

Chapter 296-841 WAC

~~((RESPIRATORY HAZARDS))~~ AIRBORNE CONTAMINANTS

AMENDATORY SECTION (Amending WSR 06-08-087, filed 4/4/06, effective 9/1/06)

WAC 296-841-100 Scope. (~~This chapter applies **only** if your employees:~~

- ~~• Are exposed to a respiratory hazard~~

~~OR~~

~~• Could be exposed to one of the specific hazards listed below.~~

~~This chapter applies to any workplace with potential or actual employee exposure to respiratory hazards. It requires you to protect employees from respiratory hazards by applying this protection strategy:~~

- ~~• Evaluate employee exposures to determine if controls are needed~~

- ~~• Use feasible controls. For example, enclose or confine the operation, use ventilation systems, or substitute with less toxic material~~

- ~~• Use respirators if controls are not feasible or if they cannot completely remove the hazard.~~

Definition:

Exposed or exposure:

~~The contact an employee has with a toxic substance, harmful physical agent or oxygen deficient condition, whether or not protection is provided by respirators or other personal protective equipment (PPE). Exposure can occur through various routes of entry, such as inhalation, ingestion, skin contact, or skin absorption.~~

Note:

- Examples of substances that may be respiratory hazards when airborne include:
 - Chemicals listed in Table 3
 - Any substance
- Listed in the latest edition of the NIOSH Registry of Toxic Effects of Chemical Substances
- For which positive evidence of an acute or chronic health hazard exists through tests conducted by, or known to, the employer
- That may pose a hazard to human health as stated on a material safety data sheet kept by, or known to, the employer
- Atmospheres considered oxygen deficient
- Biological agents such as harmful bacteria, viruses or fungi
- Examples include airborne TB aerosols and anthrax
- Pesticides with a label requirement for respirator use
- Chemicals used as crowd control agents such as pepper spray
- Chemicals present at clandestine drug labs
- These substances can be airborne as dusts, fibers, fogs, fumes, mists, gases, smoke, sprays, vapors, or aerosols.

Reference:

- Substances in Table 3 that are marked with an X in the "skin" column may require personal protective equipment (PPE).

See WAC 296-800-160, Personal protective equipment, for additional information and requirements.

● If any of the following hazards are present in your workplace, you will need both this chapter and any of the following specific rules that apply:

Hazard

Acrylonitrile
Arsenic (inorganic)
Asbestos
Benzene
Butadiene
Cadmium
Carcinogens
Coke ovens
Cotton dust
1,2-Dibromo-3-chloropropane
Ethylene oxide
Formaldehyde
Lead
Methylene chloride
Methylenedianiline
Thiram
Vinyl chloride))

This chapter applies when your employees are, or could be, exposed to an airborne hazard.

● The following are examples of airborne contaminants that may become airborne hazards in some workplaces:

- Chemicals listed in Table 3, Permissible Exposure Limits (PELs) for Airborne Contaminants

- Any substance:

■ Listed in the latest edition of the NIOSH Registry of Toxic Effects of Chemical Substances

■ For which positive evidence of an acute or chronic health hazard exists through tests conducted by, or known to, the employer

■ That may pose a hazard to human health as stated on a material safety data sheet (MSDS) kept by, or known to, the employer

- Biological agents such as harmful bacteria, viruses or fungi

■ Examples include TB aerosols and anthrax

- Pesticides

- Chemicals used as crowd control agents, such as pepper spray

- Chemicals present at clandestine drug labs.

● Airborne contaminants exist in a variety of physical forms such as dusts, fibers, fogs, fumes, mists, gases, smoke, sprays, vapors, or aerosols.

Definition:

Exposed or exposure:

The contact an employee has with a toxic substance, harmful physical agent or oxygen-deficient condition, whether or not protection is provided by respirators or other personal protective

equipment (PPE). Exposure can occur through various routes of entry, such as inhalation, ingestion, skin contact, or skin absorption.

AMENDATORY SECTION (Amending WSR 03-20-115, filed 10/1/03, effective 1/1/04)

WAC 296-841-200 Evaluate and control employee exposures.

~~((Summary~~

~~**Your responsibility:**~~

~~To protect your employees from exposure to respiratory hazards in the workplace by identifying and controlling the hazards.~~

~~**You must:**~~

~~Identify and evaluate employee exposures~~

~~WAC 296-841-20005~~

~~Control employee exposures~~

~~WAC 296-841-20010~~

~~Use respirators~~

~~WAC 296-841-20015~~

~~Notify employees~~

~~WAC 296-841-20020.))~~

NEW SECTION

WAC 296-841-20003 Employee protective measures. Protect employees from potentially hazardous exposure while you perform your exposure evaluation, using all available resources to determine adequate protective measures.

Note: • Resources include product labels, material safety data sheets (MSDSs), manufacturer recommendations, and industry protocols.

AMENDATORY SECTION (Amending WSR 04-18-079, filed 8/31/04, effective 11/1/04)

WAC 296-841-20005 (~~Identify and evaluate respiratory hazards.~~) Exposure evaluations.

~~((**You must:**~~

~~• Make sure employees are protected from potentially hazardous exposure while you perform your evaluation~~

- ~~Perform your evaluation without considering the protection provided to employees by a respirator~~
 - ~~Determine the form of the hazard, such as dust, mist, gas, oxygen deficiency, or biological agent.~~
 - ~~Make sure you consider:~~
 - ~~Potential emergency and rescue situations that may occur, such as equipment or power failures, uncontrolled chemical reactions, fire, explosion, or human error~~
 - ~~Workplace conditions such as work processes, types of material, control methods, work practices and environmental conditions.~~
 - ~~Determine or reasonably estimate whether any employee is or could be exposed to any of the following:~~
 - ~~Any airborne substance above a permissible exposure limit (PEL) listed in Table 3~~
 - ~~A substance at or above the action level (AL) specified in the rule for that substance~~
 - ~~Any other respiratory hazard.~~
 - ~~Use **any** of the following to determine employee exposure:~~
 - ~~Information that would allow an estimate of the level of employee exposure, such as MSDSs or pesticide labels, observations, measurements or calculations~~
 - ~~Data demonstrating that a particular product, material or activity cannot result in employee exposure at or above the AL or PEL~~
 - ~~Personal air samples that represent an employee's usual or worst case exposure for the entire shift.~~
- Note:**
- ~~Rules for specific substances may contain additional requirements for determining employee exposure.~~
 - ~~Use methods of sampling and analysis that have been validated by the laboratory performing the analysis.~~
 - ~~Samples from a representative group of employees may be used for other employees performing the same work activities when the duration and level of exposure are similar.~~

~~You must:~~

- ~~Consider the atmosphere to be immediately dangerous to life or health (IDLH) when you cannot determine or reasonably estimate employee exposure~~
- ~~Make sure employee exposure, to two or more substances with additive health effects, is evaluated using this formula:~~

$$E_m = \frac{C_1}{L_1} \pm \frac{C_2}{L_2} \pm \dots \pm \frac{C_n}{L_n}$$

The symbol	Is the ...
E	Equivalent exposure for the mixture. When the value of E is greater than 1, a respiratory hazard is present.
C	Concentration of a substance.
L	TWA, STEL, or ceiling for that substance, (from Table 3.)

(1) Conduct an exposure evaluation to determine or reasonably estimate whether an employee is or could be exposed to either of the following:

- An airborne contaminant above a permissible exposure limit (PEL) listed in Table 3;

OR

- Other airborne hazards, such as biological hazards.

- Note:**
- When evaluating air contaminants, keep in mind that oxygen deficient conditions may also occur due to:
 - Processes such as fermentation, decomposition of organic matter, or combustion of fossil fuels
 - Displacement by another gas such as nitrogen or carbon dioxide
 - Rules for specific substances may contain additional requirements for determining employee exposure
 - Samples from a representative group of employees may be used for other employees performing the same work activities, when the duration and level of exposure are similar.

(2) Conclude that an atmosphere is immediately dangerous to life or health (IDLH) when you cannot determine or reasonably estimate employee exposure.

(3) Do all the following when you perform your evaluation:

(a) Determine the form of the airborne contaminant, such as dust, mist, gas, or biological agent.

(b) Make sure you don't use the amount of protection provided to employees by respirators as a factor in determining whether employees are exposed to an airborne hazard.

(c) Make sure any air monitoring results used to determine employee exposures are based on personal air samples taken from, or representative of, the employee's breathing zone.

■ You may use area sampling to screen for the presence of an airborne contaminant; however, results from area sampling can't be used if they don't adequately represent exposure of affected employees.

(d) Include potential emergency and rescue situations that may occur, such as equipment or power failures, uncontrolled chemical reactions, fire, explosion, or human error.

(e) Include workplace conditions such as work processes, types of material, exposure control methods, work practices, and environmental conditions.

(f) Address extended work periods. For work shifts longer than eight hours, evaluate the continuous eight-hour portion of the shift expected to have the highest average exposure concentration.

(4) Use either of the following types of documentation to conclusively demonstrate that employee exposure cannot meet or exceed any PEL for the airborne contaminant during any reasonably anticipated conditions:

- Personal air samples that represent an employee's usual or worst-case exposure during the entire shift.

OR

- Specific information about products, materials, or activities that provides for an estimate of the level of employee exposure such as material safety data sheets (MSDSs), observations, previous air sampling results, other measurements, calculations, or pesticide labels.

- Note:**
- You should use methods of sampling and analysis that have been validated by the laboratory performing the analysis.

(5) Use the following formula to evaluate employee exposure to two or more substances that have additive health effects:

$$E_m = \frac{C_1}{L_1} \pm \frac{C_2}{L_2} \pm \dots \pm \frac{C_n}{L_n}$$

<u>The symbol</u>	<u>Is the ...</u>
<u>E</u>	<u>Equivalent exposure for the mixture. When the value of E is greater than 1, an airborne hazard is present.</u>
<u>C</u>	<u>Concentration of a specific airborne contaminant.</u>
<u>L</u>	<u>TWA, STEL, or ceiling limit for that airborne contaminant, from Table 3, Permissible Exposure Limits (PELs) for Airborne Contaminants.</u>

- Note:**
- When results from your exposure evaluation indicate an airborne hazard, follow requirements in WAC 296-841-20010 through 296-841-20020 of this chapter.
 - When changes occur that increase the level of exposure to an airborne hazard, you may need to conduct a new exposure evaluation to make sure exposure controls and other protective measures are sufficient.

AMENDATORY SECTION (Amending WSR 04-18-079, filed 8/31/04, effective 11/1/04)

WAC 296-841-20010 ((Control employee exposures.)) Exposure controls.

~~((You must:~~

~~• Use feasible controls to protect employees from exposure to respiratory hazards by:~~

~~— Reducing employee exposure to a level that removes the respiratory hazard, such as to a level below the permissible exposure limits (PEL) in Table 3;~~

~~OR~~

~~— Reducing the exposure to the lowest achievable level, when the respiratory hazard cannot be removed.~~

~~**IMPORTANT:**~~

~~Using respirators and other PPE is not a substitute for the feasible controls required by this section.~~

~~**Note:** The following table gives you examples of control methods.) **IMPORTANT:**~~

~~• Respirators and other personal protective equipment are **not** exposure controls. Respirators may be used to protect employees while exposure controls are being installed or when it's not feasible to use exposure controls to remove or reduce the airborne hazard.~~

~~(1) Use feasible exposure controls to reduce employee exposure to one of the following:~~

~~— A level below the permissible exposure limits (PEL) in Table 3~~

~~— A level that removes the airborne hazard, when no PEL is established~~

~~— The lowest achievable level, when exposure cannot be reduced to below the PEL or the airborne hazard can't be removed.~~

(2) Make sure exposure controls don't create or increase employee health hazards. For example, when ventilation systems are installed:

- Prevent contaminated exhaust air from either:

■ Reentering the building in harmful amounts

or

■ Exposing any employee to a health hazard.

- Temper make-up air, when necessary

- Prevent employee exposure to excessive air velocities.

(3) Use make-up air systems that will not interfere with the effectiveness of the exhaust air system.

- For example, make sure enough make-up air is provided to replace the amount of air exhausted.

Note: • Table 1 provides examples of possible exposure controls.

Table 1
Examples of Possible Controls

<u>((Control)) Preferred exposure controls include:</u>	<u>For example:</u>
Using a different chemical (this is also known as substitution)	<ul style="list-style-type: none"> ● Choose a chemical with a lower evaporation rate or vapor pressure ● Choose a chemical ((without)) that's not hazardous ((ingredients))
Changing a process to ((lessen)) decrease emissions	<ul style="list-style-type: none"> ● Use hand rolling or paint dipping instead of paint spraying ● Bolt items instead of welding them
Separating employees from emissions areas and sources	<ul style="list-style-type: none"> ● Use control rooms ● Build an enclosure around process machinery or other emissions sources ● Automate a process
((Removing emissions at or near the source (local exhaust ventilation))) Using local exhaust ventilation to remove emissions at or near the source	<ul style="list-style-type: none"> ● Install exhaust hoods or slots to capture emissions ● Use an exhausted enclosure (like a blasting cabinet or laboratory hood)
<u>Other exposure controls include:</u>	<u>For example:</u>

<p><u>Using general exhaust ventilation to dilute and remove emissions in the work area</u></p> <p>Note: <u>This isn't recommended for control of highly toxic airborne contaminants such as carcinogens, where low exposures can still present a health hazard</u></p>	<ul style="list-style-type: none"> ● <u>Allow natural air movement to create an adequate airflow through an area</u> ● <u>Use mechanical fans</u>
<p><u>((Diluting and removing emissions in the work area (general exhaust ventilation))</u></p>	<ul style="list-style-type: none"> ● <u>Allow natural air movement to create an adequate airflow through an area</u> ● <u>Use mechanical fans))</u>
<p><u>((Modify)) Modifying work practices</u></p>	<ul style="list-style-type: none"> ● <u>Change the position of the ((worker)) employee relative to the work so fumes, vapors, or smoke ((do not go into their face)) aren't directed into the employee's face</u>
<p><u>Limiting the amount of time employees can spend in a contaminated area.</u></p>	<ul style="list-style-type: none"> ● <u>Establish a contaminant-free area for tasks such as prep work that don't need to be done in the exposure area</u>
<p><u>((Rotate employees – Some specific rules prohibit the use of this control method</u></p> <p><u>Implementing an employee rotation schedule</u></p> <p>Note: <u>This control will increase the number of employees exposed to the airborne contaminant. Due to this risk, employee rotation is NOT recommended for highly toxic airborne contaminants such as carcinogens, where low exposures can still present a health hazard.</u></p>	<ul style="list-style-type: none"> ● <u>Move employees to another job that is without exposure, on a schedule to keep their total exposure below the permissible exposure limit))</u> <u>Have employees alternate working in the exposure area so that each employee gets less overall exposure</u>

AMENDATORY SECTION (Amending WSR 03-20-115, filed 10/1/03, effective 1/1/04)

WAC 296-841-20015 ((Use)) Respirators.

~~((You must:~~

•)) Require employees to use ~~((respiratory protection))~~ respirators when ~~((respiratory))~~ airborne hazards have not been removed using feasible exposure controls. For example, use respirators at any of the following times:

- While exposure controls are being evaluated or put in place
- When the ~~((respiratory))~~ airborne hazard is not completely removed
- When exposure controls are **NOT** feasible.

~~((Reference:~~

See chapter ~~296-842 WAC, Respirators,~~ for respirator program requirements.))

AMENDATORY SECTION (Amending WSR 04-18-079, filed 8/31/04, effective 11/1/04)

WAC 296-841-20020 ((Notify employees-)) Notification.

~~((You must:~~

•)) Notify employees who are or may be exposed to ~~((respiratory))~~ airborne hazards, as specified in Table 2.

Note: • The notification may be provided either individually, to a group, or by posting of results in an appropriate location that is accessible to affected employees.

**Table 2
Notification Requirements**

Notify employees of:	As follows:
Any exposure result above a permissible exposure limit (PEL)	Within five business days, after the employee's exposure result is known to the employer
The corrective action being taken to reduce employee exposure to or below the PEL AND The schedule for completion of the corrective action and any reasons why exposures cannot be lowered to below the PEL	Within fifteen business days, after the employee's exposure result is known to the employer
((An exposure to these substances:	In writing, as specified in the rule specific to the substance

Notify employees of:	As follows:
<ul style="list-style-type: none"> ● Acrylonitrile ● Arsenic (inorganic) ● Asbestos ● Benzene ● Butadiene ● Cadmium ● Coke oven emissions ● Cotton dust ● 1,2-Dibromo-3-chloropropane ● Ethylene oxide ● Formaldehyde ● Lead ● Methylene chloride ● Methylenedianiline ● Vinyl chloride)) 	

AMENDATORY SECTION (Amending WSR 04-18-079, filed 8/31/04, effective 11/1/04)

WAC 296-841-20025 Permissible exposure limits ((of air contaminants)) (PELs).

IMPORTANT:

The following information applies to Table 3, Permissible Exposure Limits (PELs) for ((Air)) Airborne Contaminants.

((~~● Exposure needs to be determined from personal air samples taken in the breathing zone or from monitoring representative of the employee's breathing zone.~~))

- Ppm refers to parts of vapor or gas per million parts of air by volume, at 25 degrees C and 760 mm Hg pressure.

- Mg/m³ refers to milligrams of ((~~substance~~)) an airborne contaminant per cubic meter of air.

- F/cc refers to fibers per cubic centimeter of air.

- For a metal that is measured as the metal itself, only the CAS number for the metal is given. The CAS numbers for individual compounds of the metal are not provided. For more information about CAS registry numbers see the web site: <http://www.cas.org>.

((~~● Time weighted averages (TWA₈) represent the maximum allowed average exposure for any 8-hour time period. For work periods longer than 8 hours the TWA₈ needs to be determined using the 8 continuous hours with the highest average concentration.~~))

- Short-term exposure limits (STEL) ((~~represent maximum allowed average exposure for any~~)) pertain to fifteen-minute exposure periods, unless another time period is noted in Table 3.

~~((The ceiling represents the maximum allowed exposure for the shortest time period that can feasibly be measured.))~~

• An "X" in the "skin" column indicates the ~~((substance))~~ contaminant can be absorbed through the skin, either by airborne or direct contact.

- Personal protective equipment (PPE) to prevent skin contact may be needed to minimize the risk for adverse health effects when employees are exposed to these chemicals.

~~((•))~~ = Requirements for the use of gloves, coveralls, goggles, and other personal protective equipment can be found in WAC 296-800-160, Personal protective equipment (PPE).

• Nuisance dusts (also known as inert dusts) are included in the Table 3 listing, particulates not otherwise regulated (PNOR).

- The PNOR listing in Table 3 also applies to other particulate airborne contaminants for which a specific PEL is NOT listed unless the airborne contaminant is found to require a lower limit.

