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CHAPTER 340
DEPARTMENT OF ENVIRONMENTAL QUALITY

FILING CAPTION: Air Quality Addresses Federal Actions 2025

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RULES:
340-200-0020, 340-200-0035, 340-200-0040, 340-202-0060, 340-202-0070, 340-214-0300, 340-214-0330, 340-214-0340, 340-214-0360, 340-238-0040, 340-238-0060, 340-244-0030, 340-244-0220

AMEND: 340-200-0020

RULE TITLE: General Air Quality Definitions

NOTICE FILED DATE: 06/12/2025

RULE SUMMARY: Modifies Significant Impact Levels of PM2.5 to match guidance from EPA so as to not exceed PM2.5 NAAQS promulgated Feb 7, 2024.

RULE TEXT:
As used in OAR chapter 340, divisions 200 through 268, unless specifically defined otherwise:
(1) "Act" or "FCAA" means the Federal Clean Air Act, 42 U.S.C.A. § 7401 to 7671q.
(2) "Activity" means any process, operation, action, or reaction (e.g., chemical) at a source that emits a regulated pollutant.
(3) "Actual emissions" means the mass emissions of a regulated pollutant from an emissions source during a specified time period as set forth in OAR chapter 340, divisions 214, 220 and 222.
(4) "Adjacent", as used in the definitions of major source and source and in OAR 340-216-0070, means interdependent facilities that are nearby to each other.
(5) "Affected source" means a source that includes one or more affected units that are subject to emission reduction requirements or limitations under Title IV of the FCAA.
(6) "Affected states" means all states:
(a) Whose air quality may be affected by a proposed permit, permit modification, or permit renewal and that are contiguous to Oregon; or
(b) That are within 50 miles of the permitted source.
(7) "Aggregate insignificant emissions" means the annual actual emissions of any regulated pollutant from one or more designated activities at a source that are less than or equal to the lowest applicable level specified in this section. The total emissions from each designated activity and the aggregate emissions from all designated activities must be less than or equal to the lowest applicable level specified:

(a) One ton for total reduced sulfur, hydrogen sulfide, sulfuric acid mist, any Class I or II substance subject to a standard promulgated under or established by Title VI of the FCAA, and each criteria pollutant, except lead;

(b) 120 pounds for lead;

(c) 600 pounds for fluorides;

(d) 500 pounds for PM10 in a PM10 nonattainment area;

(e) 500 pounds for direct PM2.5 in a PM2.5 nonattainment area;

(f) The lesser of the amount established in 40 C.F.R. 68.130 or 1,000 pounds;

(g) An aggregate of 5,000 pounds for all hazardous air pollutants;

(h) 2,756 tons CO2e for greenhouse gases.

(8) "Air contaminant" means a dust, fume, gas, mist, odor, smoke, vapor, pollen, soot, carbon, acid, particulate matter, regulated pollutant, or any combination thereof, exclusive of uncombined water.

(9) "Air Contaminant Discharge Permit" or "ACDP" means written authorization issued, renewed, amended, or revised by DEQ, under OAR chapter 340, division 216.

(10) “Air pollution control device” or “control device” means equipment, other than inherent process equipment that is used to destroy or remove a regulated pollutant prior to discharge to the atmosphere.

(a) The types of equipment that may commonly be used as control devices include, but are not limited to, fabric filters; mechanical collectors; electrostatic precipitators; inertial separators; afterburners; thermal or catalytic incinerators; adsorption devices (e.g., carbon beds, condensers); scrubbers (e.g., wet collection and gas absorption devices); selective catalytic or non-catalytic reduction systems; flue gas recirculation systems; spray dryers; spray towers; mist eliminators at acid plants and sulfur recovery plants; injection systems (e.g., water, steam, ammonia, sorbent or limestone injection); and combustion devices independent of the particular process being conducted at an emissions unit (e.g., the destruction of emissions achieved by venting process emission streams to flares, boilers or process heaters).

(b)(A) For purposes of OAR 340-212-0200 through 340-212-0280, a control device does not include passive control measures that act to prevent regulated pollutants from forming, such as the use of seals, lids, or roofs to prevent the release of regulated pollutants, use of low-polluting fuel or feedstocks, or the use of combustion or other process design features or characteristics.

(B) If an applicable requirement establishes that particular equipment which otherwise meets this definition of a control device does not constitute a control device as applied to a particular regulated pollutant-specific emissions unit, then that definition will be binding for purposes of OAR 340-212-0200 through 340-212-0280.

(11) "Alternative method" means any method of sampling and analyzing for an air pollutant which is not a reference or equivalent method but which has been demonstrated to DEQ's satisfaction to, in specific cases, produce results adequate for determination of compliance. The alternative method must comply with the intent of the rules, is at least equivalent in objectivity and reliability to the uniform recognized procedures, and is demonstrated to be reproducible, selective, sensitive, accurate, and applicable to the program. An alternative method used to meet an applicable federal requirement for which a reference method is specified must be approved by EPA unless EPA has delegated authority for the approval to DEQ.

(12) "Ambient air" means that portion of the atmosphere, external to buildings, to which the general public has access.

(13) "Applicable requirement" means all of the following as they apply to emissions units in an Oregon Title V Operating Permit program source or ACDP program source, including requirements that have been promulgated or approved by the EPA through rule making at the time of issuance but have future-effective compliance dates:

(a) Any standard or other requirement provided for in the applicable implementation plan approved or promulgated by the EPA through rulemaking under Title I of the FCAA that implements the relevant requirements of the FCAA, including any revisions to that plan promulgated in 40 C.F.R. part 52;

(b) Any standard or other requirement adopted under OAR 340-200-0040 of the State of Oregon Clean Air Act Implementation Plan that is more stringent than the federal standard or requirement which has not yet been approved by the EPA, and other state-only enforceable air pollution control requirements;

(c) Any term or condition in an ACDP, OAR chapter 340, division 216, including any term or condition of any preconstruction permits issued under OAR chapter 340, division 224, New Source Review, until or unless DEQ revokes or modifies the term or condition by a permit modification;

(d) Any term or condition in a Notice of Construction and Approval of Plans, OAR 340-210-0205 through 340-210-0240, until or unless DEQ revokes or modifies the term or condition by a Notice of Construction and Approval of Plans or a permit modification;

(e) Any term or condition in a Notice of Approval, OAR 340-218-0190, issued before July 1, 2001, until or unless DEQ revokes or modifies the term or condition by a Notice of Approval or a permit modification;

(f) Any term or condition of a PSD permit issued by the EPA until or unless the EPA revokes or modifies the term or condition by a permit modification;

(g) Any standard or other requirement under section 111 of the FCAA, including section 111(d);

(h) Any standard or other requirement under section 112 of the FCAA, including any requirement concerning accident prevention under section 112(r)(7) of the FCAA;

(i) Any standard or other requirement of the acid rain program under Title IV of the FCAA or the regulations promulgated thereunder;

(j) Any requirements established under section 504(b) or section 114(a)(3) of the FCAA;

(k) Any standard or other requirement under section 126(a)(1) and(c) of the FCAA;

(l) Any standard or other requirement governing solid waste incineration, under section 129 of the FCAA;

(m) Any standard or other requirement for consumer and commercial products, under section 183(e) of the FCAA;

(n) Any standard or other requirement for tank vessels, under section 183(f) of the FCAA;

(o) Any standard or other requirement of the program to control air pollution from outer continental shelf sources, under section 328 of the FCAA;

(p) Any standard or other requirement of the regulations promulgated to protect stratospheric ozone under Title VI of the FCAA, unless the Administrator has determined that such requirements need not be contained in an Oregon Title V Operating Permit; and

(q) Any national ambient air quality standard or increment or visibility requirement under part C of Title I of the FCAA, but only as it would apply to temporary sources permitted under section 504(e) of the FCAA.

(14) “Attainment area” or “unclassified area” means an area that has not otherwise been designated by EPA as nonattainment with ambient air quality standards for a particular regulated pollutant. Attainment areas or unclassified areas may also be referred to as sustainment or maintenance areas as designated in OAR chapter 340, division 204. Any particular location may be part of an attainment area or unclassified area for one regulated pollutant while also being in a different type of designated area for another regulated pollutant.

(15) “Attainment pollutant” means a pollutant for which an area is designated an attainment or unclassified area.

(16) "Baseline emission rate" means the actual emission rate during a baseline period as determined under OAR chapter 340, division 222.

(17) "Baseline period" means the period used to determine the baseline emission rate for each regulated pollutant under OAR chapter 340, division 222.

(18) "Best Available Control Technology" or "BACT" means an emission limitation, including, but not limited to, a visible emission standard, based on the maximum degree of reduction of each air contaminant subject to regulation under the FCAA which would be emitted from any proposed major source or major modification which, on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, is achievable for such source or modification through application of production processes or available methods, systems, and techniques, including fuel cleaning or treatment or innovative fuel combustion techniques for control of such air contaminant. In no event may the application of BACT result in emissions of any air contaminant that would exceed the emissions allowed by any applicable new source performance standard or any standard for hazardous air pollutant. If an emission limitation is not feasible, a design, equipment, work practice, or operational standard, or combination thereof, may be required. Such standard must, to the degree possible, set forth the emission reduction achievable and provide for compliance by prescribing appropriate permit conditions.

(19) "Biomass" means non-fossilized and biodegradable organic material originating from plants, animals, and microorganisms, including products, byproducts, residues and waste from agriculture, forestry, and related industries as well as the non-fossilized and biodegradable organic fractions of industrial and municipal wastes, including gases and liquids recovered from the decomposition of non-fossilized and biodegradable organic matter.
(20) "Capacity" means the maximum regulated pollutant emissions from a stationary source under its physical and operational design.
(21) “Capture efficiency” means the amount of regulated pollutant collected and routed to an air pollution control device divided by the amount of total emissions generated by the process being controlled.
(22) "Capture system" means the equipment, including but not limited to hoods, ducts, fans, and booths, used to contain, capture and transport a regulated pollutant to a control device.
(23) "Carbon dioxide equivalent" or "CO2e" means an amount of a greenhouse gas or gases expressed as the equivalent amount of carbon dioxide, and is computed by multiplying the mass of each of the greenhouse gases by the global warming potential published for each gas at 40 C.F.R. part 98, subpart A, Table A–1-Global Warming Potentials, and adding the resulting value for each greenhouse gas to compute the total equivalent amount of carbon dioxide.
(24) "Categorically insignificant activity" means any of the following listed regulated pollutant emitting activities principally supporting the source or the major industrial group. Categorically insignificant activities must comply with all applicable requirements.
(a) Constituents of a chemical mixture present at less than 1 percent by weight of any chemical or compound regulated under divisions 200 through 268 excluding divisions 248 and 262 of this chapter, or less than 0.1 percent by weight of any carcinogen listed in the U.S. Department of Health and Human Service's Annual Report on Carcinogens when usage of the chemical mixture is less than 100,000 pounds/year;
(b) Evaporative and tailpipe emissions from on-site motor vehicle operation;
(c) Distillate oil, kerosene, gasoline, natural gas or propane burning equipment, provided the aggregate expected actual emissions of the equipment identified as categorically insignificant do not exceed the de minimis level for any regulated pollutant, based on the expected maximum annual operation of the equipment. If a source’s expected emissions from all such equipment exceed the de minimis levels, then the source may identify a subgroup of such equipment as categorically insignificant with the remainder not categorically insignificant. The following equipment may never be included as categorically insignificant:
(A) Any individual distillate oil, kerosene or gasoline burning equipment with a rating greater than 0.4 million Btu/hour;
(B) Any individual natural gas or propane burning equipment with a rating greater than 2.0 million Btu/hour.
(d) Distillate oil, kerosene, gasoline, natural gas or propane burning equipment brought on site for six months or less for maintenance, construction or similar purposes, such as but not limited to generators, pumps, hot water pressure washers and space heaters, provided that any such equipment that performs the same function as the permanent equipment, must be operated within the source's existing PSEL;
(e) Office activities;
(f) Food service activities;
(g) Janitorial activities;
(h) Personal care activities;
(i) Groundskeeping activities including, but not limited to building painting and road and parking lot maintenance;
(j) On-site laundry activities;
(k) On-site recreation facilities;
(l) Instrument calibration;
(m) Maintenance and repair shop;
(n) Automotive repair shops or storage garages;
(o) Air cooling or ventilating equipment not designed to remove air contaminants generated by or released from associated equipment;
(p) Refrigeration systems with less than 50 pounds of charge of ozone depleting substances regulated under Title VI,

including pressure tanks used in refrigeration systems but excluding any combustion equipment associated with such systems;
(q) Bench scale laboratory equipment and laboratory equipment used exclusively for chemical and physical analysis, including associated vacuum producing devices but excluding research and development facilities;
(r) Temporary construction activities;
(s) Warehouse activities;
(t) Accidental fires;
(u) Air vents from air compressors;
(v) Air purification systems;
(w) Continuous emissions monitoring vent lines;
(x) Demineralized water tanks;
(y) Pre-treatment of municipal water, including use of deionized water purification systems;
(z) Electrical charging stations;
(aa) Fire brigade training;
(bb) Instrument air dryers and distribution;
(cc) Process raw water filtration systems;
(dd) Pharmaceutical packaging;
(ee) Fire suppression;
(ff) Blueprint making;
(gg) Routine maintenance, repair, and replacement such as anticipated activities most often associated with and performed during regularly scheduled equipment outages to maintain a plant and its equipment in good operating condition, including but not limited to steam cleaning, abrasive use, and woodworking;
(hh) Electric motors;
(ii) Storage tanks, reservoirs, transfer and lubricating equipment used for ASTM grade distillate or residual fuels, lubricants, and hydraulic fluids;
(jj) On-site storage tanks not subject to any New Source Performance Standards (NSPS), including underground storage tanks (UST), storing gasoline or diesel used exclusively for fueling of the facility's fleet of vehicles;
(kk) Natural gas, propane, and liquefied petroleum gas (LPG) storage tanks and transfer equipment;
(ll) Pressurized tanks containing gaseous compounds;
(mm) Vacuum sheet stacker vents;
(nn) Emissions from wastewater discharges to publicly owned treatment works (POTW) provided the source is authorized to discharge to the POTW, not including on-site wastewater treatment and/or holding facilities;
(oo) Log ponds;
(pp) Stormwater settling basins;
(qq) Fire suppression and training;
(rr) Paved roads and paved parking lots within an urban growth boundary;
(ss) Hazardous air pollutant emissions in fugitive dust from paved and unpaved roads except for those sources that have processes or activities that contribute to the deposition and entrainment of hazardous air pollutants from surface soils;
(tt) Health, safety, and emergency response activities;
(uu) Emergency generators and pumps used only during loss of primary equipment or utility service due to circumstances beyond the reasonable control of the owner or operator, or to address a power emergency, provided that the aggregate horsepower rating of all stationary emergency generator and pump engines is not more than 3,000 horsepower. If the aggregate horsepower rating of all stationary emergency generator and pump engines is more than 3,000 horsepower, then no emergency generators and pumps at the source may be considered categorically insignificant;
(vv) Non-contact steam vents and leaks and safety and relief valves for boiler steam distribution systems;
(ww) Non-contact steam condensate flash tanks;

(xx) Non-contact steam vents on condensate receivers, deaerators and similar equipment;
(yy) Boiler blowdown tanks;
(zz) Industrial cooling towers that do not use chromium-based water treatment chemicals;
(aaa) Ash piles maintained in a wetted condition and associated handling systems and activities;
(bbb) Uncontrolled oil/water separators in effluent treatment systems, excluding systems with a throughput of more than 400,000 gallons per year of effluent located at the following sources:
(A) Petroleum refineries;
(B) Sources that perform petroleum refining and re-refining of lubricating oils and greases including asphalt production by distillation and the reprocessing of oils and/or solvents for fuels; or
(C) Bulk gasoline plants, bulk gasoline terminals, and pipeline facilities;
(ccc) Combustion source flame safety purging on startup;
(ddd) Broke beaters, pulp and repulping tanks, stock chests and pulp handling equipment, excluding thickening equipment and repulpers;
(eee) Stock cleaning and pressurized pulp washing, excluding open stock washing systems; and
(fff) White water storage tanks.
(25) "Certifying individual" means the responsible person or official authorized by the owner or operator of a source who certifies the accuracy of the emission statement.
(26) "Class I area" or “PSD Class I area” means any Federal, State or Indian reservation land which is classified or reclassified as a Class I area under OAR 340-204-0050 and 340-204-0060.
(27) “Class II area” or “PSD Class II area’ means any land which is classified or reclassified as a Class II area under OAR 340-204-0050 and 340-204-0060.
(28) “Class III area” or “PSD Class III area’ means any land which is reclassified as a Class III area under OAR 340-204-0060.
(29) "Commence" or "commencement" means that the owner or operator has obtained all necessary preconstruction approvals required by the FCAA and either has:
(a) Begun, or caused to begin, a continuous program of actual on-site construction of the source to be completed in a reasonable time; or
(b) Entered into binding agreements or contractual obligations, which cannot be canceled or modified without substantial loss to the owner or operator, to undertake a program of construction of the source to be completed in a reasonable time.
(30) "Commission" or "EQC" means Environmental Quality Commission.
(31) "Constant process rate" means the average variation in process rate for the calendar year is not greater than plus or minus ten percent of the average process rate.
(32) "Construction":
(a) Except as provided in subsection (b) means any physical change including, but not limited to, fabrication, erection, installation, demolition, replacement, or modification of a source or part of a source;
(b) As used in OAR chapter 340, division 224 means any physical change including, but not limited to, fabrication, erection, installation, demolition, or modification of an emissions unit, or change in the method of operation of a source which would result in a change in actual emissions.
(33) "Continuous compliance determination method" means a method, specified by the applicable standard or an applicable permit condition, which:
(a) Is used to determine compliance with an emission limitation or standard on a continuous basis, consistent with the averaging period established for the emission limitation or standard; and
(b) Provides data either in units of the standard or correlated directly with the compliance limit.
(34) "Continuous monitoring systems" means sampling and analysis, in a timed sequence, using techniques which will adequately reflect actual emissions or concentrations on a continuing basis as specified in the DEQ Continuous Monitoring Manual, found in OAR 340-200-0035, and includes continuous emission monitoring systems, continuous

opacity monitoring system (COMS) and continuous parameter monitoring systems.
(35) “Control efficiency” means the product of the capture and removal efficiencies.
(36) "Criteria pollutant" means any of the following regulated pollutants: nitrogen oxides, volatile organic compounds, particulate matter, PM10, PM2.5, sulfur dioxide, carbon monoxide, and lead.
(37) "Data" means the results of any type of monitoring or method, including the results of instrumental or non-instrumental monitoring, emission calculations, manual sampling procedures, recordkeeping procedures, or any other form of information collection procedure used in connection with any type of monitoring or method.
(38) “Day” means a 24-hour period beginning at 12:00 a.m. midnight or a 24-hour period as specified in a permit.
(39) "De minimis emission level" means the level for the regulated pollutants listed below:
(a) Greenhouse Gases (CO2e) = 2,756 tons per year.
(b) CO = 1 ton per year.
(c) NOx = 1 ton per year.
(d) SO2 = 1 ton per year.
(e) VOC = 1 ton per year.
(f) PM = 1 ton per year.
(g) PM10 (except Medford AQMA) = 1 ton per year.
(h) PM10 (Medford AQMA) = 0.5 ton per year and 5.0 pounds/day.
(i) Direct PM2.5 = 1 ton per year.
(j) Lead = 0.1 ton per year.
(k) Fluorides = 0.3 ton per year.
(l) Sulfuric Acid Mist = 0.7 ton per year.
(m) Hydrogen Sulfide = 1 ton per year.
(n) Total Reduced Sulfur (including hydrogen sulfide) = 1 ton per year.
(o) Reduced Sulfur = 1 ton per year.
(p) Municipal waste combustor organics (dioxin and furans) = 0.0000005 ton per year.
(q) Municipal waste combustor metals = 1 ton per year.
(r) Municipal waste combustor acid gases = 1 ton per year.
(s) Municipal solid waste landfill gases (measured as nonmethane organic compounds) = 1 ton per year
(t) Single HAP = 1 ton per year
(u) Combined HAP (aggregate) = 1 ton per year
(40) "Department" or “DEQ”:
(a) Means Department of Environmental Quality; except
(b) As used in OAR chapter 340, divisions 218 and 220 means Department of Environmental Quality, or in the case of Lane County, LRAPA.
(41) “DEQ method [#]” means the sampling method and protocols for measuring a regulated pollutant as described in the DEQ Source Sampling Manual, found in OAR 340-200-0035.
(42) “Designated area” means an area that has been designated as an attainment, unclassified, sustainment, nonattainment, reattainment, or maintenance area under OAR chapter 340, division 204 or applicable provisions of the FCAA.
(43) “Destruction efficiency” means removal efficiency.
(44) "Device" means any machine, equipment, raw material, product, or byproduct at a source that produces or emits a regulated pollutant.
(45) "Direct PM2.5" has the meaning provided in the definition of PM2.5.
(46) "Director" means the Director of DEQ or the Director's designee.
(47) "Draft permit" means the version of an Oregon Title V Operating Permit for which DEQ or LRAPA offers public participation under OAR 340-218-0210 or the EPA and affected State review under 340-218-0230.
(48) "Dry standard cubic foot" means the amount of gas that would occupy a volume of one cubic foot, if the gas were

free of uncombined water at standard conditions.

(49) "Effective date of the program" means the date that the EPA approves the Oregon Title V Operating Permit program submitted by DEQ on a full or interim basis. In case of a partial approval, the "effective date of the program" for each portion of the program is the date of the EPA approval of that portion.

(50) "Emergency" means any situation arising from sudden and reasonably unforeseeable events beyond the control of the owner or operator, including acts of God, which situation requires immediate corrective action to restore normal operation, and that causes the source to exceed a technology-based emission limitation under the permit, due to unavoidable increases in emissions attributable to the emergency. An emergency does not include noncompliance to the extent caused by improperly designed equipment, lack of preventative maintenance, careless or improper operation, or operator error.

(51) "Emission" means a release into the atmosphere of any regulated pollutant or any air contaminant.

(52) "Emission estimate adjustment factor" or "EEAF" means an adjustment applied to an emission factor to account for the relative inaccuracy of the emission factor.

(53) "Emission factor" means an estimate of the rate at which a regulated pollutant is released into the atmosphere, as the result of some activity, divided by the rate of that activity (e.g., production or process rate).

(54) "Emission(s) limitation," “emission(s) limit,” "emission(s) standard or “emission(s) limitation or standard” means:

(a) Except as provided in subsection (b), a requirement established by a state, local government, or EPA rule; a permit condition or order, which limits the quantity, rate, or concentration of emissions of regulated pollutants on a continuous basis, including any requirements which limit the level of opacity, prescribe equipment, set fuel specifications, or prescribe operation or maintenance procedures for a source to assure continuous emission reduction.

(b) As used in OAR 340-212-0200 through 340-212-0280, any applicable requirement that constitutes an emission(s) limit, emission(s) limitation, emission(s) standard, standard of performance or means of emission(s) limitation as defined under the FCAA. An emission limitation or standard may be expressed in terms of the pollutant, expressed either as a specific quantity, rate or concentration of emissions, e.g., pounds of SO2 per hour, pounds of SO2 per million British thermal units of fuel input, kilograms of VOC per liter of applied coating solids, or parts per million by volume of SO2, or as the relationship of uncontrolled to controlled emissions, e.g., percentage capture and destruction efficiency of VOC or percentage reduction of SO2. An emission limitation or standard may also be expressed either as a work practice, process or control device parameter, or other form of specific design, equipment, operational, or operation and maintenance requirement. For purposes of 340-212-0200 through 340-212-0280, an emission limitation or standard does not include general operation requirements that an owner or operator may be required to meet, such as requirements to obtain a permit, operate and maintain sources using good air pollution control practices, develop and maintain a malfunction abatement plan, keep records, submit reports, or conduct monitoring.

(55) "Emission reduction credit banking" means to presently reserve, subject to requirements of OAR chapter 340, division 268, Emission Reduction Credits, emission reductions for use by the reserver or assignee for future compliance with air pollution reduction requirements.

(56) "Emission reporting form" means a paper or electronic form developed by DEQ that must be completed by the permittee to report calculated emissions, actual emissions, or permitted emissions for interim emission fee assessment purposes.

(57) "Emissions unit" means any part or activity of a source that emits or has the potential to emit any regulated pollutant.

(a) A part of a source is any machine, equipment, raw material, product, or byproduct that produces or emits regulated pollutants. An activity is any process, operation, action, or reaction, e.g., chemical, at a stationary source that emits regulated pollutants. Except as described in subsection (d), parts and activities may be grouped for purposes of defining an emissions unit if the following conditions are met:

(A) The group used to define the emissions unit may not include discrete parts or activities to which a distinct emissions standard applies or for which different compliance demonstration requirements apply; and

(B) The emissions from the emissions unit are quantifiable.

