

ity to develop a program suitable for their particular facility.

2. Compliance Safety and Health Officers (CSHO's) must exercise a high level of professional judgment during compliance inspections. This instruction provides guidelines and evaluation strategies. The standard itself, and the preamble accompanying it, must be relied upon for further guidance.

H. Phased Implementation. The HCS is designed to result in a downstream flow of hazard information from the producers of chemicals to industrial users of these products. Since receipt of such information is necessary to implement some parts of the standard, the effective dates allow for a phase-in period for compliance.

1. As of November 25, 1985, chemical manufacturers, importers, and distributors are required to label shipped containers of hazardous chemicals, and to provide Material Safety Data Sheets (MSDS) to manufacturing purchasers of these chemicals (i.e., employers in Standard Industrial Classification (SIC) Codes 20-39, the manufacturing sector).

2. As of May 25, 1986, all employers in SIC Codes 20-39 must be in compliance with all of the requirements of the standard.

I. Organization of this Instruction. Compliance guidelines and policy considerations are addressed within the main part of this instruction. Clarifications, interpretations, review aids and other information are provided in Appendixes A through C. This format will permit easier updating and additions, as enforcement experience provides more information regarding these areas.

1. Appendix A of this instruction provides clarifications of provisions of the standard where significant interpretations are necessary to ensure uniform enforcement and understanding.

2. Appendix B provides a sample letter for inquiries regarding missing or deficient material safety data sheets.

3. Appendix C provides general guidelines for evaluation of hazards.

J. Inspection Guidelines. The following are general inspection guidelines:

1. **Phased Enforcement.** Enforcement activity must conform with the implementation schedule described in F.1. (Phased Implementation) of this instruction. For clarity, the standard's requirement may be viewed as prompting two distinct and separable levels of effect.

a. **Suppliers of Hazardous Chemicals.** These employers include importers, chemical manufacturers and distributors. As outlined below, specific responsibilities, relating to shipped or sold hazardous chemicals, began on November 25, 1985. CSHO's are currently required to evaluate visited suppliers.

b. **Users of Hazardous Chemicals.** This category includes all employers that are in SIC Codes 20-39. In-house requirements for these employers begin on May 25, 1986.

2. **Suppliers and Users.** The roles of suppliers and users and their respective functions are intertwined. A chemical manufacturer, for example, will have had to fulfill its supplier responsibilities as of November 25, 1985. The same employer's remaining in-house responsibilities, relating to the employer's own workplace, begin on May 25, 1986.

a. **Specific Supplier Responsibilities (as of November 25, 1985).**

(1) Perform hazard determinations.

(2) Comply with labeling, and

(3) MSD requirements.

b. **Specific User Responsibilities (as of May 25, 1986).** Perform hazard determination for hazardous chemicals created within and used exclusively on-site.

3. **Inspection Resources.** Both Safety and Health Compliance Officers shall evaluate employer compliance with the HCS during the course of all programmed inspections at establishments classified within SIC Codes 20-39, including records review inspection. Employer compliance shall also be evaluated during unprogrammed inspections, when the need becomes apparent, and with supervisory approval.

a. Both safety and health CSHO's shall evaluate employer compliance with the written program requirements, use of labels, availability of MSDS and appropriate training.

b. CSHO's shall consult with opposite discipline personnel when other specific expertise is necessary to evaluate elements of the employer's program. For example, an Industrial Hygienist may need to consult with an Occupational Safety and Health Specialist when questions arise concerning fire protection statements on an MSDS.

4. **Citation Guidelines.** Citations for violations of 29 CFR 1910.1200 (e)(1), (f)(1), (g)(1) and (h) shall be issued as separate items, when there is a complete lack of hazard communication program.

5. **Hazard Determination - 29 CFR 1910.1200(d).**

Chemical manufacturers and importers are required to perform hazard determinations on all chemicals they produced or imported. Hazard determination procedures must be in writing and made available, upon request, to employees, NIOSH and OSHA.

a. If a chemical manufacturer has developed Material Safety Data Sheets (MSDS) but does not have the written procedures available that were used to determine the hazards of the chemical(s), then an apparent violation of 29 CFR 1910.1200(d)(6) exists and shall be recommended for citation. This policy applies also if the chemical manufacturer relies on MSDS from upstream chemical manufacturers (i.e., a written hazard determination is required, although the manufacturer could simply state that it is relying on the upstream chemical manufacturer's information).

b. If no written procedures are available and the chemical manufacturer has not obtained or developed an MSDS, then apparent violations of 29 CFR 1910.1200 (d)(1) and (d)(6) exist and shall be recommended for citation. (Refer to J.8.d., page 17, of this instruction for guidance.)

c. When deficiencies exist in the chemical manufacturer's or importer's hazard determination, then the specific deficiencies shall be documented and recommended for citation under 29 CFR 1910.1200 (d)(2).

d. The employer shall be asked to forward the written hazard determination procedures to the Area Director when they are not immediately available at the establishment. A reasonable time period not exceeding 5 working days shall be allowed for receipt in the Area Office.

e. CSHO's shall determine the adequacy of a company's hazard determination program primarily by assessing the outcome of that determination; i.e., the accuracy and adequacy of the information on labels and material safety data sheets. The written hazard evaluation procedures are to generally describe the process followed — they do not have to address each chemical evaluated.

(1) Although not required, many companies will keep records of individual chemical evaluations. In the event of a finding by the CSHO of an inaccurate determination, as indicated by inaccurate information on the MSDS or label, these records may be useful in identifying where the company's evaluation differed from OSHA's and for documentation of appropriate violations.

(2) In general, the hazard evaluation procedures should address the following:

(a) The person(s) responsible for evaluating the chemical(s).

(b) The sources of information to be consulted. Evaluators should have access to a wide range of sources. While well-known chemicals could be adequately evaluated by consulting established reference texts, others will require searches of bibliographic data bases.

(c) Criteria to be used to evaluate the studies, including those parameters addressed by the HCS (i.e., statistical significance; conducted according to scientific principles).

(d) A plan for reviewing information to update the MSDS if new and significant health information is found.

f. **Citations.** Citations for violations of 29 CFR 1910.1200(d)(1) shall be issued when the employer has failed to perform a hazard determination. Paragraph (d)(2) of the standard shall be used, and specific deficiencies noted, when deficiencies exist.

g. **Specific Documentation.** The following items shall be documented in addition to those required by the FOM when citations are recommended under 29 CFR 1910.1200(d):

(1) The name of the chemical.

(2) Name of person preparing the hazard determination, MSDS, who they work for, etc.

(3) To whom the chemical is being sold; i.e., name, location of establishment; document that the chemical is sold to employers in SIC Codes 20-39 or a distributor, and that employees may be exposed, where possible.

(4) Document the number of employees in the establishment being inspected that may be exposed (including potential exposure) to the chemical.

(5) Health and physical hazards of the chemical.

6. **Written Hazard Communication Program, 29 CFR 1910.1200(e).** CSHO's shall review the employer's written hazard communication program to determine if all applicable requirements of 29 CFR 1910.1200(e) have been addressed. The review of the written program shall be done first, prior to ascertaining whether the elements of the program have been implemented in the workplace. The length and complexity of the written program will vary from site to site. The CSHO shall determine whether or not the employer has addressed the issues in sufficient detail to ensure that a comprehensive approach to hazard communication has been developed. If no program exists, the employer shall be cited under 29 CFR 1910.1200(e)(1). An effective program need not include all of the elements listed below. They are provided to serve as an evaluation tool. The primary considerations should be whether the program adequately addresses the issues, and whether employees are permitted ready access to required information. The preamble states "The written program need not be lengthy or

complicated, but should adequately address each of these required components in the program." In general, the written program should include consideration of the following elements:

a. **Labels and other Forms of Warning.**

(1) Designation of person(s) responsible for ensuring labeling of in-plant containers.

(2) Designation of person(s) responsible for ensuring labeling on shipped containers.

(3) Description of labeling system(s) used.

(4) Description of written alternatives to labeling of in-plant containers, if used.

(5) Procedures to review and update label information when necessary.

b. **Material Safety Data Sheets.**

(1) Designation of person(s) responsible for obtaining/maintaining the MSDS.

(2) How such sheets are to be maintained (e.g., in notebooks in the work area(s)), and how employees can obtain access to them.

(3) Procedure to follow when the MSDS is not received at time of the first shipment.

(4) Procedure for updating the MSDS when new and significant health information is found.

(5) Description of alternatives to actual data sheets in the workplace, if used.

c. **Training.**

(1) Designation of person(s) responsible for conducting training.

(2) Format of the program to be used (audiovisuals, classroom instruction, etc.).

(3) Elements of the training program — compare to the elements required by the HCS. (See 29 CFR 1910.1200(h).)

(4) Procedure to train new employees at the time of their initial assignment to work with a hazardous chemical, and to train employees when a new hazard is introduced into the workplace.

(5) Guidelines on training programs prepared by the Office of Training and Education (49 FR 30290; July 27, 1984) can be used to provide general information on what constitutes a good training program.

d. Does a list of the hazardous chemicals exist in each work area or at a central location?

e. Are methods the employer will use to inform employees of the hazards of nonroutine tasks outlined?

f. Are employees informed of the hazards associated with chemicals contained in unlabeled pipes in their work areas?

g. Does the plan include methods employers will use to inform contractors in manufacturing facilities of the hazards to which their employees may be exposed?

h. Is the written program made available to employees and their designated representatives?

CITATIONS:

29 CFR 1910.1200(e)(1)(i) of the standard shall be cited when no lists are developed or when they are incomplete.

Paragraph (e)(1)(ii) of the standard shall be used when a system does not exist to inform employees of the hazards associated with nonroutine work tasks, and with chemicals contained in unlabeled pipes.

If a written hazard communication program exists but is found deficient, group the deficiency indicated in 1910.1200(e)(1) with that found in 1910.1200(f), (g) or (h). "Cite 1910.1200(e)(1) as an individual item only if no program exists."