• The respirable fraction of a particulate airborne contaminant is measured by sampling with a size-selector having the following characteristics:

Mean aerodynamic diameter in micrometers	Percent passing the selector
1	97
2	91
3	74
4	50
5	30
6	17
7	9
8	5
10	1

Table 3 "Permissible Exposure Limits (PELs) for ((Air)) Airborne Contaminants"

((Substance)) Airborne contaminant	CAS	TWA ₈	STEL	Ceiling	Skin
Abate (Temephos)	3383-96-8	----	----	----	----
Total particulate	----	10 mg/m ³	20 mg/m ³	----	----
Respirable fraction	----	5 mg/m ³	10 mg/m ³	----	----
Acetaldehyde	75-07-0	100 ppm	150 ppm	----	----
Acetic acid	64-19-7	10 ppm	20 ppm	----	----
Acetic anhydride	108-24-7	----	----	5 ppm	----
<u>Actinolite (asbestiform) (as asbestos)</u>	----	<u>0.1 f/cc</u>	<u>1.0 f/cc (30 minutes)</u>	----	----
<u>(see WAC 296-62-077 and chapter 296-65 WAC)</u>					
Acetone	67-64-1	750 ppm	1,000 ppm	----	----
Acetonitrile	75-05-8	40 ppm	60 ppm	----	----
2-Acetylaminofluorene (see WAC 296-62-073)	53-96-3	----	----	----	----
Acetylene	74-86-2	Simple asphyxiant	----	----	----
Acetylene dichloride (1,2-Dichloroethylene)	540-59-0	200 ppm	250 ppm	----	----
Acetylene tetrabromide	79-27-6	1 ppm	3 ppm	----	----
Acetylsalicylic acid (Aspirin)	50-78-2	5 mg/m ³	10 mg/m ³	----	----

(Substance) Airborne contaminant	CAS	TWA ₈	STEL	Ceiling	Skin
Acrolein	107-02-8	0.1 ppm	0.3 ppm	----	----
Acrylamide	79-06-1	0.03 mg/m ³	0.09 mg/m ³	----	X
Acrylic acid	79-10-7	10 ppm	20 ppm	----	X
Acrylonitrile (Vinyl cyanide) (see WAC 296-62-07336)	107-13-1	2 ppm	10 ppm	----	----
Aldrin	309-00-2	0.25 mg/m ³	0.75 mg/m ³	----	X
Allyl alcohol	107-18-6	2 ppm	4 ppm	----	X
Allyl chloride	107-05-1	1 ppm	2 ppm	----	----
Allyl glycidyl ether (AGE)	106-92-3	5 ppm	10 ppm	----	----
Allyl propyl disulfide	2179-59-1	2 ppm	3 ppm	----	----
alpha-Alumina (Aluminum oxide)	1344-28-1	----	----	----	----
Total particulate	----	10 mg/m ³	20 mg/m ³	----	----
Respirable fraction	----	5 mg/m ³	10 mg/m ³	----	----
Aluminum (as Al)	7429-90-5	----	----	----	----
Total particulate	----	10 mg/m ³	20 mg/m ³	----	----
Respirable fraction	----	5 mg/m ³	10 mg/m ³	----	----
Pyro powders	----	5 mg/m ³	10 mg/m ³	----	----
Welding fumes	----	5 mg/m ³	10 mg/m ³	----	----
Soluble salts	----	2 mg/m ³	4 mg/m ³	----	----
Alkyls (NOC)	----	2 mg/m ³	4 mg/m ³	----	----
Aluminum oxide (Alundum, Corundum)	7429-90-5	----	----	----	----
Total particulate	----	10 mg/m ³	20 mg/m ³	----	----
Respirable fraction	----	5 mg/m ³	10 mg/m ³	----	----
4-Aminodiphenyl (see WAC 296-62-073)	92-67-1	----	----	----	----
2-Aminoethanol (Ethanolamine)	141-43-5	3 ppm	6 ppm	----	----
2-Aminopyridine	504-29-0	0.5 ppm	1.5 ppm	----	----
Amitrole	61-82-5	0.2 mg/m ³	0.6 mg/m ³	----	----
Ammonia	7664-41-7	25 ppm	35 ppm	----	----
Ammonium chloride, fume	12125-02-9	10 mg/m ³	20 mg/m ³	----	----
Ammonium sulfamate (Ammate)	7773-06-0	----	----	----	----
Total particulate	----	10 mg/m ³	20 mg/m ³	----	----
Respirable fraction	----	5.0 mg/m ³	10 mg/m ³	----	----
<u>Amosite (as asbestos)</u> (see WAC 296-62-077 and chapter 296-65 WAC)	----	<u>0.1 f/cc</u>	<u>1.0 f/cc (30 minutes)</u>	----	----
n-Amyl acetate	628-63-7	100 ppm	150 ppm	----	----
sec-Amyl acetate	626-38-0	125 ppm	156 ppm	----	----
Aniline and homologues	62-53-3	2 ppm	4 ppm	----	X
Anisidine (o, p-isomers)	29191-52-4	0.1 ppm	0.3 ppm	----	X
<u>Anthophyllite (asbestiform) (as asbestos)</u> (see WAC 296-62-077 and chapter 296-65 WAC)	----	<u>0.1 f/cc</u>	<u>1.0 f/cc (30 minutes)</u>	----	----
Antimony and compounds (as Sb)	7440-36-0	0.5 mg/m ³	1.5 mg/m ³	----	----
ANTU (alpha Naphthyl thiourea)	86-88-4	0.3 mg/m ³	0.9 mg/m ³	----	----
Argon	7440-37-1	Simple asphyxiant	----	----	----
Arsenic, organic compounds (as As)	7440-38-2	0.2 mg/m ³	0.6 mg/m ³	----	----
Arsenic, inorganic compounds (as As) (when use is covered by ((WAC- 296-62-07347)) chapter 296-848 WAC)	7440-38-2	0.01 mg/m ³	----	----	----

(Substance) Airborne contaminant	CAS	TWA ₈	STEL	Ceiling	Skin
Arsenic, inorganic compounds (as As) (when use is not covered by (WAC 296-62-07347) chapter <u>296-848 WAC</u>)	7440-38-2	0.2 mg/m ³	0.6 mg/m ³	----	----
Arsine	7784-42-1	0.05 ppm	0.15 ppm	----	----
Asbestos (see WAC 296-62-077 and chapter <u>296-65 WAC</u>)	----	(---) <u>0.1 f/cc</u>	(---) <u>1.0 f/cc (30 minutes)</u>	----	----
Asphalt (Petroleum fumes)	8052-42-4	5 mg/m ³	10 mg/m ³	----	----
Atrazine	1912-24-9	5 mg/m ³	10 mg/m ³	----	----
Azinphos methyl (Guthion)	86-50-0	0.2 mg/m ³	0.6 mg/m ³	----	X
Azodrin (Monocrotophos)	6923-22-4	0.25 mg/m ³	0.75 mg/m ³	----	----
Barium, soluble compounds (as Ba)	7440-39-3	0.5 mg/m ³	1.5 mg/m ³	----	----
Barium sulfate	7727-43-7	----	----	----	----
Total particulate	----	10 mg/m ³	20 mg/m ³	----	----
Respirable fraction	----	5 mg/m ³	10 mg/m ³	----	----
Baygon (Propoxur)	114-26-1	0.5 mg/m ³	1.5 mg/m ³	----	----
Benomyl	17804-35-2	----	----	----	----
Total particulate	----	10 mg/m ³	20 mg/m ³	----	----
Respirable fraction	----	5 mg/m ³	10 mg/m ³	----	----
Benzene (see (WAC 296-62-07523) chapter <u>296-849 WAC</u>)	71-43-2	1 ppm	5 ppm	----	----
Benzidine (see WAC 296-62-073)	92-87-5	----	----	----	----
p-Benzoquinone (Quinone)	106-51-4	0.1 ppm	0.3 ppm	----	----
Benzo(a) pyrene (Coal tar pitch volatiles)	65996-93-2	0.2 mg/m ³	0.6 mg/m ³	----	----
Benzoyl peroxide	94-36-0	5 mg/m ³	10 mg/m ³	----	----
Benzyl chloride	100-44-7	1 ppm	3 ppm	----	----
Beryllium and beryllium compounds (as Be)	7440-41-7	0.002 mg/m ³	0.005 mg/m ³ (30 min.)	0.025 mg/m ³	----
Biphenyl (Diphenyl)	92-52-4	0.2 ppm	0.6 ppm	----	----
Bismuth telluride, undoped	1304-82-1	----	----	----	----
Total particulate	----	10 mg/m ³	20 mg/m ³	----	----
Respirable fraction	----	5 mg/m ³	10 mg/m ³	----	----
Bismuth telluride, Se-doped	----	5 mg/m ³	10 mg/m ³	----	----
Borates, tetra, sodium salts	----	----	----	----	----
Anhydrous	1330-43-4	1 mg/m ³	3 mg/m ³	----	----
Decahydrate	1303-96-4	5 mg/m ³	10 mg/m ³	----	----
Pentahydrate	12179-04-3	1 mg/m ³	3 mg/m ³	----	----
Boron oxide	1303-86-2	----	----	----	----
Total particulate	----	10 mg/m ³	20 mg/m ³	----	----
Boron tribromide	10294-33-4	----	----	1 ppm	----
Boron trifluoride	6737-07-2	----	----	1 ppm	----
Bromacil	314-40-9	1 ppm	3 ppm	----	----
Bromine	7726-95-6	0.1 ppm	0.3 ppm	----	----
Bromine pentafluoride	7789-30-2	0.1 ppm	0.3 ppm	----	----
Bromochloromethane (Chlorobromomthane)	74-97-5	200 ppm	250 ppm	----	----
Bromoform	15-25-2	0.5 ppm	1.5 ppm	----	X

(Substance) Airborne contaminant	CAS	TWA ₈	STEL	Ceiling	Skin
Butadiene (1,3-butadiene) (see WAC 296-62-07460)	106-99-0	1 ppm	5 ppm	----	----
Butane	106-97-8	800 ppm	1,000 ppm	----	----
Butanethiol (Butyl mercaptan)	109-79-5	0.5 ppm	1.5 ppm	----	----
2-Butanone (Methyl ethyl ketone)	78-93-3	200 ppm	300 ppm	----	----
2-Butoxy ethanol (Butyl cellosolve)	111-76-2	25 ppm	38 ppm	----	X
n-Butyl acetate	123-86-4	150 ppm	200 ppm	----	----
sec-Butyl acetate	105-46-4	200 ppm	250 ppm	----	----
tert-Butyl acetate	540-88-5	200 ppm	250 ppm	----	----
Butyl acrylate	141-32-2	10 ppm	20 ppm	----	----
n-Butyl alcohol	71-36-3	----	----	50 ppm	X
sec-Butyl alcohol	78-92-2	100 ppm	150 ppm	----	----
tert-Butyl alcohol	75-65-0	100 ppm	150 ppm	----	----
Butylamine	109-73-9	----	----	5 ppm	X
Butyl cellosolve (2-Butoxy ethanol)	111-76-2	25 ppm	38 ppm	----	----
tert-Butyl chromate (as (CrO₃) Cr) (see WAC 296-62-08003)	1189-85-1	(-----) 0.005 mg/m ³	----	0.1 mg/m ³	X
n-Butyl glycidyl ether (BGE)	2426-08-6	25 ppm	38 ppm	----	----
n-Butyl lactate	138-22-7	5 ppm	10 ppm	----	----
Butyl mercaptan	109-79-5	0.5 ppm	1.5 ppm	----	----
o-sec-Butylphenol	89-72-5	5 ppm	10 ppm	----	X
p-tert-Butyl-toluene	98-51-1	10 ppm	20 ppm	----	----
Cadmium oxide fume (as Cd) (see WAC 296-62-074 and 296-155-174)	1306-19-0	0.005 mg/m ³	----	----	----
Cadmium dust and salts (as Cd) (see WAC 296-62-074 and 296-155-174)	7440-43-9	0.005 mg/m ³	----	----	----
Calcium arsenate (see (WAC 296-62-07347) chapter 296-848 WAC)	----	0.01 mg/m ³	----	----	----
Calcium carbonate	1317-65-3	----	----	----	----
Total particulate	----	10 mg/m ³	20 mg/m ³	----	----
Respirable fraction	----	5 mg/m ³	10 mg/m ³	----	----
Calcium cyanamide	156-62-7	0.5 mg/m ³	1.5 mg/m ³	----	----
Calcium hydroxide	1305-62-0	5 mg/m ³	10 mg/m ³	----	----
Calcium oxide	1305-78-8	2 mg/m ³	4 mg/m ³	----	----
Calcium silicate	1344-95-2	----	----	----	----
Total particulate	----	10 mg/m ³	20 mg/m ³	----	----
Respirable fraction	----	5 mg/m ³	10 mg/m ³	----	----
Calcium sulfate	7778-18-9	----	----	----	----
Total particulate	----	10 mg/m ³	20 mg/m ³	----	----
Respirable fraction	----	5 mg/m ³	10 mg/m ³	----	----
Camphor (synthetic)	76-22-2	2 mg/m ³	4 mg/m ³	----	----
Caprolactam	105-60-2	----	----	----	----
Dust	----	1 mg/m ³	3 mg/m ³	----	----
Vapor	----	5 ppm	10 ppm	----	----
Captafol (Difolatan)	2425-06-1	0.1 mg/m ³	0.3 mg/m ³	----	X
Captan	133-06-2	5 mg/m ³	10 mg/m ³	----	----
Carbaryl (Sevin)	63-25-2	5 mg/m ³	10 mg/m ³	----	----
Carbofuran (Furadon)	1563-66-2	0.1 mg/m ³	0.3 mg/m ³	----	----

(Substance) Airborne contaminant	CAS	TWA ₈	STEL	Ceiling	Skin
Carbon black	1333-86-4	3.5 mg/m ³	7 mg/m ³	----	----
Carbon dioxide	124-38-9	5,000 ppm	30,000 ppm	----	----
Carbon disulfide	75-15-0	4 ppm	12 ppm	----	X
Carbon monoxide	630-08-0	35 ppm	200 ppm (5 min.)	1,500 ppm	----
Carbon tetrabromide	558-13-4	0.1 ppm	0.3 ppm	----	----
Carbon tetrachloride (Tetrachloromethane)	56-23-5	2 ppm	4 ppm	----	X
Carbonyl chloride (Phosgene)	7803-51-2	0.1 ppm	0.3 ppm	----	----
Carbonyl fluoride	353-50-4	2 ppm	5 ppm	----	----
Catechol (Pyrocatechol)	120-80-9	5 ppm	10 ppm	----	X
Cellosolve acetate (2-Ethoxyethylacetate)	111-15-9	5 ppm	10 ppm	----	X
Cellulose (paper fiber)	9004-34-6	----	----	----	----
Total particulate	----	10 mg/m ³	20 mg/m ³	----	----
Respirable fraction	----	5 mg/m ³	10 mg/m ³	----	----
Cesium hydroxide	21351-79-1	2 mg/m ³	4 mg/m ³	----	----
Chlordane	57-74-9	0.5 mg/m ³	1.5 mg/m ³	----	X
Chlorinated camphene (Toxaphen)	8001-35-2	0.5 mg/m ³	1 mg/m ³	----	X
Chlorinated diphenyl oxide	55720-99-5	0.5 mg/m ³	1.5 mg/m ³	----	----
Chlorine	7782-50-5	0.5 ppm	----	1 ppm	----
Chlorine dioxide	10049-04-4	0.1 ppm	0.3 ppm	----	----
Chlorine trifluoride	7790-91-2	----	----	0.1 ppm	----
Chloroacetaldehyde	107-20-0	----	----	1 ppm	----
a-Chloroacetophenone (Phenacyl chloride)	532-21-4	0.05 ppm	0.15 ppm	----	----
Chloroacetyl chloride	79-04-9	0.05 ppm	0.15 ppm	----	----
Chlorobenzene (Monochlorobenzene)	108-90-7	75 ppm	113 ppm	----	----
o-Chlorobenzylidene malonitrile (OCBM)	2698-41-1	----	----	0.05 ppm	X
Chlorobromomethane	74-97-5	200 ppm	250 ppm	----	----
2-Chloro-1, 3-butadiene (beta-Chloroprene)	126-99-8	10 ppm	20 ppm	----	X
Chlorodifluoromethane	75-45-6	1,000 ppm	1,250 ppm	----	----
Chlorodiphenyl (42% Chlorine) (PCB) (Polychlorobiphenyls)	53469-21-9	1 mg/m ³	3 mg/m ³	----	X
Chlorodiphenyl (54% Chlorine) (Polychlorobiphenyls (PCB))	11097-69-1	0.5 mg/m ³	1.5 mg/m ³	----	X
1-Chloro-2, 3-epoxypropane (Epichlorhydrin)	106-89-8	2 ppm	4 ppm	----	X
2-Chloroethanol (Ethylene chlorohydrin)	107-07-3	----	----	1 ppm	X
Chloroethylene (vinyl chloride) (See WAC 296-62-07329)	75-01-4	1 ppm	5 ppm	----	----
Chloroform (Trichloromethane)	67-66-3	2 ppm	4 ppm	----	----
1-Chloro-1-nitropropane	600-25-9	2 ppm	4 ppm	----	----
bis-Chloromethyl ether (see WAC 296-62-073)	542-88-1	----	----	----	----
Chloromethyl methyl ether (Methyl chloromethyl ether) (see WAC 296-62-073)	107-30-2	----	----	----	----
Chloropentafluoroethane	76-15-3	1,000 ppm	1,250 ppm	----	----

(Substance) Airborne contaminant	CAS	TWA ₈	STEL	Ceiling	Skin
Chloropicrin (Nitrotrichloromethane)	76-06-2	0.1 ppm	0.3 ppm	----	----
beta-Chloroprene (2-Chloro-1,3-butadiene)	126-99-8	10 ppm	20 ppm	----	X
o-Chlorostyrene	2039-87-4	50 ppm	75 ppm	----	----
o-Chlorotoluene	95-49-8	50 ppm	75 ppm	----	----
2-Chloro-6-trichloromethyl pyridine (Nitrapyrin)	1929-82-4	----	----	----	----
Total particulate	----	10 mg/m ³	20 mg/m ³	----	----
Respirable fraction	----	5 mg/m ³	10 mg/m ³	----	----
Chlorpyrifos	2921-88-2	0.2 mg/m ³	0.6 mg/m ³	----	X
Chromic acid and chromates (as (CrO₃) Cr) (when the compound is not covered by WAC 296-62-08003)	Varies with compound	((0.1 mg/m³)) ----	((0.3 mg/m³)) ----	((---)) 0.1 mg/m ³	----
((Chromium, soluble, chromic and chromous salts (as Cr)	7440-47-3	0.5 mg/m³	1.5 mg/m³	---	---
<u>Chromium</u>	----	----	----	----	----
Chromium (VI) compounds (as Cr) (when the compound is covered by WAC 296-62-08003)	----	((0.05)) 0.005 mg/m ³	((0.15 mg/m³)) ----	----	----
Chromium metal ((and insoluble salts)) or Chromium (II) compounds Or Chromium (III) compounds	7440-47-3	0.5 mg/m ³	((1.5 mg/m³)) ----	----	----
Chromyl chloride (as Cr) (see WAC 296-62-08003)	14977-61-8	((0.025 ppm)) 0.005 mg/m ³	((0.075 ppm)) ----	----	----
Chrysene (Coal tar pitch volatiles)	65996-93-2	0.2 mg/m ³	0.6 mg/m ³	----	----
<u>Chrysotile (as asbestos) (see WAC 296-62-077 and chapter 296-65 WAC)</u>	----	0.1 f/cc	1.0 f/cc (30 minutes)	----	----
Clopidol	2971-90-6	----	----	----	----
Total particulate	----	10 mg/m ³	20 mg/m ³	----	----
Respirable fraction	----	5 mg/m ³	10 mg/m ³	----	----
Coal dust (less than 5% SiO ₂)	----	----	----	----	----
Respirable fraction	----	2 mg/m ³	4 mg/m ³	----	----
Coal dust (greater than or equal to 5% SiO ₂)	----	----	----	----	----
Respirable fraction	----	0.1 mg/m ³	0.3 mg/m ³	----	----
Coal tar pitch volatiles (benzene soluble fraction) ((Particulate polycyclic aromatic hydrocarbons))	65996-93-2	0.2 mg/m ³	0.6 mg/m ³	----	----
<u>Acridine</u>					
<u>Anthracene</u>					
<u>Benzo (a) pyrene</u>					
<u>Chrysene</u>					
<u>Phenanthrene</u>					
<u>Pyrene</u>					
Cobalt, metal fume & dust (as Co)	7440-48-4	0.05 mg/m ³	0.15 mg/m ³	----	----
Cobalt carbonyl (as Co)	10210-68-1	0.1 mg/m ³	0.3 mg/m ³	----	----
Cobalt hydrocarbonyl (as Co)	16842-03-8	0.1 mg/m ³	0.3 mg/m ³	----	----
Coke oven emissions (see WAC 296-62-200)	----	0.15 mg/m ³	----	----	----
Copper (as Cu)	7440-50-8	----	----	----	----
Fume	----	0.1 mg/m ³	0.3 mg/m ³	----	----
Dusts and mists	----	1 mg/m ³	3 mg/m ³	----	----

