

**Draft**

**1999 Update  
Arizona Ambient Air Quality Guidelines  
(AAAQGs)**



**Prepared by**

**The Office of Environmental Health**

**Prepared for**

**The Arizona Department of Environmental Quality  
Air Programs Division**

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## **1.0 INTRODUCTION**

The Arizona Department of Health Services (ADHS) began developing health-based guidelines for contaminants in air for the Arizona Department of Environmental Quality (ADEQ) shortly after the ADEQ was formed in July of 1987. The ADHS added chemicals to the list and updated Arizona Ambient Air Quality Guidelines (AAAQGs) for the ADEQ over the next several years. A comprehensive list of AAAQGs was compiled in 1992. The ADEQ and various counties in Arizona have been using the 1992 list of AAAQGs as health-based reference values for making risk management decisions in their environmental programs.

This document updates the 1992 AAAQGs list, incorporating more recent toxicological data and occupational standards. The methods, equations, and assumptions used to develop this updated list are identical to those historically used to develop AAAQGs.

AAAQGs are residential screening values that are protective of human health, including children. Chemical concentrations in air that exceed AAAQGs may not necessarily represent a health risk. Rather, when contaminant concentrations exceed these guidelines, further evaluation may be necessary to determine whether there is a true threat to human health.

AAAQGs are not intended to be used as standards. Rather, they are intended to provide health-based guidelines that may be useful in making environmental risk management decisions. AAAQGs consider human health risk from inhalation of contaminants in ambient air. They do not take into account odor thresholds or threats to wildlife.

## **2.0 METHODOLOGY**

### **2.1 Overview**

AAAQGs are calculated using a human health-based approach developed by the ADHS. One-hour and 24-hour AAAQGs use occupational exposure limits established or recommended by the United States Occupational Safety and Health Administration (OSHA), the National Institute of Occupational Safety and Health (NIOSH), the National Institute for Environmental Health Sciences (NIEHS). Annual AAAQGs use cancer slope factors (SF) from the United States Environmental Protection Agency (USEPA). The most protective occupational standards or recommended levels from the United States (US) were used when a standard or recommendation existed. When no US standard or recommendation was found, the most protective standard or recommendation from Western Europe or Japan was used. If standards or recommendations were lacking from those sources, values from Eastern Europe, the former Soviet Union or South America were used. In the cases where no data could be located, the AAAQG value was left blank.

The methodology used to calculate Annual, 24-Hour, and One-Hour AQQs are discussed in Sections 2.2 through 2.4.

## 2.2 Annual AQGs

Annual AQGs are calculated for possible, probable and known human carcinogens. They protect against toxic doses of systemic toxicants, and limit excess lifetime cancer risk to one-in-one million ( $10^{-6}$ ) for known human carcinogens. The guidelines use standard USEPA residential exposure assumptions. They assume that constant exposure occurs over a lifetime (70 years). The default exposure factors were obtained primarily from *Risk Assessment Guidance for Superfund (RAGS), Supplemental Guidance Standard Default Exposure Factors* (OSWER Directive, 9285.6-03) dated March 25, 1991.

Annual AQGs assume an exposure frequency of 365 days/year for 70 years. Exposure doses are averaged over a lifetime (70 years) for carcinogens. They use USEPA carcinogenic slope factors from the USEPA Integrated Risk Information System (IRIS) through January 1999, USEPA Health Effects Assessment Summary Tables (HEAST) through 1998, and the USEPA National Center for Environmental Assessment (NCEA). The priority among sources of toxicological values used is as follows: (1) IRIS, (2) HEAST, (3) NCEA, and (4) withdrawn values from IRIS or HEAST and values under review. Oral cancer slope reference doses and cancer slope were used when no toxicity values were available for inhalation exposure.

The target excess lifetime cancer risk is one-in-one-million ( $1E-6$ ). Equation 1 displays the formula and assumptions used to calculate Annual AQGs. Annual AQGs are not developed for those substances on the list that are not suspected of causing cancer.

## 2.3 Twenty-four-hour AAAQGs

Twenty-four-hour AAAQGs are developed using a methodology that uses occupational exposure limits and appropriate conversion safety factors. Twenty-four-hour AAAQGs also protect against excessive exposure to possible, probable, and known human carcinogens.

Twenty-four-hour AAAQGs were developed by dividing the most recent and lowest 8-hour OSHA Time Weighted Average (TWA) or other occupational exposure limit or recommendation by 126. The divisor of 126 is a factor which incorporates the conversion of an 8-hour, 5 day work week to a 24-hour, 7 day week of 4.2, and a safety factor of 30 to protect the most sensitive members of the population such as children and the elderly. Equation 2 displays the formula for calculating 24-hour AQGs based upon systemic toxicity.

Twenty-four-hour AAAQGs for probable and known human carcinogens were developed by taking the more protective value of the 24-hour AAAQG based upon systemic toxicity, or 365 times the Annual AAAQG, which is based on a one-in-a-million excess lifetime cancer risk. Equation 3 displays the formula for calculating the 24-hour AAAQG for carcinogens.

