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undiluted sample, the following equation is used:

% Benzene by Volume=A × B

Where:

A=% by volume on report
B=Dilution Factor
(B=1 for undiluted sample)

8. Backup Data.

8.1. Detection limit—Bulk Samples.

The detection limit for the analytical procedure for bulk samples is 0.88 μg, with a coefficient of variation of 0.019 at this level. This amount provided a chromatographic peak that could be identifiable in the presence of possible interferences. The detection limit date were obtained by making 10 μL injections of a 0.10% by volume standard.

Injection	Area Count	
1	45386	
2	44214	
3	43822	$\bar{X}$=44040.1
4	44062	SD=852.5
6	42724	CV=0.019

8.2. Pooled coefficient of variation—Bulk Samples.

The pooled coefficient of variation for analytical procedure was determined by 50 μL replicate injections of analytical standards. The standards were 0.01, 0.02, 0.04, 0.10, 1.0, and 2.0% benzene by volume.

AREA COUNT (PERCENT)

Injection No.	0.01	0.02	0.04	0.10	1.0	2.0
1	45386	84737	166097	448497	4395380	9339150
2	44241	84300	170832	441299	4590800	9484900
3	43822	83835	164160	443719	4593200	9557580
4	44062	84381	164445	444842	4642350	9677060
5	44006	83012	168398	442564	4646430	9766240
6	42724	81957	173002	443975	4646260	
$\bar{X}$ =	44040.1	83703.6	167872	444149	4585767	9564986
SD =	852.5	1042.2	3589.8	2459.1	96839.3	166233
CV =	0.0194	0.0125	0.0213	0.0055	0.0211	0.0174
$\bar{CV}$ =	0.017					

[52 FR 34562, Sept. 11, 1987, as amended at 54 FR 24334, June 7, 1989; 61 FR 5508, Feb. 13, 1996; 63 FR 1289, Jan. 8, 1998; 63 FR 20099, Apr. 23, 1998; 70 FR 1142, Jan. 5, 2005; 71 FR 16673, Apr. 3, 2006; 71 FR 50189, Aug. 24, 2006; 73 FR 75585, Dec. 12, 2008; 76 FR 33608, June 8, 2011; 77 FR 17781, Mar. 26, 2012]

§ 1910.1029 Coke oven emissions.

(a) *Scope and application.* This section applies to the control of employee exposure to coke oven emissions, except that this section shall not apply to working conditions with regard to which other Federal agencies exercise statutory authority to prescribe or enforce standards affecting occupational safety and health.

(b) *Definitions.* For the purpose of this section:

Authorized person means any person specifically authorized by the employer whose duties require the person to enter a regulated area, or any person entering such an area as a designated representative of employees for the purpose of exercising the opportunity to observe monitoring and measuring procedures under paragraph (n) of this section.

Beehive oven means a coke oven in which the products of carbonization other than coke are not recovered, but are released into the ambient air.

Coke oven means a retort in which coke is produced by the destructive distillation or carbonization of coal.

Coke oven battery means a structure containing a number of slot-type coke ovens.

Coke oven emissions means the benzene-soluble fraction of total particulate matter present during the destructive distillation or carbonization of coal for the production of coke.

Director means the Director, National Institute for Occupational Safety and Health, U.S. Department of Health, Education, and Welfare, or his or her designee.

Emergency means any occurance such as, but not limited to, equipment failure which is likely to, or does, result in any massive release of coke oven emissions.

Existing coke oven battery means a battery in operation or under construction on January 20, 1977, and which is not a rehabilitated coke oven battery.

Rehabilitated coke oven battery means a battery which is rebuilt, overhauled, renovated, or restored such as from the pad up, after January 20, 1977.

Secretary means the Secretary of Labor, U.S. Department of Labor, or his or her designee.

Stage charging means a procedure by which a predetermined volume of coal in each larry car hopper is introduced into an oven such that no more than two hoppers are discharging simultaneously.

Sequential charging means a procedure, usually automatically timed, by which a predetermined volume of coal in each larry car hopper is introduced into an oven such that no more than two hoppers commence or finish discharging simultaneously although, at some point, all hoppers are discharging simultaneously.

Pipeline charging means any apparatus used to introduce coal into an oven which uses a pipe or duct permanently mounted onto an oven and through which coal is charged.

Green plush means coke which when removed from the oven results in emissions due to the presence of unvolatilized coal.

(c) *Permissible exposure limit.* The employer shall assure that no employee in the regulated area is exposed to coke oven emissions at concentrations greater than 150 micrograms per cubic meter of air (150 $\mu g/m^3$), averaged over any 8-hour period.

(d) *Regulated areas.* (1) The employer shall establish regulated areas and shall limit access to them to authorized persons.

(2) The employer shall establish the following as regulated areas:

(i) The coke oven battery including topside and its machinery, pushside and its machinery, coke side and its machinery, and the battery ends; the wharf; and the screening station;

(ii) The beehive oven and its machinery.

(e) *Exposure monitoring and measurement*—(1) *Monitoring program.* (i) Each employer who has a place of employment where coke oven emissions are present shall monitor employees employed in the regulated area to measure their exposure to coke oven emissions.

(ii) The employer shall obtain measurements which are representative of each employee's exposure to coke oven emissions over an eight-hour period. All measurements shall determine exposure without regard to the use of respiratory protection.

(iii) The employer shall collect fullshift (for at least seven continuous hours) personal samples, including at least one sample during each shift for each battery and each job classification within the regulated areas including at least the following job classifications:

(*a*) Lidman;
(*b*) Tar chaser;
(*c*) Larry car operator;
(*d*) Luterman;
(*e*) Machine operator, coke side;
(*f*) Benchman, coke side;
(*g*) Benchman, pusher side;
(*h*) Heater;
(*i*) Quenching car operator;
(*j*) Pusher machine operator;
(*k*) Screening station operator;
(*l*) Wharfman;
(*m*) Oven patcher;
(*n*) Oven repairman;
(*o*) Spellman; and
(*p*) Maintenance personnel.