<u>(Substance)</u> Airborne contaminant	CAS	TWA ₈	STEL	Ceiling	Skin
Cotton dust (raw) (waste sorting, blending, cleaning, willowing and gartetting) (see WAC 296-62-14533)	----	1 mg/m ³	----	----	----
Corundum (Aluminum oxide)	7429-90-5	----	----	----	----
Total particulate	----	10 mg/m ³	20 mg/m ³	----	----
Respirable fraction	----	5 mg/m ³	10 mg/m ³	----	----
Crag herbicide (Sesone, Sodium-2, 4-dichloro-phenoxyethyl sulfate)	136-78-7	----	----	----	----
Total particulate	----	10 mg/m ³	20 mg/m ³	----	----
Respirable fraction	----	5 mg/m ³	10 mg/m ³	----	----
Cresol (all isomers)	1319-77-3	5 ppm	10 ppm	----	X
<u>Crocidolite (as asbestos)</u> (see WAC 296-62-077 and chapter 296-65 WAC)	----	<u>0.1 f/cc</u>	<u>1.0 f/cc (30 minutes)</u>	----	----
Crotonaldehyde	123-73-9; 4170-30-3	2 ppm	4 ppm	----	----
Crufomate	299-86-5	5 mg/m ³	10 mg/m ³	----	----
Cumene	98-82-8	50 ppm	75 ppm	----	X
Cyanamide	420-04-2	2 mg/m ³	4 mg/m ³	----	----
Cyanide (as CN)	Varies with compound	5 mg/m ³	10 mg/m ³	----	X
Cyanogen	460-19-5	10 ppm	20 ppm	----	----
Cyanogen chloride	506-77-4	----	----	0.3 ppm	----
Cyclohexane	110-82-7	300 ppm	375 ppm	----	----
Cyclohexanol	108-93-0	50 ppm	75 ppm	----	X
Cyclohexanone	108-94-1	25 ppm	38 ppm	----	X
Cyclohexene	110-83-8	300 ppm	375 ppm	----	----
Cyclohexylamine	108-91-8	10 ppm	20 ppm	----	----
Cyclonite (RDX)	121-82-4	1.5 mg/m ³	3.0 mg/m ³	----	X
Cyclopentadiene	542-92-7	75 ppm	113 ppm	----	----
Cyclopentane	287-92-3	600 ppm	750 ppm	----	----
Cyhexatin (Tricyclohexyltin hydroxide)	13121-70-5	5 mg/m ³	10 mg/m ³	----	----
2,4-D (Dichlorophenoxy-acetic acid)	94-75-7	10 mg/m ³	20 mg/m ³	----	----
DBCP (1,2-Dibromo-3-chloropropane) (See WAC 296-62-07342)	96-12-8	0.001 ppm	----	0.005 ppm	----
DDT (Dichlorodiphenyltri-chloroethane)	50-29-3	1 mg/m ³	3 mg/m ³	----	X
DDVP, (Dichlorvos)	62-73-7	0.1 ppm	0.3 ppm	----	X
Dasanit (Fensulfothion)	115-90-2	0.1 mg/m ³	0.3 mg/m ³	----	----
Decaborane	17702-41-9	0.05 ppm	0.15 ppm	----	X
Demeton	8065-48-3	0.01 ppm	0.03 ppm	----	X
Diacetone alcohol (4-hydroxy-4-methyl-2-pentanone)	123-42-2	50 ppm	75 ppm	----	----
1, 2-Diaminoethane (Ethylenediamine)	107-15-3	10 ppm	20 ppm	----	----
Diazinon	333-41-5	0.1 mg/m ³	0.3 mg/m ³	----	X
Diazomethane	334-88-3	0.2 ppm	0.6 ppm	----	----
Diborane	19287-45-7	0.1 ppm	0.3 ppm	----	----
Dibrom (see Naled)	300-76-5	3 mg/m ³	6 mg/m ³	----	X
1, 2-Dibromo-3-chloropropane (DBCP) (see WAC 296-62-07342)	96-12-8	0.001 ppm	----	0.005 ppm	----

(Substance) Airborne contaminant	CAS	TWA ₈	STEL	Ceiling	Skin
2-N-Dibutylamino ethanol	102-81-8	2 ppm	4 ppm	----	X
Dibutyl phosphate	107-66-4	1 ppm	2 ppm	----	----
Dibutyl phthalate	84-74-2	5 mg/m ³	10 mg/m ³	----	----
Dichloroacetylene	7572-29-4	----	----	0.1 ppm	----
o-Dichlorobenzene	95-50-1	----	----	50 ppm	----
p-Dichlorobenzene	106-46-7	75 ppm	110 ppm	----	----
3, 3'-Dichlorobenzidine (see WAC 296-62-073)	91-94-1	----	----	----	----
Dichlorodiphenyltri- chloroethane (DDT)	50-29-3	1 mg/m ³	3 mg/m ³	----	X
Dichlorodifluoromethane	75-71-8	1,000 ppm	1,250 ppm	----	----
1, 3-Dichloro-5, 5-dimethyl hydantoin	118-52-5	0.2 mg/m ³	0.4 mg/m ³	----	----
1, 1-Dichloroethane (Ethylidene chloride)	75-34-3	100 ppm	150 ppm	----	----
1, 2-Dichloroethane (Ethylene dichloride)	107-06-2	1 ppm	2 ppm	----	----
1, 1-Dichloroethylene (Vinylidene chloride)	75-35-4	1 ppm	3 ppm	----	----
1, 2-Dichloroethylene (Acetylene dichloride)	540-59-0	200 ppm	250 ppm	----	----
Dichloroethyl ether	111-44-4	5 ppm	10 ppm	----	X
Dichlorofluoromethane	75-43-4	10 ppm	20 ppm	----	----
Dichloromethane (Methylene chloride) (See (WAC 296-62-07470) chapter 296-859 WAC)	75-09-2	25 ppm	125 ppm	----	----
1, 1-Dichloro-1-nitroethane	594-72-9	2 ppm	10 ppm	----	----
Dichlorophenoxyacetic acid (2, 4-D)	94-75-7	10 mg/m ³	20 mg/m ³	----	----
1, 2-Dichloropropane (Propylene dichloride)	78-87-5	75 ppm	110 ppm	----	----
Dichloropropene	542-75-6	1 ppm	3 ppm	----	X
2, 2-Dichloropropionic acid	75-99-0	1 ppm	3 ppm	----	----
Dichlorotetrafluoroethane	76-14-2	1,000 ppm	1,250 ppm	----	----
Dichlorvos (DDVP)	62-73-7	0.1 ppm	0.3 ppm	----	X
Dicrotophos	141-66-2	0.25 mg/m ³	0.75 mg/m ³	----	X
Dicyclopentadiene	77-73-6	5 ppm	10 ppm	----	----
Dicyclopentadienyl iron	102-54-5	----	----	----	----
Total particulate	----	10 mg/m ³	20 mg/m ³	----	----
Respirable fraction	----	5 mg/m ³	10 mg/m ³	----	----
Dieldrin	60-57-1	0.25 mg/m ³	0.75 mg/m ³	----	X
Diethanolamine	111-42-2	3 ppm	6 ppm	----	----
Diethylamine	109-89-7	10 ppm	25 ppm	----	----
2-Diethylaminoethanol	100-37-8	10 ppm	20 ppm	----	X
Diethylene triamine	111-40-0	1 ppm	3 ppm	----	X
Diethyl ether (Ethyl ether)	60-29-7	400 ppm	500 ppm	----	----
Diethyl ketone	96-22-0	200 ppm	250 ppm	----	----
Diethyl phthalate	84-66-2	5 mg/m ³	10 mg/m ³	----	----
Difluorodibromomethane	75-61-6	100 ppm	150 ppm	----	----
Difolatan (Captafol)	2425-06-1	0.1 mg/m ³	0.3 mg/m ³	----	X
Diglycidyl ether (DGE)	2238-07-5	0.1 ppm	0.3 ppm	----	----
Dihydroxybenzene (Hydroquinone)	123-31-9	2 mg/m ³	4 mg/m ³	----	----
Diisobutyl ketone (2, 6- Dimethylheptanone)	108-83-8	25 ppm	38 ppm	----	----
Diisopropylamine	108-18-9	5 ppm	10 ppm	----	X

(Substance) Airborne contaminant	CAS	TWA ₈	STEL	Ceiling	Skin
Dimethoxymethane (Methylal)	109-87-5	1,000 ppm	1,250 ppm	----	----
Dimethyl acetamide	127-19-5	10 ppm	20 ppm	----	X
Dimethylamine	124-40-3	10 ppm	20 ppm	----	----
4-Dimethylaminoazo benzene (see WAC 296-62-073)	60-11-7	----	----	----	----
Dimethylaminobenzene (Xylidene)	1300-73-8	2 ppm	4 ppm	----	X
Dimethylaniline (N, N-Dimethylaniline)	121-69-7	5 ppm	10 ppm	----	X
Dimethylbenzene (Xylene)	1300-73-8	100 ppm	150 ppm	----	----
Dimethyl-1, 2-dibromo-2, 2-dichloroethyl phosphate (Naled)	300-76-5	3 mg/m ³	6 mg/m ³	----	X
Dimethylformamide	68-12-2	10 ppm	20 ppm	----	X
2, 6-Dimethylheptanone (Diisobutyl ketone)	108-83-8	25 ppm	38 ppm	----	----
1, 1-Dimethylhydrazine	57-14-7	0.5 ppm	1.5 ppm	----	X
Dimethyl phthalate	131-11-3	5 mg/m ³	10 mg/m ³	----	----
Dimethyl sulfate	77-78-1	0.1 ppm	0.3 ppm	----	X
Dinitolmide (3, 5-Dinitro-o-toluamide)	148-01-6	5 mg/m ³	10 mg/m ³	----	----
Dinitrobenzene (all isomers - alpha, meta and para)	528-29-0; 99-65-0; 100-25-4	0.15 ppm	0.45 ppm	----	X
Dinitro-o-cresol	534-52-1	0.2 mg/m ³	0.6 mg/m ³	----	X
3, 5-Dinitro-o-toluamide (Dinitolmide)	148-01-6	5 mg/m ³	10 mg/m ³	----	----
Dinitrotoluene	25321-14-6	1.5 mg/m ³	3 mg/m ³	----	X
Dioxane (Diethylene dioxide)	123-91-1	25 ppm	38 ppm	----	X
Dioxathion	78-34-2	0.2 mg/m ³	0.6 mg/m ³	----	X
Diphenyl (Biphenyl)	92-52-4	0.2 ppm	0.6 ppm	----	----
Diphenylamine	122-39-4	10 mg/m ³	20 mg/m ³	----	----
Diphenylmethane diisocyanate (Methylene bisphenyl isocyanate (MDI))	101-68-8	----	----	0.02 ppm	----
Dipropylene glycol methyl ether	34590-94-8	100 ppm	150 ppm	----	X
Dipropyl ketone	123-19-3	50 ppm	75 ppm	----	----
Diquat	85-00-7	0.5 mg/m ³	1.5 mg/m ³	----	----
Di-sec, Octyl phthalate (Di-2-ethylhexylphthalate)	117-81-7	5 mg/m ³	10 mg/m ³	----	----
Disulfram	97-77-8	2 mg/m ³	4 mg/m ³	----	----
Disulfoton	298-04-4	0.1 mg/m ³	0.3 mg/m ³	----	X
2, 6-Di-tert-butyl-p-cresol	128-37-0	10 mg/m ³	20 mg/m ³	----	----
Diuron	330-54-1	10 mg/m ³	20 mg/m ³	----	----
Divinyl benzene	1321-74-0	10 ppm	20 ppm	----	----
Emery	12415-34-8	----	----	----	----
Total particulate	----	10 mg/m ³	20 mg/m ³	----	----
Respirable fraction	----	5 mg/m ³	10 mg/m ³	----	----
Endosulfan (Thiodan)	115-29-7	0.1 mg/m ³	0.3 mg/m ³	----	X
Endrin	72-20-8	0.1 mg/m ³	0.3 mg/m ³	----	X
Epichlorhydrin (1-Chloro-2, 3-epoxypropane)	106-89-8	2 ppm	4 ppm	----	X
EPN	2104-64-5	0.5 mg/m ³	1.5 mg/m ³	----	X
1, 2-Epoxypropane (Propylene oxide)	75-56-9	20 ppm	30 ppm	----	----
2, 3-Epoxy-1-propanol (Glycidol)	556-52-5	25 ppm	38 ppm	----	----
Ethane	----	Simple asphyxiant	----	----	----

(Substance) Airborne contaminant	CAS	TWA ₈	STEL	Ceiling	Skin
Ethanethiol (Ethyl mercaptan)	75-08-1	0.5 ppm	1.5 ppm	----	----
Ethanol (Ethyl alcohol)	64-17-5	1,000 ppm	1,250 ppm	----	----
Ethanolamine (2-Aminoethanol)	141-43-5	3 ppm	6 ppm	----	----
Ethion	563-12-2	0.4 mg/m ³	1.2 mg/m ³	----	X
2-Ethoxyethanol (Glycol monoethyl ether)	110-80-5	5 ppm	10 ppm	----	X
2-Ethoxyethyl acetate (Cellosolve acetate)	111-15-9	5 ppm	10 ppm	----	X
Ethyl acetate	141-78-6	400 ppm	500 ppm	----	----
Ethyl acrylate	140-88-5	5 ppm	25 ppm	----	X
Ethyl alcohol (ethanol)	64-17-5	1,000 ppm	1,250 ppm	----	----
Ethylamine	75-04-07	10 ppm	20 ppm	----	----
Ethyl amyl ketone (5-Methyl-3-heptanone)	541-85-5	25 ppm	38 ppm	----	----
Ethyl benzene	100-41-4	100 ppm	125 ppm	----	----
Ethyl bromide	74-96-4	200 ppm	250 ppm	----	----
Ethyl butyl ketone (3-Heptanone)	106-35-4	50 ppm	75 ppm	----	----
Ethyl chloride	75-00-3	1,000 ppm	1,250 ppm	----	----
Ethylene	74-85-1	Simple asphyxiant	----	----	----
Ethylene chlorohydrin (2-Chloroethanol)	107-07-3	----	----	1 ppm	X
Ethylenediamine (1,2- Diaminoethane)	107-15-3	10 ppm	20 ppm	----	X
Ethylene dibromide	106-93-4	0.1 ppm	0.5 ppm	----	----
Ethylene dichloride (1,2-Dichloroethane)	107-06-2	1 ppm	2 ppm	----	----
Ethylene glycol	107-21-1	----	----	50 ppm	----
Ethylene glycol dinitrate	628-96-6	----	0.1 mg/m ³	----	X
Ethylene glycol monomethyl ether acetate (Methyl cellosolve acetate)	----	5 ppm	10 ppm	----	X
Ethyleneimine (see WAC 296-62-073)	151-56-4	----	----	----	X
Ethylene oxide (see (WAC 296-62-07359) chapter 296-855 WAC)	75-21-8	1 ppm	5 ppm	----	----
Ethyl ether (Diethyl ether)	60-29-7	400 ppm	500 ppm	----	----
Ethyl formate	109-94-4	100 ppm	125 ppm	----	----
Ethylidene chloride (1, 1-Dichloroethane)	107-06-2	1 ppm	2 ppm	----	----
Ethylidene norbornene	16219-75-3	----	----	5.0 ppm	----
Ethyl mercaptan (Ethanethiol)	75-08-1	0.5 ppm	1.5 ppm	----	----
n-Ethylmorpholine	100-74-3	5 ppm	10 ppm	----	X
Ethyl sec-amyl ketone (5-methyl-3-heptanone)	541-85-5	25 ppm	38 ppm	----	----
Ethyl silicate	78-10-4	10 ppm	20 ppm	----	----
Fenamiphos	22224-92-6	0.1 mg/m ³	0.3 mg/m ³	----	X
Fensulfothion (Dasanit)	115-90-2	0.1 mg/m ³	0.3 mg/m ³	----	----
Fenthion	55-38-9	0.2 mg/m ³	0.6 mg/m ³	----	X
Ferbam	----	----	----	----	----
Total particulate	14484-64-1	10 mg/m ³	20 mg/m ³	----	----
Ferrovandium dust	12604-58-9	1 mg/m ³	3 mg/m ³	----	----
Fluorides (as F)	Varies with compound	2.5 mg/m ³	5 mg/m ³	----	----

(Substance) Airborne contaminant	CAS	TWA ₈	STEL	Ceiling	Skin
Fluorine	7782-41-4	0.1 ppm	0.3 ppm	----	----
Fluorotrichloromethane (see Trichlorofluoro methane)	75-69-4	----	----	1,000 ppm	----
Fonofos	944-22-9	0.1 mg/m ³	0.3 mg/m ³	----	X
Formaldehyde (see ((WAC 296-62-07540)) chapter 296-856 WAC)	50-00-0	0.75 ppm	2 ppm	----	----
Formamide	75-12-7	20 ppm	30 ppm	----	----
Formic acid	64-18-6	5 ppm	10 ppm	----	----
Furadon (carbofuran)	1563-66-2	0.1 mg/m ³	0.3 mg/m ³	----	----
Furfural	98-01-1	2 ppm	4 ppm	----	X
Furfuryl alcohol	98-00-0	10 ppm	15 ppm	----	X
Gasoline	8006-61-9	300 ppm	500 ppm	----	----
Germanium tetrahydride	7782-65-2	0.2 ppm	0.6 ppm	----	----
Glass, fibrous or dust	----	10 mg/m ³	20 mg/m ³	----	----
((Glutaraldehyde)) Glutaraldehyde	111-30-8	----	----	0.2 ppm	----
Glycerin mist	56-81-5	----	----	----	----
Total particulate	----	10 mg/m ³	20 mg/m ³	----	----
Respirable fraction	----	5 mg/m ³	10 mg/m ³	----	----
Glycidol (2, 3-Epoxy-1-propanol)	556-52-5	25 ppm	38 ppm	----	----
Glycol monoethyl ether (2-Ethoxyethanol)	110-80-5	5 ppm	10 ppm	----	X
Grain dust (oat, wheat, barley)	----	10 mg/m ³	20 mg/m ³	----	----
Graphite, natural	7782-42-5	----	----	----	----
Respirable particulate	----	2.5 mg/m ³	5 mg/m ³	----	----
Graphite, synthetic	----	----	----	----	----
Total particulate	----	10 mg/m ³	20 mg/m ³	----	----
Respirable fraction	----	5 mg/m ³	10 mg/m ³	----	----
Guthion (Azinphosmethyl)	86-50-0	0.2 mg/m ³	0.6 mg/m ³	----	X
Gypsum	13397-24-5	----	----	----	----
Total particulate	----	10 mg/m ³	20 mg/m ³	----	----
Respirable fraction	----	5 mg/m ³	10 mg/m ³	----	----
Hafnium	7440-58-6	0.5 mg/m ³	1.5 mg/m ³	----	----
Helium	----	Simple asphyxiant	----	----	----
Heptachlor	76-44-8	0.5 mg/m ³	1.5 mg/m ³	----	X
Heptane (n-heptane)	142-82-5	400 ppm	500 ppm	----	----
2-Heptanone (Methyl n-amyl ketone)	110-43-0	50 ppm	75 ppm	----	----
3-Heptanone (Ethyl butyl ketone)	106-35-4	50 ppm	75 ppm	----	----
Hexachlorobutadiene	87-68-3	0.02 ppm	0.06 ppm	----	X
Hexachlorocyclopentadiene	77-47-4	0.01 ppm	0.03 ppm	----	----
Hexachloroethane	67-72-1	1 ppm	3 ppm	----	X
Hexachloronaphthalene	1335-87-1	0.2 mg/m ³	0.6 mg/m ³	----	X
Hexafluoroacetone	684-16-2	0.1 ppm	0.3 ppm	----	X
Hexane	----	----	----	----	----
n-hexane	110-54-3	50 ppm	75 ppm	----	----
other isomers	Varies with compound	500 ppm	1,000 ppm	----	----
2-Hexanone (Methyl-n-butyl ketone)	591-78-6	5 ppm	10 ppm	----	----
Hexone (Methyl isobutyl ketone)	108-10-1	50 ppm	75 ppm	----	----
sec-Hexyl acetate	108-84-9	50 ppm	75 ppm	----	----

