

from any person who has participated in the oral proceedings.

Following the close of the hearing, the presiding Administrative Law Judge will certify the record of the hearing to the Assistant Secretary of Labor for Occupational Safety and Health. The Administrative Law Judge does not make or recommend any decisions as to the content of a final standard.

The proposal will be reviewed in light of all written submissions and testimony received as part of the rulemaking record. Decisions on the provisions of a final standard will be made by the Assistant Secretary based on the entire record of the proceeding.

List of Subjects in 29 CFR Part 1910

Explosives, Flammable liquids and gases, Hazard analysis, Highly hazardous chemicals, Hazardous materials, Occupational safety and health, Safety, Process hazard analysis, Pyrotechnics.

Authority

This document has been prepared under the direction of Gerard F. Scannell, Assistant Secretary of Labor for Occupational Safety and Health, U.S. Department of Labor, 200 Constitution Avenue NW, Washington, DC 20210.

Accordingly, pursuant to sections 4, 6, and 8 of the Occupational Safety and Health Act of 1970 (29 U.S.C. 653, 655, 657); Secretary of Labor's Order No. 1-90 (58 FR 9033); and 29 CFR part 1911, it is proposed to amend 29 CFR part 1910 as set forth below.

Signed at Washington, DC, this 11th day of July 1990.

Gerard F. Scannell,
Assistant Secretary of Labor.

PART 1910—OCCUPATIONAL SAFETY AND HEALTH STANDARDS

1. The authority citation for subpart H of 29 CFR part 1910 would be amended to read as follows:

Authority: Secs. 4, 6, 8, Occupational Safety and Health Act of 1970 (29 U.S.C. 653, 655, 657); Secretary of Labor's Order No. 12-71 (36 FR 6754), 8-76 (41 FR 25059), 9-83 (48 FR 35736), or 1-90 (58 FR 9033), as applicable.

Sections 1910.103, 1910.106, 1910.107, 1910.108, and 1910.109, also issued under 29 CFR part 1911.

Section 1910.110 is also issued under 5 U.S.C. 553 and 29 CFR part 1911.

Sections 1910.111 and 1910.119 are also issued under 29 CFR part 1911.

Section 1910.120 is also issued under Sec. 126, Superfund Amendments and Reauthorization Act of 1980 as amended (29 U.S.C. 655 note), 5 U.S.C. 553, and 29 CFR part 1911.

2. Part 1910 of title 29 of the Code of Federal Regulations would be amended

by adding to subpart H a new § 1910.119 and appendices A through F to § 1910.119 to read as follows:

§ 1910.119 Process safety management of highly hazardous chemicals.

(a) *Purpose.* This section contains requirements for preventing or minimizing the consequences of catastrophic releases of toxic, flammable or explosive chemicals.

(b) *Application.* (1) This section applies to the following:

(i) Processes which involve chemicals at or above the specified threshold quantities listed in mandatory appendix A to this section;

(ii) Processes which involve flammable liquids or gases (as defined in § 1910.1200(c) of this part) onsite in one location, in quantities of 10,000 pounds or more except for:

(A) Hydrocarbon fuels used solely for workplace consumption as a fuel (e.g., propane or oil used for comfort heating); and

(B) Flammable liquids stored or transferred which are kept below their atmospheric boiling point without benefit of chilling or refrigeration.

(iii) Manufacture of explosives as defined in paragraph (a)(3) of § 1910.109 of this part;

(iv) Manufacture of pyrotechnics as defined in paragraph (a)(10) of § 1910.109 of this part including fireworks and flares; and

(v) Processes which involve a chemical developed after the effective date of the standard, when the chemical has a substance hazard index (SHI) greater than 5,000 and at least 500 pounds of the substance is in the workplace.

(2) This section does not apply to:

(i) Retail facilities;

(ii) Oil or gas well drilling or servicing operations; or,

(iii) Normally unmanned remote facilities.

(c) *Definitions.* *Facility* means the buildings, containers or equipment which contain a process.

Highly hazardous chemical means a substance possessing toxic, flammable, reactive, or explosive properties and specified by paragraph (b)(1) of this section.

Hot work means work involving electric or gas welding, cutting, brazing, or similar flame- or spark-producing operations.

Normally unmanned remote facility means a facility which is operated, maintained and serviced by employees who visit the unmanned facility only periodically to check the operation and perform necessary operating or maintenance tasks. No employees are

permanently assigned. Facilities meeting this definition must be remote from other facilities.