(b) Emissions units may be defined on a regulated pollutant by regulated pollutant basis where applicable.
(c) The term emissions unit is not meant to alter or affect the definition of the term "unit" under Title IV of the FCAA.
(d) Parts and activities cannot be grouped for determining emissions increases from an emissions unit under OAR chapter 340, divisions 210 and 224, or for determining the applicability of any New Source Performance Standard.
(58) "EPA" or "Administrator" means the Administrator of the United States Environmental Protection Agency or the Administrator's designee.
(59) "EPA Method 9" means the method for Visual Determination of the Opacity of Emissions From Stationary Sources described in 40 C.F.R. part 60, Appendix A–4.
(60) "Equivalent method" means any method of sampling and analyzing for a regulated pollutant that has been demonstrated to DEQ's satisfaction to have a consistent and quantitatively known relationship to the reference method, under specified conditions. An equivalent method used to meet an applicable federal requirement for which a reference method is specified must be approved by EPA unless EPA has delegated authority for the approval to DEQ.
(61) "Event" means excess emissions that arise from the same condition and occur during a single calendar day or continue into subsequent calendar days.
(62) "Exceedance" means a condition that is detected by monitoring that provides data in terms of an emission limitation or standard and that indicates that emissions, or opacity, are greater than the applicable emission limitation or standard, or less than the applicable standard in the case of a percent reduction requirement, consistent with any averaging period specified for averaging the results of the monitoring.
(63) "Excess emissions" means emissions in excess of an emission limit, or a risk limit under OAR chapter 340, division 245, contained in an applicable requirement, a permit or permit attachment limit; or emissions in violation of any applicable air quality rule.
(64) "Excursion" means a departure from an indicator range established for monitoring under OAR 340-212-0200 through 340-212-0280 and 340-218-0050(3)(a), consistent with any averaging period specified for averaging the results of the monitoring.
(65) "Federal Land Manager" means with respect to any lands in the United States, the Secretary of the federal department with authority over such lands.
(66) "Federal Major Source" means any source listed in subsections (a) or (d) below:
(a) A source with potential to emit:
(A) 100 tons per year or more of any individual regulated pollutant, excluding greenhouse gases and hazardous air pollutants listed in OAR chapter 340, division 244 if in a source category listed in subsection (c), or
(B) 250 tons per year or more of any individual regulated pollutant, excluding greenhouse gases and hazardous air pollutants listed in OAR chapter 340, division 244, if not in a source category listed in subsection (c).
(b) Calculations for determining a source’s potential to emit for purposes of subsections (a) and (d) must include the following:
(A) Fugitive emissions and insignificant activity emissions; and
(B) Increases or decreases due to a new or modified source.
(c) Source categories:
(A) Fossil fuel-fired steam electric plants of more than 250 million BTU/hour heat input;
(B) Coal cleaning plants with thermal dryer(C) Kraft pulp mills;
(D) Portland cement plants;
(E) Primary zinc smelters;
(F) Iron and steel mill plants;
(G) Primary aluminum ore reduction plants;
(H) Primary copper smelters;
(I) Municipal incinerators capable of charging more than 50 tons of refuse per day;
(J) Hydrofluoric acid plants;
(K) Sulfuric acid plants;

(L) Nitric acid plants;
(M) Petroleum refineries;
(N) Lime plants;
(O) Phosphate rock processing plants;
(P) Coke oven batteries;
(Q) Sulfur recovery plants;
(R) Carbon black plants, furnace process;
(S) Primary lead smelters;
(T) Fuel conversion plants;
(U) Sintering plants;
(V) Secondary metal production plants;
(W) Chemical process plants, excluding ethanol production facilities that produce ethanol by natural fermentation included in NAICS codes 325193 or 312140;
(X) Fossil fuel fired boilers, or combinations thereof, totaling more than 250 million BTU per hour heat input;
(Y) Petroleum storage and transfer units with a total storage capacity exceeding 300,000 barrels;
(Z) Taconite ore processing plants;
(AA) Glass fiber processing plants;
(BB) Charcoal production plants.
(d) A major stationary source as defined in part D of Title I of the FCAA, including:
(A) For ozone nonattainment areas, sources with the potential to emit 100 tons per year or more of VOCs or oxides of nitrogen in areas classified as "marginal" or "moderate," 50 tons per year or more in areas classified as "serious," 25 tons per year or more in areas classified as "severe," and 10 tons per year or more in areas classified as "extreme"; except that the references in this paragraph to 100, 50, 25, and 10 tons per year of nitrogen oxides do not apply with respect to any source for which the Administrator has made a finding, under section 182(f)(1) or (2) of the FCAA, that requirements under section 182(f) of the FCAA do not apply;
(B) For ozone transport regions established under section 184 of the FCAA, sources with the potential to emit 50 tons per year or more of VOCs;
(C) For carbon monoxide nonattainment areas that are classified as "serious" and in which stationary sources contribute significantly to carbon monoxide levels as determined under rules issued by the Administrator, sources with the potential to emit 50 tons per year or more of carbon monoxide.
(D) For PM10 nonattainment areas classified as "serious," sources with the potential to emit 70 tons per year or more of PM10.
(67) "Final permit" means the version of an Oregon Title V Operating Permit issued by DEQ or LRAPA that has completed all review procedures required by OAR 340-218-0120 through 340-218-0240.
(68) "Form" means a paper or electronic form developed by DEQ.
(69) “Fuel burning equipment” means equipment, other than internal combustion engines, the principal purpose of which is to produce heat or power by indirect heat transfer.
(70) "Fugitive emissions":
(a) Except as used in subsection (b), means emissions of any air contaminant which escape to the atmosphere from any point or area that is not identifiable as a stack, vent, duct, or equivalent opening.
(b) As used to define a major Oregon Title V Operating Permit program source, means those emissions which could not reasonably pass through a stack, chimney, vent, or other functionally equivalent opening.
(71) "General permit":
(a) Except as provided in subsection (b), means an Oregon Air Contaminant Discharge Permit established under OAR 340-216-0060;
(b) As used in OAR chapter 340, division 218 means an Oregon Title V Operating Permit established under OAR 340-218-0090.

(72)(a) "Greenhouse gases" or "GHGs" means the aggregate group of carbon dioxide (CO2), methane (CH4), nitrous oxide (N20), sulfur hexafluoride (SF6), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and other fluorinated greenhouse gases or fluorinated GHG as defined in 40 C.F.R. part 98.

(b) The definition of greenhouse gases in subsection (a) of this section does not include, for purposes of division 216, 218, and 224, carbon dioxide emissions from the combustion or decomposition of biomass except to the extent required by federal law.

(73) "Growth allowance" means an allocation of some part of an airshed's capacity to accommodate future proposed sources and modifications of sources.

(74) "Hardboard" means a flat panel made from wood that has been reduced to basic wood fibers and bonded by adhesive properties under pressure.

(75) “Hazardous Air Pollutant” or “HAP” means an air contaminant listed by the EPA under section 112(b) of the FCAA or determined by the EQC to cause, or reasonably be anticipated to cause, adverse effects to human health or the environment.

(76) "Immediately" means as soon as possible but in no case more than one hour after a source knew or should have known of an excess emission period.

(77) "Indian governing body" means the governing body of any tribe, band, or group of Indians subject to the jurisdiction of the United States and recognized by the United States as possessing power of self-government.

(78) "Indian reservation" means any federally recognized reservation established by Treaty, Agreement, Executive Order, or Act of Congress.

(79) "Inherent process equipment" means equipment that is necessary for the proper or safe functioning of the process, or material recovery equipment that the owner or operator documents is installed and operated primarily for purposes other than compliance with air pollution regulations. Equipment that must be operated at an efficiency higher than that achieved during normal process operations in order to comply with the applicable emission limitation or standard is not inherent process equipment. For the purposes of OAR 340-212-0200 through 340-212-0280, inherent process equipment is not considered a control device.

(80) "Insignificant activity" means an activity or emission that DEQ has designated as categorically insignificant, or that meets the criteria of aggregate insignificant emissions.

(81) "Insignificant change" means an off-permit change defined under OAR 340-218-0140(2)(a) to either a significant or an insignificant activity which:

(a) Does not result in a re-designation from an insignificant to a significant activity;

(b) Does not invoke an applicable requirement not included in the permit; and

(c) Does not result in emission of regulated pollutants not regulated by the source's permit.

(82) “Internal combustion engine” means stationary gas turbines and reciprocating internal combustion engines.

(83) "Late payment" means a fee payment which is received after the due date.

(84) "Liquefied petroleum gas" has the meaning given by the American Society for Testing and Materials in ASTM D1835-82, "Standard Specification for Liquid Petroleum Gases."

(85) "Lowest Achievable Emission Rate" or "LAER" means that rate of emissions which reflects: the most stringent emission limitation which is contained in the implementation plan of any state for such class or category of source, unless the owner or operator of the proposed source demonstrates that such limitations are not achievable; or the most stringent emission limitation which is achieved in practice by such class or category of source, whichever is more stringent. The application of this term cannot permit a proposed new or modified source to emit any air contaminant in excess of the amount allowable under applicable New Source Performance Standards (NSPS) or standards for hazardous air pollutants.

(86) "Maintenance area" means any area that was formerly nonattainment for a criteria pollutant but has since met the ambient air quality standard, and EPA has approved a maintenance plan to comply with the standards under 40 C.F.R. 51.110. Maintenance areas are designated by the EQC according to division 204.

(87) "Maintenance pollutant" means a regulated pollutant for which a maintenance area was formerly designated a

nonattainment area.

(88) "Major Modification" means any physical change or change in the method of operation of a source that results in satisfying the requirements of OAR 340-224-0025.

(89) “Major New Source Review” or “Major NSR” means the new source review process and requirements under OAR 340-224-0010 through 340-224-0070 and 340-224-0500 through 340-224-0540 based on the location and regulated pollutants emitted.

(90) "Major source":

(a) Except as provided in subsection (b) of this section, means a source that emits, or has the potential to emit, any regulated air pollutant at a Significant Emission Rate. The fugitive emissions and insignificant activity emissions of a stationary source are considered in determining whether it is a major source. Potential to emit calculations must include emission increases due to a new or modified source and may include emission decreases.

(b) As used in OAR chapter 340, division 210, Stationary Source Notification Requirements; Compliance Assurance Monitoring, OAR 340-212-0200 through 340-212-0280; OAR 340-216-0066, Standard ACDPs; OAR chapter 340, division 218, Oregon Title V Operating Permits; OAR chapter 340, division 220, Oregon Title V Operating Permit Fees; 340-216-0066, Standard ACDPs, and OAR chapter 340, division 236, Emission Standards for Specific Industries; means any stationary source or any group of stationary sources that are located on one or more contiguous or adjacent properties and are under common control of the same person or persons under common control belonging to a single major industrial grouping or supporting the major industrial group and that is described in paragraphs (A), (B), or (C). For the purposes of this subsection, a stationary source or group of stationary sources is considered part of a single industrial grouping if all of the regulated pollutant emitting activities at such source or group of sources on contiguous or adjacent properties belong to the same major group (i.e., all have the same two-digit code) as described in the Standard Industrial Classification Manual (U.S. Office of Management and Budget, 1987) or support the major industrial group.

(A) A major source of hazardous air pollutants, which means:

(i) For hazardous air pollutants other than radionuclides, any stationary source or group of stationary sources located within a contiguous area and under common control that emits or has the potential to emit, in the aggregate, 10 tons per year or more of any hazardous air pollutants that has been listed under OAR 340-244-0040; 25 tons per year or more of any combination of such hazardous air pollutants, or such lesser quantity as the Administrator may establish by rule. Emissions from any oil or gas exploration or production well, along with its associated equipment, and emissions from any pipeline compressor or pump station will not be aggregated with emissions from other similar units, whether or not such units are in a contiguous area or under common control, to determine whether such units or stations are major sources; or

(ii) For radionuclides, "major source" will have the meaning specified by the Administrator by rule.

(B) A major stationary source of regulated pollutants, as defined in section 302 of the FCAA, that directly emits or has the potential to emit 100 tons per year or more of any regulated pollutant, except greenhouse gases, including any major source of fugitive emissions of any such regulated pollutant. The fugitive emissions of a stationary source are not considered in determining whether it is a major stationary source for the purposes of section 302(j) of the FCAA, unless the source belongs to one of the following categories of stationary sources:

(i) Coal cleaning plants (with thermal dryers);

(ii) Kraft pulp mills;

(iii) Portland cement plants;

(iv) Primary zinc smelters;

(v) Iron and steel mills;

(vi) Primary aluminum ore reduction plants;

(vii) Primary copper smelters;

(viii) Municipal incinerators capable of charging more than 50 tons of refuse per day;

(ix) Hydrofluoric, sulfuric, or nitric acid plants;

(x) Petroleum refineries;
(xi) Lime plants;
(xii) Phosphate rock processing plants;
(xiii) Coke oven batteries;
(xiv) Sulfur recovery plants;
(xv) Carbon black plants (furnace process);
(xvi) Primary lead smelters;
(xvii) Fuel conversion plants;
(xviii) Sintering plants;
(xix) Secondary metal production plants;
(xx) Chemical process plants, excluding ethanol production facilities that produce ethanol by natural fermentation included in NAICS codes 325193 or 312140;
(xxi) Fossil-fuel boilers, or combination thereof, totaling more than 250 million British thermal units per hour heat input;
(xxii) Petroleum storage and transfer units with a total storage capacity exceeding 300,000 barrels;
(xxiii) Taconite ore processing plants;
(xxiv) Glass fiber processing plants;
(xxv) Charcoal production plants;
(xxvi) Fossil-fuel-fired steam electric plants of more than 250 million British thermal units per hour heat input; or
(xxvii) Any other stationary source category, that as of August 7, 1980 is being regulated under section 111 or 112 of the FCAA.

(C) From July 1, 2011 through November 6, 2014, a major stationary source of regulated pollutants, as defined by Section 302 of the FCAA, that directly emits or has the potential to emit 100 tons per year or more of greenhouse gases and directly emits or has the potential to emit 100,000 tons per year or more CO2e, including fugitive emissions.

(91) "Material balance" means a procedure for determining emissions based on the difference in the amount of material added to a process and the amount consumed and/or recovered from a process.

(92) "Modification," except as used in the terms "major modification" “permit modification” and “Title I modification,” means any physical change to, or change in the method of operation of, a source or part of a source that results in an increase in the source or part of the source's potential to emit any regulated pollutant on an hourly basis. Modifications do not include the following:

(a) Increases in hours of operation or production rates that do not involve a physical change or change in the method of operation;

(b) Changes in the method of operation due to using an alternative fuel or raw material that the source or part of a source was physically capable of accommodating during the baseline period; and

(c) Routine maintenance, repair and like-for-like replacement of components unless they increase the expected life of the source or part of a source by using component upgrades that would not otherwise be necessary for the source or part of a source to function.

(93) "Monitoring" means any form of collecting data on a routine basis to determine or otherwise assess compliance with emission limitations or standards. Monitoring may include record keeping if the records are used to determine or assess compliance with an emission limitation or standard such as records of raw material content and usage, or records documenting compliance with work practice requirements. Monitoring may include conducting compliance method tests, such as the procedures in appendix A to 40 C.F.R. part 60, on a routine periodic basis. Requirements to conduct such tests on a one-time basis, or at such times as a regulatory authority may require on a non-regular basis, are not considered monitoring requirements for purposes of this definition. Monitoring may include one or more than one of the following data collection techniques as appropriate for a particular circumstance:

(a) Continuous emission or opacity monitoring systems.

(b) Continuous process, capture system, control device or other relevant parameter monitoring systems or procedures, including a predictive emission monitoring system.

(c) Emission estimation and calculation procedures (e.g., mass balance or stoichiometric calculations).
(d) Maintaining and analyzing records of fuel or raw materials usage.
(e) Recording results of a program or protocol to conduct specific operation and maintenance procedures.
(f) Verifying emissions, process parameters, capture system parameters, or control device parameters using portable or in situ measurement devices.
(g) Visible emission observations and recording.
(h) Any other form of measuring, recording, or verifying on a routine basis emissions, process parameters, capture system parameters, control device parameters or other factors relevant to assessing compliance with emission limitations or standards.
(94) "Natural gas" means a naturally occurring mixture of hydrocarbon and nonhydrocarbon gases found in geologic formations beneath the earth's surface, of which the principal component is methane.
(95) "Netting basis" means an emission rate determined as specified in OAR 340-222-0046.
(96) "Nitrogen oxides" or "NOx" means all oxides of nitrogen except nitrous oxide.
(97) "Nonattainment area" means a geographical area of the state, as designated by the EQC or the EPA, that exceeds any state or federal primary or secondary ambient air quality standard. Nonattainment areas are designated by the EQC according to division 204.
(98) "Nonattainment pollutant" means a regulated pollutant for which an area is designated a nonattainment area. Nonattainment areas are designated by the EQC according to division 204.
(99) "Normal source operation" means operation that does not include such conditions as forced fuel substitution, equipment malfunction, or highly abnormal market conditions.
(100) "Odor" means that property of an air contaminant that affects the sense of smell.
(101) "Offset" means an equivalent or greater emission reduction that is required before allowing an emission increase from a source that is subject to Major NSR or State NSR.
(102) "Opacity" means the degree to which emissions, excluding uncombined water, reduce the transmission of light and obscure the view of an object in the background as measured by EPA Method 9 or other method, as specified in each applicable rule.
(103) "Oregon Title V Operating Permit" or “Title V permit” means written authorization issued, renewed, amended, or revised under OAR chapter 340, division 218.
(104) "Oregon Title V Operating Permit program" or “Title V program” means the Oregon program described in OAR chapter 340, division 218 and approved by the Administrator under 40 C.F.R. part 70.
(105) "Oregon Title V Operating Permit program source" or “Title V source” means any source subject to the permitting requirements, OAR chapter 340, division 218.
(106) "Ozone precursor" means nitrogen oxides and volatile organic compounds.
(107) "Ozone season" means the contiguous 3 month period during which ozone exceedances typically occur, i.e., June, July, and August.
(108) "Particleboard" means matformed flat panels consisting of wood particles bonded together with synthetic resin or other suitable binder.
(109) "Particulate matter":
(a) Except as provided in subsection (b) of this section, means all finely divided solid and liquid material, other than uncombined water, that is emitted to the ambient air as measured by the test method specified in each applicable rule, or where not specified by rule, in the permit.
(b) As used in OAR chapter 340, division 208, Visible Emissions and Nuisance Requirements, means all finely divided solid material, including dust, and all finely divided liquid material, other than uncombined water, that is emitted to the ambient air.
(110) "Permit" means an Air Contaminant Discharge Permit or an Oregon Title V Operating Permit, permit attachment and any amendments or modifications thereof.
(111) "Permit modification" means a permit revision that meets the applicable requirements of OAR chapter 340,

division 216, OAR chapter 340, division 224, or OAR 340-218-0160 through 340-218-0180.

(112) "Permit revision" means any permit modification or administrative permit amendment.

(113) "Permitted emissions" as used in OAR chapter 340, division 220 means each regulated pollutant portion of the PSEL, as identified in an ACDP, Oregon Title V Operating Permit, review report, or by DEQ under OAR 340-220-0090.

(114) "Permittee" means the owner or operator of a source, authorized to emit regulated pollutants under an ACDP or Oregon Title V Operating Permit.

(115) "Person" means individuals, corporations, associations, firms, partnerships, joint stock companies, public and municipal corporations, political subdivisions, the State of Oregon and any agencies thereof, and the federal government and any agencies thereof.

(116) "Plant Site Emission Limit" or "PSEL" means the total mass emissions per unit time of an individual regulated pollutant specified in a permit for a source. The PSEL for a major source may consist of more than one permitted emission for purposes of Oregon Title V Operating Permit Fees in OAR chapter 340, division 220.

(117) “Plywood" means a flat panel built generally of an odd number of thin sheets of veneers of wood in which the grain direction of each ply or layer is at right angles to the one adjacent to it.

(118) "PM10":

(a) When used in the context of emissions, means finely divided solid or liquid material, including condensable particulate, other than uncombined water, with an aerodynamic diameter less than or equal to a nominal 10 micrometers, emitted to the ambient air as measured by the test method specified in each applicable rule or, where not specified by rule, in each individual permit;

(b) When used in the context of ambient concentration, means airborne finely divided solid or liquid material with an aerodynamic diameter less than or equal to a nominal 10 micrometers as measured under 40 C.F.R. part 50, Appendix J or an equivalent method designated under 40 C.F.R. part 53.

(119) "PM2.5":

(a) When used in the context of direct PM2.5 emissions, means finely divided solid or liquid material, including condensable particulate, other than uncombined water, with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers, emitted to the ambient air as measured by the test method specified in each applicable rule or, where not specified by rule, in each individual permit.

(b) When used in the context of PM2.5 precursor emissions, means sulfur dioxide (SO2) and nitrogen oxides (NOx) emitted to the ambient air as measured by the test method specified in each applicable rule or, where not specified by rule, in each individual permit.

(c) When used in the context of ambient concentration, means airborne finely divided solid or liquid material with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers as measured under 40 C.F.R. part 50, Appendix L, or an equivalent method designated under 40 C.F.R. part 53.

(120) "PM2.5 fraction" means the fraction of PM2.5 in relation to PM10 for each emissions unit that is included in the netting basis and PSEL.

(121) "Pollutant-specific emissions unit" means an emissions unit considered separately with respect to each regulated pollutant.

(122) “Portable” means designed and capable of being carried or moved from one location to another. Indicia of portability include, but are not limited to, wheels, skids, carrying handles, dolly, trailer, or platform.

(123) "Potential to emit" or "PTE" means the lesser of:

(a) The regulated pollutant emissions capacity of a stationary source; or

(b) The maximum allowable regulated pollutant emissions taking into consideration any physical or operational limitation, including use of control devices and restrictions on hours of operation or on the type or amount of material combusted, stored, or processed, if the limitation is enforceable by the U.S. EPA Administrator.

(c) This definition does not alter or affect the use of this term for any other purposes under the FCAA or the term "capacity factor" as used in Title IV of the FCAA and the regulations promulgated thereunder. Secondary emissions are not considered in determining the potential to emit.

(124) "ppm" means parts per million by volume unless otherwise specified in the applicable rule or an individual permit. It is a dimensionless unit of measurement for gases that expresses the ratio of the volume of one component gas to the volume of the entire sample mixture of gases.

(125) "Predictive emission monitoring system" or "PEMS" means a system that uses process and other parameters as inputs to a computer program or other data reduction system to produce values in terms of the applicable emission limitation or standard.

(126) "Press/cooling vent" means any opening through which particulate and gaseous emissions from plywood, particleboard, or hardboard manufacturing are exhausted, either by natural draft or powered fan, from the building housing the process. Such openings are generally located immediately above the board press, board unloader, or board cooling area.

(127) "Process upset" means a failure or malfunction of a production process or system to operate in a normal and usual manner.

(128) "Proposed permit" means the version of an Oregon Title V Operating Permit that DEQ or LRAPA proposes to issue and forwards to the Administrator for review in compliance with OAR 340-218-0230.

(129) "Reattainment area" means an area that is designated as nonattainment and has three consecutive years of monitoring data that shows the area is meeting the ambient air quality standard for the regulated pollutant for which the area was designated a nonattainment area, but a formal redesignation by EPA has not yet been approved. Reattainment areas are designated by the EQC according to division 204.

(130) "Reattainment pollutant" means a regulated pollutant for which an area is designated a reattainment area.

(131) "Reference method" means any method of sampling and analyzing for a regulated pollutant as specified in 40 C.F.R. part 52, 60, 61 or 63.

(132) "Regional agency" means Lane Regional Air Protection Agency.

(133) "Regulated air pollutant" or "Regulated pollutant":

(a) Except as provided in subsections (b), (c) and (d), means:

(A) Nitrogen oxides or any VOCs;

(B) Any pollutant for which an ambient air quality standard has been promulgated, including any precursors to such pollutants;

(C) Any pollutant that is subject to any standard promulgated under section 111 of the FCAA;

(D) Any Class I or II substance subject to a standard promulgated under or established by Title VI of the FCAA;

(E) Any pollutant listed under OAR 340-244-0040 or 40 C.F.R. 68.130;

(F) Greenhouse gases; and

(G) Toxic Air Contaminants.

(b) As used in OAR chapter 340, division 220, Oregon Title V Operating Permit Fees, regulated pollutant means particulate matter, volatile organic compounds, oxides of nitrogen and sulfur dioxide.

(c) As used in OAR chapter 340, division 222, Plant Site Emission Limits and division 224, New Source Review, regulated pollutant does not include any pollutant listed in OAR chapter 340, divisions 246 or 247.

(d) As used in OAR chapter 340, division 202, Ambient Air Quality Standards And PSD Increments through division 208, Visible Emissions and Nuisance Requirements; division 215, Greenhouse Reporting Requirements; division 222, Stationary Source Plant Site Emission Limits through division 244, Oregon Federal Hazardous Air Pollutant Program; and division 248, Asbestos Requirements through division 268, Emission Reduction Credits; regulated pollutant means only the air contaminants listed under paragraphs (a)(A) through (F).

(134) "Removal efficiency" means the performance of an air pollution control device in terms of the ratio of the amount of the regulated pollutant removed from the airstream to the total amount of regulated pollutant that enters the air pollution control device.

(135) "Renewal" means the process by which a permit is reissued at the end of its term.

(136) "Responsible official" means one of the following:

(a) For a corporation: a president, secretary, treasurer, or vice-president of the corporation in charge of a principal

business function, or any other person who performs similar policy or decision-making functions for the corporation, or a duly authorized representative of such person if the representative is responsible for the overall operation of one or more manufacturing, production, or operating facilities applying for or subject to a permit and either:
(A) The facilities employ more than 250 persons or have gross annual sales or expenditures exceeding $25 million (in second quarter 1980 dollars); or
(B) The delegation of authority to such representative is approved in advance by DEQ or LRAPA.
(b) For a partnership or sole proprietorship: a general partner or the proprietor, respectively;
(c) For a municipality, State, Federal, or other public agency: either a principal executive officer or ranking elected official. For the purposes of this division, a principal executive officer of a Federal agency includes the chief executive officer having responsibility for the overall operations of a principal geographic unit of EPA (e.g., a Regional Administrator of the EPA); or
(d) For affected sources:
(A) The designated representative in so far as actions, standards, requirements, or prohibitions under Title IV of the FCAA or the regulations promulgated there under are concerned; and
(B) The designated representative for any other purposes under the Oregon Title V Operating Permit program.
(137) "Secondary emissions" means emissions that are a result of the construction and/or operation of a source or modification, but that do not come from the source itself. Secondary emissions must be specific, well defined, quantifiable, and impact the same general area as the source associated with the secondary emissions. Secondary emissions may include, but are not limited to:
(a) Emissions from ships and trains coming to or from a facility;
(b) Emissions from off-site support facilities that would be constructed or would otherwise increase emissions as a result of the construction or modification of a source.
(138) "Section 111" means section 111 of the FCAA, 42 U.S.C. § 7411, which includes Standards of Performance for New Stationary Sources (NSPS).
(139) "Section 111(d)" means subsection 111(d) of the FCAA, 42 U.S.C. § 7411(d), which requires states to submit to the EPA plans that establish standards of performance for existing sources and provides for implementing and enforcing such standards.
(140) "Section 112" means section 112 of the FCAA, 42 U.S.C. § 7412, which contains regulations for Hazardous Air Pollutants.
(141) "Section 112(b)" means subsection 112(b) of the FCAA, 42 U.S.C. § 7412(b), which includes the list of hazardous air pollutants to be regulated.
(142) "Section 112(d)" means subsection 112(d) of the FCAA, 42 U.S.C. § 7412(d), which directs the EPA to establish emission standards for sources of hazardous air pollutants. This section also defines the criteria to be used by the EPA when establishing the emission standards.
(143) "Section 112(e)" means subsection 112(e) of the FCAA, 42 U.S.C. § 7412(e), which directs the EPA to establish and promulgate emissions standards for categories and subcategories of sources that emit hazardous air pollutants.
(144) "Section 112(r)(7)" means subsection 112(r)(7) of the FCAA, 42 U.S.C. § 7412(r)(7), which requires the EPA to promulgate regulations for the prevention of accidental releases and requires owners or operators to prepare risk management plans.
(145) "Section 114(a)(3)" means subsection 114(a)(3) of the FCAA, 42 U.S.C. § 7414(a)(3), which requires enhanced monitoring and submission of compliance certifications for major sources.
(146) "Section 129" means section 129 of the FCAA, 42 U.S.C. § 7429, which requires the EPA to establish emission standards and other requirements for solid waste incineration units.
(147) "Section 129(e)" means subsection 129(e) of the FCAA, 42 U.S.C. § 7429(e), which requires solid waste incineration units to obtain Oregon Title V Operating Permits.
(148) "Section 182(f)" means subsection 182(f) of the FCAA, 42 U.S.C. § 7511a(f), which requires states to include plan provisions in the SIP for NOx in ozone nonattainment areas.