(Substance) Airborne contaminant	CAS	TWA ₈	STEL	Ceiling	Skin
Hexylene glycol	107-41-5	----	----	25 ppm	----
Hydrazine	302-01-2	0.1 ppm	0.3 ppm	----	X
Hydrogen	----	Simple asphyxiant	----	----	----
Hydrogenated terphenyls	61788-32-7	0.5 ppm	1.5 ppm	----	----
Hydrogen bromide	10035-10-6	----	----	3.0 ppm	----
Hydrogen chloride	7647-01-0	----	----	5.0 ppm	----
Hydrogen cyanide	74-90-8	----	4.7 ppm	----	X
Hydrogen fluoride	7664-39-3	----	----	3 ppm	----
Hydrogen peroxide	7722-84-1	1 ppm	3 ppm	----	----
Hydrogen selenide (as Se)	7783-07-5	0.05 ppm	0.15 ppm	----	----
Hydrogen sulfide	7783-06-4	10 ppm	15 ppm	----	----
Hydroquinone (Dihydroxybenzene)	123-31-9	2 mg/m ³	4 mg/m ³	----	----
4-Hydroxy-4-methyl-2-pentanone (Diacetone alcohol)	123-42-2	50 ppm	75 ppm	----	----
2-Hydroxypropyl acrylate	99-61-1	0.5 ppm	1.5 ppm	----	X
Indene	95-13-6	10 ppm	20 ppm	----	----
Indium and compounds (as In)	7440-74-6	0.1 mg/m ³	0.3 mg/m ³	----	----
Iodine	7553-56-2	----	----	0.1 ppm	----
Iodoform	75-47-8	0.6 ppm	1.8 ppm	----	----
Iron oxide dust and fume (as Fe)	1309-37-1	----	----	----	----
Total particulate	----	5 mg/m ³	10 mg/m ³	----	----
Iron pentacarbonyl (as Fe)	13463-40-6	0.1 ppm	0.2 ppm	----	----
Iron salts, soluble (as Fe)	Varies with compound	1 mg/m ³	3 mg/m ³	----	----
Isoamyl acetate	123-92-2	100 ppm	150 ppm	----	----
Isoamyl alcohol (primary and secondary)	123-51-3	100 ppm	125 ppm	----	----
Isobutyl acetate	110-19-0	150 ppm	188 ppm	----	----
Isobutyl alcohol	78-83-1	50 ppm	75 ppm	----	----
Isooctyl alcohol	26952-21-6	50 ppm	75 ppm	----	X
Isophorone	78-59-1	4 ppm	----	5 ppm	----
Isophorone diisocyanate	4098-71-9	0.005 ppm	0.02 ppm	----	X
Isopropoxyethanol	109-59-1	25 ppm	38 ppm	----	----
Isopropyl acetate	108-21-4	250 ppm	310 ppm	----	----
Isopropyl alcohol	67-63-0	400 ppm	500 ppm	----	----
Isopropylamine	75-31-0	5 ppm	10 ppm	----	----
N-Isopropylaniline	768-52-5	2 ppm	4 ppm	----	X
Isopropyl ether	108-20-3	250 ppm	313 ppm	----	----
Isopropyl glycidyl ether (IGE)	4016-14-2	50 ppm	75 ppm	----	----
Kaolin	----	----	----	----	----
Total particulate	----	10 mg/m ³	20 mg/m ³	----	----
Respirable fraction	----	5 mg/m ³	10 mg/m ³	----	----
Ketene	463-51-4	0.5 mg/m ³	1.5 mg/m ³	----	----
Lannate (Methomyl)	16752-77-5	2.5 mg/m ³	5 mg/m ³	----	----
Lead, inorganic (as Pb) (see WAC 296-62-07521 and 296-155-176)	7439-92-1	0.05 mg/m ³	----	----	----
Lead arsenate (as Pb) (see WAC ((296-62-07347)) <u>296-62-07521</u> , <u>296-155-176</u> , and chapter <u>296-848 WAC</u>)	3687-31-8	0.05 mg/m ³	----	----	----

((Substance)) Airborne contaminant	CAS	TWA ₈	STEL	Ceiling	Skin
Lead chromate (as Pb) (see WAC 296-62-08003, 296-62-07521, and 296-155-176)	7758-97-6	0.05 mg/m ³	----	----	----
Limestone	1317-65-3	----	----	----	----
Total particulate	----	10 mg/m ³	20 mg/m ³	----	----
Respirable fraction	----	5 mg/m ³	10 mg/m ³	----	----
Lindane	58-89-9	0.5 mg/m ³	1.5 mg/m ³	----	X
Lithium hydride	7580-67-8	0.025 mg/m ³	0.075 mg/m ³	----	----
L.P.G. (liquified petroleum gas)	68476-85-7	1,000 ppm	1,250 ppm	----	----
Magnesite	546-93-0	----	----	----	----
Total particulate	----	10 mg/m ³	20 mg/m ³	----	----
Respirable fraction	----	5 mg/m ³	10 mg/m ³	----	----
Magnesium oxide fume	1309-48-4	----	----	----	----
Total particulate	----	10 mg/m ³	20 mg/m ³	----	----
Malathion	121-75-5	----	----	----	----
Total particulate	----	10 mg/m ³	20 mg/m ³	----	X
Maleic anhydride	108-31-6	0.25 ppm	0.75 ppm	----	----
Manganese and compounds (as Mn)	7439-96-5	----	----	5 mg/m ³	----
Manganese cyclopentadienyl tricarbonyl (as Mn)	12079-65-1	0.1 mg/m ³	0.3 mg/m ³	----	X
Manganese tetroxide and fume (as Mn)	7439-96-5	1 mg/m ³	3 mg/m ³	----	----
Marble	1317-65-3	----	----	----	----
Total particulate	----	10 mg/m ³	20 mg/m ³	----	----
Respirable fraction	----	5 mg/m ³	10 mg/m ³	----	----
MBOCA (4, 4'-Methylene bis (2-chloro-aniline)) (see WAC 296-62-073)	101-14-4	----	----	----	X
MDA (4, 4-Methylene dianiline) (see WAC 296-62-076 and 296-155-173)	101-77-9	0.01 ppm	0.1 ppm	----	X
MDI (Methylene bisphenyl isocyanate) (Diphenylmethane diisocyanate)	101-68-8	----	----	0.02 ppm	----
MEK (Methyl ethyl ketone) (2-Butanone)	78-93-3	200 ppm	300 ppm	----	----
MEKP (Methyl ethyl ketone peroxide)	1338-23-4	----	----	0.2 ppm	----
Mercury (as Hg)	7439-97-6	----	----	----	----
Aryl and inorganic	----	0.1 mg/m ³	0.3 mg/m ³	----	X
Organo-alkyl compounds	----	0.01 mg/m ³	0.03 mg/m ³	----	X
Vapor	----	0.05 mg/m ³	0.15 mg/m ³	----	X
Mesityl oxide	141-79-7	15 ppm	25 ppm	----	----
Methacrylic acid	79-41-4	20 ppm	30 ppm	----	X
Methane	----	Simple asphyxiant	----	----	----
Methanethiol (Methyl mercaptan)	74-93-1	0.5 ppm	1.5 ppm	----	----
Methanol (Methyl alcohol)	67-56-1	200 ppm	250 ppm	----	X
Methomyl (lannate)	16752-77-5	2.5 mg/m ³	5 mg/m ³	----	----
Methoxychlor	72-43-5	----	----	----	----
Total particulate	----	10 mg/m ³	20 mg/m ³	----	----

<u>((Substance)) Airborne contaminant</u>	CAS	TWA ₈	STEL	Ceiling	Skin
2-Methoxyethanol (Methyl cellosolve)	109-86-4	5 ppm	10 ppm	----	X
2-Methoxyethyl acetate (Methyl cellosolve acetate)	110-49-6	5 ppm	10 ppm	----	X
4-Methoxyphenol	150-76-5	5 mg/m ³	10 mg/m ³	----	----
Methyl acetate	79-20-9	200 ppm	250 ppm	----	----
Methyl acetylene (propyne)	74-99-7	1,000 ppm	1,250 ppm	----	----
Methyl acetylene-propadiene mixture (MAPP)	----	1,000 ppm	1,250 ppm	----	----
Methyl acrylate	96-33-3	10 ppm	20 ppm	----	X
Methylacrylonitrile	126-98-7	1 ppm	3 ppm	----	X
Methylal (Dimethoxy-methane)	109-87-5	1,000 ppm	1,250 ppm	----	----
Methyl alcohol (methanol)	67-56-1	200 ppm	250 ppm	----	X
Methylamine	74-89-5	10 ppm	20 ppm	----	----
Methyl amyl alcohol (Methyl isobutyl carbinol)	108-11-2	25 ppm	40 ppm	----	X
Methyl n-amyl ketone (2-Heptanone)	110-43-0	50 ppm	75 ppm	----	----
N-Methyl aniline (Monomethyl aniline)	100-61-8	0.5 ppm	1.5 ppm	----	X
Methyl bromide	74-83-9	5 ppm	10 ppm	----	X
Methyl-n-butyl ketone (2-Hexanone)	591-78-6	5 ppm	10 ppm	----	----
Methyl cellosolve (2-Methoxyethanol)	109-86-4	5 ppm	10 ppm	----	X
Methyl cellosolve acetate (2-Methoxyethyl acetate)	110-49-6	5 ppm	10 ppm	----	X
Methyl chloride	74-87-3	50 ppm	100 ppm	----	----
Methyl chloroform (1, 1, 1-trichlorethane)	71-55-6	350 ppm	450 ppm	----	----
Methyl chloromethyl ether (chloromethyl methyl ether) (see WAC 296-62-073)	107-30-2	----	----	----	----
Methyl 2-cyanoacrylate	137-05-3	2 ppm	4 ppm	----	----
Methylcyclohexane	108-87-2	400 ppm	500 ppm	----	----
Methylcyclohexanol	25639-42-3	50 ppm	75 ppm	----	----
Methylcyclohexanone	583-60-8	50 ppm	75 ppm	----	X
Methylcyclopentadienyl manganese tricarbonyl (as Mn)	12108-13-3	0.2 mg/m ³	0.6 mg/m ³	----	X
Methyl demeton	8022-00-2	0.5 mg/m ³	1.5 mg/m ³	----	X
Methylene bisphenyl isocyanate (MDI) (Diphenylmethane diisocyanate)	101-68-8	----	----	0.02 ppm	----
4, 4'-Methylene bis (2-chloro-aniline) (MBOCA) (see WAC 296-62-073)	101-14-4	----	----	----	X
Methylene bis (4-cyclohexylisocyanate)	5124-30-1	----	----	0.01 ppm	----
Methylene chloride (Dichloromethane) (see ((WAC 296-62-07470)) chapter 296-859 WAC)	75-09-2	25 ppm	125 ppm	----	----
4, 4-Methylene dianiline (MDA) (see WAC 296-62-076 and 296-155-173)	101-77-9	0.01 ppm	0.1 ppm	----	X
Methyl ethyl ketone (MEK) (2-Butanone)	78-93-3	200 ppm	300 ppm	----	----

((Substance)) Airborne contaminant	CAS	TWA ₈	STEL	Ceiling	Skin
Methyl ethyl ketone peroxide (MEKP)	1338-23-4	----	----	0.2 ppm	----
Methyl formate	107-31-3	100 ppm	150 ppm	----	----
5-Methyl-3-heptanone (Ethyl amyl ketone)	541-85-5	25 ppm	38 ppm	----	----
Methyl hydrazine (Monomethyl hydrazine)	60-34-4	----	----	0.2 ppm	X
Methyl iodide	74-88-4	2 ppm	4 ppm	----	X
Methyl isoamyl ketone	110-12-3	50 ppm	75 ppm	----	----
Methyl isobutyl carbinol (Methyl amyl alcohol)	108-11-2	25 ppm	40 ppm	----	X
Methyl isobutyl ketone (Hexone)	108-10-1	50 ppm	75 ppm	----	----
Methyl isocyanate	624-83-9	0.02 ppm	0.06 ppm	----	X
Methyl isopropyl ketone	563-80-4	200 ppm	250 ppm	----	----
Methyl mercaptan (Methanethiol)	74-93-1	0.5 ppm	1.5 ppm	----	----
Methyl methacrylate	80-62-6	100 ppm	150 ppm	----	----
Methyl parathion	298-00-0	0.2 mg/m ³	0.6 mg/m ³	----	X
Methyl propyl ketone (2-Pentanone)	107-87-9	200 ppm	250 ppm	----	----
Methyl silicate	684-84-5	1 ppm	3 ppm	----	----
alpha-Methyl styrene	98-83-9	50 ppm	100 ppm	----	----
Mevinphos (Phosdrin)	7786-34-7	0.01 ppm	0.03 ppm	----	X
Metribuzin	21087-64-9	5 mg/m ³	10 mg/m ³	----	----
Mica (Silicates) Respirable fraction	12001-26-2	3 mg/m ³	6 mg/m ³	----	----
Molybdenum (as Mo)	7439-98-7	----	----	----	----
Soluble compounds	----	5 mg/m ³	10 mg/m ³	----	----
Insoluble compounds	----	10 mg/m ³	20 mg/m ³	----	----
Monochlorobenzene (Chlorobenzene)	108-90-7	75 ppm	113 ppm	----	----
Monocrotophos (Azodrin)	6923-22-4	0.25 mg/m ³	0.75 mg/m ³	----	----
Monomethyl aniline (N-Methyl aniline)	100-61-8	0.5 ppm	1.5 ppm	----	X
Monomethyl hydrazine	----	----	----	0.2 ppm	----
Morpholine	110-91-8	20 ppm	30 ppm	----	X
Naled (Dibrom)	300-76-5	3 mg/m ³	6 mg/m ³	----	X
Naphtha	8030-30-6	100 ppm	150 ppm	----	X
Naphthalene	91-20-3	10 ppm	15 ppm	----	----
alpha-Naphthylamine (see WAC 296-62-073)	134-32-7	----	----	----	----
beta-Naphthylamine (see WAC 296-62-073)	91-59-8	----	----	----	----
Neon	7440-01-9	Simple asphyxiant	----	----	----
Nickel carbonyl (as Ni)	13463-39-3	0.001 ppm	0.003 ppm	----	----
Nickel (as Ni)	7440-02-0	----	----	----	----
Metal and insoluble compounds	----	1 mg/m ³	3 mg/m ³	----	----
Soluble compounds	----	0.1 mg/m ³	0.3 mg/m ³	----	----
Nicotine	54-11-5	0.5 mg/m ³	1.5 mg/m ³	----	X
Nitrapyrin (2-Chloro-6 trichloromethyl pyridine)	1929-82-4	----	----	----	----
Total particulate	----	10 mg/m ³	20 mg/m ³	----	----
Respirable fraction	----	5 mg/m ³	10 mg/m ³	----	----
Nitric acid	7697-37-2	2 ppm	4 ppm	----	----
Nitric oxide	10102-43-9	25 ppm	38 ppm	----	----

<u>((Substance)) Airborne contaminant</u>	CAS	TWA ₈	STEL	Ceiling	Skin
p-Nitroaniline	100-01-6	3 mg/m ³	6 mg/m ³	----	X
Nitrobenzene	98-95-3	1 ppm	3 ppm	----	X
4-Nitrobiphenyl (see WAC 296-62-073)	92-93-3	----	----	----	----
p-Nitrochlorobenzene	100-00-5	0.5 mg/m ³	1.5 mg/m ³	----	X
4-Nitrodiphenyl (see WAC 296-62-073)	----	----	----	----	----
Nitroethane	79-24-3	100 ppm	150 ppm	----	----
Nitrogen	7727-37-9	Simple asphyxiant	----	----	----
Nitrogen dioxide	10102-44-0	----	1 ppm	----	----
Nitrogen oxide (Nitrous oxide)	10024-97-2	50 ppm	75 ppm	----	----
Nitrogen trifluoride	7783-54-2	10 ppm	20 ppm	----	----
Nitroglycerin	55-63-0	----	0.1 mg/m ³	----	X
Nitromethane	75-52-5	100 ppm	150 ppm	----	----
1-Nitropropane	108-03-2	25 ppm	38 ppm	----	----
2-Nitropropane	79-46-9	10 ppm	20 ppm	----	----
N-Nitrosodimethylamine (see WAC 296-62-073)	62-75-9	----	----	----	----
Nitrotoluene	----	----	----	----	----
o-isomer	88-72-2	2 ppm	4 ppm	----	X
m-isomer	98-08-2	2 ppm	4 ppm	----	X
p-isomer	99-99-0	2 ppm	4 ppm	----	X
Nitrotrichloromethane (Chloropicrin)	76-06-2	0.1 ppm	0.3 ppm	----	----
Nitrous oxide (Nitrogen oxide)	10024-97-2	50 ppm	75 ppm	----	----
Nonane	111-84-2	200 ppm	250 ppm	----	----
<u>Nuisance dusts (see Particulates not otherwise regulated)</u>	----	----	----	----	----
Octachloronaphthalene	2234-13-1	0.1 mg/m ³	0.3 mg/m ³	----	X
Octane	111-65-9	300 ppm	375 ppm	----	----
Oil mist mineral (particulate)	8012-95-1	5 mg/m ³	10 mg/m ³	----	----
Osmium tetroxide (as Os)	20816-12-0	0.0002 ppm	0.0006 ppm	----	----
Oxalic acid	144-62-7	1 mg/m ³	2 mg/m ³	----	----
<u>Oxygen</u>	----	----	----	----	----
<u>See requirements in other chapters such as:</u>					
<u>Chapter 296-809 WAC, Confined spaces; chapter 296-843 WAC, Hazardous waste operations; chapter 296-824 WAC, Emergency response; WAC 296-62-100, Oxygen deficient atmospheres</u>					
Oxygen difluoride	7783-41-7	----	----	0.05 ppm	----
Ozone	10028-15-6	0.1 ppm	0.3 ppm	----	----
Paper fiber (Cellulose)	9004-34-6	----	----	----	----
Total particulate	----	10 mg/m ³	20 mg/m ³	----	----
Respirable fraction	----	5 mg/m ³	10 mg/m ³	----	----
Paraffin wax fume	8002-74-2	2 mg/m ³	4 mg/m ³	----	----
Paraquat	----	----	----	----	----
Respirable fraction	4685-14-7 1910-42-5 2074-50-2	0.1 mg/m ³	0.3 mg/m ³	----	X
Parathion	56-38-2	0.1 mg/m ³	0.3 mg/m ³	----	X

(Substance) Airborne contaminant	CAS	TWA ₈	STEL	Ceiling	Skin
Particulate polycyclic aromatic hydrocarbons ((benzene soluble fraction)) (see coal tar pitch volatiles)	(65996-93-2)	0.2 mg/m ³	0.6 mg/m ³)	----	----
Particulates not otherwise regulated	----	----	----	----	----
Total particulate	----	10 mg/m ³	20 mg/m ³	----	----
Respirable fraction	----	5 mg/m ³	10 mg/m ³	----	----
Pentaborane	19624-22-7	0.005 ppm	0.015 ppm	----	----
Pentachloronaphthalene	1321-64-8	0.5 mg/m ³	1.5 mg/m ³	----	X
Pentachlorophenol	87-86-5	0.5 mg/m ³	1.5 mg/m ³	----	X
Pentaerythritol	115-77-5	----	----	----	----
Total particulate	----	10 mg/m ³	20 mg/m ³	----	----
Respirable fraction	----	5 mg/m ³	10 mg/m ³	----	----
Pentane	109-66-0	600 ppm	750 ppm	----	----
2-Pentanone (methyl propyl ketone)	107-87-9	200 ppm	250 ppm	----	----
Perchloroethylene (tetrachloroethylene)	127-18-4	25 ppm	38 ppm	----	----
Perchloromethyl mercaptan	594-42-3	0.1 ppm	0.3 ppm	----	----
Perchloryl fluoride	7616-94-6	3 ppm	6 ppm	----	----
Perlite	----	----	----	----	----
Total particulate	----	10 mg/m ³	20 mg/m ³	----	----
Respirable fraction	----	5 mg/m ³	10 mg/m ³	----	----
Petroleum distillates (Naphtha, rubber solvent)	----	100 ppm	150 ppm	----	----
Phenacyl chloride (a-Chloroacetophenone)	532-21-4	0.05 ppm	0.15 ppm	----	----
Phenol	108-95-2	5 ppm	10 ppm	----	X
Phenothiazine	92-84-2	5 mg/m ³	10 mg/m ³	----	X
p-Phenylene diamine	106-50-3	0.1 mg/m ³	0.3 mg/m ³	----	X
Phenyl ether (vapor)	101-84-8	1 ppm	3 ppm	----	----
Phenyl ether-diphenyl mixture (vapor)	----	1 ppm	3 ppm	----	----
Phenylethylene (Styrene)	100-42-5	50 ppm	100 ppm	----	----
Phenyl glycidyl ether (PGE)	122-60-1	1 ppm	3 ppm	----	----
Phenylhydrazine	100-63-0	5 ppm	10 ppm	----	X
Phenyl mercaptan	108-98-5	0.5 ppm	1.5 ppm	----	----
Phenylphosphine	638-21-1	----	----	0.05 ppm	----
Phorate	298-02-2	0.05 mg/m ³	0.2 mg/m ³	----	X
Phosdrin (Mevinphos)	7786-34-7	0.01 ppm	0.03 ppm	----	X
Phosgene (carbonyl chloride)	75-44-5	0.1 ppm	0.3 ppm	----	----
Phosphine	7803-51-2	0.3 ppm	1 ppm	----	----
Phosphoric acid	7664-38-2	1 mg/m ³	3 mg/m ³	----	----
Phosphorus (yellow)	7723-14-0	0.1 mg/m ³	0.3 mg/m ³	----	----
Phosphorous oxychloride	10025-87-3	0.1 ppm	0.3 ppm	----	----
Phosphorus pentachloride	10026-13-8	0.1 ppm	0.3 ppm	----	----
Phosphorus pentasulfide	1314-80-3	1 mg/m ³	3 mg/m ³	----	----
Phosphorus trichloride	12-2-19	0.2 ppm	0.5 ppm	----	----
Phthalic anhydride	85-44-9	1 ppm	3 ppm	----	----
m-Phthalodinitrile	626-17-5	5 mg/m ³	10 mg/m ³	----	----
Picloram	1918-02-1	----	----	----	----
Total particulate	----	10 mg/m ³	20 mg/m ³	----	----
Respirable fraction	----	5 mg/m ³	10 mg/m ³	----	----
Picric acid (2, 4, 6-Trinitrophenol)	88-89-1	0.1 mg/m ³	0.3 mg/m ³	----	X