7. Labels and Other Forms of Warning, 29 CFR 1910.1200(f).

a. Labels or other markings on each container of chemicals must include:

(1) Identity (can be any chemical or common name designation for the individual chemical or mixture, as long as the term used is also used on the list of hazardous chemicals and the MSDS); and

(2) Appropriate hazard warnings. (See Appendix A for interpretation of this requirement.)

b. Labels on shipped containers must also include the name and address of the chemical manufacturer, importer, or other responsible party.

c. The standard allows considerable flexibility in format and content of labels, as long as the minimal information requirements are met.

d. CSHO's shall determine that containers are labeled, that the labels are legible, and that they are prominently displayed. The accuracy of the label information is to be assessed for a representative number of chemicals.

e. The CSHO shall determine whether the label identity is cross-referencable with the MSDS and list of hazardous chemicals.

CITATIONS:

Appropriate paragraphs from 29 CFR 1910.1200(f)(1)(i) through (f)(1)(iii) shall be cited when deficiencies are found relating to products that are shipped downstream.

Paragraphs (f)(4)(i) and (f)(4)(ii) of the standard will be cited when a hazardous chemical is created and used only in-house.

f. *Special Documentation.* The following items shall be documented in addition to those required by the FOM when citations are recommended under 1910.1200(g):

(1) The name of the chemical.

(2) Name of person preparing the hazard determination, MSDS, who they work for, etc.

(3) To whom the chemical is being sold; i.e., name, location of establishment; document that the chemical is sold to employers in SIC Codes 20-39 or a distributor, and the employees may be exposed, where possible.

(4) Document the number of employees in the establishment being inspected that may be exposed (including potential exposure) to the chemical.

(5) Health and physical hazards of the chemical. Guidance on carcinogen labeling may be found in Appendix A of this instruction.

8. Material Safety Data Sheets, 29 CFR 1910.1200(g).

a. *Development of MSDS.* Requires chemical manufacturers and importers to obtain or develop a material safety data sheet for each hazardous chemical they produce or import. The CSHO shall evaluate the compliance status of this provision by:

(1) Examining a representative number of MSDS to determine that the MSDS have been obtained or developed, and that the MSDS have been prepared in accordance with the requirements of 29 CFR 1910.1200(g)(2).

(5). (See pages 15-16.)

(2) Reviewing a representative number of MSDS to ensure that the information regarding the health and physical hazards is technically accurate. Copies of published MSDS references have been provided to each Regional Office. This system is only one of many available through the Directorate of Technical Support, Technical Data Center.

(a) If the CSHO is unfamiliar with the chemical for which the MSDS is being evaluated, a copy of a published MSDS for that chemical can be obtained by calling the Regional Office. The CSHO is to complete this review by following the procedures outlined in the Hazard Evaluation Procedures, Appendix C of this instruction.

(b) If the Regional Office does not have information on the chemical in question, then the Regional Office shall contact the Technical Data Center.

NOTE: Published MSDS reference files are copyrighted, and therefore, must NOT be copied for distribution to the public.

(3) The published MSDS are to be used as a screening resource for the CSHO. The information on these MSDS has not been evaluated by OSHA to determine if it is accurate or necessary in every situation. It should be useful to help identify which areas require further research or where information is lacking on the MSDS being reviewed. Citations may be issued only when OSHA independently verifies the information. This is to be done by completing a review of the MSDS following the procedures in Appendix C of this instruction.

(4) The number of MSDS and the particular MSDS selected for review will be dependent upon several factors, such as:

(a) The number of chemicals in the workplace.

(b) The severity of the hazards involved.

(c) The completeness of the MSDS in general.

(d) The volume of the chemicals used.

b. *Transmission of MSDS.* 29 CFR 1910.1200(g)(6) requires chemical manufacturers and importers to provide the appropriate MSDS to distributors and manufacturing purchasers of hazardous chemicals at the time of the initial shipment of the hazardous chemical(s) and with the first shipment of the hazardous chemical(s) after the MSDS has been updated. The MSDS must be shipped with the containers of the hazardous chemical(s) or sent prior to the time of the shipment.

(1) Furthermore, 1910.1200(g)(7) requires distributors to provide MSDS and any updated MSDS to other distributors and manufacturing purchasers of hazardous chemicals.

(2) The CSHO shall ensure compliance with these provisions of the standard by reviewing the chemical manufacturer's, importer's, or distributor's program for transmitting MSDS and updated MSDS to manufacturing purchasers, and other distributors.

c. *Employer MSDS Files.* Beginning May 25, 1986, 29 CFR 1910.1200(g)(1) requires employers to have MSDS for each hazardous chemical they use. In addition, 29 CFR 1910.1200(g)(8) requires employers, which includes chemical manufacturers and manufacturing purchasers, to maintain copies of the appropriate MSDS for each hazardous chemical used in the workplace, and ensure that the MSDS are readily accessible to employees in their work areas during each work shift.

Figure 1

GUIDE FOR REVIEWING MSDS COMPLETENESS

29 CFR §1910.1200(g) Material Safety Data Sheets (MSDS).

(1) Do chemical manufacturers and importers have MSDS for each hazardous chemical produced or imported?

Do employers have a MSDS for each hazardous chemical used?

(2) Is each MSDS in English?

Does each MSDS contain at least the following information:

(i) Does each MSDS contain the identity used on the label?

(A) Does each MSDS contain the chemical and common name(s) for single substance hazardous chemicals?

(B) For mixtures tested as a whole:

Does each MSDS contain the chemical and common name(s) of the ingredients which contribute to these known hazards?

Does each MSDS contain the common name(s) of the mixture itself?

(C) For mixtures not tested as a whole:

(1) Does each MSDS contain the chemical and common name(s) of all ingredients which are health hazards (1% or greater), or in the case of carcinogens (0.1% or greater)?

(2) Does each MSDS contain the chemical and common name(s) of all ingredients which have been determined to present a physical hazard when present in the mixture?

(ii) Does each MSDS contain the physical and chemical characteristics of the hazardous chemical (vapor pressure, flash point, etc.)?

(iii) Does each MSDS contain the physical hazards of the hazardous chemical, including the potential for fire, explosion, and reactivity?

(iv) Does each MSDS contain the health hazards of the hazardous chemical (including signs and symptoms, medical conditions aggravated)?

(v) Does each MSDS contain the primary routes of entry?

(vi) Does each MSDS contain the OSHA PEL? the AC-GIH TLV? other exposure limit (including ceiling and other short-term limits)?

(vii) Does each MSDS contain information on carcinogen listings (reference OSHA regulated carcinogens, those indicated in the National Toxicology Program (NTP) annual report and those listed by the International Agency for Research on Carcinogens (IARC).

NOTE: Negative conclusions regarding carcinogenicity or the fact that there is no information do not have to be reported unless there is a specific blank for carcinogenicity on the form.

(viii) Does each MSDS contain general applicable procedures and precautions for safe handling and use of the chemical (hygienic practices, maintenance and spill procedures)?

(ix) Does each MSDS contain generally applicable control (engineering controls, work practices, or personal protective equipment)?

(x) Does each MSDS contain emergency and first aid procedures?

(xi) Does each MSDS contain date of preparation or last change?

(xii) Does each MSDS contain name, address and telephone number or responsible party?

(3) Are all sections of the MSDS completed?

NOTE: This is for use as an aid on inspections. It is NOT a form.**d. Citation and Referral Procedures for Employers.**

Where employers, including chemical manufacturers, are relying on the MSDS supplied by other chemical manufacturers or importers for their in-house MSDS programs for their employees, the following procedures apply:

(1) Employers are not to be held responsible for inaccurate information on the MSDS which they did not prepare and they have accepted in good faith from the chemical manufacturer, importer or distributor, (i.e., the sheets are completed and not obviously unacceptable). The CSHO shall take copies of the MSDS with inaccurate information back to the Area Office for referral to the appropriate Regional Office for further action. Before making the referral, the Area Director shall write to the supplier using the sample letter in Appendix B of this instruction.

(2) If MSDS are missing or have not been received for a hazardous chemical(s), the employer shall be cited for violation of 29 CFR 1910.1200(g)(1) with a 30-day abatement period. CSHO's shall recommend that the employer write to both their supplier and the product manufacturer for the MSDS.

(3) If at the end of the 30-day abatement period the employer still has failed to receive all of the requisite MSDS, the Area Director shall concurrently call and send a certified letter to the supplier or manufacturer to obtain the needed information. (See sample letter in Appendix B.)

(a) Area Offices should expect to receive requests from employers to assist them in obtaining MSDS in situations where an inspection has not been conducted. All calls, not relating to an ongoing inspection, shall be documented on a log established for this purpose.

(b) If the Area Director determines that the employer has tried to obtain the information, and has not been able to, a letter and telephone call to the supplier or manufacturer is the appropriate action in this situation as well. The Area Office shall document all actions taken in the case file.

(4) If the supplier or manufacturer fails to respond within a reasonable time (e.g., 30 days), a referral (OSHA-90 Form), with completed background information attached to it, is to be sent through the Regional Office to the Regional Office within whose jurisdiction the supplier or manufacturer does business.

(a) Where the supplier or manufacturer is in the same Region as the Area Office, the OSHA-90 Form is to be completed and sent through the Regional Office to the appropriate Area Office within that Regional jurisdiction. The Area Office shall deal directly with those suppliers or manufacturers located within their jurisdictions.

(b) Where the supplier or manufacturer is under State plan jurisdiction in the same Region, the OSHA-90 Form is to be completed and sent to the State designee with a request for a State hazard communication inspection.

(c) Where the supplier or manufacturer is under State plan jurisdiction in a different Region, the OSHA-90 Form is to be completed and sent to the Regional Office under whose jurisdiction the State is located for forwarding to the State designee with a request for a State hazard communication inspection.

(d) The Regional Office shall forward a copy of each referral and/or citations which result (obtained from the State if the referral was to a State plan) to the Directorate of Field Operations.

(5) The Regional Office, within whose jurisdiction the upstream supplier or manufacturer is located, shall then ensure that an abbreviated inspection is conducted (i.e., limited to the requirements of the HCS) and take appropriate enforcement action. The findings and the MSDS obtained shall be sent to the referring office.