(149) "Section 182(f)(1)" means subsection 182(f)(1) of the FCAA, 42 U.S.C. § 7511a(f)(1), which requires states to apply those plan provisions developed for major VOC sources and major NOx sources in ozone nonattainment areas.

(150) "Section 183(e)" means subsection 183(e) of the FCAA, 42 U.S.C. § 7511b(e), which requires the EPA to study and develop regulations for the control of certain VOC sources under federal ozone measures.

(151) "Section 183(f)" means subsection 183(f) of the FCAA, 42 U.S.C. § 7511b(f), which requires the EPA to develop regulations pertaining to tank vessels under federal ozone measures.

(152) "Section 184" means section 184 of the FCAA, 42 U.S.C. § 7511c, which contains regulations for the control of interstate ozone air pollution.

(153) "Section 302" means section 302 of the FCAA, 42 U.S.C. § 7602, which contains definitions for general and administrative purposes in the FCAA.

(154) "Section 302(j)" means subsection 302(j) of the FCAA, 42 U.S.C. § 7602(j), which contains definitions of "major stationary source" and "major emitting facility."

(155) "Section 328" means section 328 of the FCAA, 42 U.S.C. § 7627, which contains regulations for air pollution from outer continental shelf activities.

(156) "Section 408(a)" means subsection 408(a) of the FCAA, 42 U.S.C. § 7651g(a), which contains regulations for the Title IV permit program.

(157) "Section 502(b)(10) change" means a change which contravenes an express permit term but is not a change that:

(a) Would violate applicable requirements;

(b) Would contravene federally enforceable permit terms and conditions that are monitoring, recordkeeping, reporting, or compliance certification requirements; or

(c) Is a FCAA Title I modification.

(158) "Section 504(b)" means subsection 504(b) of the FCAA, 42 U.S.C. § 7661c(b), which states that the EPA can prescribe by rule procedures and methods for determining compliance and for monitoring.

(159) "Section 504(e)" means subsection 504(e) of the FCAA, 42 U.S.C. § 761c(e), which contains regulations for permit requirements for temporary sources.

(160) "Significant emission rate" or "SER," except as provided in subsections (v) and (w), means an emission rate equal to the rates specified for the regulated pollutants below:

(a) Greenhouse gases (CO2e) = 75,000 tons per year

(b) Carbon monoxide = 100 tons per year except in a serious nonattainment area = 50 tons per year, provided DEQ has determined that stationary sources contribute significantly to carbon monoxide levels in that area.

(c) Nitrogen oxides (NOX) = 40 tons per year.

(d) Particulate matter = 25 tons per year.

(e) PM10 = 15 tons per year.

(f) Direct PM2.5 = 10 tons per year.

(g) PM2.5 precursors (SO2 or NOx) = 40 tons per year.

(h) Sulfur dioxide (SO2) = 40 tons per year.

(i) Ozone precursors (VOC or NOx) = 40 tons per year except:

(A) In a serious or severe ozone nonattainment area = 25 tons per year.

(B) In an extreme ozone nonattainment area = any emissions increase.

(j) Lead = 0.6 tons per year.

(k) Inorganic fluoride compounds (as measured by EPA method 13A or 13B), excluding hydrogen fluoride = 3 tons per year.

(l) Sulfuric acid mist = 7 tons per year.

(m) Hydrogen sulfide = 10 tons per year.

(n) Total reduced sulfur (including hydrogen sulfide) = 10 tons per year.

(o) Reduced sulfur compounds (including hydrogen sulfide) = 10 tons per year.

(p) Municipal waste combustor organics (measured as total tetra- through octa- chlorinated dibenzo-p-dioxins and

dibenzofurans) = 0.0000035 tons per year.
(q) Municipal waste combustor metals (measured as particulate matter) = 15 tons per year.
(r) Municipal waste combustor acid gases (measured as sulfur dioxide and hydrogen chloride) = 40 tons per year.
(s) Municipal solid waste landfill emissions (measured as nonmethane organic compounds) = 50 tons per year.
(t) Ozone depleting substances in aggregate = 100 tons per year.
(u) For the Medford-Ashland Air Quality Maintenance Area, the SER for PM10 is defined as 5.0 tons per year on an annual basis and 50.0 pounds per day on a daily basis.
(v) For regulated pollutants not listed in subsections (a) through (u), the SER is zero.
(w) Any new source or modification with an emissions increase less than the rates specified above and that is located within 10 kilometers of a Class I area, and would have an impact on such area equal to or greater than 1 ug/m3 (24 hour average) is emitting at a SER. This subsection does not apply to greenhouse gas emissions.
(161) "Significant impact" means an additional ambient air quality concentration equal to or greater than the significant impact level. For sources of VOC or NOx, a source has a significant impact if it is located within the ozone impact distance defined in OAR 340 division 224.
(162) “Significant impact level” or “SIL” means the ambient air quality concentrations listed below. The threshold concentrations listed below are used for comparison against the ambient air quality standards and PSD increments established under OAR chapter 340, division 202, but do not apply for protecting air quality related values, including visibility.
(a) For Class I areas:
(A) PM2.5:
(i) Annual = 0.03 µg/m3.
(ii) 24-hour = 0.07 µg/m3.
(B) PM10: 24-hour = 0.30 µg/m3.
(C) Sulfur dioxide:
(i) Annual = 0.10 µg/m3.
(ii) 24-hour = 0.20 µg/m3.
(iii) 3-hour = 1.0 µg/m3.
(D) Nitrogen dioxide: annual = 0.10 µg/m3.
(b) For Class II areas:
(A) PM2.5:
(i) Annual = 0.13 µg/m3.
(ii) 24-hour = 1.2 µg/m3.
(B) PM10: 24-hour = 1.0 µg/m3.
(C) Sulfur dioxide:
(i) Annual = 1.0 µg/m3.
(ii) 24-hour = 5.0 µg/m3.
(iii) 3-hour =25.0 µg/m3.
(iv) 1-hour = 8.0 µg/m3.
(D) Nitrogen dioxide:
(i) Annual =1.0 µg/m3.
(ii) 1-hour = 8.0 µg/m3.
(E) Carbon monoxide:
(i) 8-hour = 0.5 mg/m3.
(ii) 1-hour = 2.0 mg/m3.
(c) For Class III areas:
(A) PM2.5:
(i) Annual = 0.13 µg/m3.

(ii) 24-hour = 1.2 µg/m3.
(B) PM10: 24-hour = 1.0 µg/m3.
(C) Sulfur dioxide:
(i) Annual = 1.0 µg/m3.
(ii) 24-hour = 5.0 µg/m3.
(iii) 3-hour = 25.0 µg/m3.
(D) Nitrogen dioxide: annual = 1.0 µg/m3
(E) Carbon monoxide:
(i) 8-hour = 0.5 mg/m3.
(ii) 1-hour = 2.0 mg/m3.
(163) "Significant impairment" occurs when DEQ determines that visibility impairment interferes with the management, protection, preservation, or enjoyment of the visual experience within a Class I area. DEQ will make this determination on a case-by-case basis after considering the recommendations of the Federal Land Manager and the geographic extent, intensity, duration, frequency, and time of visibility impairment. These factors will be considered along with visitor use of the Class I areas, and the frequency and occurrence of natural conditions that reduce visibility.
(164) "Small scale local energy project" means:
(a) A system, mechanism or series of mechanisms located primarily in Oregon that directly or indirectly uses or enables the use of, by the owner or operator, renewable resources including, but not limited to, solar, wind, geothermal, biomass, waste heat or water resources to produce energy, including heat, electricity and substitute fuels, to meet a local community or regional energy need in this state;
(b) A system, mechanism or series of mechanisms located primarily in Oregon or providing substantial benefits to Oregon that directly or indirectly conserves energy or enables the conservation of energy by the owner or operator, including energy used in transportation;
(c) A recycling project;
(d) An alternative fuel project;
(e) An improvement that increases the production or efficiency, or extends the operating life, of a system, mechanism, series of mechanisms or project otherwise described in this section of this rule, including but not limited to restarting a dormant project;
(f) A system, mechanism or series of mechanisms installed in a facility or portions of a facility that directly or indirectly reduces the amount of energy needed for the construction and operation of the facility and that meets the sustainable building practices standard established by the State Department of Energy by rule; or
(g) A project described in subsections (a) to (f), whether or not the existing project was originally financed under ORS 470, together with any refinancing necessary to remove prior liens or encumbrances against the existing project.
(h) A project described in subsections (a) to (g) that conserves energy or produces energy by generation or by processing or collection of a renewable resource.
(165) "Source" means any building, structure, facility, installation or combination thereof that emits or is capable of emitting air contaminants to the atmosphere, is located on one or more contiguous or adjacent properties and is owned or operated by the same person or by persons under common control. The term includes all air contaminant emitting activities that belong to a single major industrial group, i.e., that have the same two-digit code, as described in the Standard Industrial Classification Manual, U.S. Office of Management and Budget, 1987, or that support the major industrial group.
(166) "Source category":
(a) Except as provided in subsection (b), means all the regulated pollutant emitting activities that belong to the same industrial grouping, i.e., that have the same two-digit code, as described in the Standard Industrial Classification Manual, U.S. Office of Management and Budget, 1987.
(b) As used in OAR chapter 340, division 220, Oregon Title V Operating Permit Fees, means a group of major sources that DEQ determines are using similar raw materials and have equivalent process controls and air pollution control

device.
(167) "Source test" means the average of at least three test runs conducted under the DEQ Source Sampling Manual found in 340-200-0035.
(168) "Standard conditions" means a temperature of 68° Fahrenheit (20° Celsius) and a pressure of 14.7 pounds per square inch absolute (1.03 Kilograms per square centimeter).
(169) "Startup" and "shutdown" means that time during which a source or control device is brought into normal operation or normal operation is terminated, respectively.
(170) "State Implementation Plan" or "SIP" means the State of Oregon Clean Air Act Implementation Plan as adopted by the EQC under OAR 340-200-0040 and approved by EPA.
(171) “State New Source Review” or “State NSR” means the new source review process and requirements under OAR 340-224-0010 through 340-224-0038, 340-224-0245 through 340-224-0270 and 340-224-0500 through 340-224-0540 based on the location and regulated pollutants emitted.
(172) "Stationary source" means any building, structure, facility, or installation at a source that emits or may emit any regulated pollutant. Stationary source includes portable sources that are required to have permits under OAR chapter 340, division 216.
(173) "Substantial underpayment" means the lesser of 10 percent of the total interim emission fee for the major source or five hundred dollars.
(174) “Sustainment area” means a geographical area of the state for which DEQ has ambient air quality monitoring data that shows an attainment or unclassified area could become a nonattainment area but a formal redesignation by EPA has not yet been approved. The presumptive geographic boundary of a sustainment area is the applicable urban growth boundary in effect on the date this rule was last approved by the EQC, unless superseded by rule. Sustainment areas are designated by the EQC according to division 204.
(175) “Sustainment pollutant” means a regulated pollutant for which an area is designated a sustainment area.
(176) "Synthetic minor source" means a source that would be classified as a major source under OAR 340-200-0020, but for limits on its potential to emit regulated pollutants contained in an ACDP or Oregon Title V permit issued by DEQ.
(177) "Title I modification" means one of the following modifications under Title I of the FCAA:
(a) A major modification subject to OAR 340-224-0050, Requirements for Sources in Nonattainment Areas or OAR 340-224-0055, Requirements for Sources in Reattainment Areas;
(b) A major modification subject to OAR 340-224-0060, Requirements for Sources in Maintenance Areas;
(c) A major modification subject to OAR 340-224-0070, Prevention of Significant Deterioration Requirements for Sources in Attainment or Unclassified Areas or 340-224-0045 Requirements for Sources in Sustainment Areas;
(d) A modification that is subject to a New Source Performance Standard under Section 111 of the FCAA; or,
(e) A modification under Section 112 of the FCAA.
(178) "Total reduced sulfur" or "TRS" means the sum of the sulfur compounds hydrogen sulfide, methyl mercaptan, dimethyl sulfide, dimethyl disulfide, and any other organic sulfides present expressed as hydrogen sulfide (H2S).
(179) “Toxic air contaminant” means an air pollutant that has been determined by the EQC to cause, or reasonably be anticipated to cause, adverse effects to human health and is listed in OAR 340-247-8010 Table 1.
(180) “Type A State NSR” means State NSR as specified in OAR 340-224-0010(2)(a).
(181) “Type B State NSR” means State NSR that is not Type A State NSR.
(182) "Typically Achievable Control Technology" or "TACT" means the emission limit established on a case-by-case basis for a criteria pollutant from a particular emissions unit under OAR 340-226-0130.
(183) "Unassigned emissions" means the amount of emissions that are in excess of the PSEL but less than the netting basis.
(184) "Unavoidable" or "could not be avoided" means events that are not caused entirely or in part by design, operation, maintenance, or any other preventable condition in either process or control device.
(185) “Unclassified area” or “attainment area” means an area that has not otherwise been designated by EPA as

nonattainment with ambient air quality standards for a particular regulated pollutant. Attainment areas or unclassified areas may also be referred to as sustainment or maintenance areas as designated in OAR chapter 340, division 204. Any particular location may be part of an attainment area or unclassified area for one regulated pollutant while also being in a different type of designated area for another regulated pollutant.

(186) "Upset" or "Breakdown" means any failure or malfunction of any air pollution control device or operating equipment that may cause excess emissions.

(187) "Veneer" means a single flat panel of wood not exceeding 1/4 inch in thickness formed by slicing or peeling from a log.

(188) "Veneer dryer" means equipment in which veneer is dried.

(189) "Visibility impairment" means any humanly perceptible change in visual range, contrast or coloration from that which existed under natural conditions. Natural conditions include fog, clouds, windblown dust, rain, sand, naturally ignited wildfires, and natural aerosols.

(190) "Volatile organic compounds" or "VOC" means any compound of carbon, excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate, that participates in atmospheric photochemical reactions.

(a) VOC includes any such organic compound other than the following, which have been determined to have negligible photochemical reactivity:

(A) Methane;
(B) Ethane;
(C) Methylene chloride (dichloromethane);
(D) 1,1,1-trichloroethane (methyl chloroform);
(E) 1,1,2-trichloro-1,2,2-trifluoroethane (CFC-113);
(F) Trichlorofluoromethane (CFC-11);
(G) Dichlorodifluoromethane (CFC-12);
(H) Chlorodifluoromethane (HCFC-22);
(I) Trifluoromethane (HFC-23);
(J) 1,2-dichloro 1,1,2,2-tetrafluoroethane (CFC-114);
(K) Chloropentafluoroethane (CFC-115);
(L) 1,1,1-trifluoro 2,2-dichloroethane (HCFC-123);
(M) 1,1,1,2-tetrafluoroethane (HFC-134a);
(N) 1,1-dichloro 1-fluoroethane (HCFC-141b);
(O) 1-chloro 1,1-difluoroethane (HCFC-142b);
(P) 2-chloro-1,1,1,2-tetrafluoroethane (HCFC-124);
(Q) Pentafluoroethane (HFC-125);
(R) 1,1,2,2-tetrafluoroethane (HFC-134);
(S) 1,1,1-trifluoroethane (HFC-143a);
(T) 1,1-difluoroethane (HFC-152a);
(U) Parachlorobenzotrifluoride (PCBTF);
(V) Cyclic, branched, or linear completely methylated siloxanes;
(W) Acetone;
(X) Perchloroethylene (tetrachloroethylene);
(Y) 3,3-dichloro-1,1,1,2,2-pentafluoropropane (HCFC-225ca);
(Z) 1,3-dichloro-1,1,2,2,3-pentafluoropropane (HCFC-225cb);
(AA) 1,1,1,2,3,4,4,5,5,5-decafluoropentane (HFC 43-10mee);
(BB) Difluoromethane (HFC-32);
(CC) Ethylfluoride (HFC-161);
(DD) 1,1,1,3,3,3-hexafluoropropane (HFC-236fa);

(EE) 1,1,2,2,3-pentafluoropropane (HFC-245ca);
(FF) 1,1,2,3,3-pentafluoropropane (HFC-245ea);
(GG) 1,1,1,2,3-pentafluoropropane (HFC-245eb);
(HH) 1,1,1,3,3-pentafluoropropane (HFC-245fa);
(II) 1,1,1,2,3,3-hexafluoropropane (HFC-236ea);
(JJ) 1,1,1,3,3-pentafluorobutane (HFC-365mfc);
(KK) chlorofluoromethane (HCFC-31);
(LL) 1 chloro-1-fluoroethane (HCFC-151a);
(MM) 1,2-dichloro-1,1,2-trifluoroethane (HCFC-123a);
(NN) 1,1,1,2,2,3,3,4,4-nonafluoro-4-methoxy-butane (C4 F9 OCH3 or HFE-7100);
(OO) 2-(difluoromethoxymethyl)-1,1,1,2,3,3,3-heptafluoropropane ((CF3)2 CFCF2 OCH3);
(PP) 1-ethoxy-1,1,2,2,3,3,4,4,4-nonafluorobutane (C4 F9 OC2 H5 or HFE-7200);
(QQ) 2-(ethoxydifluoromethyl)-1,1,1,2,3,3,3-heptafluoropropane ((CF3)2 CFCF2 OC2 H5);
(RR) Methyl acetate;
(SS) 1,1,1,2,2,3,3-heptafluoro-3-methoxy-propane (n-C3F7OCH3, HFE-7000);
(TT) 3-ethoxy- 1,1,1,2,3,4,4,5,5,6,6,6-dodecafluoro-2-(trifluoromethyl) hexane (HFE-7500);
(UU) 1,1,1,2,3,3,3-heptafluoropropane (HFC 227ea);
(VV) Methyl formate (HCOOCH3);
(WW) 1,1,1,2,2,3,4,5,5,5-decafluoro-3-methoxy-4-trifluoromethyl-pentane (HFE-7300);
(XX) Propylene carbonate;
(YY) Dimethyl carbonate;
(ZZ) Trans -1,3,3,3-tetrafluoropropene (also known as HFO-1234ze);
(AAA) HCF2 OCF2 H (HFE-134);
(BBB) HCF2 OCF2 OCF2 H (HFE-236cal2);
(CCC) HCF2 OCF2 CF2 OCF2 H (HFE-338pcc13);
(DDD) HCF2 OCF2 OCF2 CF2 OCF2 H (H-Galden 1040x or H-Galden ZT 130 (or 150 or 180));
(EEE) Trans 1-chloro-3,3,3-trifluoroprop-1-ene (also known as SolsticeTM 1233zd(E));
(FFF) 2,3,3,3-tetrafluoropropene (also known as HFO–1234yf);
(GGG) 2-amino-2-methyl-1-propanol;
(HHH) perfluorocarbon compounds which fall into these classes:
(i) Cyclic, branched, or linear, completely fluorinated alkanes;
(ii) Cyclic, branched, or linear, completely fluorinated ethers with no unsaturations;
(iii) Cyclic, branched, or linear, completely fluorinated tertiary amines with no unsaturations; and
(iv) Sulfur containing perfluorocarbons with no unsaturations and with sulfur bonds only to carbon and fluorine;
(III) cis-1,1,1,4,4,4-hexafluorobut-2-ene (also known as HFO-1336mzz-Z); and
(JJJ) t-butyl acetate.

(b) For purposes of determining compliance with emissions limits, VOC will be measured by an applicable test method in the DEQ Source Sampling Manual referenced in OAR 340-200-0035. Where such a method also measures compounds with negligible photochemical reactivity, these negligibly-reactive compounds may be excluded as VOC if the amount of such compounds is accurately quantified, and DEQ approves the exclusion.

(c) When considering a requested exclusion of negligibly-reactive compounds under subsection (b), DEQ may require an owner or operator to provide monitoring or testing methods and results that demonstrate, to DEQ's satisfaction, the amount of negligibly-reactive compounds in the source's emissions.

(191) "Wood fired veneer dryer" means a veneer dryer, that is directly heated by the products of combustion of wood fuel in addition to or exclusive of steam or natural gas or propane combustion.

(192) “Wood fuel-fired device” means a device or appliance designed for wood fuel combustion, including cordwood stoves, woodstoves and fireplace stove inserts, fireplaces, wood fuel-fired cook stoves, pellet stoves and combination

fuel furnaces and boilers that burn wood fuels.
(193) "Year" means any consecutive 12 month period of time.

NOTE: This rule is included in the State of Oregon Clean Air Act Implementation Plan that EQC adopted under OAR 340-200-0040 with the exception of all references to toxic air contaminants and OAR chapter 340, division 245.
NOTE: Referenced publications not linked to below are available from the agency.
NOTE: View a PDF of referenced tables and EPA Methods by clicking on "Tables" link below.

STATUTORY/OTHER AUTHORITY: ORS 468.020, 468A

STATUTES/OTHER IMPLEMENTED: ORS 468A.025, 468A.035, 468A.040, 468A.050, 468A.055, 468A.070, 468A.075, 468A.085, 468A.105, 468A.135, 468A.140, 468A.155, 468A.280, 468A.310, 468A.315, 468A.360, 468A.363, 468A.380, 468A.385, 468A.420, 468A.495, 468A.500, 468A.505, 468A.515, 468A.575, 468A.595, 468A.600, 468A.610, 468A.612, 468A.620, 468A.635, 468A.707, 468A.740, 468A.745, 468A.750, 468A.775, 468A.780, 468A.797, 468A.799, 468A.803, 468A.820, & Or. Laws 2009, chapter 754

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OAR 340-200-0020 Attachments

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Table 1 Significant Air Quality Impact

Pollutant	Averaging Time	Air Quality Area Designation		
		Class I	Class II	Class III
SO_2 (µg/m^3)*	Annual	0.10	1.0	1.0
	24-hour	0.20	5.0	5.0
	3-hour	1.0	25.0	25.0
	1-hour	---	8.0	---
PM10 (µg/m3)	Annual	0.20	0.2	0.2
	24-hour	0.30	1.0	1.0
PM2.5 (µg/m3)	Annual	0.06	0.3	0.3
	24-hour	0.07	1.2	1.2
NO2 (µg/m3)	Annual	0.10	1.0	1.0
	1-hour	---	8.0	---
CO (mg/m3)**	8 hour	---	0.5	0.5
	1-hour	---	2.0	2.0

* micrograms/cubic meter
**milligrams/cubic meter

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Table 2 Significant Emission Rates

Pollutant	Emission Rate
Greenhouse Gases (CO2e)	75,000 tons/year
Carbon Monoxide	100 tons/year
Nitrogen Oxides (NOX)	40 tons/year
Particulate Matter	25 tons/year
PM10	15 tons/year
Direct PM2.5	10 tons/year
PM2.5 precursors (SO2 or NOx)	40 tons/year
Sulfur Dioxide (SO2)	40 tons/year
Volatile Organic Compounds (VOC)	40 tons/year
Ozone precursors (VOC or NOx)	40 tons/year
Lead	0.6 ton/year
Fluorides	3 tons/year
Sulfuric Acid Mist	7 tons/year
Hydrogen Sulfide	10 tons/year
Total Reduced Sulfur (including hydrogen sulfide)	10 tons/year
Reduced sulfur compounds (including hydrogen sulfide)	10 tons/year
Municipal waste combustor organics (measured as total tetra- through octa- chlorinated dibenzo-p- dioxins and dibenzofurans)	0.0000035 ton/year
Municipal waste combustor metals (measured as particulate matter)	15 tons/year
Municipal waste combustor acid gases (measured as sulfur dioxide and hydrogen chloride)	40 tons/year
Municipal solid waste landfill emissions (measured as nonmethane organic compounds)	50 tons/year

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Table 3 Significant Emission Rates for the Medford-Ashland Air Quality Maintenance Area

Air Contaminant	Emission Rate	
	Annual	Day
PM10	5 tons	50 lbs.

