



Oregon Administrative Rules  
Chapter 437

Division 2  
General Occupational Safety and Health

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# Oregon Rules for Air Contaminants

Subdivision

# Z

Administrative  
Order 11-2021



The Oregon Department of Consumer and Business Services adopted these rules pursuant to ORS 654.025(2). The Secretary of State designated OAR Chapter 437 as the “Oregon Occupational Safety and Health Code.” Six general subject areas within this code are designated as “Divisions.”

- **Division 1** General Administrative Rules
- **Division 2** General Occupational Safety and Health Rules
- **Division 3** Construction
- **Division 4** Agriculture
- **Division 5** Maritime Activities
- **Division 7** Forest Activities
- **Oregon Revised Statutes (ORS) 654** The Oregon Safe Employment Act (OSEAct)

Oregon-initiated rules in this division of the Oregon Occupational Safety and Health Code 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 Basic Codification Structure adopted by the Secretary of State for Oregon Administrative Rules (OAR):

|         |          |      |         |            |            |
|---------|----------|------|---------|------------|------------|
| Chapter | Division | Rule | Section | Subsection | Paragraphs |
| 437     | 002      | 0322 | (1)     | (a)        | (A)(i)(I)  |

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

|         |          |      |                          |         |                 |
|---------|----------|------|--------------------------|---------|-----------------|
| Chapter | Division | Part | Subpart<br>(Subdivision) | Section | Paragraphs      |
| 437     | 002      | 1910 | G                        | .303    | (a)(1)(i)(A)(1) |

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

To obtain an order form or copies of these codes, address:

**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

The rules referenced in this division are available for viewing in the Office of the Secretary of State, Oregon State Archives Building, Salem, Oregon, or the Central Office, Oregon Occupational Safety and Health Division of the Department of Consumer and Business Services, 350 Winter St. NE, Salem, Oregon, and on our web site at [osha.oregon.gov](http://osha.oregon.gov).

**Table of Contents**

437-002-0360 Adoption by Reference ..... 1  
437-002-0382 Oregon Rules for Air Contaminants ..... 4  
Historical Notes for Subdivision Z, Air Contaminants ..... 35



**437-002-0360 Adoption by Reference**

In addition to, and not in lieu of, any other safety and health codes contained in OAR Chapter 437, the Department adopts by reference the following federal regulations printed as part of the Code of Federal Regulations, 29 CFR 1910, in the Federal Register:

(1) (Reserved) 29 CFR 1910.1000 Air contaminants.

**Note:** 29 CFR 1910.1000 was repealed on 11/15/93 by OR OSHA. In Oregon, OAR 437-002-0382 applies.

(2) 29 CFR 1910.1001 Asbestos, published 5/14/19, FR vol. 84, no. 93, p. 21416.

(3) 29 CFR 1910.1002 Coal tar pitch volatiles, interpretation of term, published 1/21/83, Federal Register, vol. 43, p. 2768.

(4) 29 CFR 1910.1003 13 Carcinogens, published 3/26/12, FR vol. 77, no. 58, p. 17574.

(5) 29 CFR 1910.1004 See 1910.1003, 13 Carcinogens.

(6) Reserved for 29 CFR 1910.1005.

(7) 29 CFR 1910.1006 See 1910.1003, 13 Carcinogens.

(8) 29 CFR 1910.1007 See 1910.1003, 13 Carcinogens.

(9) 29 CFR 1910.1008 See 1910.1003, 13 Carcinogens.

(10) 29 CFR 1910.1009 See 1910.1003, 13 Carcinogens.

(11) 29 CFR 1910.1010 See 1910.1003, 13 Carcinogens.

(12) 29 CFR 1910.1011 See 1910.1003, 13 Carcinogens.

(13) 29 CFR 1910.1012 See 1910.1003, 13 Carcinogens.

(14) 29 CFR 1910.1013 See 1910.1003, 13 Carcinogens.

(15) 29 CFR 1910.1014 See 1910.1003, 13 Carcinogens.

(16) 29 CFR 1910.1015 See 1910.1003, 13 Carcinogens.

(17) 29 CFR 1910.1016 See 1910.1003, 13 Carcinogens.

(18) 29 CFR 1910.1017 Vinyl chloride, published 5/14/19, FR vol. 84, no. 93, p. 21416.

(19) 29 CFR 1910.1018 Inorganic arsenic, published 5/14/19, FR vol. 84, no. 93, p. 21416.

(20) 29 CFR 1910.1020 Access to Employee Exposure and Medical Records, published 6/8/11, Federal Register, vol. 76, no. 110, p. 33590.

Appendix A Sample Authorization Letter.

Appendix B Availability of NIOSH RTECS.

- (21) 29 CFR 1910.1025 Lead, published 5/14/19, FR vol. 84, no. 93, p. 21416.
- (22) 29 CFR 1910.1026 Chromium (VI), published 5/14/19, FR vol. 84, no. 93, p. 21416.
- (23) 29 CFR 1910.1027 Cadmium, published 5/14/19, FR vol. 84, no. 93, p. 21416.
- (24) 29 CFR 1910.1028 Benzene, and Appendices A, B, C, D, and E, published 5/14/19, FR vol. 84, no. 93, p. 21416.
- (25) 29 CFR 1910.1029 Coke oven emissions, published 5/14/19, FR vol. 84, no. 93, p. 21416.
- (26) 29 CFR 1910.1030 Bloodborne pathogens, published 5/14/19, Federal Register, vol. 84, no. 93, p. 21416.
- (27) 29 CFR 1910.1043 Cotton dust, published 5/14/19, FR vol. 84, no. 93, p. 21416.
- (28) 29 CFR 1910.1044 1,2 dibromo-3 chloropropane, published 5/14/19, FR vol. 84, no. 93, p. 21416.
- (29) 29 CFR 1910.1045 Acrylonitrile, published 5/14/19, FR vol. 84, no. 93, p. 21416.
- (30) 29 CFR 1910.1047 Ethylene oxide, published 5/14/19, FR vol. 84, no. 93, p. 21416.
- (31) 29 CFR 1910.1048 Formaldehyde, and Appendices A, B, C, D and E, published 5/14/19, FR vol. 84, no. 93, p. 21416.
- (32) 29 CFR 1910.1050 Methylenedianiline (MDA), published 5/14/19, FR vol. 84, no. 93, p. 21416.
- (33) 29 CFR 1910.1051 1,3-Butadiene, published 5/14/19, FR vol. 84, no. 93, p. 21416.
- (34) 29 CFR 1910.1052 Methylene Chloride, published 5/14/19, FR vol. 84, no. 93, p. 21416.
- Note:** 29 CFR 1910.1101 Asbestos, was repealed by Federal Register, vol. 57, no. 110, issued 6/8/92, p. 24330.
- (35) 29 CFR 1910.1096 Ionizing radiation, published 5/14/19, FR vol. 84, no. 93, p. 21416.
- (36) 29 CFR 1910.1200 Hazard communication, published 2/8/13, FR vol. 78, no. 27, p. 9311.
- (37) 29 CFR 1910.1201 Retention of DOT Markings, Placards and Labels, published 7/19/94, Federal Register, vol. 59, p. 36700.
- (38) 29 CFR 1910.1450 Occupational Exposure to Hazardous Chemicals in Laboratories, published 1/22/13, FR vol. 78, no. 14, p. 4324.
- (39) 29 CFR 1910.1499 Removed. Published 3/7/96, Federal Register, vol. 61, no. 46, p. 9245.
- (40) 29 CFR 1910.1500 Removed. Published 3/7/96, Federal Register, vol. 61, no. 46, p. 9245.

These standards are available at the Oregon Occupational Safety and Health Division, Oregon Department of Consumer and Business Services, and the United States Government Printing Office.

Statutory/Other Authority: ORS 654.025(2), 654.035 and 656.726(4)

Statutes/Other Implemented: ORS 654.001 - 654.295

History: APD Administrative Order 13-1988, filed 8/2/88, effective 8/2/88 (Benzene).

APD Administrative Order 14-1988, filed 9/12/88, effective 9/12/88 (Formaldehyde).

APD Administrative Order 18-1988, filed 11/17/88, effective 11/17/88 (Ethylene Oxide).

APD Administrative Order 4-1989, filed 3/31/89, effective 5/1/89 (Asbestos-Temp).

APD Administrative Order 6-1989, filed 4/20/89, effective 5/1/89 (Non-Asbestiforms-Temp).

APD Administrative Order 9-1989, filed 7/7/89, effective 7/7/89 (Asbestos & Non-Asbestiforms-Perm).

APD Administrative Order 11-1989, filed 7/14/89, effective 8/14/89 (Lead).

APD Administrative Order 13-1989, filed 7/17/89, effective 7/17/89 (Air Contaminants).

OR-OSHA Administrative Order 1-1990, filed 1/11/90, effective 1/11/90 (Formaldehyde-Temp).

OR-OSHA Administrative Order 3-1990, filed 1/19/90, effective 1/19/90 (Asbestos & Non-Asbestiforms-Temp).

OR-OSHA Administrative Order 6-1990, filed 3/2/90, effective 3/2/90 (Formaldehyde-Perm).

OR-OSHA Administrative Order 7-1990, filed 3/2/90, effective 3/2/90 (Asbestos & Non-Asbestiforms-Perm).

OR-OSHA Administrative Order 9-1990, filed 5/8/90, effective 8/8/90 (Labs).

OR-OSHA Administrative Order 11-1990, filed 6/7/90, effective 7/1/90 (Air Contaminants).

OR-OSHA Administrative Order 13-1990, filed 6/28/90, effective 8/1/90 (Asbestos-Temp).

OR-OSHA Administrative Order 14-1990, filed 6/28/90, effective 8/1/90 (Lead).

OR-OSHA Administrative Order 19-1990, filed 8/31/90, effective 8/31/90 (Asbestos-Perm).

OR-OSHA Administrative Order 20-1990, filed 9/18/90, effective 9/18/90 (Lead).

OR-OSHA Administrative Order 21-1990, filed 9/18/90, effective 9/18/90 (Air Contaminants).

OR-OSHA Administrative Order 7-1991, filed 4/25/91, effective 4/25/91 (Air Contaminants, Asbestos, Formaldehyde).

OR-OSHA Administrative Order 13-1991, filed 10/10/91, effective 10/10/91 (Lead, Formaldehyde).

OR-OSHA Administrative Order 15-1991, filed 12/13/91, effective 12/13/91 (Asbestos).

OR-OSHA Administrative Order 1-1992, filed 1/22/92, effective 1/22/92 (Formaldehyde).

OR-OSHA Administrative Order 4-1992, filed 4/16/92, effective 4/16/92 (Formaldehyde).

OR-OSHA Administrative Order 5-1992, filed 4/24/92, effective 7/1/92 (Bloodborne Pathogens).

OR-OSHA Administrative Order 6-1992, filed 5/18/92, effective 5/18/92 (Asbestos).

OR-OSHA Administrative Order 10-1992, filed 9/24/92, effective 9/24/92 (Lead-temp).

OR-OSHA Administrative Order 11-1992, filed 10/9/92, effective 10/9/92 (Asbestos).

OR-OSHA Administrative Order 12-1992, filed 10/13/92, effective 10/13/92 (Formaldehyde).

OR-OSHA Administrative Order 15-1992, filed 12/30/92, effective 12/30/92 (Air Contaminants, BBP, Labs).

OR-OSHA Administrative Order 1-1993, filed 1/22/93, effective 1/22/93 (Cadmium, MDA).