(iv) The employer shall repeat the monitoring and measurements required by this paragraph (e)(1) at least every three months.

(2) *Redetermination.* Whenever there has been a production, process, or control change which may result in new or additional exposure to coke oven emissions, or whenever the employer has any other reason to suspect an increase in employee exposure, the employer shall repeat the monitoring and measurements required by paragraph (e)(1) of this section for those employees affected by such change or increase.

(3) *Employee notification.* (i) The employer must, within 15 working days after the receipt of the results of any monitoring performed under this section, notify each affected employee of these results either individually in writing or by posting the results in an appropriate location that is accessible to employees.

(ii) Whenever such results indicate that the representative employee exposure exceeds the permissible exposure

limit, the employer shall, in such notification, inform each employee of that fact and of the corrective action being taken to reduce exposure to or below the permissible exposure limit.

(4) *Accuracy of measurement.* The employer shall use a method of monitoring and measurement which has an accuracy (with a confidence level of 95%) of not less than plus or minus 35% for concentrations of coke oven emissions greater than or equal to 150 μg/m^3.

(f) *Methods of compliance.* The employer shall control employee exposure to coke oven emissions by the use of engineering controls, work practices and respiratory protection as follows:

(1) *Priority of compliance methods*—(i) *Existing coke oven batteries.* (*a*) The employer shall institute the engineering and work practice controls listed in paragraphs (f)(2), (f)(3) and (f)(4) of this section in existing coke oven batteries at the earliest possible time, but not later than January 20, 1980, except to the extent that the employer can establish that such controls are not feasible. In determining the earliest possible time for institution of engineering and work practice controls, the requirement, effective August 27, 1971, to implement feasible administrative or engineering controls to reduce exposures to coal tar pitch volatiles, shall be considered. Wherever the engineering and work practice controls which can be instituted are not sufficient to reduce employee exposures to or below the permissible exposure limit, the employer shall nonetheless use them to reduce exposures to the lowest level achievable by these controls and shall supplement them by the use of respiratory protection which complies with the requirements of paragraph (g) of this section.

(*b*) The engineering and work practice controls required under paragraphs (f)(2), (f)(3) and (f)(4) of this section are minimum requirements generally applicable to all existing coke oven batteries. If, after implementing all controls required by paragraphs (f)(2), (f)(3) and (f)(4) of this section, or after January 20, 1980, whichever is sooner, employee exposures still exceed the permissible exposure limit, employers shall implement any other engineering and work practice controls necessary to reduce exposure to or below the permissible exposure limit except to the extent that the employer can establish that such controls are not feasible. Whenever the engineering and work practice controls which can be instituted are not sufficient to reduce employee exposures to or below the permissible exposure limit, the employer shall nonetheless use them to reduce exposures to the lowest level achievable by these controls and shall supplement them by the use of respiratory protection which complies with the requirements of paragraph (g) of this section.

(ii) *New or rehabilitated coke oven batteries.* (*a*) The employer shall institute the best available engineering and work practice controls on all new or rehabilitated coke oven batteries to reduce and maintain employee exposures at or below the permissible exposure limit, except to the extent that the employer can establish that such controls are not feasible. Wherever the engineering and work practice controls which can be instituted are not sufficient to reduce employee exposures to or below the permissible exposure limit, the employer shall nonetheless use them to reduce exposures to the lowest level achievable by these controls and shall supplement them by the use of respiratory protection which complies with the requirements of paragraph (g) of this section.

(*b*) If, after implementing all the engineering and work practice controls required by paragraph (f)(1)(ii)(*a*) of this section, employee exposures still exceed the permissible exposure limit, the employer shall implement any other engineering and work practice controls necessary to reduce exposure to or below the permissible exposure limit except to the extent that the employer can establish that such controls are not feasible. Wherever the engineering and work practice controls which can be instituted are not sufficient to reduce employee exposures to or below the permissible exposure limit, the employer shall nonetheless use them to reduce exposures to the lowest level achievable by these controls and shall supplement them by the use of respiratory protection which

complies with the requirements of paragraph (g) of this section.

(iii) *Beehive ovens.* (*a*) The employer shall institute engineering and work practice controls on all beehive ovens at the earliest possible time to reduce and maintain employee exposures at or below the permissible exposure limit, except to the extent that the employer can establish that such controls are not feasible. In determining the earliest possible time for institution of engineering and work practice controls, the requirement, effective August 27, 1971, to implement feasible administrative or engineering controls to reduce exposures to coal tar pitch volatiles, shall be considered. Wherever the engineering and work practice controls which can be instituted are not sufficient to reduce employee exposures to or below the permissible exposure limit, the employer shall nonetheless use them to reduce exposures to the lowest level achievable by these controls and shall supplement them by the use of respiratory protection which complies with the requirements of paragraph (g) of this section.

(*b*) If, after implementing all engineering and work practice controls required by paragraph (f)(1)(iii)(*a*) of this section, employee exposures still exceed the permissible exposure limit, the employer shall implement any other engineering and work practice controls necessary to reduce exposures to or below the permissible exposure limit except to the extent that the employer can establish that such controls are not feasible. Whenever the engineering and work practice controls which can be instituted are not sufficient to reduce employee exposures to or below the permissible exposure limit, the employer shall nonetheless use them to reduce exposures to the lowest level achievable by these controls and shall supplement them by the use of respiratory protection which complies with the requirements of paragraph (g) of this section.

