UNITED STATES DEPARTMENT OF AGRICULTURE FOOD SAFETY AND INSPECTION SERVICE WASHINGTON, DC **CHANGE TRANSMITTAL SHEET**	☒ DIRECTIVE ☐ REVISION ☐ AMENDMENT ☐ OTHER

FSIS DIRECTIVE AIR CONTAMINANTS SAFETY AWARENESS PROGRAM	4791.8	6/19/96

I. BACKGROUND

A new issuance, FSIS Directive 4791.8, Air Contaminants Safety Awareness Program, has been developed. This directive issues guidelines for developing and managing an air contaminants safety awareness program. Exposure limits for air contaminants are found in 29 CFR 1910.1000, Air Contaminants. A copy of this CFR section is distributed with FSIS Directive 4791.8 for referencing convenience.

II. CANCELLATION

Cancel this transmittal sheet when the directive is filed and the copy of 29 CFR 1910.1000 is received to use as needed. For recordkeeping purposes, users may retain or destroy this transmittal sheet.

Deputy Administrator
Administrative Management

Enclosure
29 CFR 1910.1000, Air Contaminants

DISTRIBUTION:
All Inspection Offices; All Inspectors;
Plant Management; PRD; Union Officials

OPI:
IO -Resource Management
Staff

UNITED STATES DEPARTMENT OF AGRICULTURE
FOOD SAFETY AND INSPECTION SERVICE
WASHINGTON, DC

FSIS DIRECTIVE	4791.8	6/19/96

AIR CONTAMINANTS SAFETY AWARENESS PROGRAM

I. PURPOSE

This directive contains general provisions and guidelines to develop and manage an air contaminants safety awareness program.

II. (RESERVED)

III. REASON FOR ISSUANCE

This directive establishes a program to monitor, detect, and report FSIS employee exposure to harmful air contaminants in plant environments.

IV. REFERENCES

FSIS Directive 4293.1, Personnel Records
FSIS Directive 4339.2, Medical Examinations for Employees Exposed to Hazardous Employment Conditions
FSIS Directive 4791.1, Basic Occupational Safety and Health Program
FSIS Directive 4791.5, Hazard Communication Program
FSIS Directive 4810.1, Injury Compensation
29 CFR 1910.1000, Air Contaminants
29 CFR 1910.1200, Hazard Communication
29 CFR 1960, Basic Program Elements for Federal Employee Occupational Safety and Health Programs and Related Matters
Executive Order 12196, Occupational Safety and Health Program for Federal Employees

V. FORMS AND ABBREVIATIONS

CFR	Code of Federal Regulations
IH	Industrial Hygienist
IIC	Inspector-In-Charge
IO	Inspection Operations
IP	International Programs
MSDS	Material Safety Data Sheet
OSHA	Occupational Safety and Health Administration
OSH	Occupational Safety and Health
PELS	Permissible Exposure Limits
RP	Regulatory Programs

FSIS Form 4791-17, Log of Federal Occupational Injuries and Illnesses

DISTRIBUTION:
All Inspection Offices; All Inspectors; Plant Management; PRD; Union Officials

OPI:
IO - Resource Management Staff

VI POLICY

It is FSIS policy to assure that safe and healthful working conditions are provided for all FSIS employees.

VII. COVERAGE AND APPLICABILITY

This directive covers all field employees with regulatory functions in IO, IP, and RP and applies to all FSIS employees required to work in or visit official plant locations where hazardous chemicals or toxic materials are used. **NOTE:** This directive does not cover FSIS employees who are or may have been exposed to biological contaminants while working in or visiting a plant.

VIII. DEFINITIONS

A. **Air Contaminant.** A toxic or hazardous material, chemical, or substance listed in 29 CFR 1910.1000. (**EXAMPLES:** ammonia, carbon dioxide, carbon monoxide, and chlorine.)

B. **Chemical Badge.** (Also called a detector tube.) A device that measures exposure levels of hazardous chemicals and toxic materials.

C. **Exposure.** Field employees with regulatory functions who are subjected by any route of entry including inhalation, ingestion, skin contact, and absorption during employment to a chemical or material that is a physical or health hazard. This includes potential (**EXAMPLES:** accidental or possible) exposure.

D. **Hazardous Chemical.** Any chemical that OSHA has determined is a physical or health hazard.

E. **Industrial Hygienist.** A person with the academic knowledge and experience to determine the effects upon health of chemicals and physical agents under various levels of exposure. The IH is involved in monitoring, engineering, and analyzing methods to detect the extent of exposure for hazard control purposes.

F. **Regional OSH Official.** The full-time IO employee serving as the IO safety and health expert at the regional level.

G. **IO Safety and Health Manager.** The full-time IO employee serving as the primary and technical safety and health expert within IO.

H. **Material Safety Data Sheet.** Written or printed material on a hazardous chemical that is prepared according to the OSHA standard in 29 CFR 1910.1200.

I. **Toxic Material.** A material in a concentration or an amount exceeding the permissible limit established by OSHA, or that is of such toxicity it constitutes a recognized immediate or potential hazard.

IX. AIR CONTAMINANTS MONITORING

The in-plant supervisor or IIC, with assistance from the field office staff and Regional OSH Official, takes the following actions to effectively monitor exposure to air contaminants. **(NOTE:** A mechanical engineer, IH, or other qualified person may be used in the review and assessment process if determined to be necessary by the Regional OSH Official and the IO Safety and Health Manager.)

A. **Monitors Workplaces.** Conducts an air contaminants exposure review and assessment of the assigned. plant when:

1. New hazardous chemicals are **introduced** into plant operations.

2. Employees complain of sore throats, headaches, or eyes and nose irritations, and air contaminants are suspected as the cause.

B. **Surveys Workplaces.** Determines if exposure to air contaminants exists within the plant by reviewing and assessing the:

1. Ventilation system (i.e., exhaust fans ratings and make-up air supply capacities) design (i.e., blueprints and mechanical engineer reports).

2. Results of OSH inspections and IH surveys.

3. Results of the Air Contaminants Safety Awareness Program reviews and assessments of the plant's existing ventilation system, OSH inspections, and IH surveys. This allows the supervisor or IIC to identify areas within the plant that routinely handle, use, or store hazardous chemicals or toxic materials and determine if the identified areas are equipped with a ventilation system that provides a workplace environment free from known air contaminants.

C. **Reviews the Logs of On-Duty Injuries and Illnesses (FSIS Forms 4791-17).** Reviews and analyzes FSIS Forms 4791-17 for FSIS employees assigned to work in plants where hazardous chemicals or toxic materials are routinely present in order to identify over-exposure possibilities.

D. **Protects Employees From Exposure.** Reviews FSIS Directive 4791.5 including the most up-to-date MSDS's and makes periodical OSH inspections to assess that:

1. Plant management is adhering to the MSDS guidelines for using hazardous chemicals.

2. Incompatible hazardous chemicals are not being mixed by plant employees, especially housekeeping personnel, resulting in employee exposure to air contaminants.

X. AIR CONTAMINANTS EXPOSURE PROCEDURES

Air contaminants exposure conditions for a safe and healthy workplace are to be initially measured according to the OSHA standards in 29 CFR 1910.1000. When an unhealthful air contaminant exposure condition is suspected in the plant, the supervisor or IIC will issue chemical-direct reading badges or detector tubes for a specific known airborne contaminant such as ammonia, carbon dioxide and chlorine, to be worn by FSIS employees assigned to the suspected work areas. **(NOTE:** Chemical-direct reading badges or detector tubes for known airborne contaminants are issued through the Regional OSH Official. However, all known chemicals' airborne contaminant concentrations cannot be determined by direct reading badges or detector tubes.) The following exposure procedures and guidelines apply.