## 2.4 One-hour AAAQGs

One-hour AAAQGs are calculated by taking the more protective of the Short Term Exposure Limit (STEL) or other short term standard or guideline divided by 120, or the 24-Hour AQG multiplied by 3.8. The divisor for calculating a 1-Hour AQG using a STEL represents a conversion factor that converts a 15 minute exposure into a one-hour exposure, and a safety factor of 30 to protect the most sensitive members of the population such as children and the elderly.

The multiplier of 3.8, which is used in the calculation of a 1-hour AAAQG based upon the 24-hour AQG, represents the proportional difference in the lowest observed adverse effect level for 24-hour and 1-hour exposure to a common irritant (SO<sub>2</sub>) in human subjects.

## 3.0 SUMMARY

The ADHS began developing health-based guidelines for contaminants in air for the ADEQ shortly after the ADEQ was formed in July of 1987. The ADHS added chemicals to the list and updated AAAQGs for the ADEQ over the next several years. The most recent comprehensive list of AAAQGs was developed in 1992. The ADEQ and various counties in Arizona have been using the 1992 list of AAAQGs as health-based reference values for making risk management decisions in their environmental programs.

This document updates the 1992 AAAQGs list, incorporating more recent toxicological data and occupational standards. The methods, equations, and assumptions used to develop this updated list are identical to those historically used to develop AAAQGs.

AAAQGs are protective of human health, including children. Chemical concentrations in air that exceed AAAQGs may not necessarily represent a health risk.

Rather, when contaminant concentrations exceed these guidelines, further evaluation may be necessary to determine whether there is a true threat to human health. AAAQGs consider human health risk from inhalation of contaminants in ambient air; they do not take into account odor thresholds or threats to wildlife.

These guidelines were calculated using a human health-based approach developed by the ADHS. One-hour and 24-hour AAAQGs are calculated using occupational exposure limits established or recommended by the United States Occupational Safety and Health Administration (OSHA), the National Institute of Occupational Safety and Health (NIOSH), the National Institute for Environmental Health Sciences. Annual AAAQGs use toxicity information from the United States Environmental Protection Agency.

They protect against toxic doses of systemic toxicants, and limit excess lifetime cancer risk to one-in-one million (10<sup>-6</sup>) for known human carcinogens.

Equations 1 through 3 display the formulas and assumptions used to calculate AAAQGs. Table 1 displays the 1999 updated AAAQGs.

## Equations

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### Equation 1: Equation for Calculating Annual AAAQGs

$$C_{ann}(ug/ m^3) = \frac{(1E - 6) \times (70 Kg) \times (1000 ug/mg)}{(20 m^3 /day) \times CSF(1/mg/kg day)}$$

### Equation 2: Equations for Calculating 24 Hour AAAQGs

The 24-Hour AAAQG is the lesser of the result of Equation 2A and 2B:

Equation 2A:

$$C_{24}(ug/ m^3) = \frac{8Hr TWA (ug/ m^3)}{126}$$

Equation 2B:

$$C_{24}(ug/ m^3) = C_{ann} (ug/ m^3) \times 365$$

### Equation 3: Equations for Calculating 1 Hour AAAQGs

The 1-Hour AAAQG is the lesser of the result of Equation 3A and 3B:

Equation 3A:

$$C_1(ug/ m^3) = \frac{15 Min STEL (ug/ m^3)}{120}$$

Equation 3B:

$$C_1(\text{ug/ m}^3) = C_{24}(\text{ug/ m}^3) \times 3.8$$

## REFERENCES

- Sittig, M. ed. Handbook of Toxic and Hazardous Chemicals and Carcinogens. Third Edition. Noyes Publications, Park Ridge, New Jersey. 1995.
- USEPA 1989. *Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A)*. Office of Emergency and Remedial Response, Washington, DC.
- USEPA 1990. *Exposure Factors Handbook*. EPA/600/8089/043. Office of Health and Environmental Assessment, Washington, DC.
- USEPA 1991. *Risk Assessment Guidance for Superfund Volume 1: Human Health Evaluation Manual (Part B, Development of Risk-Based Preliminary Remediation Goals)*. Publication 9285.7-01B. Office of Emergency and Remedial Response, Washington, DC. NTIS PB92-963333.
- USEPA 1991. *Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors*. Publication 9285.6-03. Office of Emergency and Remedial Response, Washington, DC. NTIS PB91-921314.
- USEPA 1999. *Health Effects Assessment Summary Tables (HEAST): Annual Update, FY 1998*. Environmental Criteria Assessment Office, Office of Health and Environmental Assessment, Office of Research and Development, Cincinnati, OH.
- USEPA 1999. *Region IX Preliminary Remediation Goals (PRGs)*. August, 1999. <http://www.epa.gov/region9>
- USEPA 1999. *Integrated Risk Information System (IRIS)*. Duluth, MN.

