



Oregon Administrative Rules
Chapter 437

Division 4
Agriculture

Chemicals/Toxins

Subdivision

Z

Administrative
Order 4-2022



Pursuant to **Oregon Revised Statutes (ORS) 654**, The Oregon Safe Employment Act (OSEAct), Oregon Department of Consumer and Business Services, Occupational Safety and Health Division (Oregon OSHA), adopted these rules.

The Secretary of State designated Oregon Administrative Rules Chapter 437 as the Oregon Occupational Safety and Health Division Rules. Six subject areas are designated as “Divisions” of these rules.

- **Division 1** Administration of the Oregon Safe Employment Act
- **Division 2** General Occupational Safety and Health Rules
- **Division 3** Construction
- **Division 4** Agriculture
- **Division 5** Maritime Activities
- **Division 7** Forest Activities

Oregon-initiated rules are numbered in a uniform system developed by the Secretary of State. This system does not number the rules in sequence (001, 002, 003, etc.). Omitted numbers may be assigned to new rules at the time of their adoption.

Oregon-initiated rules are arranged in the following codification structure prescribed by the Secretary of State for Oregon Administrative Rules (OAR):

Chapter	Division	Subdivision	Rule	Section	Paragraphs
<i>437</i>	<i>002</i>	<i>N</i>	<i>0221</i>	<i>(1)</i>	<i>(a)(A)(i)(I)</i>

Cite as 437-002-0221(1)(a)

Many of the Oregon OSHA rules are adopted by reference from the Code of Federal Regulations (CFR), and are arranged in the following federal numbering system:

Part	Subpart (Subdivision)	Section	Paragraphs
1910	N	.176	(a)(1)(i)(A)(1)(i)

Cite as 1910.176(a)(1)

The terms “subdivision” and “subpart” are synonymous within OAR 437, Oregon Occupational Safety and Health rules.

These rules are available for viewing in the Office of the Secretary of State, Oregon State Archives Building, Salem, Oregon.

These rules are available in electronic and printable formats at osha.oregon.gov.

Printed copies of these rules are available at:

Department of Consumer & Business Services
Oregon Occupational Safety & Health Division (Oregon OSHA)
350 Winter St. NE
Salem, OR 97301-3882

Or call the Oregon OSHA Resource Library at 503-378-3272.

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437-004-9000 Oregon Rules for Air Contaminants

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

- (1) Oregon Table Z-1.
 - (a) Substances with limits preceded by "C" – ceiling values. An employee's exposure to any substance in Oregon Table Z-1, the exposure limit of which is not preceded by a "C", must at no time exceed the ceiling exposure limit given for that substance. If instantaneous monitoring is not feasible, then assess the ceiling as a 15-minute time-weighted average. This exposure level must never be exceeded at any time during the workday.
 - (b) Other substances – 8-hour time-weighted averages (PEL-TWA). An employee's exposure to any substance in Oregon Table Z-1, the exposure limit of which is not preceded by a "C", must not exceed the 8-hour Time-Weighted Average for that substance in any 8-hour shift of a 40-hour work week.
 - (c) Other substances – Excursion Limits. Excursions in exposure levels may be more than three times the PEL-TWA number for no more than a total of 30 minutes during a workday, and must never be more than five times the PEL-TWA, provided that the overall 8-hour PEL-TWA is not exceeded.
 - (d) Skin designation. To prevent or reduce skin absorption, you must prevent or reduce an employee's skin exposure to substances listed in Oregon Table Z-1 with an "X" in the Skin designation column following the substance name. Prevent or reduce exposure to the extent necessary in the circumstances through the use of gloves, coveralls, goggles, or other appropriate personal protective equipment, engineering controls or work practices.
 - (e) Oregon Table Z-1 in Division 4/Z, OAR 437-004-9000, has a complete list of regulated substances. If your operation exposes an employee to a substance listed in Oregon Table Z-1, and that substance includes a reference to another rule, that rule may apply to your circumstances.
- (2) Oregon Table Z-2. An employee's exposure to any substance listed in Oregon Table Z-2 must not exceed the following exposure limits:

- (a) 8-hour time-weighted averages. An employee's exposure to any substance in Oregon Table Z-2, in any 8 hour work shift of a 40-hour work week, must not exceed the 8-hour time-weighted average limit for that substance in Oregon Table Z-2.
- (b) Acceptable ceiling concentrations. An employee's exposure to a substance in Oregon Table Z-2 must not exceed the acceptable ceiling concentration for that substance during an 8-hour shift except:
- (i) Acceptable maximum peak above the acceptable ceiling concentration for an 8-hour shift. An employee's exposure to a substance in Oregon Table Z-2 must never exceed the acceptable maximum peak above the acceptable ceiling concentration and must not exceed the maximum duration of exposure at that level for the substance during an 8-hour shift.
- (c) Example. During an 8-hour work shift, an employee's exposure to benzene is limited to an 8-hour time-weighted average (TWA) of 10 ppm. The acceptable ceiling concentration of benzene during the 8-hour work shift is a maximum of 25 ppm, unless that exposure is no more than 50 ppm and for not longer than 10 minutes during an 8-hour work shift. Such exposures must be compensated by lower exposure levels (concentrations below the TWA number - 10 ppm) during that shift so that the overall 8 hour time-weighted average is a maximum of 10 ppm.

Example from Oregon Table Z-2

Substance	8-Hour Time-Weighted Average	Acceptable Ceiling Concentration	Acceptable Max. Peak Above the Acceptable Ceiling Concentration for an 8-Hour Shift		Skin
			Concentration	Maximum Duration	
Benzene (a) (Z87.4-1969)	10 ppm	25 ppm	50 ppm	10 min.	
Beryllium and Beryllium Compounds (Z37.17-1970)	2 µg/m ³	5 µg/m ³	25 µg/m ³	30 min.	
Carbon tetrachloride (Z37.19-1967)	10 ppm	25 ppm	200 ppm	5 min. In any 4 hours	

- (d) Skin designation. To prevent or reduce skin absorption, you must prevent or reduce an employee's skin exposure to substances listed in Oregon Table Z-2 with an "X" in the Skin designation column following the substance name. Prevent or reduce exposure to the extent necessary in the circumstances through the use of gloves, coveralls, goggles, or other appropriate personal protective equipment, engineering controls, or work practices.
- (3) Oregon Table Z-3. An employee's exposure to any substance in Oregon Table Z-3, in any 8-hour work shift of a 40-hour work week, must not exceed the 8-hour time-weighted average limit given for that substance.
- (4) Computation formulae. The computation formulae that apply to exposures to one or more substances, with 8-hour time-weighted averages included in OAR 437, Division 4/Z, Chemicals/Toxins, in order to determine whether an employee is exposed over the regulatory limit are as follow:

(a) For a single air contaminant:

(i) Compute the cumulative exposure for an 8-hour work shift as follows:

$$E = (C_a T_a + C_b T_b + \dots C_n T_n) \div 8$$

Where:

E is the equivalent exposure to that substance for the shift.

C is the concentration during any period T where the concentration remains constant.

T is the duration in hours of the exposure at the concentration C.

The value of E must not exceed the 8-hour time-weighted average specified for that substance in Subdivision 4/Z.

(ii) To illustrate the formula in (4)(a)(i) above, assume that Substance A (from Oregon Table Z-1) has an 8 hour time-weighted average limit of 100 ppm. 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:

$$[(C_a \times T_a) + (C_b \times T_b) + \dots (C_n \times T_n)] \div 8 = E = \text{TWA}$$

$$[(2 \times 150) + (2 \times 75) + (4 \times 50)] \div 8 = 81.25 \text{ ppm}$$

Since 81.25 ppm is less than 100 ppm, the 8-hour time-weighted average limit, the exposure is acceptable.

(b) For a mixture of air contaminants:

(i) In case of a mixture of air contaminants, compute the equivalent exposure as follows:

$$E_m = (C_1 \div L_1) + (C_2 \div L_2) + \dots (C_n \div L_n)$$

Where:

E_m is the equivalent exposure for the mixture.

C_n is the concentration of a particular contaminant.

L_n is the exposure limit for that substance in Subdivision 4/Z.

The value of E_m must not exceed "unity" (1).

(ii) To illustrate the formula in (4)(b)(i) above, consider the following exposures:

Substance	Actual concentration of 8-hour exposure (C_n)	8-hour time-weighted average exposure limit (L_n)
1	500 ppm	1,000 ppm
2	45 ppm	200 ppm
3	40 ppm	200 ppm

Substituting in the formula, we have:

$$E_m = (C_1 \div L_1) + (C_2 \div L_2) + \dots (C_n \div L_n)$$

$$E_m = (500 \div 1000) + (45 \div 200) + (40 \div 200)$$

$$E_m = 0.500 + 0.225 + 0.200$$

$$E_m = 0.925$$

Since E_m (0.925) is less than unity (1), the exposure combination is within acceptable limits.

- (5) Engineering or administrative controls. To achieve compliance with the exposure limits in paragraphs (1) through (4) of this section, first determine and implement, when feasible, engineering or administrative controls. When such controls are not feasible, mandate the use of protective equipment or any other protective measures to keep exposure within the limits in this section. Any equipment 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 using respirators, comply with Division 4/I, OAR 437-004-1040, Respiratory Protection.

Note: Bold print identifies substances for which the Permissible Exposure Limits (PELs) are different than the federal Limits.

Table Z - 1 - Adopted Values (In Alphabetic Order)

Substance	CAS No. (c)	Ppm ^(a)	Mg/m ^{3(b)}	Skin
Abate	3383-96-8		10	
Acetaldehyde	75-07-0	100	180	
Acetic Acid	64-19-7	10	25	
Acetic anhydride	108-24-7	5	20	
Acetone	67-64-1	1,000	2,400	
Acetonitrile	75-05-8	40	70	
2-Acetylaminoflourine	53-96-3		(See 437-004-9090)	
Acetylene	74-86-2	1,000		
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	107-13-1		(See 437-004-9710)	
Aldrin	309-00-2	—	0.25	X
Allyl alcohol	107-18-6	2	5	X
Allyl chloride	107-05-1	1	3	
Allyn glycidyl ether (AGE)	106-92-3	5 (C) 10	22 (C) 45	
Allyl propyl disulfide	2179-59-1	2	12	
alpha Alumina	1344-28-1			
Total Dust		—	10	
Respirable Fraction		—	5	

Substance	CAS No. (c)	Ppm ^(a)	Mg/m ^{3(b)}	Skin
Aluminum Metal Dust	7429-90-5			
Total Dust		—	10	
Respirable Fraction		—	5	
Alundum (A1203)			10	
4-Aminodiphenyl	92-67-1		(See 437-004-9090)	
2-Aminoethanol, see Ethanolamine				
2-Aminopyridine	504-29-0	0.5	2	
Ammonia	7664-41-7	25	18	
Ammonium Chloride Fumes	12125-02-9	—	10	
Ammonium sulfamate	7773-06-0			
Total Dust		—	10	
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 & 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		0.01	
Arsenic, Organic Compounds (as As)	7440-38-2	—	.05	
Arsine	7784-42-1	0.05	0.2	
Asbestos (See 437-004-9050)				
Asphalt (petroleum) Fumes	8052-42-4	—	5	
Azinphos-methyl	86-50-1	—	0.2	X
Barium (soluble compounds)	7440-39-3	—	0.5	
Barium Sulfate	7727-43-7			
Total Dust		—	10	
Respirable Fraction		—	5	
Benomyl	17804-35-2			
Total Dust		—	10	
Respirable Fraction		—	5	
Benzene See Table Z-2 for the limits applicable in the operations or sectors excluded in OAR 437-004- 9640 ^(d)	71-43-2		(See 437-004-9640)	
Benzidine	92-87-5		(See 437-004-9090)	

Substance	CAS No. (c)	Ppm ^(a)	Mg/m ^{3(b)}	Skin
p-Benzoquinone, see Quinone				
Benzoyl Peroxide	94-36-0	—	5	
Benzyl chloride	100-44-7	1	5	
Beryllium and Beryllium compounds	7440-41-7		(see Table Z-2)	
Biphenyl, see Diphenyl				
Bismuth telluride (undoped)	1304-82-1			
Total Dust		—	10	
Respirable Fraction		—	5	
Bismuth telluride (se-doped)		—	5	
Bisphenol A, see Diglycidyl ether				
Boron oxide	1303-86-2	—	10	
Boron tribromide	10294-33-4	1	10	
Boron trifluoride	7637-07-2	(C) 1	(C) 3	
Bromine	7726-95-6	0.1	0.7	
Bromine pentafluoride	7789-30-2	0.1	0.7	
Bromoform	75-25-2	0,5	5	X
Butadiene (1,3-Butadiene) (See 1910.1051; and 1910.19(1))	106-99-0	1 ppm/5 ppm STEL		
Butane	106-97-8	800	1,900	
Butanethiol, see Butyl mercaptan				
2-Butanone (Methyl Ethyl Ketone)	78-96-3	200	590	
2-Butoxyethanol (Butyl cellosolve)	111-76-2	50	240	X
Butyl acetate (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	
Butyl lactate	138-22-7	1	5	
Butylamine	109-73-9	(C) 5	(C) 15	X
tert-Butyl chromate (as CrO ₃)	1189-85-1		(See 437-004-9626)	
n-Butyl glycidyl ether (BGE)	2426-08-6	50	270	
Butyl mercaptan	109-79-5	0.5	1.5	
p-tert-Butyltoluene	98-51-1	10	60	
Cadmium dust and fume (as Cd)	7440-43-9	(See 437-004-9620)	0.005	

Substance	CAS No. (c)	Ppm ^(a)	Mg/m ^{3(b)}	Skin
Calcium carbonate	1317-65-3			
Total Dust		—	10	
Respirable Fraction		—	5	
Calcium hydroxide	1305-62-0			
Total Dust		—	10	
Respirable Fraction		—	5	
Calcium oxide	1305-78-8	—	5	
Calcium silicate	1344-95-2			
Total Dust		—	10	
Respirable Fraction		—	5	
Calcium sulfate	7778-18-9			
Total Dust		—	10	
Respirable Fraction		—	5	
Camphor, synthetic	76-22-2	—	2	
Caprolactam (2-Oxonexa-methylenimine)	105-60-2	—	5	
Carbaryl (Sevin®)	63-25-2	—	5	
Carbon black	1333-86-4	—	3.5	
Carbon dioxide	124-38-9	5,000	9,000	
Carbon disulfide	75-15-0		(See Table Z-2)	
Carbon monoxide	630-08-0	50	55	
Carbon tetrachloride	56-23-5		(See Table Z-2)	
Cellulose	9006-34-6			
Total Dust		—	10	
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	1,050	
2-Chloro-1, 3-butadiene, see beta-Chloroprene				