(6) The Regional Administrator shall coordinate with State designees to ensure that referrals from State plans are handled in a similar manner with the following taken into account:

(a) If the supplier or manufacturer fails to respond to a state plan MSDS request, the State shall submit to the Regional Administrator a referral form (OSHA-90) with complete background information attached to it (including a copy of the State's right-to-know law and/or hazard communication standard) to be forwarded to the Regional Office under whose jurisdiction (Federal or State) the supplier or manufacturer does business.

Note: OSHA will respond to referrals from State plans for the purpose of obtaining an MSDS from a supplier or manufacturer who has not provided an MSDS to an employer in the referring State, but will not act on a referral from a State if it is for the purpose of obtaining an MSDS for inclusion in a State maintained MSDS file/repository.

(b) The Region receiving a State plan MSDS referral shall ensure that a hazard communication inspection is conducted if the supplier or manufacturer is under Federal jurisdiction, or if under State plan jurisdiction, forward the referral to the State designee with a request for a State hazard communication inspection.

(c) In situations where a State plan referral is for a supplier or manufacturer who has not provided an MSDS or provided an inaccurate MSDS to a customer outside of the manufacturing SIC codes (i.e., SIC 20-39), in violation of the referring State's expanded scope, law and/or standard, and the inspecting office finds the supplier or manufacturer to be otherwise in compliance with the Federal or inspecting State's requirements, technical assistance shall be given by providing copies of the referring State's requirements and advising the supplier or manufacturer of the responsibility to provide accurate MSDS to customers in that State outside of the manufacturing sector.

(d) The inspecting office shall report its findings and submit any MSDS obtained to the Regional Administrator for forwarding to the referring State plan.

e. *Citation and Referral Procedures for Distributors.* Where the CSHO determines that a distributor is not transmitting the MSDS the following procedures apply:

(1) The distributor shall be cited for violation of paragraph (g)(7), with immediate abatement, unless the

distributor did not receive the MSDS from the chemical manufacturer, importer, or distributor. In such cases the abatement period will be 30 days.

(2) When a distributor has not received a MSDS from the supplier, the CSHO shall recommend that the distributor write to the chemical manufacturer, and if applicable, other distributor which supplied the chemical. If at the end of the 30-day abatement period, the distributor has failed to receive the MSDS, the Area Director shall follow the referral procedures outlined in J.7.d.(3) through J.7.d.(6).

(3) Abatement shall include transmitting MSDS to all manufacturing employers of the distributor receiving the chemical(s) retroactive to November 25, 1985.

f. *Distributor MSDS.* In cases where a distributor substitutes their name for that of the chemical manufacturer and those MSDS are inaccurate or incomplete, citations shall not be issued to the distributor. The following procedures shall be relied upon:

(1) The Area Director shall write to the chemical manufacturer utilizing the sample letter provided in Appendix B of this instruction.

(2) Where the chemical manufacturer fails to respond within the time period specified in the letter, a referral shall be made according to the procedures outlined under J.7.d.(4) through J.7.d.(6) of this instruction.

g. *Specific Documentation.* The following items shall be documented in addition to those required by the FOM when citations are recommended under 29 CFR 1910.1200(g):

(1) The name of the chemical.

(2) Name of the person preparing the hazard determination, MSDS, who they work for, etc.

(3) To whom the chemical is being sold; i.e., name, location of establishment; document that the chemical is sold to employers in SIC Codes 20-39 or a distributor, and that the employees may be exposed, where possible.

(4) Document the number of employees in the establishment being inspected that may be exposed (including potential exposure) to the chemical.

(5) Health and physical hazards of the chemical.

(6) Copies of inaccurate and or incomplete MSDS shall be included in the case file.

h. *Compliance Assistance.* If the Area or Regional Office encounters any difficulty in following this procedure at any point in the process, the Directorate of Field Operations shall be consulted for assistance.

9. *Employee Information and Training, 29 CFR 1910.1200(h).*

a. The training requirements of the HCS will generally complement rather than satisfy the existing training requirements contained within other OSHA standards (i.e., expanded health standards, construction requirements, etc.). CSHO's shall continue to ensure that employer's obligations under specific training standards are met.

b. Training programs must be evaluated through program review and discussion with management and employees. The following questions provide a general outline of topics to be reviewed:

(1) Employee training:

(a) Has a training and information program been established for employees exposed to hazardous chemicals?

(b) Is this training provided at the time of initial assignment and whenever a new hazard is introduced into work areas?

(c) Have all new employees at this location received training equivalent to the required initial assignment training?

(2) Information transmitted to employees:

(a) Have employees been informed of the requirements of this standard?

2 That employers are required to have hazard communication programs, and

3 Details of the existing components of the program in their workplace?

(b) Are employees informed of:

1 Any operations in their work area where hazardous chemicals are present?

2 Where the written materials required under the standard are kept, including the written hazard evaluation procedures, written hazard communication programs, lists of hazardous chemicals, and MSDS required by this section?

(3) Required training methods and observations to detect the presence of a hazardous chemical in the work area:

(a) Are employees familiar with the visual appearance, smell, and alarms from monitoring devices that will result when chemicals are released in the workplace?

(b) Have employees been trained specifically about the hazards of the chemicals in their work areas?

(c) Was training subject matter organized by:

1 Specific chemical,

2 By categories of hazard, and

3 By work area?

(d) Are employees aware that information is available on specific hazards of individual chemicals through the MSDS?

(e) Does training include the measures employees can take to protect themselves from the hazards?

(f) Does training indicate the specific procedures implemented by the employer to provide protection, such as work practices and proper use of personal protective equipment?

(g) Does the program explain the hazard communication program implemented in the workplace, including:

1 How to read and interpret information on labels and MSDS,

2 How employees can obtain and use the available hazard information?

(4) Interviews will provide general information to the CSHO regarding the training program. Obviously, it cannot be expected that employees will totally recall all information and be able to repeat it. However, if the CSHO detects a trend in employee responses that indicates training is not being conducted, or is conducted in a cursory fashion that does not meet the intent of the standard, a closer review of the written program and its implementation may be necessary. The purpose of the standard is to reduce chemical source illnesses and injuries through behavior modification resulting from acquisition of hazard information. This can occur only if

employees receive the information in usable form through appropriate training.

(5) Some employers will voluntarily keep records of training sessions. These could be helpful to CSHO's in assessing compliance with the standard.

(6) Citations shall be issued under 29 CFR 1910.1200(h) when training is not provided.

10. *Trade Secrets*, 29 CFR 1910.1200(i). Only specific chemical identities may be withheld under the HCS trade secret provisions. Even when a chemical's identity is rightfully withheld as a trade secret, its release may be required by the trade secret access provisions in 1910.1200(i).

a. OSHA CSHO's evaluating the MSDS and hazard determination programs may request disclosure of trade secret identities under paragraph (i)(12) of the HCS.

b. OSHA shall take all steps feasible to protect trade secret identities, including secure filing and return of information when its use is complete.

11. *Response to Medical Emergencies*. The HCS permits a treating physician or nurse to designate the existence of a medical emergency requiring the immediate disclosure of trade secrets (29 CFR 1910.1200(i)(2)). Complaints received from health professionals relating to a medical emergency shall be classified as nonformal in accordance with the FOM. Due to the potential risk to life and/or health, the Area Director shall ensure that these complaints are processed as soon as received. The following procedures shall apply:

a. The Area Director (local office) or his/her designee shall contact the manufacturer of the chemical by telephone. Telephone numbers are required on the MSDS. The manufacturer shall be advised of the standard's requirements and to provide immediately the needed information directly to the treating physician or nurse.

b. Failure to disclose the information shall result in the issuance of a willful citation. The chemical manufacturer will frequently be located under a different Area Office jurisdiction. Apparent violations shall be referred to the office of jurisdiction for investigation and the issuance of citations.

c. Concurrently, the Area Director of jurisdiction shall coordinate obtaining an administrative subpoena ordering the immediate disclosure of the needed information. Federal Court Orders shall be sought immediately if the administrative subpoena is not effective in obtaining the information.

12. *Response to Nonemergency Referrals*. When a health professional providing medical or other occupational health services to exposed employees; an employee; or a designated representative is denied access to trade secret information, the matter may be referred to OSHA for enforcement proceedings.

a. As stipulated in the standard, OSHA should receive from the referring health professional, employee or designated representative a copy of the written request for the trade secret information, as well as a copy of the written denial provided by the holder of the trade secret. These two written documents shall be reviewed by the Area Director to determine the validity of the request and the trade secret claim. The Regional Solicitor will provide assistance in this regard.

b. If the Area Director does not believe that there is enough information upon which to base a decision, he/she may contact either the trade secret requestor or the trade

secret holder for further information. Such requests shall be documented in the case file.

K. Classification and Grouping of Violations. If deviations appear appropriate, they shall be coordinated with the Directorate of Field Operations, Office of Health Compliance Assistance, through the Regional Office. The following guidelines shall generally be applied:

1. Violations generally shall be grouped and classified in accordance with Chapters IV and V of the FOM unless specific guidance has been given as in J.4., K. 3 and K. 4. of this instruction.

2. The CSHO also shall determine if a willful violation can be substantiated when an employer has no hazard communication program at all. As stated previously, a willful citation shall be issued when an employer refuses to provide specific chemical identity information in a medical emergency (29 CFR 1910.1200(i)(2)).

3. Violations of 29 CFR 1910.1200(i)(2) shall not be grouped. All other violations shall be grouped according to the guidelines set forth in the FOM, Chapter V, C.

4. Serious violations shall be issued whenever a deficiency on a MSDS, label or in any other element of the HCS could result, or contribute to a potential exposure capable of producing serious physical harm or death.

L. Interface With Other Standards. The HCS was designed to prevent duplication with other OSHA standards. In some cases an employer's duties under other OSHA standards can be interfaced with requirements of the HCS resulting in simplified compliance.