(2) *Engineering controls*—(i) *Charging.* The employer shall equip and operate existing coke oven batteries with all of the following engineering controls to control coke oven emissions during charging operations:

(*a*) One of the following methods of charging:

(*1*) Stage charging as described in paragraph (f)(3)(i)(*b*) of this section; or

(*2*) Sequential charging as described in paragraph (f)(3)(i)(*b*) of this section except that paragraph (f)(3)(i)(*b*)(*3*)(*iv*) of this section does not apply to sequential charging; or

(*3*) Pipeline charging or other forms of enclosed charging in accordance with paragraph (f)(2)(i) of this section, except that paragraphs (f)(2)(i)(*b*), (*d*), (*e*), (*f*) and (*h*) of this section do not apply;

(*b*) Drafting from two or more points in the oven being charged, through the use of double collector mains, or a fixed or moveable jumper pipe system to another oven, to effectively remove the gases from the oven to the collector mains;

(*c*) Aspiration systems designed and operated to provide sufficient negative pressure and flow volume to effectively move the gases evolved during charging into the collector mains, including sufficient steam pressure, and steam jets of sufficient diameter;

(*d*) Mechanical volumetric controls on each larry car hopper to provide the proper amount of coal to be charged through each charging hole so that the tunnel head will be sufficient to permit the gases to move from the oven into the collector mains;

(*e*) Devices to facilitate the rapid and continuous flow of coal into the oven being charged, such as stainless steel liners, coal vibrators or pneumatic shells;

(*f*) Individually operated larry car drop sleeves and slide gates designed and maintained so that the gases are effectively removed from the oven into the collector mains;

(*g*) Mechanized gooseneck and standpipe cleaners;

(*h*) Air seals on the pusher machine leveler bars to control air infiltration during charging; and

(*i*) Roof carbon cutters or a compressed air system or both on the pusher machine rams to remove roof carbon.

(ii) *Coking.* The employer shall equip and operate existing coke oven batteries with all of the following engineering controls to control coke oven emissions during coking operations;

(*a*) A pressure control system on each battery to obtain uniform collector main pressure;

(*b*) Ready access to door repair facilities capable of prompt and efficient repair of doors, door sealing edges and all door parts;

(*c*) An adequate number of spare doors available for replacement purposes;

(*d*) Chuck door gaskets to control chuck door emissions until such door is repaired, or replaced; and

(*e*) Heat shields on door machines.

(3) *Work practice controls*—(i) *Charging.* The employer shall operate existing coke oven batteries with all of the following work practices to control coke oven emissions during the charging operation:

(*a*) Establishment and implementation of a detailed, written inspection and cleaning procedure for each battery consisting of at least the following elements:

(*1*) Prompt and effective repair or replacement of all engineering controls;

(*2*) Inspection and cleaning of goosenecks and standpipes prior to each charge to a specified minimum diameter sufficient to effectively move the evolved gases from the oven to the collector mains;

(*3*) Inspection for roof carbon buildup prior to each charge and removal of roof carbon as necessary to provide an adequate gas channel so that the gases are effectively moved from the oven into the collector mains;

(*4*) Inspection of the steam aspiration system prior to each charge so that sufficient pressure and volume is maintained to effectively move the gases from the oven to the collector mains;

(*5*) Inspection of steam nozzles and liquor sprays prior to each charge and cleaning as necessary so that the steam nozzles and liquor sprays are clean;

(*6*) Inspection of standpipe caps prior to each charge and cleaning and luting or both as necessary so that the gases are effectively moved from the oven to the collector mains; and

(*7*) Inspection of charging holes and lids for cracks, warpage and other defects prior to each charge and removal of carbon to prevent emissions, and application of luting material to standpipe and charging hole lids where necessary to obtain a proper seal.

(*b*) Establishment and implementation of a detailed written charging procedure, designed and operated to eliminate emissions during charging for each battery, consisting of at least the following elements:

(*1*) Larry car hoppers filled with coal to a predetermined level in accordance with the mechanical volumetric controls required under paragraph (f)(2)(i)(*d*) of this section so as to maintain a sufficient gas passage in the oven to be charged;

(*2*) The larry car aligned over the oven to be charged, so that the drop sleeves fit tightly over the charging holes; and

(*3*) The oven charged in accordance with the following sequence of requirements:

(*i*) The aspiration system turned on;

(*ii*) Coal charged through the outermost hoppers, either individually or together depending on the capacity of the aspiration system to collect the gases involved;

(*iii*) The charging holes used under paragraph (f)(3)(i)(*b*)(*3*)(*ii*) of this section relidded or otherwise sealed off to prevent leakage of coke oven emissions;

(*iv*) If four hoppers are used, the third hopper discharged and relidded or otherwise sealed off to prevent leakage of coke oven emissions;

(*v*) The final hopper discharged until the gas channel at the top of the oven is blocked and then the chuck door opened and the coal leveled;

(*vi*) When the coal from the final hopper is discharged and the leveling operation complete, the charging hole relidded or otherwise sealed off to prevent leakage of coke oven emissions; and

(*vii*) The aspiration system turned off only after the charging holes have been closed.

(*c*) Establishment and implementation of a detailed written charging procedure, designed and operated to eliminate emissions during charging of each pipeline or enclosed charged battery.

(ii) *Coking.* The employer shall operate existing coke oven batteries pursuant to a detailed written procedure established and implemented for the control of coke oven emissions during coking, consisting of at least the following elements:

(*a*) Checking oven back pressure controls to maintain uniform pressure conditions in the collecting main;

(*b*) Repair, replacement and adjustment of oven doors and chuck doors and replacement of door jambs so as to provide a continuous metal-to-metal fit;

(*c*) Cleaning of oven doors, chuck doors and door jambs each coking cycle so as to provide an effective seal;

(*d*) An inspection system and corrective action program to control door emissions to the maximum extent possible; and

(*e*) Luting of doors that are sealed by luting each coking cycle and reluting, replacing or adjusting as necessary to control leakage.