Process means any activity conducted by an employer that involves a highly hazardous chemical including any use, storage, manufacturing, handling, or movement of a highly hazardous chemical, or combination of these activities.

Substance hazard index (SHI) means a calculated number assigned to a newly developed toxic substance to determine its degree of hazard. Appendix B to this section, which is mandatory, explains the method for calculating the SHI.

(d) *Process safety information.* The employer shall develop and maintain a compilation of written safety information to enable the employer and the employees operating the process to identify and understand the hazards posed by processes involving highly hazardous chemicals. This safety information must be communicated to employees involved in the processes, and shall include information pertaining to hazards of the highly hazardous chemicals used in the process, information pertaining to the technology of the process, and information pertaining to the equipment in the process.

(1) *Information pertaining to hazards of the chemicals used in the process.* This information shall consist of at least the following:

- (i) Toxicity information;
- (ii) Permissible exposure limits;
- (iii) Physical data;
- (iv) Reactivity data;
- (v) Corrosivity data;
- (vi) Thermal and chemical stability data; and
- (vii) Hazardous effects of inadvertent mixing of different materials, that could foreseeably occur.

Note: Material Safety Data Sheets meeting the requirements of 29 CFR 1910.1200(g) may be used to comply with this requirement to the extent they meet the information provisions.

(2) *Information pertaining to the technology of the process.* (i) Information concerning the technology of the process shall include at least the following:

- (A) A block flow diagram or simplified process flow diagram (see Appendix C to this section);
- (B) Process chemistry;
- (C) Maximum intended inventory;
- (D) Safe upper and lower limits for such items as temperatures, pressures, flows and/or compositions; and,

(E) The consequences of deviations, including those affecting the safety and health of employees.

(II) For processes initiated before January 1, 1990, the information concerning the technology of the process may be developed from a process hazards analysis conducted in accordance with paragraph (e) of this section.

(3) *Information pertaining to the equipment in the process.* (I) Information pertaining to the equipment in the process shall include:

- (A) Materials of construction;
- (B) Piping and instrument diagrams (P&ID's);
- (C) Electrical classification;
- (D) Relief system design and design basis;

(E) Ventilation system design;

(F) Design codes employed;

(G) Material and energy balances for processes built after the effective date of standard; and,

(H) Safety systems (such as interlocks, detection and suppression systems, etc.).

(II) The employer shall document that equipment complies with applicable codes and standards, such as those published by the American Society of Mechanical Engineers, the American Petroleum Institute, the American Institute of Chemical Engineers, the American National Standards Institute, the American Society of Testing and Materials, and the National Fire Protection Association, where they exist; or, recognized and generally accepted engineering practices.

(III) For existing equipment designed and constructed in accordance with codes, standards, or practices that are no longer in general use, the employer shall determine and document that the equipment is designed, maintained, inspected, tested, and operated in such a way that safe operation is assured.

(e) *Process hazard analysis.* (1) The employer shall perform a hazard analysis for identifying, evaluating, and controlling hazards involved in the process, using at least one of the following methodologies. (See Appendix D to this section for more detailed description of these methodologies):

- (i) What-If;
- (ii) Checklist;
- (iii) What-If/Checklist;
- (iv) Hazard and Operability Study (HAZOP);

(v) Failure Mode and Effects Analysis (FMEA); or,

(vi) Fault Tree Analysis.

(2) The hazard analysis shall address:

- (i) The hazards of the process;

(ii) Engineering and administrative controls applicable to the hazards and their interrelationships;

(iii) Consequences of failure of these controls; and,

(iv) A consequence analysis of the effects on all workplace employees.

(3) The process hazard analysis shall be performed by a team with expertise in engineering and process operations, and the team shall include at least one employee who has experience and knowledge specific to the process being evaluated.

(4) The employer shall establish a system to promptly address the team's findings and recommendations; document actions taken; communicate them to operating, maintenance and other employees whose work assignments are in the facility, and who are affected by the recommendations or actions; and assure that the recommendations are implemented in a timely manner.

(5) At least every five (5) years, the process hazard analysis shall be updated and revalidated, by a team meeting the requirements in paragraph (e)(3) of this section, to assure that the process hazard analysis is consistent with the current process.

(6) Employers shall retain the two (2) most recent analyses and/or updates for each process covered by this section, as well as the documented actions described in paragraph (e)(4) of this section.