Chemical Name	CAS#	1 Hour AAAQG i g/m <sup>3</sup>	24 Hour AAAQG i g/m <sup>3</sup>	Annual AAAQG i g/m <sup>3</sup>
1 Acetaldehyde	75-07-0	6.3E+02	1.7E+02	4.5E-01
2 Acetic Acid	64-19-7	3.1E+02	2.0E+02	
3 Acetone	67-64-1	2.0E+04	1.4E+04	
4 Acetonitrile	75-05-8	8.8E+02	5.6E+02	
5 Acetophenone	98-86-2	1.5E+02	4.0E+01	
6 Acetyl Acetone	123-54-6			
7 Acrolein	107-02-8	6.3E+00	2.0E+00	
8 Acrylamide	79-06-1	1.1E+00	2.8E-01	7.6E-04
9 Acrylic Acid (mac)	79-10-7	1.8E+02	4.8E+01	
10 Acrylonitrile	107-13-1	2.0E+01	5.3E+00	1.5E-02
11 Aldrin	309-00-2	2.9E-01	7.5E-02	2.1E-04
12 Aliphatic Naphtha	8030-30-6	1.2E+04	3.2E+03	
13 Allyl Alcohol	107-18-6	8.3E+01	4.0E+01	
14 Aluminum - Total Dust	7429-90-5	4.5E+02	1.2E+02	
15 Aluminum - Respirable Dust	7429-90-5	1.5E+02	4.0E+01	
16 Aluminum - Pyro Powders	7429-90-5	1.5E+02	4.0E+01	
17 Aluminum - Welding Fumes	7429-90-5	1.5E+02	4.0E+01	
18 Aluminum - Soluble Salts	7429-90-5	6.0E+01	1.6E+01	
19 Aluminum Nitride				
20 Aluminum Oxide - Respirable	1344-28-1	1.8E+02	4.8E+01	
21 Ammonia	7664-41-7	2.3E+02	1.4E+02	
22 Ammonium Nitrate				
23 Aniline	62-53-3	3.0E+02	7.9E+01	6.1E-01
24 Antimony	7440-36-0	1.5E+01	4.0E+00	
25 Arsenic	7440-38-0	6.0E-02	1.6E-02	2.3E-04
26 Arsenic Pentoxide	1303-28-2	6.0E-02	1.6E-02	2.3E-04
27 Arsenic Trioxide (Arsenous Oxide)	1327-53-3	6.0E-02	1.6E-02	2.3E-04
28 Arsine	7784-42-1	6.0E-02	1.6E-02	2.3E-04
29 Azinphos (Ethyl Guthion)	2642-71-9	5.0E+00	1.6E+00	
30 Barium	7440-39-3	1.5E+01	4.0E+00	



Chemical Name	CAS#	1 Hour AAAQG i g/m <sup>3</sup>	24 Hour AAAQG i g/m <sup>3</sup>	Annual AAAQG i g/m <sup>3</sup>
31 Barium Oxide	1304-28-5	1.5E+01	4.0E+00	
32 Barium Sulfate (Total Dust)	7727-43-7	3.0E+02	7.9E+01	
33 Barium Sulfate (Respirable Fraction)	7727-43-7	1.5E+02	4.0E+01	
34 Benzaldehyde	100-52-7	8.3E+01	4.0E+01	1.2E-01
35 Benzene	71-43-2	1.7E+02	4.4E+01	1.5E-05
36 Benzidine	92-87-5	2.1E-02	5.6E-03	
37 Benz(a)anthracene	56-55-3	6.0E+00	1.6E+00	4.8E-03
38 Benzo(a)Pyrene	50-32-8	6.7E-01	1.8E-01	4.8E-04
39 Benzoic Acid	65-85-0			
40 Benzyl Alcohol	100-51-6			
41 Benzyl Chloride	100-44-7	2.9E+01	7.5E+00	2.1E-02
42 Beryllium	7440-41-7	6.0E-02	1.6E-02	4.2E-04
43 Bis(2-chloroethyl) Ether	111-44-4	4.0E+00	1.1E+00	2.9E-03
44 Bis(chloromethyl) Ether	542-88-1	2.2E-02	5.8E-03	1.6E-05
45 Bis(2-ethylhexyl) Phthalate	117-81-7	1.5E+02	4.0E+01	2.5E-01
46 Bismuth Oxide	1304-76-3	1.5E+02	4.0E+01	
47 Borates	-----	3.0E+01	7.9E+00	
48 Boron	7440-42-8	3.0E+01	7.9E+00	
49 Boron Nitride				
50 Boron Oxide	1303-86-2	1.5E+02	4.0E+01	
51 Boron Trichloride	10294-34-5			
52 Boron Trifluoride	7637-07-2	9.0E+01	2.4E+01	
53 Bromodichloromethane	75-27-4	7.8E+01	2.1E+01	5.6E-02
54 Bromoform	75-25-2	1.5E+02	4.0E+01	9.0E-01
55 Bromomethane	74-83-9	5.0E+02	1.6E+02	
56 1,3-Butadiene	106-99-0	5.0E+00	1.3E+00	3.6E-03
57 Butanal	123-72-8			
58 n-Butanol	71-36-3	4.5E+03	1.2E+03	
59 2-Butoxyethanol	111-76-2	3.6E+03	9.5E+02	
60 1-Butyl Acetate	123-86-4	7.9E+03	5.6E+03	