(iii) *Pushing.* The employer shall operate existing coke oven batteries with the following work practices to control coke oven emissions during pushing operations:

(*a*) Coke and coal spillage quenched as soon as practicable and not shoveled into a heated oven; and

(*b*) A detailed written procedure for each battery established and implemented for the control of emissions during pushing consisting of the following elements:

(*1*) Dampering off the ovens and removal of charging hole lids to effectively control coke oven emissions during the push;

(*2*) Heating of the coal charge uniformly for a sufficient period so as to obtain proper coking including preventing green pushes;

(*3*) Prevention of green pushes to the maximum extent possible;

(*4*) Inspection, adjustment and correction of heating flue temperatures and defective flues at least weekly and after any green push, so as to prevent green pushes;

(*5*) Cleaning of heating flues and related equipment to prevent green pushes, at least weekly and after any green push.

(iv) *Maintenance and repair.* The employer shall operate existing coke oven batteries pursuant to a detailed written procedure of maintenance and repair established and implemented for the effective control of coke oven emissions consisting of the following elements:

(*a*) Regular inspection of all controls, including goosenecks, standpipes, standpipe caps, charging hold lids and castings, jumper pipes and air seals for cracks, misalignment or other defects and prompt implementation of the necessary repairs as soon as possible;

(*b*) Maintaining the regulated area in a neat, orderly condition free of coal and coke spillage and debris;

(*c*) Regular inspection of the damper system, aspiration system and collector main for cracks or leakage, and prompt implementation of the necessary repairs;

(*d*) Regular inspection of the heating system and prompt implementation of the necessary repairs;

(*e*) Prevention of miscellaneous fugitive topside emissions;

(*f*) Regular inspection and patching of oven brickwork;

(*g*) Maintenance of battery equipment and controls in good working order;

(*h*) Maintenance and repair of coke oven doors, chuck doors, door jambs and seals; and

(*i*) Repairs instituted and completed as soon as possible, including temporary repair measures instituted and completed where necessary, including but not limited to:

(*1*) Prevention of miscellaneous fugitive topside emissions; and

(*2*) Chuck door gaskets, which shall be installed prior to the start of the next coking cycle.

(4) *Filtered air.* (i) The employer shall provided positive-pressure, temperature controlled filtered air for larry car, pusher machine, door machine, and quench car cabs.

(ii) The employer shall provide standby pulpits on the battery topside, at

the wharf, and at ther screening station, equipped with positive-pressure, temperature controlled filtered air.

(5) *Emergencies.* Whenever an emergency occurs, the next coking cycle may not begin until the cause of the emergency is determined and corrected, unless the employer can establish that it is necessary to initiate the next coking cycle in order to determine the cause of the emergency.

(6) *Compliance program.* (i) Each employer shall establish and implement a written program to reduce exposures solely by means of the engineering and work practice controls required in paragraph (f) of this section.

(ii) The written program shall include at least the following:

(*a*) A description of each coke oven operation by battery, including work force and operating crew, coking time, operating procedures and maintenance practices;

(*b*) Engineering plans and other studies used to determine the controls for the coke battery;

(*c*) A report of the technology considered in meeting the permissible exposure limit;

(*d*) Monitoring data obtained in accordance with paragraph (e) of this section;

(*e*) A detailed schedule for the implementation of the engineering and work practice controls required in paragraph (f) of this section; and

(*f*) Other relevant information.

(iii) If, after implementing all controls required by paragraph (f)(2)–(f)(4) of this section, or after January 20, 1980, whichever is sooner, or after completion of a new or rehabilitated battery the permissible exposure limit is still exceeded, the employer shall develop a detailed written program and schedule for the implementation of any additional engineering controls and work practices necessary to reduce exposure to or below the permissible exposure limit.

(iv) Written plans for such programs shall be submitted, upon request, to the Secretary and the Director, and shall be available at the worksite for examination and copying by the Secretary, the Director, and the authorized employee representative. The plans required under paragraph (f)(6) of this section shall be revised and updated at least annually to reflect the current status of the program.

(7) *Training in compliance procedures.* The employer shall incorporate all written procedures and schedules required under this paragraph (f) in the information and training program required under paragraph (k) of this section and, where appropriate, post in the regulated area.

(g) *Respiratory protection*—(1) *General.* For employees who use respirators required by this section, the employer must provide each employee an appropriate respirator that complies with the requirements of this paragraph. Respirators must be used during:

(i) Periods necessary to install or implement feasible engineering and work-practice controls.

(ii) Work operations, such as maintenance and repair activity, for which engineering and work-practice controls are technologically not feasible.

(iii) Work operations for which feasible engineering and work-practice controls are not yet sufficient to reduce employee exposure to or below the permissible exposure limit.

(iv) Emergencies.

(2) *Respirator program.* The employer must implement a respiratory protection program in accordance with §1910.134(b) through (d) (except (d)(1)(iii)), and (f) through (m), which covers each employee required by this section to use a respirator.

(3) *Respirator selection.* Employers must select, and provide to employees, the appropriate respirators specified in paragraph (d)(3)(i)(A) of 29 CFR 1910.134; however, employers may use a filtering facepiece respirator only when it functions as a filter respirator for coke oven emissions particulates.

(h) *Protective clothing and equipment*—(1) *Provision and use.* The employer shall provide and assure the use of appropriate protective clothing and equipment, such as but not limited to:

(i) Flame resistant jacket and pants;

(ii) Flame resistant gloves;

(iii) Face shields or vented goggles which comply with §1910.133(a)(2) of this part;

(iv) Footwear providing insulation from hot surfaces for footwear;

(v) Safety shoes which comply with §1910.136 of this part; and

(vi) Protective helmets which comply with §1910.135 of this part.

(2) *Cleaning and replacement.* (i) The employer shall provide the protective clothing required by paragraphs (h)(1)(i) and (ii) of this section in a clean and dry condition at least weekly.

(ii) The employer shall clean, launder, or dispose of protective clothing required by paragraphs (h)(1)(i) and (ii) of this section.

(iii) The employer shall repair or replace the protective clothing and equipment as needed to maintain their effectiveness.

(iv) The employer shall assure that all protective clothing is removed at the completion of a work shift only in change rooms prescribed in paragraph (i)(1) of this section.