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Table 4 De Minimis Emission Levels

Pollutant	De Minimis (tons/year, except as noted)
Greenhouse Gases (CO2e)	2,756
CO	1
NOx	1
SO2	1
VOC	1
PM	1
PM10 (except Medford AQMA)	1
PM10/PM2.5 (Medford AQMA)	0.5 [5.0 lbs/day]
Direct PM2.5	1
Lead	0.1
Fluorides	0.3
Sulfuric Acid Mist	0.7
Hydrogen Sulfide	1
Total Reduced Sulfur (including hydrogen sulfide)	1
Reduced Sulfur	1
Municipal waste combustor organics (Dioxin and furans)	0.0000005
Municipal waste combustor metals	1
Municipal waste combustor acid gases	1
Municipal solid waste landfill gases	1
Single HAP	1
Combined HAP (aggregate)	1

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Table 5 Generic PSELS

Pollutant	Generic PSEL (tons/year, except as noted)
Greenhouse Gases (CO2e)	74,000
CO	99
NOx	39
SO2	39
VOC	39
PM	24
PM10 (except Medford AQMA)	14
PM10/PM2.5 (Medford AQMA)	4.5 [49 lbs/day]
Direct PM2.5	9
Lead	0.5
Fluorides	2
Sulfuric Acid Mist	6
Hydrogen Sulfide	9
Total Reduced Sulfur (including hydrogen sulfide)	9
Reduced Sulfur	9
Municipal waste combustor organics (Dioxin and furans)	0.0000030
Municipal waste combustor metals	14
Municipal waste combustor acid gases	39
Municipal solid waste landfill gases	49
Single HAP	9
Combined HAPs (aggregate)	24

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METHOD 9 - VISUAL DETERMINATION OF THE OPACITY OF EMISSIONS FROM STATIONARY SOURCES

Many stationary sources discharge visible emissions into the atmosphere; these emissions are usually in the shape of a plume. This method involves the determination of plume opacity by qualified observers. The method includes procedures for the training and certification of observers, and procedures to be used in the field for determination of plume opacity. The appearance of a plume as viewed by an observer depends upon a number of variables, some of which may be controllable and some of which may not be controllable in the field. Variables which can be controlled to an extent to which they no longer exert a significant influence upon plume appearance include: Angle of the observer with respect to the plume; angle of the observer with respect to the sun; point of observation of attached and detached steam plume; and angle of the observer with respect to a plume emitted from a rectangular stack with a large length to width ratio. The method includes specific criteria applicable to these variables.

Other variables which may not be controllable in the field are luminescence and color contrast between the plume and the background against which the plume is viewed. These variables exert an influence upon the appearance of a plume as viewed by an observer, and can affect the ability of the observer to accurately assign opacity values to the observed plume. Studies of the theory of plume opacity and field studies have demonstrated that a plume is most visible and presents the greatest apparent opacity when viewed against a contrasting background. It follows from this, and is confirmed by field trials, that the opacity of a plume, viewed under conditions where a contrasting background is present can be assigned with the greatest degree of accuracy. However, the potential for a positive error is also the greatest when a plume is viewed under such contrasting conditions. Under conditions presenting a less contrasting background, the apparent opacity of a plume is less and approaches zero as the color and luminescence contrast decrease toward zero. As a result, significant negative bias and negative errors can be made when a plume is viewed under less contrasting conditions. A negative bias decreases rather than increases the possibility that a plant operator will be cited for a violation of opacity standards due to observer error.

Studies have been undertaken to determine the magnitude of positive errors which can be made by qualified observers while reading plumes under contrasting conditions and using the procedures set forth in this method. The results of these studies (field trials) which involve a total of 769 sets of 25 readings each are as follows:

(1) For black plumes (133 sets at a smoke generator), 100 percent of the sets were read with a positive error[1] of less than 7.5 percent opacity; 99 percent were read with a positive error of less than 5 percent opacity.

(2) For white plumes (170 sets at a smoke generator, 168 sets at a coal-fired power plant, 298 sets at a sulfuric acid plant), 99 percent of the sets were read with a positive error of less than 7.5 percent opacity; 95 percent were read with a positive error of less than 5 percent opacity. The positive observational error associated with an average of twenty-five readings is therefore established. The accuracy of the method must be taken into account when determining possible violations of applicable opacity standards.

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[1] For a set, positive error-average opacity determined by observer' s 25 observations-average opacity determined from transmissometer's 25 recordings.

1. Principle and Applicability

1.1 Principle. The opacity of emissions from stationary sources is determined visually by a qualified observer.

1.2 Applicability. This method is applicable for the determination of the opacity of emissions from stationary sources pursuant to §60.11(b) and for qualifying observers for visually determining opacity of emissions.

2. Procedures

The observer qualified in accordance with section 3 of this method shall use the following procedures for visually determining the opacity of emissions:

2.1 Position. The qualified observer shall stand at a distance sufficient to provide a clear view of the emissions with the sun oriented in the 140° sector to his back. Consistent with maintaining the above requirement, the observer shall, as much as possible, make his observations from a position such that his line of vision is approximately perpendicular to the plume direction, and when observing opacity of emissions from rectangular outlets (e.g., roof monitors, open baghouses, noncircular stacks), approximately perpendicular to the longer axis of the outlet. The observer's line of sight should not include more than one plume at a time when multiple stacks are involved, and in any case the observer should make his observations with his line of sight perpendicular to the longer axis of such a set of multiple stacks (e.g., stub stacks on baghouses).

2.2 Field Records. The observer shall record the name of the plant, emission location, type facility, observer's name and affiliation, a sketch of the observer's position relative to the source, and the date on a field data sheet (Figure 9–1). The time, estimated distance to the emission location, approximate wind direction, estimated wind speed, description of the sky condition (presence and color of clouds), and plume background are recorded on a field data sheet at the time opacity readings are initiated and completed.

2.3 Observations. Opacity observations shall be made at the point of greatest opacity in that portion of the plume where condensed water vapor is not present. The observer shall not look continuously at the plume, but instead shall observe the plume momentarily at 15-second intervals.

2.3.1 Attached Steam Plumes. When condensed water vapor is present within the plume as it emerges from the emission outlet, opacity observations shall be made beyond the point in the plume at which condensed water vapor is no longer visible. The observer shall record the approximate distance from the emission outlet to the point in the plume at which the observations are made.

2.3.2 Detached Steam Plume. When water vapor in the plume condenses and becomes visible at a distinct distance from the emission outlet, the opacity of emissions should be evaluated at the emission outlet prior to the condensation of water vapor and the formation of the steam plume.

2.4 Recording Observations. Opacity observations shall be recorded to the nearest 5 percent at 15-second intervals on an observational record sheet. (See Figure 9–2 for an example.) A minimum of 24 observations shall be recorded. Each momentary observation recorded shall be deemed to represent the average opacity of emissions for a 15-second period.

2.5 Data Reduction. Opacity shall be determined as an average of 24 consecutive observations recorded at 15-second intervals. Divide the observations recorded on the record sheet into sets of 24 consecutive observations. A set is composed of any 24 consecutive observations. Sets need not be consecutive in time and in no case shall two sets overlap. For each set of 24 observations, calculate the average by summing the opacity of the 24 observations and dividing this sum by 24. If an applicable standard specifies an averaging time requiring more than 24 observations, calculate the average for all observations made during the specified time period. Record the average opacity on a record sheet. (See Figure 9–1 for an example.)

3. Qualifications and Testing

3.1 Certification Requirements. To receive certification as a qualified observer, a candidate must be tested and demonstrate the ability to assign opacity readings in 5 percent increments to 25 different black plumes and 25 different white plumes, with an error not to exceed 15 percent opacity on any one reading and an average error not to exceed 7.5 percent opacity in each category. Candidates shall be tested according to the procedures described in section 3.2. Smoke generators used pursuant to section 3.2 shall be equipped with a smoke meter which meets the requirements of section 3.3.

The certification shall be valid for a period of 6 months, at which time the qualification procedure must be repeated by any observer in order to retain certification.

3.2 Certification Procedure. The certification test consists of showing the candidate a complete run of 50 plumes—25 black plumes and 25 white plumes—generated by a smoke generator. Plumes within each set of 25 black and 25 white runs shall be presented in random order. The candidate assigns an opacity value to each plume and records his observation on a suitable form. At the completion of each run of 50 readings, the score of the candidate is determined. If a candidate fails to qualify, the complete run of 50 readings must be repeated in any retest. The smoke test may be administered as part of a smoke school or training program, and may be preceded by training or familiarization runs of the smoke generator during which candidates are shown black and white plumes of known opacity.

3.3 Smoke Generator Specifications. Any smoke generator used for the purposes of section 3.2 shall be equipped with a smoke meter installed to measure opacity across the diameter of the smoke generator stack. The smoke meter output shall display instack opacity based upon a pathlength equal to the stack exit diameter, on a full 0 to 100 percent chart recorder scale. The smoke meter optical design and performance shall meet the specifications shown in Table 9–1.
The smoke meter shall be calibrated as prescribed in section 3.3.1 prior to the conduct of each smoke reading test. At the completion of each test, the zero and span drift shall be checked and if the drift exceeds ±1 percent opacity, the condition shall be corrected prior to conducting any subsequent test runs. The smoke meter shall be demonstrated, at the time of installation, to meet the specifications listed in Table 9–1. This demonstration shall be repeated following any subsequent repair or replacement of the photocell or associated electronic circuitry including the chart recorder or output meter, or every 6 months, whichever occurs first.

Table 9–1—Smoke Meter Design and Performance Specifications

Parameter	Specification
a. Light source	Incandescent lamp operated at nominal rated voltage.
b. Spectral response of photocell	Photopic (daylight spectral response of the human eye—Citation 3).
c. Angle of view	15° maximum total angle.

d. Angle of projection	15° maximum total angle.
e. Calibration error	±3% opacity, maximum.
f. Zero and span drift	±1% opacity, 30 minutes.
g. Response time	5 seconds.

3.3.1 Calibration. The smoke meter is calibrated after allowing a minimum of 30 minutes warmup by alternately producing simulated opacity of 0 percent and 100 percent. When stable response at 0 percent or 100 percent is noted, the smoke meter is adjusted to produce an output of 0 percent or 100 percent, as appropriate. This calibration shall be repeated until stable 0 percent and 100 percent readings are produced without adjustment. Simulated 0 percent and 100 percent opacity values may be produced by alternately switching the power to the light source on and off while the smoke generator is not producing smoke.

3.3.2 Smoke Meter Evaluation. The smoke meter design and performance are to be evaluated as follows:

3.3.2.1 Light Source. Verify from manufacturer's data and from voltage measurements made at the lamp, as installed, that the lamp is operated within ±5 percent of the nominal rated voltage.

3.3.2.2 Spectral Response of Photocell. Verify from manufacturer's data that the photocell has a photopic response; i.e., the spectral sensitivity of the cell shall closely approximate the standard spectral-luminosity curve for photopic vision which is referenced in (b) of Table 9–1.

FIGURE 9-1
RECORD OF VISUAL DETERMINATION OF OPACITY

PAGE___of___

COMPANY____________________

LOCATION____________________

TEST NUMBER____________________

DATE____________________

TYPE FACILITY____________________

CONTROL DEVICE____________________

HOURS OF OBSERVATION____________________

OBSERVER____________________

OBSERVER CERTIFICATION DATE____________________

OBSERVER AFFILIATION____________________

POINT OF EMISSIONS____________________

HEIGHT OF DISCHARGE POINT____________________

	Initial			Final
CLOCK TIME				
OBSERVER LOCATION Distance to Discharge				
Direction from Discharge				
Height of Observation Point				
BACKGROUND DESCRIPTION				
WEATHER CONDITIONS Wind Direction				
Wind Speed				
Ambient Temperature				
SKY CONDITIONS (clear, overcast, % clouds, etc.)				
PLUME DESCRIPTION Color				
Distance Visible				
OTHER INFORMATION				

SUMMARY OF AVERAGE OPACITY

Set Number	Time	Opacity	
	Start--End	Sum	Average

Readings ranged from ____ to ____ % opacity

The source was/was not in compliance with ____ at the time evaluation was made.

Figure 9–2—Observation Record

Company	Observer	
Location	Type facility	
Test Number	Point of emissions	
Date		

		Seconds				**Steam plume (check if applicable)**		
Hr.	**Min.**	**0**	**15**	**30**	**45**	**Attached**	**Detached**	**Comments**
	0							
	1							
	2							
	3							
	4							
	5							
	6							
	7							
	8							
	9							
	10							
	11							
	12							
	13							
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	15							
	16							
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	18							
	19							
	20							
	21							
	22							
	23							
	24							
	25							
	26							
	27							
	28							

Company	Observer	
Location	Type facility	
Test Number	Point of emissions	
Date		

		Seconds				Steam plume (check if applicable)		
Hr.	**Min.**	**0**	**15**	**30**	**45**	**Attached**	**Detached**	**Comments**
	29							
	30							
	31							
	32							
	33							
	34							
	35							
	36							
	37							
	38							
	39							
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	58							
	59							

3.3.2.3 Angle of View. Check construction geometry to ensure that the total angle of view of the smoke plume, as seen by the photocell, does not exceed 15°. The total angle of view may be calculated from: $\Theta = 2 \tan^{-1} d/2L$, where Θ = total angle of view; d = the sum of the photocell diameter+ the diameter of the limiting aperture; and L = the distance from the photocell to the limiting aperture. The limiting aperture is the point in the path between the photocell and the smoke plume where the angle of view is most restricted. In smoke generator smoke meters this is normally an orifice plate.

3.3.2.4 Angle of Projection. Check construction geometry to ensure that the total angle of projection of the lamp on the smoke plume does not exceed 15°. The total angle of projection may be calculated from: $\Theta = 2 \tan^{-1} d/2L$, where Θ = total angle of projection; d=the sum of the length of the lamp filament + the diameter of the limiting aperture; and L = the distance from the lamp to the limiting aperture.

3.3.2.5 Calibration Error. Using neutral-density filters of known opacity, check the error between the actual response and the theoretical linear response of the smoke meter. This check is accomplished by first calibrating the smoke meter according to 3.3.1 and then inserting a series of three neutral-density filters of nominal opacity of 20, 50, and 75 percent in the smoke meter pathlength. Filters calibrated within ±2 percent shall be used. Care should be taken when inserting the filters to prevent stray light from affecting the meter. Make a total of five nonconsecutive readings for each filter. The maximum error on any one reading shall be 3 percent opacity.

3.3.2.6 Zero and Span Drift. Determine the zero and span drift by calibrating and operating the smoke generator in a normal manner over a 1-hour period. The drift is measured by checking the zero and span at the end of this period.

3.3.2.7 Response Time. Determine the response time by producing the series of five simulated 0 percent and 100 percent opacity values and observing the time required to reach stable response. Opacity values of 0 percent and 100 percent may be simulated by alternately switching the power to the light source off and on while the smoke generator is not operating.

4. Bibliography

1. Air Pollution Control District Rules and Regulations, Los Angeles County Air Pollution Control District, Regulation IV, Prohibitions, Rule 50.

2. Weisburd, Melvin I., Field Operations and Enforcement Manual for Air, U.S. Environmental Protection Agency, Research Triangle Park, NC. APTD–1100, August 1972, pp. 4.1–4.36.

3. Condon, E.U., and Odishaw, H., Handbook of Physics, McGraw-Hill Co., New York, NY, 1958, Table 3.1, p. 6–52.

AMEND: 340-200-0035

RULE TITLE: Reference Materials

NOTICE FILED DATE: 06/12/2025

RULE SUMMARY: Modifies date to specify most recent Code of Federal Regulations edition.

RULE TEXT:
As used in divisions 200 through 268, the following materials refer to the versions listed below.
(1) "C.F.R." or “CFR” means Code of Federal Regulations and, unless otherwise expressly identified, refers to the July 1, 2025, edition.
(2) The DEQ Source Sampling Manual refers to the November 2018 edition.
(3) The DEQ Continuous Monitoring Manual refers to the April 2015 edition.

NOTE: This rule is included in the State of Oregon Clean Air Act Implementation Plan that EQC adopted under OAR 340-200-0040 with the exception of all references to toxic air contaminants and OAR chapter 340, division 245.

STATUTORY/OTHER AUTHORITY: ORS 468.020, 468A

STATUTES/OTHER IMPLEMENTED: ORS 468A

State of Oregon Department of Environmental Quality

OAR 340-200-0035
DEQ Source Sampling Manual
DEQ Continuous Monitoring Manual

Air Quality Program

Source Sampling Manual

Volume 1

January, 1976

Revisions:
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August, 1981
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DEQ is a leader in restoring, maintaining and enhancing the quality of Oregon's air, land and water.

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Table of Contents

Executive Summary

DEQ’s Source Sampling Manual provides the procedures and test methods for conducting source sampling (i.e., stack testing) at facilities regulated by DEQ. The manual includes procedures for notifying DEQ of testing projects; preparing and obtaining approval of source test plans prior to conducting the testing; and preparing source test reports after the testing is completed. The manual identifies established sampling methods that are approved for source sampling projects, as well as procedures for obtaining approval for modifications or alternatives to the methods. Most of the sampling methods are federal methods that have been incorporated by reference. However, there are several test methods that are unique to DEQ. The Source Sampling Manual was first written in 1976 with revisions in 1979, 1981, 1992, 2015 and 2018. The Source Sampling Manual is included in Oregon’s State Implementation Plan.

1.0 INTRODUCTION

1.1. PURPOSE AND SCOPE

This manual has been prepared by the Oregon Department of Environmental Quality (DEQ) for the purpose of delineating practices for the measurement and sampling of exhaust gas streams originating from point sources in accordance with Oregon Administrative Rules. Within this document, the references to *permit* signify either an Air Contaminant Discharge Permit (ACDP) or an Oregon Title V Operating Permit, both issued by the State of Oregon.

This manual applies to DEQ personnel, testing contractors, and permittees. Collectively, with permit requirements and promulgated sampling guidance documents, it outlines source sampling techniques approved by DEQ for use in conducting stationary source emissions testing. Unless otherwise specified in an Oregon Administrative Rule, permit, or DEQ letter, these general requirements must be followed when conducting source testing in Oregon. If there is a conflict with a permit or rule and this manual, the permit or rule will take precedence.

This 2018 revision of the Source Sampling Manual, Volume I, supersedes all previous versions of this manual.

1.2. APPLICABILITY

The procedures specified in this manual are standard requirements for measuring point source emissions under normal circumstances. Methods or techniques not cited in this manual may be approved on a case-by-case basis.

The measurement of point source emissions (i.e. stack testing) is conducted to determine the quantity, concentration, or destruction/removal of a specific pollutant or pollutants being emitted into the atmosphere by a regulated or non-regulated source.

This manual references test methods published by DEQ, EPA, and other agencies or organizations.

2.0 SOURCE SAMPLING GENERAL REQUIREMENTS

2.1. TESTING DEADLINES FOR CONDUCTING SOURCE SAMPLING

2.1.a. Identifying Regulation(s)

The deadlines for conducting source sampling projects may be established by any or all of the following:

- Air Contaminant Discharge Permit;
- Oregon Title V Operating Permit;
- Chapter 340 of Oregon Administrative Rules;

- Title 40 of Code of Federal Regulations; or
- Enforcement document (e.g., Mutual Agreement Order).

2.1.b. Time Extensions

For sampling projects conducted to meet federal & state requirements, regulatory provisions to extend testing deadlines are limited and take into account the circumstances contributing to the delay. Failure to test a source by the required deadline may violate federal or state rule and may result in enforcement actions.

2.2. DEPARTMENT NOTIFICATION

DEQ must be notified of all source sampling projects that are required by DEQ, including federal requirements that have been delegated to DEQ by the Environmental Protection Agency (EPA). Unless specified by rule or by permit condition, DEQ must receive notification at least 30 days in advance of the source test date. Notification may be submitted electronically or by hardcopy, and accompanied by a source test plan.

In addition, DEQ must be notified of all source sampling projects that are not required by DEQ if test results are relied upon in permitting a source, used as evidence in an enforcement case, or used to demonstrate compliance with non-delegated federal requirements.

2.3. SOURCE TEST PLAN

A source test plan must be approved by DEQ in advance of all source sampling projects that are required by DEQ, including federal requirements delegated to DEQ by EPA. If not otherwise specified by rule or permit condition, DEQ must be provided at least 30 days to review and approve source test plans. For routine testing programs, the permit or rule often specifies 15 days notice. Conversely, particularly complex source testing programs may require 45 days or more for protocol approval. The source test plan may be prepared by the source owner, operator, or consultant representing the owner or operator. The source test plan will be reviewed by the DEQ or by an agent representing DEQ.

A source test plan must include, as a minimum, the information stipulated by Table A-1 in Appendix A. The source test plan should *not* include a copy of the published sampling method unless specifically requested by the regulating authority. In addition, sample system diagrams should *not* be included within the source test plan unless the proposed schematic deviates from published methodology.

2.4. MODIFICATIONS/ALTERNATIVES TO METHODS OR PROCEDURES

2.4.a. Testing Projects Required by DEQ

All modifications and/or alternatives to testing methods or procedures that are performed to satisfy DEQ testing requirements must receive approval from DEQ prior to their use in the field. When possible, these requests are to be addressed within the Source Test Plan.

If the need for testing modifications or alterations to the approved Source Test Plan is discovered during field activities, approval must first be obtained from the observing Department representative. If a DEQ representative is not on site during field activities, approval from any DEQ Source Test Coordinator or other DEQ representative may be obtained. Changes not acknowledged by the DEQ could be basis for invalidating an entire test run and potentially the entire testing program. Documentation of any deviations must be incorporated in the source test report and include an evaluation of the impact of the deviation on the test data.

2.4.b. Testing Projects Required by Federal Regulations

For all testing projects performed to satisfy federal testing requirements (e.g. NSPS, NESHAP), approval for modifications and alterations of federal testing requirements must follow the procedures outlined in the Emission Measurement Center Guideline Document GD-022R3. As per this guideline, minor changes to test methods and procedures may be approved by DEQ personnel. All other changes must be approved by EPA.

Minor change to a test method is a modification to a federally enforceable test method that (a) does not decrease the stringency of the emission limitation or standard; (b) has no national significance (e.g., does not affect implementation of the applicable regulation for other affected sources, does not set a national precedent, and individually does not result in a revision to the test method); and (c) is site-specific, made to reflect or accommodate the operational characteristics, physical constraints, or safety concerns of an affected source. Examples of minor changes to a test procedure are:

- Modified sampling traverse or location to avoid interference from an obstruction in the stack,
- Increasing the sampling time or volume,
- Use of additional impingers for a high moisture situation,
- Accepting particulate emission results for a test run that was conducted with a lower than specified temperature,
- Substitution of a material in the sampling train that has been demonstrated to be more inert for the sample matrix, and
- Changes in recovery and analytical techniques such as a change in QA/QC requirements needed to adjust for analysis of a certain sample matrix.

(Per memo from John S. Seitz, Director OAQPS, *Delegation of 40 CFR Part 63 General Provisions Authorities to State and Local Air Pollution Control Agencies,* Attachment 1, July 10, 1998)

2.5. SAMPLE REPLICATES

Unless otherwise specified by permit, State rule, federal regulation, or Department letter, each source test must consist of at least three (3) test runs and the emission results reported for each run individually and as the arithmetic average of all valid test runs. If for reasons beyond the control of the permittee (e.g., forced shutdown, extreme meteorological conditions, failure of an irreplaceable portion of the sample train) a test run is invalidated and cannot be replaced by a valid test run, DEQ may consider accepting two (2) test runs for demonstrating compliance with the emission limit or standard. However, all test runs, including those deemed invalid, are to be included in the test report.

2.6. SAMPLE POSTPONEMENTS & STOPPAGES

It is acceptable to postpone a scheduled test or suspend a test in progress if the discontinuation is due to equipment failure beyond the facility's control, construction delays beyond the facility's control, severe meteorological conditions, and situations that would jeopardize the safety of the testing contractors and/or operators. If the test is underway, the permittee should make every effort to complete the test run. All recoverable test information (process & sample data) must be available for DEQ review.

It is unacceptable to postpone or suspend a test run in progress if it is discontinued because the source is not able to comply with an emission limit, verify an existing emission factor, or comply with a control equipment performance standard. The permittee must provide DEQ written documentation explaining the reasons for the postponement or stoppage, and any data collected prior to the stoppage . DEQ will review the documentation and all available stack test data to determine if a violation occurred.

2.7. TEST DURATION & SAMPLE VOLUMES

2.7.a. General Duration & Volume Requirements

Unless otherwise specified by permit, state rule, federal regulation, or Department letter, each source test must be a minimum of one (1) hour long. For criteria pollutants (PM, PM_{10}, $PM_{2.5}$, SO_x, NO_x, CO, & VOCs) measured utilizing wet-chemistry methods, the sample volume must be sufficient to ensure a minimum In-Stack Detection Limit (ISDL) of one-half (1/2) the emission standard. Refer to Section 2.8 of this manual for the definition and calculation of ISDL.

Unless otherwise specified by rule, permit condition, or source test plan approval letter, all toxic air contaminants and hazardous air pollutants (HAPs) sampling programs must ensure adequate sample volumes so that the mass recovered is at least five (5) times the limit of detection for the analytical method chosen. Alternatively, the ISDL must be less than or equal to one-fifth (1/5) the emission standard.

For purposes of this section, "emission standard" refers to emission limits (other than Plant Site Emission Limits), emission factor(s), and/or destruction and removal efficiencies.

2.7.b. DEQ Methods Specific Duration & Volume Requirements

For DEQ Methods 5 & 7, the minimum sample volume must be the greater of 31.8 dry standard cubic feet (dscf) or sufficient to ensure a minimum In-Stack Detection Limit (ISDL) of one-half (1/2) the emission standard. In addition, the minimum sample duration must be 60 minutes.

For DEQ Method 8 (high volume sampler), the minimum sample volume must be the greater of 150 dry standard cubic feet (dscf) or sufficient to ensure a minimum In-Stack Detection Limit of one-half (1/2) the emission standard. In addition, the minimum sample duration must be 15 minutes.

2.8. IN-STACK DETECTION LIMIT

2.8.a. General In-Stack Detection Limit (ISDL)

In general practice, the In-Stack Detection Limit (ISDL) is defined as follows:

$$ISDL = \frac{AxB}{C}$$

Where:

ISDL = In-Stack detection limit
A = Analytical detection limit for analyte (e.g., pollutant) in a sample matrix (e.g., solution, filter, resin)
B = Quantity of sample matrix (e.g. milliliters of solution)
C = Volume of stack gas sampled

Example:

For an HCl sample with the following characteristics:

A = 1 ug (HCl) per ml of solution;
B = 300 mls of sample solution; and
C = 1 dscm of exhaust gas (C) drawn through the sample solution.