(f) *Operating procedures.* (1) The employer shall develop and implement written operating procedures that provide clear instructions for safely conducting activities involved in each process consistent with the process safety information and shall address at least the following.

(i) *Steps for each operating phase:*

- (A) Initial startup;
- (B) Normal operation;
- (C) Temporary operations as the need arises;

(D) Emergency operations, including emergency shutdowns, and who may initiate these procedures;

- (E) Normal shutdown; and,
- (F) Startup following a turnaround, or after an emergency shutdown.

(ii) *Operating limits:*

- (A) Consequences of deviation;
- (B) Steps required to correct and/or avoid deviation; and,

(C) Safety systems and their functions.

(iii) *Safety and health considerations:*

(A) Properties of, and hazards presented by, the chemicals used in the process;

(B) Precautions necessary to prevent exposure, including administrative

controls, engineering controls, and personal protective equipment;

(C) Control measures to be taken if physical contact or airborne exposure occurs;

(D) Safety procedures for opening process equipment (such as pipe line breaking);

(E) Quality control for raw materials and control of hazardous chemical inventory levels; and;

(F) Any special or unique hazards.

(2) A copy of the operating procedures shall be readily accessible to employees who work in or maintain a process.

(3) The operating procedures shall be reviewed as often as necessary to assure that they reflect current operating practice, including changes that result from changes in process chemicals, technology, and equipment; and changes to facilities.

(g) *Training.* (1) *Initial training.* Each employee presently involved in a process, and each employee before working in a newly assigned process, shall be trained in an overview of the process and in the operating procedures as specified in paragraph (f) of this section. The training shall include emphasis on the specific safety and health hazards, procedures, and safe practices applicable to the employee's job tasks.

(2) *Refresher and supplemental training.* Refresher and supplemental training shall be provided to each employee at least annually to assure that the employee understands and adheres to the current operating procedures of the process.

(3) *Training certification.* The employer shall certify that each of these employees has received and successfully completed training as specified by this paragraph. The employer, after the initial or refresher training shall prepare a certification record which contains the identity of the employee, the date of training, and the signature of the person doing the training.

(h) *Contractors.* (1) The employer shall inform contractors performing work on, or near, a process of the known potential fire, explosion or toxic release hazards related to the contractor's work and the process, and ensure that contract employees are trained in the work practices necessary to safely perform their job. The employer shall also inform contractors of any applicable safety rules of the facility.

(2) The employer shall explain to contractors the applicable provisions of the emergency action plan required by paragraph (n) of this section.

(3) Contract employers shall assure that each of their employees follow all applicable work practices and safety rules of the facility.

(i) *Pre-startup safety review.* (1) The employer shall perform a pre-startup safety review for new facilities and for modified facilities for which the modification necessitates a change in the process safety information.

(2) The pre-startup safety review shall confirm that prior to the introduction of highly hazardous chemicals to a process:

(i) Construction is in accordance with design specifications;

(ii) Safety, operating, maintenance, and emergency procedures are in place and are adequate;

(iii) Process hazard analysis recommendations have been addressed and actions necessary for startup have been completed; and,

(iv) Operating procedures are in place and training of each operating employee has been completed.

(j) *Mechanical integrity.* (1) *Application.* Paragraphs (j)(2) through (j)(5) of this section apply to the following process equipment:

(i) Pressure vessels and storage tanks;

(ii) Piping systems (including piping components such as valves);

(iii) Relief and vent systems and devices;

(iv) Emergency shutdown systems; and,

(v) Controls (including monitoring devices and sensors), alarms, and interlocks.

(2) *Written procedures.* (i) The employer shall establish and implement written procedures to maintain the on-going integrity of process equipment.

(ii) The employer shall assure that each employee involved in maintaining the on-going integrity of the process equipment is trained in the procedures applicable to the employee's job tasks.

(3) *Inspection and testing.* (i) Inspections and tests shall be performed on process equipment.

(ii) Inspection and testing procedures shall follow applicable codes and standards, such as those published by the American Society of Mechanical Engineers, the American Petroleum Institute, the American Institute of Chemical Engineers, the American National Standards Institute, the American Society of Testing and Materials, and the National Fire Protection Association, where they exist; or, recognized and generally accepted engineering practices.

(iii) The frequency of inspections and tests shall be consistent with applicable codes and standards; or, more frequently if determined necessary by prior operating experience.