Chemical Name	CAS#	1 Hour AAAQG i g/m <sup>3</sup>	24 Hour AAAQG i g/m <sup>3</sup>	Annual AAAQG i g/m <sup>3</sup>
61 n-Butyric Acid	107-92-6	3.0E+02	7.9E+01	
62 Butyrolactone	96-48-0			5.6E-04
63 Cadmium	7440-43-9	7.7E-01	2.0E-01	
64 Calcium Carbonate (Total Dust)	1317-65-3	3.0E+02	7.9E+01	
65 Calcium Carbonate (Respirable Fraction)	1317-65-3	1.5E+02	4.0E+01	
66 Calcium Fluoride	7789-74-5	7.5E+01	2.0E+01	
67 Calcium Nitrate	10124-37-5			
68 Calcium Oxide	1305-78-3	6.0E+01	1.6E+01	
69 Caprolactam - Dust	105-60-2	2.5E+01	7.9E+00	
70 Caprolactam - Vapor	105-60-2	3.0E+01	7.9E+00	
71 Captan	133-06-2	1.3E+02	4.0E+01	1.0E+00
72 Carbon Black	13333-86-4	1.1E+02	2.8E+01	
73 Carbon Disulfide	75-15-0	9.0E+01	2.4E+01	
74 Carbon Monoxide	630-08-0	1.2E+03	3.1E+02	
75 Carbon Monoxide - 2	630-08-0			
76 Carbon Tetrachloride	56-23-5	9.2E+01	2.4E+01	6.6E-02
77 Carbonyl Fluoride	353-50-4	1.3E+02	4.0E+01	
78 Carbonyl Sulfide	463-58-1	1.3E+02	4.0E+01	
79 Cellulose Nitrate (Total Dust)	9004-70-0			
80 Cellulose Nitrate (Respirable Fraction)	9004-70-0			
81 Cellulose Tetranitrate	9004-70-0			
82 Chlorine	7782-50-5	2.5E+01	1.2E+01	
83 Chlorobenzene	108-90-7	1.1E+04	2.8E+03	
84 2-Chloro-1,3-butadiene	9010-98-4			
85 Chlordane	57-74-9	3.7E+00	9.8E-01	2.7E-03
86 Chloroform	67-66-3	6.0E+01	1.6E+01	4.3E-02
87 Chloromethane	74-87-3	7.7E+02	2.0E+02	5.6E-01
88 Chloromethyl Methyl Ether	107-30-2			
89 3-Chloropropene	107-05-1			
90 Chloroethanol	1897-45-6			3.2E-01

Chemical Name	CAS#	1 Hour AAAQG i g/m <sup>3</sup>	24 Hour AAAQG i g/m <sup>3</sup>	Annual AAAQG i g/m <sup>3</sup>
91 Chromic Oxide	1333-82-0	1.5E+01	4.0E+00	
92 Chromium	7440-47-3	1.5E+01	4.0E+00	
93 Chromium VI	7440-47-3	1.7E-02	4.4E-03	1.2E-05
94 Cinnamaldehyde	104-55-2			
95 Cobalt Nitrate	10141-47-3			
96 Copper (fume)	7440-50-8	3.0E+00	7.9E-01	
97 Cuprous Chloride	7758-89-6	3.0E+01	7.9E+00	
98 Cuprous Oxide	1317-39-1	3.0E+01	7.9E+00	
99 Cote	----			
100 Cresols	1319-77-3	6.6E+02	1.7E+02	
101 Cupric Chloride	1344-67-8			
102 Cupric Oxide	1317-38-0			
103 Diacetone Alcohol	123-42-2	7.2E+03	1.9E+03	
104 DDT (Dichlorodiphenyltrichloroethane)	50-29-3	1.4E+01	3.8E+00	1.0E-02
105 DDD	72-54-8	2.0E+01	5.3E+00	1.5E-02
106 DDE	72-55-9	1.4E+01	3.8E+00	1.0E-02
107 Diazinon	333-41-5	2.5E+00	7.9E-01	
108 Dibenzo(a,h)anthracene	53-70-3	6.7E-01	1.8E-01	4.8E-04
109 Diborane	19287-45-7	3.0E+00	7.9E-01	
110 Dibromochloromethane	124-48-1	5.8E+01	1.5E+01	4.2E-02
111 1,2-Dibromo-3-chloropropane	96-12-8	3.0E-01	7.9E-02	7.9E-02
112 1,2-Dibromoethane	75-34-3	6.3E+00	1.7E+00	4.5E-03
113 1,2-Dichlorobenzene	95-50-1	9.0E+03	2.4E+03	
114 1,4-Dichlorobenzene	106-46-7	2.0E+02	5.3E+01	1.5E-01
115 Dichlorodifluoromethane	75-71-8	5.0E+04	3.9E+04	
116 1,1-Dichloroethane	75-34-3	8.4E+03	3.2E+03	
117 1,2-Dichloroethane	107-06-2	5.3E+01	1.4E+01	3.8E-02
118 1,1-Dichloroethene	75-35-4	1.3E+02	6.3E+01	
119 1,2-Dichloroethene	156-59-2	8.3E+03	6.3E+03	
120 Dichloromethane	75-09-2	3.0E+03	8.0E+02	2.2E+00