A. If a chemical badge or tube indicates levels of chemical exposure above OSHA PELS, the supervisor or IIC shall ensure that the employee's amount and duration of exposure to any air contaminant is limited to those levels specified in 29 CFR 1910.1000. The supervisor or IIC will:

1. Conduct immediate withdrawal of employees from the affected work area(s), as necessary, to assure that employees are no longer exposed to a chemical above PELS.

2. Inform plant management of the withdrawal of FSIS employees from the affected areas, the circumstances, and the plan to return to duty when concentration of the chemical no longer exceeds PELS.

3. Contact the immediate supervisor. The supervisor will contact the Regional OSH Official. The Regional OSH Official immediately becomes involved to resolve the exposure problem. **(NOTE:** A mechanical engineer, IH, or other qualified person may be used in the air contaminant exposure evaluation if determined to be necessary by the Regional OSH Official and the IO Safety and Health Manager.)

B. If a chemical badge or tube indicates levels of chemical exposure **safely below** OSHA PELS, but FSIS employees continue to complain of headaches, sore eyes, sore throats or other physical aches, the supervisor or IIC requests the area supervisor to contact the Regional OSH Official. The Regional OSH Official immediately becomes involved to resolve the suspected exposure problem. **(NOTE:** A mechanical engineer, IH, or other qualified person may be used in the suspected air contaminant exposure evaluation if determined to be necessary by the Regional OSH Official and the IO Safety and Health Manager.)

C. If the air contaminants in the FSIS employee work areas are **not known,** but FSIS employees complain of physical symptoms similar to those described in subparagraph B., follow the same procedures in subparagraph B. The Regional OSH Official immediately becomes involved to resolve the exposure problem. **(NOTE:** A mechanical engineer, IH, or other qualified person may be used in the suspected air contaminant exposure evaluation if determined to be necessary by the Regional OSH Official and the IO Safety and Health Manager.)

XI. COMMUNICATING WITH PLANT MANAGEMENT

When an air contaminant exposure condition is determined by any means including OSH inspections and IH surveys, the in-plant supervisor or IIC with assistance from the field office staff and the Regional OSH Official, shall immediately contact and meet with plant management. The in-plant supervisor, IIC, and/or area supervisor shall:

A. Implement administrative controls as needed, and recommend to plant management that engineering controls or other controls be implemented to abate the air contaminant problem. (**EXAMPLES:** Administrative controls would be work practice changes or modifications, and engineering controls would be ventilation changes, chemical substitution, process isolation, and equipment modifications.)

B. Recommend to plant management when controls listed in subparagraph A. are not feasible to achieve full abatement, that protective equipment or other protective measures (**EXAMPLES:** installing gas alarms at work stations and establishing a gas detectors/monitors exposure program) be implemented to keep the exposure within OSHA PELS.

C. Inform plant management of the withdrawal of FSIS employees from the plant to the extent necessary to assure FSIS employee protection.

XII. MEDICAL EVALUATION

Medical tests and medical monitoring shall be established and provided for FSIS employees required to conduct work tasks in plants where IH tests or OSH inspections have confirmed exposure over the PELS or FSIS employees have complained of physical symptoms similar to those described in Subparagraph X. B.

A. **Physician.** The required medical tests and medical monitoring shall be supervised by a physician and the extent of the medical services provided will be dictated by the FSIS employee's exposure to the hazardous chemical. The employee should provide the physician with information related to the chemicals (i.e., copies of MSDS's) to which he or she was exposed, the nature of the symptoms experienced, and the results of any IH surveys or air contaminant sampling performed at the duty location related to the air contaminant exposure.

B. **Workplace Injuries.** FSIS employees injured from exposure to air contaminants of hazardous chemicals, confirmed by IH tests or OSH inspections to have been over the PELS, are classified as workplace injuries or illnesses. See FSIS Directive 4810.1 for compensation benefits and claim filing instructions.

XIII. RECORDKEEPING

Keep the testing and monitoring results records used to determine exposure to air contaminants for the duration of the affected employee's employment plus 30 years. All employee medical records on medical tests and medical monitoring are confidential and are kept according to FSIS Directive 4293.1.

XIV. ASSISTANCE AND CONSULTATION

Field supervisors needing immediate assistance or consultation to determine whether exposure to hazardous employment conditions exists in their field workplaces may contact an OSH Official or the IO Safety and Health Manager directly. IP and RP field employees who work in or visit a meat, poultry, or egg products plant may request assistance from the Regional OSH Official. They may contact an in-plant supervisor or IIC, or the Area or Regional Office. **NOTE:** FSIS employees have the right to report air contaminants exposure conditions in their workplace environments to appropriate OSH officials.

Deputy Administrator
Administrative Management

29 CFR 1910.1000
Air Contaminants:

An employee's exposure to any substance listed is Tables Z-1, Z-2, or Z-3 of this section shall be limited is accordance with the requirements of the following paragraphs of this section.

(a) Table Z-1:

(1) Substances with limits preceded by ' 'C' ' - Ceiling Values. An employee's exposure to any substance is Table Z-1, the exposure limit of which is preceded by a ' 'C' ' , shall at no time exceed the exposure limit given for that substance. If instantaneous monitoring is not feasible, then the ceiling shall be assessed as a 15-minute time weighted average exposure which shall not be exceeded at any time during the working day.

(2) Other substances-8-hour Time Weighted Averages. An employee's exposure to any substance is Table Z-1, the exposure limit of which is not preceded by a ' 'C' ', shall not exceed the 8-hour Time Weighted Average given for that substance in any 8-hour work shift of a 40-hour work week.

(b) Table Z-2. An employee's exposure to any substance listed is Table Z-2 shall not exceed the exposure limits specified as follows:

(1) 8-hour time weighted averages. An employee's exposure to any substance listed in Table Z-2, is any 8-hour work shift of a 40-hour work week, shall not exceed the 8-hour time weighted average limit given for that substance is Table Z-2 .

(2) Acceptable ceiling concentrations. An employee's exposure to a substance listed is Table Z-2 shall not exceed at any time during as 8-hour shift the acceptable ceiling concentration limit given for the substance is the table, except for a time period, and up to a concentration not exceeding the maximum duration and concentration allowed is the column under "acceptable maximum peak above the acceptable ceiling concentration for as 8-hour shift."

(3) Example. During an 8-hour work shift, an employee may be exposed to a concentration of Substance A (with a 10 ppm TWA, 25 ppm ceiling and 50 ppm peak) above 25 ppm (but never above 50 ppm) only for a maximum period of 10 -minutes. Such exposure must be compensated by exposures to concentrations less than 10 ppm so that the cumulative exposure for the entire 8-hour work shift does not exceed a weighted average of 10 ppm.

(c) Table Z-3. An employee's exposure to any substance listed in Table Z-3, is any 8-hour work shift of a 40-hour work week, shall not exceed the 8-hour time weighted average limit gives for that substance in the table.

(d) Computation formulae. The computation formula which shall apply to employee exposure to more than one substance for which 8-hour time weighted averages are listed is subpart Z of 29 CFR part 1910 is order to determine whether an employee is exposed over the regulatory limit is as follows:

(1)

(i) The cumulative exposure for an 8-hour work shift shall be computed as follows:

$$E = (CaTa + CbTb + . . .CnTn) + 8$$

Where:

E is the equivalent exposure for the working shift.
C is the concentration during any period of time T where the concentration remains constant.
T is the duration in hours of the exposure at the concentration C.
The value of E shall not exceed the 8-hour time weighted average specified in subpart Z of 29 CFR part 1910 for the substance involved.