Substance	CAS No. (c)	Ppm ^(a)	Mg/m ^{3(b)}	Skin
Chlorodiphenyl (42% Chlorine)	53469-21-9	—	1	X
Chlorodiphenyl (54% Chlorine)	11097-69-1	—	0.5	X
1-Chloro, 2, 3-epoxypropane, see Epichlorhydrin				
2-Chloroethanol, see Ethylene chlorohydrin				
Chloroethylene, see Vinyl Chloride				
Chloroform (Trichloromethane)	67-66-3	(C) 25	(C) 120	
bis-Chloromethyl ether	542-88-1		(See 437-004-9090)	
Chloromethyl methyl ether	107-30-2		(See 437-004-9090)	
1-Chloro-1-nitropropane	600-25-9	20	100	
Chloropicrin	76-06-2	0.1	0.7	
beta-Chloroprene (2-chloro-1,3-butadiene)	126-99-8	25	90	X
2-Chloro-6-(trichloromethyl) pyridine	1929-82-4			
Total Dust		—	10	
Respirable Fraction		—	5	
Chromic acid and chromates (as CrO ₃)	1333-82-0		(See Table Z-2)	
Chromium (II) compounds (as Cr)	7440-47-3	—	0.5	
Chromium (III) compounds (as Cr)	7440-47-3	—	0.5	
Chromium (VI) compounds			(See 437-004-9626)	
Chromium metal & insol. Salts (as Cr)	7440-47-3	—	1	
Clopidol	2971-90-6			
Total Dust		—	10	
Respirable Fraction		—	5	
Coal Dust			(See Table Z-3)	
Coal tar pitch volatiles (See 1910.1002) (Benzene soluble fraction) anthracene, BaP, phenanthrene, acridine, chrysene, pyrene	65966-93-2	—	0.2	
Cobalt metal, fume & dust	7440-48-4	—	0.1	
Coke oven emissions (See 1910.1029)				
Copper fume	7440-50-8	—	0.1	
Dusts and Mists	7440-50-8	—	1	
Corundum (A1203)	1302-74-5	—	10	
Cotton dust (See 1910.1043)				
Cotton dust (raw)		—	1 ^(e)	

Substance	CAS No. (c)	Ppm ^(a)	Mg/m ^{3(b)}	Skin
Crag® herbicide (Sesone)	136-78-7			
Total Dust		—	10	
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)		—	5	X
Cyanogen	460-19-5	10	—	
Cyclohexane	110-82-7	300	1,050	
Cyclohexanol	108-93-0	50	200	
Cyclohexanone	108-94-1	50	200	
Cyclohexene	110-83-8	300	1,015	
Cyclopentadiene	542-92-7	75	200	
2,4-D (Dichlorophenoxyacetic acid)	94-75-7	—	10	
DDT	50-29-3	—	1	X
DDVP, see Dichlorvos				
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				
Diazinon	333-41-5	—	0.1	X
Diazomethane	334-88-3	0.2	0.4	
Diborane	19287-45-7	0.1	0.1	
Dibrom®	300-76-5	—	3	
1,2-Dibromo-3-chloropropane (DBCP) (See 1910.1044)	96-12-8	0.001		
1,2-Dibromoethane, see Ethylene dibromide				
2-N-Dibutylaminoethanol	102-81-8	2	14	X
Dibutyl phosphate	107-66-4	1	5	
Dibutyl phthalate	84-74-2	—	5	
Dichloroacetylene	7572-29-4	(C) 0.1	(C) 0.4	
o-Dichlorobenzene	95-50-1	(C) 50	(C) 300	
p-Dichlorobenzene	106-46-7	75	450	

Substance	CAS No. (c)	Ppm ^(a)	Mg/m ^{3(b)}	Skin
3,3-Dichlorobenzidine	91-94-1		(See 437-004-9090)	X
Dichlorodifluoromethane	75-71-8	1,000	4,950	
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-Dichlorethylene	540-59-0	200	790	
Dichloroethyl Ether	111-44-4	5 (C) 15	30 (C) 90	X
Dichloromethane, see Methylene chloride				
Dichloromonofluoromethane	75-43-4	1,000	4,200	
1, 1-Dichloro-1-nitroethane	594-72-9	(C) 10	(C) 60	
1, 2-Dichloropropane, see Propylene dichloride				
Dichlorotetrafluoroethane	76-14-2	1,000	7,000	
Dichlorvos (DDVP)	62-73-7	0.1	1	X
Dicyclohexylmethane 4,4'-diisocyanate (hydrogenated MDI)	5124-30-1		See Table Z-2	
Dicyclopentadienyl iron Total Dust	102-54-5	—	10	
Respirable Fraction		—	5	
Dieldrin	60-57-1	—	0.25	X
Diethylamine	109-89-7	25	75	
2-Diethylaminoethanol	100-37-8	10	50	X
Diethylene triamine	111-40-0	(C) 1	(C) 4	X
Diethylether, 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	25	150	
Diisopropylamine	108-18-9	5	20	X
Dimethoxymethane, see Methylal				
Dimethyl acetamide	127-19-5	10	35	X
Dimethylamine	124-40-3	10	18	

Substance	CAS No. (c)	Ppm ^(a)	Mg/m ^{3(b)}	Skin
4-Dimethylaminoazobenzene	60-11-7		(See 437-004-9090)	
Dimethylaminobenzene, see Xylidene				
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-Dimethylheptanone, 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	
Diphenylamine	122-39-4	—	10	
Diphenylmethane diisocyanate (MDI),			(See Table Z-2)	
Dipropylene glycol methyl ether	34590-94-8	100	600	X
Diquat	231-36-7	—	0.5	
Di-sec, octyl phthalate (Di-2-ethylhexylphthalate)	117-81-7	—	5	
Emery	12415-34-8			
Total Dust		—	10	
Respirable Fraction		—	5	
Endosulfan (Thiodan®)	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				
Ethane	74-84-0	1,000	—	
Ethanethiol, see Ethyl mercaptan				

Substance	CAS No. (c)	Ppm ^(a)	Mg/m ^{3(b)}	Skin
Ethanolamine	141-43-5	3	6	
2-Ethoxyethanol (Cellosolve)	110-80-5	100	370	X
2-Ethoxyethylacetate (Cellosolve acetate)	111-15-9	100	540	X
Ethyl acetate	141-78-6	400	1,400	
Ethyl acrylate	140-88-5	25	100	X
Ethyl alcohol (ethanol)	64-17-5	1,000	1,900	
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	1,000	2,600	
Ethyl ether	60-29-7	400	1,200	
Ethyl formate	109-94-4	100	300	
Ethyl mercaptan	75-08-1	0.5 (C) 10	1 (C) 25	
Ethyl silicate	78-10-4	100	850	
Ethylene	74-85-1	1,000	—	
Ethylene chlorohydrin	107-07-3	5	16	X
Ethylenediamine	107-15-3	10	25	
Ethylene dibromide	106-93-4		(See Table Z-2)	
Ethylene dichloride	107-06-2		(See Table Z-2)	
Ethylene glycol particulate		—	10	
Ethylene glycol, Vapor	107-21-1	100	260	
Ethylene glycol dinitrate	628-96-6	(C) 0.2	(C) 1	X
Ethylene glycol methyl acetate (Methyl cellosolve acetate) (2-Methoxy-ethyl acetate)	110-49-6	25	120	X
Ethylenimine	151-56-4		(See 437-004-9090)	
Ethylene oxide	75-21-8	1	(See 437-004-9740)	
Ethylidene chloride, see 1, 1-Dichloroethane				
N-Ethylmorpholine	100-74-3	20	94	X

Substance	CAS No. (c)	Ppm ^(a)	Mg/m ^{3(b)}	Skin
Ferbam	14484-64-1			
Total Dust		—	10	
Respirable Fraction		—	5	
Ferrovandium dust	12604-58-9	—	1	
Fibrous glass, see Glass, Fibrous				
Fluorides (As F)		—	(See Table Z-2)	
Fluorine	7782-41-4	0.1	0.2	
Fluorotrichloromethane (Trichlorofluoromethane)	75-69-4	1,000	5,600	
Formaldehyde	50-00-0		(See 437-004-9760)	
Formic acid	64-18-6	5	9	
Furfural	98-01-1	5	20	X
Furfuryl alcohol	98-00-0	5	20	
Gasoline	8006-61-9		^(g)	
Germanium tetrahydride	7782-65-2	0.2	0.6	
Glass, Fibrous or dust			10	
Glycerin (mist)	56-81-5			
Total Dust			10	
Respirable Fraction			5	
Glycidol	556-52-5	50	150	
Glycol momoethyl ether, see 2-Ethoxythanol				
Grain dust (oat, wheat, barley)			10	
Graphite natural, respirable	7782-42-5		(See Table Z-3)	
Graphite (Synthetic)	7782-42-5			
Total Dust			10	
Respirable Fraction			5	
Guthion®, see Azinphosmethyl				
Gypsum	13397-24-5			
Total Dust		—	10	
Respirable Fraction		—	5	
Hafnium	7440-58-6	—	0.5	
Heptachlor	76-44-8	—	0.5	X
Heptane (n-heptane)	142-82-5	500	2,000	
Hexachlorocyclopentadiene	77-47-4	0.1	1	
Hexachloroethane	67-72-1	1	10	X
Hexachloronaphthalene	1335-87-1	—	0.2	X
Hexafluoroacetone	684-16-2	0.1	0.7	X

Substance	CAS No. (c)	Ppm ^(a)	Mg/m ^{3(b)}	Skin
Hexamethylene diisocyanate (HDI)	822-06-0		(See Table Z-2)	
1,6 Hexamethylene diisocyanate Based Adduct			(See Table Z-2)	
Hexane (n-hexane)	110-54-3	500	1,800	
2-Hexanone	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	1333-74-0	1,000	—	
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		(See Table Z-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		(See Table Z-2)	
Hydroquinone	123-31-9	—	2	
Indene	95-13-6	10	45	
Indium and compounds (as In)	7440-74-6	—	0.1	
Iodine	7553-56-2	(C) 0.1	(C) 1	
Iron oxide fume	1309-37-1	—	10	
Iron pentacarbonyl	13463-40-6	0.1	0.23	
Iron salts, soluble, as Fe		—	1	
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	10	55	
Isophorone diisocyanate (IPDI)	4098-71-9		(See Table Z-2)	
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	250	1,050	
Isopropyl glycidyl ether (IGE)	4016-14-2	50	240	

Substance	CAS No. (c)	Ppm ^(a)	Mg/m ^{3(b)}	Skin
Kaolin	1332-58-7			
Total Dust		—	10	
Respirable Fraction		—	5	
Ketene	463-51-4	0.5	0.9	
Lead, inorganic (as Pb)	7439-92-1	<u>(See 437-004-9600)</u>	0.05	
Lead arsenate (See 1910.1018)	7784-40-9		0.01	
Limestone	1317-65-3			
Total Dust		—	10	
Respirable Fraction		—	5	
Lindane	58-89-9	—	0.5	X
Lithium hydride	7580-67-8	—	0.025	
L.P.G. (Liquified petroleum gas)	68476-85-7	1,000	1,800	
Magnesite	546-93-0			
Total Dust		—	10	
Respirable Fraction		—	5	
Magnesium oxide fume	1309-48-4			
Total Dust		—	10	
Respirable Fraction		—	5	
Malathion	121-75-5	—	10	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		—	10	
Respirable Fraction		—	5	
Mercury (aryl, inorganic, organo, and vapor) (as Hg)	7439-97-6 (metal)		(See Table Z-2)	
Mesityl oxide	141-79-7	25	100	
Methane	74-82-8	1,000	—	
Methanethiol, see Methyl mercaptan				
Methoxychlor	72-43-5			
Total Dust		—	10	
Respirable Fraction		—	5	
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	1,000	1,650	

Substance	CAS No. (c)	Ppm ^(a)	Mg/m ^{3(b)}	Skin
Methyl acetylene-propadiene mixture (MAPP)		1,000	1,800	
Methyl acrylate	96-33-3	10	35	X
Methylacrylonitrile	126-98-7	1	3	X
Methylal (dimethoxymethane)	109-87-5	1,000	3,100	
Methyl alcohol (methanol)	67-56-1	200	260	
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	15 (C) 20	60 (C) 80	X
Methyl butyl ketone, see 2-Hexanone				
Methylcyclohexane	108-87-2	500	2,000	
Methylcyclohexanol	25639-42-3	50	235	
o-Methylcyclohexanone	583-60-8	50	230	X
2-Methylcyclopentadienyl manganese tricarbonyl (as Mn)	12108-13-3	0.1	0.2	X
Methyl demeton	8022-00-2	—	0.5	X
Methyl ethyl ketone (MEK), see 2-Butanone				
Methyl formate	107-31-3	100	250	
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	0.5 (C) 10	1 (C) 20	
Methyl methacrylate	80-62-6	100	410	
Methyl parathion	298-00-0	—	0.2	X
Methyl propyl ketone, see 2-Pentanone				
Methyl silicate	681-84-5	(C) 5	(C) 30	
a-Methyl styrene	98-83-9	(C) 100	(C) 480	
Methylene bisphenyl isocyanate (MDI)	101-68-8	(See Table Z-2 -- diisocyanates)		
Methylenedianiline (MDA)		(See 437-004-9780)	0.01	

Substance	CAS No. (c)	Ppm ^(a)	Mg/m ^{3(b)}	Skin
Methylene Chloride	75-09-2	25		
Mineral Wool Fiber		—	10	
MOCA [4,4'-Methylene bis (2-chloroaniline)] (See 437-002-0346)	101-14-4			
Molybdenum	7439-98-7			
(soluble compounds)		—	5	
(insoluble compounds)		—	10	
Monomethyl aniline	100-61-8	2	9	X
Monomethyl hydrazine	60-34-4	(C) 0.2	(C) 0.35	X
Morpholine	110-91-8	20	70	X
Naphtha (coal tar)	8030-30-6	100	400	
Naphthalene	91-20-3	10	50	
Naphthalene diisocyanate (NDI)	3173-72-6		(See Table Z-2)	
alpha-Naphthylamine	134-32-7		(See 437-004-9090)	
beta-Naphthylamine	91-59-8		(See 437-004-9090)	
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	0.075	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
4-Nitrodiphenyl	92-93-3		(See 437-004-9090)	
p-Nitrochlorobenzene	100-00-5	—	1	X
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 437-004-9090)	

Substance	CAS No. (c)	Ppm ^(a)	Mg/m ^{3(b)}	Skin
Nitrotoluene (all isomers)	88-72-2/ 99-08-1/ 99-99-0	5	30	X
Nitrotrichloromethane, see Chloropicrin				
Nitrous oxide	10024-97-5	50	90	
Octachloronaphthalene	2234-13-1	—	0.1	X
Octane	111-65-9	400	1,900	
Oil mist (mineral)	8012-95-1	—	5	
Oil mist, vapor		—	^(g)	
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	
Parafin wax fume	8002-74-2	—	1	
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		—	10	
Respirable Fraction		—	5	
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		—	10	
Respirable Fraction		—	5	
Pentane	109-66-0	500	1,500	
2-Pentanone (Methyl propyl ketone)	107-87-9	200	700	
Perchloroethylene (tetrachloroethylene)	127-18-4		(See Table Z-2)	
Perchloromethyl mercaptan	594-42-3	0.1	0.8	
Perchloryl fluoride	7616-94-6	3	13.5	
Perlite	93763-70-3			
Total Dust		—	10	
Respirable Fraction		—	5	
Petroleum distillates (naphtha) (Rubber Solvent)		500	2,000 (g)	
Phenol	108-95-2	5	19	X

Substance	CAS No. (c)	Ppm ^(a)	Mg/m ^{3(b)}	Skin
Phenothiazine	92-84-2	—	5	X
p-Phenylene diamine	106-50-3	—	0.1	X
Phenyl ether (vapor)	101-84-8	1	7	
Phenyl ether – diphenyl mixture (vapor)	8004-13-5	1	7	
Phenylethylene, see Styrene				
Phenyl glycidyl ether (PGE)	122-60-1	10	60	
Phenylhydrazine	100-63-0	5	22	X
Phenylphosphine	638-21-1	(C) 0.05	(C) 0.25	
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		—	10	
Respirable Fraction		—	5	
Picric acid	88-89-1	—	0.1	X
Pindone (2-Pivalyl-1, 3-indan-dione)	83-26-1	—	0.1	
Plaster of Paris	26499-65-0			
Total Dust		—	10	
Respirable Fraction		—	5	
Platinum (Soluble Salts) as Pt	7440-06-4	—	0.002	
Polychlorobiphenyls, see Chlorodiphenyls				
Portland Cement	65997-15-1			
Total Dust		—	10	
Respirable Fraction		—	5	
Propane	74-98-6	1,000	1,800	
Beta-Propiolactone	57-57-8		(See 437-004-9090)	
Propargyl alcohol	107-19-7	1	—	X
n-Propyl acetate	109-60-4	200	840	
n-Propyl alcohol	71-23-8	200	500	
n-Propyl nitrate	627-13-4	25	110	