OR-OSHA Administrative Order 6-1993, filed 5/17/93, effective 5/17/93 (Air Contaminants-Temp).

OR-OSHA Administrative Order 12-1993, filed 8/20/93, effective 11/1/93 (remainder of 2/Z).

OR-OSHA Administrative Order 17-1993, filed 11/15/93, effective 11/15/93 (Air Contaminants-Perm).

OR-OSHA Administrative Order 4-1995, filed 3/29/95, effective 3/29/95 (Asbestos).

OR-OSHA Administrative Order 8-1995, filed 8/25/95, effective 8/25/95 (Asbestos).

OR-OSHA Administrative Order 4-1996, filed 9/13/96, effective 9/13/96 (Lead).

OR-OSHA Administrative Order 6-1996, filed 11/29/96, effective 11/29/96 (Asbestos).

OR-OSHA Administrative Order 4-1997, filed 4/2/97, effective 4/2/97.

OR-OSHA Administrative Order 6-1997, filed 5/2/97, effective 5/2/97.

OR-OSHA Administrative Order 8-1997, filed 11/14/97, effective 11/14/97 (Methylene Chloride).

OR-OSHA Administrative Order 1-1998, filed 2/13/98, effective 2/13/98 (Methylene Chloride).

OR-OSHA Administrative Order 3-1998, filed 7/7/98, effective 7/7/98.

OR-OSHA Administrative Order 1-1999, filed 3/22/99, effective 3/22/99.

OR-OSHA Administrative Order 4-1999, filed 4/30/99, effective 4/30/99.

OR-OSHA Administrative Order 6-2001, filed 5/15/01, effective 5/15/01 (Cotton Dust).

OR-OSHA Administrative Order 10-2001, filed 9/14/01, effective 10/18/01 (Bloodborne Pathogens).

OR-OSHA Administrative Order 12-2001, filed 10/26/01, effective 10/26/01 (Methylene Chloride).

OR-OSHA Administrative Order 1-2005, filed 4/12/05, effective 4/12/05.

OR-OSHA Administrative Order 4-2006, filed 4/24/06, effective 4/24/06.

OR-OSHA Administrative Order 6-2006, filed 8/30/06, effective 8/30/06.

OR-OSHA Administrative Order 10-2006, filed 11/30/06, effective 11/30/06.

OR-OSHA Administrative Order 5-2009, filed 5/29/09, effective 5/29/09.

OR-OSHA Administrative Order 3-2010, filed 6/10/10, effective 6/15/10.

OR-OSHA Administrative Order 4-2011, filed 12/8/11, effective 12/8/11.

OR-OSHA Administrative Order 5-2011, filed 12/8/11, effective 7/1/12.  
OR-OSHA Administrative Order 1-2012, filed 4/10/12, effective 4/10/12.  
OR-OSHA Administrative Order 5-2012, filed 9/25/12, effective 9/25/12.  
OR-OSHA Administrative Order 3-2013, filed 7/18/13, effective 7/18/13.  
OR-OSHA Administrative Order 4-2013, filed 7/19/13, effective 7/19/13.  
OR-OSHA Administrative Order 3-2019, filed 10/29/19, effective 10/29/19.  
OR-OSHA Administrative Order 11-2021, filed 9/1/21, effective 9/1/22.

## 437-002-0382 Oregon Rules for Air Contaminants

An employee's exposure to any substance listed in Oregon Tables Z-1, Z-2, or Z-3 of this section shall 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 preceded by a "C", shall at no time exceed the exposure limit given for that substance. If instantaneous monitoring is not feasible, then the ceiling shall be assessed as a 15-minute time weighted average exposure which shall not be exceeded at any time during the working day.
- (b) Other substances – 8-hour Time Weighted Averages. An employee's exposure to any substance in Oregon Table Z-1, the exposure limit of which is not preceded by a "C", shall not exceed the 8-hour Time Weighted Average given for that substance in any 8-hour work shift of a 40-hour work week.
- (c) Other Substances – Excursion Limits. Excursions in worker exposure levels may exceed 3 times the PEL-TWA for no more than a total of 30 minutes during a workday, and under no circumstances should they exceed 5 times the PEL-TWA, provided that the PEL-TWA is not exceeded.
- (d) Skin Designation. To prevent or reduce skin absorption, 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 shall be prevented or reduced 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.

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

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



- (b) Acceptable ceiling concentrations. An employee's exposure to a substance listed in Oregon Table Z-2 shall not exceed the acceptable ceiling concentration for the given substance in the table at any time 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 listed in Oregon Table Z-2 shall not exceed the acceptable maximum peak above the acceptable ceiling concentration, and shall not exceed the maximum duration for the given substance during an 8-hour shift.
- (c) Example.

| Example  |                              |                                  |   |                     |      |
|--|------------------------------|----------------------------------|---|---------------------|------|
| 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 <sup>(b)</sup> (Z87.4-1969)              | 10 ppm                       | 25 ppm                           | 50 ppm  | 10 min.             |      |
| Beryllium, and beryllium compounds (Z37.29-1970) | 2 µg/m <sup>3</sup>          | 5 µg/m <sup>3</sup>              | 25 µg/m <sup>3</sup>  | 30 min.             |      |
| Cadmium fume <sup>(b)</sup> (Z37.5-1970)         | 0.1 mg/m <sup>3</sup>        | 0.3 mg/m <sup>3</sup>            |   |                     |      |
| Cadmium dust <sup>(b)</sup> (Z37.5-1970)         | 0.2 mg/m <sup>3</sup>        | 0.6 mg/m <sup>3</sup>            |   |                     |      |
| 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 |      |

During an 8-hour work shift, an employee exposed to benzene may be exposed to an 8-hour time weighted average (TWA) of 10 ppm. Concentrations of benzene during the 8-hour work shift may not exceed 25 ppm, unless that exposure is no more than 50 ppm and does not exceed 10 minutes during an 8-hour work shift. Such exposures must be compensated by exposures to concentrations below 10 ppm so that the 8-hour time-weighted average is less than 10 ppm.

- (d) Skin Designation. To prevent or reduce skin absorption, 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 shall be prevented or reduced 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 listed in Oregon Table Z-3, in any 8-hour work shift of a 40-hour work week, shall not exceed the 8-hour time weighted average limit given for that substance in the table.

(4) Computation formulae. The computation formula which shall apply to employee exposure to more than one substance for which 8-hour time weighted averages are included in OAR 437, Division 2/Z, Toxic and Hazardous Substances, in order to determine whether an employee is exposed over the regulatory limit is as follows:

(a) Cumulative exposures

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

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

Where:

E is the equivalent exposure for the working shift.

C is the concentration during any period of time T where the concentration remain constant.

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

The value of E shall not exceed the 8-hour time weighted average specified in subpart Z of 29 CFR part 1910 for the substance involved.

(B) To illustrate the formula prescribed in paragraph (4)(a)(i) of this section, assume that Substance A has an 8-hour time weighted average limit of 100 ppm (Oregon Table Z-1). Assume that an employee is subject to the following exposure:

Two hours exposure at 150 ppm

Two hours exposure at 75 ppm

Four hours exposure at 50 ppm

Substituting this information in the formula, we have

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

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

(b) Mixtures

(A) In case of a mixture of air contaminants an employer shall 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 is the concentration of a particular contaminant.

L is the exposure limit for that substance specified in Subpart Z of 29 CFR Part 1910.

The value of  $E_m$  shall not exceed unity (1).

- (B) To illustrate the formula prescribed in paragraph (4)(b)(i) of this section, consider the following exposures:

| Substance | Actual concentration of 8-hour exposure | 8-hour time weighted average exposure limit |
|-----------|---|---|
| B         | 500 ppm                                 | 1,000 ppm                                   |
| C         | 45 ppm                                  | 200 ppm                                     |
| D         | 40 ppm                                  | 200 ppm                                     |

Substituting in the formula, we have:

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

$$E_m = 0.500 + 0.225 + 0.200$$

$$E_m = 0.925$$

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

- (5) To achieve compliance with paragraphs (1) through (4) of this section, administrative or engineering controls must first be determined and implemented whenever feasible. When such controls are not feasible to achieve full compliance, protective equipment or any other protective measures shall be used to keep the exposure of employees to air contaminants within the limits prescribed in this section. Any equipment and/or technical measures used for this purpose must be approved for each particular use by a competent industrial hygienist or other technically qualified person. Whenever respirators are used, their use shall comply with 1910.134.



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

**Table Z-1 Adopted Values (In Alphabetical Order)**

| Substance                                      | CAS No. <sup>(c)</sup> | ppm <sup>(a)</sup> | mg/m <sup>3</sup> <sup>(b)</sup> | Skin |
|--|------------------------|--------------------|----------------------------------|------|
| <b>Abate</b>                                   | <b>3383-96-8</b>       | —                  | <b>10</b>                        |      |
| <b>Acetaldehyde</b>                            | <b>75-07-0</b>         | <b>100</b>         | <b>180</b>                       |      |
| 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                | (C)                | (See 1910.1003)                  |      |
| <b>Acetylene</b>                               | <b>74-86-2</b>         | <b>1,000</b>       | —                                |      |
| 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 1910.1045)                  |      |
| Aldrin   | 309-00-2               | —                  | 0.25                             | X    |
| Allyl alcohol                                  | 107-18-6               | 2                  | 5                                | X    |
| Allyl chloride                                 | 107-05-1               | 1                  | 3                                |      |
| <b>Allyn glycidyl ether (AGE)</b>              | <b>106-92-3</b>        | <b>5</b><br>(C) 10 | <b>22</b><br>(C) 45              |      |
| Allyl propyl disulfide                         | 2179-59-1              | 2                  | 12                               |      |
| <b>alpha Alumina</b>                           | <b>1344-28-1</b>       |                    |                                  |      |
| <b>Total Dust</b>                              |                        | —                  | <b>10</b>                        |      |
| <b>Respirable Fraction</b>                     |                        | —                  | <b>5</b>                         |      |
| <b>Aluminum Metal Dust</b>                     | <b>7429-90-5</b>       |                    |                                  |      |
| <b>Total Dust</b>                              |                        | —                  | <b>10</b>                        |      |
| <b>Respirable Fraction</b>                     |                        | —                  | <b>5</b>                         |      |
| <b>Alundum (A1203)</b>                         |                        | —                  | <b>10</b>                        |      |
| 4-Aminodiphenyl                                | 92-67-1                |                    | (See 1910.1003)                  |      |
| 2-Aminoethanol, see Ethanolamine               |                        |                    |                                  |      |
| 2-Aminopyridine                                | 504-29-0               | 0.5                | 2                                |      |
| <b>Ammonia</b>                                 | <b>7664-41-7</b>       | <b>25</b>          | <b>18</b>                        |      |
| <b>Ammonium Chloride Fumes</b>                 | <b>12125-02-9</b>      | —                  | <b>10</b>                        |      |