(ii) To illustrate the formula prescribed in paragraph (d)(1)(i) of this section, assume that Substance A has as 8-hour time weighted average limit of 100 ppm noted in Table Z-1. Assume that an employee is subject to the following exposure:

Two hours exposure at 150 ppm
Two hours exposure at 75 ppm
Four hours exposure at 50 ppm

Substituting this information in the formula, we have
$(2 \times 150 + 2 \times 75 + 4 \times 50) + 8 = 81.25$ ppm
Since 81.25 ppm is less than 100 ppm, the 8-hour time weighted average limit, the exposure is acceptable.

(2)

(i) in case of a mixture of air contaminants as employer shall compute the equivalent exposure as follows:

$$Em = (C1 + L1 + C2 + L2) +. . . (Cn + Ln)$$

Where:

Em is the equivalent exposure for the mixture.
C is the concentration *of* a particular contaminant.
L is the exposure limit for that substance specified is subpart Z of 29 CFR part 1910.

The value of Em shall not exceed unity (1).

(ii) To illustrate the formula prescribed is paragraph (d)(2)(i) of this section, consider the following exposures;

Substance	Actual concentration of 8-hour exposure (ppm)	8-hour TWA PEL (ppm)
B	500	1,000
C	45	200
D	40	200

Substituting in the formula, we have:
Em=500+1,000+45+200+40+200
Em=0.500+0.225+0.200
Em=0.925
Since Em is less than unity (1), the exposure combination is within acceptable limits.

(e) To achieve compliance with paragraphs (a) through (d) of this section, administrative or engineering controls must first be determined and implemented whenever feasible. When such controls are not feasible to achieve full compliance, protective equipment or any other protective measures shall be used to keep the exposure of employees to air contaminants within the limits prescribed in this section. Any equipment and/or technical measures used for this purpose must be approved for each particular use by a competent industrial hygienist or other technically qualified person. Whenever respirators are used, their use shall comply with 1910.134.

(f) Effective dates. The exposure limits specified have been in effect with the method of compliance specified is paragraph (e) of this section since May 29, 1971.

Table Z-1. - Limits for Air Contaminants

Substance	CAS No. (c)	ppm (a) {1}	mg/m3 (b) {1}	Skin designation
Acetaldehyde	75-07-0	200	360	.....
Acetic acid	64-19-7	10	25	.....
Acetic anhydride	108-24-7	5	20	.....
Acetone	67-64-1	1000	2400	.....
Acetonitrile	75-05-8	40	70	.....
2-Acetylaminofluorine; see 1910.1014.	53-96-3			
Acetylene dichloride; see 1,2-Dichloroethylene.				
Acetylene tetrabromide	79-27-6	1	14	.....
Acrolein	107-02-8	0.1	0.25	.....
Acrylamide	79-06-1	.....	0.3	X
Acrylonitrile; see 1910.1045	107-13-1			
Aldrin	309-00-2	.....	0.25	X
Allyl alcohol	107-18-6	2	5	X
Allyl chloride	107-05-1	1	3	.....
Allyl glycidyl ether (AGE)	106-92-3	(C)10	(C)45	.....
Allyl propyl disulfide	2179-59-1	2	12	.....
alpha-Alumina	1344-28-1			
Total dust		.....	15	.....
Respirable fraction		.....	5	.....
Aluminum, metal (as Al)	7429-90-5			
Total dust		.....	15	.....
Respirable fraction		.....	5	.....
4-Aminodiphenyl; see 1910.1011	92-67-1			
2-Aminoethanol; see Ethanolamine.				
2-Aminopyridine	504-29-0	0.5	2	.....
Ammonia	7664-41-7	50	35	.....
Ammonium sulfamate	7773-06-0			
Total dust		.....	15	.....
Respirable fraction		.....	5	.....
n-Amyl acetate	628-63-7	100	525	.....
sec-Amyl acetate	626-38-0	125	650	.....
Aniline and homologs	62-53-3	5	19	X
Anisidine (o-, p-isomers)	29191-52-4	.....	0.5	X
Antimony and compounds (as Sb)	7440-36-0	.....	0.5	.....
ANTU (alpha Naphthylthiourea)	86-88-4	.....	0.3	.....
Arsenic, inorganic compounds (as As); see 1910.1018.	7440-38-2			
Arsenic, organic compounds (as As)	7440-38-2	.....	0.5	.....
Arsine	7784-42-1	0.05	0.2	.....
Asbestos; see 1910.1001	({4})			
Azinphos-methyl	86-50-0	.....	0.2	X
Barium, soluble compounds (as Ba)	7440-39-3	.....	0.5	.....
Barium sulfate	7727-43-7			
Total dust		.....	15	.....
Respirable fraction		.....	5	.....
Benomyl	17804-35-2			
Total dust		.....	15	.....
Respirable fraction		.....	5	.....
Benzene; see 1910.1028	71-43-2			
See Table Z-2 for the limits applicable in the operations or sectors excluded in 1910.1028 {d}				
Benzidine; see 1910.1010	92-87-5			
p-Benzoquinone; see Quinone.				
Benzo(a)pyrene; see Coal tar pitch volatiles.				
Benzoyl peroxide	94-36-0	.....	5	.....
Benzyl chloride	100-44-7	1	5	.....
Beryllium and beryllium compounds (as Be).	7440-41-7	.....	({2})	
Biphenyl; see Diphenyl.				
Bismuth telluride, Undoped	1304-82-1			
Total dust		.....	15	.....
Respirable fraction		.....	5	.....
Boron oxide	1303-86-2			
Total dust		.....	15	.....
Boron trifluoride	7637-07-2	(C)1	(C)3	.....
Bromine	7726-95-6	0.1	0.7	.....
Bromoform	75-25-2	0.5	5	X
Butadiene (1,3-Butadiene)	106-99-0	1000	2200	.....
Butanethiol; see Butyl mercaptan.				
2-Butanone (Methyl ethyl ketone)	78-93-3	200	590	.....
2-Butoxyethanol	111-76-2	50	240	X
n-Butyl acetate	123-86-4	150	710	.....
sec-Butyl acetate	105-46-4	200	950	.....
tert-Butyl acetate	540-88-5	200	950	.....
n-Butyl alcohol	71-36-3	100	300	.....
sec-Butyl alcohol	78-92-2	150	450	.....
tert-Butyl alcohol	75-65-0	100	300	.....
Butylamine	109-73-9	(C)5	(C)15	X
tert-Butyl chromate (as CrO3)	1189-85-1	.....	(C)0.1	X
n-Butyl glycidyl ether (BGE)	2426-08-6	50	270	.....
Butyl mercaptan	109-79-5	10	35	.....
p-tert-Butyltoluene	98-51-1	10	60	.....
Cadmium (as Cd); see 1910.1027	7440-43-9			
Calcium carbonate	1317-65-3			
Total dust		.....	15	.....
Respirable fraction		.....	5	.....
Calcium hydroxide	1305-62-0			
Total dust		.....	15	.....
Respirable fraction		.....	5	.....
Calcium oxide	1305-78-8	.....	5	.....
Calcium silicate	1344-95-2			
Total dust		.....	15	.....
Respirable fraction		.....	5	.....
Calcium sulfate	7778-18-9			
Total dust		.....	15	.....