(v) The employer shall assure that contaminated protective clothing which is to be cleaned, laundered, or disposed of, is placed in a closable container in the change room.

(vi) The employer shall inform any person who cleans or launders protective clothing required by this section, of the potentially harmful effects of exposure to coke oven emissions.

(i) *Hygiene facilities and practices*—(1) *Change rooms.* The employer shall provide clean change rooms equipped with storage facilities for street clothes and separate storage facilities for protective clothing and equipment whenever employees are required to wear protective clothing and equipment in accordance with paragraph (h)(1) of this section.

(2) *Showers.* (i) The employer shall assure that employees working in the regulated area shower at the end of the work shift.

(ii) The employer shall provide shower facilities in accordance with §1910.141(d)(3) of this part.

(3) *Lunchrooms.* The employer shall provide lunchroom facilities which have a temperature controlled, positive pressure, filtered air supply, and which are readily accessible to employees working in the regulated area.

(4) *Lavatories.* (i) The employer shall assure that employees working in the regulated area wash their hands and face prior to eating.

(ii) The employer shall provide lavatory facilities in accordance with §1910.141(d)(1) and (2) of this part.

(5) *Prohibition of activities in the regulated area.* (i) The employer shall assure that in the regulated area, food or beverages are not present or consumed, smoking products are not present or used, and cosmetics are not applied, except that these activities may be conducted in the lunchrooms, change rooms and showers required under paragraphs (i)(1)–(i)(3) of this section.

(ii) Drinking water may be consumed in the regulated area.

(j) *Medical surveillance*—(1) *General requirements.* (i) Each employer shall institute a medical surveillance program for all employees who are employed in a regulated area at least 30 days per year.

(ii) This program shall provide each employee covered under paragraph (j)(1)(i) of this section with an opportunity for medical examinations in accordance with this paragraph (j).

(iii) The employer shall inform any employee who refuses any required medical examination of the possible health consequences of such refusal and shall obtain a signed statement from the employee indicating that the employee understands the risk involved in the refusal to be examined.

(iv) The employer shall assure that all medical examinations and procedures are performed by or under the supervision of a licensed physician, and are provided without cost to the employee.

(2) *Initial examinations.* At the time of initial assignment to a regulated area or upon the institution of the medical surveillance program, the employer shall provide a medical examination for employees covered under paragraph (j)(1)(i) of this section including at least the following elements:

(i) A work history and medical history which shall include smoking history and the presence and degree of respiratory symptoms, such as breathlessness, cough, sputum production, and wheezing;

(ii) A standard posterior-anterior chest x-ray;

(iii) Pulmonary function tests including forced vital capacity (FVC) and forced expiratory volume at one second

(FEV 1.0) with recording of type of equipment used;

(iv) Weight;

(v) A skin examination;

(vi) Urinalysis for sugar, albumin, and hematuria; and

(vii) A urinary cytology examination.

(3) *Periodic examinations.* (i) The employer shall provide the examinations specified in paragraphs (j)(2) (i)–(vi) of this section at least annually for employees covered under paragraph (j)(1)(i) of this section.

(ii) The employer must provide the examinations specified in paragraphs (j)(2)(i) through (j)(2)(vii) of this section at least annually for employees 45 years of age or older or with five (5) or more years employment in the regulated area.

(iii) Whenever an employee who is 45 years of age or older or with five (5) or more years employment in a regulated area transfers or is transferred from employment in a regulated area, the employer must continue to provide the examinations specified in paragraphs (j)(2)(i) through (j)(2)(vii) of this section at least annually as long as that employee is employed by the same employer or a successor employer.

(iv) Whenever an employee has not taken the examinations specified in paragraphs (j)(3) (i)–(iii) of this section with the six (6) months preceding the termination of employment the employer shall provide such examinations to the employee upon termination of employment.

(4) *Information provided to the physician.* The employer shall provide the following information to the examining physician:

(i) A copy of this regulation and its Appendixes;

(ii) A description of the affected employee's duties as they relate to the employee's exposure;

(iii) The employee's exposure level or estimated exposure level;

(iv) A description of any personal protective equipment used or to be used; and

(v) Information from previous medical examinations of the affected employee which is not readily available to the examining physician.

(5) *Physician's written opinion.* (i) The employer shall obtain a written opinion from the examining physician which shall include:

(*a*) The results of the medical examinations;

(*b*) The physician's opinion as to whether the employee has any detected medical conditions which would place the employee at increased risk of material impairment of the employee's health from exposure to coke oven emissions;

(*c*) Any recommended limitations upon the employee's exposure to coke oven emissions or upon the use of protective clothing or equipment such as respirators; and

(*d*) A statement that the employee has been informed by the physician of the results of the medical examination and any medical conditions which require further explanation or treatment.

(ii) The employer shall instruct the physician not to reveal in the written opinion specific findings or diagnoses unrelated to occupational exposure.

(iii) The employer shall provide a copy of the written opinion to the affected employee.

(k) *Employee information and training*—(1) *Training program.* (i) The employer shall train each employee who is employed in a regulated area in accordance with the requirements of this section. The employer shall institute a training program and ensure employee participation in the program.

(ii) The training program shall be provided as of January 27, 1977 for employees who are employed in the regulated area at that time or at the time of initial assignment to a regulated area.

(iii) The training program shall be provided at least annually for all employees who are employed in the regulated area, except that training regarding the occupational safety and health hazards associated with exposure to coke oven emissions and the purpose, proper use, and limitations of respiratory protective devices shall be provided at least quarterly until January 20, 1978.

(iv) The training program shall include informing each employee of:

(*a*) The information contained in the substance information sheet for coke oven emissions (Appendix A);

(*b*) The purpose, proper use, and limitations of respiratory protective devices required in accordance with paragraph (g) of this section;

(*c*) The purpose for and a description of the medical surveillance program required by paragraph (j) of this section including information on the occupational safety and health hazards associated with exposure to coke oven emissions;

(*d*) A review of all written procedures and schedules required under paragraph (f) of this section; and

(*e*) A review of this standard.

