Evaluation of the
Carcinogenic Risk of Chemicals to Man
Geneva: World Health Organization
International Agency for Research on Cancer, 1972-Present
(Multivolume work)
Summaries are available in supplement volumes.
49 Sheridan Street, Albany, New York 12210

Industrial Hygiene and Toxicology
by F.A. Patty (Multivolume work)
John Wiley & Sons, Inc.
New York, New York

Clinical Toxicology of Commercial Products
Gleason, Gosselin & Hodge
Casarett & Doull's Toxicology

The Basic Science of Poisons Doull, Klaassen & Amdur
Macmillan Publishing Co., Inc.
New York, New York

Industrial Toxicology
by Alice Hamilton and Harriet L. Hardy
Publishing Sciences Group, Inc.
Acton, Massachusetts

Toxicology of the Eye
by W. Morton Grant
Charles C. Thomas
301-327 East Lawrence Avenue
Springfield, Illinois

Recognition of Health Hazards in Industry
William A. Burgess
John Wiley & Sons
605 Third Avenue
New York, New York 10158

Chemical Hazards of the Workplace
Nick H. Proctor and James P. Hughes
J.P. Lipincott Company
6 Winchester Terrace
New York, New York 10022

Handbook of Chemistry and Physics Chemical Rubber Company
18901 Cranwood Parkway
Cleveland, Ohio 44128

Threshold Limit Values for Chemical Substances and
Physical Agents in the Work Environment and
Biological Exposure Indices with Intended Changes
American Conference of Governmental Industrial Hygienists
(ACGIH)
6500 Glenway Avenue, Building D-5
Cincinnati, Ohio 45211

Information on the physical hazards of chemicals may be found in publications
of the National Fire Protection Association, Boston, Massachusetts. Note.

- The following documents may be purchased from the Superintendent of
Documents, U.S. Government Printing Office, Washington, D.C. 20402:

Occupational Health Guidelines NIOSH/OSHA
(NIOSH Pub. No. 81-123);

NIOSH Pocket Guide to Chemical Hazards
(NIOSH Pub. No. 85-114);

Registry of Toxic Effects of Chemical Substances
(NIOSH Pub. No. 80-102);

Miscellaneous Documents published by the
National Institute for Occupational Safety and Health:
Criteria documents;

Special Hazard Reviews;

Occupational Hazard Assessments;

Current Intelligence Bulletins;

OSHA's General Industry Standards (29 CFR Part 1910)
NTP Annual Report on Carcinogens and
Summary of the Annual Report on Carcinogens
National Technical Information Service (NTIS)
5285 Port Royal Road
Springfield, Virginia 22161
(703) 487-4650

BIBLIOGRAPHIC DATA BASES

Service Provider	File Name
Bibliographic Retrieval Services (BRS) 1200 Route 7 Latham, New York 12110	Biosis Previews CA Search Medlars NTIS Hazardline American Chemical Society Journal Excerpta Medica IRCS Medical Science Journal Pre-Med Intl Pharmaceutical Abstracts Paper Chem
Lockheed-DIALOG Information Service, Inc. 3460 Hillview Avenue Palo Alto, California 94304	Biosis Prev. Files CA Search Files CAB Abstracts Chemical Exposure Chemname Chemsis Files Chemzero Embase Files Environmental Bibliographies Enviroline Federal Research in Progress IRL Life Science Collection NTIS Occupational Safety and Health (NIOSH) Paper Chem
SDC-Orbit SDC Information Service 2500 Colorado Avenue Santa Monica, California 90406	CAS Files Chemdex, 2, 3 NTIS