Substance	CAS No. (c)	Ppm ^(a)	Mg/m ^{3(b)}	Skin
Propylene dichloride	78-87-5	75	350	
Propylene glycol monomethyl ether	107-98-2	100	360	
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 (Cyclonite)	121-82-4	—	1.5	X
Rhodium, Metal fume and dusts, as Rh	7440-16-6	—	0.1	
Soluble salts	7440-16-6	—	0.001	
Ronnel	299-84-3	—	10	
Rosin core solder pyrolysis products (as Formaldehyde)		—	0.1	
Rotenone	83-79-4	—	5	
Rouge				
Total Dust		—	10	
Respirable Fraction		—	5	
Selenium compounds (as Se)	7782-49-2	—	0.2	
Selenium hexafluoride (as Se)	7783-79-1	0.05	0.4	
Silica			(See Table Z-3)	
Silicon	7440-21-3			
Total Dust		—	10	
Respirable Fraction		—	5	
Silicon carbide	409-21-2			
Total Dust		—	10	
Respirable Fraction		—	5	
Silver, metal and soluble compounds (as Ag)	7440-22-4	—	0.01	
Sodium fluoroacetate	62-74-8	—	0.05	X
Sodium hydroxide	1310-73-2	—	2	
Starch	9005-25-8			
Total Dust		—	10	
Respirable Fraction		—	5	
Stibine	7803-52-3	0.1	0.5	
Stoddard solvent	8052-41-3	200	1,150	
Strychnine	57-24-9	—	0.15	
Styrene	100-42-5		(See Table Z-2)	

Substance	CAS No. (c)	Ppm ^(a)	Mg/m ^{3(b)}	Skin
Subtilisins (Proteolytic enzymes) (as 100% pure crystalline enzyme)	1395-21-7	—	(C) 0.0003	
Sucrose	57-50-1			
Total Dust		—	10	
Respirable Fraction		—	5	
Sulfur dioxide	7446-09-5	5	13	
Sulfur hexafluoride	2551-62-4	1,000	6,000	
Sulfuric acid	7664-93-9	—	1	
Sulfur monochloride	10025-67-9	1	6	
Sulfur pentafluoride	5714-22-7	0.025	0.25	
Sulfur tetrafluoride	7783-60-0	0.1	0.4	
Sulfuryl fluoride	2699-79-8	5	20	
Systox, see Demeton®				
2, 4, 5-T	93-76-5	—	10	
Tantalum, metal and oxide dust	7440-25-7	—	5	
TEDP (Sulfotepp)	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		—	10	
Respirable Fraction		—	5	
TEPP (Tetraethyl pyrophosphate)	107-49-3	0.004	0.05	X
Terphenyls	26140-60-3	(C) 1	(C) 9	
1, 1, 1, 2-Tetrachloro-2, 2-difluoroethane	76-11-9	500	4,170	
1, 1, 2, 2-Tetrachloro-1, 2-difluoroethane	76-12-0	500	4,170	
1, 1, 2, 2-Tetrachloroethane	79-34-5	5	35	X
Tetrachloroethylene, see Perchloroethylene				
Tetrachloronaphthalene	1335-88-2	—	2	X
Tetrachloromethane, see Carbon tetrachloride				
Tetraethyl lead (as Pb)	78-0-2	—	.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	

Substance	CAS No. (c)	Ppm ^(a)	Mg/m ^{3(b)}	Skin
Tetryl (2, 4, 6-trinitro-phenyl-methylnitramine)	479-45-8	—	1.5	X
Thallium (soluble compounds) as TI	7440-28-0	—	0.1	X
4,4'-Thiobis (6-tert, Butyl-m-cresol)	96-69-5			
Total Dust		—	10	
Respirable Fraction		—	5	
Thiram	137-26-8		(See 437-004-9720)	
Tin (inorganic compounds, except oxides) as Sn	7440-31-5	—	2	
Tin (organic compounds)	7440-31-5	—	0.1	
Tin oxide	1332-29-2			
Total Dust		—	10	
Respirable Fraction		—	5	
Titanium dioxide	13463-67-7	—	10	
Toluene (toluol)	108-88-3		(See Table Z-2)	
Toluene diisocyanate (TDI),	584-84-9		(See Table Z-2)	
o-Toluidine	95-53-4	5	22	X
Toxaphene, see Chlorinated camphene				
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		(See Table Z-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-trifluoro-ethane	76-13-1	1,000	7,600	
Triethylamine	121-44-8	25	100	
Trifluorobromomethane	75-63-8	1,000	6,100	
Trimethyl benzene	25551-13-7	25	120	
2, 4, 6-Trinitrophenol, see Picric acid				
2, 4, 6-Trinitrophenylmethyl-nitramine, see Tetryl				
Trinitrotoluene (TNT)	118-96-7		1.5	X
Triorthocresyl phosphate	78-30-8	—	0.1	
Triphenyl phosphate	115-86-6	—	3	

Substance	CAS No. (c)	Ppm ^(a)	Mg/m ^{3(b)}	Skin
Tungsten & compounds, as W	7440-33-7			
Soluble		—	1	
Insoluble		—	5	
Turpentine	8006-64-2	100	560	
Uranium (as U)	7440-61-1			
Soluble compounds		—	0.05	
Insoluble compounds		—	0.2	
Vanadium respirable dust				
(as V2O5)	1314-62-1	—	(C) 0.5	
Fume (as V2O5)	1314-62-1	—	(C) 0.05	
Vegetable oil mist				
Total Dust		—	10	
Respirable Fraction		—	5	
Vinyl acetate	108-05-4	10	30	
Vinyl benzene, see Styrene				
Vinyl bromide	593-60-2	250	1,100	
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	
Wood Dust (non-allergenic)		—	10	
Xylene (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	1314-13-2			
Total Dust		—	10	
Respirable Fraction		—	5	
Zinc oxide fume	1314-13-2	—	5	
Zinc stearate	557-05-1			
Total Dust		—	10	
Respirable Fraction		—	5	
Zirconium compounds (as Zr)	7440-67-7	—	5	

Note: PNOR means “particles not otherwise regulated.”

Table Z-1 FOOTNOTES:

^(a) Parts of vapor or gas per million parts of contaminated air by volume at 25 degrees 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 benzene standard in 4/Z, OAR 437-004-9640 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 4/Z, OAR 437-004-9640 for specific circumstances.
- (e) 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 that is the same as the inert or nuisance dust limit of Table Z 3.
- (f) Usually a mixture, in general the aromatic hydrocarbon content will determine which TWA applies.
- (g) If the exposure limit in 1910.1026 is stayed or is otherwise not in effect, the exposure limit is a ceiling of 0.1 mg/m³.
- (h) See Table Z-2 for the exposure limit for any operations or sectors where the exposure limit in 1910.1026 is stayed or is otherwise not in effect.

Oregon Table Z-2 - Adopted Permissible Exposure Limits (PEL)

Substance	8-Hour Time-Weighted Average	Acceptable Ceiling Concentration	Acceptable Max. Peak Above the Acceptable Ceiling Concentration for an 8-Hour Shift		Skin
			Concentration	Maximum Duration	
Benzene ^(a) (Z87.4-1969)	10 ppm	25 ppm	50 ppm	10 min.	
Beryllium, and beryllium compounds (Z37.29-1970)	2 µg/m ³	5 µg/m ³	25 µg/m ³	30 min.	
Cadmium fume ^(b) (Z37.5-1970)	0.1 mg/m ³	0.3 mg/m ³			
Cadmium dust ^(b) (Z37.5-1970)	0.2 mg/m ³	0.6 mg/m ³			
Carbon disulfide (Z37.3-1968)	20 ppm	30 ppm	100 ppm	30 min.	X
Carbon tetrachloride (Z37.17-1967)	10 ppm	25 ppm	200 ppm	5 min. in any 4 hrs	
Chromic acid and chromates (Z37.7-1971) (as CrO ₃) ^c		0.1 mg/m ³			
Ethylene dibromide (Z37.31-1970)	20 ppm	25 ppm	50 ppm	5 min.	X
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/m ³				
Formaldehyde (see 1910.1048)					
Hydrogen fluoride (Z37.28-1969)	3 ppm				

Substance	8-Hour Time-Weighted Average	Acceptable Ceiling Concentration	Acceptable Max. Peak Above the Acceptable Ceiling Concentration for an 8-Hour Shift		Skin
			Concentration	Maximum Duration	
Hydrogen sulfide (Z37.2-1966)		20 ppm	50 ppm	10 min. once, only if no other measurable exposure occurs	
Mercury (Z37.8-1971)	0.05 mg/m³	0.1 mg/m³			X
Methyl chloride (Z37.18-1969)	100 ppm	200 ppm	300 ppm	5 min. in any 3 hrs	
Organo (alkyl) mercury (Z37.30-1969)	0.001 mg/m³	0.01 mg/m³			X
Styrene (Z37.15-1969)	100 ppm	200 ppm	600 ppm	5 min. in any 3 hrs.	
Tetrachloroethylene (Z37.22-1967)	100 ppm	200 ppm	300 ppm	5 min. in any 3 hrs.	
Toluene (Z37.12-1967)	100 ppm	300 ppm	500 ppm	10 min.	
Trichloroethylene (Z37.19-1967)	100 ppm	200 ppm	300 ppm	5 min. in any 2 hrs.	
Diisocyanates					
Dicyclohexylmethane 4,4'-diisocyanate (hydrogenated MDI)	.055 mg/m³ .005 ppm	0.210 mg/m³ 0.02 ppm			
Diphenylmethane diisocyanate (MDI)	.050 mg/m³ .005 ppm	0.200 mg/m³ 0.02 ppm			
Hexamethylene diisocyanate (HDI)	.035 mg/m³ .005 ppm	0.140 mg/m³ 0.02 ppm			
1,6 Hexamethylene diisocyanated Based Adduct (includes HDI-Biuret trimer, and other polymeric forms of HDI, including isocyanurates)	0.5 mg/m³	1.0 mg/m³			
Isophorone diisocyanate (IPDI)	.045 mg/m³ .005 ppm	0.180 mg/m³ 0.02 ppm			
Napthalene diisocyanate (NDI)	.040 mg/m³ .005 ppm	0.170 mg/m³ 0.02 ppm			

Note: Bold print identifies substances for which the Oregon Permissible Exposure Limits (PELs) are different than the federal limits.

Table Z-2 FOOTNOTES:

- (a) This standard applies to the industry segments exempt from the 1 ppm 8-hour TWA and 5 ppm STEL of the Benzene Standard, 4/Z, OAR 437-004-9640.
- (b) This standard applies to any operations on sectors for which the Cadmium Standard, 4/Z, OAR 437-004-9620, is stayed or otherwise not in effect.
- (c) This standard applies to any operations or sectors for which the exposure limit in the Chromium (VI) standard, 1910.1026, is stayed or is otherwise not in effect.

Oregon TABLE Z 3 - Permissible Exposure Limits (PEL-TWA) for MINERAL DUSTS

Substance	mppcf ^(a)	mg/m ³
Silica:		
Crystalline		0.1 ^(e)
Quartz (respirable)		
Quartz (total dust)		$\frac{30\text{mg} / \text{m}^3}{\% \text{SiO}_2 + 2}$
Cristobalite (Respirable)		0.05
Tridymite: Use 1/2 the value calculated from the formulae for quartz.		
Amorphous, including natural diatomaceous earth	20	$\frac{80\text{mg} / \text{m}^3}{\% \text{SiO}_2}$
Silicates (less than 1 percent crystalline silica):		
Mica	20	
Soapstone	20	
Talc (not containing asbestos)	20 ^(c)	
Talc (containing asbestos) Use asbestos limit.		
Tremolite, asbestiform (see OAR 437-004-9050, Asbestos)		
Portland cement	50	
Graphite (Natural)		5
Coal Dust:		
Respirable fraction less than 5% SiO ₂		2.4 ^{(e) (f)}
Coal Dust:		
Respirable fraction greater than 5% SiO ₂		0.1 ^(e)
Inert or Nuisance Dust (PNOR): ^(d)		
Respirable fraction		5
Total dust		10

Note: Bold print identifies substances for which the Oregon Permissible Exposure Limits (PEL-TWAs) are different than the federal limits.

Conversion factors: $\text{mppcf} \times 35.3 = \text{million particles per cubic meter} = \text{particles per c.c.}$

Table Z-3 FOOTNOTES:

- (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 are applicable.
- (c) Containing less than 1 percent quartz; if 1 percent 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) Calculate both concentration and percent quartz for the application of this limit from the fraction passing a size-selector with the following characteristics.
- (f) The measurements under this note refer to the use of an AEC (now NRC) instrument. If the respirable fraction of coal dust is determined with a MRE the figure corresponding to that of 2.4 mg/m³ in the table for coal dust is 4.5 mg/m³.

Statutory Authority: ORS 654.025(2) and 656.726(4).
Statutes Implemented: ORS 654.001 through 654.295.
History: OR-OSHA Admin. Order 4-1998, filed 8/28/98, effective 10/1/98.
OR-OSHA Admin. Order 4-2001, filed 2/5/01, effective 2/5/01.
OR-OSHA Admin. Order 9-2001, filed 9/14/01, effective 9/14/01.
OR-OSHA Admin. Order 6-2006, filed 8/30/06, effective 8/30/06.
OR-OSHA Admin. Order 4-2012, filed 9/19/12, effective 1/1/13.

437-004-9010 Fumigated Areas

- (1) Scope: Covers pesticides which when applied, forms a gas to control pests.
- (2) Definitions:
 - (a) Types of fumigants include aluminum phosphide, methyl bromide, chloropicrin, 1,3-D (Telone), dazomet, metam sodium and iodomethane.
 - (b) Types of fumigations include soil, space (warehouse), vertical storage, flat storage, tarpaulin, spot (includes grain handling equipment, empty tanks and empty silos), chamber, vehicle and rodent burrows.
- (3) All work with fumigants must follow the instructions and precautions in the manufacturer's application manual and on the product label and MSDS.
- (4) All entry points into fumigated interior areas must have signs that identify the area as fumigated and prohibit entry.
- (5) Leave the signs posted according to the instructions of the manufacturer of the fumigating chemical or until the hazard resulting from the fumigation is gone, whichever is the longer time.

- (6) After fumigation, there must be a way to aerate the fumigated area without contaminating other areas where there are employees.
- (7) If the fumigation process requires the worker to be in the fumigated area, there must be at least one other person present to assist during an emergency. That person must have the same training and access to the same personal protective equipment as the first worker.
- (8) Fumigation chambers or areas must not allow the toxic fumigants to escape or otherwise enter other areas where they can be hazardous to other workers.
- (9) If the fumigant concentration can exceed 10 percent of the lower explosive limit (LEL), all electrical equipment, fittings, and connections must be vapor proof.

Statutory Authority: ORS 654.025(2) and 656.726(4).
Statutes Implemented: ORS 654.001 through 654.295.
History: OR-OSHA Admin. Order 9-2006, filed 9/22/06, effective 9/22/06.