Chemical Name	CAS#	1 Hour AAAQG i g/m <sup>3</sup>	24 Hour AAAQG i g/m <sup>3</sup>	Annual AAAQG i g/m <sup>3</sup>
121 1,2-Dichloropropane	78-87-5	7.1E+01	1.9E+01	5.1E-02
122 2,4-Dichlorophenol	120-83-2			
123 Dichlorosilane	4109-96-0			
124 Dicofof	115-32-2	1.1E+01	2.9E+00	8.0E-03
125 Dieldrin	60-57-1	3.0E-01	8.0E-02	2.2E-04
126 Diethylene Glycol Monobutyl Ether (Butyl Carbitol)	112-34-5	4.8E+02	1.3E+02	
127 Diethylene Glycol Monobutylether Acetate	124-17-4	4.8E+02	1.3E+02	
128 Diethylene Triamine	111-40-0	8.3E+01	3.2E+01	
129 Diethyl Phthalate	84-66-2	8.3E+01	4.0E+01	
130 Diethyl Telluride	627-54-3			
131 Diethylstilbestrol	56-53-1			
132 Dimethoate	60-51-5	1.5E+01	4.0E+00	
133 2,5-Dimethyl Furan	625-86-5			
134 Dimethyl Disulfide	624-92-0			
135 Dimethylnitrosoamine	62-75-9			
136 Dimethyl Sulfate	77-78-1	1.5E+01	4.0E+00	
137 Dimethyl Sulfide	75-18-3	1.5E+03	4.0E+02	
138 Di-n-butyl Phthalate	84-74-2	8.3E+01	4.0E+01	
139 Di-n-Octyl Phthalate	117-84-0	8.3E+01	4.0E+01	
140 2,4-Dinitrophenol	51-28-5	1.5E+00	4.0E-01	
141 2,4-Dinitrotoluene	121-14-2	4.2E+01	1.2E+01	
142 1,4-Dioxane	123-91-1	2.7E+03	7.1E+02	
143 Diphenylamine	122-39-4	1.7E+02	7.9E+01	
144 1,2-Diphenylhydrazine	122-66-7	6.3E+00	1.7E+00	4.5E-03
145 N,N-Dipropyl-4-Trifluoromethyl-2,6-Dinitroaniline	1582-09-8			
146 Dithane	8018-01-7			
147 Endosulfan	115-25-7	2.5E+00	7.9E-01	
148 Endrin	72-20-8	2.5E+00	7.9E-01	
149 Epichlorohydrin	106-89-8	1.7E+02	6.3E+01	8.3E-01
150 Ethanol	64-17-5	5.7E+04	1.5E+04	

Chemical Name	CAS#	1 Hour AAAQG i g/m <sup>3</sup>	24 Hour AAAQG i g/m <sup>3</sup>	Annual AAAQG i g/m <sup>3</sup>
151 2-Ethoxy Ethyl Acetate	111-15-9	8.1E+02	2.1E+02	
152 Ethyl Acetate	141-78-6	4.2E+04	1.1E+04	
153 Ethylbenzene	100-41-4	4.5E+03	3.5E+03	
154 Ethylene Glycol Dimethyl Ether	110-71-4			
155 Ethylene Glycol Monopropyl Ether	2807-30-9			
156 Ethyl-3-Ethoxy Propionate	763-69-9			
157 Ethylene Oxide	75-21-8	1.4E+01	3.6E+00	1.0E-02
158 Ethyl Parathion	56-38-2			
159 Fiberglass		1.5E+02	4.0E+01	
160 Fiberglass - 2				
161 Fluorine	7782-41-4	6.0E+00	1.6E+00	
162 Formaldehyde	50-00-0	2.5E+01	1.6E+01	7.6E-02
163 Formic Acid	64-18-6	1.5E+02	7.1E+01	
164 Glycerol - Total Dust	56-81-5	3.0E+02	7.9E+01	
165 Glycerol - Respirable fraction	56-81-5	1.5E+02	4.0E+01	
166 Glycol Monobutylether Acetate	112-07-2			
167 Heptachlor	76-44-8	1.1E+00	2.8E-01	7.6E-04
168 Heptachlor Epoxide	1024-57-3	5.3E-01	1.4E-01	3.8E-04
169 2-Heptanone	110-43-0	7.1E+03	1.9E+03	
170 Heptane	142-82-5	1.7E+04	1.6E+04	
171 Hexachlorobenzene	118-74-1	3.0E+00	8.0E-01	2.2E-03
172 Hexachlorobutadiene	87-68-3	7.2E+00	1.9E+00	4.5E-02
173 a-Hexachlorocyclohexane	319-84-6	7.7E-01	2.0E-01	5.6E-04
174 b-Hexachlorocyclohexane	319-85-7	2.7E+00	7.1E-01	1.9E-03
175 g-Hexachlorocyclohexane (lindane)	58-89-9	3.7E+00	9.8E-01	2.7E-03
176 Hexachlorocyclohexane, Tech	608-73-1	2.7E+00	7.1E-01	1.9E-03
177 Hexachlorocyclopentadiene	77-47-4	3.0E+00	7.9E-01	
178 Hexachloroethane	67-72-1	3.0E+02	7.9E+01	2.5E-01
179 n-Hexane	110-54-3	5.4E+03	1.4E+03	
180 Hydrofluoric Acid	7664-39-3	4.2E+01	2.0E+01	