(iv) The employer shall have a certification record that each inspection and test has been performed in accordance with this paragraph. The certification shall identify the date of the inspection; the name of the person who performed the inspection and test; and the serial number or other identifier of the equipment.

(4) *Equipment deficiencies.* The employer shall correct deficiencies in equipment which are outside acceptable limits, before further use.

(5) *Quality assurance.* (i) The employer shall assure that equipment as fabricated meets design specifications.

(ii) Appropriate checks and inspections shall be performed as necessary to assure that equipment is installed properly and consistent with design specifications and manufacturer's instructions.

(iii) The employer shall assure that maintenance materials, and spare parts and equipment, meet design specifications.

(k) *Hot work permit.* (1) The employer shall issue a permit for all hot work, with the following exceptions:

(i) Where the employer or the employer's representative, designated as responsible for authorizing hot work operations, is present while the hot work is being performed; and,

(ii) In welding shops authorized by the employer.

(2) The permit shall certify that the fire prevention and protection requirements contained in 29 CFR 1910.252(a) have been implemented prior to beginning the hot work operations; indicate the date(s) authorized for hot work, and identify the equipment or facility on which hot work is to be done. The permit shall be kept on file until completion of the hot work operations.

(l) *Management of change.* (1) The employer shall establish and implement written procedures to manage changes (except for "replacements in kind") to process chemicals, technology, and equipment; and changes to facilities.

(2) The procedures shall assure that the following are addressed prior to any change.

(i) The technical basis for the proposed change;

(ii) Impact of change on safety and health;

(iii) Modifications to operating procedures;

(iv) Necessary time period for the change; and,

(v) Authorization requirements for the proposed change.

(3) Employees involved in the process shall be informed of, and trained in, the change in the process as early as practicable prior to its implementation.

(4) If a change covered by this paragraph results in a change to the process safety information, such information shall be appended and/or updated in accordance with paragraph (d) of this section.

(5) If a change covered by this paragraph results in a change to the operating procedures, such procedures shall be appended and/or updated in accordance with paragraph (f) of this section.

(m) *Incident investigation.* (2) The employer shall investigate every incident which results in, or could reasonably have resulted in, a major accident in the workplace. (See Appendix E to this section for guidelines on conducting incident investigations.)

(2) Incident investigations shall be initiated as promptly as possible, but no later than 48 hours following the incident.

(3) An incident investigation team shall be established and consist of persons knowledgeable in the process involved and other appropriate specialties as necessary.

(4) A report shall be prepared at the conclusion of the investigation which includes at a minimum:

(i) Date of incident;

(ii) Date investigation began;

(iii) A description of the incident;

(iv) The factors that contributed to the incident; and,

(v) Any recommendations resulting from the investigation.

(5) The report shall be reviewed with all operating, maintenance, and other personnel whose work assignments are within the facility where the incident occurred.

(6) The employer shall establish a system to promptly address the report findings and recommendations and shall implement the report recommendations in a timely manner.

(7) Incident investigation reports shall be retained for five years.

(n) *Emergency planning and response.* The employer shall establish and implement an emergency action plan in accordance with the provisions of 29 CFR 1910.38(a).

Note: 29 CFR 1910.120 (a), (p) and (q) may also be applicable.

(o) *Compliance Safety Audits.* (1) Employers shall certify that they have evaluated compliance with the provisions of this section, at least every three years.

(2) A team shall conduct the compliance safety audit and shall be comprised of at least one person knowledgeable in the process.

(3) A report of the findings of the audit shall be developed.

(4) The employer shall promptly determine and document an appropriate response to each of the findings of the compliance audit, and certify that deficiencies have been corrected.

(5) Employers shall retain the two (2) most recent compliance safety audit reports, as well as the documentation described in paragraph (c)(4) of this section.

Appendix A to § 2912.119—List of Highly Hazardous Chemicals (Mandatory)

This Appendix contains a listing of some and reactive chemicals which present a potential for a catastrophic event at or above the threshold quantity.