Table Z-1. Limits for Air Contaminants

Substance	CAS No. (c)	ppm (a) {1}	mg/m3 (b) {1}	Skin designation
Respirable fraction		.....	5	.....
Camphor, synthetic	76-22-2	.....	2	.....
Carbaryl (Sevin)	63-25-2	.....	5	.....
Carbon black	1333-86-4	.....	3.5	.....
Carbon dioxide	124-38-9	5000	9000	.....
Carbon disulfide	75-15-0	.....	({2})	
Carbon monoxide	630-08-0	50	55	.....
Carbon tetrachloride	56-23-5	.....	({2})	
Cellulose	9004-34-6			
Total dust		.....	15	.....
Respirable fraction		.....	5	.....
Chlordane	57-74-9	.....	0.5	X
Chlorinated camphene	8001-35-2	.....	0.5	X
Chlorinated diphenyl oxide	55720-99-5	.....	0.5	.....
Chlorine	7782-50-5	(C)1	(C)3	.....
Chlorine dioxide	10049-04-4	0.1	0.3	.....
Chlorine trifluoride	7790-91-2	(C)0.1	(C)0.4	.....
Chloroacetaldehyde	107-20-0	(C)1	(C)3	.....
a-Chloroacetophenone (Phenacyl chloride).	532-27-4	0.05	0.3	.....
Chlorobenzene	108-90-7	75	350	.....
o-Chlorobenzylidene malononitrile	2698-41-1	0.05	0.4	.....
Chlorobromomethane	74-97-5	200	1050	.....
2-Chloro-1,3-butadiene; see beta-Chloroprene.				
Chlorodiphenyl (42% Chlorine) (PCB)	53469-21-9	.....	1	X
Chlorodiphenyl (54% Chlorine) (PCB)	11097-69-1	.....	0.5	X
1-Chloro-2,3-epoxypropane; see Epichlorohydrin.				
2-Chloroethanol; see Ethylene chlorohydrin.				
Chloroethylene; see Vinyl chloride.				
Chloroform (Trichloromethane)	67-66-3	(C)50	(C)240	.....
bis(Chloromethyl) ether; see 1910.1008.	542-88-1			
Chloromethyl methyl ether; see 1910.1006.	107-30-2			
1-Chloro-1-nitropropane	600-25-9	20	100	.....
Chloropicrin	76-06-2	0.1	0.7	.....
beta-Chloroprene	126-99-8	25	90	X
2-Chloro-6-(trichloromethyl) pyridine.	1929-82-4			
Total dust		.....	15	.....
Respirable fraction		.....	5	.....
Chromic acid and chromates (as CrO3).	({4})	.....	({2})	
Chromium (II) compounds. (as Cr)	7440-47-3	.....	0.5	.....
Chromium (III) compounds. (as Cr)	7440-47-3	.....	0.5	.....
Chromium metal and insol. salts (as Cr).	7440-47-3	.....	1	.....
Chrysene; see Coal tar pitch volatiles.				
Clopidol	2971-90-6			
Total dust		.....	15	.....
Respirable fraction		.....	5	.....
Coal dust (less than 5% SiO2), respirable fraction.		.....	({3})	
Coal dust (greater than or equal to 5% SiO2), respirable fraction.		.....	({3})	
Coal tar pitch volatiles (benzene soluble fraction), anthracene, BaP, phenanthrene, acridine, chrysene, pyrene.	65966-93-2	.....	0.2	.....
Cobalt metal, dust, and fume (as Co).	7440-48-4	.....	0.1	.....
Coke oven emissions; see 1910.1029.				
Copper	7440-50-8			
Fume (as Cu)		.....	0.1	.....
Dusts and mists (as Cu)		.....	1	.....
Cotton dust {e}; see 1910.1043 ...		.....	1	
Crag herbicide (Sesone)	136-78-7			
Total dust		.....	15	.....
Respirable fraction		.....	5	.....
Cresol, all isomers	1319-77-3	5	22	X
Crotonaldehyde	123-73-9; 4170-30-3	2	6	
Cumene	98-82-8	50	245	X
Cyanides (as CN)	({4})	.....	5	.....
Cyclohexane	110-82-7	300	1050	.....
Cyclohexanol	108-93-0	50	200	.....
Cyclohexanone	108-94-1	50	200	.....
Cyclohexene	110-83-8	300	1015	.....
Cyclopentadiene	542-92-7	75	200	.....
2,4-D (Dichlorophenoxyacetic acid)	94-75-7	.....	10	.....
Decaborane	17702-41-9	0.05	0.3	X
Demeton (Systox)	8065-48-3	.....	0.1	X
Diacetone alcohol (4-Hydroxy-4-methyl-2-pentanone).	123-42-2	50	240	.....
1,2-Diaminoethane; see Ethylenediamine.				
Diazomethane	334-88-3	0.2	0.4	.....
Diborane	19287-45-7	0.1	0.1	.....
1,2-Dibromo-3-chloropropane (DBCP) ; see 1910.1044.	96-12-8			
1,2-Dibromoethane; see Ethylene dibromide.				
Dibutyl phosphate	107-66-4	1	5	.....
Dibutyl phthalate	84-74-2	.....	5	.....
o-Dichlorobenzene	95-50-1	(C)50	(C)300	.....
p-Dichlorobenzene	106-46-7	75	450	.....

