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

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	Rule that applies
Acrylonitrile	WAC 296-62-07336

Arsenic (inorganic)	WAC 296-62-07347
Asbestos	WAC 296-62-077
Benzene	Chapter 296-849 WAC ((~~296-62-07523~~))
Butadiene	WAC 296-62-07460
Cadmium	WAC 296-62-074 through 296-62-07449 or 296-155-174
Carcinogens	Chapter 296-62 WAC, Part F
Coke ovens	Chapter 296-62 WAC, Part O
Cotton dust	Chapter 296-62 WAC, Part N
1, 2-Dibromo-3-chloropropane	WAC 296-62-07342
Ethylene oxide	Chapter 296-855 WAC ((~~296-62-07355~~))
Formaldehyde	WAC 296-62-07540
Lead	WAC 296-62-07521 or 296-155-176
Methylene chloride	WAC 296-62-07470
Methylenedianiline	WAC 296-62-076 or 296-155-173
Thiram	WAC 296-62-07519
Vinyl chloride	WAC 296-62-07329

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

WAC 296-849-100 Scope. This chapter applies to **all** occupational exposure to benzene.

Definition:

Exposure is the contact an employee has with benzene, 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.

Exemptions: This chapter does not apply to any of the following:

- Liquids, vapors, mixtures in containers or pipelines, and gas in natural gas processing plants when benzene content is 0.1% or less.
- Gasoline and other fuels containing benzene once they leave the final bulk wholesale facility and are being:
  - Transported;
  - Sold;
  - Distributed;
  - Stored;
  - Dispensed either:
    - Outdoors;

    OR
    - Indoors four hours or less a day.
  - Used as a fuel.

((~~- Laboratories subject to the requirements in hazardous chemicals in laboratories, WAC 296-62-400, the General occupational health standards, chapter 296-62 WAC.~~))

- Oil and gas drilling, production, and servicing operations.
- Solid materials that contain only trace amounts of benzene.
- Coke ovens.

All requirements in this chapter will not apply to every workplace with an occupational exposure. The following will show you which requirements apply to your workplace.

Step 1: If any of your work tasks are listed in Table 1, follow Table 1.

- Go to Step 2a if you have additional work tasks or other exposures that are not covered in Table 1.

Table 1
Requirements that Apply to Specific Tasks

If employees do any of the following:	Then the only requirements in this chapter that apply to those tasks are:
Load and unload benzene at bulk storage facilities that use vapor control systems for all loading and unloading operations.	The labeling requirement found in Preventive practices, WAC 296-849-11010.

Perform tasks around sealed transport pipelines carrying gasoline, crude oil, or other liquids containing more than 0.1% benzene.	✎ This requirement found in Training, WAC 296-849-11050: – Make sure training and information includes specific information on benzene for each hazard communication training topic. For the list of hazard communication training tropics, go to the Safety and health core rules, chapter 296-800 WAC, and find Inform and train your employees about hazardous chemicals in your workplace, WAC 296-800-17030.
Work with, or around, sealed containers of liquids containing more than 0.1% benzene.	✎ Emergency requirements found in Medical evaluations, WAC 296-849-12030. ✎ Requirements found in Medical records, WAC 296-849-12080.
	✎ Respirator requirements found in Respirators, WAC 296-849-13045.

Step 2a: Follow requirements in the basic rules sections, WAC 296-849-11010 through 296-849-11090, for tasks **not** listed in Table 1.

✎ This includes completing an exposure evaluation, as specified in Exposure evaluations, WAC ((~~296-849-11060~~)) 296-849-11030, to:

– Obtain employee fifteen-minute and eight-hour exposure monitoring results of airborne benzene;

AND

– Determine if employee exposure monitoring results are above, at, or below these values:

✂ Eight-hour time-weighted average **(TWA_8)** . . . . . .1 parts per million (ppm).

✂ Fifteen-minute short-term exposure limit **(STEL)** . . . .5 ppm.

✂ Eight-hour action level **(AL)** . . . . . .0.5 ppm.

Step 2b: Use employee exposure monitoring results from Step 2a and follow Table 2 to find out which additional sections of this chapter apply to your workplace.