| Substance   | CAS No. <sup>(c)</sup> | ppm <sup>(a)</sup>            | mg/m <sup>3</sup> <sup>(b)</sup> | Skin |
|---|------------------------|-------------------------------|----------------------------------|------|
| <b>Ammonium sulfamate</b>   | <b>7773-06-0</b>       |                               |                                  |      |
| <b>Total Dust</b>   |                        | —                             | <b>10</b>                        |      |
| <b>Respirable Fraction</b>  |                        | —                             | <b>5</b>                         |      |
| 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)  | 7440-38-2              |                               | 0.01<br>(See 1910.1018)          |      |
| Arsenic, Organic Compounds (as As)  | 7440-38-2              | —                             | 0.5                              |      |
| Arsine  | 7784-42-1              | 0.05                          | 0.2                              |      |
| Asbestos  |                        | (See 1910.1001 and 1926.1101) |                                  |      |
| <b>Asphalt (petroleum) Fumes</b>  | <b>8052-42-4</b>       | —                             | <b>5</b>                         |      |
| Azinphos-methyl   | 86-50-1                | —                             | 0.2                              | X    |
| Barium (soluble compounds)  | 7440-39-3              | —                             | 0.5                              |      |
| <b>Barium Sulfate</b>   | <b>7727-43-7</b>       |                               |                                  |      |
| <b>Total Dust</b>   |                        | —                             | <b>10</b>                        |      |
| <b>Respirable Fraction</b>  |                        | —                             | <b>5</b>                         |      |
| <b>Benomyl</b>  | <b>17804-35-2</b>      |                               |                                  |      |
| <b>Total Dust</b>   |                        | —                             | <b>10</b>                        |      |
| <b>Respirable Fraction</b>  |                        | —                             | <b>5</b>                         |      |
| Benzene<br>See Oregon Table Z-2 for the limits applicable in the operations or sectors excluded in 1910.1028 <sup>(d)</sup> | 71-43-2                |                               | (See 1910.1028)                  |      |
| Benzidine   | 92-87-5                |                               | (See 1910.1003)                  |      |
| p-Benzoquinone, see Quinone   |                        |                               |                                  |      |
| Benzoyl peroxide  | 94-36-0                | —                             | 5                                |      |
| Benzyl chloride   | 100-44-7               | 1                             | 5                                |      |
| Beryllium and Beryllium compounds (as Be); see Division 2/Z Beryllium <sup>(k)</sup>  | 7440-41-7              |                               | (See Oregon Table Z-2)           |      |
| Biphenyl, see Diphenyl  |                        |                               |                                  |      |
| <b>Bismuth telluride (undoped)</b>  | <b>1304-82-1</b>       | —                             | <b>10</b>                        |      |
| <b>Total Dust</b>   |                        | —                             | <b>5</b>                         |      |
| <b>Respirable Fraction</b>  |                        |                               |                                  |      |
| <b>Bismuth telluride (Se-doped)</b>   |                        | —                             | <b>5</b>                         |      |
| Bisphenol A, see Diglycidyl ether   |                        |                               |                                  |      |

| Substance                                  | CAS No. <sup>(c)</sup> | ppm <sup>(a)</sup>                                | mg/m <sup>3</sup> <sup>(b)</sup> | Skin |
|--|------------------------|---|----------------------------------|------|
| <b>Boron oxide</b>                         | <b>1303-86-2</b>       | —   | <b>10</b>                        |      |
| <b>Boron tribromide</b>                    | <b>10294-33-4</b>      | <b>1</b>  | <b>10</b>                        |      |
| Boron trifluoride                          | 7637-07-2              | (C) 1   | (C) 3                            |      |
| Bromine                                    | 7726-95-6              | 0.1   | 0.7                              |      |
| <b>Bromine pentafluoride</b>               | <b>7789-30-2</b>       | <b>0.1</b>  | <b>0.7</b>                       |      |
| Bromoform                                  | 75-25-2                | 0.5   | 5                                | X    |
| Butadiene (1,3-Butadiene)                  | 106-99-0               | 1 ppm/5 ppm<br>STEL                               | (See 1910.1051;<br>1910.19(l))   |      |
| <b>Butane</b>                              | <b>106-97-8</b>        | <b>800</b>  | <b>1,900</b>                     |      |
| 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                              |      |
| <b>Butyl lactate</b>                       | <b>138-22-7</b>        | <b>1</b>  | <b>5</b>                         |      |
| Butylamine                                 | 109-73-9               | (C) 5   | (C) 15                           | X    |
| tert-Butyl chromate (as CrO <sub>3</sub> ) | 1189-85-1              | (See 1910. 1026) <sup>g</sup>                     |                                  |      |
| n-Butyl glycidyl ether (BGE)               | 2426-08-6              | 50  | 270                              |      |
| <b>Butyl mercaptan</b>                     | <b>109-79-5</b>        | <b>0.5</b>  | <b>1.5</b>                       |      |
| p-tert-Butyltoluene                        | 98-51-1                | 10  | 60                               |      |
| Cadmium dust and fume (as Cd)              | 7440-43-9              | (See 1910.1027,1926.1127 and<br>Division 4) 0.005 |                                  |      |
| <b>Calcium carbonate</b>                   | <b>1317-65-3</b>       |   |                                  |      |
| <b>Total Dust</b>                          |                        | —   | <b>10</b>                        |      |
| <b>Respirable Fraction</b>                 |                        | —   | <b>5</b>                         |      |
| <b>Calcium hydroxide</b>                   | <b>1305-62-0</b>       |   |                                  |      |
| <b>Total Dust</b>                          |                        | —   | <b>10</b>                        |      |
| <b>Respirable Fraction</b>                 |                        | —   | <b>5</b>                         |      |
| Calcium oxide                              | 1305-78-8              | —   | 5                                |      |
| <b>Calcium silicate</b>                    | <b>1344-95-2</b>       |   |                                  |      |
| <b>Total Dust</b>                          |                        | —   | <b>10</b>                        |      |
| <b>Respirable Fraction</b>                 |                        | —   | <b>5</b>                         |      |
| <b>Calcium sulfate</b>                     | <b>7778-18-9</b>       |   |                                  |      |
| <b>Total Dust</b>                          |                        | —   | <b>10</b>                        |      |
| <b>Respirable Fraction</b>                 |                        | —   | <b>5</b>                         |      |

| Substance                                       | CAS No. <sup>(c)</sup> | ppm <sup>(a)</sup> | mg/m <sup>3</sup> <sup>(b)</sup> | Skin |
|---|------------------------|--------------------|----------------------------------|------|
| Camphor, synthetic                              | 76-22-2                | —                  | 2                                |      |
| <b>Caprolactam (2-Oxonexa-methylenimine)</b>    | <b>105-60-2</b>        | <b>—</b>           | <b>5</b>                         |      |
| 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 Oregon Table Z-2)           |      |
| Carbon monoxide                                 | 630-08-0               | 50                 | 55                               |      |
| Carbon tetrachloride                            | 56-23-5                |                    | (See Oregon Table Z-2)           |      |
| <b>Cellulose</b>                                | <b>9006-34-6</b>       |                    |                                  |      |
| <b>Total Dust</b>                               |                        | <b>—</b>           | <b>10</b>                        |      |
| <b>Respirable Fraction</b>                      |                        | <b>—</b>           | <b>5</b>                         |      |
| 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   |                        |                    |                                  |      |
| 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              |                        |                    |                                  |      |
| <b>Chloroform (Trichloromethane)</b>            | <b>67-66-3</b>         | <b>(C) 25</b>      | <b>(C) 120</b>                   |      |
| bis-Chloromethyl ether                          | 542-88-1               |                    | (See 1910.1003)                  |      |
| Chloromethyl methyl ether                       | 107-30-2               |                    | (See 1910.1003)                  |      |
| 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    |



| Substance  | CAS No. <sup>(c)</sup> | ppm <sup>(a)</sup> | mg/m3 <sup>(b)</sup>   | Skin |
|--|------------------------|--------------------|------------------------|------|
| <b>2-Chloro-6-(trichloromethyl) pyridine</b>   | <b>1929-82-4</b>       |                    |                        |      |
| <b>Total Dust</b>  |                        | —                  | <b>10</b>              |      |
| <b>Respirable Fraction</b>   |                        | —                  | <b>5</b>               |      |
| Chromic acid and chromates (as CrO <sub>3</sub> )  |                        |                    | (See Oregon 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 1910.1026)    |                        |      |
| Chromium metal & insol. salts (as Cr)  | 7440-47-3              | —                  | 1                      |      |
| <b>Clopidol</b>  | <b>2971-90-6</b>       |                    |                        |      |
| <b>Total Dust</b>  |                        | —                  | <b>10</b>              |      |
| <b>Respirable Fraction</b>   |                        | —                  | <b>5</b>               |      |
| Coal Dust  |                        |                    | (See Oregon Table Z-3) |      |
| Coal tar pitch volatiles<br>(Benzene soluble fraction)<br>anthracene, BaP, phenanthrene, acridine,<br>chrysene, pyrene | 65966-93-2             | —                  | 0.2<br>(See 1910.1002) |      |
| 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                      |      |
| <b>Corundum (A1203)</b>  | <b>1302-74-5</b>       | —                  | <b>10</b>              |      |
| Cotton dust  |                        |                    | (See 1910.1043)        |      |
| Cotton dust (raw)  |                        | —                  | 1 <sup>(e)</sup>       |      |
| <b>Crag® herbicide (Sesone)</b>  | <b>136-78-7</b>        |                    |                        |      |
| <b>Total Dust</b>  |                        | —                  | <b>10</b>              |      |
| <b>Respirable Fraction</b>   |                        | —                  | <b>5</b>               |      |
| Cresol (all isomers)   | 1319-77-3              | 5                  | 22                     | X    |
| Crotonaldehyde   | 123-73-9/<br>4170-30-3 | 2                  | 6                      |      |
| Cumene   | 98-82-8                | 50                 | 245                    | X    |
| Cyanides (as CN)   |                        | —                  | 5                      | X    |
| <b>Cyanogen</b>  | <b>460-19-5</b>        | <b>10</b>          | —                      |      |
| 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                     |      |

| Substance  | CAS No. <sup>(c)</sup> | ppm <sup>(a)</sup>        | mg/m <sup>3</sup> <sup>(b)</sup> | Skin     |
|--|------------------------|---------------------------|----------------------------------|----------|
| 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            |                        |                           |                                  |          |
| <b>Diazinon</b>                                    | <b>333-41-5</b>        | <b>—</b>                  | <b>0.1</b>                       | <b>X</b> |
| Diazomethane                                       | 334-88-3               | 0.2                       | 0.4                              |          |
| Diborane   | 19287-45-7             | 0.1                       | 0.1                              |          |
| <b>Dibrom®</b>                                     | <b>300-76-5</b>        | <b>—</b>                  | <b>3</b>                         |          |
| 1,2-Dibromo-3-chloropropane (DBCP)                 | 96-12-8                | 0.001                     | (See 1910.1044)                  |          |
| 1,2-Dibromoethane, see Ethylene dibromide          |                        |                           |                                  |          |
| <b>2-N-Dibutylaminoethanol</b>                     | <b>102-81-8</b>        | <b>2</b>                  | <b>14</b>                        | <b>X</b> |
| Dibutyl phosphate                                  | 107-66-4               | 1                         | 5                                |          |
| Dibutyl phthalate                                  | 84-74-2                | —                         | 5                                |          |
| <b>Dichloroacetylene</b>                           | <b>7572-29-4</b>       | <b>(C) 0.1</b>            | <b>(C) 0.4</b>                   |          |
| o-Dichlorobenzene                                  | 95-50-1                | (C) 50                    | (C) 300                          |          |
| p-Dichlorobenzene                                  | 106-46-7               | 75                        | 450                              |          |
| 3,3-Dichlorobenzidine                              | 91-94-1                |                           | (See 1910.1003)                  | 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                              |          |
| <b>Dichloroethyl Ether</b>                         | <b>111-44-4</b>        | <b>5</b><br><b>(C) 15</b> | <b>30</b><br><b>(C) 90</b>       | <b>X</b> |
| 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        |