Chemical Name	CAS#	1 Hour AAAQG i g/m <sup>3</sup>	24 Hour AAAQG i g/m <sup>3</sup>	Annual AAAQG i g/m <sup>3</sup>
181 Hydrogen Chloride	7647-01-0	2.1E+02	5.6E+01	
182 Hydrogen Cyanide	74-90-8	1.0E+02	4.0E+01	
183 Hydrogen Sulfide	7783-06-4	1.8E+02	1.1E+02	
184 1-Hydroxy-2-Propanone (Acetol)	116-09-6			
185 Iron	7439-89-6			
186 Iron (Soluble Compounds)	----	1.7E+01	7.9E+00	
187 Iron (Insoluble Compounds)	----	1.5E+02	4.0E+01	
188 Iron (II) Chloride	7758-94-3			
189 Iron (III) Chloride	7705-08-0			
190 Iron (III) Oxide	1309-37-1	1.5E+02	4.0E+01	
191 Iron (II,III) Oxide	1317-61-9	1.5E+02	4.0E+01	
192 Isobutyl Acetate	110-19-0	2.1E+04	5.6E+03	
193 Isobutyl Alcohol	78-83-1	4.5E+03	1.2E+03	
194 Isobutyl Isobutyrate	97-85-8			
195 Isopropanol	67-63-0	1.0E+04	7.8E+03	
196 Isopropyl Acetate	108-21-4	9.8E+03	7.5E+03	
197 Lacquer Thinner	----			
198 Lactol Spirits	64742-89-8			
199 Lead	7439-92-1	NAAQS	NAAQS	
200 Lead (II) Oxide	1317-36-8	NAAQS	NAAQS	
201 Lead (III) Oxide		NAAQS	NAAQS	
202 Lead Oxide	1314-41-6	NAAQS	NAAQS	
203 Light Aromatic Solvent Naptha	64742-95-6	1.2E+04	3.2E+03	
204 Magnesium	7439-95-4			
205 Magnesium Chloride				
206 Magnesium Fluoride	7783-40-6	7.5E+01	2.0E+01	
207 Magnesium Nitride				
208 Magnesium Oxide (Total Dust)	1309-48-4	3.0E+02	7.9E+01	
209 Magnesium Oxide (Respirable Fraction)	1309-48-4	1.5E+02	4.0E+01	
210 Magnesium Silicate	1343-90-4			

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211 Manganese (metal or fume)	7439-96-5	2.5E+01	7.9E+00	7.9E+00
212 Manganese Dioxide	1313-13-9	2.5E+01	7.9E+00	7.9E+00
213 Malathion	121-75-5	1.5E+02	4.0E+01	4.0E+01
214 Mercury	7439-97-6	1.5E+00	4.0E-01	4.0E-01
215 Metalaxyl	57837-19-1			
216 Methanol	67-56-1	2.6E+03	2.1E+03	2.1E+03
217 Methomyl	16752-77-5	7.5E+01	2.0E+01	2.0E+01
218 Methoxychlor	72-43-5	3.0E+02	7.9E+01	7.9E+01
219 1-Methoxy-2-Propanol Acetate	108-65-5			
220 a-Methylacrolein	78-85-3			
221 Methyl Bromide	74-83-9	5.0E+02	1.6E+02	1.6E+02
222 3-Methylcholanthrene	56-49-5			
223 Methyl Cyclopropyl Ketone	765-43-5			
224 Methyl Ethyl Ketone	78-93-3	7.4E+03	4.7E+03	4.7E+03
225 4,4-Methylene-bis-2-chloroaniline	101-14-4	6.6E+00	1.7E+00	1.7E+00
226 Methylhydrazine	60-34-4	4.4E+00	1.2E+00	1.2E+00
227 Methyl Isocyanate	624-83-9	1.5E+00	4.0E-01	4.0E-01
228 Methyl Mercaptan	74-93-4	3.0E+01	7.9E+00	7.9E+00
229 2-Methylnaphthalene	91-57-6			
230 Methyl N-Butyl Ketone	591-78-6	6.0E+02	1.6E+02	1.6E+02
231 Methyl Parathion	298-00-0	5.0E+00	1.6E+00	1.6E+00
232 4-Methyl-2-Pentanone (Hexanone, MIBK)	108-10-1			
233 2-Methyl-2-Propen-1-ol	513-42-8			
234 a-Methylstyrene	98-83-9	4.0E+03	1.9E+03	1.9E+03
235 Methyl Vinyl Ketone	79-84-4			
236 Mineral Spirits	8032-32-4	1.2E+04	3.2E+03	3.2E+03
237 Mixed Alcohol Phthalates	-----			
238 Mixed Paraffins (alkanes)	-----	5.0E+01	1.6E+01	1.6E+01
239 Monoammonium Phosphate				
240 Molybdenum Trioxide	1313-27-5	8.3E+01	4.0E+01	4.0E+01