(Substance) Airborne contaminant	CAS	TWA ₈	STEL	Ceiling	Skin
Pindone (2-Pivalyl-1, 3-indandione, Pival)	83-26-1	0.1 mg/m ³	0.3 mg/m ³	----	----
Piperazine dihydrochloride	142-64-3	5 mg/m ³	10 mg/m ³	----	----
Pival (Pindone)	83-26-1	0.1 mg/m ³	0.3 mg/m ³	----	----
Plaster of Paris	26499-65-0	----	----	----	----
Total particulate	----	10 mg/m ³	20 mg/m ³	----	----
Respirable fraction	----	5 mg/m ³	10 mg/m ³	----	----
Platinum (as Pt)	7440-06-4	----	----	----	----
Metal	----	1 mg/m ³	3 mg/m ³	----	----
Soluble salts	----	0.002 mg/m ³	0.006 mg/m ³	----	----
Polychlorobiphenyls (Chlorodiphenyls)	----	----	----	----	----
42% Chlorine (PCB)	53469-21-9	1 mg/m ³	3 mg/m ³	----	X
54% Chlorine (PCB)	11097-69-1	0.5 mg/m ³	1.5 mg/m ³	----	X
Portland cement	65997-15-1	----	----	----	----
Total particulate	----	10 mg/m ³	20 mg/m ³	----	----
Respirable fraction	----	5 mg/m ³	10 mg/m ³	----	----
Potassium hydroxide	1310-58-3	----	----	2 mg/m ³	----
Propane	74-98-6	1,000 ppm	1,250 ppm	----	----
Propargyl alcohol	107-19-7	1 ppm	3 ppm	----	X
beta-Propiolactone (see WAC 296-62-073)	57-57-8	----	----	----	----
Propionic acid	79-09-4	10 ppm	20 ppm	----	----
Propoxur (Baygon)	114-26-1	0.5 mg/m ³	1.5 mg/m ³	----	----
n-Propyl acetate	109-60-4	200 ppm	250 ppm	----	----
n-Propyl alcohol	71-23-8	200 ppm	250 ppm	----	X
n-Propyl nitrate	627-13-4	25 ppm	40 ppm	----	----
Propylene	----	Simple asphyxiant	----	----	----
Propylene dichloride (1, 2-Dichloropropane)	78-87-5	75 ppm	110 ppm	----	----
Propylene glycol dinitrate	6423-43-4	0.05 ppm	0.15 ppm	----	X
Propylene glycol monomethyl ether	107-98-2	100 ppm	150 ppm	----	----
Propylene imine	75-55-8	2 ppm	4 ppm	----	X
Propylene oxide (1,2- Epoxypropane)	75-56-9	20 ppm	30 ppm	----	----
Propyne (Methyl acetylene)	74-99-7	1,000 ppm	1,250 ppm	----	----
Pyrethrum	8003-34-7	5 mg/m ³	10 mg/m ³	----	----
Pyridine	110-86-1	5 ppm	10 ppm	----	----
Pyrocatachol (Catechol)	120-80-9	5 ppm	10 ppm	----	X
Quinone (p-Benzoquinone)	106-51-4	0.1 ppm	0.3 ppm	----	----
RDX (Cyclonite)	----	1.5 mg/m ³	3 mg/m ³	----	X
Resorcinol	108-46-3	10 ppm	20 ppm	----	----
Rhodium (as Rh)	7440-16-6	----	----	----	----
Insoluble compounds, metal fumes and dusts	----	0.1 mg/m ³	0.3 mg/m ³	----	----
Soluble compounds, salts	----	0.001 mg/m ³	0.003 mg/m ³	----	----
Ronnel	299-84-3	10 mg/m ³	20 mg/m ³	----	----
Rosin core solder, pyrolysis products (as formaldehyde)	8050-09-7	0.1 mg/m ³	0.3 mg/m ³	----	----
Rotenone	83-79-4	5 mg/m ³	10 mg/m ³	----	----
Rouge	----	----	----	----	----
Total particulate	----	10 mg/m ³	20 mg/m ³	----	----
Respirable fraction	----	5 mg/m ³	10 mg/m ³	----	----

((Substance)) Airborne contaminant	CAS	TWA ₈	STEL	Ceiling	Skin
Rubber solvent (naphtha)	8030-30-6	100 ppm	150 ppm	----	----
Selenium compounds (as Se)	7782-49-2	0.2 mg/m ³	0.6 mg/m ³	----	----
Selenium hexafluoride (as Se)	7783-79-1	0.05 ppm	0.15 ppm	----	----
Sesone (Crag herbicide)	136-78-7	----	----	----	----
Total particulate	----	10 mg/m ³	20 mg/m ³	----	----
Respirable fraction	----	5 mg/m ³	10 mg/m ³	----	----
Sevin (Carbaryl)	63-25-2	5 mg/m ³	10 mg/m ³	----	----
Silane (see Silicon tetrahydride)	7803-62-5	5 ppm	10 ppm	----	----
Silica, amorphous, precipitated and gel	112926-00-8	6 mg/m ³	12 mg/m ³	----	----
Silica, amorphous, diatomaceous earth, containing less than 1% crystalline silica	61790-53-2	----	----	----	----
Total particulate	----	6 mg/m ³	12 mg/m ³	----	----
Respirable fraction	----	3 mg/m ³	6 mg/m ³	----	----
Silica, crystalline cristobalite	----	----	----	----	----
Respirable fraction	14464-46-1	0.05 mg/m ³	0.15 mg/m ³	----	----
Silica, crystalline quartz	----	----	----	----	----
Respirable fraction	14808-60-7	0.1 mg/m ³	0.3 mg/m ³	----	----
Silica, crystalline tripoli (as quartz)	----	----	----	----	----
Respirable fraction	1317-95-9	0.1 mg/m ³	0.3 mg/m ³	----	----
Silica, crystalline tridymite	----	----	----	----	----
Respirable fraction	15468-32-3	0.05 mg/m ³	0.15 mg/m ³	----	----
Silica, fused	----	----	----	----	----
Respirable fraction	60676-86-0	0.1 mg/m ³	0.3 mg/m ³	----	----
Silicates (less than 1% crystalline silica)	----	----	----	----	----
Mica	----	----	----	----	----
Respirable fraction	12001-26-2	3 mg/m ³	6 mg/m ³	----	----
Soapstone	----	----	----	----	----
Total particulate	----	6 mg/m ³	12 mg/m ³	----	----
Respirable fraction	----	3 mg/m ³	6 mg/m ³	----	----
Talc (containing asbestos) (as asbestos) (see WAC 296-62-07705 and chapter 296-65 WAC)	----	((---)) 0.1 f/cc	((---)) 1.0 f/cc (30 minutes)	----	----
Talc (containing no asbestos)	----	----	----	----	----
Respirable fraction	14807-96-6	2 mg/m ³	4 mg/m ³	----	----
Tremolite (asbestiform) (as asbestos) (see WAC 296-62-07705 and chapter 296-65 WAC)	----	((---)) 0.1 f/cc	((---)) 1.0 f/cc (30 minutes)	----	----
Silicon	7440-21-3	----	----	----	----
Total particulate	----	10 mg/m ³	20 mg/m ³	----	----
Respirable fraction	----	5 mg/m ³	10 mg/m ³	----	----
Silicon carbide	409-21-2	----	----	----	----
Total particulate	----	10 mg/m ³	20 mg/m ³	----	----
Respirable fraction	----	5 mg/m ³	10 mg/m ³	----	----
Silicon tetrahydride (Silane)	7803-62-5	5 ppm	10 ppm	----	----
Silver, metal dust and soluble compounds (as Ag)	7440-22-4	0.01 mg/m ³	0.03 mg/m ³	----	----
Soapstone	----	----	----	----	----

<u>(Substance)</u> Airborne contaminant	CAS	TWA ₈	STEL	Ceiling	Skin
Total particulate	----	6 mg/m ³	12 mg/m ³	----	----
Respirable fraction	----	3 mg/m ³	6 mg/m ³	----	----
Sodium azide (as HN ₃ or NaN ₃)	26628-22-8	----	----	0.1 ppm	X
Sodium bisulfite	7631-90-5	5 mg/m ³	10 mg/m ³	----	----
Sodium-2, 4-dichloro- phenoxyethyl sulfate (Crag herbicide)	136-78-7	----	----	----	----
Total particulate	----	10 mg/m ³	20 mg/m ³	----	----
Respirable fraction	----	5 mg/m ³	10 mg/m ³	----	----
Sodium fluoroacetate	62-74-8	0.05 mg/m ³	0.15 mg/m ³	----	X
Sodium hydroxide	1310-73-2	----	----	2 mg/m ³	----
Sodium metabisulfite	7681-57-4	5 mg/m ³	10 mg/m ³	----	----
Starch	9005-25-8	----	----	----	----
Total particulate	----	10 mg/m ³	20 mg/m ³	----	----
Respirable fraction	----	5 mg/m ³	10 mg/m ³	----	----
Stibine	7803-52-3	0.1 ppm	0.3 ppm	----	----
Stoddard solvent	8052-41-3	100 ppm	150 ppm	----	----
Strychnine	57-24-9	0.15 mg/m ³	0.45 mg/m ³	----	----
Styrene (Phenylethylene, Vinyl benzene)	100-42-5	50 ppm	100 ppm	----	----
Subtilisins	9014-01-1	----	0.00006 mg/m ³ (60 min.)	----	----
Sucrose	57-50-1	----	----	----	----
Total particulate	----	10 mg/m ³	20 mg/m ³	----	----
Respirable fraction	----	5 mg/m ³	10 mg/m ³	----	----
Sulfotep (TEDP)	3689-24-5	0.2 mg/m ³	0.6 mg/m ³	----	X
Sulfur dioxide	7446-09-5	2 ppm	5 ppm	----	----
Sulfur hexafluoride	2551-62-4	1,000 ppm	1,250 ppm	----	----
Sulfuric acid	7664-93-9	1 mg/m ³	3 mg/m ³	----	----
Sulfur monochloride	10025-67-9	----	----	1 ppm	----
Sulfur pentafluoride	5714-22-1	----	----	0.01 ppm	----
Sulfur tetrafluoride	7783-60-0	----	----	0.1 ppm	----
Sulfuryl fluoride	2699-79-8	5 ppm	10 ppm	----	----
Sulprofos	35400-43-2	1 mg/m ³	3 mg/m ³	----	----
Systox (Demeton)	8065-48-3	0.01 ppm	0.03 ppm	----	X
2, 4, 5-T (<u>2, 4, 5- tri- chlorophenoxyacetic acid</u>)	93-76-5	10 mg/m ³	20 mg/m ³	----	----
Talc (containing asbestos) (as asbestos) (see WAC 296-62-07705 and chapter 296-65 WAC)	----	<u>((---)) 0.1 f/cc</u>	<u>((---)) 1.0 f/cc (30 minutes)</u>	----	----
Talc (containing no asbestos)	----	----	----	----	----
Respirable fraction	14807-96-6	2 mg/m ³	4 mg/m ³	----	----
Tantalum	----	----	----	----	----
Metal and oxide dusts	7440-25-7	5 mg/m ³	10 mg/m ³	----	----
TDI (Toluene-2, 4-diisocyanate)	584-84-9	0.005 ppm	0.02 ppm	----	----
TEDP (Sulfotep)	3689-24-5	0.2 mg/m ³	0.6 mg/m ³	----	X
Tellurium and compounds (as Te)	13494-80-9	0.1 mg/m ³	0.3 mg/m ³	----	----
Tellurium hexafluoride (as Te)	7783-80-4	0.02 ppm	0.06 ppm	----	----
Temephos (Abate)	3383-96-8	----	----	----	----
Total particulate	----	10 mg/m ³	20 mg/m ³	----	----
Respirable fraction	----	5 mg/m ³	10 mg/m ³	----	----
TEPP	107-49-3	0.004 ppm	0.012 ppm	----	X

(Substance) Airborne contaminant	CAS	TWA ₈	STEL	Ceiling	Skin
Terphenyls	26140-60-3	----	----	0.5 ppm	----
1, 1, 1, 2-Tetrachloro-2, 2-difluoroethane	76-11-0	500 ppm	625 ppm	----	----
1, 1, 2, 2-Tetrachloro-1, 2-difluoroethane	76-12-0	500 ppm	625 ppm	----	----
1, 1, 2, 2-Tetrachloroethane	79-34-5	1 ppm	3 ppm	----	X
Tetrachloroethylene (Perchloroethylene)	127-18-4	25 ppm	38 ppm	----	----
Tetrachloromethane (Carbon tetrachloride)	56-23-5	2 ppm	4 ppm	----	X
Tetrachloronaphthalene	1335-88-2	2 mg/m ³	4 mg/m ³	----	X
Tetraethyl lead (as Pb)	78-00-2	0.075 mg/m ³	0.225 mg/m ³	----	X
Tetrahydrofuran	109-99-9	200 ppm	250 ppm	----	----
Tetramethyl lead (as Pb)	75-74-1	0.075 mg/m ³	0.225 mg/m ³	----	X
Tetramethyl succinonitrile	3333-52-6	0.5 ppm	1.5 ppm	----	X
Tetranitromethane	509-14-8	1 ppm	3 ppm	----	----
Tetrasodium pyrophosphate	7722-88-5	5 mg/m ³	10 mg/m ³	----	----
Tetryl (2, 4, 6-trinitrophenyl-methylnitramine)	479-45-8	1.5 mg/m ³	3 mg/m ³	----	X
Thallium (soluble compounds) (as Tl)	7440-28-0	0.1 mg/m ³	0.3 mg/m ³	----	X
4, 4-Thiobis (6-tert-butyl-m-cresol)	96-69-5	----	----	----	----
Total particulate	----	10 mg/m ³	20 mg/m ³	----	----
Respirable fraction	----	5 mg/m ³	10 mg/m ³	----	----
Thiodan (Endosulfan)	115-29-7	0.1 mg/m ³	0.3 mg/m ³	----	X
Thioglycolic acid	68-11-1	1 ppm	3 ppm	----	X
Thionyl chloride	7719-09-7	----	----	1 ppm	----
Thiram (see WAC 296-62-07519)	137-26-8	5 mg/m ³	10 mg/m ³	----	----
Tin (as Sn)	----	----	----	----	----
Inorganic compounds	7440-31-5	2 mg/m ³	4 mg/m ³	----	----
Tin (as Sn)	----	----	----	----	----
Organic compounds	7440-31-5	0.1 mg/m ³	0.3 mg/m ³	----	X
Tin oxide (as Sn)	21651-19-4	2 mg/m ³	4 mg/m ³	----	----
Titanium dioxide	13463-67-7	----	----	----	----
Total particulate	----	10 mg/m ³	20 mg/m ³	----	----
TNT (2, 4, 6-Trinitrotoluene)	118-96-7	0.5 mg/m ³	1.5 mg/m ³	----	X
Toluene	108-88-3	100 ppm	150 ppm	----	----
Toluene-2, 4-diisocyanate (TDI)	584-84-9	0.005 ppm	0.02 ppm	----	----
m-Toluidine	108-44-1	2 ppm	4 ppm	----	X
o-Toluidine	95-53-4	2 ppm	4 ppm	----	X
p-Toluidine	106-49-0	2.0 ppm	4 ppm	----	X
Toxaphene (Chlorinated camphene)	8001-35-2	0.5 mg/m ³	1 mg/m ³	----	X
Tremolite (asbestiform) (as asbestos) (see WAC 296-62-07705 and chapter 296-65 WAC)	----	((****)) 0.1 f/cc	((****)) 1.0 f/cc (30 minutes)	----	----
Tributyl phosphate	126-73-8	0.2 ppm	0.6 ppm	----	----
Trichloroacetic acid	76-03-9	1 ppm	3 ppm	----	----
1, 2, 4-Trichlorobenzene	120-82-1	----	----	5 ppm	----
1, 1, 1-Trichloroethane (Methyl chloroform)	71-55-6	350 ppm	450 ppm	----	----
1, 1, 2-Trichloroethane	79-00-5	10 ppm	20 ppm	----	----

((Substance)) Airborne contaminant	CAS	TWA ₈	STEL	Ceiling	Skin
Trichloroethylene	79-01-6	50 ppm	200 ppm	----	----
Trichlorofluoromethane (Fluorotrichloromethane)	75-69-4	----	----	1,000 ppm	----
Trichloromethane (Chloroform)	67-66-3	2 ppm	4 ppm	----	----
Trichloronaphthalene	1321-65-9	5 mg/m ³	10 mg/m ³	----	X
1, 2, 3-Trichloropropane	96-18-4	10 ppm	20 ppm	----	X
1, 1, 2-Trichloro-1, 2, 2-trifluoroethane	76-13-1	1,000 ppm	1,250 ppm	----	----
Tricyclohexyltin hydroxide (Cyhexatin)	13121-70-5	5 mg/m ³	10 mg/m ³	----	----
Triethylamine	121-44-8	10 ppm	15 ppm	----	----
Trifluorobromomethane	75-63-8	1,000 ppm	1,250 ppm	----	----
Trimellitic anhydride	552-30-7	0.005 ppm	0.015 ppm	----	----
Trimethylamine	75-50-3	10 ppm	15 ppm	----	----
Trimethyl benzene	25551-13-7	25 ppm	38 ppm	----	----
Trimethyl phosphite	121-45-9	2 ppm	4 ppm	----	----
2, 4, 6-Trinitrophenol (Picric acid)	88-89-1	0.1 mg/m ³	0.3 mg/m ³	----	X
2, 4, 6-Trinitrophenyl- methylnitramine (Tetryl)	479-45-8	1.5 mg/m ³	3 mg/m ³	----	X
2, 4, 6-Trinitrotoluene (TNT)	118-96-7	0.5 mg/m ³	1.5 mg/m ³	----	X
Triorthocresyl phosphate	78-30-8	0.1 mg/m ³	0.3 mg/m ³	----	X
Triphenyl amine	603-34-9	5 mg/m ³	10 mg/m ³	----	----
Triphenyl phosphate	115-86-6	3 mg/m ³	6 mg/m ³	----	----
Tungsten (as W)	7440-33-7	----	----	----	----
Soluble compounds	----	1 mg/m ³	3 mg/m ³	----	----
Insoluble compounds	----	5 mg/m ³	10 mg/m ³	----	----
Turpentine	8006-64-2	100 ppm	150 ppm	----	----
Uranium (as U)	7440-61-1	----	----	----	----
Soluble compounds	----	0.05 mg/m ³	0.15 mg/m ³	----	----
Insoluble compounds	----	0.2 mg/m ³	0.6 mg/m ³	----	----
n-Valeraldehyde	110-62-3	50 ppm	75 ppm	----	----
Vanadium (as V ₂ O ₅)	----	----	----	----	----
Respirable fraction	1314-62-1	0.05 mg/m ³	0.15 mg/m ³	----	----
Vegetable oil mist	----	----	----	----	----
Total particulate	----	10 mg/m ³	20 mg/m ³	----	----
Respirable fraction	----	5 mg/m ³	10 mg/m ³	----	----
Vinyl acetate	108-05-1	10 ppm	20 ppm	----	----
Vinyl benzene (Styrene)	100-42-5	50 ppm	100 ppm	----	----
Vinyl bromide	593-60-2	5 ppm	10 ppm	----	----
Vinyl chloride (Chloroethylene) (see WAC 296-62-07329)	75-01-4	1 ppm	5 ppm	----	----
Vinyl cyanide (Acrylonitrile) (see WAC 296-62-07336)	107-13-1	2 ppm	10 ppm	----	----
Vinyl cyclohexene dioxide	106-87-6	10 ppm	20 ppm	----	X
Vinyl toluene	25013-15-4	50 ppm	75 ppm	----	----
Vinylidene chloride (1, 1-Dichloroethylene)	75-35-4	1 ppm	3 ppm	----	----
VM & P Naphtha	8032-32-4	300 ppm	400 ppm	----	----
Warfarin	81-81-2	0.1 mg/m ³	0.3 mg/m ³	----	----
Welding fumes (total particulate)	----	5 mg/m ³	10 mg/m ³	----	----
Wood dust	----	----	----	----	----

(Substance) Airborne contaminant	CAS	TWA ₈	STEL	Ceiling	Skin
Nonallergenic; (All woods except allergenics)	----	5 mg/m ³	10 mg/m ³	----	----
Allergenics (e.g. cedar, mahogany and teak)	----	2.5 mg/m ³	5 mg/m ³	----	----
Xylenes (ortho, meta, and para isomers) (Dimethylbenzene)	1330-20-7	100 ppm	150 ppm	----	----
m-Xylene alpha, alpha-diamine	1477-55-0	----	----	0.1 mg/m ³	X
Xylidine (Dimethylaminobenzene)	1300-73-8	2 ppm	4 ppm	----	X
Yttrium	7440-65-5	1 mg/m ³	3 mg/m ³	----	----
Zinc chloride fume	7646-85-7	1 mg/m ³	2 mg/m ³	----	----
Zinc chromate (as (CrO3)) Cr (see WAC 296-62-08003)	Varies with compound	((0.05)) 0.005 mg/m ³	----	0.1 mg/m ³	----
Zinc oxide	1314-13-2	----	----	----	----
Total particulate	----	10 mg/m ³	20 mg/m ³	----	----
Respirable fraction	----	5 mg/m ³	10 mg/m	----	----
Zinc oxide fume	1314-13-2	5 mg/g ³	10 mg/m ³	----	----
Zinc stearate	557-05-1	----	----	----	----
Total particulate	----	10 mg/m ³	20 mg/m ³	----	----
Respirable fraction	----	5 mg/m ³	10 mg/m ³	----	----
Zirconium compounds (as Zr)	7440-67-2	5 mg/m ³	10 mg/m ³	----	----

AMENDATORY SECTION (Amending WSR 04-18-079, filed 8/31/04, effective 11/1/04)

WAC 296-841-300 Definitions.