437-004-9050 Asbestos

Definitions:

Asbestos includes chrysotile, amosite, crocidolite, tremolite asbestos, anthophyllite asbestos, actinolite asbestos and any of these minerals that have been chemically treated or altered.

Asbestos-containing material (ACM) means any material containing more than 1% asbestos.

Presumed asbestos containing material (PACM) means thermal system insulation and surfacing material found in buildings constructed no later than 1980. The designation of a material as "PACM" may be rebutted pursuant to Division 2/Z, 1910.1001(j)(8).

- (1) The employer is responsible to determine, before work begins, if any task or activity assigned to workers will result in a potential exposure to asbestos.
- (2) Work that exposes employees to asbestos must comply with Division 4/Z, 1910.1001, Asbestos; except that construction activities exposing employees to asbestos must comply with Division 3/Z, 1926.1101, Asbestos.

Note: Construction activities are building, altering and repairing, and include painting.

- (3) The employer must periodically examine all asbestos-containing material in the workplace to ensure that there is no deterioration or damage that could cause employee exposure.

- (4) If you find damage or deterioration, the material must be repaired, encapsulated, or removed consistent with the requirements in Division 3/Z, 1926.1101, Asbestos.

Notes: Tasks or work activities that could expose employees to asbestos include the following:

- Housekeeping or maintenance activities on workplace surfaces or systems with asbestos-containing materials (examples include flooring, ceiling tiles, roofing, siding, boilers, heaters, insulation, and fireproofing);
- Inspection, disassembly, repair and assembly of automotive or farm vehicle brakes and clutches;
- Demolition or salvage of structures where asbestos-containing materials are present;
- New construction, alteration, or renovation of structures, substrates, or portions thereof with asbestos-containing materials; and,
- Routine or emergency cleanup of asbestos-containing materials.

Employers who have pipe systems that are insulated with asbestos-containing materials in their workplaces, must also comply with Division 4/Z, OAR 437-004-9850, Pipe Labeling.

Statutory Authority: ORS 654.025(2) and 656.726(4).
Statutes Implemented: ORS 654.001 through 654.295.
History: OR-OSHA Admin. Order 4-1998, filed 8/28/98, effective 10/1/98.
OR-OSHA Admin. Order 4-2012, filed 9/19/12, effective 1/1/13.

437-004-9090 13 Carcinogens

Definitions:

The 13 carcinogens are:

- 4-Nitrobiphenyl, CAS 92-93-3;
- alpha-Naphthylamine, CAS 134-32-7;
- Methyl chloromethyl ether, CAS 107-30-2;
- 3,3-Dichlorobenzidine (and its salts), CAS 91-94-1;
- bis-Chloromethyl ether, CAS 542-88-1;
- beta-Naphthylamine, CAS 91-59-8;
- Benzidine, CAS 92-87-5;
- 4-Aminodiphenyl, CAS 92-67-1;
- Ethyleneimine, CAS 151-56-4;
- beta-Propiolactone, CAS 57-57-8;
- 2-Acetylaminofluorene, CAS 53-96-3;
- 4-Dimethylaminoazo-benzene, CAS 60-11-7; and
- N-Nitrosodimethylamine, CAS 62-75-9.

- (1) The employer is responsible to determine, before work begins, if any task or activity assigned to workers will result in potential exposure to any of the 13 carcinogens.
- (2) Work that exposes employees to any of the 13 carcinogens must comply with Division 2/Z, 1910.1003, 13 Carcinogens.

Statutory Authority: ORS 654.025(2) and 656.726(4).
Statutes Implemented: ORS 654.001 through 654.295.
History: OR-OSHA Admin. Order 4-1998, f/8/28/98, effective 10/1/98.
OR-OSHA Admin. Order 4-2012, filed 9/19/12, effective 1/1/13.

437-004-9600 **Lead**

Definition:

Lead means elemental, metallic lead (chemical formula Pb), all inorganic lead compounds, and organic lead soaps. All other organic lead compounds are excluded.

- (1) The employer is responsible to determine, before work begins, if any task or activity assigned to workers will result in a potential exposure to lead.
- (2) Work that exposes employees to lead must comply with Division 2/Z, 1910.1025, Lead; except that construction activities exposing employees to lead must comply with Division 3/D, 1926.62, Lead.

Notes:

Construction activities are building, altering and repairing and include painting.

Tasks or work activities that could expose employees to lead include:

- Demolition or salvage of structures where lead-containing materials are present;
- New construction, alteration, or renovation of structures, substrates, or portions thereof with lead-containing materials;
- Routine or emergency cleanup of lead-containing materials;
- Using lead-containing paints or pigments;
- Cutting, brazing, burning, heating, grinding or welding surfaces with lead-containing paints or pigments; and
- Soldering with lead-containing solder.

Statutory Authority: ORS 654.025(2) and 656.726(4).
Statutes Implemented: ORS 654.001 through 654.295.
History: OR-OSHA Admin. Order 4-1998, filed 8/28/98, effective 10/1/98.
OR-OSHA Admin. Order 9-2006, filed 9/22/06, effective 9/22/06.
OR-OSHA Admin. Order 4-2012, filed 9/19/12, effective 1/1/13.

437-004-9620 Cadmium

Definition:

Cadmium means the element cadmium (Cd) and all cadmium compounds.

- (1) The employer is responsible to determine, before work begins, if any task or activity assigned to workers will result in a potential exposure to cadmium.
- (2) Work that exposes employees to cadmium must comply with Division 2/Z 1910.1027, Cadmium; except that construction activities exposing employees to cadmium must comply with Division 3/Z, 1926.1127, Cadmium.

Note: Construction activities are building, altering, and repairing and include painting.

Statutes Authority: ORS 654.025(2) and 656.726(4).
Statutes Implemented: ORS 654.001 through 654.295.
History: OR-OSHA Admin. Order 4-1998, filed 8/28/98, effective 10/1/98.
OR-OSHA Admin. Order 4-2012, filed 9/19/12, effective 1/1/13.

437-004-9626 Chromium (VI)

Definition:

Chromium (VI) [hexavalent chromium or Cr(VI)] means chromium with a valence of positive six, in any form and in any compound.

- (1) The employer is responsible to determine, before work begins, if any task or activity assigned to workers will result in a potential exposure to hexavalent chromium.
- (2) Work that exposes employees to hexavalent chromium must comply with Division 2/Z 1910.1026, Chromium (VI); except that construction activities exposing employees to hexavalent chromium must comply with Division 3/Z, 1926.1126, Chromium (VI).

Note: Construction activities are building, altering and repairing and include painting.

Statutory Authority: ORS 654.025(2) and 656.726(4).
Statutes Implemented: ORS 654.001 through 654.295.
History: OR-OSHA Admin. Order 4-2012, filed 9/19/12, effective 1/1/13.

437-004-9640 Benzene

Definition:

Benzene (Chemical formula C₆H₆, CAS 71-43-2) means liquefied or gaseous benzene and includes benzene in liquid mixtures and benzene vapors released by these liquids. It does not include trace amounts of unreacted benzene in solid materials.

- (1) The employer is responsible to determine, before work begins, if any task or activity assigned to workers will result in a potential exposure to benzene.
- (2) Tasks or activities within the scope of the Division 2, Benzene rule must comply with Division 2/Z, 1910.1028, Benzene.
- (3) Tasks or activities that are not within the scope of the Division 2, Benzene rule must comply with the permissible exposure limits listed in Division 4/Z, OAR 437-004-9000, Table Z-2.

Notes:

An example of a task or activity that is within the scope of the Division 2, Benzene rule is an employee dispensing gasoline or motor fuels containing benzene for more than 4 hours per day in an indoor location.

Examples of task or activities that are NOT within the scope of the Division 2, Benzene rule include:

- The storage, transportation, distribution, dispensing, sale or use of gasoline, motor fuels, or other fuels containing benzene after final discharge from bulk wholesale storage facilities.
- The storage, transportation, distribution or sale of benzene or liquid mixtures containing more than 0.1 percent benzene in intact containers while sealed in a way to contain benzene vapors or liquid.

Statutes Authority: ORS 654.025(2) and 656.726(4).

Statutes Implemented: ORS 654.001 through 654.295.

History: OR-OSHA Admin. Order 4-1998, filed 8/28/98, effective 10/1/98.

OR-OSHA Admin. Order 4-2012, filed 9/19/12, effective 1/1/13.

437-004-9650 Bloodborne Pathogens

Definitions:

Blood means human blood, human blood components and products made from human blood.

Bloodborne Pathogens means pathogenic micro-organisms that are present in human blood and can cause disease in humans. These pathogens include, but are not limited to, hepatitis B virus (HBV) and human immunodeficiency virus (HIV).

Contaminated means the presence or the reasonably anticipated presence of blood or other potentially infectious materials on an item or surface.

Occupational exposure means reasonably anticipated skin, eye, mucous membrane, or parenteral contact with blood or other potentially infectious materials that may result from the performance of an employee's duties.

Other Potentially Infectious Materials means:

- Human body fluids with visible contamination of blood, and all body fluids in situations where it is difficult or impossible to differentiate between body fluids;
 - Any unfixed tissue or organ (other than intact skin) from a human (living or dead); and
 - HIV-containing cell or tissue cultures, organ cultures, and HIV- or HBV-containing culture medium or other solutions; and blood, organs, or other tissues from experimental animals infected with HIV or HBV.
- (1) The employer is responsible to determine, before work begins, if any task or activity assigned to workers will result in an occupational exposure to bloodborne pathogens.
- (2) Work that exposes employees to bloodborne pathogens must comply with Division 2/Z, 1910.1030, Bloodborne Pathogens.

Note:

Examples of tasks or work activities with a potential for occupational exposures to bloodborne pathogens in agricultural workplaces include:

- Employees performing janitorial duties that include cleaning up human blood or OPIM;
- Employees who are required, as part of their job duties, to administer first aid to others that could include contact with another person's blood or OPIM.

Statutes Authority: ORS 654.025(2) and 656.726(4).

Statutes Implemented: ORS 654.001 through 654.295.

History: OR-OSHA Admin. Order 4-1998, filed 8/28/98, effective 10/1/98.

OR-OSHA Admin. Order 4-2012, filed 9/19/12, effective 1/1/13.

437-004-9710 Acrylonitrile

Definition.

Acrylonitrile or "AN" (Chemical formula CH₂=CHCN, CAS 107-13-1) means acrylonitrile monomer and includes Liquid AN.

Liquid AN means acrylonitrile monomer in liquid form, and liquid or semi-liquid polymer intermediates, including slurries, suspensions, emulsions, and solutions, made during the polymerization of AN.

- (1) The employer is responsible to determine, before work begins, if any task or activity assigned to workers will result in a potential exposure to acrylonitrile.
- (2) Work that exposes employees to acrylonitrile must comply with Division 2/Z, 1910.1045, Acrylonitrile.

Note:

The Division 2 Acrylonitrile rule does not apply to exposures which result solely from the processing, use, and handling of the following materials:

- ABS resins, SAN resins, nitrile barrier resins, solid nitrile elastomers, and acrylic and modacrylic fibers, when these listed materials are in the form of finished polymers, and products fabricated from such finished polymers;
- Materials made from and/or containing AN for which objective data is reasonably relied upon to demonstrate that the material is not capable – under the expected conditions of processing, use, and handling which will cause the greatest possible release – of releasing AN in airborne concentrations in excess of 1 ppm as an 8-hour time-weighted average, or
- Solid materials made from and/or containing AN which will not be heated above 170 degrees F. during handling, use, or processing.

Statutes Authority: ORS 654.025(2) and 656.726(4).

Statutes Implemented: ORS 654.001 through 654.295.

History: OR-OSHA Admin. Order 4-1998, filed 8/28/98, effective 10/1/98.

OR-OSHA Admin. Order 4-2012, filed 9/19/12, effective 1/1/13.

437-004-9720 **Thiram**

- (1) Scope and application.
 - (a) These rules apply where worker exposure to thiram may occur during manufacture, storage, packaging, tree application, treated seedling handling, or use of thiram or thiram treated seedlings.
 - (b) These rules apply to the transportation of thiram or thiram treated trees except to the extent that the U. S. Department of Transportation may regulate the hazards covered by these rules.
- (2) Definitions.

Clean – The absence of dirt or materials that may be harmful to a worker’s health.

Large seedlings – Seedlings long enough or wide enough that during normal planting avoiding mouth of face contact with the thiram treated plant is difficult.

(3) General requirements.

(a) Permissible exposure limits.

- (A) Do not expose workers to thiram at atmospheric concentrations more than 0.15 mg/m³ over any 8-hour period; and
- (B) Do not expose workers to thiram at atmospheric concentrations more than 0.30 mg/m³ averaged over any period not longer than 15 minutes.
- (C) Workers must not work more than 5 days in any 7-day period with or around thiram or thiram treated seedlings.
- (D) Paragraph (3)(a)(C) above is not applicable if there is a specific thiram control program, beyond these rules and approved by the Administrator.

(b) Washing and worker hygiene.

- (A) Workers must wash their hands before eating or smoking and when done working.
- (B) At fixed work sites or planting units, provide warm (at least 85 degrees F, 29.4 degrees C) wash water and single use hand wiping materials for washing.
- (C) Where warm water is not available within, or the means to access within, a 15 minutes travel time, provide clean water, soap and single-use towels.
- (D) Advise every planter or nursery worker to bathe or shower daily.
- (E) Wash or vacuum and wipe down the inside of crummies or other worker carrying vehicles at least weekly during thiram use.

(c) Personal protective measures.

- (A) Workers must wear clothing that reduces skin contact with thiram on the legs, arms and torso.
- (B) For those workers with thiram skin irritations, protect exposed areas with a suitable barrier cream.
- (C) Workers may wear only impervious gloves.
- (D) Workers' hands must be clean of thiram before placing them into gloves.

- (E) Provide nursery applicators with approved respirators, disposable coveralls or rubber slickers or other impervious clothing, rubberized boots, head covers and rubberized gloves. They must use the respirators according to 4/I, OAR 437-004-1040, Respiratory Protection.
 - (F) Other than applicators, nursery workers who may suffer thiram exposure must have and use disposable coveralls or rubber slickers or other impervious clothing, impervious footwear and gloves, and head covers unless they use showers that comply with 4/J, OAR 437-004-1105, Sanitation.
 - (G) Provide eye protection that complies with 4/I, OAR 437-004-1035. Workers exposed to thiram such as during spraying, plug bundling, belt line grading and plugging or other operations must wear this eye protection.
- (d) Respiratory protection.
- (A) When worker exposure is more than the Permissible Exposure Limit (PEL), provide them with applicable, certified respiratory protection approved by NIOSH.
 - (B) Use and maintain respirators according to 4/I, OAR 437-004-1041, Respiratory Protection.
 - (C) Workers must wear respirators when planting large seedlings to avoid mouth and face contact with the thiram treated plant unless they use equally effective measures or planting practices.
- (e) Food handling.
- (A) Do not store or consume food, snacks, beverages, smoking materials, or any similar items in the packing area of the nursery.
 - (B) Crummies or other worker carrying vehicles must have a clean area for carrying lunches.
 - (C) The clean area of the vehicle must be above from the floor and not used to carry other than food or other consumable items.
 - (D) Do not carry lunches, food or other consumable items in tree planting bags.
 - (E) Minimize or eliminate worker exposure to thiram spray, including downwind driftings.