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241 Myclobutanil (Systhane)	88671-89-0			
242 Naphthalene	91-20-3	6.3E+02	4.0E+02	
243				
244 Nickel (metal or fume)	7440-02-0	4.5E-01	1.2E-01	2.1E-03
245 Nickel Acetate	373-02-4	3.0E+00	7.9E-01	
246 Nitric Acid	7697-37-2	8.3E+01	4.0E+01	
247 Nitrobenzene	98-95-3	8.3E+01	4.0E+01	
248 Nitrogen Dioxide	10102-44-0	NAAQS	NAAQS	
249 Nitrogen Oxide	10102-43-9	3.8E+02	2.4E+02	
250 2-Nitropropane	79-46-9	1.1E+03	2.8E+02	No data
251 N-Nitrosodiethylamine	55-18-5	3.2E-02	8.5E-03	2.3E-05
252 N-Nitrosodimethylamine	62-75-9	9.9E-02	2.6E-02	7.1E-05
253 N-Nitrosopyrrolidine	930-55-2	2.3E+00	6.1E-01	1.7E-03
254 N-Nitroso-di-n-butylamine	924-16-3	2.3E+00	6.1E-01	1.7E-03
255 Octane	111-65-9	1.5E+04	1.2E+04	
256 Oxoheptyl Acetate	90438-79-2			
257 Oxohexyl Acetate				
258 Ozone	10028-15-6	NAAQS	NAAQS	
259 Particulate Matter (PM10)	-----	NAAQS	NAAQS	
260 Pentachlorobenzene	608-93-5			
261 Pentachloronitrobenzene	82-68-8	1.5E+01	4.0E+00	1.3E-02
262 Pentachlorophenol	87-86-5	1.3E+01	4.0E+00	2.9E-02
263 Pentanal	110-62-3	5.3E+03	1.4E+03	
264 Pantane	109-66-8	1.9E+04	1.4E+04	
265 2-Pentanone	107-87-9	7.3E+03	5.6E+03	
266 Phenol	108-95-2	3.2E+02	1.5E+02	
267 p-Phenylenediamine	106-50-3	3.0E+00	7.9E-01	
268 Phenylmercuric Acetate	62-38-4	1.3E+00	4.0E-01	
269 Phosgene	75-44-5	1.2E+01	3.2E+00	
270 Phosmet	732-11-6	9.0E+00	2.4E+00	



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271 Phosphamidon	13171-21-6			
272 Phosphine	7803-51-2	1.1E+01	3.2E+00	
273 Phosphoric Acid	7664-38-2	2.5E+01	7.9E+00	
274 Phosphorous Nitride				
275 Phosphorous Pentafluoride	7647-19-0	7.5E+01	2.0E+01	
276 Phosphorous Pentoxide	1314-56-3	2.5E+01	7.9E+00	
277 Phosphorous Pentasulfide		2.5E+01	7.9E+00	
278 a-Pinene (2-Pinene)	80-56-8			
279 b-Pinene	127-91-3			
280 Polyacrylamide				
281 Polychlorinatedbiphenyls (PCBs)	1336-36-3	6.3E-01	1.7E-01	4.5E-04
282 Potassium				
283 Potassium Borate	See Borates	3.0E+01	7.9E+00	
284 Potassium Carbonate	584-08-7			
285 Potassium Chloride	7447-40-7			
286 Potassium Fluoride	7789-23-3	7.5E+01	2.0E+01	
287 Potassium Hydroxide	1310-58-3	1.7E+01	1.6E+01	
288 Potassium Oxide				
289 Potassium Sulfate	7778-80-5			
290 Propanal	123-38-6			
291 Propane (asphyxiant)	74-98-6	5.4E+04	1.4E+04	
292 n-Propanol	71-23-8	5.2E+03	3.9E+03	
293 Pronamide	23950-58-5			No data
294 Propionic Acid	79-09-6	3.8E+02	2.4E+02	
295 n-Propyl Acetate	109-60-4	8.8E+03	6.7E+03	
296 Propylene Glycol Monomethyl Ether	107-98-2	4.5E+03	2.9E+03	
297 Propylene Oxide	75-56-9	3.7E+02	9.8E+01	2.7E-01
298 Pyridine	110-86-1	2.5E+02	1.2E+02	
299 Reserpine	50-55-5			
300 Selenium	7782-49-2	6.0E+00	1.6E+00	