Table Z–1. – Limits for Air Contaminants

Substance	CAS No. (c)	ppm (a) {1}	mg/m3 (b) {1}	Skin designation
3,3'-Dichlorobenzidine; see 1910.1007.	91-94-1			
Dichlorodifluoromethane	75-71-8	1000	4950	.....
1,3-Dichloro-5,5-dimethyl hydantoin.	118-52-5	.....	0.2	.....
Dichlorodiphenyltrichloroethane (DDT).	50-29-3	.....	1	X
1,1-Dichloroethane	75-34-3	100	400	.....
1,2-Dichloroethane; see Ethylene dichloride.				
1,2-Dichloroethylene	540-59-0	200	790	.....
Dichloroethyl ether	111-44-4	(C)15	(C)90	X
Dichloromethane; see Methylene chloride.				
Dichloromonofluoromethane	75-43-4	1000	4200	.....
1,1-Dichloro-1-nitroethane	594-72-9	(C)10	(C)60	.....
1,2-Dichloropropane; see Propylene dichloride.				
Dichlorotetrafluoroethane	76-14-2	1000	7000	.....
Dichlorvos (DDVP)	62-73-7	.....	1	X
Dicyclopentadienyl iron	102-54-5			
Total dust		.....	15	.....
Respirable fraction		.....	5	.....
Dieldrin	60-57-1	.....	0.25	X
Diethylamine	109-89-7	25	75	.....
2-Diethylaminoethanol	100-37-8	10	50	X
Diethyl ether; see Ethyl ether.				
Difluorodibromomethane	75-61-6	100	860	.....
Diglycidyl ether (DGE)	2238-07-5	(C)0.5	(C)2.8	.....
Dihydroxybenzene; see Hydroquinone.				
Diisobutyl ketone	108-83-8	50	290	.....
Diisopropylamine	108-18-9	5	20	X
4-Dimethylaminoazobenzene; see 1910.1015.	60-11-7			
Dimethoxymethane; see Methylal.				
Dimethyl acetamide	127-19-5	10	35	X
Dimethylamine	124-40-3	10	18	.....
Dimethylaminobenzene; see Xylidine				
Dimethylaniline (N,N-Dimethylaniline).	121-69-7	5	25	X
Dimethylbenzene; see Xylene.				
Dimethyl-1,2-dibromo-2,2-dichloroethyl phosphate.	300-76-5	.....	3	.....
Dimethylformamide	68-12-2	10	30	X
2,6-Dimethyl-4-heptanone; see Diisobutyl ketone.				
1,1-Dimethylhydrazine	57-14-7	0.5	1	X
Dimethylphthalate	131-11-3	.....	5	.....
Dimethyl sulfate	77-78-1	1	5	X
Dinitrobenzene (all isomers)		.....	1	X
(ortho)	528-29-0			
(meta)	99-65-0			
(para)	100-25-4			
Dinitro-o-cresol	534-52-1	.....	0.2	X
Dinitrotoluene	25321-14-6	.....	1.5	X
Dioxane (Diethylene dioxide)	123-91-1	100	360	X
Diphenyl (Biphenyl)	92-52-4	0.2	1	.....
Diphenylmethane diisocyanate; see Methylene bisphenyl isocyanate.				
Dipropylene glycol methyl ether ..	34590-94-8	100	600	X
Di-sec octyl phthalate (Di-(2-ethylhexyl) phthalate).	117-81-7	.....	5	.....
Emery	12415-34-8			
Total dust		.....	15	.....
Respirable fraction		.....	5	.....
Endosulfan	115-29-7	.....	0.1	X
Endrin	72-20-8	.....	0.1	X
Epichlorohydrin	106-89-8	5	19	X
EPN	2104-64-5	.....	0.5	X
1,2-Epoxypropane; see Propylene oxide.				
2,3-Epoxy-1-propanol; see Glycidol.				
Ethanethiol; see Ethyl mercaptan.				
Ethanolamine	141-43-5	3	6	.....
2-Ethoxyethanol (Cellosolve)	110-80-5	200	740	X
2-Ethoxyethyl acetate (Cellosolve acetate).	111-15-9	100	540	X
Ethyl acetate	141-78-6	400	1400	.....
Ethyl acrylate	140-88-5	25	100	X
Ethyl alcohol (Ethanol)	64-17-5	1000	1900	.....
Ethylamine	75-04-7	10	18	.....
Ethyl amyl ketone (5-Methyl-3-heptanone).	541-85-5	25	130	.....
Ethyl benzene	100-41-4	100	435	.....
Ethyl bromide	74-96-4	200	890	.....
Ethyl butyl ketone (3-Heptanone) .	106-35-4	50	230	.....
Ethyl chloride	75-00-3	1000	2600	.....
Ethyl ether	60-29-7	400	1200	.....
Ethyl formate	109-94-4	100	300	.....
Ethyl mercaptan	75-08-1	(C)10	(C)25	.....
Ethyl silicate	78-10-4	100	850	.....
Ethylene chlorohydrin	107-07-3	5	16	X
Ethylenediamine	107-15-3	10	25	.....
Ethylene dibromide	106-93-4	.....	({2})	
Ethylene dichloride (1,2-Dichloroethane).	107-06-2	.....	({2})	
Ethylene glycol dinitrate	628-96-6	(C)0.2	(C)1	X
Ethylene glycol methyl acetate;				
Ethylenimine; see 1910.1012	151-56-4			
Ethylene oxide see 1910.1047	75-21-8			
Ethylidene chloride; see 1,1-dichloroethane.				

Table Z–1. – Limits for Air Contaminants

Substance	CAS No. (c)	ppm (a) {1}	mg/m3 (b) {1}	Skin designation
N-Ethylmorpholine	100-74-3	20	94	X
Ferbam	14484-64-1			
Total dust		.....	15	.....
Ferrovanadium dust	12604-58-9	.....	1	.....
Fluorides (as F)	({4})	.....	2.5	.....
Fluorine	7782-41-4	0.1	0.2	.....
Fluorotrichloromethane (Trichlorofluoromethane).	75-69-4	1000	5600	.....
Formaldehyde; see 1910.1048	50-00-0			
Formic acid	64-18-6	5	9	.....
Furfural	98-01-1	5	20	X
Furfuryl alcohol	98-00-0	50	200	.....
Grain dust (oat, wheat, barley)		.....	10	.....
Glycerin (mist)	56-81-5			
Total dust		.....	15	.....
Respirable fraction		.....	5	.....
Glycidol	556-52-5	50	150	.....
Glycol monoethyl ether; see 2-Ethoxyethanol.				
Graphite, natural, respirable dust	7782-42-5	.....	({3})	
Graphite, synthetic				
Total dust		.....	15	.....
Respirable fraction		.....	5	.....
Guthion; see Azinphos methyl.				
Gypsum	13397-24-5			
Total dust		.....	15	.....
Respirable fraction		.....	5	.....
Hafnium	7440-58-6	.....	0.5	.....
Heptachlor	76-44-8	.....	0.5	X
Heptane (n-Heptane)	142-82-5	500	2000	.....
Hexachloroethane	67-72-1	1	10	X
Hexachloronaphthalene	1335-87-1	.....	0.2	X
n-Hexane	110-54-3	500	1800	.....
2-Hexanone (Methyl n-butyl ketone)	591-78-6	100	410	.....
Hexone (Methyl isobutyl ketone)	108-10-1	100	410	.....
sec-Hexyl acetate	108-84-9	50	300	.....
Hydrazine	302-01-2	1	1.3	X
Hydrogen bromide	10035-10-6	3	10	.....
Hydrogen chloride	7647-01-0	(C)5	(C)7	.....
Hydrogen cyanide	74-90-8	10	11	X
Hydrogen fluoride (as F)	7664-39-3	.....	({2})	
Hydrogen peroxide	7722-84-1	1	1.4	.....
Hydrogen selenide (as Se)	7783-07-5	0.05	0.2	.....
Hydrogen sulfide	7783-06-4	.....	({2})	
Hydroquinone	123-31-9	.....	2	.....
Iodine	7553-56-2	(C)0.1	(C)1	.....
Iron oxide fume	1309-37-1	.....	10	.....
Isoamyl acetate	123-92-2	100	525	.....
Isoamyl alcohol (primary and secondary).	123-51-3	100	360	.....
Isobutyl acetate	110-19-0	150	700	.....
Isobutyl alcohol	78-83-1	100	300	.....
Isophorone	78-59-1	25	140	.....
Isopropyl acetate	108-21-4	250	950	.....
Isopropyl alcohol	67-63-0	400	980	.....
Isopropylamine	75-31-0	5	12	.....
Isopropyl ether	108-20-3	500	2100	.....
Isopropyl glycidyl ether (IGE)	4016-14-2	50	240	.....
Kaolin	1332-58-7			
Total dust		.....	15	.....
Respirable fraction		.....	5	.....
Ketene	463-51-4	0.5	0.9	.....
Lead, inorganic (as Pb); see 1910.1025.	7439-92-1			
Limestone	1317-65-3			
Total dust		.....	15	.....
Respirable fraction		.....	5	.....
Lindane	58-89-9	.....	0.5	X
Lithium hydride	7580-67-8	.....	0.025	.....
L.P.G. (Liquefied petroleum gas)	68476-85-7	1000	1800	.....
Magnesite	546-93-0			
Total dust		.....	15	.....
Respirable fraction		.....	5	.....
Magnesium oxide fume	1309-48-4			
Total particulate		.....	15	.....
Malathion	121-75-5			
Total dust		.....	15	X
Maleic anhydride	108-31-6	0.25	1	.....
Manganese compounds (as Mn)	7439-96-5	.....	(C)5	.....
Manganese fume (as Mn)	7439-96-5	.....	(C)5	.....
Marble	1317-65-3			
Total dust		.....	15	.....
Respirable fraction		.....	5	.....
Mercury (aryl and inorganic) (as Hg).	7439-97-6	.....	({2})	.....
Mercury (organo) alkyl compounds (as Hg).	7439-97-6	.....	({2})	
Mercury (vapor) (as Hg)	7439-97-6	.....	({2})	
Mesityl oxide	141-79-7	25	100	.....
Methanethiol; see Methyl mercaptan.				
Methoxychlor	72-43-5			
Total dust		.....	15	.....
2-Methoxyethanol (Methyl cellosolve).	109-86-4	25	80	X
2-Methoxyethyl acetate (Methyl cellosolve acetate).	110-49-6	25	120	X
Methyl acetate	79-20-9	200	610	.....
Methyl acetylene (Propyne)	74-99-7	1000	1650	.....
Methyl acetylene-propadiene mixture (MAPP).		1000	1800	.....
Methyl acrylate	96-33-3	10	35	X
Methylal (Dimethoxy-methane)	109-87-5	1000	3100	.....
Methyl alcohol	67-56-1	200	260	.....