Service Provider	File Name
National Library of Medicine Department of Health and Human Services Public Health Service National Institutes of Health Bethesda, Maryland 20209	Hazardous Substances Data Bank (NSDB) Medline files Toxline files Cancerlit RTECS Chemline
Pergamon International Information Corp. 1340 Old Chain Bridge Road McLean, Virginia 22101	Laboratory Hazard Bulletin
Questel, Inc. 1625 Eye Street, N.W., Suite 818 Washington, D.C. 20006	CIS/LO Cancernet
Chemical Information System ICI (ICIS) Bureau of National Affairs 1133 15th Street, N.W. Suite 300 Washington D.C. 20005	Structure and Nomenclature Search System (SANSS) Acute toxicity Clinical toxicology of commercial products Oil and hazardous materials technical assistance data system CCRIS CESARS
Occupational Health Services 400 Plaza Drive Secaucus, New Jersey 07094	MSDS Hazardline

Appendix D

Definition of "Trade Secret" (Mandatory)

The following is a reprint of the Restatement of Torts section 757, comment b (1939): b. Definition of trade secret. A trade secret may consist of any formula, pattern, device or compilation of information which is used in one's business, and which gives him an opportunity to obtain an advantage over competitors who do not know or use it. It may be a formula for a chemical compound, a process of manufacturing, treating or preserving materials, a pattern for a machine or other device, or a list of customers. It differs from other secret information in a business (see 759 of the Restatement of Torts which is not included in this Appendix) in that it is not simply information as to single or ephemeral events in the conduct of the business, as, for example, the amount or other terms of a secret bid for a contract or the salary of certain employees, or the security investments made or contemplated, or the date fixed for the announcement of a new policy or for bringing out a new model or the like. A trade secret is a process or device for continuous use in the operations of the business. Generally it relates to the production of goods, as, for example, a machine or formula for the production of an article. It may, however, relate to the sale of goods or to other operations in the business, such as a code for determining discounts, rebates or other concessions in a price list or catalogue, or a list of specialized customers, or a method of bookkeeping or other office management. Secrecy. The subject matter of a trade secret must be secret. Matters of public knowledge or of general knowledge in an industry cannot be appropriated by one as his secret. Matters which are completely disclosed by the goods which one markets cannot be his secret. Substantially, a trade secret is known only in the particular business in which it is used. It is not requisite that only the proprietor of the business know it. He may, without losing his protection, communicate it to

employees involved in its use. He may likewise communicate it to others pledged to secrecy. Others may also know of it independently, as, for example, when they have discovered the process or formula by independent invention and are keeping it secret. Nevertheless, a substantial element of secrecy must exist, so that, except by the use of improper means, there would be difficulty in acquiring the information. An exact definition of a trade secret is not possible. Some factors to be considered in determining whether given information is one's trade secret are:

- (1) The extent to which the information is known outside of his business;
- (2) The extent to which it is known by employees and others involved in his business;
- (3) The extent of measures taken by him to guard the secrecy of the information;
- (4) The value of the information to him and his competitors;
- (5) The amount of effort or money expended by him in developing the information; and
- (6) The ease or difficulty with which the information could be properly acquired or duplicated by others. Novelty and prior art. A trade secret may be a device or process which is patentable; but it need not be that. It may be a device or process which is clearly anticipated in the prior art or one which is merely a mechanical improvement that a good mechanic can make. Novelty and invention are not requisite for a trade secret as they are for patentability. These requirements are essential to patentability because a patent protects against unlicensed use of the patented device or process even by one who discovers it properly through

independent research. The patent monopoly is a reward to the inventor. But such is not the case with a trade secret. Its protection is not based on a policy of rewarding or otherwise encouraging the development of secret processes or devices. The protection is merely against breach of faith and reprehensible means of learning another's secret. For this limited protection it is not appropriate to require also the kind of novelty and invention which is a requisite of patentability. The nature of the secret is, however, an important factor in determining the kind of relief that is appropriate against one who is subject to liability under the rule stated in this section. Thus, if the secret consists of a device or process which is a novel invention, one who acquires the secret wrongfully is ordinarily enjoined from further use of it and is required to account for the profits derived from his past use. If, on the other hand, the secret consists of mechanical improvements that a good mechanic can make without resort to the secret, the wrongdoer's liability may be limited to damages, and an injunction against future use of the improvements made with the aid of the secret may be inappropriate.

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