Table 2

Section Application

If employee exposure monitoring results are:	Then continue to follow the basic rules, and these additional requirements:
✎ **Above** the TWA_8 or STEL	✎ Exposure and medical monitoring, WAC 296-849-12005 through 296-849-12080; **AND** ✎ Exposure control areas, WAC 296-849-13005 through 296-849-13045.
✎ **At or below** the TWA_8 or STEL; **AND** ✎ **At or above** AL	✎ Exposure and medical monitoring, WAC 296-849-12005 through 296-849-12080.
✎ **Below** the AL and STEL	✎ No additional requirements apply.

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

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.

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 ±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 296-849-12010 Periodic exposure evaluations.

Exemption: Periodic exposure evaluations aren't required if exposure monitoring results conducted to fulfill requirements in Exposure evaluation, WAC 296-849-11030, are below the action level (AL) and short-term exposure limit (STEL).

You must:

✎ Obtain employee exposure monitoring results as specified in Table 3, by repeating Steps 3, 4, 6, and 7 of the exposure evaluation process found within this chapter, in Exposure evaluations, WAC 296-849-11030.

Note: If you document that one work shift consistently has higher exposure monitoring results than another for a particular operation, then you can limit sample collection to the work shift with higher exposures and use results to represent all employees performing the operation on other shifts.

Table 3
Periodic Exposure Evaluation Frequencies

If exposure monitoring results	Then
Are between the: – AL of 0.5 ppm **AND** – Eight-hour time-weighted average (TWA_8) of 1 ppm	Conduct additional exposure evaluations at least every twelve months for the employees represented by the monitoring results.
Are above the TWA_8	Conduct additional exposure evaluations at least every six months for the employees represented by the monitoring results.
Have decreased to a concentration between the AL and TWA_8; **AND** The decrease is demonstrated by two consecutive exposure evaluations, made at least seven days apart.	You may **decrease** your evaluation frequency to every twelve months for employees represented by the monitoring results.
Are above the short-term exposure limit **(STEL)** of 5 ppm	Repeat as often as necessary to evaluate employee exposure.
Have decreased to below the AL and the STEL **AND** The decrease is demonstrated by two consecutive evaluations, made at least seven days apart.	You may **stop** periodic exposure evaluations for employees represented by the monitoring results.

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

WAC 296-849-12030 Medical evaluations.

IMPORTANT:

Medical evaluations conducted under this section will satisfy the medical evaluation requirement found in Respirators, chapter 296-842 WAC.

You must:

✎ Provide the relevant medical follow-up specified in Tables 4 and 5 to any employee exposed to benzene during an emergency.

✎ Make medical evaluations available to current employees who meet the following criteria:

– Potential or actual exposure to benzene at or above the action level (AL) for at least thirty days in any twelve-month period.

– Potential or actual exposure to benzene at or above either permissible exposure limit (PEL) for at least ten days in a twelve-month period.

– Past exposure to concentrations above 10 ppm benzene for at least thirty days in a twelve-month period before November 11, 1988.

– Current or past work as a tire building machine operator using solvents containing more than 0.1% benzene during tire building operations.

You must:

✎ Make medical evaluations available at no cost to employees.

– Pay all costs, including travel costs and wages associated with any time spent outside of the employee's normal work hours;

✎ Make medical evaluations available at reasonable times and places;

✎ Make medical evaluations available by completing Steps 1 through 6 of the medical evaluation process for each employee covered.

Note: ✎ Employees who wear respirators need to be medically evaluated to make sure the respirator will not harm them, before they are assigned work in areas requiring respirators. Employees who decline to receive medical examination and testing to monitor for health effects caused by benzene are not excluded from receiving a separate medical evaluation for a respirator use.

✎ If employers discourage participation in medical monitoring for health effects caused by benzene, or in any way interfere with an employee's decision to continue with this program, this interference may represent unlawful discrimination under RCW 49.17.160, Discrimination against employee filing, instituting proceeding, or testifying prohibited--Procedure--Remedy.

Helpful tool:

Declination form for nonemergency related medical

evaluations.

✎ You may use this optional form to document employee decisions to decline participation in the medical evaluation process for exposure to benzene.

Medical evaluation process:

Step 1: Identify employees who qualify, as stated above, for medical evaluations.

Step 2: Make medical evaluations available for employees identified in Step 1 at the following times:

✎ Initially, before the employee starts a job or task assignment where benzene exposure will occur.

✎ Every twelve months from the initial medical evaluation.

✎ Whenever the employee develops signs or symptoms commonly associated with toxic benzene exposure.