Table Z–1. – Limits for Air Contaminants

Substance	CAS No. (c)	ppm (a) {1}	mg/m3 (b) {1}	Skin designation
Methylamine	74-89-5	10	12	.....
Methyl amyl alcohol; see Methyl isobutyl carbinol.				
Methyl n-amyl ketone	110-43-0	100	465	.....
Methyl bromide	74-83-9	(C)20	(C)80	X
Methyl butyl ketone; see 2-Hexanone.				
Methyl cellosolve; see 2-Methoxyethanol.				
Methyl cellosolve acetate; see 2-Methoxyethyl acetate.				
Methyl chloride	74-87-3	.....	({2})	
Methyl chloroform (1,1,1-Trichloroethane).	71-55-6	350	1900	.....
Methylcyclohexane	108-87-2	500	2000	.....
Methylcyclohexanol	25639-42-3	100	470	.....
o-Methylcyclohexanone	583-60-8	100	460	X
Methylene chloride	75-09-2	.....	({2})	
Methyl ethyl ketone (MEK); see 2-Butanone.				
Methyl formate	107-31-3	100	250	.....
Methyl hydrazine (Monomethyl hydrazine).	60-34-4	(C)0.2	(C)0.35	X
Methyl iodide	74-88-4	5	28	X
Methyl isoamyl ketone	110-12-3	100	475	.....
Methyl isobutyl carbinol	108-11-2	25	100	X
Methyl isobutyl ketone; see Hexone.				
Methyl isocyanate	624-83-9	0.02	0.05	X
Methyl mercaptan	74-93-1	(C)10	(C)20	.....
Methyl methacrylate	80-62-6	100	410	.....
Methyl propyl ketone; see 2-Pentanone.				
alpha-Methyl styrene	98-83-9	(C)100	(C)480	.....
Methylene bisphenyl isocyanate (MDI).	101-68-8	(C)0.02	(C)0.2	.....
Mica; see Silicates.				
Molybdenum (as Mo)	7439-98-7			
Soluble compounds		.....	5	.....
Insoluble compounds.				
Total dust		.....	15	.....
Monomethyl aniline	100-61-8	2	9	X
Monomethyl hydrazine; see Methyl hydrazine.				
Morpholine	110-91-8	20	70	X
Naphtha (Coal tar)	8030-30-6	100	400	.....
Naphthalene	91-20-3	10	50	.....
alpha-Naphthylamine; see 1910.1004	134-32-7			
beta-Naphthylamine; see 1910.1009	91-59-8			
Nickel carbonyl (as Ni)	13463-39-3	0.001	0.007	.....
Nickel, metal and insoluble compounds (as Ni).	7440-02-0	.....	1	.....
Nickel, soluble compounds (as Ni)	7440-02-0	.....	1	.....
Nicotine	54-11-5	.....	0.5	X
Nitric acid	7697-37-2	2	5	.....
Nitric oxide	10102-43-9	25	30	.....
p-Nitroaniline	100-01-6	1	6	X
Nitrobenzene	98-95-3	1	5	X
p-Nitrochlorobenzene	100-00-5	.....	1	X
4-Nitrodiphenyl; see 1910.1003	92-93-3			
Nitroethane	79-24-3	100	310	.....
Nitrogen dioxide	10102-44-0	(C)5	(C)9	.....
Nitrogen trifluoride	7783-54-2	10	29	.....
Nitroglycerin	55-63-0	(C)0.2	(C)2	X
Nitromethane	75-52-5	100	250	.....
1-Nitropropane	108-03-2	25	90	.....
2-Nitropropane	79-46-9	25	90	.....
N-Nitrosodimethylamine; see 1910.1016.				
Nitrotoluene (all isomers)		5.	30	X
o-isomer	88-72-2			
m-isomer	99-08-1			
p-isomer	99-99-0			
Nitrotrichloromethane; see Chloropicrin.				
Octachloronaphthalene	2234-13-1	.....	0.1	X
Octane	111-65-9	500	2350	.....
Oil mist, mineral	8012-95-1	.....	5	.....
Osmium tetroxide (as Os)	20816-12-0	.....	0.002	.....
Oxalic acid	144-62-7	.....	1	.....
Oxygen difluoride	7783-41-7	0.05	0.1	.....
Ozone	10028-15-6	0.1	0.2	.....
Paraquat, respirable dust	4685-14-7; 1910-42-5; 2074-50-2	.....	0.5	X
Parathion	56-38-2	.....	0.1	X
Particulates not otherwise regulated (PNOR) {f}.				
Total dust		.....	15	.....
Respirable fraction		.....	5	.....
PCB; see Chlorodiphenyl (42% and 54% chlorine).				
Pentaborane	19624-22-7	0.005	0.01	.....
Pentachloronaphthalene	1321-64-8	.....	0.5	X
Pentachlorophenol	87-86-5	.....	0.5	X
Pentaerythritol	115-77-5			
Total dust		.....	15	.....
Respirable fraction		.....	5	.....
Pentane	109-66-0	1000	2950	.....
2-Pentanone (Methyl propyl ketone)	107-87-9	200	700	.....
Perchloroethylene (Tetrachloroethylene).	127-18-4	.....	({2})	
Perchloromethyl mercaptan	594-42-3	0.1	0.8	.....
Perchloryl fluoride	7616-94-6	3	13.5	.....