- (F) Workers must stand upwind when burning bags that contained thiram or thiram treated seedlings.
- (f) Thiram use and handling.
- (A) Nurseries must develop a quality control program approved by the Administrator to ensure that they apply only the minimum amount of thiram necessary to achieve the desired anti-browsing results to the tree seedlings.
- (B) Thiram treated seedlings must set between the time of spraying and packing.
- (C) Keep seedlings moist during packing and when possible during planting.
- (D) Vacuum or wash floors daily where thiram is used, do not sweep them.
- (E) Remove silica chips covering seedling plugs at the nursery.
- (g) Labeling.
- (A) Rules enforced by the Oregon Department of Agriculture, or the U.S. Environmental Protection Agency (EPA), about the labeling of thiram treated seedlings, apply.
- (B) If the Oregon Department of Agriculture, or EPA, has no thiram labeling rules, each container, bundle or wrapping of thiram treated seedlings must have a clearly legible and visible tag or label, of waterproof material and printing, on which is the following in English and Spanish:

CAUTION

These seedlings are treated with an animal repellent containing Thiram (tetra- methyl thiuram disulfide) that may flake off during handling. Consumption of alcoholic beverages or use of alcohol-base creams or lotions during a time span from 12 hours before to 7 days after exposure to Thiram may result in nausea, headache, vomiting, fatigue, or flushness. Exposure to Thiram may also cause irritation of the eyes, nose, throat, or skin.

Thiram may interfere with or render ineffective medications taken by epileptics or heart patients with blood-clotting difficulties. Animal studies at very high concentrations (more than 250 mg/kg) suggest that Thiram may cause birth defects.

SAFETY PRECAUTIONS

1. Keep treated seedlings moist.
2. Wear clothing to reduce skin contact with Thiram to the legs, arms and torso.
3. A fiber or cloth face mask (respirator) may be worn at the planter's discretion, except that when planting large seedlings, you must wear a respirator to avoid mouth and face contact with thiram treated plants, unless you use equally effective measures
4. Wash exposed skin areas thoroughly after handling treated seedlings and before smoking, drinking, eating or going to the bathroom.
5. If Thiram flakes contact eyes, immediately flush eyes freely with water.
6. Bathe daily and change work clothes at least every other day.

PRECAUCION

Estas plantas han sido tratadas con un replente contra animales que tiene la substancia Thiram (tetramethyl thiuram disulfide) que puede desaparecer en manoseo. La consuncion de bebidas alcoholicas o el uso de cremas o lociones con base de alcohol dentro de 12 horas antes de ser expuesto o hasta 7 dias despues de ser expuesto a Thiram puede resultar en sintomas de nausea, dolor de cabeza, vomito, faiga o rubor. Contacto con Thiram puede causar irritacion de los ojos, nariz, garganta o piel.

Thiram puede interferir o desvalidar en completa las medicinas de los epilepticos o personas con condiciones de la corazon con dificultades de coagulacion de la sangre. Estudios con animals en concentraciones muy altas (mas que 250 mg/ kg) indican que Thiram puede causar deformaciones fetales. Sin que cuando se sembra plantas de semillas grandes macaras estaran requerido a evitar contacto con la boca y la cara con plantas tratado con Thiram excepto cuando otros metodos igualmente efecaz estarah usados.

MEDIAS DE PRECAUCION

1. Guardar mojados las platas siempre.

2. El trabajador necesita usar ropa para reducir el contacto de Thiram con las piernas, brazos, y el torso.
 3. Una máscara de fibre o garra (mascara) se puede usar a la discrecion del plantador.
 4. Lavese bien los parten expuestos cuando trate los semillos antes de fumar, tomar, comer e ir al bano.
 5. Se acaso el Thiram cae en sus ojos, imediatamente lavese los ojos libremente con agua.
 6. Banese todos los dias y cambiese de ropa de trabajo por lo menos cada otro dia.
- (C) Other containers or thiram handling areas must have signs and labels that comply with 4/J, OAR 437-004-1150 and 1180.
- (h) Training.
- (A) Where exposures to thiram may occur, train each worker about the hazards of thiram and precautions for its safe use and handling.
 - (B) The training must be approved by the Administrator.
 - (C) The training must include:
 - (i) The health hazard(s) of chronic exposure to thiram including the potential for birth defects, alcohol intolerance, and drug interaction.
 - (ii) The specific nature of work that could result in exposure to thiram and the necessary protective steps;
 - (iii) The purpose for, proper use, and limitations of protective devices including respirators and clothing;
 - (iv) The acute toxicity and skin irritation effects of thiram, and the necessary protective steps;
 - (v) The need for and requirements of excellent personal hygiene;
 - (vi) A review of the thiram rules at the worker's first training and indoctrination, and annually thereafter.
 - (D) Give each worker a copy of these thiram rules.

Statutory Authority: ORS 654.025(2) and 656.726(4).
Statutes Implemented: ORS 654.001 through 654.295.
History: OR-OSHA Admin. Order 4-1998, filed 8/28/98, effective 10/1/98.
OR-OSHA Admin. Order 9-2006, filed 9/22/06, effective 9/22/06.

437-004-9740 Ethylene Oxide

Definition:

Ethylene oxide or EtO means the organic compound with chemical formula C₂H₄O, and CAS 75-21-8.

- (1) The employer is responsible to determine, before work begins, if any task or activity assigned to workers will result in a potential exposure to ethylene oxide.
- (2) Work that exposes employees to ethylene oxide must comply with Division 2/Z, 1910.1047, Ethylene Oxide.

Statutory Authority: ORS 654.025(2) and 656.726(4).
Statutes Implemented: ORS 654.001 through 654.295.
History: OR-OSHA Admin. Order 4-1998, filed 8/28/98, effective 10/1/98.
OR-OSHA Admin. Order 4-2012, filed 9/19/12, effective 1/1/13.

437-004-9760 Formaldehyde

Definition:

Formaldehyde means the substance with chemical formula HCHO and CAS 50-00-0.

- (1) The employer is responsible to determine, before work begins, if any task or activity assigned to workers will result in a potential exposure to formaldehyde.
- (2) Work that exposes employees to formaldehyde must comply with Division 2/Z, 1910.1048, Formaldehyde.

Statutory Authority: ORS 654.025(2) and 656.726(4).
Statutes Implemented: ORS 654.001 through 654.295.
History: OR-OSHA Admin. Order 4-1998, filed 8/28/98, effective 10/1/98.
OR-OSHA Admin. Order 4-2012, filed 9/19/12, effective 1/1/13.

437-004-9780 Methylenedianiline

Definition:

Methylenedianiline or "MDA" means the chemical substance 4,4'-Diaminodiphenylmethane (CAS 101-77-9), in the form of a vapor, liquid, or solid, including the salts of MDA.

- (1) The employer is responsible to determine, before work begins, if any task or activity assigned to workers will result in potential exposure to Methylenedianiline.

- (2) Work that exposes employees to MDA must comply with Division 2/Z, 1910.1050, Methylenedianiline, except that construction activities exposing employees to MDA must comply with Division 3/D, 1926.60, Methylenedianiline.

Note: Construction activities are building, altering and repairing and include painting.

Statutory Authority: ORS 654.025(2) and 656.726(4).
Statutes Implemented: ORS 654.001 through 654.295.
History: OR-OSHA Admin. Order 4-1998, filed 8/28/98, effective 10/1/98.
OR-OSHA Admin. Order 4-2012, filed 9/19/12, effective 1/1/13.

437-004-9791 Protection from Wildfire Smoke

Note: Oregon OSHA recognizes that occupational wildfire smoke exposures can occur in particularly dynamic situations. Employers must address such hazards based on the information available to them through the exercise of reasonable diligence.

- (1) Scope and application. This standard applies to public and private sector employers whose employees are or will be exposed to wildfire smoke where the ambient air concentration for fine particulate matter (PM_{2.5}) is at or above 35.5 µg/m³ (Air Quality Index value of 101 for PM_{2.5})
- (a) The following workplaces and operations are exempt from this standard:
- (A) Enclosed buildings and structures in which the air is filtered by a mechanical ventilation system and the employer ensures that windows, doors, bays, and other exterior openings are kept closed, except when it is necessary to briefly open doors to enter or exit;
 - (B) Enclosed vehicles in which the air is filtered by a properly maintained cabin air filter system, and when the windows, doors, and other exterior openings are kept closed, except when it is necessary to briefly open doors to enter or exit. Buses, light rails, and other enclosed vehicles used for public transit systems where doors are frequently opened to board and deboard passengers are not included under this exemption;
 - (C) When the employer predetermines that operations will be suspended to prevent employee exposure to wildfire smoke at an ambient air concentration for PM_{2.5} of 35.5 µg/m³ (AQI 101) or higher; and
 - (D) Employees working at home.
- (b) The following workplaces and operations are only subject to subsections (4)(a) through (4)(g) "information and training," and subsection (7)(b) "voluntary use of filtering facepiece respirators" under this standard:

- (A) Wildland firefighting and associated support activities such as fire camp services and fire management;
- (B) Emergency operations that are directly involved in the protection of life or property, public safety power shutoffs, or restoration of essential services, such as evacuation, rescue, medical, structural firefighting, law enforcement, utilities, and communications; and
- (C) Work activities involving only intermittent employee exposure of less than 15 minutes in an hour to an ambient air concentration for PM_{2.5} at or above 35.5 µg/m³ (AQI 101) for a total exposure of less than one hour in a single 24-hour period.

(2) Definitions.

- (a) **Air Quality Index** – The Air Quality Index (AQI) was developed by the U.S. Environmental Protection Agency (EPA) as an indicator of overall air quality and is based on the five criteria pollutants regulated under the Clean Air Act: ground-level ozone, particulate matter, carbon monoxide, sulfur dioxide, and nitrogen dioxide.
- (b) **NIOSH** – The National Institute for Occupational Safety and Health of the United States Centers for Disease Control and Prevention. NIOSH tests and approves respirators for use in the workplace.
- (c) **PM_{2.5}** – Solid particles and liquid droplets suspended in air, known as fine particulate matter, with an aerodynamic diameter of 2.5 micrometers or smaller and measured in micrograms per cubic meter (µg/m³).
- (d) **Sensitive groups** – Individuals with pre-existing health conditions and those who are sensitive to air pollution who are among those likely to experience health problems from exposure to wildfire smoke. Examples of sensitive groups include: people with lung disease such as asthma or chronic obstructive pulmonary disease (COPD), including bronchitis and emphysema, and those who smoke; people with respiratory infections, such as pneumonia, acute bronchitis, bronchiolitis, cold, flu, or those recovering from severe respiratory illness; people with existing heart or circulatory problems, such as irregular heartbeat, congestive heart failure, coronary artery disease, angina, and those who have had a heart attack or stroke; children under 18 years old, and adults over age 65; pregnant women; people with diabetes; and people with other medical or health conditions which can be exacerbated by exposure to wildfire smoke as determined by a physician or other licensed healthcare provider.

- (e) **Wildfire smoke** – Emissions from unplanned fires in wildlands, which may include adjacent developed and cultivated areas to which the fire spreads or from where it originates.
 - (f) **Wildlands** – Uncultivated and sparsely populated geographical areas covered primarily by grass, brush, trees, slash, or a combination thereof.
- (3) Exposure assessment. Monitor employee exposure to wildfire smoke when employees are, or are likely to be, exposed to an ambient air concentration for PM_{2.5} at or above 35.5 µg/m³ (AQI 101). This monitoring must be performed at the start of each shift, and as needed, to comply with the applicable requirements of sections (6) and (7) of this standard, by using one or more of the following methods:
- (a) Check the current average and forecasted AQI value for PM_{2.5} from the Oregon Department of Environmental Quality, U.S. EPA AirNow or Interagency Wildland Fire Air Quality Response Program websites, or equivalent source;
 - (b) Check notifications of air quality advisories due to wildfire smoke issued by the Oregon Department of Environmental Quality or local government health agencies;
 - (c) Directly measure workplace ambient air concentration for PM_{2.5} in accordance with the testing device manufacturer's user instructions; or
 - (d) If the employer determines and can demonstrate that none of the methods in subsections (3)(a) through (3)(c) of this standard are available for their work location, the employer can then use the 5-3-1 Visibility Index provided in Appendix B, Table 1 of this standard to estimate the current air concentration for PM_{2.5}, and equivalent AQI value, during daylight hours.
- (4) Information and training. Provide wildfire smoke training to all employees, including new employees, supervisory and non-supervisory employees, who may be exposed to an ambient air concentration for PM_{2.5} at or above 35.5 µg/m³ (AQI 101). The training must be provided annually before employees are exposed in a language and vocabulary readily understood, and in a manner that facilitates employee feedback. The training must include at least the following information:
- (a) The symptoms of wildfire smoke exposure:
 - (A) Eyes: burning sensations, redness, and tearing of the eyes caused by irritation and inflammation of the eyes that can temporarily impair one's vision;

- (B) Respiratory system: runny nose, sore throat, cough, difficulty breathing, sinus irritation, wheezing, shortness of breath; and
 - (C) Fatigue, headache, irregular heartbeat, chest pain.
- (b) The potential acute and chronic health effects from wildfire smoke exposure, including increased health risks to “sensitive groups” as defined in subsection (2)(d) of this standard, and how chronic exposures can increase the risk of cardiovascular disease and can exacerbate an individual’s asthma;
 - (c) Each employee’s right to report health issues related to wildfire smoke exposure and obtain medical treatment for such workplace exposures without fear of retaliation;
 - (d) How employees can obtain the current average and forecasted ambient air concentration for PM_{2.5} and equivalent AQI value for their work location;
 - (e) The importance, limitations, and benefits of using a filtering facepiece respirator, that is provided by the employer at no cost to the employee to reduce exposure to wildfire smoke, and how to use and maintain their filtering facepiece respirator;
 - (f) The employer's methods to protect employees from wildfire smoke as required by section (7) of this standard, including how filtering facepiece respirators are required to be made readily accessible to employees for voluntary use when workplace ambient air concentration for PM_{2.5} is at or above 35.5 µg/m³ (AQI 101), and how employees can obtain such respirators before exposure and replace them when needed;
 - (g) Review of any job tasks performed by employees that the use of a filtering facepiece respirator would expose the wearer to a hazard associated with a substantially more serious injury or illness than the potential acute health effects of wildfire smoke exposure, and must not be used when performing such tasks;
 - (h) The procedures supervisors must follow when an employee reports or exhibits health symptoms that necessitate immediate medical attention such as, but not limited to, asthma attacks, difficulty breathing, and chest pain;
 - (i) How to operate and interpret exposure results based on any PM_{2.5} monitoring device used by the employer in compliance with this standard; and

- (j) An explanation of the employer's two-way communication system for wildfire smoke exposure control information as required by section (6) of this standard.
- (5) Training documentation. Verify supervisor and employee training required under section (4) of this standard by preparing a written or electronic record that includes at least the name or identification number of each employee trained, the date(s) of the training(s), and the name of the person(s) who conducted the training. The most recent annual training record for each employee must be maintained for one year.
- (6) Employer two-way communication. Before employees are exposed to an ambient air concentration of PM_{2.5} at or above 35.5 µg/m³ (AQI 101), develop and implement a two-way system to communicate wildfire smoke information between supervisors and employees. At a minimum, this communication system must include:
- (a) A means to notify exposed employees of any changes in the air quality at their work location that would necessitate an increase or decrease in the level of exposure controls required in section (7) of this standard; and
 - (b) A means to enable and encourage employees to inform their employer or supervisor of at least the following:
 - (A) Any changes in the air quality at their work location that could necessitate an increase or decrease in the level of exposure controls required by section (7) of this standard;
 - (B) Any availability issues of appropriate exposure control measures required by section (7) of this standard; and
 - (C) Any health symptoms that may be the result of wildfire smoke exposure and that could necessitate medical attention.
- Note:** The employer's emergency medical plan provisions to comply with Division 4, Subdivision K, OAR 437-004-1305(4), must address the types medical situations that employees could encounter, including those conditions relating to wildfire smoke exposure.
- (7) Exposure controls.
- (a) Engineering and administrative controls. Implement engineering and administrative controls to reduce employee PM_{2.5} exposure to less than 35.5 µg/m³ (AQI 101), unless the employer can demonstrate that such controls are functionally impossible, or would prevent the completion of work.