The ISDL in ug/dscm would be calculated as follows:

ISDL = (A x B)/C
ISDL = (1 ug/ml x 300 ml)/1 dscm
ISDL = 300 ug/dscm

2.8.b. ISDL for Particulate Measurement Methods

When calculating the ISDL for particulate sampling methods, the analytical detection limits (A) are:

- 7 mg for ODEQ Methods 5 & 7 (total particulate),
- 3 mg for EPA Methods 5, 5A, 5B, 5D, 5E, 5F, & 17 (filterable particulate),
- 4 mg for EPA Method 202 (condensable particulate), and
- 100 mg for ODEQ Method 8 (high volume sampler-filterable particulate).

Additionally, when calculating the ISDL for the above particulate sampling methods, the quantity of sample matrix (character "B" in equation) equals "1 sample train".

2.8.c. ISDL for Instrumental Monitoring Reference Methods

The ISDL for continuous emission monitoring (CEM) reference methods (i.e., 3A, 6C, 16C, 7E, 10, 20, & 25A), is equal to the sensitivity of the instrumentation, which is two percent (2%) of the span value (as per the CEMS Methods).

2.8.d. ISDL Expressed on a Mass Rate or Process Rate Basis

If the emission standard is expressed on a mass rate basis, a representative flow and/or process rate is to be applied in conjunction with the ISDL (on a concentration basis) to obtain a value expressed in comparable units.

2.9. REPRESENTATIVE TESTING CONDITIONS

For demonstrating compliance with an emission standard, the stack test must successfully demonstrate that a facility is capable of complying with the applicable standard under all normal operating conditions. Therefore, an owner or operator should conduct the source test while operating under typical worst-case conditions that generate the highest emissions. During the compliance demonstration, new or modified equipment should operate at levels that equal or exceed ninety-percent (90%) of the design capacity. For existing equipment, emission units should operate at levels that equal or exceed ninety-percent (90%) of normal maximum operating rates. Furthermore, the process material(s) and fuel(s) that generate the highest emissions for the pollutant(s) being tested should be used during the testing. Operating requirements for performance tests are often specified by State or federal rule, or by permit condition.

When verifying or determining an emission factor, the stack test must generate an emission factor that represents normal emissions for the operating condition tested. Multiple testing projects may be required for sources that experience variations in process, have frequent start-ups and shut-downs, use multiple fuel combinations, utilize numerous process materials, or manufacture diverse products.

Whether sampling to demonstrate compliance, to establish an emission factor, or to support an toxic air contaminant risk assessment, it is imperative to describe in detail the proposed process conditions within the Source Test Plan. Refer to Section 2.3 and Appendix A of this manual for Source Test Plan requirements.

2.10. SIGNIFICANT FIGURES & ROUNDING PROCEDURES

2.10.a. Significant Figures

All federal emission standards have at least two (2) significant figures but no more than three (3) (Memorandum from William G. Lawton and John S. Seitz to New Source Performance Standards/National Emission Standards for Hazardous Pollutants Compliance Contacts, subject “Performance Test Calculation Guidelines”, June 6, 1990). For example, 0.04 gr/dscf is considered to be 0.040 gr/dscf and 90 mg/dscm is considered to be 90. mg/dscm.

Generally, DEQ emission standards have at least two (2) significant figures. However, the number of significant figures for DEQ standards are defined by the standards themselves. For example, 40 lbs/hr is considered to be 40. lbs/hr and 0.1 gr/dscf does not include additional significant figures.

It is imperative to maintain an appropriate number of significant figures within the intermediate calculations to minimize the discrepancy of results due to rounding inconsistencies. In general, at least five (5) significant figures should be retained throughout the intermediate calculations.

2.10.b. Rounding Procedures

The procedure for rounding of a figure or a result may mean the difference between demonstrating compliance or demonstrating a violation. Based on the routine specified by the American Society for Testing and Materials (ASTM, Standard for Metric Practice E 380) the following procedure must be used:

> *If the first digit to be discarded is less than five (5), the last digit retained should not be changed. When the first digit discarded is greater than five (5), or if it is a five (5) followed by at least one digit other than zero (0), the last figure retained should be increased by one unit. When the first digit discarded is exactly five, followed only by zeros (0s), the last digit retained should be rounded upward if it is an odd number, but no adjustment made if it is an even number.*

For example, if the emission standard is 0.040 gr/dscf, then 0.040341 would be rounded to 0.040, 0.040615 would be rounded to 0.041, 0.040500 would be rounded to 0.040, and 0.041500 would be rounded to 0.042 (note that five significant figures were retained prior to rounding).

2.11. REPORTING & RECORDKEEPING

2.11.a. Report Content & Format

At a minimum, the content of the source sampling report must be consistent with the requirements outlined in Table A-2 in Appendix A. DEQ recognizes that the presentation and format of the reports will vary between sampling projects and testing contractors. However, the report must comprehensively include all essential information and maintain sufficient detail to satisfactorily communicate the test objectives and results.

To conserve storage space and natural resources, all test reports should be published utilizing both-sides of each page. In addition, each page of the report body and of the appendices is to be numbered for ease of reference. Refer to Section 2.11.b. for information on the Source Test Audit Report.

2.11.b. Source Test Audit Report (STAR)

A Source Testing Audit Report (STAR) is required for all testing required by DEQ. Like test reports, the submittal of the STAR is the responsibility of the owner or operator. DEQ may not accept test reports that do not include the STAR or if the submitted STAR is incomplete or inaccurate. Refer to the document, *"Guidelines for Completing Source Testing Audit Report"* for more details regarding the STAR. Contact a DEQ Source Test Coordinator to receive instructions on how to obtain the most current STAR forms.

2.11.c. Reporting Results that are below the In-Stack Detection Limits

Emission tests occasionally yield results that are below the in-stack detection limit (ISDL) for a given pollutant. These data frequently provide important information, depending on the purpose of the test and if the tester extracted an adequate sample volume (see Section 2.7). Therefore, unless otherwise stated by method, rule, or permit, the following reporting procedures are to be followed when results from replicate tests are below the in-stack detection limit. Substitution at less than the

ISDL may be used in Cleaner Air Oregon risk assessments conducted under OAR 340 division 245 if approved by DEQ.

- Each test replicate that is below the ISDL should be reported as less than (<) the detection limit value (e.g., <0.14). If the test replicate is included in a multi-run test series, the ISDL value is used when calculating the numerical average.
- Label the average result as less than (<) if the numerical average of a test series includes at least one test replicate below the ISDL.

Several groups of toxic air contaminants are generally reported as the sum of the individual compounds (or elements) within that group. For example, the individual dioxin/furan compounds (or 'congeners') specified in the test method are summed using toxicity factors and reported as a single value (i.e., 2,3,7,8-TCDD Equivalents). The corresponding emission limits and/or emission factors are also expressed as 2,3,7,8-TCDD Equivalents. If any of the individual congeners are reported as 'below the detection limit' for a given test result, the contribution of that congener to the 2,3,7,8-TCDD Equivalent value shall be calculated as 0.5 x the detection limit. The 2,3,7,8-TCDD Equivalent value is a 'composite result' of the individual dioxin/furan compounds in a given sample. Although this TCDD Equivalent value may contain non-detectable quantities, the value is reported as a quantity (i.e., not a '< DL' value).

Other groups of compounds that present similar reporting complexities are polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), Total Organic Hazardous Air Pollutants (OHAPs), and Total Selected Metals (TSM). A specific regulation, method, or permit condition may dictate other calculation procedures to be followed in combining non-detectable with measured quantities within a composite result; these shall take precedent over the above-described approach.

2.11.d. Report Submittal

Unless otherwise specified by rule or permit, one (1) bound copy of the source test report must be submitted to the regional Source Test Coordinator within 30 days following the field work. Requests for extensions will be evaluated by DEQ on a case- by-case basis. An electronic version of the report can also be submitted in addition to the bound copy.

2.11.e. Recordkeeping

All documentation of sampling equipment calibrations and analytical results should be maintained for a minimum of five years.

In general, the unanalyzed portions (aliquots) of the source test samples must be preserved up to the maximum holding times as specified by method. Sample filters gravimetrically analyzed for particulate matter are to be archived for a minimum of 6 months. However, sample archiving specifications pertaining to laboratory glassware is left to the discretion of the analyzing laboratory and the testing contractor.

3.0 SAMPLING METHODS

3.1. ESTABLISHED SAMPLING METHODS

Established sampling methods for various pollutants are listed within Appendix B of this manual. These methods have historically been accepted by DEQ and originate from various governmental agencies and organizations. This list is not all-inclusive and may not reflect current method updates. The use of a listed method is not automatically approved by DEQ. Instead, written DEQ approval is required prior to all testing projects that are executed to satisfy state or federal testing requirements. Refer to Sections 2.2 & 2.3 of this manual for notification and source test plan requirements.

Generally, DEQ sampling methods (ODEQ Methods) or EPA methods (promulgated, alternative, & conditional) are preferable for conducting a testing program. In some cases, utilizing methods published by other public agencies and organizations are often valid and more desirable, but must be evaluated cautiously to ensure that the test requirements established by rule or permit are satisfied.

3.2. DEQ SOURCE SAMPLING METHODS

DEQ test methods are presented in Appendix C of this manual. These methods do not encompass all the provisions and procedures critical to their successful use. Persons performing these methods must have a comprehensive understanding of the physical sciences, have ample experience utilizing the testing equipment, and have a thorough knowledge of the sources to which they are applied.

DEQ test methods should only be applied to sampling situations that are consistent with their applicability. A careful and thorough evaluation of the applicability of each method to a specific testing condition is strongly recommended. Modifications or alterations to DEQ test methods must receive approval from DEQ prior to their utilization within the testing program. Refer to Section 2.4 of this manual for requirements pertaining to modifications to methods or procedures.

There are multiple references to EPA test methods within the Oregon Source Sampling Manual and test methods. The EPA methods are incorporated into this manual by reference as of the date they were published in the CFR, as shown below. Sampling provisions and procedures published within the most up-to-date revisions to the CFR may be incorporated into the testing program if approved by the administrator.

EPA Methods incorporated by reference:

Methods 1 through 30B: 40 CFR, Part 60, Appendix A, July 2012
Methods 201 through 207: 40 CFR Part 52, Appendix M, July 2012
Methods 301 through 323: 40 CFR Part 63, Appendix A, July 2012
EPA Publication SW-846, Third Edition

3.3. Quality Assurance Requirements

Quality assurance , including minimum calibration requirements are typically specified within each test method. DEQ test methods often refer to EPA test methods for quality assurance procedures The calibration requirements for Oregon DEQ Methods 4, 5, 7, & 8 are summarized within Appendix D. Where inconsistencies exist, quality assurance requirements specified by method or by regulation supersede those presented within Appendix D.

APPENDIX A

SOURCE TEST PLAN
&
TEST REPORT REQUIREMENTS

MINIMUM SOURCE TEST PLAN REQUIREMENTS

DEQ does not require that source test plans adhere to a specific format, but the information listed in Table A-1 must be included (as applicable). In addition, the following statements must be included in the test plan:

- Sampling replicate(s) will not be accepted if separated by a time duration of twenty-four (24) hours or more, unless prior authorization is granted by DEQ.

- All compliance source tests must be performed while the emission unit(s) are operating at normal maximum operating rates. Unless defined by permit condition or applicable rule, normal maximum operating rate is defined as the 90th percentile of the average hourly operating rates during a 12 month period immediately preceding the source test. Rates not in agreement with those stipulated in the Air Contaminant Discharge Permit can result in rejection of the test data. Imposed process limitations could also result from operating at atypical rates during the compliance demonstration.

- The DEQ must be notified of any changes in the source test plan and/or the specified methods prior to testing. Significant changes not acknowledged by the DEQ could be the basis for invalidating a test run and potentially the entire testing program. Documentation of any deviations must include an evaluation of the impact of the deviation on the test data.

- Method-specific quality assurance/quality control (QA/QC) procedures must be performed to ensure that the data is valid for determining source compliance. Documentation of the procedures and results shall be presented in the source test report for review. Omission of this critical information will result in rejection of the data, requiring a retest.

- Only regular operating staff may adjust the combustion system or production process and emission control parameters during the source performance tests and within two (2) hours prior to the tests. Any operating adjustments made during the source performance tests, which are a result of consultation during the tests with source testing personnel, equipment vendors or consultants, may render the source performance test invalid.

- Source test reports must be submitted to DEQ within thirty (30) days of the test dates, unless another deadline has been stipulated, either by permit condition, or by DEQ written approval.

Table A-1

SOURCE TEST PLAN REQUIREMENTS

Item #	Description	Explanatory Notes
1	Facility Identification	- Facility Name; - Facility Address; - Permit Number (and source number if under General Permit); - Emission Unit(s) included within proposed testing project
2	Facility Personnel	Name, address, phone number(s) and e-mail for: - Project Manager - On-site Contact (if different than Project Manager)
3	Testing Contractor Personnel	Name, physical address, phone number(s) and e-mail for: - Project Manager - Site Personnel (Team Leader, Technicians) - Laboratory Support
4	Project Purpose	- Specify purpose of project (compliance, emission factor verification, applicability study, etc.) - Specify permit condition or rule initiating project - Specify applicable compliance limits and emission factors
5	Schedule	- Specify testing dates for each unit tested - Specify starting times (approximate) for each test day
6	Source Description	Description of the emission unit(s), including the following: - Narrative of the emission source (system type, manufacturer, date installed, capacity, configuration, fuel type, etc.) - Narrative of the pollution control device (system type, manufacturer, date installed, configuration, etc.) - Narrative of the sample locations (where in system, distances to disturbances, duct configuration, etc.)
7	Pollutant(s) Measured	Specify the following for each pollutant measured: - Pollutant (CO, PM, Formaldehyde, etc.) - Reporting unit for each pollutant (ppmdv, lbs/hr, lbs/ton, etc.)
8	Test Methods	Include the following for each test method proposed: - Method reference number (e.g., EPA 1, ODEQ 7); - Copy of method (only if requested by DEQ); - Quantifiable or detectable limits for each pollutant
9	Sampling Replicates	- Specify the number of sample replicates for each method on each emission unit; - Specify the duration of each sample replicate for each method.
10	Production and Process Information	- List the parameters to be recorded - Specify the frequency of measurements and recordings - Specify how each parameter is measured (manual, instrument, etc.)

11	Pollution Control Device Information	- List the parameters to be recorded - Specify the frequency of measurements and recordings - Specify how each parameter is measured (manual, instrument, etc.)
		-
12	Fuel Sampling and Analysis	- Specify how sample(s) will be collected (include references to established procedures such as ASTM, if applicable) - Specify frequency of collection - Specify the type of analysis, the analytical procedure, and the analytical laboratory
13	Other Test Method Considerations	<u>Include in the test plan a brief discussion of:</u> - Applicability of proposed test methods - Any and all proposed method modifications/deviations, including modifications/deviations to QA/QC activities - Any foreseeable problems with sample recovery - Any known errors in the proposed method(s) - Simultaneous testing (multiple parameters or methods) - Multiple exhaust points of the source (if applicable) - Possible method interferences - Cyclonic flow measurements (if applicable) - Stratification measurements
14	Other Process Considerations	<u>Include in the test plan a brief discussion of:</u> - Target process rate(s) and how it compares to day-to-day operations and the unit's rated capacity - Product (e.g., type, size, specie, etc.) - Potential process variability (i.e., continuous, cyclical, etc.) - Whether the proposed test conditions represent worst-case conditions with respect to emissions

MINIMUM SOURCE TEST REPORT REQUIREMENTS

The DEQ does not require that test reports adhere to a specific format, but the information listed in Table A-2 (below) needs to be included (as applicable). Reports shall be organized in a clear and logical fashion to promote correctness and accuracy.

Table A-2

SOURCE TEST REPORT REQUIREMENTS

Item#	Description	Explanatory Notes
1	Facility Identification	- Facility Name - Facility Address - Permit Number (and source number if under General Permit) - Emission Unit(s) included within the testing project
2	Facility Personnel	Name, address, phone number(s) and e-mail for: - Project Manager - On-site Contact (if different than Project Manager)
3	Testing Contractor Personnel	Name, physical address, phone number(s) and e-mail for: - Project Manager - Site Personnel (Team Leader, Technicians) - Laboratory Support
4	Project Purpose	- Specify purpose of project (compliance, emission factor verification, applicability study, etc.) - Specify permit condition or rule initiating project - Specify applicable compliance limits and emission factors
5	Schedule	- Specify testing dates for each unit tested - Specify starting and ending times for each test run
6	Source Description	Description of the emission unit(s), including the following: - Narrative of the emission source (system type, manufacturer, date installed, capacity, configuration, fuel type, etc.) - Stack height above the ground - Orientation of the exhaust (vertical, horizontal, etc.) - Narrative of the pollution control device (system type, manufacturer, date installed, configuration, etc.) - Narrative of the sample locations (where in system, distances to disturbances, duct configuration, etc.)
7	Process & Pollution Control Operating Rates & Settings	Operating rates and parameters, including the following: - Process rates for each run on each emission unit - Process characteristics for each test run (temperature, process time, size, species, pressures, settings, fuel characteristics, etc.) - Pollution control device parameters for each test run (temperature, pressure drop, water injection rate, voltage, settings, etc.)

		- Description of process changes and interruptions that occurred during testing.
8	Pollutant(s) Measured	<u>Discuss the following for each pollutant measured:</u> - Specie (CO, PM, Formaldehyde, Opacity, etc.) - Reporting unit for each specie (ppmdv, lbs/hr, lbs/ton, etc.)
9	Test Methods	<u>Include the following for each test method:</u> - Method reference number (e.g., EPA 1, ODEQ 7) - Discuss deviations from published methods and their impact on test results
10	Summary of Results	- One summary table for each emission unit (when possible) - List individual run results and average (when possible) - Include applicable emission standard, factor, or compliance limit
11	Supporting Sampling Information	- Spreadsheets & electronic data records - Field data sheets, notes, and forms - Equipment calibration documentation (field & laboratory equipment) - Example calculations - Sampling equipment description - Pre-test procedure documentation (stratification, cyclonic, etc.)
12	Laboratory Analysis	- Electronic data records - Data sheets, notes, and forms - Analytical detection limit for each constituent - Applicable analytical QA/QC information - Chain of custody
13	Supporting Process & Pollution Control Information	- Electronic generated output (if applicable) - Log sheets and forms - Operating capacity - 90% Percentile 12 Month Operating Analysis (existing sources)
14	Source Test Audit Report	- Complete for each test method and emission unit - Complete certification form
15	Test Correspondence	- Test plan - Test plan approval correspondence - Approval for method deviations - Applicable permit excerpts that pertain to testing requirements, emission limits, and emission factors

APPENDIX B

LISTING OF
SOURCE SAMPLING
METHODS

ALPHABETICALLY BY
POLLUTANT OR STACK
PARAMETER

ESTABLISHED SAMPLING METHODS

POLLUTANT OR STACK PARAMETER	TEST METHOD	COMMENTS
Ammonia	EPA CTM-027, BAAQMD ST-1B, EPA 320,	Method depends on isokinetic requirements
Carbon Dioxide (CO_2)	EPA 3, EPA 3A, EPA 3B	
Carbon Monoxide	EPA 10	
Chloride (Total)	EPA 26A, EPA 26 SW846-0050	
Dioxins & Furans	EPA 23, SW846-23a	
Formaldehyde	NCASI 98.01,NCASI 99.02, NCASI A105.1, EPA 316, EPA 320, EPA 323	Method depends on source type, isokinetic and ISDL requirements.
Gaseous Organics	EPA 18	Not applicable for high molecular weight compounds or for compounds with very low vapor pressure at stack or instrument conditions.
Hydrogen Chloride, Hydrogen Halide and Halogens	EPA 26, EPA 26A, SW846-0050, EPA 321	Use EPA 26A when isokinetic sampling is required. EPA 321 utilizes FTIR and is specific to Portland Cement Kilns
Methanol	EPA 308, NCASI 98.01, NCASI 99.02 NCASI A105.1	Methods may also be applicable to phenol with approval
Moisture Content	EPA 4, ODEQ 4	
Molecular Weight	EPA 3, EPA 3A, EPA 3B	
Metals	EPA 29, SW846-0060	Includes: Antimony, Arsenic, Barium, Beryllium, Cadmium, Total Chromium, Cobalt, Copper, Lead, Manganese, Mercury, Nickel, Phosphorus, Selenium, Silver, Thallium, Zinc.
Nitrogen Oxides	EPA 7E, EPA 20	
Nonmethane Organic Compounds (NMOC)	EPA 25, EPA 25C, BAAQMD ST-7, SCAQMD 25.3, EPA CTM-042	EPA 25 subject to interference by H_2O and CO_2. ST-7 applicable for compounds that respond well to FID. 25.3 for low concentration sources. EPA 25C for LFG. CTM-042 for bakeries.
Opacity	EPA 9, EPA ALT Method 082	ALT 082 when pre-approved by DEQ
Oxygen	EPA 3, EPA 3A, EPA 3B	
Particulate Matter-Filterable	EPA 5, EPA 5A, EPA 5B, EPA 5D, EPA 5E, EPA 5F, EPA 5i, EPA 17, Modified DEQ 5, DEQ 8	ODEQ 8 acceptable under limited conditions EPA 5i for low level particulate
Particulate Matter - Total	ODEQ 5, ODEQ 7, EPA 5/202	
Particulate Matter - $\leq$10um	EPA 201A/202	

Particulate Matter-<2.5um	EPA 201A/202	
Phenol	NCASI 98.01, NCASI 99.02, EPA 18, NCASI A105.1	
Sulfur Dioxide	EPA 6, EPA 6C, EPA 8	EPA 8 also measures sulfuric acid mist
Total Enclosure	EPA 204	Use for determining capture efficiency.
Total Hydrocarbons	EPA 25A, EPA 18	Applicable to alkanes, alkenes, and aromatic hydrocarbons. EPA 25A has a fractional response to many other organic compounds.
Total Reduced Sulfur	EPA 16, EPA 16A, EPA 16C	
Velocity and Volumetric Flow Rate	EPA 2, EPA 2A, EPA 2C, EPA 2E, EPA 2F, EPA 2G, EPA 2H	EPA 2 if duct ≥12” in diameter EPA 2A if duct < 12” in diameter
Volatile Organic Compounds by FTIR	EPA 320	Analyzes for specific defined VOCs
Volatile Organic Compounds-Uncharacterized	EPA 25, EPA 25A, EPA 25B	Total VOC’s reported on an equivalent basis (i.e. “as propane”)
Volatile Organic Compounds by GC	EPA 18, EPA CTM-028	Analyzes for specific defined VOCs. EPA 18 not applicable for high molecular weight compounds or for compounds with very low vapor pressure at stack or instrument conditions. CTM-028 direct interface.

APPENDIX C

OREGON DEQ
SOURCE SAMPLING
METHODS

C-4: Oregon Method 4 (moisture)
C-5: Oregon Method 5 (PM)
C-7: Oregon Method 7 (PM)
C-8: Oregon Method 8 (PM, High Volume)

SUB-APPENDIX C-4

OREGON DEQ
SOURCE SAMPLING
METHOD 4

Oregon Method 4

State of Oregon
Department of Environmental Quality
Source Sampling Method 4

Determination of Moisture Content of Stack Gases
(Alternate Method)

1. **Principle.** Under certain conditions, the quantity of water vapor in the gas stream can be determined by measuring the wet-bulb and dry-bulb temperatures of the gaseous fluid.

2. **Applicability**. This method is applicable for the determination of the moisture content of the sample stream when EPA Method 4 is not suitable or when rigid moisture content measurements are not essential to the success of the testing program.

3. **Procedure.**

   3.1 Measure the dry bulb temperature in the conventional way using either a thermometer or thermocouple.

   3.2 Wrap the end of the temperature-measuring device in a cloth sock soaked with water. Insert the sock and temperature-measuring device into the flowing gas stream and allow the temperature to reach a steady state value. Caution: after the water on the sock has evaporated, the temperature will rise to the dry bulb temperature. (Refer to Figure 4-1). The wet bulb temperature must be taken while the sock is saturated with moisture.

   3.3 Apply the wet bulb readings to Table 4-1 to determine the water vapor pressure in the gas stream. Then use the dry bulb reading and equation 4.4-1 to determine the approximate water vapor content. In lieu of using Table 4-1, equation 4.4-2 may be utilized to determine the vapor pressure at saturation if the wet bulb temperature is less than 175°F.

   3.4 Alternately, if the barometric pressure is 29.92 ± 0.5 inches of mercury (in. Hg) apply the wet bulb and dry bulb readings to a standard psychrometric chart and determine the approximate water vapor content.

4. **Interferences and Calculations**

   4.1 Wet-bulb temperature readings may be affected by other gas stream components that ionize when dissolved in water (e.g., salts, acids, bases) or hydrocarbon compounds, particularly water-soluble solvents. The effect of these components on the wet-bulb temperature is usually negligible. However, should any of the above compounds exist at levels that cause inaccurate wet-bulb readings, the tester must utilize an alternative approach to determine moisture.

   4.2 The wet depression temperature is dependent on the total pressure (i.e., barometric pressure ± static pressure) in the gas stream. Moisture concentrations that are obtained from a psychometric chart are reliable only if the gas stream is at, or near, 1 atmosphere pressure (i.e., 29.92 in. Hg ± 0.5 in. Hg). For other pressure conditions, the tester must use Equation 4.4-1 to calculate the gas stream moisture content.

4.3 Additionally, the following conditions can lead to difficulties:

4.3.a. Very high dry bulb temperature (in excess of 500° F).
4.3.b. Very high or very low gas velocities.
4.3.c. High concentrations of particulate matter which may adhere to the wet sock.