Table Z-1. - Limits for Air Contaminants

Substance	CAS No. (c)	ppm (a) (1)	mg/m3 (b) (1)	Skin designation
Perlite	93763-70-3			
Total dust			15	
Respirable fraction			5	
Petroleum distillates (Naphtha) (Rubber Solvent).		500	2000	
Phenol	108-95-2	5	19	X
p-Phenylene diamine	106-50-3		0.1	X
Phenyl ether, vapor	101-84-8	1	7	
Phenyl ether-biphenyl mixture, vapor.		1	7	
Phenylethylene; see Styrene.				
Phenyl glycidyl ether (PGE)	122-60-1	10	60	
Phenylhydrazine	100-63-0	5	22	X
Phosdrin (Mevinphos)	7786-34-7		0.1	X
Phosgene (Carbonyl chloride)	75-44-5	0.1	0.4	
Phosphine	7803-51-2	0.3	0.4	
Phosphoric acid	7664-38-2		1	
Phosphorus (yellow)	7723-14-0		0.1	
Phosphorus pentachloride	10026-13-8		1	
Phosphorus pentasulfide	1314-80-3		1	
Phosphorus trichloride	7719-12-2	0.5	3	
Phthalic anhydride	85-44-9	2	12	
Picloram	1918-02-1			
Total dust			15	
Respirable fraction			5	
Picric acid	88-89-1		0.1	X
Pindone (2-Pivalyl-1,3-indandione)	83-26-1		0.1	
Plaster of Paris	26499-65-0			
Total dust			15	
Respirable fraction			5	
Platinum (as Pt)	7440-06-4			
Metal				
Soluble salts			0.002	
Portland cement	65997-15-1			
Total dust			15	
Respirable fraction			5	
Propane	74-98-6	1000	1800	
beta-Propriolactone; see 1910.1013	57-57-8			
n-Propyl acetate	109-60-4	200	840	
n-Propyl alcohol	71-23-8	200	500	
n-Propyl nitrate	627-13-4	25	110	
Propylene dichloride	78-87-5	75	350	
Propylene imine	75-55-8	2	5	X
Propylene oxide	75-56-9	100	240	
Propyne; see Methyl acetylene.				
Pyrethrum	8003-34-7		5	
Pyridine	110-86-1	5	15	
Quinone	106-51-4	0.1	0.4	
RDX; see Cyclonite.				
Rhodium (as Rh), metal fume and insoluble compounds.	7440-16-6		0.1	
Rhodium (as Rh), soluble compounds	7440-16-6		0.001	
Rotenone	83-79-4		5	
Rouge				
Total dust			15	
Respirable fraction			5	
Selenium compounds (as Se)	7782-49-2		0.2	
Selenium hexafluoride (as Se)	7783-79-1	0.05	0.4	
Silica, amorphous, precipitated and gel.	112926-00-8		((3))	
Silica, amorphous, diatomaceous earth, containing less than 1% crystalline silica.	61790-53-2		((3))	
Silica, crystalline cristobalite, respirable dust.	14464-46-1		((3))	
Silica, crystalline quartz, respirable dust.	14808-60-7		((3))	
Silica, crystalline tripoli (as quartz), respirable dust.	1317-95-9		((3))	
Silica, crystalline tridymite, respirable dust.	15468-32-3		((3))	
Silica, fused, respirable dust	60676-86-0		((3))	
Silicates (less than 1% crystalline silica).				
Mica (respirable dust)	12001-26-2		((3))	
Soapstone, total dust			((3))	
Soapstone, respirable dust			((3))	
Talc (containing asbestos); use asbestos limit; see 29 CFR 1910.1001.			((3))	
Talc (containing no asbestos), respirable dust.	14807-96-6		((3))	
Tremolite, asbestiform; see 1910.1001.				
Silicon	7440-21-3			
Total dust			15	
Respirable fraction			5	
Silicon carbide	409-21-2			
Total dust			15	
Respirable fraction			5	
Silver, metal and soluble compounds (as Ag).	7440-22-4		0.01	
Soapstone; see Silicates.				
Sodium fluoroacetate	62-74-8		0.05	X
Sodium hydroxide	1310-73-2		2	
Starch	9005-25-8			
Total dust			15	
Respirable fraction			5	
Stibine	7803-52-3	0.1	0.5	
Stoddard solvent	8052-41-3	500	2900	
Strychnine	57-24-9		0.15	
Styrene	100-42-5		((2))	

Table Z-1. - Limits for Air. Contaminants

Substance	CAS No. (c)	ppm (a) (1)	mg/m3 (b) (1)	Skin designation
Sucrose	57-50-1			
Total dust			15	
Respirable fraction			5	
Sulfur dioxide	7446-09-5	5	13	
Sulfur hexafluoride	2551-62-4	1000	6000	
Sulfuric acid	7664-93-9		1	
Sulfur monochloride	10025-67-9	1	6	
Sulfur pentafluoride	5714-22-7	0.025	0.25	
Sulfuryl fluoride	2699-79-8	5	20	
Systox; see Demeton.				
2,4,5-T (2,4,5-trichlorophenoxyacetic acid).	93-76-5		10	
Talc; see Silicates.				
Tantalum, metal and oxide dust	7440-25-7		5	
TEDP (Sulfotep)	3689-24-5		0.2	X
Tellurium and compounds (as Te)	13494-80-9		0.1	
Tellurium hexafluoride (as Te)	7783-80-4	0.02	0.2	
Temephos	3383-96-8			
Total dust			15	
Respirable fraction			5	
TEPP (Tetraethyl pyrophosphate)	107-49-3		0.05	X
Terphenyls	26140-60-3	(C)1	(C)9	
1,1,1,2-Tetrachloro-2,2-difluoroethane.	76-11-9	500	4170	
1,1,2,2-Tetrachloro-1,2-difluoroethane.	76-12-0	500	4170	
1,1,2,2-Tetrachloroethane	79-34-5	5	35	X
Tetrachloroethylene; see Perchloroethylene.				
Tetrachloromethane; see Carbon tetrachloride.				
Tetrachloronaphthalene	1335-88-2		2	X
Tetraethyl lead (as Pb)	78-00-2		0.075	X
Tetrahydrofuran	109-99-9	200	590	
Tetramethyl lead (as Pb)	75-74-1		0.075	X
Tetramethyl succinonitrile	3333-52-6	0.5	3	X
Tetranitromethane	509-14-8	1	8	
Tetryl (2,4,6-Trinitrophenylmethylnitramine).	479-45-8		1.5	X
Thallium, soluble compounds (as Tl)	7440-28-0		0.1	X
4,4'-Thiobis (6-tert, Butyl-m-cresol).	96-69-5			
Total dust			15	
Respirable fraction			5	
Thiram	137-26-8		5	
Tin, inorganic compounds (except oxides) (as Sn).	7440-31-5		2	
Tin, organic compounds (as Sn)	7440-31-5		0.1	
Titanium dioxide	13463-67-7			
Total dust			15	
Toluene	108-88-3		((2))	
Toluene-2,4-diisocyanate (TDI)	584-84-9	(C)0.02	(C)0.14	
o-Toluidine	95-53-4	5	22	X
Toxaphene; see Chlorinated camphene.				
Tremolite; see Silicates.				
Tributyl phosphate	126-73-8		5	
1,1,1-Trichloroethane; see Methyl chloroform.				
1,1,2-Trichloroethane	79-00-5	10	45	X
Trichloroethylene	79-01-6		((2))	
Trichloromethane; see Chloroform.				
Trichloronaphthalene	1321-65-9		5	X
1,2,3-Trichloropropane	96-18-4	50	300	
1,1,2-Trichloro-1,2,2-trifluoroethane.	76-13-1	1000	7600	
Triethylamine	121-44-8	25	100	
Trifluorobromomethane	75-63-8	1000	6100	
2,4,6-Trinitrophenyl; see Picric acid.				
2,4,6-Trinitrophenylmethylnitramine; see Tetryl.				
2,4,6-Trinitrotoluene (TNT)	118-96-7		1.5	X
Triorthocresyl phosphate	78-30-8		0.1	
Triphenyl phosphate	115-86-6		3	
Turpentine	8006-64-2	100	560	
Uranium (as U)	7440-61-1			
Soluble compounds			0.05	
Insoluble compounds			0.05	
Vanadium	1314-62-1			
Respirable dust (as V2O5)			(C)0.5	
Fume (as V2O5)			(C)0.1	
Vegetable oil mist				
Total dust			15	
Respirable fraction			5	
Vinyl benzene; see Styrene.				
Vinyl chloride; see 1910.1017	75-01-4			
Vinyl cyanide; see Acrylonitrile.				
Vinyl toluene	25013-15-4	100	480	
Warfarin	81-81-2		0.1	
Xylenes (o-, m-, p-isomers)	1330-20-7	100	435	
Xylidine	1300-73-8	5	25	X
Yttrium	7440-65-5		1	
Zinc chloride fume	7646-85-7		1	
Zinc oxide fume	1314-13-2		5	
Zinc oxide	1314-13-2			
Total dust			15	
Respirable fraction			5	
Zinc stearate	557-05-1			
Total dust			15	
Respirable fraction			5	
Zirconium compounds (as Zr)	7440-67-7		5	

{1} The PELs are 8-hour TWAs unless otherwise noted; a (C) designation denotes a ceiling limit. They are to be determined from breathing-zone air samples.