- (A) Appropriate engineering controls may include, but are not limited to, temporarily relocating outdoor workers to available indoor areas or vehicles where the air is adequately filtered, or using portable air purifiers equipped with HEPA filters (or similar high-efficiency air filters) that are sufficient in number and performance for the size of the enclosed area where used.
 - (B) Appropriate administrative controls may include, but are not limited to, temporarily relocating outdoor work operations to another outdoor location with better air quality when work permits, and changing employee work schedules to when better air quality is forecasted.
- (b) Voluntary use of filtering facepiece respirators. Whenever employee exposure to PM_{2.5} is at or above 35.5 µg/m³ (AQI 101), even after the implementation of engineering and administrative controls, ensure that appropriate NIOSH-approved filtering facepiece respirators are provided to employees for voluntary use, strictly for protection against wildfire smoke, when such use would not expose the wearer to a hazard associated with a substantially more serious injury or illness than the potential acute health effects of wildfire smoke exposure. Ensure that such respirators are:
- (A) Provided and replaced as needed at no cost to employees by either:
 - (i) Distributing filtering facepiece respirators directly to each exposed employee; or
 - (ii) Maintaining a sufficient supply of filtering facepiece respirators that is readily accessible and known to any exposed employee at each work location. This respirator supply must be in a location that does not restrict or hinder employee access to respirators or discourage the replacement of a respirator when needed.
 - (B) Stored and maintained so that they do not present a health hazard to the user.

Note: Voluntary use of filtering facepiece respirators under subsection (7)(b) in this standard is not subject to the requirements under the Respiratory Protection Standard – OAR 437-004-1041.

Note: Employer supplies of NIOSH-approved filtering facepiece respirators for voluntary use should include an adequate size selection for exposed employees.

- (c) Required use of filtering facepiece respirators in accordance with a Wildfire Smoke Respiratory Protection Program. Whenever employee exposure to PM_{2.5} is at or above 200.9 µg/m³ (AQI 251), even after the implementation of engineering and administrative controls, ensure that employees wear appropriate NIOSH-approved filtering facepiece respirators when such use would not expose the wearer to a hazard associated with a substantially more serious injury or illness than the potential acute health effects of wildfire smoke exposure. When such filtering facepiece respirators are provided and used strictly for protection against wildfire smoke, the employer may implement and follow the Wildfire Smoke Respiratory Protection Program as described in Appendix A of this standard in lieu of conducting medical evaluations and fit testing, which are otherwise required under the Respiratory Protection Standard – OAR 437-004-1041.
- (d) Required use of respirators in accordance with the Respiratory Protection Standard – OAR 437-004-1041. Whenever employee exposure to PM_{2.5} is at or above 500.4 µg/m³ (AQI 501), even after the implementation of engineering and administrative controls, ensure that employees wear appropriate NIOSH-approved respirators that protects wearers from PM_{2.5} when such use would not expose the wearer to a hazard associated with a substantially more serious injury or illness than the potential acute health effects of wildfire smoke exposure. For respirators used exclusively to protect employees from wildfire smoke concentrations of PM_{2.5} at or above 500.4 µg/m³ (AQI 501), develop and implement a complete Respiratory Protection Program in accordance with OAR 437-004-1041, Respiratory Protection.

Note: The requirements of subsections (7)(c) and (7)(d) do not apply to occupants of employer-provided housing while they are inside the housing.

Note: Elastomeric respirators are distinct from filtering facepiece respirators. If elastomeric respirators are used to reduce employee exposure to wildfire smoke at any PM_{2.5} concentration, employers must comply with all applicable requirements under of the Respiratory Protection Standard – OAR 437-004-1041.

Statutory/Other Authority: ORS 654.025(2), 654.035 & 656.726(4)
Statutes Implemented: ORS 654.001 through 654.295
History: OSHA 4-202, filed 05/10/2022, effective 07/01/2022

Appendix A to 437-004-9791: Mandatory Workplace Guidance for the Use of Filtering Facepiece Respirators to Address Wildfire Smoke

This appendix applies only to employers covered by this standard that require NIOSH-approved filtering facepiece respirators, including N95, P95, R95, N99, P99, N100 and P100, to be used by their employees strictly for wildfire smoke exposures when the work location ambient air concentrations of PM_{2.5} is at or above 200.9 µg/m³ (AQI 251) and below 500.4 µg/m³ (AQI 501).

Note: Employer supplies of NIOSH-approved filtering facepiece respirators for required use under this standard should include an adequate size selection for exposed employees.

Filtering facepiece respirators are disposable, negative-pressure, air purifying respirators where an integral part of the facepiece or the entire facepiece is made of air contaminant filtering material. This appendix does not apply to other types of respirators, including but not limited to elastomeric tight-fitting respirators, nor does it apply to situations where workers use filtering facepiece respirators for protection against air contaminants other than PM_{2.5} from wildfire smoke.

Employers whose workers are required to wear filtering facepiece respirators to protect against wildfire smoke exposures when workplace ambient air concentrations of PM_{2.5} is at or above 200.9 µg/m³ (AQI 251) must either develop and implement a respiratory protection program in accordance with the Respiratory Protection Standard (OAR 437-004-1041), or a Wildfire Smoke Respiratory Protection Program in accordance with the following requirements when workplace ambient air concentration of PM_{2.5} is under 500.4 µg/m³ (AQI 501):

- (A) Employee training. Employers must ensure that employees wearing filtering facepiece respirators are trained in the proper use of the respirators, including putting them on and removing them, any limitations on their use, how to care for the respirator, and the ability to demonstrate a seal check as described in section (B) of this appendix.
- (B) Filtering facepiece respirator user seal check. Each employee who uses a filtering facepiece respirator must perform a user seal check to ensure a sufficient face fit to maximize effectiveness each time the respirator is put on. Either the positive or negative pressure checks listed in this appendix, or the respirator manufacturer's recommended user seal check method must be used.

1. Instructions for positive pressure user seal check. Once you have properly donned the respirator, place your hands over the facepiece, covering as much surface area as possible. Exhale gently into the facepiece. The face fit is considered sufficient if a slight positive pressure is being built up inside the facepiece without feeling air passing between your face and the facepiece. If the particulate respirator has an exhalation valve, then performing a positive pressure check may not be possible. In such cases, a negative pressure check must be performed.
 2. Instructions for negative pressure user seal check. Negative pressure seal checks are typically conducted on particulate respirators that have exhalation valves. Once you have properly donned the respirator, cover the filter surface with your hands as much as possible and then inhale gently. The face fit is considered sufficient if the facepiece slightly collapses towards your face without feeling air passing between your face and the facepiece.
 3. Correcting problems discovered during the seal check. In the case of either type of seal check (positive or negative), if air leaks around the nose, use both hands to readjust the nosepiece by placing your fingertips at the top of the metal nose clip. Slide your fingertips down both sides of the metal strip to more efficiently mold the nose area to the shape of your nose. Readjust the straps along the sides of your head until a proper seal is achieved.
- (C) Filtering facepiece respirator storage and replacement. Store, maintain, and replace so that they do not present a health hazard to the user.

Appendix B to 437-004-9791: Information for Wildfire Smoke Protection

Table 1: Air Quality Index (AQI) Values and Equivalent Concentrations for PM_{2.5}, and 5-3-1 Visibility Index Values

AQI Values	PM _{2.5} Concentration in µg/m ³	Visibility Index Values (How far you can see)
0 - 50	0.0 - 12.0	over 15 miles
51 - 100	12.1 - 35.4	5 - 15 miles
101 - 150	35.5 - 55.4	3 - 5 miles
151 - 200	55.5 - 150.4	1 - 3 miles
201 - 300	150.5 - 250.4	1 mile
301 and higher	250.5 and higher	less than 1 mile

Note: The AQI, as used in this standard, is a recognized proxy to identify worker exposure to PM_{2.5} for which traditional occupational exposure limits have not been established. The EPA AQI risk category labels were specifically developed to advise the public of the community health risk levels associated with air quality conditions in a general population setting. The AQI calculation allows for a measurement that is easily accessible to both employers and employees.

Note: When estimating the current AQI value by using the 5-3-1 Visibility Index, determine the limit of your visual range by looking for distant targets or familiar landmarks such as mountains, mesas, hills, or buildings at known distances (miles). The visual range is that point at which these targets are no longer visible. Ideally, the viewing of any distance target should be made with the sun behind you. Looking into the sun or at an angle increases the ability of sunlight to reflect off of the smoke, and thus making the visibility estimate less reliable.

Table 2: Protection from Wildfire Smoke Standard Requirements by AQI Value

AQI Value	General Requirements
101 - 250	<ol style="list-style-type: none"> 1. Assess and monitor air quality at each work location where employees are exposed; 2. Provide and document employees training; 3. Implement two-way communication system; 4. Implement engineering and administrative controls; and 5. Provide NIOSH-approved filtering facepiece respirators for voluntary use.
251 - 500	<ol style="list-style-type: none"> 1. 1 through 4 for AQI 101 - 250 above; and 2. Provide NIOSH-approved filtering facepiece respirators for mandatory use by implementing a Wildfire Smoke Respiratory Protection Program in accordance with Appendix A.
501 and above	<ol style="list-style-type: none"> 1. 1 through 4 for AQI 101 - 250 above; and 2. Provide NIOSH-approved respirators for mandatory use by implementing a Respiratory Protection Program in accordance with OAR 437-004-1041.
See rules for complete requirements.	

437-004-9800 Hazard Communication Standard for Agricultural Employers

Notes: The Division 4, Hazard Communication Standard for Agricultural Employers (OAR 437-004-9800), focuses on those parts of the General Industry Hazard Communication Standard (Division 2/Z, 1910.1200) that describe the employer's responsibility to establish a workplace program and to communicate information to workers about the hazards of the chemicals used in their workplace.

The Division 4 standard does not include the parts of the Division 2, Hazard Communication Standard that apply only to producers, distributors, and importers of chemicals because these are not typical activities for agricultural employers. As stated in 437-004-9800(2) Scope and application, any agricultural employer who produces, imports, or distributes chemical products must follow the more detailed rules that apply to those general industry activities in Division 2/Z, 1910.1200.

The requirements of this Division 4, Hazard Communication Standard, are intended to be consistent with the Hazard Communication Standard for general industry as aligned with the provisions of the United Nations Globally Harmonized System of Classification and Labeling of Chemicals (GHS.)

- (1) **Purpose.** The purpose of this Division 4 Hazard Communication Standard (HCS) is to ensure that agricultural employers provide appropriate information to their employees about the hazardous chemicals to which they can be exposed at their workplaces. The responsibility of chemical manufacturers, importers, and distributors to provide this information is described in Division 2/Z, 1910.1200. The HCS for agricultural employers describes how this information is to be provided: through a comprehensive hazard communication program, including container labels and other forms of warning, safety data sheets and employee training.
- (2) **Scope and application.**
 - (a) This standard applies to agricultural employers when a hazardous chemical is known to be present in the workplace in a way that employees may be exposed under normal conditions of use or in a foreseeable emergency.
 - (b) This standard also applies to agricultural employers engaged in crop- or product-related quality control- or quality assurance-type laboratory work.

Note: See Division 4/Z, 437-004-9860, Hazardous Chemicals in Laboratories, for rules that apply to other types of laboratory activities.
 - (c) Division 2/Z, 1910.1200, the Hazard Communication Standard for General Industry, including all mandatory appendices, applies to any agricultural employer who is a producer, importer, or distributor of hazardous chemicals, as those activities are defined in this standard.

- (d) The following types of hazardous substances are exempted from the requirements of this standard, under the stated conditions or circumstances:
- (A) Any hazardous waste defined by the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended (42 U.S.C. 6901 et seq.), when subject to regulations issued under that Act by the Environmental Protection Agency;
 - (B) Any hazardous substance as such term is defined by the Comprehensive Environmental Response, Compensation and Liability ACT (CERCLA) (42 U.S.C. 9601 et seq.), when the hazardous substance is the focus of remedial or removal action being conducted under CERCLA (such as a "Superfund" site) in accordance with Environmental Protection Agency regulations;
 - (C) Tobacco or tobacco products;
 - (D) Wood or wood products, including lumber if it will not be processed, where the manufacturer or importer has established that the only hazard posed to employees is the potential for combustibility;
Note: Wood and wood products that are treated with a hazardous chemical covered by this standard (such as chemically pressure-treated wood); and wood that will later be sawed, cut or sanded, generating dust, is covered by this standard.
 - (E) Articles as defined in OAR 437-004-9800(11);
 - (F) Food or alcoholic beverages sold, used, or prepared in a retail establishment (such as a grocery store, restaurant, or drinking place), and foods intended for personal consumption by employees while at work;
 - (G) Any drug, defined in the Federal Food, Drug, and Cosmetic Act (21 U.S.C. 301 et seq.), when it is in solid, final form for direct administration to the patient (e.g., tablets or pills); drugs packaged by the chemical manufacturer for sale to consumers in a retail establishment (e.g., over-the-counter drugs); and drugs intended for personal consumption by employees while at work (e.g., first aid supplies);
 - (H) Cosmetics which are packaged for sale to consumers or intended for personal consumption by employees while in the workplace;

- (I) Any consumer product or hazardous substance, defined in the Consumer Product Safety Act (15 U.S.C. 2051 et seq.) and Federal Hazardous Substances Act (15 U.S.C. 1261 et seq.) respectively, where the employer can show that it is used in the workplace for the purpose intended by the chemical manufacturer or importer of the product, and the use results in a duration and frequency of exposure not more than the range of exposures that could reasonably be experienced by consumers;
- (J) Nuisance particulates where the chemical manufacturer or importer has established that they do not pose any physical or health hazard covered under this standard;

Note: Nuisance particulate is synonymous with “particulate not otherwise regulated” (PNOR.) PNOR includes all inert or nuisance dusts, whether mineral, inorganic, or organic, that are not specifically listed in Division 4/Z, OAR 437-004-9000, Oregon Rules for Air Contaminants.

- (K) Ionizing and non-ionizing radiation; and,
- (L) Biological hazards.

Notes: In addition to these exempted hazardous substances, the general industry Hazard Communication Standard [at 1910.1200(b)(5)] lists additional types of hazardous chemicals whose manufacturers are not covered by the Hazard Communication labeling requirements, because the products are already regulated by other labeling regulations. (For example, labeling of consumer products is regulated by the Consumer Product Safety Commission; and labeling of pesticide products is regulated by the Environmental Protection Agency.)

Nonetheless, employers must ensure that hazardous chemicals are properly identified in their workplaces, as described in 437-004-9800(5).

- (3) Reserved.
- (4) Written hazard communication program.
 - (a) Employers must develop, implement, and maintain an effective written hazard communication program that is specific to their workplace. It must include the following:
 - (A) A list of all the hazardous chemicals in the workplace using a product identifier that allows cross-referencing to both the product label and a Safety Data Sheet. (Lists may be developed for individual work areas, but the program-required list must include all hazardous chemicals present in the workplace to which the written hazard communication program applies.)