| Substance   | CAS No. <sup>(c)</sup> | ppm <sup>(a)</sup> | mg/m3 <sup>(b)</sup> | Skin     |
|---|------------------------|--------------------|----------------------|----------|
| <b>Dicyclohexylmethane 4,4'-diisocyanate (hydrogenated MDI, see Oregon Table Z-2 (Diisocyanates))</b> | <b>5124-30-1</b>       |                    |                      |          |
| <b>Dicyclopentadienyl iron</b>  | <b>102-54-5</b>        |                    | <b>10</b>            |          |
| <b>Total Dust</b>   |                        | —                  | <b>5</b>             |          |
| <b>Respirable Fraction</b>  |                        | —                  |                      |          |
| Dieldrin  | 60-57-1                | —                  | 0.25                 | X        |
| Diethylamine  | 109-89-7               | 25                 | 75                   |          |
| 2-Diethylaminoethanol   | 100-37-8               | 10                 | 50                   | X        |
| <b>Diethylene triamine</b>  | <b>111-40-0</b>        | <b>(C) 1</b>       | <b>(C) 4</b>         | <b>X</b> |
| 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  |                        |                    |                      |          |
| <b>Diisobutyl ketone</b>  | <b>108-83-8</b>        | <b>25</b>          | <b>150</b>           |          |
| Diisopropylamine  | 108-18-9               | 5                  | 20                   | X        |
| Dimethoxymethane, see Methylal  |                        |                    |                      |          |
| Dimethyl acetamide  | 127-19-5               | 10                 | 35                   | X        |
| Dimethylamine   | 124-40-3               | 10                 | 18                   |          |
| 4-Dimethylaminoazobenzene   | 60-11-7                |                    | (See 1910.1003)      |          |
| Dimethylaminobenzene, see Xylidene  |                        |                    |                      |          |
| Dimethylaniline (N,N-Dimethy-laniline)  | 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                    |          |

| Substance   | CAS No. <sup>(c)</sup> | ppm <sup>(a)</sup>          | mg/m <sup>3</sup> <sup>(b)</sup> | Skin     |
|---|------------------------|-----------------------------|----------------------------------|----------|
| <b>Diphenylamine</b>  | <b>122-39-4</b>        | —                           | <b>10</b>                        |          |
| <b>Diphenylmethane diisocyanate (MDI),<br/>see Oregon Table Z-2 (Diisocyanates)</b> |                        |                             |                                  |          |
| Dipropylene glycol methyl ether   | 34590-98-8             | 100                         | 600                              | X        |
| <b>Diquat</b>   | <b>231-36-7</b>        | —                           | <b>0.5</b>                       |          |
| Di-sec, octyl phthalate (Di-2-ethyl-hexylphthalate)                                 | 117-81-7               | —                           | 5                                |          |
| <b>Emery</b>  | <b>12415-34-8</b>      |                             |                                  |          |
| <b>Total Dust</b>   |                        | —                           | <b>10</b>                        |          |
| <b>Respirable Fraction</b>  |                        | —                           | <b>5</b>                         |          |
| <b>Endosulfan (Thiodan®)</b>  | <b>115-29-7</b>        | —                           | <b>0.1</b>                       | <b>X</b> |
| 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  |                        |                             |                                  |          |
| <b>Ethane</b>   | <b>74-84-0</b>         | <b>1,000</b>                | —                                |          |
| Ethanethiol, see Ethyl mercaptan  |                        |                             |                                  |          |
| Ethanolamine  | 141-43-5               | 3                           | 6                                |          |
| <b>2-Ethoxyethanol (Cellosolve)</b>   | <b>110-80-5</b>        | <b>100</b>                  | <b>370</b>                       | <b>X</b> |
| 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                              |          |
| <b>Ethyl mercaptan</b>  | <b>75-08-1</b>         | <b>0.5</b><br><b>(C) 10</b> | <b>1</b><br><b>(C) 25</b>        |          |
| Ethyl silicate  | 78-10-4                | 100                         | 850                              |          |
| <b>Ethylene</b>   | <b>74-85-1</b>         | <b>1,000</b>                | —                                |          |
| Ethylene chlorohydrin   | 107-07-3               | 5                           | 16                               | X        |

| Substance  | CAS No. <sup>(c)</sup> | ppm <sup>(a)</sup> | mg/m <sup>3</sup> <sup>(b)</sup> | Skin |
|--|------------------------|--------------------|----------------------------------|------|
| Ethylenediamine  | 107-15-3               | 10                 | 25                               |      |
| Ethylene dibromide   | 106-93-4               |                    | (See Oregon Table Z-2)           |      |
| Ethylene dichloride  | 107-06-2               |                    | (See Oregon Table Z-2)           |      |
| <b>Ethylene glycol particulate</b>   |                        | —                  | <b>10</b>                        |      |
| <b>Ethylene glycol, Vapor</b>  | <b>107-21-1</b>        | <b>100</b>         | <b>260</b>                       |      |
| 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 1910.1003)                  |      |
| Ethylene oxide   | 75-21-8                | 1                  | (See 1910.1047)                  |      |
| Ethylidene chloride, see 1, 1-Dichloroethane   |                        |                    |                                  |      |
| N-Ethylmorpholine  | 100-74-3               | 20                 | 94                               | X    |
| <b>Ferbam</b>  | <b>14484-64-1</b>      |                    |                                  |      |
| <b>Total Dust</b>  |                        | —                  | <b>10</b>                        |      |
| <b>Respirable Fraction</b>   |                        | —                  | <b>5</b>                         |      |
| Ferrovandium dust  | 12604-58-9             | —                  | 1                                |      |
| Fibrous glass, see Glass, Fibrous  |                        |                    |                                  |      |
| Fluorides (As F)   |                        | —                  | 2.5<br>(See Oregon Table Z-2)    |      |
| Fluorine   | 7782-41-4              | 0.1                | 0.2                              |      |
| Fluorotrichloromethane (Trichlorofluoromethane)                                      | 75-69-4                | 1,000              | 5,600                            |      |
| Formaldehyde   | 50-00-0                | 0.75               | (See 1910.1048)                  |      |
| Formic acid  | 64-18-6                | 5                  | 9                                |      |
| Furfural   | 98-01-1                | 5                  | 20                               | X    |
| <b>Furfuryl alcohol</b>  | <b>98-00-0</b>         | <b>5</b>           | <b>20</b>                        |      |
| <b>Gasoline</b>  | <b>8006-61-9</b>       | —                  | <sup>(g)</sup>                   |      |
| <b>Germanium tetrahydride</b>  | <b>7782-65-2</b>       | <b>0.2</b>         | <b>0.6</b>                       |      |
| <b>Glass, Fibrous or dust</b>  |                        | —                  | <b>10</b>                        |      |
| <b>Glycerin (mist)</b>   | <b>56-81-5</b>         | —                  | <b>10</b>                        |      |
| <b>Total Dust</b>  |                        | —                  | <b>5</b>                         |      |
| <b>Respirable Fraction</b>   |                        | —                  |                                  |      |
| Glycidol   | 556-52-5               | 50                 | 150                              |      |
| Glycol momoethyl ether, see 2-Ethoxyethanol  |                        |                    |                                  |      |

| Substance   | CAS No. <sup>(c)</sup> | ppm <sup>(a)</sup> | mg/m <sup>3</sup> <sup>(b)</sup> | Skin     |
|---|------------------------|--------------------|----------------------------------|----------|
| Grain dust (oat, wheat, barley)   |                        | —                  | 10                               |          |
| Graphite natural, respirable  | 7782-42-5              |                    | (See Oregon Table Z-3)           |          |
| <b>Graphite (Synthetic)</b>   | <b>7782-42-5</b>       | <b>—</b>           | <b>10</b>                        |          |
| <b>Total Dust</b>   |                        | <b>—</b>           | <b>5</b>                         |          |
| <b>Respirable Fraction</b>  |                        |                    |                                  |          |
| Guthion®, see Azinphosmethyl  |                        |                    |                                  |          |
| <b>Gypsum</b>   | <b>13397-24-5</b>      |                    |                                  |          |
| <b>Total Dust</b>   |                        | <b>—</b>           | <b>10</b>                        |          |
| <b>Respirable Fraction</b>  |                        | <b>—</b>           | <b>5</b>                         |          |
| Hafnium   | 7440-58-6              | —                  | 0.5                              |          |
| Heptachlor  | 76-44-8                | —                  | 0.5                              | X        |
| Heptane (n-heptane)   | 142-82-5               | 500                | 2,000                            |          |
| <b>Hexachlorocyclopentadiene</b>  | <b>77-47-4</b>         | <b>0.1</b>         | <b>1</b>                         |          |
| Hexachloroethane  | 67-72-1                | 1                  | 10                               | X        |
| Hexachloronaphthalene   | 1335-87-1              | —                  | 0.2                              | X        |
| <b>Hexafluoroacetone</b>  | <b>684-16-2</b>        | <b>0.1</b>         | <b>0.7</b>                       | <b>X</b> |
| <b>Hexamethylene diisocyanate (HDI), see Oregon Table Z-2 (Diisocyanates)</b>     | <b>822-06-0</b>        |                    |                                  |          |
| 1,6 Hexamethylene diisocyanate Based Adduct, see Oregon Table Z-2 (Diisocyanates) |                        |                    |                                  |          |
| 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 Oregon 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 Oregon Table Z-2)           |          |
| Hydroquinone  | 123-31-9               | —                  | 2                                |          |
| <b>Indene</b>   | <b>95-13-6</b>         | <b>10</b>          | <b>45</b>                        |          |

| Substance   | CAS No. <sup>(c)</sup> | ppm <sup>(a)</sup>             | mg/m <sup>3</sup> <sup>(b)</sup> | Skin     |
|---|------------------------|--------------------------------|----------------------------------|----------|
| <b>Indium and compounds (as In)</b>   | <b>7440-74-6</b>       | —                              | <b>0.1</b>                       |          |
| Iodine  | 7553-56-2              | (C) 0.1                        | (C) 1                            |          |
| Iron oxide fume   | 1309-37-1              | —                              | 10                               |          |
| <b>Iron pentacarbonyl</b>   | <b>13463-40-6</b>      | <b>0.1</b>                     | <b>0.23</b>                      |          |
| <b>Iron salts, soluble, as Fe</b>   |                        | —                              | <b>1</b>                         |          |
| 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                              |          |
| <b>Isophorone</b>   | <b>78-59-1</b>         | <b>10</b>                      | <b>55</b>                        |          |
| <b>Isophorone diisocyanate (IPDI), see Oregon Table Z-2 (Diisocyanates)</b> | <b>4098-71-9</b>       |                                |                                  |          |
| Isopropyl acetate   | 108-21-4               | 250                            | 950                              |          |
| Isopropyl alcohol   | 67-63-0                | 400                            | 980                              |          |
| Isopropylamine  | 75-31-0                | 5                              | 12                               |          |
| <b>Isopropyl ether</b>  | <b>108-20-3</b>        | <b>250</b>                     | <b>1,050</b>                     |          |
| Isopropyl glycidyl ether (IGE)  | 4016-14-2              | 50                             | 240                              |          |
| <b>Kaolin</b>   | <b>1332-58-7</b>       |                                |                                  |          |
| <b>Total Dust</b>   |                        | —                              | <b>10</b>                        |          |
| <b>Respirable Fraction</b>  |                        | —                              | <b>5</b>                         |          |
| Ketene  | 463-51-4               | 0.5                            | 0.9                              |          |
| Lead, inorganic (as Pb)   | 7439-92-1              | (See 1910.1025 & 1926.62) 0.05 |                                  |          |
| <b>Lead arsenate</b>  | <b>7784-40-9</b>       | <b>(See 1910.1018)</b>         | <b>0.01</b>                      |          |
| <b>Limestone</b>  | <b>1317-65-3</b>       | —                              | <b>10</b>                        |          |
| <b>Total Dust</b>   |                        | —                              | <b>5</b>                         |          |
| <b>Respirable Fraction</b>  |                        |                                |                                  |          |
| 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                            |          |
| <b>Magnesite</b>  | <b>546-93-0</b>        |                                |                                  |          |
| <b>Total Dust</b>   |                        | —                              | <b>10</b>                        |          |
| <b>Respirable Fraction</b>  |                        | —                              | <b>5</b>                         |          |
| <b>Magnesium oxide fume</b>   | <b>1309-48-4</b>       | —                              | <b>10</b>                        |          |
| <b>Total Dust</b>   |                        | —                              | <b>5</b>                         |          |
| <b>Respirable Fraction</b>  |                        |                                |                                  |          |
| <b>Malathion</b>  | <b>121-75-5</b>        | —                              | <b>10</b>                        | <b>X</b> |
| Maleic anhydride  | 108-31-6               | 0.25                           | 1                                |          |
| Manganese Compounds and fume (as Mn)  | 7439-96-5              | —                              | 0.1<br>(C) 5                     |          |