1. **Medical Records Access.** The Access to Employee Exposure and Medical Records standard (29 CFR 1910.20) and the HCS do overlap with regard to MSDS. In the absence of air sampling data and other exposure information, MSDS are specifically identified as exposure records under 29 CFR 1910.20(c)(5)(iii). Each MSDS received by an employer must be maintained for at least 30 years as required at 1910.20(d)(1)(ii). The access standard does offer an alternative to keeping MSDS at 1910.20(d)(1)(ii)(B), which reads as follows:

Material safety data sheets and paragraph (c)(5)(iv) records concerning the identity of a substance or agent need not be retained for any specific period as long as some record of the identity (chemical name if known) of the substance or agent, where it was used, and when it was used is retained for at least thirty (30) years.

a. 1910.1200(e)(1)(i) of the HCS requires that employers maintain a list of hazardous chemicals as part of the written hazard communication.

b. Employers might simplify their responsibilities as they relate to the overlap between these two standards, by incorporating the requirements under 1910.1200(d)(1)(ii)(B) with those for 1910.1200(e)(1)(i). That is, the list of hazardous chemicals could include information on where chemicals were used and for how long. These lists would then have to be kept for at least 30 years.

2. **Ethylene Oxide.** The ethylene oxide (ETO) standard provides a different labeling requirement than the HCS. Labels do not have to be affixed to containers of ETO, unless the product is capable of producing employee exposure at or above the action level of 0.5 ppm as an 8-hour time weighted average (29 CFR 1910.1047(j)(1)(ii)).

3. **Other Health Standards.** Paragraph (f)(3) of the HCS defers labeling requirements to the specific standard when one exists.

M. Evaluation. In keeping with agency policy, an evaluation of the effectiveness of this instruction shall be conducted annually. An evaluation report from each Region shall be written and submitted to the Directorate of Field Operations within 30 days of the close of the fiscal year. Elements to be considered in the evaluation are the following:

1. Observed improvements in labels and MSDS.

2. Assessment of employee information and training requirements under the HCS.

3. Assessment of the accuracy and correctness of the employer's hazard determination procedure.

John B. Miles, Jr., Director
Directorate of Field Operations

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Appendix A

Clarifications and Interpretations of the Hazard Communication Standard (HCS).

This appendix includes clarifications and interpretations which respond to the most frequently asked questions and points of common misunderstanding. Where possible, clarifications are keyed to the most applicable section of the HCS. In many cases a clarification applies to an entire section of the standard, (these are included after each section).

Purpose

(a)(2)

The Agency's position regarding State standards has been described in OSHA Instruction STP 2-1.117, dated August, 31, 1984. This should be consulted when answering questions regarding such State standards.

Basically, OSHA's position is that State standards can be enforced only under the auspices of an OSHA-approved State plan. States without State plans are preempted from addressing the issue of Hazard Communication within manufacturing. Community right-to-know standards are outside the jurisdiction of OSHA and are not affected by this position. Preemption is a complicated issue. It is suggested that inquiries regarding preemption that require in-depth knowledge be referred through the Directorate of Field Operations to the Office of State Programs for response.

Scope and Application

(b)(1)

The HCS has a unique requirement for downstream disclosure of information from chemical manufacturers and importers to manufacturing purchasers of their products. This downstream flow of information is essential to the complete implementation of the standard, but does create enforcement situations that have not been encountered with previous standards. CSHO familiarity with the procedures established in this instruction to address such situations is essential to the implementation of the HCS.

Most of the HCS requirements are limited to employers in Standard Industrial Classification (SIC) Codes 20-39. SIC

codes are generally assigned to a workplace based on its primary activity. However, some workplaces not classified in SIC codes 20-39 may have captive operations that are manufacturing in nature.

The Standard Industrial Classification Manual of 1972 provides for the application of additional SIC codes. Essentially, subunits should be identified whenever the manufacturing activity in question would not normally be carried out under the primary SIC code. Where secondary manufacturing operations are identified, according to these guidelines only those operations shall be included in the HCS evaluation.

For example, a chemical wholesaler classified under SIC Codes 5161 or 5171 would not manufacture chemicals but rather only wholesale them. In the event such an employer decides to begin a chemical processing operation then, since processing is not included under SIC codes 5161 and 5171, it would be appropriate to apply additional manufacturing SIC codes for the new activities.

Compliance officers shall use these guidelines in deciding whether or not elements of the HCS are applicable to specific operations contained within nonmanufacturing industries when encountered.

(b)(2)

The phrase "known to be present" is essential to understanding the scope of the standard. No testing or analysis of a mixture has to be done to comply with the standard, but if a hazardous chemical is known to be present (e.g., nitrosamines are a known byproduct of the process), then it is covered by the standard.

This paragraph also sets specific limits regarding the conditions under which chemicals are covered by the standard. The terminology "exposed under normal conditions of use or in a foreseeable emergency" provides a basis for excluding products or chemicals that meet this condition. Compliance officers should consult the definitions for "exposure" for further clarification.

(b)(3)

The coverage of laboratories in manufacturing facilities is limited under the standard. Although the standard does not specifically define the term "laboratory", it is intended to include research facilities, as well as quality control laboratory operations located within manufacturing facilities. Laboratories do not have to have a written hazard communication program. Therefore, when the required training is performed, the part that deals with the program availability will simply point out that such written programs are not required for laboratories. Employees must still be trained relative to the hazards of chemicals in the laboratory whether or not MSDS are available.

Some manufacturers of chemical specialty products have tried to interpret the laboratory provisions as exempting them from coverage. These operations are considered to be manufacturing processes, and are not exempted. Furthermore, a pilot plant operation is also considered to be a manufacturing operation — not a research laboratory operation.

Samples that are shipped out of manufacturing facility laboratories must be labeled if they are hazardous chemicals. If the samples are shipped to another manufacturer, then a data sheet must be provided as well.

Quality control samples taken in a plant must be labeled, tagged, or marked unless the person taking the sample is

also going to be performing the analysis, and thus the sample would come under the portable container exemption. A hand-written label may be utilized as long as required label information is present. The rack in which samples are placed could be labeled in lieu of labeling individual samples, if the contents and hazards are similar.

(b)(4)

These labeling exemptions apply to labels required on shipped containers — the chemicals are NOT exempted from coverage by the standard in other respects. In particular, it should be noted that there is no blanket exemption for consumer products under the standard — it only exempts such products from labels on shipped containers.

The transmission of MSDS is required whenever a hazardous chemical is destined for an employer in SIC Codes 20-39.

A common sense approach must be employed whenever a product is used in a manner similar to which it could be used by a consumer, thus resulting in levels of exposure comparable to consumer exposure. The frequency and duration of use should be considered. For example, it may not be necessary to have a data sheet for a can of cleanser used to clean the sink in an employee rest room. However, if such cleanser is used in large quantities to clean process equipment, it should be addressed in the Hazard Communication Program.

Manufacturers who purchase such products from retail stores which do not have data sheets on file must seek to obtain one from the chemical manufacturer or importer as required under paragraph (g)(6).

(b)(5)

Hazardous waste is completely exempted from the standard when subject to EPA regulations. If the waste is not regulated by EPA, then the requirements of the standard apply (e.g., containers of hazardous materials would have to be labeled).

The "article" exemption poses many questions. The key to the definition of "article", and thus the exemption, is the term "under normal conditions of use." For example, an item may meet the definition of "article", but produces a hazardous byproduct if burned. If burning is not considered as part of its normal conditions of use, the item would be an "article" under the standard, and thus exempted. The following items are examples of articles:

Stainless steel table

Vinyl upholstery

Tires

The following items are examples of products which would NOT be considered "articles" under the standard, and would thus not be exempted from the requirements:

Metal ingots that will be melted under normal conditions of use.

Fabric treated with formaldehyde where downstream garment manufacturing employees will be exposed when making clothing.

Switches with mercury in them when a certain percentage break under normal conditions of use.

It should be noted that the only information that has to be reported in these situations is that which concerns the hazard of the release. The hazardous chemicals which are still bound in the article would still be exempted under the "article" exemption.

Accordingly, a toxic powder that is mixed in a low volatility nonhazardous liquid would be considered an "article" as long as no exposure is anticipated based on its expected use.

Definitions.

(c)

The definitions of the HCS must be heavily relied upon to properly interpret and apply the standard. In many cases terms within a definition are themselves defined within the same section.

Chemical Manufacturer. This definition considerably broadens the common understanding of the term. As indicated in under paragraph (c), several key words within this definition are also defined. The terms "produced" or "produce" and "use" must be reviewed.

Based on this definition and that of its related terms an employer that processes, formulates, repackages, handles, reacts or transfers a hazardous chemical is considered a "Chemical Manufacturer".

Container. This definition does include tank trucks, rail cars and the like.

Distributor. The definition is not tied to SIC Codes, and most distributors will be classified in industries other than manufacturing. Manufacturers need only provide data sheets to distributors that sell to manufacturing purchasers.

Employee. The clarification concerning consumer products given in (b)(4) of this appendix, in part evolves from the definition of this term.

Identity. This definition allows common names to be used on labels for individual components or for the mixture as a whole. (See definitions for common name.)

Mixture. This definition does not apply if there is a chemical reaction, and a new product results.

Hazard Determination.

(d)(1)

The HCS causes a downstream flow of information from the chemical manufacturer, importer and distributor of products containing hazardous chemicals.

Although the chemical manufacturer and the importer have the primary duty for evaluation, it is expected that some employers will choose to do their own evaluations. Whoever does the evaluation is responsible for the accuracy of the information.

In some cases an employer may have a need to begin using a product before receiving an MSDS and or proper label. In these cases the manufacturing user would be in violation for not having an MSDS for the product under paragraph (g)(1) of the HCS. The user may opt to generate their own MSDS. In other words employers must have proper MSDS and label before using chemicals.

An employer is considered a "chemical manufacturer" if chemicals are produced within a process and employees are potentially exposed to them. An employer in SIC 20-39 is thus required to evaluate the hazards of such chemicals. For example, the evaluation of a byproduct when two chemicals are reacted.

(d)(2)

See Appendix C of this instruction for further guidance on evaluating health effects. No testing of chemicals to deter-

mine hazards is ever required; the evaluation is to be based on currently available information.

(d)(3)

Any compound of a substance for which there is an OSHA PEL or TLV in the latest edition of the American Conference of Governmental Industrial Hygienists, Threshold Limit Value listing is considered to be part of the floor of hazardous chemicals covered by the standard.