✎ After benzene exposure from an emergency.

Step 3: Select a licensed health care professional (LHCP) who will conduct or supervise medical evaluations and make sure:

✎ Individuals who conduct pulmonary function tests have completed a training course in spirometry sponsored by an appropriate governmental, academic, or professional institution, if they are not licensed physicians;

AND

✎ Your LHCP uses an accredited laboratory, such as one accredited by a nationally or state-recognized organization, to conduct laboratory tests.

Step 4: Make sure the LHCP receives all of the following before the medical evaluation is performed:

✎ A copy of:

– This chapter.

– The following information found in the General occupational health standards, chapter 296-62 WAC:

✂ Appendix A, the substance safety data sheet--benzene, found in WAC 296-62-07525.

✂ Appendix B, the substance technical guidelines--benzene, found in WAC 296-62-07527.

✂ Appendix C, the medical surveillance guidelines for benzene, found in WAC 296-62-07529.

✎ A description of the duties of the employee being evaluated and how these duties relate to benzene exposure.

✎ The anticipated or representative exposure monitoring results for the employee being evaluated.

✎ A description of the personal protective equipment (PPE) each employee being evaluated uses or will use.

✎ Information from previous employment-related examinations when this information is not available to the examining LHCP.

✎ Instructions that the written opinions the LHCP provides, be **limited to** the following information:

– Specific records, findings, or diagnosis relevant to the

employee's ability to work around benzene.

– The occupationally relevant results from examinations and tests.

– A statement about whether or not medical conditions were found that would increase the employee's risk for impairment from exposure to benzene.

– Any recommended limitations for benzene exposure.

– Whether or not the employee can use respirators and any recommended limitations for respirator or other PPE use.

– A statement that the employee has been informed of medical results and medical conditions caused by benzene exposure requiring further explanation or treatment.

Step 5: Provide the medical evaluation to the employee. Make sure it includes the content listed in Table 4, Content of medical evaluations, and Table 5, Medical follow-up requirements.

Step 6: Obtain the LHCP's written opinion for each employee's medical evaluation and give a copy to the employee within fifteen days of the evaluation date.

✎ Make sure the written opinion is limited to the information specified for written opinions in Step 4.

Note: If the written opinion contains specific findings or diagnoses unrelated to occupational exposure, send it back and obtain a revised version without the additional information.

IMPORTANT:

These tables apply when conducting medical evaluations, including medical follow-up for employees exposed to benzene during emergencies.

Table 4
Content of Medical Evaluations

When conducting	Include
An initial evaluation	✎ A detailed history including: – Past work exposure to benzene or other hematological toxins; – Exposure to marrow toxins outside of current employment; – Exposure to ionizing radiation; – Family history of blood dyscrasias including hematological neoplasms; – History of blood dyscrasias including genetic hemoglobin abnormalities, bleeding abnormalities, and abnormal function of formed blood elements; – History of renal or liver dysfunction; – History of medications routinely taken.

	✎ A complete physical examination: – Include a pulmonary function test and specific evaluation of the cardiopulmonary system **if** the employee is required to use a respirator for at least thirty days a year. ✎ A complete blood count including a: – Leukocyte count with differential; – Quantitative thrombocyte count; – Hematocrit; – Hemoglobin; – Erythrocyte count and indices (MCV, MCH, MCHC). ✎ Additional tests the examining LHCP determines are necessary based on alterations in the components of the blood or other signs that may be related to benzene exposure. ✎ **Medical follow-up as required in Table 5.**
Annual evaluations	✎ An updated medical history covering: – Any new exposure to potential marrow toxins; – Changes in medication use; – Any physical signs associated with blood disorders. ✎ A complete blood count including a: – Leukocyte count with differential; – Quantitative thrombocyte count; – Hematocrit; – Hemoglobin; – Erythrocyte count and indices (MCV, MCH, MCHC).