- (B) A description of their procedures or methods for meeting the requirements of this Hazard Communication Standard for Agricultural Employers including paragraphs (5) Labels and other forms of warning, (6) Safety data sheets, and (7) Employee information and training.
 - (C) A description of the methods for informing their employees about the hazards of nonroutine tasks and the hazards associated with chemicals contained in any unlabeled pipes in their work areas.
- (b) At multi-employer workplaces, employers who use or store hazardous chemicals in a way that may expose other employer's workers must also ensure that their hazard communication program includes their methods for:
- (A) Making safety data sheets available to the workers of other employers;
 - (B) Informing other employer(s) of any precautionary measures needed for the other employer to protect their employees during normal operating conditions and foreseeable emergencies;
 - (C) Informing other employer(s) about the labeling system and other forms of warning in use. This includes how the employer will notify other employer(s) about areas where pesticides will be or are being applied and areas under a Restricted Entry Interval.
- (c) Upon request, the employer must make their written hazard communication program available to employees, the employee's designated representatives, and the Administrator.

Note: Where employees work at more than one workplace, the written hazard communication program may be kept at the primary workplace as long as the information is made available for routine reference during the employee's regular shift and is readily available in an emergency.

(5) Labels and other forms of warning.

Note: Chemical producers, importers, and distributors have responsibilities for labeling products that are shipped and for providing those labels to end-users.

- (a) Workplace labeling. The employer must ensure that the primary (shipped) labels are legible, in English, and prominently displayed on the container in the work area. Employers with employees who communicate in languages other than English may include information in the other languages, as long as it is also in English.

- (b) Except as provided in (5)(d), (5)(e), and (5)(f), the employer must ensure that each container of hazardous chemicals is labeled, tagged or marked with either:
 - (A) The same elements required on the shipped label:
 - (i) Product identifier,
 - (ii) Signal word,
 - (iii) Hazard statement(s),
 - (iv) Pictogram(s),
 - (v) Precautionary statement(s), and
 - (vi) Name, address, and telephone number of the chemical manufacturer, importer, or other responsible party; OR
 - (B) The product identifier (that allows cross-referencing with the product's safety data sheet), and
 - (i) Words, pictures, symbols, or a combination that provide at least general information about the hazards of the chemical;
 - (ii) This alternative in conjunction with the other information readily available to employees under the employer's hazard communication program, must provide employees with specific information about the hazards of the chemical and appropriate protective measures.
 - (c) If an employer becomes aware of new information from an up-dated, product label about the hazards of a chemical, or ways to protect against the hazards, affected employees must be trained on this new information before the chemical is used again in the workplace.
 - (d) The employer may use signs, placards, or other written materials instead of labels on individual, stationary process containers. This alternative method must identify the specific container, meet the requirements in (5)(a) and (b) and be readily accessible to the employees in their work area.
 - (e) Labels are not required on portable, secondary containers of hazardous chemicals that are for immediate use.
 - (f) Pesticide application equipment (such as spray tanks and backpack-type sprayers) do not require labeling if the pesticide handlers have access to the pesticide product label during handling activities.
- (6) Safety data sheets.

- (a) Employers must have a safety data sheet (SDS) for each hazardous chemical that is used or present in the workplace in a way that may expose employees under normal conditions of use or in a foreseeable emergency. This includes residual pesticides encountered by workers doing field hand-labor operations.
- (b) SDSs must be readily accessible to all employees on all shifts. Where employees work at more than one workplace, the SDSs may be kept at the primary workplace.
- (c) SDSs may be kept electronically if they are readily accessible to employees during their work shifts and available at all times, especially during an emergency such as a power failure.
- (d) SDSs must be in English. Employers with employees who communicate in other languages may maintain copies of SDSs in other languages as well.
- (e) Where complex mixtures of chemical products have similar hazards and contents (for example, the chemical ingredients are the same, but the specific composition varies from mixture to mixture), the employer may use one SDS to apply to all of these essentially similar mixtures. The product identifier of each mixture, as identified on the product label, must be cross-referenced to the SDS used.
- (f) If an employer becomes aware of new information from an up-dated SDS about the hazards of a chemical or about ways to protect employees from the hazards, affected employees must be trained on this new information before the chemical is used again in the workplace.
- (g) Safety data sheets as employee exposure records. In accordance with Division 4/A, OAR 437-004-0005, Access to Employee Medical and Exposure Records, employers must retain either the SDS or some record of the identity of the substance or agent, where it was used, and when it was used; and, make this record available upon request to employees, employee's designated representatives, and to the Administrator.

Note: OAR 437-004-0005 refers employers to Division 2/Z 1910.1020. For more information about this requirement, see 1910.1020(d)(1)(ii)(B).

(7) Employee information and training.

- (a) Give employees effective information and training on hazardous chemicals in their work area at the time of their initial assignment, and when a new physical or health hazard is introduced into their work area. Information and training may cover categories of hazards (examples include flammable liquids and pesticides) or specific chemicals.

- (A) Chemical-specific information must always be available through labels and safety data sheets. Agricultural employees who mix, load, or apply pesticides; or otherwise handle hazardous chemicals must receive the full information and training required by this standard.
 - (B) If employees only handle chemicals in sealed, unopened containers, give them training to the extent necessary to protect them in the event of a spill or leak of a hazardous chemical from a sealed container.
- (b) Inform employees of:
- (A) The requirements of this training paragraph;
 - (B) Any operations in their work area where hazardous chemicals are present; and,
 - (C) The location and availability of the written hazard communication program, including the required list(s) of hazardous chemicals, and safety data sheets.
- (c) Employee training must include at least:
- (A) Methods and observations to detect the presence or release of a hazardous chemical in the work area (such as monitoring done by the employer, alarm systems, or characteristic odors;)
 - (B) The physical and health hazards of the chemicals in the work area;
 - (C) The measures employees can take to protect themselves from these hazards, including specific procedures the employer has implemented to protect employees from exposure to hazardous chemicals, such as appropriate work practices, emergency procedures, and personal protective equipment; and,
 - (D) The details of the hazard communication program as it relates to the employee's work activities, including an explanation of any alternative labeling or warning systems, possible exposures from non-routine tasks, and how employees can get and use the right hazard information.
- (d) Agricultural employers must give all of their employees a copy of, or provide them with training that covers the information in the Oregon OSHA publication #1951 "Safe Practices When Working Around Hazardous Agricultural Chemicals."

- (e) For employees doing only field hand-labor operations where their only potential exposure is to residual pesticides, employers may meet the training and information requirements of this rule by:
 - (A) Giving each employee a copy of or providing training that covers the information in the Oregon OSHA publication #1951, "Safe Practices When Working Around Hazardous Agricultural Chemicals"; and
 - (B) Providing information about the location and availability of, and ensuring that employees have access to safety data sheets.
- (8) Trade secrets. There are special standards about the relationship of this standard to trade secrets. If those circumstances apply, follow Division 2/Z, 1910.1200(i) and its Appendix E.

Note: Division 2/Z 1910.1200(i) provides guidance for emergency medical personnel who need to obtain more detailed safety and health information about products with Trade Secret-protected ingredients. Appendix E to Division 2/Z, 1910.1200, Definition of Trade Secret, sets out the criteria to be used in evaluating trade secret claims.

- (9) Subpoenas, citations, penalties.
 - (a) The Oregon Occupational Safety and Health Division has the authority under ORS Chapter 654 to issue a subpoena or any protective orders.
 - (b) Agency actions under ORS Chapter 654 and this Hazard Communication Standard for Agricultural Employers are enforceable by the issuance of additional citations and penalties pursuant to ORS 654.071(4), ORS 654.086(1)(d), or ORS 654.086(3). The Oregon Occupational Safety and Health Division may refer the matter to the Circuit Court in the county in which the proceedings are pending for enforcement of the subpoena.
- (10) Phase-in dates for new rule requirements.
 - (a) By February 1, 2015, agricultural employers must train their employees about the new label elements (product identifier, signal word, hazard statements, pictograms, and precautionary statements); and, about the new, standardized, 16-section, safety data sheet (SDS) format. After this phase-in date has passed, this information must be included in the initial employee training in accordance with paragraph (7).

Note: Chemical producers have until June 1, 2015 to be in compliance with all the modified provisions of the Division 2/Z Hazard Communication Standard (1910.1200) including those concerning classification, labeling, and safety data sheets.
 - (b) By June 1, 2016, employers must, as necessary, based on any new hazards identified by chemical manufacturers on updated labels and SDSs:

- (A) Update their workplace hazard communication program, as required by paragraph (4); and
- (B) Update any alternative workplace labeling used under paragraph (5); and
- (C) Provide additional employee training in accordance with paragraph (7).

(11) Definitions.

Agricultural employer – See definition in Division 4/B, OAR 437-004-0100. Also, see “Employer” below.

Article - A manufactured item other than a fluid or particle:

- (A) Formed to a specific shape or design during manufacture; and
- (B) With end use function(s) dependent in whole or in part on its shape or design during end use; and
- (C) That under normal conditions of use does not release more than minute or trace amounts of a hazardous chemical and does not pose a physical hazard or health risk to employees.

Administrator - The Administrator of the Oregon Occupational Safety and Health Division, or their designee.

Biological hazard (or biohazard) – An infectious or other biological agent (bacteria, virus, fungus, etc.) presenting a risk of death, injury or illness to employees. (Biohazards are excluded from the requirements of the HCS.)

Chemical - Any element, chemical compound or mixture of elements or compounds. Chemicals may be in solid, liquid, or gaseous form.

Chemical name - The scientific designation of a chemical according to the nomenclature system developed by the International Union of Pure and Applied Chemistry (IUPAC) or the Chemical Abstracts Service (CAS) rules of nomenclature, or a name that clearly identifies the chemical for the purpose of conducting a hazard classification.

Classification – The process of identifying the relevant data about the hazards of a chemical; reviewing that data to determine the hazards or effects associated with the chemical; and deciding whether the chemical meets the criteria and definitions in this standard. Classification for health and physical hazards includes the determination of the degree of hazard, where appropriate, by comparing the data with the criteria for the health and physical hazard categories.

Container – Any bag, barrel, bottle, box, can, cylinder, drum, reaction vessel, storage tank, or the like that contains a hazardous chemical. Pipes or piping systems, and engines, fuel tanks, or other operating systems in a vehicle, are not considered to be containers.

Crop- or product-related quality control- or quality assurance-type laboratory work - The sampling or testing of crops or agricultural products to discover defects, with the goal of improving or stabilizing production standards. This type of laboratory work at agricultural workplaces is covered by the requirements of the HCS.

Note: See Division 4/Z, 437-004-9860, Hazardous Chemicals in Laboratories, for rules that apply to other types of laboratory work.

Designated representative - Any individual or organization to whom an employee gives written authorization to exercise such employee's rights. A recognized or certified collective bargaining agent is automatically a designated representative without regard to written employee authorization.

Distributor – Any business, other than a chemical manufacturer or importer, that supplies hazardous chemicals to other distributors or to employers.

Employee – For the purpose of this rule, any worker who may be exposed to hazardous chemicals under normal conditions of use or in a foreseeable emergency. (Also, see definition of “Worker” in Division 4/B, OAR 437-004-0100.)

Employer - For the purposes of this rule, any person, corporation, association, or other legal entity, including a contractor or subcontractor, engaged in a business where employees may be exposed to chemicals. (Also, see definition of “Agricultural employer” in Division 4/B, OAR 437-004-0100.)

Exposure or exposed – An occurrence when an employee is subjected, in the course of employment, to a chemical that is a physical, health, or other listed hazard, including accidental or reasonably anticipated exposure. “Subjected” in terms of health hazards includes any route of entry into the body, including inhalation, ingestion, percutaneous, and skin contact or absorption.

Field hand-labor operations – Agricultural work done by hand or with hand tools, including the cultivation, weeding, planting, and harvesting of crops (including mushrooms) and the packing of produce into containers, whether done on the ground, on a moving machine, or in a temporary packing shed in the field.

Flammable liquids – See definition in Division 4/B, OAR 437-004-0100.

Foreseeable emergency – Any potential event that could result in an uncontrolled release of a hazardous chemical into the workplace. Examples include equipment failure, rupture of containers, or failure of control equipment.

GHS – Globally Harmonized System – The United Nations’ system of classification and labeling of chemicals; an international approach to hazard communication that provides specific criteria for classification of chemical hazards and a standardized approach to label elements and safety data sheets. In 2012, OSHA revised the Hazard Communication Standard (29 CFR 1910.1200) to be consistent with the GHS.

Hand-labor operations See, Field hand-labor operations.

Handler (or Pesticide Handler) – includes any person, who is employed for any type of compensation by an agricultural establishment and who:

- (A) Mixes, loads, transfers, or applies pesticides;
- (B) Disposes of pesticides or pesticide containers;
- (C) Handles opened containers of pesticides;
- (D) Acts as a flagger for equipment or aircraft applying pesticides;
- (E) Cleans, adjusts, handles, or repairs the parts of mixing, loading, or application equipment that may contain pesticide residues;
- (F) Assists with the application of pesticides; or
- (G) Performs other activities included within the definition of Handler by the Environmental Protection Agency.

Note: For more information, see the pesticide Worker Protection Standard in Division 4/W, §170. The term “handler” does not include an employee who only handles sealed, unopened pesticide containers or empty pesticide containers.

Hazard category – The divisions within a hazard class that compare the degree or severity of the hazard. For example, the chemical hazard classifications “oral acute toxicity” and “flammable liquid” both include four hazard categories based on specific criteria. Categories within a hazard class should not be compared with the categories of different hazard classes.

Hazard class – Describes the nature and effect of a physical or health hazard, such as “flammable solid”, “carcinogen”, and “oral acute toxicity”. (Also, see “Classification”.)

Hazard not otherwise classified (HNOC) – An adverse physical or health effect identified through evaluation of scientific evidence during the manufacturer’s classification process that does not meet the specified criteria for the physical and health hazard classes addressed in Division 2/Z. 1910.1200. This does not extend coverage to adverse physical and health effects for which there is a hazard class addressed in 1910.1200, but the effect either falls below the cut-off value/concentration limit of the hazard class or is under a GHS hazard category that has not been adopted by OSHA. (One example is Category 5 oral acute toxicity.)

Hazard statement – A statement assigned to a hazard class and category that describes the nature of the hazards of a chemical, including, where appropriate, the degree of hazard.

Hazardous chemical – Any chemical that is classified as a physical hazard or a health hazard, a simple asphyxiant, combustible dust, pyrophoric gas, or hazard not otherwise classified.

Note: Division 2/Z, 1910.1200, Appendices A and B describe the criteria producers must use for determining whether or not a chemical is a health or physical hazard for purposes of this standard.

Hazard warning – The words, pictures, symbols, or combination on a label (or other appropriate form of warning) that communicate the specific physical and health hazards of the chemical(s) in the container. (See the definitions for “physical hazard” and “health hazard” to determine the hazards which must be covered by the manufacturer.)

HCS – The Hazard Communication Standard.

Health hazard – A chemical that is classified as posing one of the following hazardous effects: acute toxicity (any route of exposure); skin corrosion or irritation; serious eye damage or eye irritation; respiratory or skin sensitization; germ cell mutagenicity; carcinogenicity; reproductive toxicity; specific target organ toxicity (single or repeated exposure); or aspiration hazard.

Note: The criteria for determining whether a chemical is classified as a health hazard are detailed in Appendix A to 1910.1200 – Health Hazard Criteria.

Identity – See Product Identifier.

Immediate use – For the purpose of this rule, describes when a hazardous chemical will be used only within the work shift in which it is transferred, be under the control of and used only by the person who transfers it from a labeled container. Under these specific conditions, a portable, secondary container is exempted from the requirement for a workplace label. (See 437-004-9800(5)(e).)

Importer – The first business with employees within the Customs Territory of the United States that receives hazardous chemicals made in other countries for the purpose of supplying them to distributors or employers within the United States.