"Nuisance dust" is part of the floor since it is regulated by 29 CFR 1910.1000 and appears in the TLV list. The American Conference of Governmental Industrial Hygienists (ACGIH) includes an appendix in its TLV publication that lists examples of nuisance dust. All substances listed in Appendix D of the TLV list must be evaluated using the same procedures for hazard determination that are used for all other chemicals. In situations where a valid determination concludes that a chemical listed in Appendix D presents no potential hazards to exposed employees other than its being a nuisance, OSHA will consider the lack of labels and MSDS to have no direct or immediate relationship to safety and health and will classify such violations as "de minimis."

(d)(4)

On December 20, 1985, OSHA published an interpretive notice in the *Federal Register* regarding the carcinogenicity of lubricating oils (50 FR 51852). The notice was published in response to a number of inquiries which were received regarding the applicability of the HCS requirements to naphthenic lubricating oils which are refined using a hydrotreatment process. These types of oils may be found in a number of industrial operations, including ink manufacture and the production of synthetic rubber.

Positive findings of carcinogenicity by the International Agency for Research on Cancer (IARC) must be reported under the HCS. IARC Monograph 33 addresses the carcinogenicity of mineral oils, and relates the findings to the type of processing the oils have undergone. The IARC Monograph concludes that there is sufficient evidence to indicate that mildly hydrotreated and mildly solvent refined oils are carcinogenic. Therefore, under the requirements of the HCS, producers of such materials will have to report such findings on the MSDS for the substance, and include appropriate hazard warnings on labels. IARC also stated that there is inadequate evidence to conclude that severely hydrotreated oils are carcinogenic, and that there is no evidence to indicate that severely solvent refined oils are carcinogenic. In the absence of any valid, positive evidence from sources other than IARC regarding the carcinogenicity of severely hydrotreated or severely solvent refined oils, no reference to carcinogenicity need be included on the MSDS and labels for such materials. IARC has also concluded that when an oil is refined using sequential processing of mild hydrotreatment and mild solvent refining, there is no evidence of carcinogenicity.

The questions posed to OSHA concerned the process parameters used for mild hydrotreatment. OSHA examined the studies upon which the IARC based its positive findings of carcinogenicity to determine the process parameters used to refine the oils studied. These parameters are to be used by CSHO's in evaluating whether such materials require information regarding potential carcinogenicity on MSDS and labels. Any oil will be considered to be mildly hydrotreated if the hydrotreatment process was conducted using pressures of 800 pounds per square inch or less, at temperatures of 800 degrees Fahrenheit or less, independent of other

process parameters. It may be necessary for the CSHO to contact the manufacturer of the oil to determine the hydro-treatment process parameters in order to evaluate compliance.

It should also be noted that negative evidence generated by a producer does not negate the positive IARC finding. Negative evidence cannot be used to dispute positive findings relating to any substance. If the oil is being produced within the specified parameters, it must be considered to be potentially carcinogenic under the requirements of the HCS. The producer is free to report any negative findings as well, but there is a positive duty to report IARC's conclusions. At such time as evidence becomes available concerning the potential carcinogenicity of oils processed outside these established parameters, OSHA will revise its interpretation accordingly.

The notice includes considerable additional information concerning the background and rationale for this interpretation, and CSHO's encountering this type of oil should read it prior to evaluating the MSDS and labels to determine compliance. Any questions concerning the applicability of this interpretation should be referred through the Region to the Directorate of Field Operations, Office of Health Compliance Assistance.

(d)(5)

While the HCS does not require testing of chemicals to determine their hazards, some employers are apparently considering testing mixtures as a whole so as not to have to list hazardous ingredients on the MSDS. Should employers choose to pursue this option, a full range of tests would have to be performed, including tests to determine health hazards (acute and chronic) and physical hazards.

(d)(6)

Employers, who are not planning to evaluate the hazards of chemicals they purchase, can satisfy the requirement for written hazard evaluation procedures by stating that they intend to rely on the evaluations of the chemical manufacturer/importer.

Downstream employers/employees do not have access to the written procedures maintained by the chemical manufacturer/importer. If there appears to be a problem with the information received, and it cannot be resolved with the supplier of the product, the matter should be referred to OSHA for investigation. OSHA does have access to the written procedures.

Written Hazard Communication Program.

(e)(1)

Employers are responsible for protecting their employees from all hazardous chemicals known to be present, including those brought on-site by contractors. To ensure such chemicals are addressed, it is recommended that provisions to obtain information regarding them be included in the employer's contracting arrangements.

Labels and Other Forms of Warning.

(f)(1)

When the shipping container is a tank truck, rail car, or the like, the appropriate label or label information may either be posted on the tank or vehicle, or attached to the accompanying shipping papers.

Chemical manufacturers choosing to attach labels or label information *should* communicate the location of the information prior to shipment. Manufacturing users must ensure that their employees are aware of the label warning before potential exposure to incoming chemicals occur.

It will not necessarily be "appropriate" to warn on the label about every hazard listed in the MSDS. The data sheet is to address essentially everything that is known about the chemical — determination of the hazards to be highlighted on the label will involve some assessment of the weight of the evidence regarding each hazard reported on the data sheet. However, this does not mean that only acute hazards are to be covered on the label, or that well-substantiated hazards can be left off the label because they appear on the data sheet.

The "hazard warning" must convey the hazard of the chemical. This is intended to be specific information regarding the hazard — the specific hazards indicated in the standard's definitions for "physical" and "health" hazards would be appropriate. Phrases such as "caution", "danger", or "harmful if inhaled", generally do not meet the intent of the standard by themselves. The definition of "hazard warning" states that the warning must convey the hazard of the chemical. If, when inhaled, the chemical causes lung damage, then that is the appropriate warning. Lung damage is the hazard, not inhalation. There are some situations where the specific target organ effect is not known. Where this is the case, the more general warning statement would be permitted. For example, if the only information available is an L⁵⁰ test result, "harmful if inhaled" may be appropriate.

There are some labeling systems used in the workplace that communicate degree of severity of the hazard by means of a numerical rating system. These systems are acceptable only when additional warnings indicating the effects of exposure are added to the label.

(f)(4)

As of May 25, 1986, all containers in the workplace are to be labeled in accordance with the provisions of the standard. The 2 1/2 year phase-in period for this requirement should allow turnover of most chemical supplies. The employer is responsible for ensuring that all containers in the plant are labeled by that date.

Carcinogen Labeling.

Chemicals listed in any of the following three references as carcinogens will be considered to be carcinogens for the purpose of the Hazard Communication Standard:

1. National Toxicology Program (NTP) Annual Report on carcinogens (latest edition).
2. International Agency for Research on Cancer (IARC) monographs.
3. 29 CFR 1910, Subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration.

In addition, the existence of one valid, positive study indicating carcinogenic potential is sufficient basis for a notation on the MSDS. Further, if such studies include positive human evidence then the label must contain hazard warnings (on carcinogenicity).

In general, those chemicals identified as being "known to be carcinogenic" and those substances that may "reasonably be anticipated to be carcinogenic" by NTP must have carcinogen warnings on the label and information on the MSDS.

Those chemicals regulated by OSHA as carcinogens in substance-specific standards are listed below:

The specific regulations in Subpart Z of 1910 on these individual chemicals contain provisions for labeling. Therefore, containers of hazardous chemicals labeled in accordance with the substance specific standard will be deemed to be in compliance with the labeling requirements of the Hazard Communication Standard.

It should be noted that in many instances the labeling requirements of the substance specific standard address only carcinogenicity and do not address acute health hazards or physical hazards.

Asbestos

4 — Nitrobiphenyl

Alpha — Naphtylamine

Methyl Chloromethyl Ether

3,3' Dichlorobenzidine (and its salts)

Bis — Chloromethyl Ether

Beta — Naphthylamine

Benzidine

4 — Aminodiphenyl

Ethyleneimine

Beta — Propiolactone

2 — Acetylaminofluorene

N — Nitrosodimethylamine

Vinyl Chloride (and Polyvinyl Chloride)

Inorganic Arsenic

1,2 Dibromo — 3 — Chloropropane

Acrylonitrile

Ethylene Oxide

IARC evaluates chemicals, manufacturing processes, and occupational exposures as to their carcinogenic potential. The IARC criteria for judging the adequacy of available data and for evaluating carcinogenic risk to humans were established in 1971 (covering Volumes 1-16). The criteria were later revised in 1977. The revised criteria covers Volumes 17 and later.

The individual monographs contain evaluations on specific chemicals or processes. At the conclusion of each evaluation IARC provides a summary evaluation for the individual chemical. Periodically IARC publishes Supplements in which chemicals that have already been evaluated in previous monographs are reevaluated. In cases where a chemical has been reevaluated, the most recent IARC evaluation shall be relied upon.

IARC provides a summary in Supplement 4 of the Chemicals which have been evaluated in Volumes 1-29. Table I of Supplement 4 provides a summary evaluation of all chemicals for which there were some human and animal data considered. Appendix 2 of Supplement 4 provides a listing of chemicals for which there is sufficient evidence of carcinogenicity in animals. The nonitalicized chemicals in Appendix 2 are the chemicals for which there was *only* animal data.

In Table I IARC provides a summary classification of a chemical's carcinogenic risk:

Category 1 — There is sufficient evidence to support a casual association between the exposure and cancer.

Category 2 — Includes exposures which are probably carcinogenic to humans. There are two subdivisions.

Category 2A — Usually reserved for exposures for which there was at least limited evidence of carcinogenicity to humans.

Category 2B — Cases where there are inadequate data in humans but there is sufficient evidence in animals.

Category 3 — This group of chemicals could not be classified as to its carcinogenicity to humans.

It should be noted that in some cases the results of short term tests were considered by IARC and thus a Category 3 was transferred to Category 2B, or Category 2B to 2A.

Those chemicals listed in Appendix 2 of Supplement 4 in nonitalic will be considered by OSHA to correspond to Category 2B carcinogens.

All IARC listed chemicals in Categories 1, 2A, and 2B must result in appropriate entries on the MSDS. Generally, the container labels must have an appropriate carcinogen warning.

Individual monographs have been published subsequent to Supplement 4. For the purpose of compliance with the MSDS and labeling requirements, the IARC summary evaluation for the chemical must be relied upon.

A separate document on IARC and NTP carcinogens is being considered. When published, this document may be relied upon to properly determine a chemical's classification under IARC.