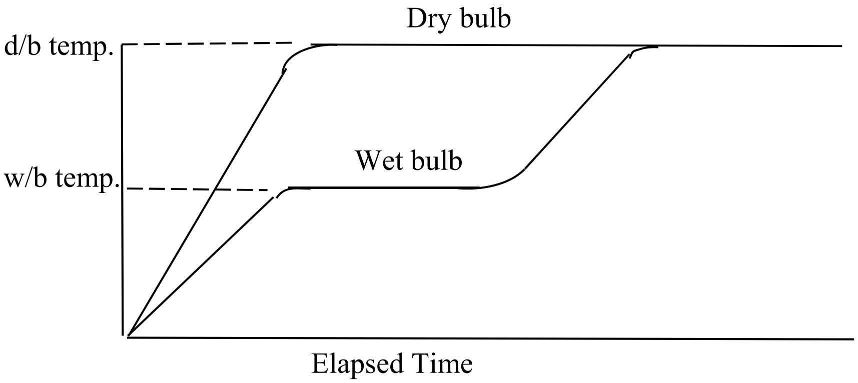

Figure 4-1

4.4 Moisture Equation:

$$H_2O = \frac{e'' - \frac{(P_s - e'')(t_d - t_w)}{2800 - (1.3t_w)}}{P_s} x100 \qquad (Eq.\ 4.4\text{-}1)$$

where:

e" = Vapor pressure of H_2O at t_w, in. Hg (See Table 4-1)
P_s = Exhaust gas pressure (absolute), in. Hg
t_d = Dry bulb temperature, °F
t_w = Wet bulb temperature, °F

TABLE 4-1: VAPOR PRESSURE OF WATER AT SATURATION* (Inches of Mercury)

Wet Bulb Temperature (°F)	0	1	2	3	4	5	6	7	8	9
-20	0.0126	0.0119	0.0112	0.0106	0.0100	0.0095	0.0089	0.0084	0.0080	0.0075
-10	0.0222	0.0209	0.0190	0.0187	0.0176	0.0168	0.0158	0.0150	0.0142	0.0134
-0	0.0376	0.0359	0.0339	0.0324	0.0306	0.0289	0.0275	0.0259	0.0247	0.0233
0	0.0376	0.0398	0.0417	0.0441	0.0463	0.0489	0.0517	0.0541	0.0571	0.0598
10	0.0631	0.0660	0.0696	0.0728	0.0768	0.0810	0.0846	0.0892	0.0932	0.0982
20	0.1025	0.1080	0.1127	0.1186	0.1248	0.1302	0.1370	0.1429	0.1502	0.1567
30	0.1647	0.1716	0.1803	0.1878	0.1955	0.2035	0.2118	0.2203	0.2292	0.2383
40	0.2478	0.2576	0.2677	0.2782	0.2891	0.300	0.3120	0.3240	0.3364	0.3493
50	0.3626	0.3764	0.3906	0.4052	0.4203	0.4359	0.4520	0.4586	0.4858	0.5035
60	0.5218	0.5407	0.5601	0.5802	0.6009	0.6222	0.6442	0.6669	0.6903	0.7144
70	0.7392	0.7648	0.7912	0.8183	0.8462	0.8750	0.9046	0.9352	0.9666	0.9989
80	1.032	1.066	1.102	1.138	1.175	1.213	1.253	1.293	1.335	1.378
90	1.422	1.467	1.513	1.561	1.610	1.660	1.712	1.765	1.819	1.875
100	1.932	1.992	2.052	2.114	2.178	2.243	2.310	2.379	2.449	2.521
110	2.596	2.672	2.749	2.829	2.911	2.995	3.081	3.169	3.259	3.351
120	3.446	3.543	3.642	3.744	3.848	3.954	4.063	4.174	4.89	4.406
130	4.525	4.647	4.772	4.900	5.031	5.165	5.302	5.442	5.585	5.732
140	5.881	6.034	6.190	6.350	6.513	6.680	6.850	7.024	7.202	7.384
150	7.569	7.759	7.952	8.150	8.351	8.557	8.767	8.981	9.200	9.424
160	9.652	9.885	10.12	10.36	10.61	10.86	11.12	11.38	11.65	11.92
170	12.20	12.48	12.77	13.07	13.37	13.67	13.98	14.30	14.62	14.96
180	15.29	15.63	15.98	16.34	16.70	17.07	17.44	17.82	18.21	18.61
190	19.01	19.42	19.84	20.27	20.70	21.14	21.59	22.05	22.52	22.99
200	23.47	23.96	24.46	24.97	25.48	26.00	26.53	27.07	27.62	28.18
210	28.75	29.33	29.92	30.52	31.13	31.75	32.38	33.02	33.67	34.33
220	35.00	35.68	36.37	37.07	37.78	38.50	39.24	39.99	40.75	41.52
230	42.31	43.11	43.92	44.74	45.57	46.41	47.27	48.18	49.03	49.93
240	50.84	51.76	52.70	53.65	54.62	55.60	56.60	57.61	58.63	59.67

*Methods for Determination of Velocity, Volume, Dust, and Mist Content of Gases, Bulletin WP-50, Western Precipitation Corp., Los Angeles, CA

The following equation can be substituted for the above table for determining vapor pressures (e") from measured wet bulb (t_w) temperatures:

$$e'' = 0.1805 \times e^{\left[\frac{(17.27 \times (t_w - 32))}{(t_w + 395)}\right]} \qquad \text{(Eq. 4.4-2)}$$

SUB-APPENDIX C-5

OREGON DEQ
SOURCE SAMPLING
METHOD 5

Oregon Method 5

State of Oregon
Department of Environmental Quality
Source Sampling Method 5

Sampling Particulate Emissions from Stationary Sources

1.0 Principle and Applicability

1.1 **Principle.** Particulate matter including condensable aerosols are withdrawn isokinetically from a flowing gas stream. Filterable particulate matter is determined gravimetrically after removal of combined water. Condensable particulate matter is determined gravimetrically after extraction with an organic solvent and evaporation.

1.2 **Applicability.** This method is applicable to the determination of particulate emissions from stationary sources except those sources for which specified sampling methods have been devised and are on file with DEQ.

2.0 **Acceptability.** Results of this method will be accepted as demonstration of compliance (or non-compliance) provided that the methods included or referenced in this procedure are strictly adhered to and a report is prepared according to Section 2.11 of DEQ's Source Sampling Manual, Volume I. Deviations from the procedures described herein will be permitted only if authorization from DEQ is obtained in writing in advance of the tests. EPA Method 5 combined with EPA Method 202 may be substituted for this method.

3.0 Equipment and Supplies

3.1 **Sampling Train (figure 5-1)**: Same as EPA Method 5 Section 6.1. with the following exception: Use of a glass frit filter support is prohibited. The support must be fabricated such that it can be quantitatively rinsed with acetone during sample recovery (refer to Section 5.7.1)

3.2 **Barometer:** Same as EPA Method 5 Section 6.1.2.

3.3 **Gas Density Determination Equipment:** Same as EPA Method 5 Section 6.1.3.

3.4 **Sample Recovery:** Same as EPA Method 5 Section 6.2.

3.5 **Sample Analysis:** Same as EPA Method 5 Section 6.3 with the following addition:

3.5.1 Glass separatory funnel (500-1000 ml) with Teflon[1] stopcock and plug.

4.0 Reagents and Standards

4.1 **Sample Collection**: Same as EPA Method 5 Section 7.1 with the following condition:

4.1.1 Distilled water with a residue content of ≤ 0.001% (0.0l mg/ml) must be used in the impingers. The distilled water reagent blank weight correction will not exceed 0.001%, or 0.01 mg/ml.

4.1.2 Stopcock grease (Section 7.1.5 of EPA Method 5) can bias test results and its use should be avoided whenever possible.

4.2 **Sample Recovery**: Same as EPA Method 5 Section 7.2.

4.3 **Analysis:** Same as EPA Method 5 Section 7.3 with following addition:

4.3.1 Methylene Chloride reagent grade, with a residue content of ≤0.001% (0.013 mg/ml). The methylene chloride reagent blank weight correction will not exceed 0.001%, or 0.013 mg/ml. Hexane may be substituted for methylene chloride. The same purity is required.

4.3.2 Distilled water with a residue content of ≤ 0.001% (0.0l mg/ml). The distilled water reagent blank weight correction will not exceed 0.001%, or 0.01 mg/ml.

5.0 Sample Collection, Preservation, Storage, and Transport

5.1 **Pretest Preparation:** Same as EPA Method 5 Section 8.1.

5.2 **Preliminary Determinations**: Same as EPA Method 5 Section 8.2.

5.3 **Preparation of Sampling Train:** Same as EPA Method 5 Section 8.3.

5.4 **Leak-Check Procedures:** Same as EPA Method 5 Section 8.4.

5.5 **Sampling Train Operation:** Same as EPA Method 5 Section 8.5.

5.6 **Calculation of % Isokinetics:** Same as EPA Method 5 Section 8.6.

5.7 **Sample Recovery:** Same as EPA Method 5 Section 8.7 (with the following additions:

5.7.1 In addition to the nozzle, probe, and filter-holder rinses, the filter frit support is to be rinsed with acetone and stored in Container No. 2.

5.7.2 Container No. 4. The contents of impingers 1 through 3 along with a distilled water rinse of impingers and all interconnects between the heated filter holder to the silica gel impinger must be transferred to Container No. 4. To adequately recover the sample from the impingers and interconnects, each component is to be rinsed in triplicate and the total rinse volume should equal or exceed 75 mls of reagent (distilled water).

5.7.3 Container 5. Rinse all sample exposed surfaces between the filter frit support and the inlet to the silica gel impinger with acetone and store in container No. 5. To adequately recover the sample from this portion of the sampling train, each component is to be rinsed in triplicate and the total rinse volume should equal or exceed 100 mls of reagent (acetone).

5.8 **Sample Transport:** Same as EPA Method 5 Section 8.8.

6.0 Quality Control

6.1 **Miscellaneous Quality Control Procedures:** Same as EPA Method 5 Section 9.1 with the following additions:

6.1.1 Analytical balance calibration and auditing procedures as per Section 7.8 of this method.

6.2 **Volume Metering System Checks:** Same as EPA Method 5 Section 9.2.

7.0 Calibration and Standardization

7.1 **Documentation:** The calibration data and/or calibration curves shall be included in the source test report.

7.2 **Nozzles**: Same as EPA Method 5 Section 10.1.

7.3 **Pitot Tube**: Same as EPA Method 5 Section 10.2 with the following addition:

7.3.1 If calibrated against a standard pitot, Type S pitot tubes shall be recalibrated at least once every six months.

7.3.2 If default Cp value used based on measured pitot features, measurements must be conducted pre and post test.

7.4 **Metering System:** Same as EPA Method 5 Section 10.3.

7.5 **Probe Heater Calibration:** Same as EPA Method 5 Section 10.4.

7.6 **Temperature Sensors:** Same as EPA Method 5 Section 10.5 with the following additions:

7.6.1 Thermometers that measure the filter-oven, impinger exit, and dry-gas meter temperatures are to be calibrated at 32° F and 212°F against an ASTM mercury thermometer or NIST traceable thermometer. At a minimum, the filter-oven, impinger exit, and dry-gas meter thermometers are to be calibrated before initial use and at least once every six months thereafter.

7.6.2 Alternatively, in-stack temperature thermometers are to be calibrated at 32° F and 212°F against an ASTM mercury thermometer or NIST traceable thermometer. At a minimum, the in-stack temperature thermometers are to be calibrated before initial use and at least once every six months thereafter.

7.7 **Barometer:** Same as EPA Method 5 Section 10.6.

7.8 **Analytical Balance:** The following calibration and standardization procedures must be performed on the analytical balance:

7.8.1 The balance must be audited utilizing 0.500 g, 1.0000 g, 10.0000 g, 50.0000 g, and 100.0000 g Class-S standard weights. Alternatively, five (5) Class-S standard weights may be substituted that accurately represent the anticipated measurement range. The balance results must agree within ±1 mg of the Class-S weights. At a minimum, the balance calibration must be performed subsequent to disturbing the analytical balance and annually thereafter.

7.8.2 Prior to weighing filters before and after sampling, adjust the analytical balance to zero and check the accuracy with a 0.5 g Class-S weight. A Class-S standard weight within 1 g of the filter weight may be used as an alternate. The balance results must agree within ±0.5 mg and the relative humidity in the weighing environment must be ≤50%.

7.8.3 Prior to weighing beakers before and after sampling, adjust the analytical balance to zero and check the accuracy with a 100 g Class-S standard weight. A Class-S standard weight within 1 g of the beaker weight may be used as an alternate. The balance results must agree within ±0.5 mg and the relative humidity in the weighing environment must be ≤50%.

8.0 Analytical Procedures

8.1 **Documentation:** Analytical documentation shall be consistent with the data entry forms presented in Figures 5-2a through 5-2c.

8.2 **Analysis:** Same as EPA Method 5 Section 11.2 with following additions:

8.2.1 **Container No. 1:** The sample (filter) must be desiccated and weighed to a constant final weight, even if it is oven dried.

8.2.2 **Container No. 4:** Transfer the contents of Container No. 4 to a separator funnel (Teflon[1] stoppered). Rinse the container with distilled water and add to the separatory funnel. Add 50 ml of methylene chloride or hexane. Stopper the separatory funnel and vigorously shake for 1 minute. Take care to momentarily release the funnel pressure several times during the shaking process. Allow the sample to separate into two distinct layers and transfer the methylene chloride (lower layer) into a tared beaker or evaporating dish made of glass, Teflon[1], or other inert material. Repeat the extraction process twice more.

NOTE: Always leave a small amount of methylene chloride in the separatory funnel to ensure that water does not get into the extracted sample. If water is present in the extracted sample, it will be difficult to completely evaporate the sample to dryness for gravimetric analysis.

8.2.2.*i* Transfer the remaining water in the separator funnel to a tared beaker or evaporating dish and evaporate at 105ºC. Desiccate for 24 hours and weigh to a constant weight.

8.2.2.*ii* Evaporate the combined impinger water extracts from Section 8.2.2 at laboratory temperature (≤ 70ºF) and pressure, desiccate for 24 hours and weigh to a constant weight.

8.2.3 **Container No. 5:** Transfer the contents of container No. 5 to a tared beaker or evaporating dish, evaporate at laboratory temperature and pressure, desiccate for 24 hours, and weigh to a constant weight.

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[1] Mention of trade names or specific products does not constitute endorsement by DEQ.

8.2.4 **Solvent Blanks:** Evaporate a portion of the solvents in a manner similar to the sample evaporation to determine the solvent blanks.

9.0 Calculations

9.1 **Nomenclature:** Same as EPA Method 5 Section 12.1 with following additions:

C_m = Methylene chloride (or hexane) blank residue concentration, mg/g.

C_w = Distilled water blank residue concentration, mg/g.

m_m = Mass of residue of methylene chloride (or hexane) after evaporation, mg.

m_w = Mass of residue of distilled water after evaporation, mg.

V_{mb} = Volume of methylene chloride (or hexane)blank, ml.

V_{mc} = Volume of methylene chloride (or hexane) used for extracting the impinger water, ml.

V_{wb} = Volume of distilled water blank, ml.

V_{ws} = Volume of distilled water for charging the impingers and for recovery, ml.

W_m = Weight of residue in methylene chloride (or hexane), mg.

W_w = Weight of residue of distilled water, mg.

ρ_m = Density of methylene chloride (or hexane), g/ml (see label on bottle).

ρ_w = Density of distilled water, g/ml (1.0 g/ml).

9.2 **Dry Gas Volume**: Same as EPA Method 5 Section 12.3.

9.3 **Volume of Water Vapor Condensed:** Same as EPA Method 5 Section 12.4.

9.4 **Moisture Content:** Same as EPA Method 5 Section 12.5.

9.5 **Acetone Blank Concentration:** Same as EPA Method 5 Section 12.6.

9.6 **Acetone Blank Deduction:** Same as EPA Method 5 Section 12.7 with the following addition: The acetone reagent blank weight correction will not exceed 0.001%, or 0.01 mg/ml. An acetone blank deduction value (Wa) of 0.0 mg shall be used when the acetone blank concentration (Ca) is less than or equal to zero.

9.7 **Water Blank Concentration:**

$$C_w = \frac{m_w}{V_{wb} \times \rho_w} \qquad \textit{(Eq. 5.9-1)}$$

9.8 **Water Blank Deduction:**

$$W_w = C_w \times V_{ws} \times \rho_w \qquad \textit{(Eq. 5.9-2)}$$

NOTE: The distilled water reagent blank weight correction will not exceed 0.001%, or 0.01 mg/ml. A water blank deduction value (W_w) of 0.0 mg shall be used when the water blank concentration (C_w) is less than or equal to zero.

9.9 **Methylene Chloride (or Hexane) Blank Concentration:**

$$C_m = \frac{m_m}{V_{mb} \times \rho_m} \qquad \textit{(Eq. 5.9-3)}$$

9.10 **Methylene Chloride (or Hexane) Blank Deduction:**

$$W_m = C_m \times V_{mc} \times \rho_m \qquad \textit{(Eq. 5.9-4)}$$

NOTE: The methylene chloride reagent blank weight correction will not exceed 0.001%, or 0.01 mg/ml. A methylene chloride (or hexane) blank deduction value (W_m) of 0.0 mg shall be used when the methylene chloride blank concentration (C_m) is less than or equal to zero.

9.11 **Total Particulate Weight:**

Determine the total particulate matter catch from the sum of the weights obtained from Containers 1, 2, 4, 5 (including the organic solvent extract of the water from Container No. 4), less the acetone, methylene chloride (or hexane), and distilled water blanks (see Figures 5-2a, 5-2b, and 5-2c).

9.12 **Particulate Concentration:** Same as EPA Method 5 Section 12.9.

9.13 **Isokinetic Variation:** Same as EPA Method 5 Section 12.11.

9.14 **Stack Gas Velocity and Volumetric Flow Rate:** Same as EPA Method 5 Section 12.12.

10.0 Alternative Procedures, Bibliography, Sampling Train Schematic, Example Data Sheets, Etc.:

Same as EPA Method 5 Sections 16, 17 and Figures 5-1 through 5-12 excluding Figure 5-6 (use ODEQ Method 5 Figures 5-2a through 5-2b in place of EPA Method 5 Figure 5-6).

Figure 5-1: Particulate Sampling Train

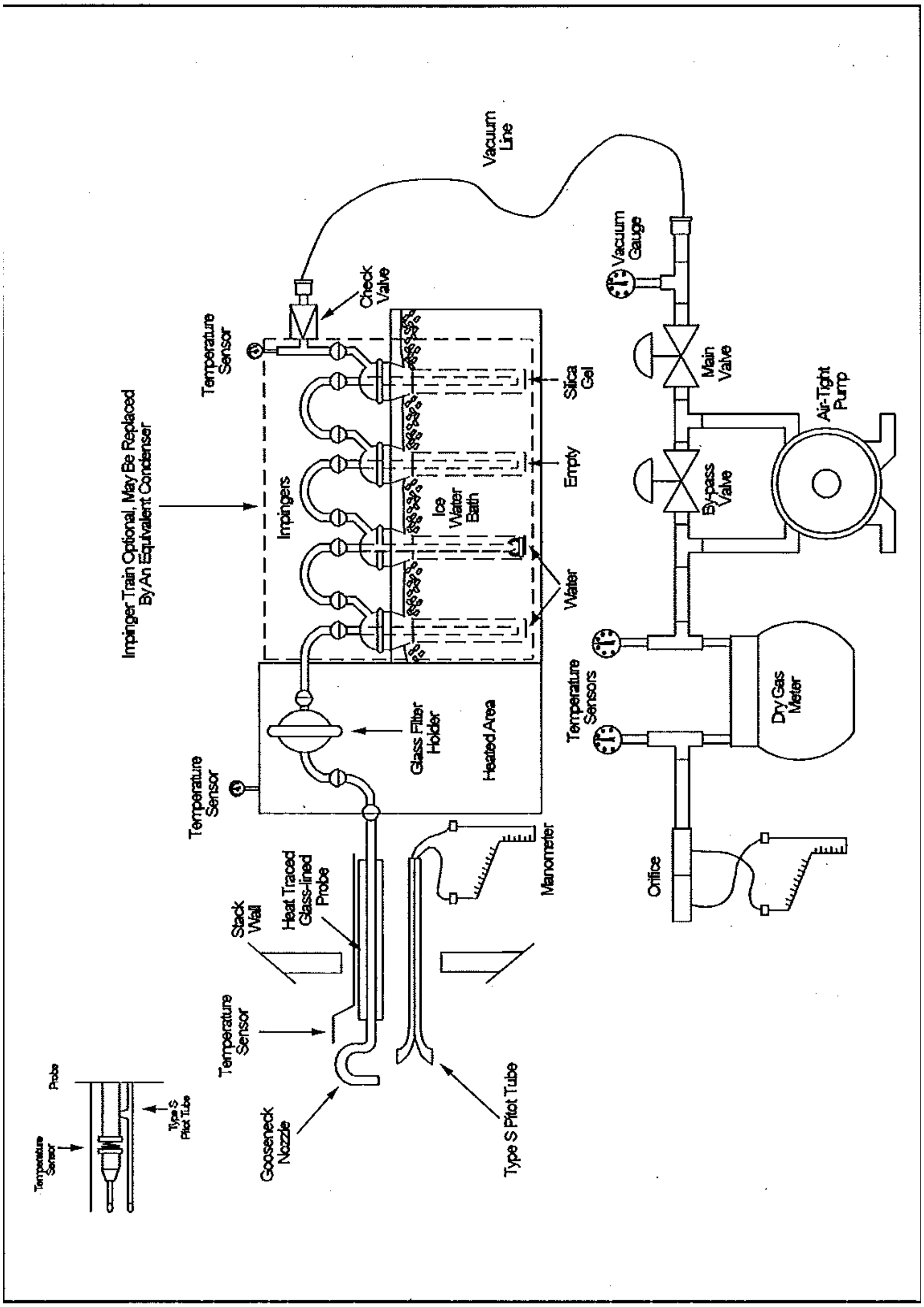

Figure 5-2a
METHOD 5 DATA ANALYSIS FORM

Plant________________________________ **Run Number**_________________________

Sample Location_______________________ **Test Date**____________________________

Sample Recovered by____

Reagent	Date/Time	Weight (g)	Audit* (g)	Lab Temp. °F	Lab RH %	Analyst
FRONT HALF:						
Filter Filter ID:_________ Tare Wt.:_________ Date/time into desiccator:_________						
Acetone Beaker ID:_________ Tare Wt.:_________ Solv. Vol.:_________ Solv. ID:_________ Date/time into desiccator:_________						
BACK HALF:						
Acetone Beaker ID:_________ Tare Wt.:_________ Solv. Vol.:_________ Solv. ID:_________ Date/time into desiccator:_________						
Water Beaker ID:_________ Tare Wt.:_________ Water Vol.:________ Water ID:_________ Date/time into desiccator:_________						
MeCl or Hexane Beaker ID:_________ Tare Wt.:_________ Solv. Vol.:_________ Solv. ID:_________ Date/time into desiccator:_________						

*filter 0.5000 g ± 0.5 mg tolerance – NIST traceable Class S weight
beaker 100.0000 g ± 0.5 mg tolerance – NIST traceable Class S weight

Figure 5-2b
METHOD 5 BLANK ANALYSIS DATA FORM

Sample Prepared ___________________________________ **Date**_______________

Reagent	Date/Time	Weight (g)	Audit* (g)	Lab Temp. ºF	Lab RH %	Analyst
Filter Filter ID:__________ Tare Wt.:__________ Date/time into desiccator:_________						
Acetone Beaker ID:_________ Tare Wt.:__________ Solv. Vol.:_________ Solv. ID:__________ Date/time into desiccator:_________						
Water Beaker ID:_________ Tare Wt.:__________ Water Vol.:________ Water ID:_________ Date/time into desiccator:_________						
MeCl or Hexane Beaker ID:_________ Tare Wt.:__________ Solv. Vol.:_________ Solv. Wt:__________ Date/time into desiccator:_________						

*filter 0.5000 g ± 0.5 mg tolerance – NIST traceable Class S weight
beaker 100.0000 g ± 0.5 mg tolerance – NIST traceable Class S weight

Figure 5-2c
METHOD 5 TARE WEIGHT RECORD

Indicate: filters or evaporation containers

Media ID	Date_________ Time________ Temp_____ ºF RH_______ % Audit____ gm By__________	Date_________ Time________ Temp_____ ºF RH_______ % Audit____ gm By__________	Date_________ Time________ Temp_____ ºF RH_______ % Audit____ gm By__________	Date_________ Time________ Temp_____ ºF RH_______ % Audit____ gm By__________	Date_________ Time________ Temp_____ ºF RH_______ % Audit_____ gm By__________
	Weight (g)	Weight (g)	Weight (g)	Weight (g)	Weight (g)

SUB-APPENDIX C-7

OREGON DEQ
SOURCE SAMPLING
METHOD 7

Oregon Method 7

State of Oregon
Department of Environmental Quality
Source Sampling Method 7

Sampling Condensable Particulate Emissions from Stationary Sources

1.0 Principle and Applicability

1.1 **Principle:** Particulate matter including condensable gases is withdrawn isokinetically from a flowing gas stream. The particulate matter is determined gravimetrically after extraction with an organic solvent and evaporation.

1.2 **Applicability:** This method is applicable to stationary sources whose primary emissions are condensable gases. It should be considered a modification of Source Sampling Method 5, and applied only when directed to do so by DEQ.

2.0 **Acceptability.** Results of this method will be accepted as demonstration of compliance (or non-compliance) provided that the methods included or referenced in this procedure are strictly adhered to and a report is prepared according to Section 2.11 of DEQ's Source Sampling Manual, Volume I. Deviations from the procedures described herein will be permitted only if permission from DEQ is obtained in writing in advance of the tests.

3.0 **Equipment and Supplies:** Same as Oregon Source Sampling Method 5 Sections 3.1 through 3.5 with the following addendum:

3.1 **Sampling train (Figure 7-1)**: Same as Oregon Source Sampling Method 5 Section 3.1 with the following exceptions:

3.1.1 The heated filter and/or cyclone are optional, but should be used if a significant quantity of filterable particulate matter is present.

3.1.2 An unheated glass fiber filter is placed at the inlet to the silica gel impinger (generally Impinger 4).

4.0 **Reagents and Standards:** Same as Oregon Source Sampling Method 5 Section 4.1 through 4.3.