(2) *Access to training materials.* (i) The employer shall make a copy of this standard and its appendixes readily available to all employees who are employed in the regulated area.

(ii) The employer shall provide upon request all materials relating to the employee information and training program to the Secretary and the Director.

(l) *Communication of hazards*—(1) *Hazard communication—general.* The employer shall include coke oven emissions in the program established to comply with the Hazard Communication Standard (HCS) (§1910.1200). The employer shall ensure that each employee has access to labels on containers of chemicals and substances associated with coke oven processes and to safety data sheets, and is trained in accordance with the provisions of HCS and paragraph (k) of this section. The employer shall ensure that at least the following hazard is addressed: Cancer.

(2) *Signs.* (i) The employer shall post signs in the regulated area bearing the legend:

DANGER
COKE OVEN EMISSIONS
MAY CAUSE CANCER
DO NOT EAT, DRINK OR SMOKE
WEAR RESPIRATORY PROTECTION IN THIS AREA
AUTHORIZED PERSONNEL ONLY

(ii) In addition, the employer shall post signs in the areas where the permissible exposure limit is exceeded bearing the legend:

WEAR RESPIRATORY PROTECTION IN THIS AREA

(iii) The employer shall ensure that no statement appears on or near any sign required by this paragraph (l) which contradicts or detracts from the effects of the required sign.

(iv) The employer shall ensure that signs required by this paragraph (l)(2) are illuminated and cleaned as necessary so that the legend is readily visible.

(v) Prior to June 1, 2016, employers may use the following legend in lieu of that specified in paragraph (l)(2)(i) of this section:

DANGER
CANCER HAZARD
AUTHORIZED PERSONNEL ONLY
NO SMOKING OR EATING

(vi) Prior to June 1, 2016, employers may use the following legend in lieu of that specified in paragraph (l)(2)(ii) of this section:

DANGER
RESPIRATOR REQUIRED

(3) *Labels.* (i) The employer shall ensure that labels of containers of contaminated protective clothing and equipment include the following information:

CONTAMINATED WITH COKE EMISSIONS
MAY CAUSE CANCER
DO NOT REMOVE DUST BY BLOWING OR SHAKING

(ii) Prior to June 1, 2015, employers may include the following information on contaminated protective clothing and equipment in lieu of the labeling requirements in paragraph (l)(3)(i) of this section:

CAUTION
CLOTHING CONTAMINATED WITH COKE EMISSIONS
DO NOT REMOVE DUST BY BLOWING OR SHAKING

(m) *Recordkeeping*—(1) *Exposure measurements.* The employer shall establish and maintain an accurate record of all measurements taken to monitor employee exposure to coke oven emissions required in paragraph (e) of this section.

(i) This record shall include:

(*a*) Name, social security number, and job classification of the employees monitored;

(*b*) The date(s), number, duration and results of each of the samples taken, including a description of the sampling

procedure used to determine representative employee exposure where applicable;

(*c*) The type of respiratory protective devices worn, if any;

(*d*) A description of the sampling and analytical methods used and evidence of their accuracy; and

(*e*) The environmental variables that could affect the measurement of employee exposure.

(ii) The employer shall maintain this record for at lest 40 years or for the duration of employment plus 20 years, whichever is longer.

(2) *Medical surveillance.* The employer shall establish and maintain an accurate record for each employee subject to medical surveillance as required by paragraph (j) of this section.

(i) The record shall include:

(*a*) The name, social security number, and description of duties of the employee;

(*b*) A copy of the physician's written opinion;

(*c*) The signed statement of any refusal to take a medical examination under paragraph (j)(1)(ii) of this section; and

(*d*) Any employee medical complaints related to exposure to coke oven emissions.

(ii) The employer shall keep, or assure that the examining physician keeps, the following medical records:

(*a*) A copy of the medical examination results including medical and work history required under paragraph (j)(2) of this section;

(*b*) A description of the laboratory procedures used and a copy of any standards or guidelines used to interpret the test results;

(*c*) The initial x-ray;

(*d*) The x-rays for the most recent five (5) years;

(*e*) Any x-ray with a demonstrated abnormality and all subsequent x-rays;

(*f*) The initial cytologic examination slide and written description;

(*g*) The cytologic examination slide and written description for the most recent 10 years; and

(*h*) Any cytologic examination slides with demonstrated atypia, if such atypia persists for 3 years, and all subsequent slides and written descriptions.

(iii) The employer shall maintain medical records required under paragraph (m)(2) of this section for at least 40 years, or for the duration of employment plus 20 years, whichever is longer.

(3) *Availability.* (i) The employer shall make available upon request all records required to be maintained by paragraph (m) of this section to the Secretary and the Director for examination and copying.

(ii) Employee exposure measurement records and employee medical records required by this paragraph shall be provided upon request to employees, designated representatives, and the Assistant Secretary in accordance with 29 CFR 1910.1020(a)–(e) and (g)–(i).

(4) *Transfer of records.* (i) Whenever the employer ceases to do business, the successor employer shall receive and retain all records required to be maintained by paragraph (m) of this section.

(ii) The employer shall also comply with any additional requirements involving transfer of records set forth in 29 CFR 1910.1020(h).

(n) *Observation of monitoring*—(1) *Employee observation.* The employer shall provide affected employees or their representatives an opportunity to observe any measuring or monitoring of employee exposure to coke oven emissions conducted pursuant to paragraph (e) of this section.

(2) *Observation procedures.* (i) Whenever observation of the measuring or monitoring of employee exposure to coke oven emissions requires entry into an area where the ues of protective clothing or equipment is required, the employer shall provide the observer with and assure the use of such equipment and shall require the observer to comply with all other applicable safety and health procedures.