Table 1 summarizes the MSDS and labeling requirements for carcinogens to be used as general guidance. Deviations may be appropriate where recent authoritative evidence is available disputing past studies. Such departures should be reviewed by the Regional Administrator and coordinated with the Director of Field Operations.

Material Safety Data Sheets.

(g)(1)

Chemical manufacturers/importers who choose to purchase data sheets from information services, rather than developing them, still retain responsibility for provision of the sheets and for their accuracy.

For mixtures, if the employer is assuming the mixture has the same hazard as its hazardous components (i.e., no test data on the mixture as a whole), the data sheets for the components will satisfy the requirements of the standard for a data sheet for the mixture. These MSDS must be physically attached to one another and identified in a manner where they can be cross-referenced with the label.

The OSHA Form 20 will be phased out as of May 1986. The Form 20 is similar to the requirements of the HCS for the MSDS, but not identical. Simply following the titles of the blocks on the Form 20 will not result in an appropriate sheet, but it could be modified to comply. Any format is acceptable, as long as the required information is included. Computerized data sheets are permitted as long as they are readily accessible to employees. Many larger firms are planning to install terminals in-plant, and to train key employees to access them. This is acceptable, as long as the information can be obtained during any workshift, as required by the HCS.

OSHA has published a new MSDS, form number OSHA-174. This is an optional form which may be used to comply with the HCS. Compliance Officers shall make employers aware that the form is available.

Maritime employers fall into three general categories: Ship Building and Repairing (SIC 3731), Boat Building and Repairing (SIC 3732) and Shipbreaking (SIC 4469). Shipbuilding and repair activities fall under the coverage of the HCS. OSHA plans to begin rulemaking to expand the scope of the HCS to include shipbreaking. In the interim, employers in

the shipbreaking industry may continue to use the OSHA-20 or may follow the MSDS requirements for the HCS (29 CFR 1910.1200(g)).

TABLE 1

REQUIREMENTS FOR MSDS AND LABEL NOTATIONS FOR CARCINOGENS

Source	MSDS	Label
Listed on NTP Carcinogen	X	X
IARC — Group 1A	X	X
IARC — Group 1B	X	X
IARC — Group 2A	X	X
IARC — Group 2B	X	Not Required
IARC — Group 3	Not Required	Not Required
One Positive Study- Animal Only	X	Not Required
One Positive Study- Some Human Evidence	X	X

(g)(2)

If a hazardous chemical is present in the mixture in reportable quantities (i.e., 0.1% for carcinogens, and 1% for other health hazards), it must be reported unless the mixture has been tested as a whole. This would include chemicals which are hazardous only when airborne (such as silica), when they are in a wet mixture. The employer is free to indicate that exposure potential is limited because of the physical form of the mixture, but the "right-to-know" that the chemical is present is not obviated by the physical state of the mixture.

If there really is no exposure (and the standard defines exposure as including potential as well as measurable exposure), either under normal conditions of use or in a foreseeable emergency, then the chemical is not covered by the standard. (See paragraph (b)(2).) In the case of liquid mixtures, this provision has to be considered very carefully. Using the silica example, it is possible that, if the mixture dries upon application, there is a potential for the silica to become airborne, and thus a potential for exposure. The presence of silica must be indicated on the MSDS for the liquid mixture in this situation.

Employee Information and Training.

(h)

Employees are to be trained at the time they are assigned to work with a hazardous chemical. The point of this provision in the standard is to have information prior to exposure to prevent the occurrence of adverse health effects. This purpose cannot be met if training is delayed until a later date.

Retraining is to be done when a new hazard is introduced into the work area, not a new chemical. For example, if a new solvent is brought into the workplace, and it has hazards similar to existing chemicals for which training has already been done, then no new training is required. Of course, the substance-specific data sheet must be available, and the product must be properly labeled. However, if the solvent is a suspect carcinogen, and there has never been a carcinogenic hazard in the workplace before, then new training on the carcinogenic hazard must be done in the work areas where employees will be exposed to it.

Giving an employee a data sheet to read does not satisfy the intent of the standard with regard to training. The training (as described in the preamble to the HCS) is to be a forum for explaining to employees not only the hazards of the chemicals in their work area, but also how to use the information generated in the Hazard Communication Program. This can be accomplished in many ways (audiovisuals, classroom instruction, interactive video), and ideally should include an opportunity for employees to ask questions to ensure that they understand the information presented to them.

Trade Secrets.

(i)(2)

The designation of an incident as a "medical emergency" is left to the discretion of the treating physician or nurse.

Appendix B

Sample Letter, MSDS Query

Dear (Name or Position of Responsible Employer Representative):

Representatives of the Occupational Safety and Health Administration (OSHA)/or State plan designated agency recently visited/or corresponded with (company name), which purchases the following chemical(s) from your company:

(List chemicals, products)

OPTION 1: At the time of the visit, (company name) did not have Material Safety Data Sheets (MSDS) for these products.

OPTION 2: At the time of the visit, Material Safety Data Sheets (MSDS) supplied by your company were found to be deficient. (Describe the specific deficiencies.)

OPTION 3: (Company name) distributes your products under their name and by doing so has passed along information that appears to be deficient. (Describe the specific deficiencies.)

You are required under OSHA's Hazard Communication Standard (29 CFR 1910.1200) or your States right-to-know law to perform hazard determinations, label containers, and provide the MSDS for all hazardous chemicals which you produce or import. A copy of the standard is provided for your reference. Please immediately send properly completed material safety data sheets for the chemicals listed above to your customer.

If you are a distributor that has simply replaced the product manufacturer's name with your own, then you must provide us with the name and address of the chemical manufacturer. This information is needed so we may correspond with them to correct deficiencies.

Thank you for your assistance. If you have any questions regarding this matter, please feel free to contact me at (insert telephone number).

Sincerely,
Area Director

Appendix C

Hazard Evaluation Procedures

The hazard evaluation procedures required by the standard are, of necessity, performance-oriented. There is no

generally accepted process agreed upon by the scientific community. Basically, OSHA's concern is that the information on labels and data sheets, and in the training program, is adequate and accurate. Whether that is accomplished by reviewing 2 studies or 50 studies is irrelevant.

Although specific procedures to follow cannot be established, general guidance can be provided. The hazard evaluation process can be characterized as a "tiered" approach — the extent to which a chemical must be evaluated depends to a large degree upon the common knowledge regarding the chemical, whether its health effects are under review, and how prevalent it is in the workplace.

1. The first step for CSHO's evaluating chemicals is to determine whether the chemical is part of the "floor" of chemicals to be considered hazardous in all situations.

a. Any substance for which OSHA has a permissible exposure limit (PEL) in 1910.1000, or a substance-specific standard in Subpart Z, is to be included in the hazard Communication Program. This floor includes any compound of such substances where we would sample to determine compliance with the PEL.

b. Any substance for which the American Conference of Governmental Industrial Hygienists (ACGIH) has a Threshold Limit Value (TLV) in the latest edition of their annual list is to be included in the Hazard Communication Program. Any compound of these substances would also be included.

c. Any substance which the National Toxicology Program (NTP) or the International Agency for Research on Cancer (IARC) has found to be a suspect or confirmed carcinogen, or which OSHA regulates as a carcinogen is to be included in the Hazard Communication Program. For NTP, appearing on the annual listing constitutes a positive finding of suspect or confirmed carcinogenicity. For IARC, it is necessary to look at the actual evaluations to determine their findings. In some cases, for example, a group of compounds will be listed by IARC in a summary as being carcinogenic, but closer examination of the appropriate monograph will reveal that they had data only for certain compounds. Anything categorized by IARC as Groups I and II are covered by the HCS — Group III is not.

d. Sources to generally establish hazards of the 2311 chemicals that are part of the floor of hazardous chemicals covered by the standard:

OSHA's Industrial Hygiene Technical Manual
NIOSH/OSHA Occupational Health Guidelines
Documentation for the Threshold Limit Values
NTP Summary of the Annual Report on Carcinogens
IARC Monographs

In addition, the CSHO should check the *NIOSH Registry of Toxic Effects of Chemical Substances* to see if any hazards are indicated which do not appear in these sources. If there are, further study should be done to evaluate the hazards. RTECS should never be considered a definitive source establishing hazard since it consists of unevaluated data. It is a useful screening resource.

2. The second step is to consult other generally available sources to see what has been published regarding the chemical. Patty's *Industrial Hygiene and Toxicology* would be one such source. Material Safety Data Sheets available through information services would also be useful. The Technical Data Center can provide assistance in this regard.

3. The third step, for those chemicals where information is not readily available, or where such available information is not complete, is to perform searches of bibliographic data bases. In general, the National Library of Medicine (NLM) services should be used. These include the Toxicology Data Bank (TDB), TOXLINE, and MEDLARS. The information generated by these data bases should be evaluated using the criteria in Appendix B of the HCS; i.e., to qualify as an acceptable study, it must be conducted according to scientific principles (e.g., in animal studies, number of subjects is adequate to do statistical analyses of the results; control group is used), and the study must show statistically significant results indicating an adverse health effect. This evaluation obviously requires a subjective, professional assessment. Any problems should be referred to the Directorate of Field Operations (through the Regional Office) for assistance. In general, uncorroborated case reports and *in vitro* studies, such as Ames Tests, are useful pieces of information, but not definitive findings of hazards. Animal studies involving species other than those indicated in the acute hazard definition must be evaluated as well. The acute hazard definitions are not included in the standard to "categorize" chemicals, but rather just to establish that chemicals meeting those definitions fall under the coverage of the standard.

4. In some cases, the only information available on a substance may be employer-generated data. If the employer indicates that such information is the basis for the hazard evaluation, the CSHO shall ask to see it to complete the OSHA evaluation.

In cases where the employer denies the CSHO access to its own hazard data, and no published data on the chemical can be found to review the sufficiency of the hazard determination, the Directorate of Field Operations shall be contacted for assistance. Field Operations staff will develop procedures for obtaining unpublished chemical hazard information available from other Federal agencies such as Environmental Protection Agency.