5.0 **Sample Collection, Preservation, Storage, and Transport:** Same as Oregon Source Sampling Method 5 Sections 5.1 through 5.8 with the following addenda:

5.1 **Preparation of Sampling Train:** Same as Oregon Source Sampling Method 5 Section 5.3 with the following addition:

5.1.1 Insert numbered and pre-weighed filters into each of the front (heated if used) and back (non-heated) filter holders.

5.2 **Sample Recovery:** Same as Oregon Source Sampling Method 5 Section 5.7 with the following addition:

5.2.1 Container 6: Transfer the back filter to container No. 6.

6.0 **Quality Control:** Same as Oregon Source Sampling Method 5 Sections 6.1 and 6.2.

7.0 **Calibration and Standardization:** Same as Oregon Source Sampling Method 5 Sections 7.1 through 7.8.

8.0 **Analytical Procedure**s: Same as Oregon Source Sampling Method 5 Sections 8.1 through 8.2 with the following addendums:

8.1 Documentation: Analytical documentation shall be consistent with the data entry forms presented in Figure 7-2 of Oregon Source Sampling Method 7, and Figures 5-2b through 5-2c of Oregon Source Sampling Method 5

8.2 Analysis: Same as Oregon Source Sampling Method 5 Section 8.2 with the following addition:

8.2.1 **Container No. 6:** Desiccate the back filter in Container No. 6 for 24 hours at 70°F or less. Weigh the filter to a constant weight.

Note: In some cases, desiccation may cause slow vaporization of the condensable material. Therefore, if the weights continue to decrease over time and the sample is obviously dry, use the average of the first three weights to determine the particulate matter catch.

9.0 **Calculations:** Same as Oregon Source Sampling Method 5 Sections 9.1 through 9.14 with the following addendum:

9.1 Total Particulate Weight: Determine the total particulate matter catch from the sum of the weights obtained from Containers 1 (if front filter is used), 2, 4, 5, & 6 (including the organic solvent extract of the water from Container No. 4), less the acetone , methylene chloride (or hexane), and distilled water blanks (see Figure 7-2).

10.0 **Alternative Procedures, Bibliography, Sampling Train Schematic, Example Data Sheets, Etc.:** Same as Oregon Source Sampling Method 5 Section 10.0 with the following addenda:

10.1 An unheated glass fiber filter is placed at the inlet to the silica gel impinger (generally Impinger 4).

10.2 Use ODEQ Method 7 Figure 7-2 in place of ODEQ Method 5 Figure 5-2a.

FIGURE 7-1. OREGON METHOD 7 SAMPLING APPARATUS

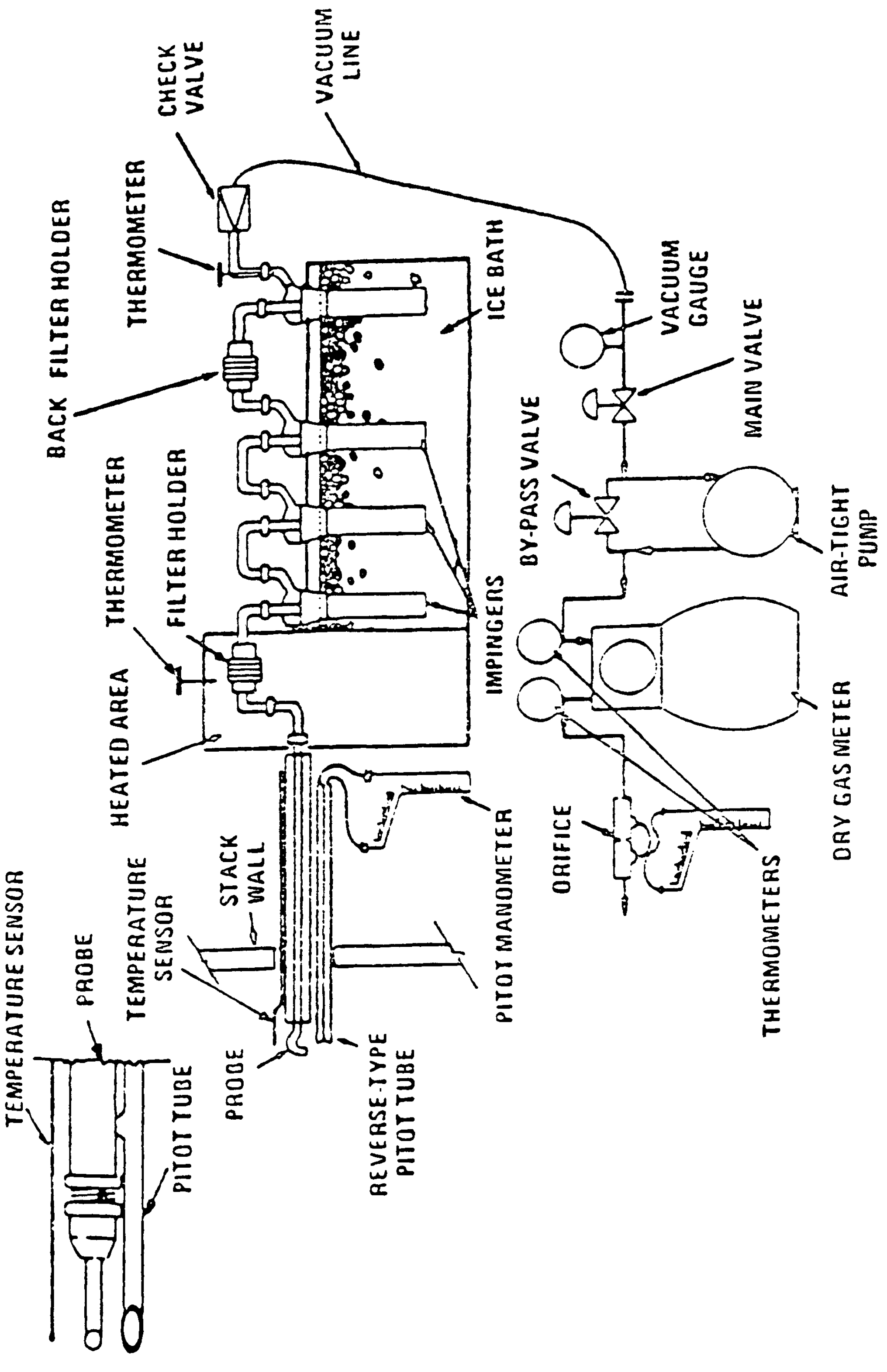

Figure 7-2
OREGON METHOD 7 DATA ANALYSIS FORM

Facility________________________________ **Run Number**____________________
Sample Location_______________________ **Test Date**_______________________
Sample Recovered by____

Reagent	Date/Time	Weight (g)	Audit* (g)	Lab Temp. °F	Lab RH %	Analyst
FRONT HALF:						
Front Filter Filter ID:___________ Tare Wt.:___________ Date/time into desiccator:___________						
Acetone Beaker ID:___________ Tare Wt.:___________ Solv. Vol.:___________ Solv. ID:____________ Date/time into desiccator:___________						
BACK HALF:						
Back Filter Filter ID:___________ Tare Wt.:___________ Date/time into desiccator:___________						
Acetone Beaker ID:___________ Tare Wt.:___________ Solv. Vol.:___________ Solv. ID:____________ Date/time into desiccator:___________						
Water Beaker ID:___________ Tare Wt.:___________ Water Vol.:__________ Water ID:___________ Date/time into desiccator:___________						
MeCl or Hexane Beaker ID:___________ Tare Wt.:___________ Solv. Vol.:___________ Solv. ID:___________ Date/time into desiccator:___________						

*filter 0.5000 g ± 0.5 mg tolerance – NIST traceable Class S weight
beaker 100.0000 g ± 0.5 mg tolerance – NIST traceable Class S weight

SUB-APPENDIX C-8

OREGON DEQ
SOURCE SAMPLING
METHOD 8

Oregon Method 8

State of Oregon
Department of Environmental Quality
Source Sampling Method 8

Sampling Filterable Particulate Emissions from Stationary Sources (High Volume Method)

1. **Principle and Applicability**

1.1 **Principle:** Particulate matter is withdrawn isokinetically from a flowing gas stream and deposited on a glass fiber filter. The particulate matter is determined gravimetrically after removal of uncombined water.

1.2 **Applicability:** This method is applicable to stationary sources whose exhaust points do not meet minimum EPA Method 1 flow disturbance requirements and whose primary emissions are solid (filterable) particulate. Its primary application is intended to be for wood product handling cyclones and baghouse exhaust systems. Caution must be taken when applying this method to sources with elevated exhaust temperatures and/or moistures as they may diminish the integrity of the sampling filter and damage the sampling apparatus.

2.0 **Acceptability:** Results from this method will be accepted as a demonstration of compliance (or non-compliance) provided that the methods included or referenced in this procedure are strictly adhered to and a report containing at least the minimum amount of information regarding the source is included as described in Section 2.11 of Oregon DEQ's Source Sampling Manual, Volume I. Deviations from the procedures described herein will be permitted only if permission from DEQ is obtained in writing in advance of the tests.

3.0 **Sampling Apparatus (Figure 8-1)**

3.1 **Nozzle** - smooth metal construction with sharp leading edge. The nozzle shall be connected to the probe by means of a joint designed to minimize particulate matter deposition.

3.2 **Probe** - smooth metal construction. The probe shall be attached to the nozzle and filter holder with air-tight joints designed to minimize particulate matter deposition. The probe should be as short as possible.

3.3 **Filter Holder** - air-tight with support screen for the filter.

3.4 **Metering system** - a calibrated orifice followed by a thermometer or thermocouple and flow control device. The metering system shall be connected to the filter holder by means of an air-tight joint.

3.5 **Pitot Tube** – Standard pitot same as EPA Method 2, Sec. 6.7.1, or S-type same as EPA Method 2, Sec. 6.1, or equivalent.

3.6 **Blower** - high capacity (typically 60 cfm free air). The blower may be connected to the metering system by a flexible hose if desired.

3.7 **Probe-Nozzle Brush** - flexible, nylon bristle brush at least as long as the probe and nozzle.

3.8 **Differential Pressure Gauges** - liquid manometer, Magnehelic[2], or equivalent.

3.9 **Barometer** - mercury, aneroid, or other type capable of measuring atmospheric pressure to within 0.1"Hg. If the barometric pressure is obtained from a nearby weather bureau station, the true station pressure (not corrected for elevation) must be obtained and an adjustment for elevation differences between the station and sampling site must be applied.

3.10 **Temperature Gauges** - Same as EPA Method 2 Section 6.3.

3.11 **Timer** - integrating type, accurate and readable to the nearest 6 seconds (tenth of a minute).

3.12 **Wash Bottles**: Same as EPA Method 5 Section 6.2.2 .

3.13 **Filter Storage Container** - clean manila envelopes and tagboards, or suitable equivalent.

3.14 **Sample Storage Containers** - glass with leak-tight cap that is resistant to attack by the solvent used, and allows complete recovery of particulate matter. Polyethylene bottles are also acceptable.

4.0 Reagents and Standards

4.1 **Filters** - glass fiber filters, free of pinhole leaks or other imperfections and exhibiting at least 99.95% efficiency on 0.3 micron DOP smoke particles. Desiccate individually numbered filters for 24-hours and weigh to the nearest 0.5 mg before use.

4.2 **Rinse Solvent** - acetone, reagent-grade, $\leq$ 0.001% (0.008 mg/ml) residue. For aluminum probes and nozzles, methanol may be substituted for acetone. The same purity is required.

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[2] Mention of trade names or specific products does not constitute endorsement by DEQ.

5.0 Sample Train Preparation

5.1 All parts of the sampling train shall be cleaned and properly calibrated as directed in Section 10.

5.2 Place a filter in the filter holder with the coarse side facing the flow, being careful not to damage it. Be certain that the filter is positioned so that no air can be drawn around the filter.

5.3 Assemble the sample train with the appropriate nozzle and length of probe. Perform a leak check by plugging the nozzle, turning on the blower, and observing the deflection of the flow orifice pressure gauge. The acceptable leakage rate shall not exceed 5% of the expected sample flow rate.

6.0 Sample Collection, Preservation, Storage, and Transport

6.1 Use a pitot tube to roughly map the velocity distribution across the face of the exhaust opening or duct. Areas of zero or negative flow should also be indicated if present. At each point at which the velocity is measured, measure the flow in the direction giving maximum deflection of the pitot pressure gauge. Record the data on a form similar to Figure 8-6.

6.2 Select six or more points of outgoing (positive) flow from the points measured in Section 6.1 to sample. The points shall be representative of the flow pattern, and shall include the point of maximum velocity. If six points of positive flow cannot be obtained, use the maximum number possible. Do not choose any points closer than 2 inches to the exhaust duct wall.

Alternatively, sample point locations may be determined utilizing criteria specified within EPA Method 1 if the minimum distances from upstream and downstream flow disturbances are met (Figure 1-1 of EPA Method 1).

6.3 Measure the exhaust temperature.

6.4 Determine the nozzle size required for isokinetic sampling. An estimate of the orifice temperature is required. For low temperature exhausts, the orifice temperature is usually very close to the exhaust temperature. For higher temperature exhausts, a trial run may be necessary to determine the expected orifice temperature.

6.5 Calculate the required orifice pressure drop for each chosen sampling point to obtain an isokinetic sample rate. With the probe out of the exhaust stream, turn on the blower and adjust the sample flow rate to that calculated for the first sampling point in Section 6.2. Locate the probe nozzle at the first sampling point, and immediately start the timer. Move the probe around until the velocity pressure matches that for which the sampling flow rate was pre-set. The probe nozzle must be pointing directly into the flow.

6.6 Continually monitor the velocity during the sampling period and move the probe around as required to keep it in an area where the velocity matches the original velocity used to calculate the pre-set sampling rate. Record the sampling time, the orifice temperature, and orifice pressure drop on a data sheet similar to Figure 8-7. Record data every 5 minutes or once per sampling point, whichever is more frequent. Sample for a length of time so that the total sampling time for all points is at least 15 minutes and a minimum of 100 mg of particulate matter is collected.

6.7 Repeat steps 6.5 and 6.6 for each sampling point. The blower need not be turned off between points if readjustments to the new sampling rate can be made rapidly (less than 15 seconds).

6.8 Care should be taken so that the nozzle does not touch the walls of the exhaust stack because particulate matter may be dislodged and enter the sample train. If there is reason to believe this has happened, discontinue the sample, clean the train, and restart the test.

6.9 If excessive loading of the filter should occur such that isokinetic conditions cannot be maintained, replace the filter and continue the test.

6.10 At the conclusion of the sampling period, remove the probe from the exhaust and turn off the blower (do not reverse this order because the filter may be broken and sample lost). Plug the nozzle to prevent sample loss, and transport to the sample recovery area.

6.11 Conduct a post-test leak check (as per Section 5.3).

6.12 Measure the moisture content, molecular weight, and the pressure (absolute) of the exhaust gas. In most cases, the moisture may be measured by the wet bulb/dry bulb technique as described in Oregon Source Sampling Method 4. The molecular weight shall be measured by EPA Method 3 or 3a. If the exhaust gas being sampled is ambient air, the dry molecular weight can be assumed to equal 29 lbs/lb mol (29 g/g mol). If feasible, these supplemental measurements should be conducted during each PM sample run. Otherwise, these supplemental measurements should be conducted immediately prior to and immediately following each PM sample run. The process operating parameters realized during these supplemental measurements must be consistent with the parameters encountered during the PM sampling collection.

7.0 Sample Recovery

7.1 Remove the nozzle plug, turn on the blower, insert the probe brush into the nozzle, and brush the particulate from the nozzle and probe onto the filter. Do not insert the brush so far in that it will come into contact with the filter. Turn off the blower and recover the PM adhered to the brush. This brushing process must be performed after every PM sample run.

7.2 Open the filter holder and carefully remove the filter. Inspect the filter for holes or tears. A leak around the filter is likely if particulate deposits are found at the edge of the filter. If any of these problems are found, the observations should be recorded on the field data sheet and the sample should be voided (repeat the run). Fold the filter once lengthwise with the dirty side in, and place in a folded manila tagboard (or equivalent), folded edge down. Fasten the outside edge of the tagboard (or equivalent) with a paper clip, and place in the manila envelope (or equivalent). Be aware that some filter material will likely remain on the gasket and filter support. If possible, these filter remains should be removed with a spatula and placed within the folded filter.

7.3 Rinse the inside front of the filter holder, probe, and nozzle with a measured amount of acetone or methanol while brushing. Repeat the rinsing/brushing until all particulate and filter remains is removed as evidenced by a lack of visible residue on the inside surfaces after evaporation of the acetone or methanol. Be sure to also recover the PM matter adhered to the recovery brushes. Retain the acetone or methanol rinse and a blank sample of the acetone or methanol in labeled containers for laboratory analysis. This rinsing process must be performed after every PM sample run.

8.0 Analytical Procedures

8.1 Desiccate the filter for 24-hours at room temperature (70ºF or less), and weigh to a constant weight to the nearest 0.5mg.

NOTE: Make certain that any particulate that may have dislodged from the filter into the tagboard or envelope (or their equivalent) is returned to the filter before weighing. Alternatively, the filter and corresponding filter receptacle (envelope) may be tared simultaneously and analyzed collectively. In this case, the filter receptacle must be opened prior to being placed in the desiccator to instigate sample drying.

Since the relatively large filter and particulate catch may be hygroscopic, weigh immediately upon removal from the desiccator.

8.2 Filter blanks shall be run in the field before and after the complete source testing activity. A minimum of 2 filter blanks shall be collected for each source test. This is accomplished by inserting a pre-weighed filter into the filter holder, performing a leak check, removing the filter, and treating it as a sample filter in accordance with Section 7.2.

8.3 Quantitatively transfer the solvent rinse and blank solvent to tared beakers or evaporating dishes, evaporate at room temperature (70ºF or less) and pressure, desiccate, and weigh to a constant weight to the nearest 0.5 mg.

8.4 Record the data on forms similar to Figures 8-2, 8-3, 8-4, and 8-5.

9.0 Exhaust Gas Flow Rate Measurement

9.1 If the PM sampling location does not satisfy the flow disturbance requirements of EPA Method 1, then an alternate sampling location shall be selected for a velocity traverse. The velocity traverse location shall meet EPA Method 1 requirements and should accurately represent the flow rate to the atmosphere at the particulate sampling point (i.e., no air flows should be added to or removed from the system between the velocity and the particulate sampling points).

9.2 The dry molecular weight of the gas stream shall be determined as per EPA Method 3 or 3a. If the exhaust gas being sampled is ambient air, the dry molecular weight can be assumed to equal 29 lbs/lb mol (29 g/g mol).

9.3 In most cases, the moisture may be measured by the wet bulb/dry bulb technique as described in Oregon Source Sampling Method 4. If Oregon Source Sampling Method 4 is not applicable, then exhaust moisture must be measured as per EPA Method 4.

9.4 The flow rate shall be measured as per EPA Method 2 at the location specified by Section 9.1 of this DEQ method.

9.5 If possible, the flow rate (including velocity, molecular weight, & moisture) should be measured during each PM sample run. Alternatively, these supplemental measurements should be conducted immediately prior to and immediately following each PM sample run. The process operating parameters realized during these supplemental measurements must be consistent with the parameters encountered during the PM sampling collection.

10.0 **Calibration**

10.1 The orifice flow meter shall be calibrated at least once within twelve months of the sampling date using a primary standard or a device which has been calibrated against a primary standard. The calibration data and calibration curves for the orifice and intermediate standard shall be included in the source test report, along with documentation of the primary standard.

10.2 All S-type pitot tubes, differential pressure gauges, and thermometers or thermocouples, shall be calibrated at least once within six months of the sampling date. The calibration data and/or calibration curves shall be included in the source test report.

10.3 The calibration records shall include the date, place, and method of calibration.

10.4 Differential pressure gauges (if not liquid manometers) shall be calibrated against a liquid manometer.

10.5 The following calibration and standardization procedures must be performed on the analytical balance:

10.5.1 The balance must be audited utilizing 0.500 g, 1.0000 g, 10.0000 g, 50.0000 g, and 100.0000 g Class-S standard weights. Alternatively, five (5) Class-S standard weights may be substituted that accurately represent the anticipated measurement range. The balance results must agree within ±1 mg of the Class-S weights. At a minimum, the balance calibration must be performed subsequent to disturbing the analytical balance and annually thereafter.

10.5.2 Prior to weighing filters before and after sampling, adjust the analytical balance to zero and check the accuracy with a 5 g Class-S weight. A Class-S standard weight within 1 g of the filter weight may be used as an alternate. The balance results must agree within ±0.5 mg and the temperature in the weighing environment must be $\leq 70^{o}$F.

10.5.3 Prior to weighing beakers before and after sampling, adjust the analytical balance to zero and check the accuracy with a 100 g Class-S standard weight. A Class-S standard weight within 1 g of the beaker weight may be used as an alternate. The balance results must agree within ±0.5 mg and the temperature in the weighing environment must be $\leq 70^{o}$F.

11.0 **Calculations**

11.1 Total particulate emissions from the system shall be calculated by multiplying the measured particulate concentration by the flow rate through the exhaust system. An index to the parameters utilized in these calculations are as follows:

Bws = Moisture content of sample stream as per EPA 4 or ODEQ 4, vol./vol.

Cg = Calculated PM concentration, gr/dscf.

Cp = Pitot tube coefficient for Method 8 apparatus, typically 0.99

Dn = Sample nozzle diameter, inches.

$\sqrt{dp}$ = Average square root of velocity pressures measured at sample points, (“$H_2O)^{1/2}$.

E= PM emission rate, lb/hr

I = Isokinetic sampling rate percentage, %

Mc = Molecular weight of gas stream used to calibrate orifice, typically 29.0 #/#mol.

m_n = Mass of PM recovered from sampling apparatus, mg

Ms = Molecular weight of sample gas stream on a wet basis, #/# mol.

Pb_s = Barometric pressure during the course of sampling, “Hg.

Ps = Absolute exhaust pressure at sampling location, “Hg.

Qs_{std} = Standard exhaust gas flow rate, dscfm

SRstd=Standard sample rate (wet) as indicated by calibration curve, scfm

SRstd’ = Corrected standard sample rate (wet) for temp., pressure, & molecular weight, scfm.

$SRstd'_i$ = Corrected standard sample rate (wet) at sample point “*i*”, scfm.

To_s = Orifice temperature measured at sample point, ^{o}R.

Ts=Average exhaust temperature at sampling location, ^{o}R

Vstd’ = Standard sample volume (dry) of entire test replicate, dscf.

Ø = Sampling time of entire test replicate, min.

$\O_i$ = Sampling time at sample point "i", min.

11.2 Particulate Concentration: The following calculations shall be conducted for each test run:

11.2.1 Total Sample Weight: Calculate the total sample weight from laboratory results by adding the net weight gain of the filter sample(s), adjusted for a blank value, to the net weight of particulate matter collected in the acetone (or methanol) rinse, corrected for an acetone (or methanol) blank. Record the results on a laboratory form similar to Figure 8-5.

11.2.2 Sampling Rate: Sample flow rates for each point shall be determined from the orifice calibration curve. Typically, the orifice calibration curve is a plot of orifice pressure drop versus sample flow rates at standard temperature and pressure. Some calibration curves account for varying orifice temperatures, but rarely do they adjust for orifice pressure and gaseous molecular weight.

Consequently, the calibration curve must be corrected to accurately reflect the relationship between the orifice differential pressure and the standard sampling flow rate. The correction to the standard sampling flow rate for a constant orifice differential is specified by Equation 8.11-1.

$$SRstd' = 4.2 \times SRstd \times \sqrt{\frac{Pb_s}{To_s}} \times \sqrt{\frac{Mc}{Ms}} \qquad \text{(Eq. 8.11-1)}$$

Note: Equation 8.11-1 only applies to the calibration curve that represents an orifice temperature of 68° F and an orifice pressure of 29.92"Hg. Set Mc equal to Ms (Mc:Ms ratio of 1) if sample gas is mainly comprised of air with Bws less than 0.05 vol./vol.

11.2.3 Total Sample Gas Volume: Calculate the sample gas volume by multiplying each sample point duration in minutes, times the average sample rate (wet standard cubic feet per minute – wscfm) as determined using the orifice calibration curve and the corrected sample rate from Equation 8.11-1. Add the volume of all sample points and adjust for exhaust gas moisture to get the total dry standard sample gas volume for the entire test run as shown by Equation 8.11-2.

$$Vstd' = \left[\sum_{i=1}^{n} SRstd'_i \times \phi_i\right] \times \left[1 - Bws\right)] \qquad \text{(Eq. 8.11-2)}$$

11.2.4 Calculate the particulate concentration in gr/dscf by the following equation:

$$Cg = 0.0154 \times \frac{m_n}{Vstd'} \qquad \text{(Eq. 8.11-3)}$$

11.3 Total Exhaust Gas Flow Rate: Use EPA Method 2 calculations to determine the total exhaust gas flow rate using the data obtained from Section 9 of this DEQ method. For some cyclones, the total flow may be adjusted to account for air purposely vented out the bottom of the cyclone.

11.4 Total Emissions: Calculate the total particulate emission rate (lb/hr) by the following equation:

$$E = 0.00857 \times Cg \times Qs_{std} \qquad \text{(Eq. 8.11-4)}$$

11.5 Percent Isokinetic Sampling Rate: Calculate the isokinetic sampling rate, defined as the ratio of the average velocity of the sample gas entering the sample nozzle to the average sample point velocity. In order to achieve acceptable results, the value of this parameter must be between 80% and 120%. Test results falling outside this range shall be discarded, and the test repeated.

$$I = 0.2017 \times \frac{Vstd'}{\phi \times (1 - Bws) \times Dn^2 \times Cp \times \sqrt{dp}} \times \sqrt{\frac{(Ts + 460) \times Ms}{Ps}} \qquad \text{(Eq. 8.11-5)}$$

12.0 Test Reports

The test report shall include as a minimum the information requested in Section 2.11 of this manual.