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301 Selenourea	630-10-4			
302 Sevin Bait (Carbaryl)	63-25-2	8.3E+01	4.0E+01	
303 Silane	7803-62-5	8.3E+00	5.6E+00	
304 Silica (Amorphous Hydrated)	7631-86-9	1.8E+02	4.8E+01	
305 Silver	7440-22-4	3.0E-01	7.9E-02	
306 Sodium Aluminofluoride	15096-52-3	6.0E+01	1.6E+01	
307 Sodium Carbonate	497-19-8			
308 Sodium Chloride	7647-14-5			
309 Sodium Dichromate (VI)	10588-01-9	1.5E+00	4.0E-01	
310 Sodium Fluoride	7681-49-4	7.5E+01	2.0E+01	
311 Sodium Hydroxide	1310-73-2	1.7E+01	1.6E+01	
312 Sodium Oxide				
313 Sodium Sulfate	7757-82-6			
314 Strychnine	57-24-9	3.8E+00	1.2E+00	
315 Styrene (includes dimers)	100-42-5	3.5E+03	1.7E+03	
316 Sulfur				
317 Sulfur Dioxide	7446-09-5	NAAQS	NAAQS	
318 Sulfur Trioxide	7446-11-9			
319 Sulfuric Acid	7446-93-9	2.5E+01	7.9E+00	
320 Talc	14807-96-6	6.0E+01	1.6E+01	
321 1,2,4,5-Tetrachlorobenzene	95-94-3			
322 2,3,7,8-Tetrachlorodibenzo-p-dioxin	1746-01-6	3.2E-05	8.5E-06	2.3E-08
323 1,1,2,2-Tetrachloroethane	79-39-5	2.4E+01	6.4E+00	1.8E-02
324 Tetrachloroethene	127-18-4	1.3E+03	6.4E+02	1.7E+00
325 2,3,4,6-Tetrachlorophenol (2,4,5,6)	58-90-2			
326 Tetraethyl Lead	78-00-2	2.3E+00	6.0E-01	
327 Tetrafluoromethane	75-73-0			
328 Tetrahydrofuran	109-99-9	6.1E+03	4.7E+03	
329 Thallium	7440-28-0	3.0E+00	7.9E-01	
330 Thiourea	62-56-6			

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331 Thorium 232	7440-29-1			
332 Titanium Dioxide (Total Dust)	13463-67-7	3.0E+02	7.9E+01	
333 Titanium Dioxide (Respirable Dust)	13463-67-7	1.5E+02	4.0E+01	
334 Toluene	101-88-3	4.4E+03	3.0E+03	
335 2,4-Toluene Diisocyanate	584-84-9	1.2E+00	3.2E-01	
336 Toxaphene	8001-35-2	4.4E+00	1.2E+00	3.2E-03
337 1,2,4-Trichlorobenzene	120-82-1	3.3E+02	3.2E+02	
338 1,1,1-Trichloroethane	71-55-6	5.7E+04	1.5E+04	
339 1,1,2-Trichloroethane	79-00-5	8.7E+01	2.3E+01	6.2E-02
340 Trichloroethene	79-01-6	8.1E+02	2.1E+02	5.8E-01
341 Trichlorofluoromethane	75-69-4	5.8E+04	4.4E+04	
342 2,4,5-Trichlorophenol	95-95-4	1.3E+01	4.0E+00	
343 2,4,6-Trichlorophenol	88-06-2	1.3E+01	4.0E+00	3.2E-01
344 1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	7.9E+04	6.0E+04	
345 Triethylenetetramine	112-24-3			
346 1,2,4-Trimethylbenzene	95-63-6	1.4E+03	9.9E+02	
347 1,3,5-Trimethylbenzene	108-67-8	1.4E+03	9.9E+02	
348 2,2,4-Trimethyl-1,3-pentanediol (Texanol)	Isobutyrate25265-77-4			
349 Tungsten Trioxide	1314-35-8	8.3E+01	4.0E+01	
350 Turpentine	8006-64-2	7.0E+03	4.4E+03	
351 Uranium 238 (Soluble)	7440-61-1	1.5E+00	4.0E-01	
352 Uranium 238 (Insoluble)	7440-61-1	6.0E+00	1.6E+00	
353 Urea	57-13-6			
354 Vanadium	7440-62-2	1.5E+00	4.0E-01	
355 Vinyl Chloride	75-01-4	1.6E+01	4.3E+00	1.2E-02
356 VM & P Naphtha (Benzin)	8030-30-6	4.1E+04	1.1E+04	
357 Xylenes, Mixed	1330-20-7	5.4E+03	3.5E+03	
358 Zinc Chloride	7646-85-7	1.7E+01	7.9E+00	
359 Zinc Oxide Fume	1314-13-2	8.3E+01	4.0E+01	
360 Zinc Oxide Respirable Dust	1314-13-2	1.5E+02	4.0E+01	

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361 Zinc Oxide Total Dust	1314-13-2	3.0E+02	7.9E+01	
362 Zinc Stearate - Total Dust	557-05-1	3.0E+02	7.9E+01	
363 Zinc Stearate - Respirable Fraction	557-05-1	1.5E+02	4.0E+01	
364 Zirconium	7440-67-7	8.3E+01	4.0E+01	
365 Zirconium Carbide	7440-67-7	8.3E+01	4.0E+01	
366 Zirconium Oxide	1314-23-4	8.3E+01	4.0E+01	