5. If an employer has found any chemical to be nonhazardous, and the CSHO has reason to believe it is hazardous, further investigation is required. The definitions of hazard in the standard are very broad, and it is not expected that many chemicals can be considered nonhazardous under this approach. Those most likely to be exempted would be chemicals that pose no physical hazards, and which have lethal dose findings above the limits found in the acute hazard definitions.

In some cases, the employer may not have addressed a specific chemical in the Hazard Communication Program that the CSHO knows to be present through knowledge of the process or through sampling or other investigation of the workplace. This situation should also be further investigated. If the CSHO has information to indicate there is a hazard, the employer must be able to defend the finding of no hazard.

6. The citations to be issued for improper hazard evaluation generally will be for inaccurate labels and data sheets, rather than for improper procedures. The exception would be if the procedures are obviously inadequate to be able to detect the type of health effect missing from the label or data sheets. For example, if the procedures do not address carcinogenicity, and that is the type of information lacking, a citation should be issued for paragraph (d)(6) as well.

AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS REPORT ON PROPOSED AND CURRENT CHANGES TO THE TLV AND BEI LISTS

MAY 21, 1985

Editor's Note: Notations found in this document are listed and explained in the ACGIH TLV booklet. The notation 'A1' indicates the substance is a human carcinogen; 'A2' indicates the substance is a suspected human carcinogen. The single asterisk (*) indicates the biological determinant is a non-specific indicator of exposure, while the double asterisk (**) denotes the determinant is a specific indicator of exposure to the chemical. The non-specific indicators are preferred.

CHEMICAL SUBSTANCES TLV COMMITTEE REPORT

21 May 1986

NOTICE OF INTENDED CHANGES FOR 1986-87

ADDITIONS:

SUBSTANCE	TWA		STEL	
	ppm	mg/m ³	ppm	mg/m ³
Ammonium perfluorooctanoate - Skin [3825-26-1]	--	0.1	--	--
Hexamethylene diisocyanate [822-06-0]	0.005	0.035	--	--
Zinc chromates [13530-65-9; 1103-86-9; 37300-23-5], as Cr	--	0.01, A1	--	--

APPENDIX D -- Nuisance Particulates

Stearates TWA: 10 mg/m³, Total dust

REVISIONS:

SUBSTANCE	TWA		STEL	
	ppm	mg/m ³	ppm	mg/m ³
Caprolactam [105-60-2]				
Dust	from:	1	--	3
Vapor	5	20	10	40
TO: Vapor & Aerosol	0.25	1	--	--
Formamide [75-12-7] - Skin	from:	30	30	35
	TO:	15	--	--
Isophorone diisocyanate	from:	0.09	--	--
[4098-71-9]	TO:	0.045	--	--
Manganese dust & compounds	from:	5	--	--
[739-96-5]	TO TWA:	5	--	--

REVISIONS (con't):

SUBSTANCE		TWA		STEL	
		ppm	mg/m ³	ppm	mg/m ³
Methylene bisphenyl isocyanate [101-68-8]	from:	C 0.02	C 0.2	--	--
	TO TWA:	0.005	0.055	--	--
Methylene chloride [75-09-2]	from:	100	350	500	1740
	TO:	50,A2	175,A2	--	--
Methylene bis-(4-cyclohexylisocyanate) [5124-30-1]	from:	C 0.01	C 0.11	--	--
	TO TWA:	0.005	0.055	-	--
p-Nitrochlorobenzene [100-00-5]	from:	0.5	3	--	-
	TO:	0.1	0.6	--	--
Tantalum [7440-25-7]	from:	--	5	--	10
	TO:	SEE	DUSTS		
Yttrium [7440-65-5]	from:	--	1	--	3
	TO: Yttrium metal and compounds, as Y	--	1	--	--
Zinc chromate [13530-65-9], as Cr	from:	--	0.05,A2	--	--
	TO: Plural listing of Zinc chromates	See	Additions	--	--
Zinc stearate [557-05-1]	from:	--	D	--	--
	TO: Plural listing of Stearates	See	Additions	--	20

DUSTS

Other Dusts

Tantalum [7440-25-7], metal and oxide TWA: 10 mg/m³, Total dust

TRANSFERS TO ADOPTED LIST FOR 1986-87

SUBSTANCE		TWA		STEL	
		ppm	mg/m ³	ppm	mg/m ³
Amitrole [61-82-5]		--	0.2	--	--
Boron tribromide [10294-33-4]		C 1	C 10	--	--
1,3-Butadiene [106-00-0]		10,A2	22,A2	--	--
Carbon dioxide [124-38-9]		5000	9000	30,000	54,000
Hydrogen bromide [10035-10-6]		C 3	C 10	--	--
Hydrogen fluoride [7664-39-3], as F		C 3	C 2.5	--	--
4,4-Methylene dianiline [101-77-9]- Skin		0.1,A2	0.8,A2	--	--
Oxygen difluoride [7783-41-7]		C 0.05	C 0.1	--	--
Sulfur monochloride [10025-67-9]		C 1	C 6	--	--

TRANSFERS TO THE ADOPTED LIST FOR 1986-87 (con't)

Sulfur pentafluoride [5714-22-7]	C 0.01	C 0.1	--	--
Sulfur tetrafluoride [7783-60-0]	C 0.1	C 0.4	--	--
Thionyl chloride [7719-09-7]	C 1	C 5	--	--
m-Toluidine [108-44-1] - Skin	2	9	--	--
p-Toluidine [106-49-0] - Skin	2,A2	9,A2	--	--

STEL VALUES DELETED FROM THE FOLLOWING CHEMICAL SUBSTANCES WITH TWAs RETAINED:

Acetylene tetrabromide	Disulfiram
Aldrin	Disulfoton
α -Alumina	Emery
Aluminum metal & oxide	Endosulfan
2-Aminopyridine	Endrin
Ammonium sulfamate	Epichlorohydrin
Aniline & homologues	EPN
ANTU	Ethyl chloride
Azinphos-methyl	Ethylene dichloride
Benomyl	Ethyl mercaptan
Bismuth telluride & Se-doped	N-Ethylmorpholine
Boron oxide	Ethyl silicate
Bromacil	Ferbam
Bromine pentafluoride	Germanium tetrahydride
Cadmium dusts & salts	Gypsum
Calcium carbonate/marble	Hafnium
Calcium cyanamide	Heptachlor
Captan	Hexachlorocyclopentadiene
Carbaryl	Hexachloronaphthalene
Carbon black	Hexafluoroacetone
Carbon tetrachloride	Hydrogen peroxide
Cellulose (paper fiber)	Indium & compounds
Chloroform	Iodoform
Copper dusts & mists	Iron oxide fume
Cotton dust, raw	Iron salts, soluble
Cyhexatin	N-Isopropylaniline
2,4-D	Kaolin
DDT	Lead, inorganic dusts & fumes
Demeton	Limestone
Diazinon	Lindane
2-N-Dibutylaminoethanol	Magnesite
Dichlorodifluoromethane	Manganese cyclopentadienyl tricarbonyl
1,1-Dichloro-1-nitroethane	Marble/calcium carbonate
Dichloropropene	Methylacrylonitrile
Dichlorotetrafluoroethane	N-Methyl aniline
Dichlorvos	Methyl bromide
Dicyclopentadienyl iron	Methylcyclopentadienyl manganese
Dieldrin	tricarbonyl
Difluorodibromomethane	Methyl demeton
Dimethyl acetamide	Methyl iodide

STEL Deletions (con't):

Dimethylformamide
 1,1-Dimethylhydrazine
 Dimethylphthalate
 Dinitrobenzene
 Dinitro-o-cresol
 Dinitrotoluene
 Dioxane
 Diphenylamine
 Diquat
 Nitroethane
 Nitrogen trifluoride
 Nitromethane
 1-Nitropropane
 Parathion
 Pentachloronaphthalene
 Pentachlorophenol
 Pentaerythritol
 Phenothiazine
 Phosphorus (yellow)
 Plaster of Paris
 Rouge
 Sesone
 Silicon
 Silicon carbide
 Starch
 Stibine
 Strychnine
 Sucrose
 Sulfotep
 Sulfur hexafluoride
 2,4,5-T
 Temephos

Methyl parathion
 Methyl silicate
 Molybdenum, soluble & insoluble compounds
 Naled
 Nickel soluble compounds
 Nicotine
 Nitric oxide
 Nitrobenzene
 TEPP
 1,1,1,2-Tetrachloro-2,2-difluoroethane
 1,1,2,2-Tetrachloro-1,2-difluoroethane
 1,1,2,2-Tetrachloroethane
 Tetrachloronaphthalene
 Tetraethyl lead
 Tetramethyl lead
 Tetramethyl succinonitrile
 Tetryl
 4,4'-Thiobis(6-tert. butyl-m-cresol)
 Thiram
 Tin, metal, oxide, soluble & insoluble compounds
 Titanium dioxide
 Tributyl phosphate
 1,1,2-Trichloroethane
 Trichloronaphthalene
 Trifluorobromomethane
 Trimethyl phosphite
 2,4,6-Trinitrotoluene (TNT)
 Triorthocresyl phosphate
 Triphenyl phosphate

DUSTSSILICA, SiO₂Crystalline

Quartz [14808-60-7]
 Cristobalite [14464-46-1]
 Tridymite [15468-32-3]

Amorphous

Diatomaceous earth (uncalcined)(m)
 [68855-54-9]

SILICATES(m)

Graphite, synthetic
 Mica [12001-26-2]
 Nuisance particulates
 (see Appendix D)

TLV-TWA

0.1 mg/m³, Respirable dust
 0.05 mg/m³, Respirable dust
 0.05 mg/m³, Respirable dust

10 mg/m³, Total dust

10 mg/m³, Total dust
 3 mg/m³, Respirable dust
 10 mg/m³, Total dust

DUSTS (con't)

Perlite 10 mg/m³, Total dust

Portland cement 10 mg/m³, Total dust

OTHER DUSTS

Barium sulfate [7727-43-7] 10 mg/m³, Total dust

Grain dust (oats, wheat, barley) 4 mg/m³, Total particulate

FOOTNOTES

j) Both concentration and percent quartz (if applicable) for respirable dust for the application of this limit are to be determined from the fraction passing a size-selector with the characteristics defined in Appendix G.

m) For silicates, the values are for dust containing no asbestos and < 1% crystalline silica in the total dust. For coal dust, the value is for coal dust containing < 5% crystalline silica in the respirable fraction. For materials containing more than these percentages of crystalline silica, the environment should be evaluated against the TLV of 0.1 mg/m³ for respirable quartz. Even where the respirable quartz concentration is less than 0.1 mg/m³, the level of the major component should not exceed its TLV.