(ii) Without interfering with the measurement, observers shall be entitled to:

(*a*) An Explanation of the measurement procedures;

(*b*) Observe all steps related to the measurement of coke oven emissions performed at the place of exposure; and

(*c*) Record the results obtained.

(o) [Reserved]

(p) *Appendices.* The information contained in the appendixes to this section

is not intended, by itself, to create any additional obligations not otherwise imposed or to detract from any existing obligation.

APPENDIX A TO §1910.1029—COKE OVEN EMISSIONS SUBSTANCE INFORMATION SHEET

I. SUBSTANCE IDENTIFICATION

A. *Substance:* Coke Oven Emissions

B. *Definition:* The benzene-soluble fraction of total particulate matter present during the destructive distillation or carbonization of coal for the production of coke.

C. *Permissible Exposure Limit:* 150 micrograms per cubic meter of air determined as an average over an 8-hour period.

D. *Regulated areas:* Only employees authorized by your employer should enter a regulated area. The employer is required to designate the following areas as regulated areas: the coke oven battery, including topside and its machinery, pushside and its machinery, cokeside and its machinery, and the battery ends; the screening station; and the wharf; and the beehive ovens and their machinery.

II. HEALTH HAZARD DATA

Exposure to coke oven emissions is a cause of lung cancer, and kidney cancer, in humans. Although there have not been an excess number of skin cancer cases in humans, repeated skin contact with coke oven emissions should be avoided.

III. PROTECTIVE CLOTHING AND EQUIPMENT

A. *Respirators:* Respirators will be provided by your employer for routine use if your employer is in the process of implementing engineering and work practice controls or where engineering and work practice controls are not feasible or insufficient to reduce exposure to or below the PEL. You must wear respirators for non-routine activities or in emergency situations where you are likely to be exposed to levels of coke oven emissions in excess of the permissible exposure limit. Until January 20, 1978, the routine wearing of respirators is voluntary. Until that date, if you choose not to wear a respirator you do not have to do so. You must still have your respirator with you and you must still wear it if you are near visible emissions. Since how well your respirator fits your face is very important, your employer is required to conduct fit tests to make sure the respirator seals properly when you wear it. These tests are simple and rapid and will be explained to you during your training sessions.

B. *Protective clothing:* Your employer is required to provide, and you must wear, appropriate, clean, protective clothing and equipment to protect your body from repeated skin contact with coke oven emissions and from the heat generated during the coking process. This clothing should include such items as jacket and pants and flame resistant gloves. Protective equipment should include face shield or vented goggles, protective helmets and safety shoes, insulated from hot surfaces where appropriate.

IV. HYGIENE FACILITIES AND PRACTICES

You must not eat, drink, smoke, chew gum or tobacco, or apply cosmetics in the regulated area, except that drinking water is permitted. Your employer is required to provide lunchrooms and other areas for these purposes.

Your employer is required to provide showers, washing facilities, and change rooms. If you work in a regulated area, you must wash your face, and hands before eating. You must shower at the end of the work shift. Do not take used protective clothing out of the change rooms without your employer's permission. Your employer is required to provide for laundering or cleaning of your protective clothing.

V. SIGNS AND LABELS

Your employer is required to post warning signs and labels for your protection. Signs must be posted in regulated areas. The signs must warn that a cancer hazard is present, that only authorized employees may enter the area, and that no smoking or eating is allowed. In regulated areas where coke oven emissions are above the permissible exposure limit, the signs should also warn that respirators must be worn.

VI. MEDICAL EXAMINATIONS

If you work in a regulated area at least 30 days per year, your employer is required to provide you with a medical examination every year. The medical examination must include a medical history, a chest x-ray, pulmonary function test, weight comparison, skin examination, a urinalysis, and a urine cytology exam for early detection of urinary cancer. The urine cytology exam is only included in the initial exam until you are either 45 years or older, or have 5 or more years employment in the regulated areas when the medical exams including this test, but excepting the x-ray exam, are to be given every six months; under these conditions, you are to be given an x-ray exam at least once a year. The examining physician will provide a written opinion to your employer containing the results of the medical exams. You should also receive a copy of this opinion.

VII. OBSERVATION OF MONITORING

Your employer is required to monitor your exposure to coke oven emissions and you are

entitled to observe the monitoring procedure. You are entitled to receive an explanation of the measurement procedure, observe the steps taken in the measurement procedure, and to record the results obtained. When the monitoring procedure is taking place in an area where respirators or personal protective clothing and equipment are required to be worn, you must also be provided with and must wear the protective clothing and equipment.

VIII. ACCESS TO RECORDS

You or your representative are entitled to records of your exposure to coke oven emissions upon request to your employer. Your medical examination records can be furnished to your physician upon request to your employer.

IX. TRAINING AND EDUCATION

Additional information on all of these items plus training as to hazards of coke oven emissions and the engineering and work practice controls associated with your job will also be provided by your employer.

APPENDIX B TO §1910.1029—INDUSTRIAL HYGIENE AND MEDICAL SURVEILLANCE GUIDELINES

I. INDUSTRIAL HYGIENE GUIDELINES

A. *Sampling* (Benzene-Soluble Fraction Total Particulate Matter).

Samples collected should be full shift (at least 7-hour) samples. Sampling should be done using a personal sampling pump with pulsation damper at a flow rate of 2 liters per minute. Samples should be collected on 0.8 micrometer pore size silver membrane filters (37 mm diameter) preceded by Gelman glass fiber type A-E filters encased in three-piece plastic (polystyrene) field monitor cassettes. The cassette face cap should be on and the plug removed. The rotameter should be checked every hour to ensure that proper flow rates are maintained.

A minimum of three full-shift samples should be collected for each job classification on each battery, at least one from each shift. If disparate results are obtained for particular job classification, sampling should be repeated. It is advisable to sample each shift on more than one day to account for environmental variables (wind, precipitation, etc.) which may affect sampling. Differences in exposures among different work shifts may indicate a need to improve work practices on a particular shift. Sampling results from different shifts for each job classification should not be averaged. Multiple samples from same shift on each battery may be used to calculate an average exposure for a particular job classification.