(a) Parts of vapor or gas per million parts of contaminated air by volume at 25 °C and 760 torr.

(b) Milligrams of substance per cubic meter of air. When entry is in this column only, the value is exact; when listed with a ppm entry, it is approximate.

(c) The CAS number is for information only. Enforcement is based. on the substance name. For an entry covering more than one metal compound, measured as the metal, the CAS number for the metal is given-not CAS numbers for the individual compounds.

(d) The final benzene standard in 1910.1028 applies to all occupational exposures to benzene except in some circumstances the distribution and sale of fuels, sealed containers and pipelines, coke production, oil and gas drilling and production, natural gas processing, and the percentage exclusion for liquid mixtures; for the excepted subsegments, the benzene limits in Table Z-2 apply. See 1910.1028 for specific circumstances.

(e) This 8-hour-TWA applies to respirable dust as measured by a vertical elutriator cotton dust sampler or equivalent instrument. The time-weighted average applies to the cotton waste processing operations of waste recycling (sorting, blending, cleaning and willowing) and garnetting. See also 1910.1043 for cotton dust limits applicable to other sectors.

(f) All inert or nuisance dusts, whether mineral, inorganic, or organic, not listed specifically by substance name are covered by the Particulates Not Otherwise Regulated (PNOR) limit which is the same as the inert or nuisance dust limit of Table Z-3.

{2} See Table Z-2.
{3} See Table Z-3.
{4} Varies with compound.

Table Z-2

Substance	8-hour time weighted average	Acceptable ceiling concentration	Acceptable maximum peak above the acceptable ceiling concentration for an 8-hr shift	
			Concentration	Maximum duration
Benzene(a) (Z37.40-1969).....	10 ppm.....	25 ppm.....	50 ppm.....	10 minutes.
Beryllium and beryllium compounds (Z37.29-1970).	2 µg/m3.....	5 µg/m3.....	25 µg/m3....	30 minutes.
Cadmium fume(b) (Z37.5-1970).....	0.1 mg/m3...	0.3 mg/m3...	.....	
Cadmium dust(b) (Z37.5-1970)	0.2 mg/m3..	0.6 mg/m3...		
Carbon disulfide (Z37.3-1968).....	20 ppm.....	30 ppm.....	100 ppm.....	30 minutes.
Carbon tetrachloride (Z37.17-1967)	10 ppm.....	25 ppm.....	200 ppm.....	5 min. in any 4 hrs.
Chromic acid and chromates (Z37.7-1971).	.....	1 mg/10m3..		

Table Z-2

Substance	8-hour time weighted average	Acceptable ceiling concentration	Acceptable maximum peak above the acceptable ceiling concentration for an 8-hr shift	
			Concentration	Maximum duration
Ethylene dibromide (Z37.31-1970)..	20 ppm.....	30 ppm.....	50 ppm.....	5 minutes.
Ethylene dichloride (Z37.21-1969).	50 ppm.....	100 ppm.....	200 ppm.....	5 min. in any 3 hrs.
Fluoride as dust (Z37.28-1969) ...	2.5 mg/m3..	.....	.....	
Formaldehyde; see 1910.1048.....	.....	.....	.....	
Hydrogen fluoride (Z37.28-1969)...	3 ppm.....	.....	.....	
Hydrogen sulfide (Z37.2-1966).....	.....	20 ppm.....	50 ppm.....	10 mins. once, only if no other meas. exp. occurs.
Mercury (Z37.8-1971).....	.....	1 mg/10m3...	.....	
Methyl chloride (Z37.18-1969).....	100 ppm.....	200 ppm.....	300 ppm.....	5 mins. in any 3 hrs.
Methylene chloride (Z37.23-1969)..	500 ppm.....	1,000 ppm...	2,000 ppm...	5 mins. in any 2 hrs.
Organo (alkyl) mercury (Z37.28-1969).	0.01 mg/m3..	0.04 mg/m3..	.....	
Styrene (Z37.15-1969).....	100 ppm.....	200 ppm.....	600 ppm.....	5 mins. in any 3 hrs.
Tetrachloroethylene (Z37.22-1967).	100 ppm.....	200 ppm.....	300 ppm.....	5 mins. in any 3 hrs.
Toluene (Z37.12-1967).....	200 ppm.....	300 ppm.....	500 ppm.....	10 minutes.
Trichloroethylene (Z37.19-1967)...	100 ppm.....	200 ppm.....	300 ppm.....	5 mins. in any 2 hrs.

(a) This standard applies to the industry segments exempt from the 1 ppm 8-hour TWA and 5 ppm STEL of the benzene standard at 1910.1028.

(b) This standard applies to any operations or sectors for which the Cadmium standard, 1910.1027, is stayed or otherwise not in effect.

Table Z-3 Mineral Dusts

Substance	mppcf(a)	mg/m3
Silica: Crystalline Quartz (Respirable)	250(b) / %SiO^Y2+5	10 mg/m3(e) / % SiO^Y2 + 2
Quartz (Total Dust)	.....	30 mg/m3 / %SiO^Y2+2
Cristobalite: Use 1/2 the value calculated from the count or mass formulae for quartz.		.....
Tridymite: Use 1/2 the value calculated from the formulae for quartz.		
Amorphous, including natural .... diatomaceous earth.	 20	80 mg/m3 / %SiO^Y2
Silicates (less than 1% crystalline silica):		
Mica	20	.....
Soapstone	20	.....
Talc (not containing asbestos)	20(e)	.....
Talc (containing asbestos) Use asbestos limit.		.....
Tremolite, asbestiform (see 29 CFR 1910.1001).		.....
Portland cement	50	.....
Graphite (Natural)	15	.....
Coal Dust:		
Respirable fraction less than 5 % SiO^Y2	.....	2.4 mg/m3(e)

Table Z-3 Mineral Dusts

Substance	mppcf{a}	mg/m3
Respirable fraction greater than 5% SiO^Y2.	.....	10 mg/m3{e} / %SiO^Y2+2
Inert or Nuisance Dust{d}:		
Respirable fraction	15	5 mg/m3
Total dust	50	15 mg/m3

Note—Conversion factors - mppcf X 35.3 = million particles per cubic meter = particles per c.c.

{a) Millions of particles per cubic foot of air, based on impinger samples counted by light-field techniques.

{b} The percentage of crystalline silica in the formula is the amount determined from airborne samples, except in those instances in which other methods have been shown to be applicable.

{c) Containing less than 1% quartz; if 1% quartz or more, use quartz limit.

{d) All inert or nuisance dusts, whether mineral, inorganic, or organic, not listed specifically by substance name are covered by this limit, which is the same as the Particulates Not Otherwise Regulated (PNOR) limit in Table Z-1.

{e) Both concentration and percent quartz for the application of this limit are to be determined from the fraction passing a size-selector with the following characteristics:

Aerodynamic diameter (unit density sphere)	Percent passing selector
2.....	90
2.5.....	75
3.5	50
5.0.....	25
10.....	0

The measurements under this note refer to the use of an AEC (now NRC) instrument. The respirable fraction of coal dust is determined with an MRE; the figure corresponding to that of 2.4 mg/m3 in the table for coal dust is 4.5 mg/m3.