Breathing zone

The space around and in front of an employee's nose and mouth, forming a hemisphere with a six to nine inch radius.

Ceiling limit

~~((An exposure limit, measured over the shortest time period feasible, that must not be exceeded during any part of the employee's workday.))~~ See Permissible exposure limits (PELs).

Dust

Solid particles suspended in air. Dusts are generated by handling, drilling, crushing, grinding, rapid impact, detonation, or decrepitation of organic or inorganic materials such as rock, ore, metal, coal, wood, grain, etc.

Exposed or exposure

The contact an employee has with a toxic substance, harmful physical agent or oxygen deficient condition, whether or not protection is provided by respirators or other personal protective equipment (PPE). Exposure can occur through various routes of entry, such as inhalation, ingestion, skin contact, or skin absorption.

Fume

Solid particles suspended in air, generated by condensation

from the gaseous state, generally after volatilization from molten metals, etc.

Gas

A normally formless fluid which can be changed to the liquid or solid state by the effect of increased pressure or decreased temperature or both.

General exhaust ventilation

The general movement of air out of an area or permit-required confined space by mechanical or natural means.

Immediately dangerous to life or health (IDLH)

An atmospheric condition that would:

● Cause an immediate threat to life

or

● Cause permanent or delayed adverse health effects

or

● Interfere with an employee's ability to escape

Mist

Liquid droplets suspended in air, generated by condensation from the gaseous to the liquid state or by breaking up a liquid into a dispersed state, such as by splashing, foaming, spraying or atomizing.

Nuisance dust (or inert dust)

Dusts that, when inhaled, have little adverse effect on the lungs and do not produce significant organic disease or toxic effect when exposures are kept under reasonable control.

The biological reaction to these dusts in lung tissue has the following characteristics:

● The architecture of the air spaces remains intact

● Scar tissue (collagen) isn't formed to a significant extent

● The tissue reaction is potentially reversible

Oxygen deficient

An atmosphere with an oxygen content below 19.5% by volume.

Permissible exposure limits (PEL)

~~((Permissible exposure limits (PELs) are employee exposures to toxic substances or harmful agents that must not be exceeded. PELs are specified in applicable WISHA rules.))~~ The amount of an airborne chemical, toxic substance, or other harmful agent that must not be exceeded during any part of the workday.

An airborne chemical or toxic substance can have 3 PEL values:

● TWA₈. This is an 8-hour, time-weighted average limit.

● Short-term exposure limit (STEL). This is typically a 15-minute, time-weighted average limit.

● Ceiling limit (C). This is an instantaneous limit.

Short-term exposure limit (STEL)

~~((An exposure limit averaged over a short time period (usually measured for fifteen minutes) that must not be exceeded during any part of an employee's workday.))~~ See Permissible exposure limits (PELs).

Temper

To condition air for a specific work environment by changing its temperature or moisture content.

Time weighted average (TWA₈)

~~((An exposure limit averaged over eight hours that must not be exceeded during an employee's workday.))~~ See Permissible exposure limits (PELs).

Toxic substance

Any chemical substance or biological agent, such as bacteria, virus, and fungus, which is any of the following:

- Listed in the latest edition of the National Institute for Occupational Safety and Health (NIOSH) Registry of Toxic Effects of Chemical Substances (RTECS)

- Shows positive evidence of an acute or chronic health hazard in testing conducted by, or known to, the employer.

- The subject of a material safety data sheet kept by or known to the employer showing the material may pose a hazard to human health.

Vapor

The gaseous form of a substance that is normally in the solid or liquid state.

Ventilation

Providing, circulating or exhausting air into or out of an area or space.

REPEALER

The following sections of the Washington Administrative Code are repealed:

WAC 296-62-100	Oxygen deficient atmospheres.
WAC 296-62-110	Ventilation.
WAC 296-62-11001	Definition.
WAC 296-62-11003	Ventilation guide.
WAC 296-62-11005	Adequate system.
WAC 296-62-11007	Exhaust.
WAC 296-62-11009	Make-up air quantity.
WAC 296-62-11011	Design and operation.
WAC 296-62-11013	Compatibility of systems.
WAC 296-62-11017	Grinding, polishing, and buffing operations.

AMENDATORY SECTION (Amending WSR 05-20-055, filed 10/3/05, effective 12/1/05)

WAC 296-78-71015 Tanks and chemicals. (1) All open vats and tanks into which workers may fall shall be guarded with standard railings or screen guards in all cases where such guarding is possible with regard to practical operation.

(2) Foundations of elevated tanks shall be accessible for inspections. When the tank platform is more than five feet above the ground a stairway or ladder shall be permanently attached.

(3) Every open tank over five feet in height shall be equipped with fixed standard ladders both inside and out, extending from the bottom to the rim of the tank arranged to be accessible to each other, so far as local conditions permit.

(4) The use of chemicals for treating of lumber for prevention of sap stain or mold or as preservatives, shall conform to the requirements of chapter 296-835 WAC, Dipping and coating operations (dip tanks).

(a) Storage, handling, and use of chemicals. Threshold limits. Employees shall not be exposed to airborne concentration of toxic dusts, vapors, mists or gases that exceed the threshold limit values set forth in chapter 296-62 WAC, Part H, and chapter 296-841 WAC, (~~Respiratory hazard~~) Airborne contaminants.

(b) Protective equipment. The use of chemicals shall be controlled so as to protect employees from harmful exposure to toxic materials. Where necessary, employees shall be provided with and required to wear such protective equipment as will afford adequate protection against harmful exposure as required by WAC 296-800-160, and chapter 296-842 WAC, Respirators.

(5) (a) Means shall be provided and used to collect any excess of chemicals used in treating lumber so as to protect workers from accidental contact with harmful concentrations of toxic chemicals or fumes.

(b) Dip tanks containing flammable or combustible liquids shall be constructed, maintained and used in accordance with chapter 296-835 WAC, Dipping and coating operations (dip tanks).

(c) An evacuation plan shall be developed and implemented for all employees working in the vicinity of dip tanks using flammable and/or combustible liquids. A copy of the plan shall be available at the establishment for inspection at all times. Every employee shall be made aware of the evacuation plan and know what to do in the event of an emergency and be evacuated in accordance with the plan. The plan shall be reviewed with employees at least quarterly and documented.

(d) When automatic foam, automatic carbon dioxide or automatic dry chemical extinguishing systems are used, an alarm device shall be activated to alert employees in the dip tank area before and

during the activation of the system. The following combinations of extinguishment systems when used in conjunction with the evacuation plan as stated above will be acceptable in lieu of bottom drains:

(i) A dip tank cover with an automatic foam extinguishing system under the cover, or an automatic carbon dioxide system, or an automatic dry chemical extinguishing system, or an automatic water spray extinguishing system;

(ii) An automatic dry chemical extinguishing system with an automatic carbon dioxide system or a second automatic dry chemical extinguishing system or an automatic foam extinguishing system;

(iii) An automatic carbon dioxide system with a second automatic carbon dioxide system or an automatic foam extinguishing system.

(e) The automatic water spray extinguishing systems, automatic foam extinguishing systems, and dip tank covers shall conform with the requirements of chapter 296-835 WAC, Dipping and coating operations (dip tanks). The automatic carbon dioxide systems and dry chemical extinguishing system shall conform with the requirements of WAC 296-24-615 and 296-24-620.

(6) Where workers are engaged in the treating of lumber with chemicals or are required to handle lumber or other materials so treated, the workers shall be provided with, at no cost to the worker, and required to use such protective equipment as will provide complete protection against contact with toxic chemicals or fumes therefrom.

(7) Sanitation requirements. The requirements of WAC 296-800-220 and 296-800-230 (safety and health core rules), shall govern sanitation practices.

(8) The sides of steam vats and soaking pits unless otherwise guarded shall extend forty-two inches above the floor level. The floor adjacent thereto shall be of nonslip construction.

(9) Large steam vats or soaking pits, divided into sections, shall be provided with substantial walkways between each section, each walkway to be provided with standard railings which may be removable if necessary.

(10) Covers shall be removed only from that portion of the steaming vats on which workers are working and a portable railing shall be placed at this point to protect the operators.

(11) Workers shall not ride or step on logs in steam vats.

AMENDATORY SECTION (Amending WSR 05-03-093, filed 1/18/05, effective 3/1/05)

WAC 296-155-20301 Definitions. Confined space means a space that:

- (1) Is large enough and so configured that an employee can bodily enter and perform assigned work; and
- (2) Has limited or restricted means for entry or exit (for example, tanks, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry); and
- (3) Is not designed for continuous employee occupancy.

"Corrosives" means substances which in contact with living tissue cause destruction of the tissue by chemical action.

"Hazardous atmosphere" means an atmosphere that may expose employees to the risk of death, incapacitation, impairment of ability to self-rescue (that is, escape unaided from a permit space), injury, or acute illness from one or more of the following causes:

- (1) Flammable gas, vapor, or mist in excess of ten percent of its lower flammable limit (LFL);
- (2) Airborne combustible dust at a concentration that meets or exceeds its LFL;

Note: This concentration may be approximated as a condition in which the dust obscures vision at a distance of five feet (1.52m) or less.

- (3) Atmospheric oxygen concentration below 19.5 percent or above 23.5 percent;
- (4) Atmospheric concentration of any substance for which a dose or a permissible exposure limit is published in chapter 296-62 WAC, general occupational health standards, or chapter 296-841 WAC, (~~identifying and controlling respiratory hazards~~) Airborne contaminants, and which could result in employee exposure in excess of its dose or permissible exposure limit;

Note: An atmospheric concentration of any substance that is not capable of causing death, incapacitation, impairment of ability to self-rescue, injury, or acute illness due to its health effects is not covered by this provision.

- (5) Any other atmospheric condition that is immediately dangerous to life or health.

Note: For air contaminants for which WISHA has not determined a dose or permissible exposure limit, other sources of information, such as material safety data sheets that comply with the Chemical Hazard Communication Standard, WAC 296-800-170, published information, and internal documents can provide guidance in establishing acceptable atmospheric conditions.

"Irritants" means substances which on immediate, prolonged, or repeated contact with normal living tissue will induce a local inflammatory reaction.

"Oxygen deficient atmospheres" means atmospheres at sea level having less than 19.5% oxygen by volume or having a partial pressure of 148 millimeters of mercury or less. This may deviate when working at higher altitudes and should be determined for an

individual location. Factors such as acclimatization, physical condition of persons involved, etc., must be considered for such circumstances and conditions. (See chapter 296-62 WAC, Part M, permit-required confined spaces.)

"Toxicants" means substances which have the inherent capacity to produce personal injury or illness to persons by absorption through any body surface.

AMENDATORY SECTION (Amending WSR 05-19-086, filed 9/20/05, effective 12/1/05)

WAC 296-304-01009 Precautions for hot work. (1) General requirements.

(a) **Designated areas.** The employer may designate areas for hot work in sites such as vessels, vessel sections, fabricating shops, and subassembly areas that are free of fire hazards.

(b) **Nondesignated areas.**

(i) Before authorizing hot work in a nondesignated area, the employer must visually inspect the area where hot work is to be performed, including adjacent spaces, to ensure the area is free of fire hazards, unless a marine chemist's certificate or shipyard competent person's log is used for authorization.

(ii) The employer shall authorize employees to perform hot work only in areas that are free of fire hazards, or that have been controlled by physical isolation, fire watches, or other positive means.

Note: The requirements of (b) of this subsection apply to all hot work operations in shipyard employment except those covered by WAC 296-304-02007.

(2) **Specific requirements.**

(a) **Maintaining fire hazard-free conditions.** The employer must keep all hot work areas free of new hazards that may cause or contribute to the spread of fire. Unexpected energizing and energy release are covered by WAC 296-304-120. Exposure to toxic and hazardous substances is covered in chapter 296-841 WAC, (~~Respiratory hazards~~) Airborne contaminants; chapter 296-802 WAC, Employee medical and exposure records; and WAC 296-800-170, Employer chemical hazard communication--Introduction.

(b) **Fuel gas and oxygen supply lines and torches.** The employer must make sure that:

(i) No unattended fuel gas and oxygen hose lines or torches are in confined spaces;

(ii) No unattended charged fuel gas and oxygen hose lines or torches are in enclosed spaces for more than fifteen minutes;

(iii) All fuel gas and oxygen hose lines are disconnected at the supply manifold at the end of each shift; and

(iv) All disconnected fuel gas and oxygen hose lines are rolled back to the supply manifold or to open air to disconnect the torch; or extended fuel gas and oxygen hose lines are not reconnected at the supply manifold unless the lines are given a positive means of identification when they were first connected and the lines are tested using a drop test or other positive means to ensure the integrity of fuel gas and oxygen burning system.

AMENDATORY SECTION (Amending WSR 04-14-028, filed 6/29/04, effective 1/1/05)

WAC 296-806-47502 Guard drum sanders.

You must:

● Make sure drum sanders have one of the following to enclose that part of the drum not used to work on the material:

- Guard.
- Exhaust hood.

Reference: Exhaust hoods are required on sanders when dust levels exceed exposure limits. ~~((For requirements about air contaminants, see Respiratory hazards.))~~ See chapter 296-841 WAC, Airborne contaminants.

Exemption: When a table is used for the application of material to be finished, you do not need to enclose the portion of the drum above the table that is necessary to do the work.

AMENDATORY SECTION (Amending WSR 04-03-081, filed 1/20/04, effective 5/1/04)

WAC 296-809-800 Definitions.

Acceptable entry conditions:

The conditions that must exist in a permit-required confined space to allow safe entry and work.

Attendant:

An individual stationed outside one or more permit-required confined spaces to monitor the entrants.

Blanking or blinding:

The absolute closure of a pipe, line, or duct by fastening a solid plate (such as a spectacle blind or a skillet blind) that completely covers the bore. It is capable of withstanding the maximum pressure of the pipe, line, or duct with no leakage beyond the plate.

Confined space:

A space that is **all** of the following:

- Large enough and arranged so an employee could fully enter the space and work.
- Has limited or restricted entry or exit. Examples of spaces with limited or restricted entry are tanks, vessels, silos, storage bins, hoppers, vaults, excavations, and pits.
- Not primarily designed for human occupancy.

Double block and bleed:

The closure of a line, duct, or pipe by closing and locking or tagging two in-line valves and by opening and locking or tagging a drain or vent valve in the line between the two closed valves.

Emergency:

Any occurrence (including any failure of hazard control or monitoring equipment) or event internal or external to the permit-required confined space that could endanger authorized entrants.

Engulfment:

The surrounding capture of a person by a liquid or finely divided (flowable) solid substance that can be inhaled to cause death by filling or plugging the respiratory system or that can exert enough force on the body to cause death by strangulation, constriction, or crushing.

Enter (entry):

The action by which a person passes through an opening into a permit-required confined space and includes work activities in that space. Entry is considered to have occurred as soon as any part of the entrant's body breaks the plane of an opening into the space.

Note: If the opening is large enough for the worker to fully enter the space, a permit is required even for partial body entry. Permits are not required for partial body entry where the opening is not large enough for full entry, although other rules such as chapter 296-803 WAC, lockout-tagout, ((WAC 296-24-110 or respiratory hazards, chapter 296-841 WAC)) and chapter 296-841 WAC, Airborne contaminants, may apply.

Entrant:

An employee who is authorized by the employer to enter a permit-required confined space.

Entry permit (permit):

The written or printed document that is provided by you to allow and control entry into a permit-required confined space and that contains the information required in WAC 296-809-500, Permit entry procedures.

Entry supervisor:

The person (such as the employer, crew leader, or crew chief) responsible for:

- Determining if acceptable entry conditions are present at a permit-required confined space where entry is planned;
- Authorizing entry and overseeing entry operations; and
- Terminating entry as required.

Hazardous atmosphere:

An atmosphere that may expose employees to the risk of death, incapacitation, impairment of ability to self-rescue (that is, escape unaided from a permit-required confined space), injury, or acute illness caused by one or more of the following:

- Flammable gas, vapor, or mist in excess of ten percent of its lower flammable limit (LFL).
- Airborne combustible dust at a concentration that meets or exceeds its LFL.

Note: This concentration may be approximated as a condition in which the dust obscures vision at a distance of five feet (1.52 m) or less.

- Atmospheric oxygen concentration below 19.5 percent or above 23.5 percent.

- Atmospheric concentration of any substance which may exceed a permissible exposure limit. For additional information about atmospheric concentration, see chapter 296-62 WAC, Parts F, G, and I, General occupational health standards and chapter 296-841 WAC, (~~Respiratory hazards~~) Airborne contaminants.

Note: An airborne concentration of a substance that is not capable of causing death, incapacitation, impairment of ability to self-rescue, injury, or acute illness due to its health effects is not covered by this definition.

- Any other atmospheric condition that is immediately dangerous to life or health.

Note: You can find guidance on establishing acceptable atmospheric conditions for air contaminants, which have no WISHA-determined doses or permissible exposure limits using other sources of information, such as:

- Material safety data sheets required by WAC 296-800-170, Employer chemical hazard communication.
- Published information.
- Internal documents.

Hot work permit:

A written authorization to perform operations, for example, riveting, welding, cutting, burning, and heating, that can provide a source of ignition.

Immediately dangerous to life or health (IDLH):

Any of the following conditions:

- An immediate or delayed threat to life.
- Anything that would cause irreversible adverse health effects.

- Anything that would interfere with an individual's ability to escape unaided from a permit-required confined space.

Note: Some materials - hydrogen fluoride gas and cadmium vapor, for example - may produce immediate transient effects that, even if severe, may pass without medical attention, but are followed by sudden, possibly fatal collapse twelve to seventy-two hours after exposure. The victim "feels normal" after recovery from transient effects until collapse. Such materials in hazardous quantities are considered to be "immediately" dangerous to life or health (IDLH).