Chemical name	CAS	TQ ^a
Acetaldehyde	75-07-0	2500
Acrolein (2-Propenal)	107-02-8	450
Acrylyl Chloride	518-60-8	250
Allyl Chloride	107-05-4	6000
Allylamine	107-91-8	6000
Alkylaluminums	None	5000
Ammonia, Anhydrous	7664-41-7	5000
Ammonia solutions (>44% ammonia by weight)	7664-41-7	10000
Ammonium Perchlorate	7790-98-9	7500
Ammonium Perbenzoate	7787-36-2	7500
Aniline (also called Aniline Hydroxide)	7784-42-1	400
Bis(Chloromethyl) Ether	642-89-1	400
Boron Trichloride	10294-34-5	2500
Boron Trifluoride	7637-07-2	250
Bromine	7725-05-8	1500
Bromine Chloride	13863-41-7	1500
Bromine Pentafluoride	7789-80-2	2500
Bromine Trifluoride	7787-71-5	15000
3-Bromopropene (also called Propargyl Bromide)	105-66-7	7500
Butyl Hydroperoxide (Tertiary)	75-91-2	9000
Butyl Perbenzoate (Tertiary)	814-45-9	7500
Carbonyl Chloride (see Phosgene)	75-44-5	400
Carbonyl Fluoride	853-60-4	2500
Cellulose Nitrate (concentration >12.6% Nitrogen)	9004-70-0	2500
Chlorine	7782-50-5	1500
Chlorine Dioxide	10049-94-4	1000
Chlorine pentafluoride	13637-63-3	4000
Chlorine Trifluoride	7790-81-2	4000
Chlorodiethylaluminum (also called Diethylaluminum Chloride)	85-40-6	5000
1-Chloro-2,4-Dinitrobenzene	97-00-7	5000
Dichloromethyl Methyl Ether	107-30-2	500
Chloroplatin	78-06-2	500
Chloroplatin and Methyl Bromide mixture	None	1500
Chloroplatin and Methyl Chloride mixture	None	1500
Cumene Hydroperoxide	80-15-9	5000
Cyanogen	460-19-5	2500
Cyanogen Chloride	506-77-4	500
Cyanuric Fluoride	575-14-8	400
Diacetyl Peroxide (concentration >70%)	110-22-6	5000
Diazomethane	334-88-3	500
Dibenzoyl Peroxide	94-36-0	7500
Diborane	19287-45-7	100
Dibutyl Peroxide (Tertiary)	119-05-4	9000
Dichloro Acetylene	3572-29-1	250
Dichlorosilane	4109-96-0	2500
Diethylzinc	557-20-0	40000
Diisopropyl peroxydicarbonate	105-84-6	7500
Dilauryl Peroxide	105-74-8	7500
Dimethyl Sulfide	75-18-3	400
Dimethyldichlorosilane	75-78-6	1000
Dimethylhydrazine, 1,1-	57-14-7	1000
Dimethylamine, Anhydrous	124-40-3	2500
2,4-Dinitroaniline	97-02-9	5000
Ethyl Methyl Ketone Peroxide (also Methyl Ethyl Ketone Peroxide; concentration >60%)	1336-23-4	5000
Ethyl Nitrite	108-95-6	5000
Ethylamine	75-04-7	7500
Ethylene Fluorohydrin	371-82-0	400
Ethylene Oxide	75-21-8	5000
Ethyleneimine	151-68-4	1000
Fluorine	7782-41-4	1000
Formaldehyde (concentration >90%)	50-00-0	1000
Furan	110-00-9	500
Hexafluoroacetone	684-16-2	5000
Hydrochloric Acid, Anhydrous	7647-01-0	5000
Hydrofluoric Acid, Anhydrous	7664-39-3	1000
Hydrogen Bromide	10035-10-6	5000
Hydrogen Chloride	7647-01-0	5000
Hydrogen Cyanide, Anhydrous	74-90-8	1000
Hydrogen Fluoride	7664-39-3	1000
Hydrogen Peroxide (52% by weight or more)	7722-84-1	7500
Hydrogen Selenide	7783-07-5	150