Label – An appropriate group of written, printed or graphic information elements concerning a hazardous chemical that is affixed to, printed on, or attached to the immediate container of a hazardous chemical, or to the outside packaging.

Label elements -- The specified product identifier, pictogram(s), hazard statement(s), signal word, and precautionary statement(s) that correlate to each chemical product's hazard class and category. Also, labels must identify and provide contact information for the product's manufacturer or other responsible party.

Manufacturer – See Producer.

Material Safety Data Sheet (MSDS) See, "Safety Data Sheet (SDS)".

Mixture – A combination or a solution composed of two or more substances in which they do not react.

Nonroutine task – A work activity that occurs infrequently or that varies from what is considered a regular, standard, or normal task.

Pesticide handler – See Handler.

Pesticide, residual – See Residual pesticide.

Physical hazard – A chemical that is classified as posing one of the following hazardous effects: explosive; flammable (gases, aerosols, liquids, or solids); oxidizer (liquid, solid or gas); self-reactive; pyrophoric (liquid or solid); self-heating; organic peroxide; corrosive to metal; gas under pressure; or in contact with water emits flammable gas.

Note: Physical Hazard Criteria is available in Appendix B to Division 2/Z, 1910.1200.

Pictogram – A composition that includes a red bordered square set on its point, enclosing a black symbol on a white background that is intended to convey specific information about the hazard of a chemical. Eight pictograms are designated under this standard for application to specific hazard categories.

Precautionary statement – A phrase that describes recommended measures that should be taken to prevent or minimize adverse effects resulting from exposure to, or improper storage or handling of a hazardous chemical.

Producer – For the purposes of this rule, an employer with a workplace where chemicals are manufactured, processed, extracted, generated, formulated, or repackaged for use or for distribution.

Note: If you mix or blend chemical products for use in your own workplace, and the resulting mixture has no new chemical ingredients or new hazardous characteristics, you can use the SDSs for the component ingredients and you are not considered to be a “producer.” (An example is mixing granular fertilizers together for application on your own property.) However, if the combined chemicals react to create a new ingredient or the combination creates a new hazard, you become a “producer” and you must follow the more detailed rule requirements in the Division 2/Z, 1910.1200, Hazard Communication Standard.

Product identifier – The unique name or number used on the label and in the SDS that provides a means by which the user can identify the hazardous chemical. (Examples include the chemical name, Chemical Abstracts Service (CAS) Registry Number, or other precise designation of the substance.) The product identifier must allow cross-referencing of the product’s label with the product’s SDS, and the list of hazardous chemicals in the employer’s written hazard communication program.

Pyrophoric gas – A chemical in a gaseous state that will ignite spontaneously in air at a temperature of 130 degrees F (54.4 degrees C) or below.

Residual pesticide – Pesticide residue that remains on crops, soil, equipment or other work surfaces, after a pesticide application is completed and any label-required restricted entry interval (REI) has expired. For the purpose of providing hazard information, a Safety Data Sheet must be available for any pesticide that has been used at the workplace within the previous 30 days.

Responsible party – As used on a Label or Safety Data Sheet, someone who can provide additional information on the hazardous chemical and appropriate emergency procedures, if necessary.

Restricted entry interval (REI) – The time period that immediately follows a pesticide application (as specified on the product label) during which only trained and protected employees may enter into the treated area. (The treated area is the physical location where a pesticide is being or has been applied.)

Safety data sheet (SDS) – Written or printed information about a hazardous chemical that is prepared (generally by the manufacturer) in accordance with paragraph (g) of and Appendix D to Division 2/Z, 1910.1200.

Signal word – A word used to alert the reader of the product label to a potential hazard. The signal words used in this section are “DANGER” and “WARNING” “DANGER” is used for the more severe hazards, while “WARNING” is used for the less severe. These words are chosen by the manufacturer based on the classification and categorization of the chemical’s hazards.

Note: The EPA has jurisdiction over manufacturers of pesticides and currently has its own system of signal words used on pesticide labels.

Simple asphyxiant – A substance or mixture that displaces oxygen in the ambient atmosphere, and can thus cause oxygen deprivation in those who are exposed, leading to unconsciousness and death.

Specific chemical identity – See “Product identifier”.

Substance – Chemical elements and their compounds in the natural state or obtained by any production process, including any additive necessary to preserve the stability of the product and any impurities deriving from the process used, but excluding any solvent which may be separated without affecting the stability of the substance or changing its composition.

Trade secret – A confidential formula, pattern, process, device, information or compilation of information that is used in an employer’s business, and that gives the employer an opportunity to obtain an advantage over competitors who do not know or use it.

Note: Division 2/Z 1910.1200(i) provides guidance for emergency medical personnel who need to obtain more detailed safety and health information about products with Trade Secret-protected ingredients. Appendix E to Division 2/Z, 1910.1200 – Definition of Trade Secret, sets out the criteria to be used in evaluating trade secret claims.

Use – To handle, apply, transfer, or generate as a by-product, any hazardous chemical covered by the requirements of this rule.

Work area – A room or defined space in a workplace where hazardous chemicals are used, and where there are employees.

Workplace – An establishment, job site, or project, at one geographical location with one or more work areas.

Statutory Authority: ORS 654.025(2) and 656.726(4).

Statutes Implemented: ORS 654.001 through 654.295.

History: OR-OSHA Admin. Order 4-1998, filed 8/28/98, effective 10/1/98.

OR-OSHA Admin. Order 3-2014, filed 8/8/14, effective 8/8/14.

437-004-9830 Retention of Department of Transportation (DOT) Markings, Placards and Labels

- (1) If you receive any container or vehicle containing hazardous material, marked to comply with U.S. Department of Transportation Hazardous Materials Regulations (49 CFR Parts 171 through 180), you must keep those markings in place and legible until the container is empty enough of product, residue or vapors to eliminate all hazards.
- (2) Markings, placards and labels must be readily visible.
- (3) For non-bulk packages that will not be reshipped, you are in compliance with this rule if a label or other acceptable marking is affixed to the container and includes the information required by the Hazard Communication Standard.
- (4) For this rule, "hazardous material" and other terms not defined here have the same definitions as in the U.S. DOT Hazardous Materials Regulations (49 CFR Parts 171 through 180).

Statutory Authority: ORS 654.025(2) and 656.726(4).
Statutes Implemented: ORS 654.001 through 654.295.
History: OR-OSHA Admin. Order 4-1998, filed 8/28/98, effective 10/1/98.
OR-OSHA Admin. Order 4-2012, filed 9/19/12, effective 1/1/13.

437-004-9850 Pipe Labeling

- (1) Scope and application. This rule applies to all pipes and piping systems that contain hazardous substances, transport substances in a hazardous state, or that use asbestos as insulation material. This rule does not apply to buried pipe.
- (2) Definitions:

Asbestos: includes chrysotile, amosite, crocidolite, tremolite asbestos, anthophyllite asbestos, actinolite asbestos and any of these minerals that have been chemically treated or altered.

Hazardous substances: any substance that is a physical or health hazard.

Health hazard: A chemical that is classified as posing one of the following hazardous effects: acute toxicity (any route of exposure); skin corrosion or irritation; serious eye damage or eye irritation; respiratory or skin sensitization; germ cell mutagenicity; carcinogenicity; reproductive toxicity; specific target organ toxicity (single or repeated exposure); or aspiration hazard. The criteria for determining whether a chemical is classified as a health hazard are detailed in Appendix A to 1910.1200 - Health Hazard Criteria, in Division 2/Z.

Physical hazard: A chemical that is classified as posing one of the following hazardous effects: explosive; flammable (gases, aerosols, liquids, or solids); oxidizer (liquid, solid or gas); self-reactive; pyrophoric (liquid or solid); self-heating; organic peroxide; corrosive to metal; gas under pressure; or in contact with water emits flammable gas. The criteria for determining whether a chemical is classified as a physical hazard are detailed in Appendix B to 1910.1200 – Physical Hazard Criteria, in Division 2/Z.

Piping system: includes single or multiple pipes of any kind in addition to valves and pipe coverings.

(3) Labeling.

- (a) Label pipes that contain hazardous substances or transport substances in a hazardous state according to (A), (B), (C) and (D) below or otherwise identify them according to (3)(b) below:
 - (A) Positive identification of the hazardous contents of pipe must be by lettered labels. The label must give the name of the contents in full or abbreviated form.
 - (B) The label must identify the contents with enough detail to identify the hazard.
 - (C) Label wording must be brief, informative and simple.
 - (D) Use stenciling, tape, adhesives, markers or effective alternative means for labels.

Note: Substances “transported in a hazardous state” typically refer to the hazards of pressure and temperature. Examples include compressed air, hot water or steam, and cryogenic liquids or gases.

- (b) The employer may use an alternative warning method, instead of affixing labels to individual pipes, if that method identifies the pipe(s) to which the warning applies and conveys the hazard information required by this rule. Examples include signs, placards, process sheets, or schematics posted on walls in the work area; or other such written materials. These alternative written materials must be readily accessible to the employees in their work areas during each shift.

Note: See OAR 437-004-9800(5) Labels and other forms of warning for other related requirements.

- (c) Label pipes or piping systems that use asbestos insulation material to include the following statements:

(A)

DANGER
CONTAINS ASBESTOS FIBERS
MAY CAUSE CANCER
DO NOT BREATHE DUST
AVOID CREATING DUST

(B) Or, otherwise identify them according to (3)(b), above.

Note: See OAR 437-004-9800, Hazard Communication for Agricultural Employers and OAR 437-004-9050, Asbestos, for additional requirements.

(4) Location of labeling.

- (a) Place the labeling near valves or flanges; adjacent to changes in direction or branches; where pipes pass through walls, floors or ceilings; and where confusion about the contents of the piping system may occur.
- (b) Labeling must be applied, at a minimum, at the beginning and end of continuous pipe runs.
- (c) For asbestos insulation, labeling on unobstructed continuous pipe runs must be at least every 75 feet.

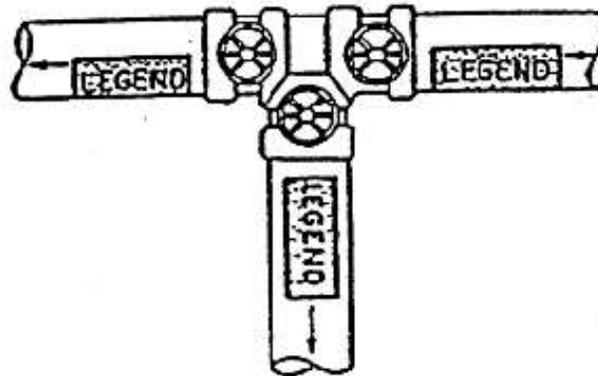


Illustration 1 - Location of Labeling

(5) Visibility.

- (a) Where pipes are located above or below the normal line of vision, put the lettering below or above the horizontal centerline of the pipe, to facilitate visibility.
- (b) If pipes are inaccessible, or at a distance that makes clear identification of the letters on a label difficult, use alternatives to labeling that meet all other requirements of this rule.

Statutory Authority: ORS 654.025(2) and 656.726(4).
Statutes Implemented: ORS 654.001 through 654.295.

History: OR-OSHA Admin. Order 4-1998, filed 8/28/98, effective 10/1/98.
OR-OSHA Admin. Order 4-2012, filed 9/19/12, effective 1/1/13.
OR-OSHA Admin. Order 3-2014, filed 8/8/14, effective 8/8/14.

Appendix A to 437-004-9850 Pipe Labeling (Non-Mandatory)

Table 1 - General Classification of Hazards of Materials Transported in Pipes With Suggested Labeling Colors

Classification	Color Field**	Color of Letters for Legends
Materials Inherently Dangerous		
Flammable or Explosive	Yellow	Black
Chemically Active or Toxic	Yellow	Black
Extreme Temperatures or Pressures	Yellow	Black
Radioactive	Yellow	Magenta
Materials of Inherently Low Hazard		
Liquid or Liquid Admixture	Green	White
Gas or Gaseous Admixture	Blue	White

** Alternatives to the colors suggested in Table 1 are acceptable if they meet all other requirements of the pipe labeling rule and are used consistently on all pipes in a given location.

- (1) Color may be displayed on the piping by any physical means, but when it is used it must be in combination with labels.
- (2) Color may be used in continuous, total length, or in intermittent displays.

Types and Sizes of Letters

- (1) There must be contrast between color field and letters for readability.
- (2) Use of letters of block lettering in sizes 1/2-inch (13 mm) and larger, is recommended. (Table 2)

Table 2 - Types and Styles of Letters

Outside Diameter of Pipe or Covering		Length of Color Field		Size of Letters	
In.	mm.	In.	mm.	In.	mm.
3/4 to 1 1/4	19 to 32	8	200	1/2	13
1 1/2 to 2	38 to 51	8	200	3/4	19
2 1/2 to 6	64 to 150	12	300	1 1/4	32
8 to 10	200 to 250	24	600	2 1/2	64
over 10	Over 250	32	800	3 1/2	89

- (3) For identification of materials in pipes less than 3/4-inch (19 mm.) in diameter, and for valve and fitting identification, the use of a legible tag is recommended.

Statutory Authority: ORS 654.025(2) and 656.726(4).
 Statutes Implemented: ORS 654.001 through 654.295.
 History: OR-OSHA Admin. Order 4-1998, filed 8/28/98, effective 10/1/98.
 OR-OSHA Admin. Order 3-2014, filed 8/8/14, effective 8/8/14.

437-004-9860 Hazardous Chemicals in Laboratories

Definitions:

Carcinogens are chemicals that have been determined to cause cancer by the following sources:

- (a) National Toxicology Program (NTP), Annual Report on Carcinogens (latest edition);
- (b) International Agency for Research on Cancer (IARC) Monographs (latest edition);
- (c) 29 CFR Part 1910, Subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration: or
- (d) National Institute for Occupational Safety and Health (NIOSH), The Registry of Toxic Effects of Chemical Substances (latest edition.)

Crop- or product-related quality control or quality assurance-type laboratory work means the testing of crops or agricultural products to uncover defects, with the goal of improving or stabilizing production standards.

Laboratory use of hazardous chemicals means handling or use of such chemicals in which all of the following conditions are met:

- (a) Chemical manipulations are carried out on a “laboratory scale;”
- (b) Multiple chemical procedures or chemicals are used;
- (c) The procedures involved are not part of a production process, nor in any way simulate a production process; and
- (d) Protective laboratory practices and equipment are available and in common use to minimize the potential for employee exposure to hazardous chemicals.

Laboratory scale means work with substances in which the containers used for reactions, transfers, and other handling of substances are designed to be easily and safely manipulated by one person. Laboratory scale does not include those workplaces whose function is to produce commercial quantities of materials.

- (1) If employees are engaged only in crop- or product-related quality control or quality assurance-type laboratory work, as defined in this rule, any work with hazardous chemicals must comply with the requirements in OAR 437-004-9800, Hazard Communication.

- (2) If employees use carcinogens in laboratory research or crop- or product-related quality control or quality assurance-type laboratory work, then Division 2/Z, OAR 437-002-0391, Additional Oregon Rules for Carcinogens in Laboratories, also applies.
- (3) If employees are engaged in the laboratory use of hazardous chemicals, as defined in this rule, then Division 2/Z, 1910.1450, Occupational Exposure to Hazardous Chemicals in Laboratories, applies to these activities.

Statutory Authority: ORS 654.025(2) and 656.726(4).

Statutes Implemented: ORS 654.001 through 654.295.

History: OR-OSHA Admin. Order 4-1998, filed 8/28/98, effective 10/1/98.

OR-OSHA Admin. Order 4-2012, filed 9/19/12, effective 1/1/13.