Inerting:

The displacement of the atmosphere in a permit-required confined space by a noncombustible gas (such as nitrogen) to such an extent that the resulting atmosphere is noncombustible.

Note: This procedure produces an IDLH oxygen-deficient atmosphere.

Isolation:

The process by which a permit-required confined space is removed from service and completely protected against the release of energy and material into the space by such means as: Blanking or blinding; misaligning or removing sections of lines, pipes, or ducts; a double block and bleed system; lockout or tagout of all sources of energy; or blocking or disconnecting all mechanical linkages.

Line breaking:

The intentional opening of a pipe, line, or duct that is or has been carrying flammable, corrosive, or toxic material, an inert gas, or any fluid at a volume, pressure, or temperature capable of causing injury.

Nonpermit confined space:

A confined space that does NOT contain actual hazards or potential hazards capable of causing death or serious physical harm.

Oxygen deficient atmosphere:

An atmosphere containing less than 19.5 percent oxygen by volume.

Oxygen enriched atmosphere:

An atmosphere containing more than 23.5 percent oxygen by volume.

Permit-required confined space or permit space:

A confined space that has one or more of the following characteristics capable of causing death or serious physical harm:

- Contains or has a potential to contain a hazardous atmosphere.
- Contains a material with the potential for engulfing someone who enters.
- Has an internal configuration that could allow someone entering to be trapped or asphyxiated by inwardly converging walls or by a floor, which slopes downward and tapers to a smaller cross section.
- Contains any physical hazard. This includes any recognized health or safety hazards including engulfment in solid or liquid material, electrical shock, or moving parts.
- Contains any other recognized serious safety or health hazard that could either:
 - Impair the ability to self-rescue; or
 - Result in a situation that presents an immediate danger to life or health.

Permit-required confined space program:

An overall program for:

- Controlling and appropriately protecting employees from permit-required confined space hazards; and
- Regulating employee entry into permit-required confined

spaces.

Prohibited condition:

Any condition in a permit-required confined space that is not allowed by the permit during the authorized entry period.

Rescue service:

The personnel designated to rescue employees from permit-required confined spaces.

Retrieval system:

The equipment used for nonentry rescue of persons from permit-required confined spaces, such as a retrieval line, full-body harness or wristlets, and a lifting device or anchor.

Testing:

The process of identifying and evaluating the hazards that entrants may be exposed to in a permit-required confined space. Testing includes specifying the tests that are to be performed in the permit-required confined space.

Note: Testing allows employers to devise and implement adequate controls to protect entrants during entry, and to determine if acceptable entry conditions are present.

AMENDATORY SECTION (Amending WSR 05-03-093, filed 1/18/05, effective 3/1/05)

WAC 296-824-800 Definitions. The following definitions are specific to this chapter:

Annually

Any twelve-month cycle.

Buddy system

A system of organizing employees (who enter or stand by danger areas) into work groups, so each employee can be observed by at least one other member of the group. The purpose of this system is to provide rapid assistance to employees in an emergency.

Clean-up operation(s)

An operation where hazardous substances are removed, contained, incinerated, neutralized, stabilized, cleared up or, in any other manner, processed or handled with the goal of making the site safer for people or the environment.

Danger area

Areas where conditions pose a serious danger to employees, such as areas where:

- Immediately dangerous to life or health (IDLH) conditions could exist

OR

- High levels of exposure to toxic substances could exist

OR

- There is a potential for exceeding the lower explosive limit (LEL), also known as the lower flammability limit (LFL), of a substance.

Decontamination

Removing hazardous substances from employees and their equipment so potential adverse health effects will not occur.

Emergency response

An organized response to an anticipated release of a hazardous substance that is, or could become an uncontrolled release.

Emergency response plan

A written plan that requires coordination between emergency response participants, and contains procedures, criteria, and other information that will be applied to emergency response operations. Each employer's plan should be compatible with local and state plans.

Engineering controls

Methods of controlling employee exposures by modifying the source or reducing the quantity of contaminants.

Hazardous materials team (HAZMAT team)

A group of employees who are expected to perform responses to releases, or possible releases, of hazardous substances for the purpose of control and stabilization. As a result of their duties,

HAZMAT team members may have close contact with hazardous substances.

Note: A HAZMAT team may be a separate component of a fire brigade or fire department.

Hazardous substance

Any of the following substances that could adversely affect an exposed employee's health or safety:

- Substances defined under section 101(14) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) or "Superfund" Act (visit: <http://www.epa.gov>)

- Biological or other disease-causing agents released that could reasonably be expected to cause death, disease, behavioral abnormalities, cancer, genetic mutation, physiological malfunctions (including malfunctions in reproduction) or physical deformations in a person or their offspring when the person:

- Is directly exposed to the agent in the environment

- Directly ingests, inhales, or assimilates the agent from the environment

- Indirectly ingests the agent through a food chain

- Substances listed by the United States Department of Transportation as hazardous materials under Title 49 (Transportation) in the Code of Federal Regulations (CFR), Part 172, section 101 and appendices (visit: <http://www.nara.gov> and search for "List of CFR subjects")

- Hazardous wastes as defined in this chapter.

Hazardous waste

A substance designated by chapter 173-303 WAC, Dangerous waste regulations, department of ecology, as a dangerous waste or an extremely hazardous waste and any waste fitting the definition of "health hazard" in this chapter.

Note: For department of ecology regulations, visit: <http://www.ecy.wa.gov>

Health hazard

A chemical, a mixture of chemicals, or a pathogen for which there is statistically significant evidence, based on at least one study conducted according to established scientific principles, that acute or chronic health effects may occur in exposed employees.

The term "health hazard" includes stress due to temperature extremes and chemicals that are:

- Carcinogens

- Toxic or highly toxic agents

- Reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, or neurotoxins

- Agents acting on the hematopoietic system agents that damage lungs, skin, eyes, or mucous membranes. (Detailed definitions of these chemical terms can be found in the Safety and health core rules, WAC 296-800-170, chemical hazard communication.)

Incident command system (ICS)

An organized approach to control and manage operations at an emergency response incident.

Incidental release

A release that can be safely controlled at the time of the release and does not have the potential to become an uncontrolled release.

Note:

Example of a situation that results in an incidental release:

A tanker truck is receiving a load of hazardous liquid when a leak occurs. The driver knows the only hazard from the liquid is minor skin irritation. The employer has trained the driver on procedures and provided equipment to use for a release of this quantity. The driver puts on skin protection and stops the leak. A spill kit is used to contain, absorb, and pick up the spilled material for disposal.

Immediately dangerous to life or health (IDLH)

Any atmospheric condition that would:

- Cause an immediate threat to life

OR

- Cause permanent or delayed adverse health effects

OR

- Interfere with an employee's ability to escape

Limited action

Action necessary to:

- Secure an operation during emergency responses,

OR

- Prevent an incident from increasing in severity.

Examples include shutting down processes and closing emergency valves.

Lines of authority

A preestablished ranking of individuals, qualified to assume a commanding role during an emergency response, noted in an emergency response plan and implemented during a response. This is most important when responders from multiple employers could participate in an emergency response.

Lower explosive limit (LEL)

See lower flammable limit (LFL).

Lower Flammable limit (LFL)

The lowest concentration of a material that will propagate a flame. The LFL is usually expressed as a percent (by volume) of the material in air (or other oxidant).

Must

Must means mandatory.

Permissible exposure limit (PEL)

Means the established time-weighted-average (TWA) concentration or ceiling concentration of a contaminant that must not be exceeded. The exposure, inhalation, or dermal permissible limit specified in chapter 296-841 WAC, (~~identifying and controlling respiratory hazards~~) Airborne contaminants.

Personal protective equipment (PPE)

Protective items designed to be worn by the user to protect them against airborne, skin contact and other hazards. This includes items such as respiratory protection, protective suits,

gloves, eye protection, etc.

Postemergency response

The stage of the emergency response where the immediate threat from the release has been stabilized or eliminated, and cleanup of the site has started.

Published exposure level

Exposure limits published in "*National Institute for Occupational Safety and Health (NIOSH) Recommendations for Occupational Safety and Health*" (DHHS publication #92-100, 1992).

If an exposure limit is not published by NIOSH, then "published exposure level" means the exposure limits published by the American Conference of Governmental Industrial Hygienists (ACGIH) in "*TLVs and BEIs-Threshold Limit Values for Chemical Substances and Physical Agents*" (1999 edition).

Note: Additional exposure levels published by recognized organizations such as the American Industrial Hygiene Association are not required to be observed by this rule; however, they may be a useful resource when a hazardous substance is not covered by NIOSH and ACGIH publications.

Release

A spill, leak, or other type of hazardous substance discharge.

Uncontrolled release

A release where significant safety and health risks could be created. Releases of hazardous substances that are either incidental or could not create a safety or health hazard (i.e., fire, explosion or chemical exposure) are not considered to be uncontrolled releases.

Examples of conditions that could create a significant safety and health risk:

- Large-quantity releases
- Small releases that could be highly toxic
- Potentially contaminated individuals arriving at hospitals
- Airborne exposures that could exceed a WISHA permissible exposure limit or a published exposure limit and employees are not adequately trained or equipped to control the release.

Example of an uncontrolled release:

A forklift driver knocks over a container of a solvent-based liquid, releasing the contents onto the warehouse floor. The driver has been trained to recognize the vapor is flammable and moderately toxic when inhaled. The driver has not been trained or provided appropriate equipment to address this type of spill. In this situation, it is not safe for the driver to attempt a response. The driver needs to notify someone of the release so an emergency response can be initiated.

Workplace

- A fixed facility

OR

- A temporary location (such as a traffic corridor)

OR

- Locations where employees respond to emergencies.

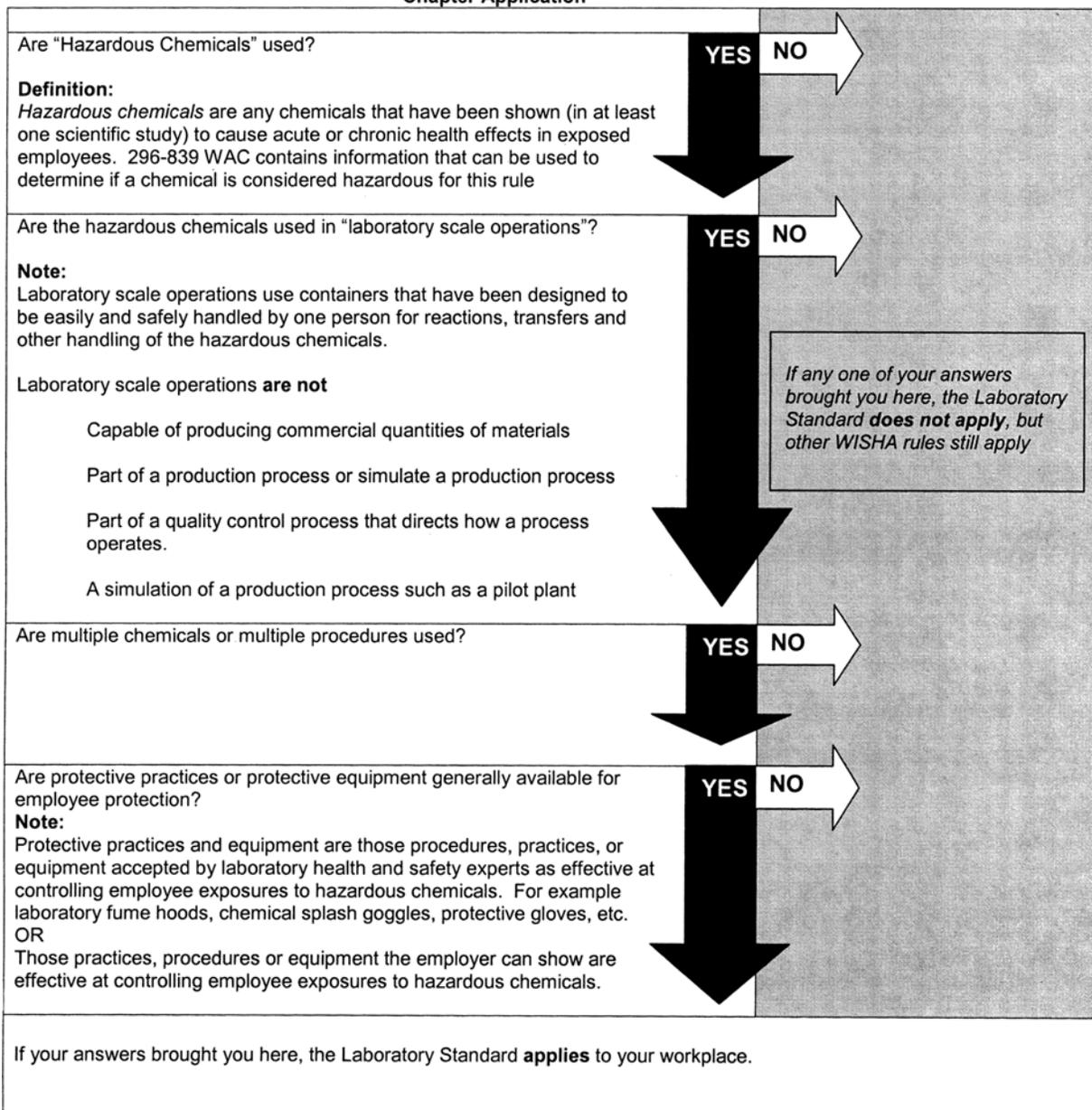
You

The employer. For a complete definition of "employer" see Safety and health core rules, chapter 296-800 WAC.

AMENDATORY SECTION (Amending WSR 06-02-060, filed 1/3/06, effective 4/1/06)

WAC 296-828-100 Scope. This chapter applies to the laboratory use of hazardous chemicals. To determine if this chapter applies to your workplace, use Table 1.

**Table 1
Chapter Application**



IMPORTANT :

● When your laboratory operation is covered by this chapter, and you use any of the substances in Table 2, the following applies:

- The exposure limits and any requirement protecting employees from skin and eye contact in the rules listed in Table 2 will still apply.

- Where the action level (or where no action level exists, the permissible exposure limit) is exceeded for a substance listed in Table 2, the exposure evaluation and medical surveillance requirements in the substance rule will still apply.

- You are not required to meet other requirements of the substance rule.

● To get the permissible exposure limits (PELs) for hazardous chemicals used in your laboratory, see chapter 296-841 WAC, (~~Respiratory hazards~~) Airborne contaminants.

Table 2
WISHA Regulated Hazardous Chemicals

Acrylonitrile
Arsenic (inorganic)
Asbestos
Benzene
Butadiene
Cadmium
Coke ovens
Cotton dust
1, 2-Dibromo-3-chloropropane
Ethylene oxide
Formaldehyde
Lead
Methylene chloride
Methylenedianiline
Vinyl chloride
Ionizing radiation
4-Nitrobiphenyl
Alpha-Naphthylamine
4,4' Methylene bis (2 - chloroaniline)
Methyl chloromethyl ether
3,3'-Dichlorobenzidine (and its salts)
Bis-Chloromethyl ether
Beta-Naphthylamine benzidine
4-Aminodiphenyl
Ethyleneimine
Beta-Propiolactone
2-Acetylaminofluorene
4-Dimethylaminoazobenzene
N-Nitrosodimethylamine

AMENDATORY SECTION (Amending WSR 06-02-060, filed 1/3/06, effective 4/1/06)

WAC 296-828-20005 Chemical hygiene plan.

You must:

● Develop and carry out a written chemical hygiene plan (CHP) that will protect your employees from hazardous substances in the laboratory and keep exposure levels below those listed in (~~Respiratory hazards,~~) chapter 296-841 WAC, Airborne contaminants.

● Make sure the written plan is readily available to employees and their representatives.

● Include the following elements in your written CHP:

- The names or job titles of the chemical hygiene officer, other personnel responsible for implementing the CHP, or when appropriate, the members of a chemical hygiene committee.

- Standard operating procedures that provide employee protection when working with hazardous substances.

- Criteria for how you will select and use control measures to reduce employee exposures to hazardous chemicals, especially chemicals known to be extremely hazardous.

- Additional employee protection for select carcinogens, reproductive toxins, and chemicals with high degree of acute toxicity. The following will be considered, when appropriate:

■ The establishment of exposure control areas.

■ Containment devices, such as fume hoods or glove boxes.

■ The safe removal of contaminated waste.

■ Procedures for decontamination.

- Specific measures to make sure fume hoods and other protective equipment provide proper and adequate performance and are properly functioning.

- The circumstances when specific laboratory operation, activity, or procedure requires prior approval from the employer or their designated representative before implementation.

- A description of how you are going to train and inform your employees about laboratory use of hazardous chemicals.

- A description of your provisions for medical consultations and medical examinations.

● Review and evaluate the effectiveness of your written CHP at least annually and update as necessary.

Reference: This publication can provide you with additional information to help you with your written chemical hygiene plan: National Research Council, Prudent Practices for Disposal of Chemicals from Laboratories, National Academy Press, Washington, DC, 1995.

AMENDATORY SECTION (Amending WSR 05-03-093, filed 1/18/05, effective 3/1/05)

WAC 296-839-30005 Develop or obtain material safety data sheets (MSDSs).

You must:

● Develop or obtain a complete and accurate material safety data sheet (MSDS) for each hazardous chemical or mixture according to **ALL** of the following:

- **ALL** information in Table 8 must be completed. If there is no relevant information for a required item, this must be noted. Blank spaces are not permitted.

- Note:**
- No specific format is required for MSDSs; however, an example format (OSHA form 174) can be found online at <http://www.osha.gov>
 - One MSDS can be developed for a group of complex mixtures (for example, jet fuels or crude oil) **IF** the health and physical hazards of the mixtures are similar (the amounts of chemicals in the mixture may vary).

- Content of MSDSs must accurately represent the available scientific evidence.

Note: You may report results of scientifically valid studies that tend to refute findings of hazards.

- MSDSs must be in English.

Note: You may develop copies of MSDSs in other languages.

You must:

● Revise an MSDS when you become aware of new and significant information regarding the hazards of a chemical, or how to protect against the hazards

- Within three months after you first become aware of the information

OR

- Before the chemical is reintroduced into the workplace if the chemical is no longer being used, produced or imported.

Table 8 Information Required on MSDSs
● The chemical's identity as it appears on the label
● The date the MSDS was prepared or updated
● A contact for additional information about the hazardous chemical and appropriate emergency procedures Include all of the following: <ul style="list-style-type: none">- Name- Address- Telephone number of the responsible party preparing or distributing the MSDS

**Table 8
Information Required on MSDSs**

<ul style="list-style-type: none"> ● The chemical's hazardous ingredients¹ as determined by your hazard evaluation <ul style="list-style-type: none"> – For a single substance chemical, include the chemical and common name(s) of the substance – For mixtures tested as a whole <ul style="list-style-type: none"> ■ Include the common name(s) of the mixture AND ■ List the chemical and common name(s) of ingredients that contribute to the known hazards – For mixtures NOT tested as a whole, list the chemical and common name(s) of hazardous ingredients <ul style="list-style-type: none"> ■ That make up 1% or more of the mixture, by weight or volume, including carcinogens (if 0.1% concentration or more, by weight or volume) – If ingredients are less than the above concentrations but may present a health risk to employees (for example, allergic reaction or exposure could exceed the permissible exposure limits, or PEL) they must be listed here
<ul style="list-style-type: none"> ● Exposure limits for airborne concentrations. Include ALL of the following, when they exist: <ul style="list-style-type: none"> – WISHA or OSHA PELs² <ul style="list-style-type: none"> ■ The 8-hour time weighted average (TWA) ■ The short-term exposure limit (STEL), if available ■ Ceiling values, if available – Threshold limit values (TLVs) including 8-hour TWAs, STELs, and ceiling values – Other exposure limits used or recommended by the employer preparing the MSDS
<ul style="list-style-type: none"> ● Physical and chemical characteristics <ul style="list-style-type: none"> – For example, boiling point, vapor pressure, and odor
<ul style="list-style-type: none"> ● Fire, explosion data, and related information <ul style="list-style-type: none"> – For example, flashpoint, flammable and explosion limits, extinguishing media, and unusual fire or explosion hazards
<ul style="list-style-type: none"> ● Physical hazards of the chemical including reactivity information <ul style="list-style-type: none"> – For example, incompatibilities, decomposition products, by-products, and conditions to avoid
<ul style="list-style-type: none"> ● Health hazard information including ALL of the following: <ul style="list-style-type: none"> – Primary routes of exposure <ul style="list-style-type: none"> ■ For example, inhalation, ingestion, and skin absorption or other contact³ – Health effects (or hazards) associated with: <ul style="list-style-type: none"> ■ Short-term exposure⁴ AND ■ Long-term exposure⁴ – Whether the chemical is listed or described as a carcinogen or potential carcinogen in the latest editions of each of the following: <ul style="list-style-type: none"> ■ The National Toxicology Program (NTP) Annual Report on Carcinogens OR ■ The International Agency for Research on Cancer (IARC) Monographs as a potential carcinogen OR ■ WISHA or OSHA rules – Signs and symptoms of exposure⁵ – Medical conditions generally recognized as being aggravated by exposure
<ul style="list-style-type: none"> ● Emergency and first-aid procedures
<ul style="list-style-type: none"> ● Generally applicable precautions for safe handling and use known to the employer preparing the MSDS <ul style="list-style-type: none"> – For example, appropriate procedures for clean-up of spills and leaks, waste disposal method, precautions during handling and storing

Table 8
Information Required on MSDSs

- Generally applicable and appropriate control measures known to the employer preparing the MSDS, including ALL of the following:
 - Engineering controls (for example, general or local exhaust ventilation)
 - Work practices
 - Personal protective equipment (PPE)
 - Personal hygiene practices
 - Protective measures during repair and maintenance of contaminated equipment

¹The identities of some chemicals may be protected as trade secret information (see chapter 296-62 WAC, Part B-1, Trade secrets).