| Substance  | CAS No. <sup>(c)</sup> | ppm <sup>(a)</sup>         | mg/m <sup>3</sup> <sup>(b)</sup> | Skin     |
|--|------------------------|----------------------------|----------------------------------|----------|
| <b>Marble</b>  | <b>1317-65-3</b>       |                            |                                  |          |
| <b>Total Dust</b>  |                        | —                          | <b>10</b>                        |          |
| <b>Respirable Fraction</b>   |                        | —                          | <b>5</b>                         |          |
| Mercury (aryl, inorganic, organo, and vapor) (as Hg)                 | 7439-97-6              |                            | (See Oregon Table Z-2)           |          |
| Mesityl oxide  | 141-79-7               | 25                         | 100                              |          |
| <b>Methane</b>   | <b>74-82-8</b>         | <b>1,000</b>               | —                                |          |
| Methanethiol, see Methyl mercaptan                                   |                        |                            |                                  |          |
| <b>Methoxychlor</b>  | <b>72-43-5</b>         |                            |                                  |          |
| <b>Total Dust</b>  |                        | —                          | <b>10</b>                        |          |
| <b>Respirable Fraction</b>   |                        | —                          | <b>5</b>                         |          |
| 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                            |          |
| Methyl acetylene-propadiene mixture (MAPP)                           |                        | 1,000                      | 1,800                            |          |
| Methyl acrylate  | 96-33-3                | 10                         | 35                               | X        |
| <b>Methylacrylonitrile</b>   | <b>126-98-7</b>        | <b>1</b>                   | <b>3</b>                         | <b>X</b> |
| 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                              |          |
| <b>Methyl bromide</b>  | <b>74-83-9</b>         | <b>15</b><br><b>(C) 20</b> | <b>60</b><br><b>(C) 80</b>       | <b>X</b> |
| Methyl butyl ketone, see 2-Hexanone                                  |                        |                            |                                  |          |
| Methyl cellosolve, see 2 Methoxy ethanol                             |                        |                            |                                  | X        |
| Methyl cellosolve acetate (Ethylene glycol monomethyl ether acetate) | 110-49-6               | 25                         | 120                              | X        |
| Methyl Chloride  | 74-87-3                |                            | (See Oregon Table Z-2)           |          |
| Methyl Chloroform (1,1,1-Trichloroethane)                            | 71-55-6                | 350                        | 1,900                            |          |
| Methyl Chloromethyl ether  |                        |                            | (See 1910.1003)                  |          |
| <b>Methyl 2-cyanoacrylate</b>  | <b>137-05-3</b>        | <b>2</b>                   | <b>8</b>                         |          |
| Methylcyclohexane  | 108-87-2               | 500                        | 2,000                            |          |
| <b>Methylcyclohexanol</b>  | <b>25639-42-3</b>      | <b>50</b>                  | <b>235</b>                       |          |
| <b>o-Methylcyclohexanone</b>   | <b>583-60-8</b>        | <b>50</b>                  | <b>230</b>                       | <b>X</b> |



| Substance   | CAS No. <sup>(c)</sup> | ppm <sup>(a)</sup>                            | mg/m <sup>3</sup> <sup>(b)</sup> | Skin     |
|---|------------------------|---|----------------------------------|----------|
| <b>2-Methylcyclopentadienyl manganese tricarbonyl (as Mn)</b>               | <b>12108-13-3</b>      | <b>0.1</b>                                    | <b>0.2</b>                       | <b>X</b> |
| <b>Methyl demeton</b>   | <b>8022-00-2</b>       | <b>—</b>                                      | <b>0.5</b>                       | <b>X</b> |
| 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        |
| <b>Methyl mercaptan</b>   | <b>74-93-1</b>         | <b>0.5</b><br><b>(C) 10</b>                   | <b>1</b><br><b>(C) 20</b>        |          |
| Methyl methacrylate   | 80-62-6                | 100   | 410                              |          |
| <b>Methyl parathion</b>   | <b>298-00-0</b>        | <b>—</b>                                      | <b>0.2</b>                       | <b>X</b> |
| Methyl propyl ketone, see 2-Pentanone                                       |                        |   |                                  |          |
| <b>Methyl silicate</b>  | <b>681-84-5</b>        | <b>(C) 5</b>                                  | <b>(C) 30</b>                    |          |
| a-Methyl styrene  | 98-83-9                | (C) 100                                       | (C) 480                          |          |
| <b>Methylene bisphenyl isocyanate (MDI)</b>                                 | <b>101-68-8</b>        | <b>(See Oregon Table Z-2 (diisocyanates))</b> |                                  |          |
| Methylenedianiline (MDA)  |                        | (See 1910.1050 & 1926.60) 0.01                |                                  |          |
| Methylene Chloride  | 75-09-2                | 25  | (See 1910.1052)                  |          |
| <b>Mineral Wool Fiber</b>   |                        | <b>—</b>                                      | <b>10</b>                        |          |
| <b>MOCA</b>   | <b>101-14-4</b>        |   | <b>(See 437-002-0346)</b>        |          |
| <b>Molybdenum (soluble compounds)</b>                                       | <b>7439-98-7</b>       | <b>—</b>                                      | <b>5</b>                         |          |
| <b>(insoluble compounds)</b>  |                        | <b>—</b>                                      | <b>10</b>                        |          |
| 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                               |          |
| <b>Naphthalene diisocyanate (NDI), see Oregon Table Z-2 (Diisocyanates)</b> | <b>3173-72-6</b>       |   |                                  |          |
| alpha-Naphthylamine   | 134-32-7               |   | (See 1910.1003)                  |          |
| beta-Naphthylamine  | 91-59-8                |   | (See 1910.1003)                  |          |
| Nickel carbonyl (as Ni)   | 13463-39-3             | 0.001   | 0.007                            |          |

| Substance                                    | CAS No. <sup>(c)</sup>                | ppm <sup>(a)</sup> | mg/m <sup>3</sup> <sup>(b)</sup> | Skin     |
|--|---------------------------------------|--------------------|----------------------------------|----------|
| Nickel, metal and insoluble compounds, as Ni | 7440-02-0                             | —                  | 1                                |          |
| Nickel, soluble compounds, (as Ni)           | 7440-02-0                             | —                  | 1                                |          |
| <b>Nicotine</b>                              | <b>54-11-5</b>                        | <b>0.075</b>       | <b>0.5</b>                       | <b>X</b> |
| 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 1910.1003)                  |          |
| 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 1910.1003)                  |          |
| Nitrotoluene (all isomers)                   | 88-72-2/<br>99-08-1/<br>99-99-0       | 5                  | 30                               | X        |
| Nitrotrichloromethane, see Chloropicrin      |                                       |                    |                                  |          |
| <b>Nitrous oxide</b>                         | <b>10024-97-5</b>                     | <b>50</b>          | <b>90</b>                        |          |
| Octachloronaphthalene                        | 2234-13-1                             | —                  | 0.1                              | X        |
| <b>Octane</b>                                | <b>111-65-9</b>                       | <b>400</b>         | <b>1,900</b>                     |          |
| Oil mist (mineral)                           | 8012-95-1                             | —                  | 5                                |          |
| <b>Oil mist, vapor</b>                       |                                       | <b>—</b>           | <b>(g)</b>                       |          |
| 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                              |          |
| <b>Parafin wax fume</b>                      | <b>8002-74-2</b>                      | <b>—</b>           | <b>1</b>                         |          |
| Paraquat respirable dust                     | 4685-14-7/<br>1910-42-5/<br>2074-50-2 | —                  | 0.5                              | X        |

| Substance  | CAS No. <sup>(c)</sup> | ppm <sup>(a)</sup> | mg/m <sup>3</sup> <sup>(b)</sup> | Skin     |
|--|------------------------|--------------------|----------------------------------|----------|
| Parathion  | 56-38-2                | —                  | 0.1                              | X        |
| <b>Particulates not otherwise regulated (PNOR)<sup>(f)</sup></b> |                        |                    |                                  |          |
| <b>Total Dust</b>  |                        | —                  | <b>10</b>                        |          |
| <b>Respirable Fraction</b>                                       |                        | —                  | <b>5</b>                         |          |
| Pentaborane  | 19624-22-7             | 0.005              | 0.01                             |          |
| Pentachloronaphthalene   | 1321-64-8              | —                  | 0.5                              | X        |
| Pentachlorophenol  | 87-86-5                | —                  | 0.5                              | X        |
| <b>Pentaerythritol</b>   | <b>115-77-5</b>        |                    |                                  |          |
| <b>Total Dust</b>  |                        | —                  | <b>10</b>                        |          |
| <b>Respirable Fraction</b>                                       |                        | —                  | <b>5</b>                         |          |
| <b>Pentane</b>   | <b>109-66-0</b>        | <b>500</b>         | <b>1,500</b>                     |          |
| 2-Pentanone (Methyl propyl ketone)                               | 107-87-9               | 200                | 700                              |          |
| Perchloroethylene (tetrachloroethylene)                          | 127-18-4               |                    | (See Oregon Table Z-2)           |          |
| Perchloromethyl mercaptan  | 594-42-3               | 0.1                | 0.8                              |          |
| Perchloryl fluoride  | 7616-94-6              | 3                  | 13.5                             |          |
| <b>Perlite</b>   | <b>93763-70-3</b>      |                    |                                  |          |
| <b>Total Dust</b>  |                        | —                  | <b>10</b>                        |          |
| <b>Respirable Fraction</b>                                       |                        | —                  | <b>5</b>                         |          |
| Petroleum distillates (naphtha) (Rubber Solvent)                 |                        | 500                | 2,000 <sup>(g)</sup>             |          |
| Phenol   | 108-95-2               | 5                  | 19                               | X        |
| <b>Phenothiazine</b>   | <b>92-84-2</b>         | —                  | <b>5</b>                         | <b>X</b> |
| 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                               |          |
| Phenyldiazine  | 100-63-0               | 5                  | 22                               | X        |
| <b>Phenylphosphine</b>   | <b>638-21-1</b>        | <b>(C) 0.05</b>    | <b>(C) 0.25</b>                  |          |
| 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                                |          |