DELETIONS

All mppcf values.

Appendix F, Conversion of mppcf to Mass Concentration

Ammonium persulfate, sodium persulfate, and persulfates, alkali metal, from the Notice of Intended Changes and transfer to Appendix G -- Substances Under Study.

RETENTIONS

Cobalt dust and fume, enflurane and halothane on Notice of Intended Changes for an additional year.

Retain STEL value for sulfur dioxide as listed in adopted values.

APPENDIX G**Chemical Substances and Other Issues Under StudyA**

Chemical Substances

Acetomethylchloride

Acetophenone

Acetylacetone

Acrylic acid

Allyl chloride

Bromodichloromethane

Dibutyl phenyl phosphate

Dichlorvos

Chemical Substances

Dinitrotoluene
Epichlorohydrin
Ethylamines
Gasoline (unleaded)
Hexachlorocyclopentadiene
Hydrazine
Jet, petroleum and diesel fuels
Malathion
Methyl bromide
Methyl hydrazines
Naled
Nitrous oxide
Pentachlorophenol

Perchloroethylene
Persulfates
Petroleum solvents
o-Phenylenediamine
Propylene dichloride
Rosin core solder pyrolysis products
Skydrol hydraulic fluid
1,1,1,2-Tetrachloro-2,2-difluoroethane
1,1,2,2-Tetrachloro-1,2-difluoroethane
1,1,2,2-Tetrachloroethane
Thiram
Trichloroethylene
Mineral wool fibers
Graphite fibers
Ceramic fiber

Other Issues

1. Particle Size-Selective Sampling Criteria for Airborne Particulate Matter^B

For chemical substances present in inhaled air as suspensions of solid particles or droplets, the potential hazard depends on particle size as well as mass concentration because of: 1) effects of particle size on deposition site within the respiratory tract, and 2) the tendency for many occupational diseases to be associated with material deposited in particular regions of the respiratory tract.

ACGIH has recommended particle size-selective TLVs for crystalline silica for many years in recognition of the well established association between silicosis and respirable mass concentrations. It now has embarked on a re-examination of other chemical substances encountered in particulate form in occupational environments with the objective of defining: 1) the size-fraction most closely associated for each substance with the health effect of concern, and 2) the mass concentration within that size fraction which should represent the TLV.

The Particle Size-Selective TLVs (PSS-TLVs) will be expressed in three forms, e.g.,

- a. Inspirable Particulate Mass TLVs (IPM-TLVs) for those materials which are hazardous when deposited anywhere in the respiratory tract.
- b. Thoracic Particulate Mass TLVs (TPM-TLVs) for those materials which are hazardous when deposited anywhere within the lung airways and the gas-exchange region.
- c. Respirable Particulate Mass TLVs (RPM-TLVs) for those materials which are hazardous when deposited in the gas-exchange region.

The three particulate mass fractions described above are defined in quantitative terms as follows:

- a. Inspirable Particulate Mass consists of those particles that are captured according to the following collection efficiency regardless of sampler orientation with respect to wind direction:

$$E = 50(1 + \exp[-0.06 d_a]) \pm 10;$$

$$\text{for } 0 < d_a \leq 100 \mu\text{m}$$

Collection characteristics for $d_a > 100 \mu\text{m}$ are presently unknown. E is collection efficiency in percent and d_a is aerodynamic diameter in μm .

- b. Thoracic Particulate Mass consists of those particles that penetrate a separator whose size collection efficiency is described by a cumulative lognormal function with a median aerodynamic diameter of $10 \mu\text{m} \pm 1.0 \mu\text{m}$ and with a geometric standard deviation of $1.5 (+ 0.1)$.
- c. Respirable Particulate Mass consists of those particles that penetrate a separator whose size collection efficiency is described by a cumulative lognormal function with a median aerodynamic diameter of $3.5 \mu\text{m} \pm 0.3 \mu\text{m}$ and with a geometric standard deviation of $1.5 (+ 0.1)$. This incorporates and clarifies the previous ACGIH Respirable Dust Sampling Criteria.

These definitions provide a range of acceptable performance for each type of size-selective sampler. Further information is available on the background and performance criteria for these particle size-selective sampling recommendations. (1-3)

References

1. ACGIH: Particle Size-Selective Sampling in the Workplace, 80 pp. Cincinnati, Ohio (1984).
 2. Particle Size-Selective Sampling in the Workplace. Ann. Am. Conf. Govt. Ind. Hyg. 11:23-100 (1984).
 3. Chapter 7, Performance Considerations for Size-Selective Samplers (revised). Submitted to Ann. Am. Conf. Govt. Ind. Hyg. (1986).
2. Should the TLVs currently expressed as "total dust"* be changed to "inspirable particulate mass" (as defined in the above criteria) without changing the numerical value?
 3. Applications of TLVs to altered work schedules.

A Information, data especially, and comments are solicited to assist the Committee in its deliberations and in the development of draft documents. Draft documentations are used by the Committee to decide what action, if any, to recommend on a given question.

B Includes redefinition of respirable dust and notice of additional size-selective concentrations to be used in TLVs for particulate matter under consideration for revision.

* As used for the mineral dusts.

BIOLOGICAL EXPOSURE INDICES COMMITTEE REPORT

21 May 1986

NOTICE OF INTENT TO ESTABLISH BEIs FOR 1986-87

Airborne Chemical [CAS #]

Indices	Timing	BEI	Additional Notation
ANILINE [62-53-3]			
* Total p-aminophenol in urine	End of shift	50 mg/L	G
CADMIUM [7440-43-9]			
Cadmium in urine	Not critical	10 µg/g creat.	†
Cadmium in blood	Not critical	10 µg/L	†
CARBON DISULFIDE [75-15-0]			
2-Thiothiazolidine-4-carboxylic acid (=TTCA) in urine	End of shift	5 mg/g creat.	
DIMETHYLFORMAMIDE [68-12-2]			
N-Methylformamide in urine	End of shift	40 mg/£g creat.	
METHYL ETHYL KETONE (MEK) [78-93-3]			
MEK in urine	End of shift	2 mg/L	G
PENTACHLOROPHENOL (PCP) [87-86-5]			
Total PCP in urine	Prior to the last shift of workweek	2 mg/L	†
Free PCP in plasma	End of shift	5 mg/L	†

TRANSFERS TO ADOPTED LIST FOR 1986-87

Airborne Chemical [CAS #]

Indices	Timing	BEI	Additional Notation
CARBON MONOXIDE [630-08-0]			R
* Carboxyhemoglobin in blood	End of shift	Less than 8%	†
* CO in end-exhaled air	End of shift	Less than 40 ppm	†

Airborne Chemical [CAS #]

Indices	Timing	BEI	Additional Notation
ETHYL BENZENE [100-41-4]			
* Mandelic acid in urine	End of shift and end of workweek	2 g/L 1.5 g/g creat.	G G
** Ethyl benzene in end-exhaled air	Prior to shift	2 ppm	
STYRENE [100-42-5]			
* Mandelic acid in urine	End of shift	1 g/L 0.8 g/g creat.	G G
** Styrene in mixed-exhaled air	Prior to shift	40 ppb	
* Phenylglyoxylic acid in urine	End of shift	250 mg/L 240 mg/g creat.	† G G
** Styrene in mixed-exhaled air	During shift	18 ppm	
** Styrene in blood	End of shift Prior to shift	0.55 mg/L 0.02 mg/L	
TOLUENE [108-88-3]			
* Hippuric acid in urine	End of shift Last 4 hrs of shift	2.5 g/g creat. 3 mg/min	† G G
** Toluene in venous blood	End of shift	1 mg/L	
** Toluene in end-exhaled air	During shift	20 ppm	
TRICHLOROETHYLENE [79-01-6]			
* Trichloroacetic acid in urine	End of workweek	100 mg/L	G
* Trichloroacetic acid and trichloroethanol in urine	End of workweek and end of shift	300 mg/L 320 mg/g creat.	G G
* Free trichloroethanol in blood	End of shift and end of workweek	4 mg/L	
** Trichloroethylene in end-exhaled air	Prior to shift and end of workweek	0.5 ppm	
XYLENES [1330-20-7]			
Methylhippuric acids in urine	End of shift Last 4 hrs of shift	1.5 g/g creat. 2 mg/min	

<<<<< >>>>>

NOTICE OF INTENDED CHANGES FOR 1986-87

Light and Near-infrared Radiation

Change equations 3a and 3b as follows:

$$\sum_{400}^{770} L_{\lambda} \cdot t \cdot B_{\lambda} \cdot \Delta\lambda \leq 100 \text{ cm}^{-2} \text{ sr}^{-1} (t \leq 10^4 \text{ s}) \quad (3a)$$

$$\sum_{400}^{770} L_{\lambda} \cdot B_{\lambda} \cdot \Delta\lambda \leq 10^{-2} \text{ sr}^{-1} (t > 10^4 \text{ s}) \quad (3b)$$

TABLE 13

Spectral Weighting Functions for Assessing Retinal Hazards from Optical Sources

Last two entries to read:

Wavelength (nm)	Blue-Light Hazard-Function B_{λ}	Burn Hazard Function R_{λ}
700-770	0.001	$10[(700-\lambda)/505]$
770-1400	0.001	0.2

TRANSFERS TO ADOPTED LIST FOR 1986-87

Lasers

Repetitively Pulsed Exposures -- Full section appearing on page 94 of the of the 1985-86 TLV booklet.

Cold Stress

Full section appearing on pages 98-109 of the 1985-86 TLV booklet.

Hand-Arm (Segmental) Vibration

Full section appearing on pages 109-113 of the 1985-86 TLV booklet.

PHYSICAL AGENTS UNDER STUDY

1. Extremely Low Frequency (ELF) Radiation. Specifically, that portion of the spectrum from 0 to 300 Hz.