²WISHA PEL categories are defined, and values are provided, in chapter 296-841 WAC, ((identifying and controlling respiratory hazards))
Airborne contaminants.

³A "skin notation" listed with either an ACGIH TLV or WISHA/OSHA PEL indicates that skin absorption is a primary route of exposure.

⁴Examples of:

- Short-term health effects (or hazards) include eye irritation, skin damage caused by contact with corrosives, narcosis, sensitization, and lethal dose.
- Long-term health effects (or hazards) include cancer, liver degeneration, and silicosis.

⁵Signs and symptoms of exposure to hazardous substances include those that:

- Can be measured such as decreased pulmonary function

AND

- Are subjective such as feeling short of breath.

AMENDATORY SECTION (Amending WSR 05-13-152, filed 6/21/05, effective 8/1/05)

WAC 296-849-11030 Exposure evaluations.

IMPORTANT:

● When you conduct an exposure evaluation in a workplace where an employee uses a respirator, the protection provided by the respirator is not considered.

● Following this section will fulfill the requirements to identify and evaluate respiratory hazards found in (~~another chapter, Respiratory hazards,~~) chapter 296-841 WAC, Airborne contaminants.

You must:

● Conduct an employee exposure evaluation to accurately determine airborne concentrations of benzene by completing Steps 1 through 7 of the exposure evaluation process, each time any of the following apply:

- No evaluation has been conducted.

■ You have up to thirty days to complete an evaluation once benzene is introduced into your workplace.

- Changes have occurred in any of the following areas that may result in new or increased exposures:

■ Production.

■ Processes.

■ Exposure controls such as ventilation systems or work practices.

■ Personnel.

- You have any reason to suspect new or increased exposure may occur.

- Spills, leaks, or other releases have been cleaned up.

Note: As part of your exposure evaluation after cleanup, you will make sure exposure monitoring results have returned to prerelease levels.

Exposure evaluation process.

IMPORTANT:

● If you are evaluating employee exposures during cleaning and repair of barges and tankers that contained benzene:

- Collect samples that effectively measure benzene concentrations that employees may be exposed to;

AND

- Skip to Step 7.

● Following the exposure evaluation process is not necessary when you have documentation conclusively demonstrating benzene exposures for a particular operation and material cannot exceed the action level (AL) during any conditions reasonably anticipated.

- Documentation can be based on data or qualitative information, such as information about:

■ The material.

■ How the material is handled.

- The work conditions.

- Retain this documentation for as long as you rely on it.

Step 1: Identify all employees who have potential airborne exposure to benzene in your workplace.

Step 2: Identify operations where fifteen-minute exposures could exceed benzene's short-term exposure limit (STEL) of 5 parts per million (ppm).

- Include operations where it is reasonable to expect high, fifteen-minute exposures, such as operations where:

- Tanks are opened, filled, unloaded, or gauged.
- Containers or process equipment are opened.
- Benzene is used as a solvent for cleaning.

Note: You may use monitoring devices such as colorimetric indicator tubes or real-time monitors to screen for activities where employee exposure monitoring results could be high.

Step 3: Select employees from those working in the operations you identified in Step 2 who will have their fifteen-minute exposures measured.

Step 4: Select employees from those identified in Step 1 who will have their eight-hour exposures monitored.

- Make sure the exposures of the employees selected represent eight-hour exposures for **all** employees identified at Step 1, including each job classification, work area, and shift.

Note: A written description of the procedure used for obtaining representative employee exposure monitoring results needs to be kept as part of your exposure records required by this chapter in Exposure records, WAC 296-849-11090. This description can be created while completing Steps 3 through 6 of this exposure evaluation process.

Step 5: Determine how you will obtain employee monitoring results.

- Select and use a method that is accurate to $\pm 25\%$, with a confidence level of 95%.

Note:

- Here are examples of methods that meet this accuracy requirement:
 - OSHA Method 12 for air samples, found by going to <http://www.osha.gov/dts/sltc/methods/toc.html>.
 - NIOSH Method 1500, found by going to <http://www.cdc.gov/niosh/homepage.html> and link to the *NIOSH Manual of Analytical Methods*.

Step 6: Obtain employee exposure monitoring results by collecting air samples representing employees identified at Step 1.

- Collect fifteen-minute samples from employees selected at Step 3.

- Sample at least one shift representative of the eight-hour exposure for each employee selected at Step 4.

- Make sure samples are collected from each selected employee's breathing zone.

- Collecting area samples is permitted after emergency releases.

Note:

- You may use any sampling method that meets the accuracy specified in Step 5. Examples of these methods include:
 - Real-time monitors that provide immediate exposure monitoring results.
 - Equipment that collects samples that are sent to a laboratory for analysis.
- The following are examples of methods of monitoring representative of eight-hour exposures:
 - Collect one or more continuous samples, for example, a single eight-hour sample or four two-hour samples.
 - Take a minimum of five brief samples, such as fifteen-minute samples, during the work shift and at times selected randomly.
 - For work shifts longer than eight hours, monitor the continuous eight-hour portion of the shift expected to have the highest average exposure concentration.

Step 7: Have the samples you collected analyzed to obtain monitoring results representing eight-hour and fifteen-minute exposures.

- Go to the scope of this chapter, WAC 296-849-100, and compare employee exposure monitoring results to the **values** found in

Step 2a and follow Step 2b to determine if additional sections of this chapter apply.

- Note:**
- You may contact your local WISHA consultant for help:
 - Interpreting data or other information.
 - Obtaining eight-hour or fifteen-minute employee exposure monitoring results.
 - To contact a WISHA consultant:
 - Go to another chapter, the Safety and health core rules, chapter 296-800 WAC, and find the resources section, and under "other resources," find service location for labor and industries.

AMENDATORY SECTION (Amending WSR 05-01-172, filed 12/21/04, effective 3/1/05)

WAC 296-849-13005 Exposure control plan.

Exemption: This section does not apply to the cleaning and repair of barges and tankers that contained benzene.

You must:

- Establish and implement a written exposure control plan for exposure control areas that include a schedule for developing and implementing feasible exposure controls to reduce benzene exposure to, or below, the PELs.

(Reference: To see examples of exposure controls, go to Respiratory hazards, chapter 296-841 WAC, and find Table I in Control employee exposure, WAC 296-841-20010.)

Note: Respirators and other personal protective equipment (PPE) help protect employees from exposures, but are **not** substitutes for feasible exposure controls.

You must:

- Review and update your exposure control plan as needed, based on the most recent exposure evaluation results.
- Provide a copy of your exposure control plan to affected employees and their designated representatives when they ask to review or copy it.

AMENDATORY SECTION (Amending WSR 05-01-172, filed 12/21/04, effective 3/1/05)

WAC 296-849-13020 Exposure controls.

IMPORTANT:

Respirators and other personal protective equipment (PPE) do **not** substitute for feasible exposure controls.

You must:

- Use feasible exposure controls to reduce exposures, as specified in Table 6.

(Reference: To see examples of exposure controls, go to Respiratory hazards, chapter 296-841 WAC, and find Table I in Control employee exposures, WAC 296-841-20010.)

**Table 6
Exposure Control Requirements**

If:	Then you must use feasible controls to:
You have operations where employees clean and repair barges or tankers which have contained benzene	Keep all employee exposure concentrations below 10 parts per million (ppm).
You can document that benzene is used for less than thirty days a year in the workplace	<p>Reduce eight-hour employee exposure monitoring results to a time-weighted average of 10 ppm or less.</p> <p>Note:</p> <p>If employee exposure monitoring results are between 1 and 10 ppm, you are permitted to use respirators or a combination of respirators and feasible controls to protect employees.</p>
Employees are exposed to benzene above a PEL for at least thirty days a year	<p>Reduce eight-hour employee exposure concentrations to the TWA₈ of 1 ppm or less;</p> <p>AND</p> <p>Reduce fifteen-minute employee exposure concentrations to the STEL of 5 ppm or less.</p>

AMENDATORY SECTION (Amending WSR 05-01-173, filed 12/21/04, effective 5/1/05)

WAC 296-848-20060 Exposure evaluations.

IMPORTANT:

● This section applies when workplace operations create potential airborne exposure to inorganic arsenic.

● When you conduct an exposure evaluation in a workplace where an employee uses a respirator, the protection provided by the respirator is not considered.

● Following this section will fulfill the requirements to identify and evaluate respiratory hazards found in (~~another chapter, Respiratory hazards,~~) chapter 296-841 WAC, Airborne contaminants.

You must:

(1) Conduct an employee exposure evaluation to accurately determine airborne concentrations of inorganic arsenic by completing Steps 1 through 5 of the Exposure Evaluation Process, each time any of the following apply:

- No evaluation has been conducted.
- Changes have occurred in any of the following areas that may result in new or increased exposures:
 - Production.
 - Processes.
 - Exposure controls such as ventilation systems or work practices.
 - Personnel.
- You have any reason to suspect new or increased exposure may occur.

(2) Provide affected employees and their designated representatives an opportunity to observe exposure monitoring during Step 4 of the Exposure Evaluation Process.

● Make sure observers do not interfere with exposure measurements.

- Make sure observers are entitled to:
 - An explanation of your exposure measurement and monitoring procedures;
 - Observe all tasks of exposure measurement performed at the workplace;

AND

- Receive a copy of the exposure measurement results when you obtain them; or are allowed to record the exposure measurement results, if made during observations.

● Make sure observers who enter areas with inorganic arsenic exposure:

- Are provided with and use the same protective clothing, respirators, and other personal protective equipment (PPE) that

employees working in the area are required to use;

AND

- Follow safety and health requirements that apply.

Exposure Evaluation Process

IMPORTANT:

Following the Exposure Evaluation Process is not necessary when you have documentation conclusively demonstrating inorganic arsenic exposures for a particular operation and material, cannot exceed the action level (AL) during any conditions reasonably anticipated. Documentation can be based on quantitative information such as soil test results OR qualitative information such as observations of how inorganic arsenic-containing materials are handled.

- Retain this documentation for as long as you rely on it.

Step 1: Identify all employees who have potential airborne exposure to inorganic arsenic in your workplace.

Step 2: Select employees from those identified in Step 1 who will have their eight-hour exposures monitored.

- Make sure the exposures of the employees selected represent eight-hour exposures for all employees identified in Step 1, including each job classification, work area, and shift.

Note: ● A written description of the procedure used for obtaining representative employee exposure monitoring results needs to be kept as part of your exposure records required by this chapter in Exposure records, WAC 296-848-20090. This description can be created while completing Steps 2 through 4 of this exposure evaluation process.

Step 3: Determine how you'll obtain employee exposure monitoring results.

- Select and use a method that meets the following criteria for accuracy:

- $\pm 25\%$, with a confidence level of 95%, when concentrations are potentially at or above an eight-hour time-weighted average of 10 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$);

OR

- $\pm 35\%$, with a confidence level of 95%, when concentrations are potentially between the eight-hour time-weighted averages of 5 $\mu\text{g}/\text{m}^3$ and 10 $\mu\text{g}/\text{m}^3$.

Note: ● Here are examples of methods that meet this accuracy requirement:
- OSHA Method ID105 found by going to <http://www.osha.gov/dts/sltc/methods/toc.html>.
- NIOSH method 7901 found by going to <http://www.cdc.gov/niosh/homepage.html> and linking to the NIOSH Manual of Analytical Methods.

Step 4: Obtain employee exposure monitoring results by collecting air samples representing employees identified in Step 1.

- Sample at least one shift representative of the eight-hour exposure, for each employee selected in Step 2.

- Make sure samples are collected from each selected employee's breathing zone.

Note: ● You may use any sampling method that meets the accuracies specified in Step 3. Examples of these methods include:
- Real-time monitors that provide immediate exposure monitoring results.
- Equipment that collects samples that are sent to a laboratory for analysis.
● The following are examples of methods for collecting samples representative of eight-hour exposures.
- Collect one or more continuous samples, for example, a single eight-hour sample or four two-hour samples.
- Take a minimum of 4 to 7 brief samples, such as fifteen-minute samples, during the work shift and at times selected randomly.
● For work shifts longer than eight hours, monitor the continuous eight-hour portion of the shift expected to have the highest average exposure concentration.

Step 5: Have the samples you collected analyzed to obtain monitoring results representing eight-hour exposures.

● Go to the Scope of this chapter, WAC 296-848-100, and compare employee exposure monitoring results to the values found in Step 1 and follow Step 2 to determine if additional sections of this chapter apply.

- Note:**
- You may contact your local WISHA consultant for help:
 - Interpreting data or other information.
 - Determining eight-hour employee exposure monitoring results.
 - To contact a WISHA consultant:
 - Go to the Safety and health core rules, chapter 296-800 WAC;
- AND**
- Find the Resources section, and under "Other Resources," find *Service Locations for Labor and Industries*.

AMENDATORY SECTION (Amending WSR 05-01-173, filed 12/21/04, effective 5/1/05)

WAC 296-848-40020 Exposure controls.

IMPORTANT:

● Use of employee rotation to control exposures is not advisable since inorganic arsenic is a known carcinogen.

● Respirators and other personal protective equipment (PPE) do not substitute for feasible exposure controls.

You must:

● Use feasible exposure controls to reduce exposures to or below the permissible exposure limit (PEL), or as low as achievable.

((**Reference:** To see examples of exposure controls go to Respiratory hazards, chapter 296-841 WAC, and find Table 1 in the section, Control employee exposure, WAC 296-848-20010.))

AMENDATORY SECTION (Amending WSR 05-17-168, filed 8/23/05, effective 1/1/06)

WAC 296-855-20050 Exposure evaluations.

IMPORTANT:

This section applies when there is a potential for airborne exposure to ethylene oxide (EtO) in your workplace.

When you conduct an exposure evaluation in a workplace where an employee uses a respirator, the protection provided by the respirator is not considered.

Following this section will also meet the requirements to identify and evaluate respiratory hazards found in (~~another chapter, Respiratory hazards,~~) chapter 296-841 WAC, Airborne contaminants.

You must:

- Conduct an employee exposure evaluation to accurately determine airborne concentrations of EtO by completing Steps one through seven of the exposure evaluation process, each time any of the following apply:

- No evaluation has been conducted.
- Changes have occurred in any of the following areas that may result in new or increased employee exposures:

- Production.
- Processes.
- Personnel.

- Exposure controls such as ventilation systems or work practices.

- You have any reason to suspect new or increased employee exposure may occur.

- Provide affected employees and their designated representatives an opportunity to observe any exposure monitoring during Step six of the exposure evaluation process.

- Make sure observers entering areas with EtO exposure:

- Are provided with and use the same protective clothing, respirators, and other personal protective equipment (PPE) that employees working in the area are required to use;

AND

- Follow all safety and health requirements that apply.

Exposure evaluation process

Step one: Identify all employees who have potential exposure to airborne ethylene oxide (EtO) in your workplace.

Step two: Identify operations where employee exposures could exceed EtO's fifteen-minute short-term exposure limit (STEL) of five parts per million (ppm).

Step three: Select employees from those working in the operations you identified in Step two who will have their STEL exposures measured.

Step four: Select employees from those identified in Step one who will have their eight-hour exposures monitored.

- Make sure the exposures of the employees selected represent eight-hour exposures for all employees identified in Step one including each job classification, work area, and shift.
- If you expect all employee exposures to be below the action level (AL), you can choose to limit your selection to those employees reasonably believed to have the highest exposures. If you find these employees' exposure to be above the AL, then you'll need to repeat Step four to represent all employees identified in Step one.

Note: You can use Steps three through six of this process to create a written description of the procedure used for obtaining representative employee exposure monitoring results, which is a requirement in Exposure records, WAC 296-855-20070.

Exemption:

- You can skip Steps four through seven if you have documentation conclusively demonstrating that employee exposure for a particular material and the operation where it's used, cannot exceed the AL or STEL during any conditions reasonably anticipated.
- Such documentation can be based on observations, data, calculations, and previous air monitoring results. Previous air monitoring results:
 - Must meet the accuracy required by Step five.
 - May be from outside sources, such as industry or labor studies.
 - Must be based on data that represents conditions being evaluated in your workplace.

Step five: Determine how you will obtain accurate employee exposure monitoring results. Select and use an air monitoring method with a confidence level of ninety-five percent, that's accurate to:

- ±twenty-five percent when concentrations are potentially above the AL or eight-hour time-weighted average of one part per million (ppm).
- ±thirty-five percent when concentrations are potentially above the AL of 0.5 ppm or the STEL of five ppm.

Note: Here are examples of air monitoring methods that meet this accuracy requirement:

- OSHA Method thirty found by going to: <http://www.osha.gov/dts/sltc/methods/toc.html>.
- NIOSH Method thirty eight hundred found by going to: <http://www.cdc.gov/niosh/homepage.html> and linking to the NIOSH Manual of analytical methods.

Step six: Obtain employee monitoring results by collecting air samples representing employees identified in Steps three and four.

- Collect STEL samples for employees and operations selected in Step three.
- Collect samples representing the eight-hour exposure, for at least one shift, for each employee selected in Step four.
- Make sure samples are collected from each selected employee's breathing zone.

Note:

- You may use any sampling method that meets the accuracy specified in Step five. Examples of these methods include:
 - Real-time monitors that provide immediate exposure monitoring results.
 - Equipment that collects samples that are sent to a laboratory for analysis.
- The following are examples of methods for collecting samples representative of eight-hour exposures.
 - Collect one or more continuous samples, such as a single eight-hour sample or four two-hour samples.
 - Take a minimum of five brief samples, such as five fifteen-minute samples, during a work shift at randomly selected times.
- For work shifts longer than eight hours, monitor the continuous eight-hour portion of the shift expected to have the highest average exposure concentration.

- Step seven:** Have the samples you collected analyzed to obtain monitoring results for eight-hour and STEL exposures.
- Determine if employee exposure monitoring results are above or below the following values:
 - Eight-hour time-weighted average (TWA₈) of one ppm.
 - Fifteen-minute short-term exposure limit (STEL) of five ppm.
 - Eight-hour action level (AL) of 0.5 ppm.

- Note:**
- You may contact your local WISHA consultant for help:
 - Interpreting data or other information.
 - Determining eight-hour or fifteen-minute employee exposure monitoring results.

AMENDATORY SECTION (Amending WSR 05-17-168, filed 8/23/05, effective 1/1/06)

WAC 296-855-40030 Exposure controls.

IMPORTANT:

The use of an employee rotation schedule to control employee exposure to ethylene oxide (EtO) is prohibited.

Respirators and other personal protective equipment (PPE) are not exposure controls.

You must:

- Use feasible exposure controls to:
 - Reduce exposure to, or below, the permissible exposure limit (PELs);

OR

- To reduce exposure to the lowest achievable level above the PELs.

~~((Reference: Go to another chapter, Respiratory hazards, chapter 296-841 WAC for additional information on employee exposure controls.))~~