| Substance   | CAS No. <sup>(c)</sup> | ppm <sup>(a)</sup> | mg/m <sup>3</sup> <sup>(b)</sup> | Skin     |
|---|------------------------|--------------------|----------------------------------|----------|
| Phosphorus pentasulfide   | 1314-80-3              | —                  | 1                                |          |
| Phosphorus trichloride  | 7719-12-2              | 0.5                | 3                                |          |
| Phthalic anhydride  | 85-44-9                | 2                  | 12                               |          |
| <b>Picloram</b>   | <b>1918-02-1</b>       |                    |                                  |          |
| <b>Total Dust</b>   |                        | —                  | <b>10</b>                        |          |
| <b>Respirable Fraction</b>  |                        | —                  | <b>5</b>                         |          |
| Picric acid   | 88-89-1                | —                  | 0.1                              | X        |
| Pindone (2-Pivalyl-1, 3-indan-dione)                              | 83-26-1                | —                  | 0.1                              |          |
| <b>Plaster of Paris</b>   | <b>26499-65-0</b>      |                    |                                  |          |
| <b>Total Dust</b>   |                        | —                  | <b>10</b>                        |          |
| <b>Respirable Fraction</b>  |                        | —                  | <b>5</b>                         |          |
| Platinum (Soluble Salts) as Pt                                    | 7440-06-4              | —                  | 0.002                            |          |
| Polychlorobiphenyls, see Chloro-diphenyls                         |                        |                    |                                  |          |
| <b>Portland Cement</b>  | <b>65997-15-1</b>      |                    |                                  |          |
| <b>Total Dust</b>   |                        | —                  | <b>10</b>                        |          |
| <b>Respirable Fraction</b>  |                        | —                  | <b>5</b>                         |          |
| Propane   | 74-98-6                | 1,000              | 1,800                            |          |
| Beta-Propiolactone  | 57-57-8                |                    | (See 1910.1003)                  |          |
| <b>Propargyl alcohol</b>  | <b>107-19-7</b>        | <b>1</b>           | —                                | <b>X</b> |
| n-Propyl acetate  | 109-60-4               | 200                | 840                              |          |
| n-Propyl alcohol  | 71-23-8                | 200                | 500                              |          |
| n-Propyl nitrate  | 627-13-4               | 25                 | 110                              |          |
| Propylene dichloride  | 78-87-5                | 75                 | 350                              |          |
| <b>Propylene glycol monomethyl ether</b>                          | <b>107-98-2</b>        | <b>100</b>         | <b>360</b>                       |          |
| 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                              |          |
| <b>RDX (Cyclonite)</b>  | <b>121-82-4</b>        | —                  | <b>1.5</b>                       | <b>X</b> |
| Rhodium, Metal fume and dusts,<br>as Rh                           | 7440-16-6              | —                  | 0.1                              |          |
| Soluble salts   | 7440-16-6              | —                  | 0.001                            |          |
| <b>Ronnel</b>   | <b>299-84-3</b>        | —                  | <b>10</b>                        |          |
| <b>Rosin core solder pyrolysis products<br/>(as Formaldehyde)</b> |                        | —                  | <b>0.1</b>                       |          |

| Substance  | CAS No. <sup>(c)</sup> | ppm <sup>(a)</sup> | mg/m <sup>3</sup> <sup>(b)</sup> | Skin |
|--|------------------------|--------------------|----------------------------------|------|
| Rotenone   | 83-79-4                | —                  | 5                                |      |
| <b>Rouge</b>   |                        |                    |                                  |      |
| <b>Total Dust</b>  |                        | —                  | <b>10</b>                        |      |
| <b>Respirable Fraction</b>   |                        | —                  | <b>5</b>                         |      |
| Selenium compounds (as Se)   | 7782-49-2              | —                  | 0.2                              |      |
| Selenium hexafluoride (as Se)  | 7783-79-1              | 0.05               | 0.4                              |      |
| <b>Silica, crystalline, respirable dust<sup>(i)</sup></b>                  |                        | —                  |                                  |      |
| <b>Cristobalite</b>  | <b>14464-46-1</b>      |                    | <b>(See Division 2/Z-Silica)</b> |      |
| <b>Quartz</b>  | <b>14808-60-7</b>      |                    |                                  |      |
| <b>Tripoli (as quartz)</b>   | <b>1317-95-9</b>       |                    |                                  |      |
| <b>Tridamite</b>   | <b>15468-32-3</b>      |                    |                                  |      |
| <b>Silicon</b>   | <b>7440-21-3</b>       |                    |                                  |      |
| <b>Total Dust</b>  |                        | —                  | <b>10</b>                        |      |
| <b>Respirable Fraction</b>   |                        | —                  | <b>5</b>                         |      |
| <b>Silicon carbide</b>   | <b>409-21-2</b>        |                    |                                  |      |
| <b>Total Dust</b>  |                        | —                  | <b>10</b>                        |      |
| <b>Respirable Fraction</b>   |                        | —                  | <b>5</b>                         |      |
| 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                                |      |
| <b>Starch</b>  | <b>9005-25-8</b>       |                    |                                  |      |
| <b>Total Dust</b>  |                        | —                  | <b>10</b>                        |      |
| <b>Respirable Fraction</b>   |                        | —                  | <b>5</b>                         |      |
| Stibine  | 7803-52-3              | 0.1                | 0.5                              |      |
| <b>Stoddard solvent</b>  | <b>8052-41-3</b>       | <b>200</b>         | <b>1,150</b>                     |      |
| Strychnine   | 57-24-9                | —                  | 0.15                             |      |
| Styrene  | 100-42-5               |                    | (See Oregon Table Z-2)           |      |
| <b>Subtilisins (Proteolytic enzymes) (as 100% pure crystalline enzyme)</b> | <b>1395-21-7</b>       | —                  | <b>(C) 0.0003</b>                |      |
| <b>Sucrose</b>   | <b>57-50-1</b>         |                    |                                  |      |
| <b>Total Dust</b>  |                        | —                  | <b>10</b>                        |      |
| <b>Respirable Fraction</b>   |                        | —                  | <b>5</b>                         |      |
| 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                             |      |
| <b>Sulfur tetrafluoride</b>  | <b>7783-60-0</b>       | <b>0.1</b>         | <b>0.4</b>                       |      |

| Substance  | CAS No. <sup>(c)</sup> | ppm <sup>(a)</sup> | mg/m <sup>3</sup> <sup>(b)</sup> | Skin     |
|--|------------------------|--------------------|----------------------------------|----------|
| 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                              |          |
| <b>Temephos</b>                                  | <b>3383-96-8</b>       |                    |                                  |          |
| <b>Total Dust</b>                                |                        | —                  | <b>10</b>                        |          |
| <b>Respirable Fraction</b>                       |                        | —                  | <b>5</b>                         |          |
| <b>TEPP (Tetraethyl pyrophosphate)</b>           | <b>107-49-3</b>        | <b>0.004</b>       | <b>0.05</b>                      | <b>X</b> |
| Terphenyls                                       | 26140-60-3             | (C) 1              | (C) 9                            |          |
| 1, 1, 1, 2-Tetrachloro-2, 2-difluoro-ethane      | 76-11-9                | 500                | 4,170                            |          |
| 1, 1, 2, 2-Tetrachloro-1, 2-difluoro-ethane      | 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                                |          |
| Tetryl (2, 4, 6-trinitro-phenyl-methylnitramine) | 479-45-8               | —                  | 1.5                              | X        |
| Thallium (soluble compounds) as Tl               | 7440-28-0              | —                  | 0.1                              | X        |
| <b>4,4'-Thiobis (6-tert, Butyl-m-cresol)</b>     | <b>96-69-5</b>         |                    |                                  |          |
| <b>Total Dust</b>                                |                        | —                  | <b>10</b>                        |          |
| <b>Respirable Fraction</b>                       |                        | —                  | <b>5</b>                         |          |
| <b>Thiram</b>                                    | <b>137-26-8</b>        |                    | <b>(See 437-002 0373) 0.15</b>   |          |
| Tin (inorganic compounds, except oxides) as Sn   | 7440-31-5              | —                  | 2                                |          |
| Tin (organic compounds)                          | 7440-31-5              | —                  | 0.1                              |          |

| Substance   | CAS No. <sup>(c)</sup> | ppm <sup>(a)</sup> | mg/m <sup>3</sup> <sup>(b)</sup> | Skin |
|---|------------------------|--------------------|----------------------------------|------|
| <b>Tin oxide</b>  | <b>1332-29-2</b>       |                    |                                  |      |
| <b>Total Dust</b>   |                        | —                  | <b>10</b>                        |      |
| <b>Respirable Fraction</b>  |                        | —                  | <b>5</b>                         |      |
| Titanium dioxide  | 13463-67-7             | —                  | 10                               |      |
| Toluene (toluol)  | 108-88-3               |                    | (See Oregon Table Z-2)           |      |
| <b>Toluene diisocyanate (TDI), See Oregon Table Z-2 (Diisocyanates)</b> | <b>584-84-9</b>        |                    |                                  |      |
| 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 Oregon 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                            |      |
| <b>Trimethyl benzene</b>  | <b>25551-13-7</b>      | <b>25</b>          | <b>120</b>                       |      |
| 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                                |      |
| <b>Tungsten &amp; compounds, as W</b>                                   | <b>7440-33-7</b>       |                    |                                  |      |
| <b>Soluble</b>  |                        | —                  | <b>1</b>                         |      |
| <b>Insoluble</b>  |                        | —                  | <b>5</b>                         |      |
| Turpentine  | 8006-64-2              | 100                | 560                              |      |
| Uranium (as U)  | 7440-61-1              |                    |                                  |      |
| Soluble compounds   |                        | —                  | 0.05                             |      |
| <b>Insoluble compounds</b>  |                        | —                  | <b>0.2</b>                       |      |
| <b>Vanadium respirable dust</b>   |                        |                    |                                  |      |
| <b>(as V<sub>2</sub>O<sub>5</sub>)</b>                                  | <b>1314-62-1</b>       | —                  | <b>(C) 0.5</b>                   |      |
| <b>Fume (as V<sub>2</sub>O<sub>5</sub>)</b>                             | <b>1314-62-1</b>       | —                  | <b>(C) 0.05</b>                  |      |

| Substance                         | CAS No. <sup>(c)</sup> | ppm <sup>(a)</sup> | mg/m <sup>3</sup> <sup>(b)</sup> | Skin |
|-----------------------------------|------------------------|--------------------|----------------------------------|------|
| <b>Vegetable oil mist</b>         |                        |                    |                                  |      |
| <b>Total Dust</b>                 |                        | —                  | <b>10</b>                        |      |
| <b>Respirable Fraction</b>        |                        | —                  | <b>5</b>                         |      |
| <b>Vinyl acetate</b>              | <b>108-05-4</b>        | <b>10</b>          | <b>30</b>                        |      |
| Vinyl benzene, see Styrene        |                        |                    |                                  |      |
| <b>Vinyl bromide</b>              | <b>593-60-2</b>        | <b>250</b>         | <b>1,100</b>                     |      |
| Vinyl chloride                    | 75-01-4                |                    | (See 1910.1017)                  |      |
| Vinyl cyanide, see Acrylonitrile  |                        |                    |                                  |      |
| Vinyl toluene                     | 25013-15-4             | 100                | 480                              |      |
| Warfarin                          | 81-81-2                | —                  | 0.1                              |      |
| <b>Wood Dust (non-allergenic)</b> |                        | —                  | <b>10</b>                        |      |
| 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                                |      |
| <b>Zinc oxide</b>                 | <b>1314-13-2</b>       |                    |                                  |      |
| <b>Total Dust</b>                 |                        | —                  | <b>10</b>                        |      |
| <b>Respirable Fraction</b>        |                        | —                  | <b>5</b>                         |      |
| Zinc oxide fume                   | 1314-13-2              | —                  | 5                                |      |
| <b>Zinc stearate</b>              | <b>557-05-1</b>        |                    |                                  |      |
| <b>Total Dust</b>                 |                        | —                  | <b>10</b>                        |      |
| <b>Respirable Fraction</b>        |                        | —                  | <b>5</b>                         |      |
| Zirconium compounds (as Zr)       | 7440-67-7              | —                  | 5                                |      |

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

**Note:** PNOR means “particles not otherwise regulated.”

**Footnotes:**

- (a) Parts of vapor or gas per million parts of contaminated air by volume at 25°C and 760 torr.
- (b) Milligrams of substance per cubic meter of air. When entry is in this column only, the value is exact; when listed with a ppm entry, it is approximate.
- (c) The CAS number is for information only. Enforcement is based on the substance name. For an entry covering more than one metal compound, measured as the metal, the CAS number for the metal is given – not CAS numbers for the individual compounds.