	✎ Additional tests that the examining LHCP determines necessary, based on alterations in the components of the blood or other signs that may be related to benzene exposure. ✎ A pulmonary function test and specific evaluation of the cardiopulmonary system every three years if the employee is required to use a respirator for at least thirty days a year. ✎ **Medical follow-up as required in Table 5.**
Evaluations triggered by employee signs and symptoms commonly associated with the toxic effects of benzene exposure	✎ An additional medical examination that addresses elements the examining LHCP considers appropriate.
Evaluations triggered by employee exposure during an emergency	✎ A urinary phenol test performed on the exposed employee's urine sample within seventy-two hours of sample collection. – The urine sample must be collected at the end of the work shift associated with the emergency; – The urine specific gravity must be corrected to 1.024. ✎ **Medical follow-up as required in Table 5.** **Reference:** Employees who are not covered by medical evaluation requirements in this chapter may be covered by medical evaluation requirements in other chapters such as Emergency response, chapter 296-824 WAC.

Table 5
Medical Follow-up Requirements

If	Then
✎ The **complete blood count test** result is normal.	✎ No further evaluation is required.
✎ The **complete blood count test** shows any of the following abnormal conditions:	✎ Repeat the complete blood count within two weeks:

– A leukocyte count less than 4,000 per mm^3 or an abnormal differential count; **OR** – A thrombocyte (platelet) count that is either: ✂ More than 20% below the employee's most recent values; **OR** ✂ Outside the normal limit (95% C.I.) according to the laboratory; **OR** – The hematocrit or hemoglobin level is either of the following, and can not be explained by other medical reasons: ✂ Below the normal limit (outside the 95% C.I.), as determined by the laboratory for the particular geographical area; **OR** ✂ Persistently decreasing compared to the employee's preexposure levels.	– If the abnormal condition persists, refer the employee to a hematologist or an internist for follow-up medical examination and evaluation, unless the LHCP has good reason to believe it is unnecessary; – The hematologist or internist will determine what follow-up tests are necessary; **AND** ✎ Follow the requirements found in Medical removal, WAC 296-849-12050.
Results from the **urinary phenol test** conducted during an emergency evaluation show phenol levels less than 75 mg/L.	✎ No further evaluation is required.

Results from the **urinary phenol test** conducted during an emergency evaluation show phenol levels equal or more than 75 mg/L.	✎ Provide a complete blood count monthly for three months. Include a: – Leukocyte count with differential; – Thrombocyte count; – Erythrocyte count; **AND** ✎ If any of the abnormal conditions previously listed in this table for complete blood count results are found: – Provide the employee with periodic examinations, if directed by the LHCP; **AND** – **Refer the employee** to a hematologist or an internist for follow-up medical examination and evaluation unless the LHCP has good reason to believe a referral is unnecessary; **AND** – Follow the requirements found in Medical removal, WAC 296-849-12050; **AND** – The hematologist or internist will determine what follow-up tests are necessary.

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

WAC 296-849-13045 Respirators.

IMPORTANT:

These requirements are in addition to the requirements

found in other chapters:

✎ Respiratory hazards, chapter 296-841 WAC;

✎ Respiratory, chapter 296-842 WAC.

You must:

✎ Provide respirators and require that employees use them in circumstances where exposure is above either permissible exposure limit (PEL) for benzene, including any of the following circumstances:

– Employees are in an exposure control area;

– Feasible exposure controls are being put in place;

– Where you determine that exposure controls are not feasible;

– Feasible exposure controls do not reduce exposures to, or below, a PEL((.)); ;

((✎)) – Emergencies.

✎ Meet these requirements to protect employees from benzene exposure above a PEL:

– Limit selection of escape respirators to either:

✂ A full-facepiece organic vapor gas mask;

OR

✂ A full-facepiece self-contained breathing apparatus (SCBA);

OR

✂ A hood-style SCBA that operates in positive-pressure mode.

✎ Make sure respirator cartridges or canisters are replaced at the beginning of each work shift, or sooner if their service life has expired.

✎ Make sure canisters on gas masks and powered air-purifying respirators (PAPRs) have a minimum service life of four hours when tested under these conditions:

– A benzene concentration of 150 ppm;

– A temperature of 25☜C;

– A relative humidity of 85%;

– A flow rate of one of the following:

✂ 64 liters per minute (lpm) for nonpowered air-purifying respirators;

✂ 115 lpm for **tight-**fitting PAPRs;

✂ 170 lpm for **loose-**fitting PAPRs.

✎ Provide an employee a respirator with low breathing resistance, such as a PAPR or an air-line respirator when the:

– Employee cannot use a negative-pressure respirator;

AND

– A licensed health care professional's (LHCP's) written opinion allows this type of respirator.

REPEALER

The following section of the Washington Administrative Code is repealed:

WAC 296-62-07523 Benzene.