B. *Analysis.*

1. All extraction glassware is cleaned with dichromic acid cleaning solution, rinsed with tap water, then dionized water, acetone, and allowed to dry completely. The glassware is rinsed with nanograde benzene before use. The Teflon cups are cleaned with benzene then with acetone.

2. Pre-weigh the 2 ml Teflon cups to one hundredth of a milligram (0.01 mg) on an autobalance AD 2 Tare weight of the cups is about 50 mg.

3. Place the silver membrane filter and glass fiber filter into a 15 ml test tube.

4. Extract with 5 ml of benzene for five minutes in an ultrasonic cleaner.

5. Filter the extract in 15 ml medium glass fritted funnels.

6. Rinse test tube and filters with two 1.5 ml aliquots of benzene and filter through the fritted glass funnel.

7. Collect the extract and two rinses in a 10 ml Kontes graduated evaporative concentrator.

8. Evaporate down to 1 ml while rinsing the sides with benzene.

9. Pipet 0.5 ml into the Teflon cup and evaporate to dryness in a vacuum oven at 40 °C for 3 hours.

10. Weigh the Teflon cup and the weight gain is due to the benzene soluble residue in half the Sample.

II. MEDICAL SURVEILLANCE GUIDELINES

A. *General.* The minimum requirements for the medical examination for coke oven workers are given in paragraph (j) of the standard. The initial examination is to be provided to all coke oven workers who work at least 30 days in the regulated area. The examination includes a 14″ × 17″ posterior-anterior chest x-ray reading, pulmonary function tests (FVC and FEV 1.0), weight, urinalysis, skin examination, and a urinary cytologic examination. These tests are needed to serve as the baseline for comparing the employee's future test results. Periodic exams include all the elements of the initial exam, except that the urine cytologic test is to be performed only on those employees who are 45 years or older or who have worked for 5 or more years in the regulated area; periodic exams, with the exception of x-rays, are to be performed semiannually for this group instead of annually; for this group, x-rays will continue to be given at least annually. The examination contents are minimum requirements; additional tests such as lateral and oblique x-rays or additional pulmonary function tests may be performed if deemed necessary.

B. *Pulmonary function tests.*

Pulmonary function tests should be performed in a manner which minimizes subject and operator bias. There has been shown to be learning effects with regard to the results obtained from certain tests, such as FEV 1.0. Best results can be obtained by multiple

trials for each subject. The best of three trials or the average of the last three of five trials may be used in obtaining reliable results. The type of equipment used (manufacturer, model, etc.) should be recorded with the results as reliability and accuracy varies and such information may be important in the evaluation of test results. Care should be exercised to obtain the best possible testing equipment.

[39 FR 23502, June 27, 1974, 41 FR 46784, Oct. 22, 1976, as amended at 42 FR 3304, Jan. 18, 1977; 45 FR 35283, May 23, 1980; 50 FR 37353, 37354, Sept. 13, 1985; 54 FR 24334, June 7, 1989; 61 FR 5508, Feb. 13, 1996; 63 FR 1290, Jan. 8, 1998; 63 FR 33468, June 18, 1998; 70 FR 1142, Jan. 5, 2005; 71 FR 16672, 16673, Apr. 3, 2006; 71 FR 50189, Aug. 24, 2006; 73 FR 75585, Dec. 12, 2008; 76 FR 33608, June 8, 2011; 77 FR 17782, Mar. 26, 2012]

§ 1910.1030 Bloodborne pathogens.

(a) *Scope and Application.* This section applies to all occupational exposure to blood or other potentially infectious materials as defined by paragraph (b) of this section.

(b) *Definitions.* For purposes of this section, the following shall apply:

Assistant Secretary means the Assistant Secretary of Labor for Occupational Safety and Health, or designated representative.

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

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

Clinical Laboratory means a workplace where diagnostic or other screening procedures are performed on blood or other potentially infectious materials.

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

Contaminated Laundry means laundry which has been soiled with blood or other potentially infectious materials or may contain sharps.

Contaminated Sharps means any contaminated object that can penetrate the skin including, but not limited to, needles, scalpels, broken glass, broken capillary tubes, and exposed ends of dental wires.

Decontamination means the use of physical or chemical means to remove, inactivate, or destroy bloodborne pathogens on a surface or item to the point where they are no longer capable of transmitting infectious particles and the surface or item is rendered safe for handling, use, or disposal.

Director means the Director of the National Institute for Occupational Safety and Health, U.S. Department of Health and Human Services, or designated representative.

Engineering controls means controls (e.g., sharps disposal containers, self-sheathing needles, safer medical devices, such as sharps with engineered sharps injury protections and needleless systems) that isolate or remove the bloodborne pathogens hazard from the workplace.

Exposure Incident means a specific eye, mouth, other mucous membrane, non-intact skin, or parenteral contact with blood or other potentially infectious materials that results from the performance of an employee's duties.

Handwashing facilities means a facility providing an adequate supply of running potable water, soap, and single-use towels or air-drying machines.

Licensed Healthcare Professional is a person whose legally permitted scope of practice allows him or her to independently perform the activities required by paragraph (f) Hepatitis B Vaccination and Post-exposure Evaluation and Follow-up.

HBV means hepatitis B virus.

HIV means human immunodeficiency virus.

Needleless systems means a device that does not use needles for:

(1) The collection of bodily fluids or withdrawal of body fluids after initial venous or arterial access is established;

(2) The administration of medication or fluids; or

(3) Any other procedure involving the potential for occupational exposure to bloodborne pathogens due to percutaneous injuries from contaminated sharps.

Occupational Exposure means reasonably anticipated skin, eye, mucous membrane, or parenteral contact with blood or other potentially infectious