- (d) The final benzene standard in 1910.1028 applies to all occupational exposures to benzene except in some circumstances the distribution and sale of fuels, sealed containers and pipelines, coke production, oil and gas drilling and production, natural gas processing, and the percentage exclusion for liquid mixtures; for the excepted subsegments, the benzene limits in Oregon Table Z-2 apply. See 1910.1028 for specific circumstances.
- (e) This 8-hour TWA applies to respirable dust as measured by a vertical elutriator cotton dust sampler or equivalent instrument. The time weighted average applies to the cotton waste processing operations of waste recycling (sorting, blending, cleaning, and willowing) and garnetting. See also 1910.1043 for cotton dust limits applicable to other sectors.
- (f) All inert or nuisance dusts, whether mineral, inorganic, or organic, not listed specifically by substance name are covered by the Particulates Not Otherwise Regulated (PNOR) limit which is the same as the inert or nuisance dust limit of Oregon Table Z-3.
- (g) Usually a mixture, in general the aromatic hydrocarbon content will determine which TWA applies.
- (h) 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/m<sup>3</sup>.
- (i) 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.
- (j) See Table Z-3 for the exposure limit for any operations or sectors where the exposure limit in Division 2/Z-Silica is stayed or is otherwise not in effect.
- (k) See Table Z-2 for the exposure limits for any operations or sectors where the exposure limits in Division 2/Z Beryllium are stayed or otherwise not in effect.



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 <sup>(a)</sup> (Z37.4-1969)   | 10 ppm                        | 25 ppm                           | 50 ppm  | 10 min.   |          |
| Beryllium, and beryllium compounds (Z37.29-1970) <sup>(d)</sup>             | 2 µg/m <sup>3</sup>           | 5 µg/m <sup>3</sup>              | 25 µg/m <sup>3</sup>  | 30 min.   |          |
| Cadmium fume <sup>(b)</sup> (Z37.5-1970)                                    | 0.1 mg/m <sup>3</sup>         | 0.3 mg/m <sup>3</sup>            |   |   |          |
| Cadmium dust <sup>(b)</sup> (Z37.5-1970)                                    | 0.2 mg/m <sup>3</sup>         | 0.6 mg/m <sup>3</sup>            |   |   |          |
| 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 <sub>3</sub> ) <sup>c</sup> |                               | 0.1 mg/m <sup>3</sup>            |   |   |          |
| 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 <sup>3</sup>         |                                  |   |   |          |
| Formaldehyde (see 1910.1048)  |                               |                                  |   |   |          |
| Hydrogen fluoride (Z37.28-1969)   | 3 ppm                         |                                  |   |   |          |
| Hydrogen sulfide (Z37.2-1966)   |                               | 20 ppm                           | 50 ppm  | 10 min. once, only if no other measurable exposure occurs |          |
| <b>Mercury (Z37.8-1971)</b>   | <b>0.05 mg/m<sup>3</sup></b>  | <b>0.1 mg/m<sup>3</sup></b>      |   |   | <b>X</b> |
| Methyl chloride (Z37.18-1969)   | 100 ppm                       | 200 ppm                          | 300 ppm   | 5 min. in any 3 hrs                                       |          |
| <b>Organo (alkyl) mercury (Z37.30-1969)</b>                                 | <b>0.001 mg/m<sup>3</sup></b> | <b>0.01 mg/m<sup>3</sup></b>     |   |   | <b>X</b> |
| Styrene (Z37.15-1969)   | 100 ppm                       | 200 ppm                          | 600 ppm   | 5 min. in any 3 hrs                                       |          |

| 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    |      |
| Tetrachloroethylene (Z37.22-1967) | 100 ppm                      | 200 ppm                          | 300 ppm   | 5 min. in any 3 hrs |      |
| <b>Toluene (Z37.12-1967)</b>      | <b>100 ppm</b>               | <b>300 ppm</b>                   | <b>500 ppm</b>  | <b>10 min.</b>      |      |
| Trichloroethylene (Z37.19-1967)   | 100 ppm                      | 200 ppm                          | 300 ppm   | 5 min. in any 2 hrs |      |

Oregon Table Z-2 (Continued)

| 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 |      |
| <b>Diisocyanates</b>  |                                    |                                     |   |                  |      |
| Dicyclohexylmethane 4,4'-diisocyanate (hydrogenated MDI)  | .055 mg/m<br>.005 ppm              | 0.210 mg/m <sup>3</sup><br>0.02 ppm |   |                  |      |
| Diphenylmethane diisocyanate (MDI)  | .050 mg/m <sup>3</sup><br>.005 ppm | 0.200 mg/m <sup>3</sup><br>0.02 ppm |   |                  |      |
| Hexamethylene diisocyanate (HDI)  | .035 mg/m <sup>3</sup><br>.005 ppm | 0.140 mg/m <sup>3</sup><br>0.02 ppm |   |                  |      |
| 1,6 Hexamethylene diisocyanated Based Adduct(includes HDI-Biuret trimer, and other polymeric forms of HDI, including isocyanurates) | 0.5 mg/m <sup>3</sup>              | 1.0 mg/m <sup>3</sup>               |   |                  |      |
| Isophorone diisocyanate (IPDI)  | .045 mg/m <sup>3</sup><br>005 ppm  | 0.180 mg/m <sup>3</sup><br>0.02 ppm |   |                  |      |
| Napthalene diisocyanate (NDI)   | .040 mg/m <sup>3</sup><br>.005 ppm | 0.170 mg/m <sup>3</sup><br>0.02 ppm |   |                  |      |
| Toluene diisocyanate (TDI)  | .035 mg/m <sup>3</sup><br>.005 ppm | 0.140 mg/m <sup>3</sup><br>0.02 ppm |   |                  |      |

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

**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, 1910.1028.
- (b) This standard applies to any operations or sectors for which the Cadmium Standard, 1910.1027, is stayed or otherwise not in effect.
- (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.
- (d) This standard applies to any operations or sectors for which the exposure limits in the beryllium standard, Division 2/Z Beryllium, are stayed or is otherwise not in effect.

Oregon Table Z-3 Mineral Dusts

| Substance   | mppcf <sup>(a)</sup> | mg/m <sup>3</sup>   |
|---|----------------------|---|
| Silica:   |                      |   |
| Crystalline   |                      |   |
| Quartz (respirable)   |                      | 0.1 mg/m <sup>3</sup>                                     |
| Quartz (total dust)   |                      | $\frac{30 \text{ mg/m}^3\text{(e)}}{\% \text{SiO}_2 + 2}$ |
| Cristobalite (respirable)   |                      | 0.05 mg/m <sup>3</sup>                                    |
| Tridymite: Use 1/2 the value calculated from the formulae for quartz. |                      |   |
| Amorphous, including natural diatomaceous earth                       | 20                   | $\frac{80 \text{ mg/m}^3\text{(e)}}{\% \text{SiO}_2}$     |
| Silicates (less than 1% crystalline silica):                          |                      |   |
| Mica  | 20                   |   |
| Soapstone   | 20                   |   |
| Talc (not containing asbestos)  | 20 <sup>(c)</sup>    |   |
| Talc (containing asbestos) Use asbestos limit.                        | 20                   |   |
| Tremolite, asbestiform (see OAR 437, Div. 2/Z, 1910.1001, Asbestos).  |                      |   |
| Portland cement   | 50                   |   |
| Graphite (Natural)  |                      | 5 mg/m <sup>3</sup>                                       |
| Coal Dust:  |                      |   |
| Respirable fraction less than 5% SiO <sub>2</sub>                     |                      | 2.4 mg/m <sup>3</sup> (e) (f)                             |
| Coal Dust:  |                      |   |
| Respirable fraction greater than 5% SiO <sub>2</sub>                  |                      | 0.1 mg/m <sup>3</sup> (e)                                 |
| <b>Inert or Nuisance Dust:</b> <sup>(d)</sup>                         |                      |   |
| <b>Respirable fraction</b>  |                      | <b>5 mg/m<sup>3</sup></b>                                 |
| <b>Total dust</b>   |                      | <b>10 mg/m<sup>3</sup></b>                                |

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

**Note:** Conversion factors - mppcf x 35.3 = million particles per cubic meter = particles per c.c.

**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 have been shown to be applicable.
- (c) Containing less than 1% quartz; if 1% quartz or more, use quartz limit.
- (d) All inert or nuisance dusts, whether mineral, inorganic, or organic, not listed specifically by substance name are covered by this limit, which is the same as the Particulates Not Otherwise Regulated (PNOR) limit in Oregon Table Z-1.
- (e) Silica sampling methods must conform to OSHA or NIOSH sampling methods for respirable quartz silica.
- (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/m<sup>3</sup> in the table for coal dust is 4.5 mg/m<sup>3</sup>.

Statutory/Other Authority: ORS 654.025(2), 654.035 and 656.726(4)

Statutes/Other Implemented: ORS 654.001 - 654.295

History: WCB Administrative Order, Safety 3-1975, filed 10/6/75, effective 11/1/75.

WCB Administrative Order, Safety 6-1978, filed 7/5/78, effective 7/15/78.

WCD Administrative Order, Safety 12-1979, filed 12/21/79, effective 3/1/80.

WCB Administrative Order, Safety 2-1980, filed 4/17/80, effective 8/1/80.

WCB Administrative Order, Safety 1-1982, filed 3/4/82, effective 5/5/82.

WCB Administrative Order, Safety 6-1983, filed 5/25/83, effective 5/25/83.

WCB Administrative Order, Safety 21-1984, filed 12/20/84, effective 1/1/85.

WCD Administrative Order, Safety 4-1986, filed 5/5/86, effective 5/5/86.

WCB Administrative Order, Safety 5-1986, filed 5/20/86, effective 6/13/86.

APD Administrative Order, Safety 13-1989, filed 7/17/89, effective 7/17/89.

OR-OSHA Administrative Order 6-1993, filed 5/17/93, effective 5/17/93 (temp).

OR-OSHA Administrative Order 17-1993, filed 11/15/93, effective 11/15/93 (perm).

OR-OSHA Administrative Order 5-1997, filed 4/22/97, effective 4/22/97.

OR-OSHA Administrative Order 6-1997, filed 5/2/97, effective 5/2/97.

OR-OSHA Administrative Order 4-2001, filed 2/5/01, effective 2/5/01.

OR-OSHA Administrative Order 6-2006, filed 8/30/06, effective 8/30/06.