Chemical name	CAS ¹	To. ²
Hydrogen Sulfide	7783-06-4	1500
Hydroxylamine	7803-49-8	2500
Iron, pentacarbonyl	13463-40-8	250
Isopropyl Formate	625-65-8	500
Isopropylamine	75-31-0	5000
Ketene	463-51-4	100
Methacrylaldehyde	78-85-3	1000
Methacryloyl Chloride	920-46-7	150
Methacryloyloxyethyl isocyanate	30674-80-7	100
Methyl Acrylonitrile	126-99-7	250
Methylamine, Anhydrous	74-89-5	1000
Methyl Bromide	74-83-9	2500
Methyl Chloride	74-87-8	15000
Methyl Chloroformate	78-22-1	500
Methyl Oleulfide	624-92-0	100
Methyl Ethyl Ketone Peroxide (concentration > 60%)	1336-23-4	5000
Methyl Fluoroacetate	453-18-9	100
Methyl Fluorosulfate	421-20-5	100
Methyl Hydrazine	60-34-4	100
Methyl Iodide	74-88-4	7500
Methyl isocyanate	624-83-9	250
Methyl Mercaptan	74-83-1	5000
Methyl Vinyl Ketone	79-84-4	100
Methyltrichlorosilane	75-79-6	500
Nickel Carbonyl (Nickel Tetracarbonyl)	13463-39-3	150
Nitric Acid (84.5% by weight or greater)	7697-37-2	500
Nitric Oxide	10102-43-8	250
Nitrobenzene (para Nitrobenzene)	100-01-6	5000
Nitromethane	75-52-5	2500
Nitrogen Dioxide	10102-44-0	250
Nitrogen Oxides (NO; NO ₂ ; N ₂ O; N ₂ O ₄)	10102-44-0	250
Nitrogen Tetroxide (also called Nitrogen Peroxide)	10544-72-8	250
Nitrogen Trifluoride	7783-54-2	5000
Nitrogen Trioxide	10544-73-7	250
Oleum (65% to 80% by weight; also called Fuming Sulfuric Acid)	8014-94-7	1000
Osmium Tetroxide	20818-12-0	100
Oxygen (Fluoride (Fluorine Monoxide))	7783-41-7	100
Ozone	10028-15-6	100
Pentaborane	19624-22-7	100
Peroxyacetic Acid (also called Peroxyacetic Acid)	79-21-0	5000
Perchloric Acid (concentration > 60%)	7601-80-3	5000
Perchloromethyl Mercaptan	594-42-3	150
Perchloryl Fluoride	7816-64-6	5000
Peroxyacetic Acid (Concentration > 60%; also called Peroxyacetic Acid)	79-21-0	5000
Phosgene (also called Carbonyl Chloride)	75-44-6	100
Phosphine (Hydrogen Phosphide)	7803-51-2	100
Phosphorus Oxychloride (also called Phosphoryl Chloride)	10025-87-3	1000
Phosphorus Trichloride	7719-12-2	1000
Phosphoryl Chloride (also called Phosphorus Oxychloride)	10025-87-3	1000
Propargyl Bromide	106-66-7	7500
Propyl Nitrate	627-3-4	2500
Sarin	107-44-8	100
Selenium Hexafluoride	7783-78-1	1000
Stibine (Antimony Hydride)	7803-52-9	500
Sulfur Dioxide (liquid)	7446-08-6	1000
Sulfur Pentafluoride	5714-22-7	250
Sulfur Tetrafluoride	7783-60-0	250
Sulfur Trioxide (also called Sulfuric Anhydride)	7446-11-9	1000
Sulfuric Anhydride (also called Sulfur Trioxide)	7446-11-9	1000
Tellurium Hexafluoride	7783-80-4	250
Tetrafluoroethylene	116-14-3	5000
Tetrafluorohydrazine	10036-47-2	5000
Tetramethyl Lead	75-74-1	7500
Thionyl Chloride	7719-08-7	250
Trichloro(chloromethyl) Silane	1558-25-4	100
Trichloro(dichlorophenyl) Silane	21737-85-6	2500
Trichlorosilane	10025-78-2	5000
Trifluorochloroethylene	79-38-9	10000
Trimethylsilane	2487-90-3	1500

¹ Chemical Abstract Service Number² Threshold Quantity in Pounds (Amount necessary to be covered by this standard.)

Appendix B to § 1910.119—Substance Hazard Index (Mandatory)

This appendix contains the method for calculating the Substance Hazard Index (SHI). It is important to note that calculating an SHI is necessary only for a newly

developed toxic substance to determine its degree of hazard.

The substance hazard index (SHI) is calculated as follows:

$$SHI = \frac{EVC}{ERPG-3}$$

EVC is the equilibrium vapor concentration at 20 degrees C. defined as the substance

vapor pressure at 20 degrees C in millimeters of mercury multiplied by 10 to the sixth divided by 760.

ERPG-3 (Emergency Response Planning Guidelines, Level 3) is defined as the maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to one hour without experiencing or developing life-threatening health effects. ERPG's are published by the American Industrial Hygiene Association.

Appendix C to § 1910.119—Block Flow Diagram and Simplified Process Flow Diagram (Nonmandatory)

BILLING CODE 4910-66-M