OR-OSHA Administrative Order 6-2008, filed 5/13/08, effective 7/1/08.

OR-OSHA Administrative Order 5-2016, filed 9/23/16, effective 7/1/18.

OR-OSHA Administrative Order 3-2017, filed 07/07/17, effective 03/12/18.

OR-OSHA Administrative Order 11-2021, filed 9/1/21, effective 9/1/22.

## Historical Notes for Subdivision Z, Air Contaminants

**Note:** OR-OSHA rules for Air Contaminants were adopted or repealed temporarily on 5/17/93 in OAR 437, Division 2/Z, Toxic and Hazardous Substances, by OR-OSHA Administrative Order 6-1993 (temp.). At the same time, a Notice of Rulemaking was filed to adopt the rule changes permanently. Revised rules for Air Contaminants have now been adopted PERMANENTLY by **OROSHA Administrative Order 17-1993, filed 11/15/93, EFFECTIVE 11/15/93.**

Due to the July 1992 decision by the U. S. Court of Appeals for the 11th Circuit (AFL-CIO v. OSHA, 15 OSHC 1729), it became necessary for Federal OSHA to first vacate and subsequently to revise its Air Contaminant Standard. To ensure adequate protection for Oregon workers during the interim, OR-OSHA temporarily readopted Oregon Air Contaminant rules (in former Division 114) that were in place prior to OR-OSHA's adoption of the now-vacated federal standard. In this Permanent Adoption, OR-OSHA has combined the former Oregon Air Contaminant standard with the recently revised federal standard, in order to maintain the level of protection historically provided in Oregon.

Oregon-initiated Rule 437-002-0360 is the rule which adopts by reference the federal standards in Division 2/Z. Federal standard 29 CFR 1910.1000 has been repealed because OAR 437-002-0382 now contains Air Contaminants rules effective in Oregon. OAR 437-002-0381 has also been repealed because it pertains to the now-vacated 1910.1000. OAR 437-002-0385 has been repealed because its provisions are now included in 437-002-0382.

**Note:** The definition for Excursion Limits from the booklet "1993-1994 Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices" published by the American Conference of Governmental Industrial Hygienists (ACGIH), is used in lieu of an older definition in OAR 437-002-0382(1)(c).

**Note:** Changes to Oregon-initiated rule OAR 437-002-0382 and 437-005-0030, Oregon Rules for Air Contaminants, are adopted by **OR-OSHA Administrative Order 5-1997, filed and effective 4/22/97.**

These rules are located in Division 2/Z and 5/Z, Toxic and Hazardous Substances.

The changes correct clerical errors; add language to clarify the requirements of Oregon Table Z-2; readopt permissible limits for zinc oxide total particulates; and, adopt permissible limits for zinc oxide respirable dust and soluble nickel compounds from federal OSHA's final rule on Air Contaminants.

**Note:** Federal OSHA amended the standards that regulate employee exposure to 1,3-Butadiene and Methylene Chloride. Oregon OSHA adopts these standards by reference into Oregon's Division 2, General Occupational Safety and Health Rules; Division 3, Construction; Division 5, Maritime Activities; and amend Oregon's Air Contaminants, by **OR-OSHA Administrative Order 6-1997, filed and effective 5/2/97.**

Federal OSHA has determined, based on studies and tests, that the current permissible exposure limits (PELs) do not properly protect workers. Both final standards have reduced PELs.

In order to reduce exposures and protect employees, OSHA's 1,3-Butadiene and Methylene Chloride standards include requirements such as engineering controls, work practices and personal protective equipment, measurement of employee exposures, training, medical surveillance, hazard communication, regulated areas, emergency procedures and recordkeeping.

**Note:** Oregon OSHA standards must be as effective as federal OSHA. There were slight differences in the air contaminants rules. Therefore, OR-OSHA has modified three substances: Carbon disulfide; Ethylene dibromide; and Mercury and Mercury organo (alkyl), to match federal OSHA's standard in construction and maritime. For uniformity, Oregon initiated air contaminant rules in general industry, construction and agriculture will all reflect the amendments.

Oregon added the skin designation to the three substances listed above. Also, Oregon changed the PEL to 25 ppm ceiling value for Ethylene dibromide (currently at 30 ppm).

This is **Oregon OSHA Administrative Order number 4-2001, Adopted and effective February 5, 2001.**

**Note:** This rule adds new requirements for exposures to hexavalent chromium, including a lower airborne permissible exposure limit, an action level, airborne exposure assessments, regulated areas, change and washing facilities, medical surveillance, and training.

These changes are required to keep OR-OSHA standards as effective as Federal OSHA. Oregon OSHA did not adopt the exception for pesticide use. Federal OSHA does not regulate the use of pesticides because the Environmental Protection Agency (EPA) regulates these exposures through the Worker Protection Standard (WPS). However, since Oregon OSHA enforces the WPS this exemption does not apply in Oregon.

Oregon OSHA adopted these changes into general industry, construction, agriculture, and maritime.

The proposed amendments to the permissible limit for airborne concentrations of respirable silica were not adopted in this rulemaking.

This is **Oregon OSHA Administrative Order 6-2006, adopted and effective August 30, 2006.**

**Note:** On March 25, 2016, federal OSHA adopted final rules for crystalline silica for general industry, construction, and maritime. Before these rules, the only specific rule for crystalline silica was an airborne permissible exposure limit (PEL) of 100 micrograms per cubic meter of air ( $\mu\text{g}/\text{m}^3$ ). With the adoption of these rules, federal OSHA lowered the PEL from 100  $\mu\text{g}/\text{m}^3$  to 50  $\mu\text{g}/\text{m}^3$ , and instituted an action level of 25  $\mu\text{g}/\text{m}^3$ . These rules require an exposure assessment, with periodic monitoring under certain circumstances, requires engineering and work practice controls to reduce exposure levels, institutes a written exposure control plan, requires provisions for regulating employee access to certain areas, respiratory protection, medical surveillance, and employee training and information. The construction rule also lists specific tasks with engineering controls, work practice controls, and respiratory protection for specific tasks that do not require an exposure assessment, and requires that a competent person ensure that the written program and specific tasks are followed.



On July 15, 2016 Oregon OSHA proposed to combine the requirements of the general industry and construction rules into one set of rules applicable to both industries, as new Oregon-initiated rules OAR 437-002-1053 through 437-002-1065. These Oregon-initiated rules provide the same options for construction employers to use certain specified methods in lieu of an exposure assessment as the federal rules, and a note was added at Table 1 in 437-002-1057 Specified exposure control methods, to remind employers that the rest of the rules still apply.

Oregon OSHA amended the compliance dates to July 1, 2018 for both general industry and construction. The one effective date, paired with education and outreach, will help increase employer understanding and compliance with the new silica standard. The effective date for medical evaluations for employees exposed to airborne levels above the action level but below the PEL is July 1, 2020.

This is **Oregon OSHA Administrative Order 5-2016, adopted September 23, 2016, and effective July 1, 2018.**

**Note:** On January 9, 2017, federal OSHA adopted final rules for beryllium for general industry, construction, and maritime. Before these rules, the only specific rule for beryllium was an airborne permissible exposure limit (PEL) of 2 micrograms per cubic meter of air ( $\mu\text{g}/\text{m}^3$ ). With the adoption of these rules, federal OSHA lowered the PEL from 2  $\mu\text{g}/\text{m}^3$  to 0.2  $\mu\text{g}/\text{m}^3$ , and instituted an action level of 0.1  $\mu\text{g}/\text{m}^3$ . These rules require an exposure assessment, with periodic monitoring under certain circumstances, requires engineering and work practice controls to reduce exposure levels, institutes a written exposure control plan, requires provisions for regulating employee access to certain areas, respiratory protection, medical surveillance, and employee training and information.

Oregon OSHA combined the requirements of the general industry and construction rules into one set of rules applicable to both industries, as new Oregon-initiated rules OAR 437-002-2024 through 437-002-2026, 437-002-2028 through 437-002-2030, 437-002-2032 through 437-002-2038, 437-002-2040, and 437-002-2045.

Oregon OSHA also updated the air contaminants rules for general industry and construction, OAR 437-002-0382 and 437-003-1000, to reflect the new beryllium rules.

Two public hearings were held during June of 2017. Oregon OSHA did not receive any comments at these hearings. We received one written comment in support of this rulemaking.

This is **Oregon OSHA Administrative Order 3-2017, adopted July 7, 2017 and effective March 12, 2018.**

**Note:** Oregon OSHA is adopting changes to their administrative (recordkeeping), general industry, and construction standards, and updating references in the maritime activity standards in response to federal OSHA's adoption of final rules published in the May 14, 2019 Federal Register. This is Phase IV of federal OSHA's Standards Improvement Project (SIP-IV), the fourth in a series of rulemakings to improve and streamline workplace safety and health standards. Oregon's response removes or revises rules or requirements within our corresponding rules that are outdated, duplicative, or inconsistent. This rulemaking is anticipated to reduce regulatory burden and compliance costs while maintaining or enhancing worker safety and health as well as worker privacy protections.

In Division 2Z, Air Contaminants, Oregon OSHA updated the adopt by reference rule for air contaminants rules.

This is **Oregon OSHA Administrative Order 3-2019, filed and effective October 29, 2019.**

**Note:** This rulemaking reduces Oregon OSHA's permissible exposure limit (PEL) for manganese compounds and fume (as Mn, C.A.S. #7349-96-5) in the Air Contaminants rules for general industry (Subdivision 2/Z), construction (Subdivision 3/Z), and agriculture (Subdivision 4/Z). The revised PEL is 0.1 mg/m<sup>3</sup>, as an 8-hour time-weighted average; and retains the ceiling limit of 5 mg/m<sup>3</sup>.

It clarified and simplified the Oregon-initiated rules that supplement the federal OSHA 29 CFR 1910.252 General Requirements protections in Subdivision 2/Q, and amended:

- 437-002-0280- Adoption by Reference,
- 437-002-0282- Job Planning and Layout,
- 437-002-0283- Additional Protective Clothing Requirements,
- 437-002-0284- Additional Specifications for Eye and Face Protection,
- 437-002-0285- Additional Special Precautions,
- 437-002-0286- Flammable Preservative Coatings,
- 437-002-0287- Toxic Preservative Coatings,
- 437-002-0288- Additional General Health Protection,
- 437-002-0297- Oregon Requirements for Welding or Cutting Containers, and
- 437-002-0298- Supplied Air Respiratory Equipment.

This rulemaking also adopted three new rules to supplement the requirements in Subdivision 2/Q.

OAR 437-002-0279, Additional Oregon Confined Space Requirements clarifies and standardizes the protections for workers welding in confined spaces. The rule title emphasizes that these requirements related to welding in confined spaces are in addition to those in 29 CFR 1910.252.

OAR 437-002-0281, Manganese (includes a new Table OR Q-2.) Offers an alternative to air monitoring for estimating manganese exposures. The rule allows employers to use specific levels of respiratory protection – based on the assigned protective factor (APF) of the equipment -- for specific types of welding tasks within specific periods of time and other limits. The new Table OR Q-2 correlates this approach which is offered as an option, and not as a requirement.

OAR 437-002-0299, Definitions. Adds a more general definition of terms used in Division 2/Q. (This new rule is referenced in 437-002-0280 as a substitute for the repealed 1910.251, replacing the previous reference to 437-002-2253, where the definitions in the rule only pertain to that specific rule.)

This is **Oregon OSHA Administrative Order 11-2021, adopted September 1, 2021, and effective September 1, 2022**