Figure 8-1

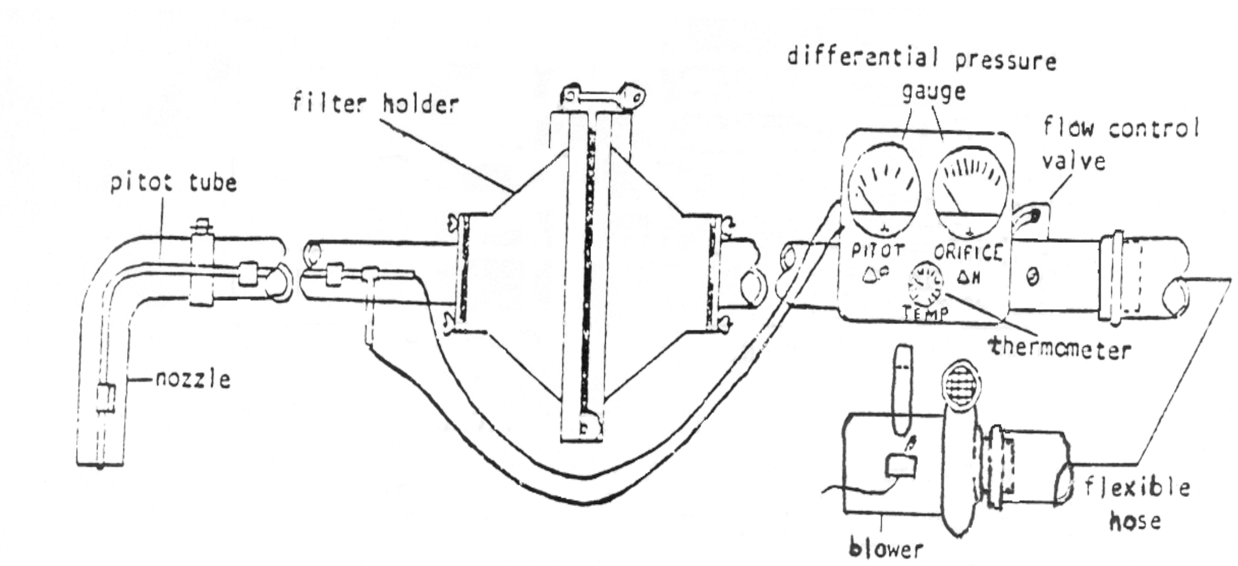
differential pressure gauge
filter holder
flow control valve
pitot tube
PITOT
ΔP
ORIFICE
ΔH
TEMP
thermometer
nozzle
flexible hose
blower

Figure 8-2
METHOD 8 DATA ANALYSIS FORM

Facility________________________________ **Run Number**_______________
Sample Location_______________________ **Test Date**__________________
Sample Recovered by____

Reagent	Date/Time	Weight (g)	Audit* (g)	Lab Temp. ºF	Lab RH %	Analyst
Filter Filter ID:___________ Tare Wt.:____________ Date/time into desiccator: ___________						
Acetone Beaker ID:___________ Tare Wt.:____________ Solv. Vol.:___________ Solv. ID:_____________ Date/time into desiccator: ____________						

*filter 5.0000 g ± 0.5 mg tolerance – NIST traceable Class S weight
beaker 100.0000 g ± 0.5 mg tolerance – NIST traceable Class S weight

Figure 8-3
METHOD 8 BLANK ANALYSIS DATA FORM

Samples Prepared by________________________ **Date**________________

Reagent	Date/Time	Weight (g)	Audit* (g)	Lab Temp. ºF	Lab RH %	Analyst
<u>Pre Test Blank Filter</u> Filter ID:____________ Tare Wt.:____________						
<u>Post Test Blank Filter</u> Filter ID:____________ Tare Wt.:____________						
<u>Blank Acetone</u> Beaker ID:___________ Tare Wt.:____________ Solv. Vol.:___________ Solv. ID:_____________						

*filter 5.0000 g ± 0.5 mg tolerance – NIST traceable Class S weight
beaker 100.0000 g ± 0.5 mg tolerance – NIST traceable Class S weight

Figure 8-4
METHOD 8 TARE WEIGHT RECORD

Indicate: filters or evaporation containers (beakers)

Media ID	Date_________ Time________ Temp_____ ºF RH_______ % Audit____ gm By__________	Date_________ Time________ Temp_____ ºF RH_______ % Audit____ gm By__________	Date_________ Time________ Temp_____ ºF RH_______ % Audit____ gm By__________	Date_________ Time________ Temp_____ ºF RH_______ % Audit____ gm By__________	Date_________ Time________ Temp_____ ºF RH_______ % Audit_____ gm By__________
	Weight (g)	Weight (g)	Weight (g)	Weight (g)	Weight (g)

Figure 8-5

METHOD 8 ANALYSIS SUMMARY

Facility________________________________ Run Number________________
Sample Location________________________ Test Date____________________
Sample Recovered by____

ANALYSIS	RUN _____	RUN _____	RUN _____	RUN _____	RUN _____
SAMPLE FILTER					
Filter ID					
Gross Weight, mg					
Tare Weight, mg					
Net Weight, mg					
PRE TEST BLANK FILTER					
Filter ID					
Gross Weight, mg					
Tare Weight, mg					
Net Weight, mg					
POST TEST BLANK FILTER					
Filter ID					
Gross Weight, mg					
Tare Weight, mg					
Net Weight, mg					
ACETONE RINSE					
Acetone ID					
Acetone Volume, mls					
Gross Weight, mg					
Tare Weight, mg					
Net Weight, mg					
ACETONE BLANK					
Acetone ID					
Acetone Blk Vol., mls					
Gross Weight, mg					
Tare Weight, mg					
Net Weight, mg					
Net Weight, mg/ml					
TOTAL PM RECOVERY*					
PM Recovered, mg					

*Total PM = (Filter) – (Average (pre-test blank & post-test blank)) + (Acetone Rinse) – (Acetone Blank Corrected for Rinse Volume). Note: The blank corrections for the filter and/or rinse samples are ‘0’, if the blank filter or rinse samples yield negative weight gains.

Oregon Source Sampling Method 8
High Volume Sampling Data
Form 1 of 2

Figure 8-6
VELOCITY PRE-SURVEY

Plant Name & Location____
Date____________ **Time**_________________ **By (name)**___________________________
Source Location or ID____

☐Low Pressure System ☐High Pressure System

Type of Exhaust: ☐Straight Vertical ☐China Hat

☐Goose-Neck ☐Other (specify)_________

Temperature: Dry Bulb _______________ºF Wet Bulb ______________ºF

Velocity Survey: Record velocity head at enough points to roughly map the velocity distribution across the exhaust cross-section. Select six points for sample collection and show in diagram.

Point	X inches	Y inches	Δ P " H_2O	Check if selected ( )
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
Average				

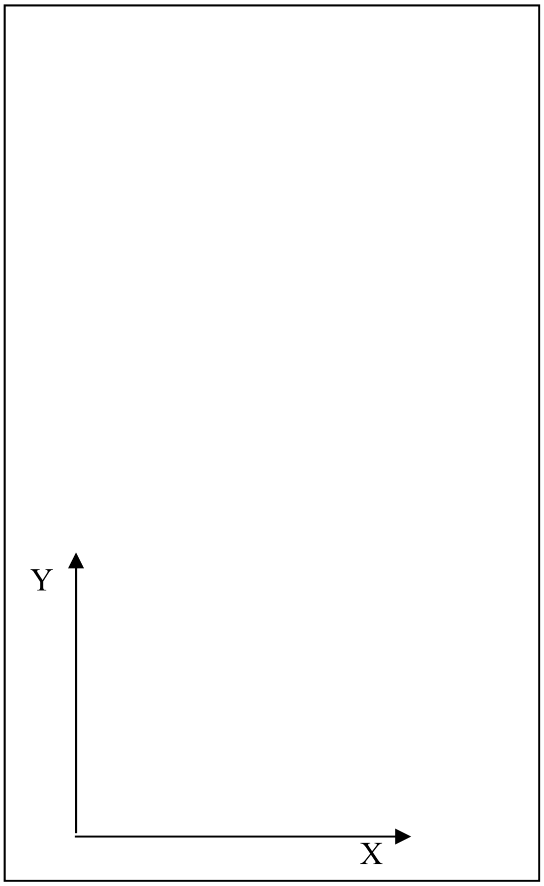

Figure 8-7

Sampling Data and Field Analysis

Plant Name/Location ____________________________ Source Identification _________________Run #________

Date_________ Time_________ By (name)______________Process Operation During Test: ______________

Temperature: Dry bulb___________ Wet bulb___________ %Moisture__________ Ambient____________

Gas composition: %O_2 _____________ %CO_2 _____________ Pitot factor (C_p)____________

Static Press (P_g)______"H_2O

Nozzle Dia. _________ Nozzle area (A_n)_____________ Barometric Pressure(P_b) __________________in. H_g

Pt.	Location		Velocity Pressure		Orifice ΔH		Orifice Temperature °F	Sample Time minutes	Sample Rate Indicated by Calibration Curve scfm	Sample Rate Corrected for Sampling Conditions scfm	Sample Volume dscf
	X	Y	ΔP	√ΔP	Pre-set " H_2O	Actual "H_2O					
1											
2											
3											
4											
5											
6											
Avg. or Total			--		--	--			--		

Sample Filter ID:	
Acetone ID:	
Acetone Volume, mls.	
Pre Test Blank Filter ID:	
Post Test Blank Filter , ID:	

APPENDIX D

GENERAL CALIBRATION REQUIREMENTS

FOR
OREGON SOURCE SAMPLING METHODS

Table D-1: CALIBRATION REQUIREMENTS FOR OREGON DEQ SOURCE SAMPLING METHODS

Measurement Equipment	Reference	Calibration Points	Frequency	Acceptance Criteria	Applicable ODEQ Method			
					M4	**M5**	**M7**	**M8**
TEMPERATURE MEASURING DEVICES								
Stack/Exhaust	ASTM mercury thermometer, NIST traceable, or thermocouple/potentiometer	32°F & 212°F or Sec. 10.3 of EPA M2	every 6 months or EPA M2	±1.5% absolute	X	X	X	X
Oven/Filter	ASTM mercury thermometer, or NIST traceable	32°F & 212°F	every 6 months	±1.5% absolute		X	X	
Impinger Exit	ASTM mercury thermometer, or NIST traceable	32°F & 212°F	every 6 months	±1.5% absolute		X	X	
Dry Gas Meter	ASTM mercury thermometer, or NIST traceable	32°F & 212°F	every 6 months	±1.5% absolute		X	X	
Orifice Meter	ASTM mercury thermometer, or NIST traceable	32°F & 212°F	every 6 months	±1.5% absolute				X
Note: The entire measurement system including readout shall be calibrated. All thermocouples should be checked before each source test. This could be accomplished by noting on the field data sheets that all of the thermocouples and/or thermometers register the same temperature at ambient conditions.								
SAMPLE NOZZLE								
Sample Nozzle (initial & thereafter)	micrometer	3 diameters	12 months & after repair	high minus low ≤0.004"		X	X	X
Sample Nozzle (pre-test)	visual inspection	tapered edge of opening	prior to each field use	no nicks, dents, or corrosion		X	X	X
PITOT TUBES								
S-type pitot tube (preferred procedure)	standard pitot tube (Cp=0.99)	800; 1,500; 3,000; & 4,500 fpm	every 6 months	mean deviation ≤0.01 A & B deviation ≤0.01		X	X	X
S-type pitot tube (D_t, P_A, P_B, x, Z, & W in limits)	specifications illustrated in Method 2, Figures, 2-2, 2-3, 2-4, 2-7, & 2-8	face alignments & dynamic interferences	pre & post each field use	EPA Method 2		X	X	X
Standard pitot tube	specifications of EPA Method 2, Section 6.7 and Figure 2-5	static pressure holes location & size	prior to initial use	≥ 6 D to tip, ≥8 D to bend, 0.1D hole diam.		X	X	X

Note: Where inconsistencies exist, quality assurance requirements specified by method supersede those presented within Tables D-1 & D-2.

Table D-2: CALIBRATION REQUIREMENTS FOR OREGON DEQ SOURCE SAMPLING METHODS

Measurement Equipment	Reference	Calibration Points	Frequency	Acceptance Criteria	Applicable ODEQ Method			
					M4	M5	M7	M8
SAMPLE VOLUME METERING EQUIPMENT								
Dry Gas Meter (pre test)	standard meter	3 orifice pressures (1.0”, 2.0”, & 3.0”H_2O)	every 6 months	Y ± 0.02 from average ΔH@ ±0.2 from average		X	X	
Dry Gas Meter (post test)	standard meter	3 replicates at avg. ΔH and max. vacuum during test	following each source test	Y_{post} ±5% of Y_{pre}		X	X	
Standard Gas Meter (dry gas meter)	spyrometer or wet test meter	5 orifice pressures over range	annual	$Y_{max} - Y_{min} \leq 0.030$ $0.95 \leq Y \leq 1.05$		X	X	
Standard Gas Meter (wet test meter)	spyrometer	3 flow rates (0.25, 0.5, & 0.75 cfm)	annual	deviation ≤ 1%		X	X	
High-Volume Orifice (pre test)	standard orifice or meter (or approved equivalent)	7 settings over full range of orifice	every 12 months	demonstrate linearity on a logarithmic plot				X
Critical Orifices (as a calibration standard)	standard meter	duplicate runs for each orifice	every 6 months	K’ ± 0.5% from average		X	X	
MISCELLANEOUS EQUIPMENT								
Magnehelic[3]	liquid manometer	3 points over range	after each field use	±5%		X	X	X
Barometer (aneroid type)	mercury barometer	one point	annual	± 0.1”Hg	X	X	X	X

Note: Where inconsistencies exist, quality assurance requirements specified by method supersede those presented within Table D-1 & D-2.

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[3] Mention of trade names or specific products does not constitute endorsement by DEQ.

Air Quality Program

Source Sampling Manual

Volume II

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May, 1981
January, 1992
April, 2015

State of Oregon
Department of Environmental Quality

Air Quality Division

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503-229-5696, or toll-free in Oregon at 1-800-452-4011, ext. 5696.

Table of Contents

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DEQ METHOD 30

Test Procedures for Determining the Efficiency of Gasoline Vapor Recovery Systems at Service Stations

STATE OF OREGON
DEPARTMENT OF ENVIRONMETNAL QUALITY

DEQ Air Quality Program
Portland, Oregon
December 1, 1980

Revisions:
May 15, 1981
January 23, 1992

Method 30

Test Procedures for Determining the Efficiency of Gasoline vapor recovery systems at Service Stations and Similar Facilities with Small Storage Tanks

1.0 Introduction

The following test procedures are for determining the efficiency of vapor recovery systems for controlling gasoline vapors emitted during the filling of small storage tanks.

The test procedure for determining the efficiency of systems for controlling gasoline vapors displaced during filling of storage tanks requires determination of the weight of gasoline vapors vented through the storage tank vent and the volume of gasoline dispersed. The percentage effectiveness of control is then calculated from these values.

During the performance test, maintenance, adjustment, replacement of components or other such alteration of the control system is not allowed unless such action is specifically called for in the system's maintenance manual. Any such allowable alteration shall be recorded and included in the test report. During the testing, the control system will be sealed in such a manner that unauthorized maintenance may be detected. Maintenance is to be performed only after notification of the person in charge of the testing, except in case of emergency. Unauthorized maintenance may be reason for immediate failure of the test.

For systems which are identical in design and include the same components as systems tested and found to comply with the test procedures, but differ, primarily in size, the owner or vendor may demonstrate compliance capability and obtain approval by submitting engineering and/or test data demonstrating the relationship between capacity and throughput of each component whose performance is a function of throughput. Examples of such components include: blowers, catalyst, carbon or other absorbent, compressors, heat exchangers, combustors, piping, etc.

For the purpose of determining compliance with applicable Administrative Rules, equipment on systems with 90 percent or greater control efficiency shall be considered to be vapor tight.

2.0 Acceptance of Test Results

Results of this method will be accepted as a demonstration of compliance status of the equipment tested, provided that the methods included or referenced in this procedure are strictly adhered to. A statement containing at least the minimum amount of information regarding the test procedures applied should be included with the results.

Deviations from the procedure described herein will be permitted only if permission from DEQ is obtained in writing in advance of the test.

3.0 Small Storage Tank Filling (Phase I Systems):

3.1 Principle and Applicability:

3.1.1 Principle: During a fuel delivery, the volume of gasoline delivered from the tank to the storage tank is recorded and the concentration of gasoline vapor returning to the tank truck is measured. The weight of gasoline vapor discharged from the vent of the storage tank and, if applicable, from the vent of the vacuum assisted secondary processing unit during the same period is determined. The efficiency of control is calculated from these determinations.

3.1.2. Applicability: The method is applicable to all control systems which have a vapor line connecting the storage tank to the tank truck.

The storage tank is filled by submerged fill.

3.2. Test Equipment

3.2.1. For each vent, including restricted vents and vents of any processing units, a positive displacement meter, with a capacity of 3,000 standard cubic feet per hour (SCFH), a pressure drop of no more than 0.05 inches of water at an air flow of 30 SCFH, and equipped with an automatic data gathering system that can differentiate direction of flow and record volume vented in such a manner that this date can be correlated with simultaneously recorded hydrocarbon concentration data. A manifold for meter outlet with taps for a hydrocarbon (HC) analyzer, a thermocouple, and a pressure sensor is to be used with the positive displacement meter.

3.2.2. Coupling for the vent vapor line to connect the gas meter. Coupling to be sized so as to create no significant additional pressure drop in the system.

3.2.3. Coupling for the vent of the vacuum assisted secondary processing unit to connect the gas meter. Coupling to be sized as to create no significant additional pressure drop on the system.

3.2.4. Coupling for tank truck vapor line with thermocouple, manometer and HC analyzer taps. Coupling to be the same diameter as the vapor return line.

3.2.5. Coupling for tank truck fuel drop line with thermocouple tap. Coupling to be the same diameter as the fuel line.

3.2.6. Two (2) hydrocarbon analyzers (Flame Ionization Detector, FID, or DEQ approved equivalent) with recorders and with a capacity of measuring total gasoline vapor concentration of 100 percent as propane. Both analyzers to be of same make and model.

3.2.7. Three (3) flexible thermocouples or thermistors (0-150°F) with a recorder system.

3.2.8. Explosimeter

3.2.9. Barometer

3.2.10. Three (3) manometers or other pressure sensing devices capable of measuring zero to ten inches of water.

3.2.11. Thermometer

3.3 Testing Procedure:

3.3.1. The test during filling operating will be conducted under, as closely as feasible, normal conditions for the station. Normal conditions will include delivery time and station operating conditions.

3.3.2. Connect manifold to outlet of positive displacement meter and restriction to system vent of underground tank using the coupler, or if the vent has a restriction, remove the restriction and connect the coupler, manifold and outlet. If appropriate, connect another manifold and meter to the vent of the vacuum assisted secondary processing unit. If the system uses an incinerator to control emissions, use test procedures set forth in Section 4.0.

3.3.3. Connect the HC analyzer with recorder, thermocouple and manometer to the vent manifold. Calibrate the equipment in accordance with Section 6.0.

3.3.4. Connect the couplers to the tank truck fuel and vapor return lines.

3.3.5. Connect an HC analyzer with a recorder, a manometer and a thermocoupler to the taps on the coupler on the vapor return line.

3.3.6. Connect tank fuel and vapor return lines to appropriate underground tank lines in accordance with written procedure for the system.

3.3.7. Check the tank truck and all vapor line connections for a tight seal before and during the test with the explosimeter.

3.3.8. Record the initial reading of gas meter(s).

3.3.9. Start filling of the storage tank in accordance with manufacturers' established normal procedure.

3.3.10. Hydrocarbon concentrations, temperature and pressure measurements should be recorded using stripchart recorders within the first 15 seconds of the unloading period. The gas meter reading is to be taken at 120 second intervals.

3.3.11. Record at the start and the end of the test, barometric pressure and ambient temperature.

3.3.12. At the end of the drop, disconnect the tank truck from the storage tank in accordance with manufacturers' instructions (normal procedures). Leave the underground vent instrumentation in place.

3.3.13. Continue recording hydrocarbon concentrations, temperature, pressure and gas meter readings at the storage tank vent and/or the exhaust of any processing unit at 20 minute intervals. Do this for one hour for balance systems and until the system returns to normal conditions as specified by the manufacturer for secondary systems.

3.3.14. Disconnect instrumentation from the vent(s).

3.3.15. Record volume of gasoline that is delivered.

3.3.16. Record final reading of gas meter.

3.4. Calculations:

3.4.1. Volume of gas discharged through "i_{th}" vent (V_{vi}). This includes underground tank vent and any other control system vent.

$$V_{vsi} = \frac{V_{vi} \times 528 \times P_b}{T_{vi} \times 29.92} \quad (ft^3)$$

Where:

V_{vsi} = Volume of gas discharged through "i_{th}" vent, corrected to 68°F and 29.92 in. Hg; (Ft^3).

P_b = Barometric Pressure, (in. Hg).

V_{vi}= Volume of gas recorded by meter on "i_{th}" vent, corrected for amount of vapor removed for the hydrocarbon analysis, (ft^3).

T_{vi} = Average temperature in "i_{th}" vent line, ($^{\circ}R$).

"i_{th}" = The vent under consideration.

3.4.2. Volume of gas returned to the tank truck, (V_t) corrected to 68°F and 29.92 in. Hg.

$$V_t = \frac{0.1337 \times G_t \times [528(P_b + \Delta H)]}{T_t \times 29.92} \quad (ft^3)$$

Where:

G_t = Volume of gasoline delivered, (gal)

ΔH = Final gauge pressure of truck tank, (in Hg)

T_t = Average temperature of gas returned to tank truck, (°R)

P_b = Barometric pressure, (in. Hg)

T_t = Average temperature of gas returned to tank truck, (°R)

P_b = Barometric pressure, (in. Hg)

0.1337 = Conversion factor gallons to ft^3

3.4.3. Control Efficiency (E%):

$$E\% = \frac{V_t \times C_t \times 100}{(V_t \times C_t) + \sum(C_{vi} \times V_{vsi})}$$

Where:

E% = the efficiency of control in percent.

V_t = From 3.4.2 above

Ct = The average fractional volume concentration of gasoline vapor in the return line to the truck as determined by the hydrocarbon analyzer, (decimal fraction).

Cvi = The average fractional volume concentration of gasoline vapor in the "ith" vent as determined by the hydrocarbon analyzer, (decimal fraction).

V_{vsi} = From 3.4.1. above.

4.0 Test Procedure for Determining the Control Efficiency of Gasoline Vapor Incinerators

4.1. Principle and Applicability:

4.1.1. Principle: Hydrocarbon and carbon dioxide concentrations in the exhaust gases, and gas volume and HC concentrations in the inlet vapor, and ambient carbon dioxide concentrations are measured. These values are used to calculate the incinerator HC control efficiency and mass emission rate based on a carbon balance.

4.1.2. Applicability: This method is applicable as a performance test method for gasoline vapor control incinerators.

4.2. Test Scope and Conditions:

4.2.1. Station Status: The procedure is designed to measure incinerator control efficiency under conditions that may be considered normal for the station under test. All dispensing pumps interconnected with or sharing the control system under test shall remain open as is normal. Vehicles shall be fueled as is normal for the test period.

4.2.2. Fuel Reid Vapor Pressure (RVP): The RVP of the fuel dispensed during the test shall be within the range normal for the geographic location and time of the year.

4.3. Test Equipment:

4.3.1. HC Analyzers: HC analyzers using flame ionization detectors calibrated with known concentrations of propane in air are used to measure HC concentrations at both the incinerator inlet and exhaust. A suitable continuous recorder is required to record real-time output from the HC analyzers.

4.3.2 Sample System: The sample probe is to be of a material unaffected by combustion gases (S.S. 307, 316, 3365, etc.). The sample pump should be oil-less and leak-tight. Sample lines are to be inert, teflon is recommended. A thermocouple (0-2000^{o}F) shall be used to monitor temperature of exhaust gases at the inlet to sampling system.

4.3.3 Carbon Dioxide Analyzer: A non-dispersive infrared analyzer calibrated with known quantities of CO_2 concentrations in the exhaust gas.

4.3.4 Other equipment is specified in Section 3.2.

4.4 Test Procedure:

4.4.1 The sampling point should be located in the exhaust stack down-stream of the burner far enough to permit complete mixing of the combustion gases. For most sources, this point is at least eight stack diameters downstream of any interference and two diameters upstream of the stack exit. There are many cases where these conditions cannot be met. The sample point should be no less than one stack diameter from the stack exit and one stack diameter above the high point of the flame and be a point of maximum velocity head as determined by the number of equal areas of a cross-section of the stack. The inlet sampling location is in the system inlet line routing vapors to the burner. A HC sample tap, a pressure sensor tap, and a thermocouple connection to monitor gas temperature must be installed on the inlet side of the volume meter.

4.4.2 Span and calibrate all monitors. Connect sampling probes, pumps and recorders to the monitors and mount sampling probes in the stack and at the inlet.

4.4.3 Mark strip charts at the start of the test period and proceed with HC, CO_2, and volume measurements for at least three burning cycles of the system. The total sampling time should be at least three hours. Sampling for HCs and CO_2 must occur simultaneously. At the end of each cycle, disconnect CO_2 instrument and obtain an ambient air sample. This step requires that the CO_2 instrument be calibrated for the lower concentrations expected at ambient levels.

4.4.4 The quantity of gasoline dispensed during each test shall be recorded.

4.5 Calculations:

CO_{2e} = Carbon dioxide concentration in the exhaust gas (ppmv).

CO_{2a} = Average carbon dioxide concentration in the ambient air (ppmv).

HC_i = Hydrocarbon concentration in the inlet gas to the burner (ppmv as propane).

HC_e = Hydrocarbon concentration in the exhaust (ppmv as propane).

L_d = Gasoline liquid volume dispensed during test period (gallons).

P_i = Static pressure at inlet meter (in Hg).

T_i = Temperature of gas at inlet meter (^oR).

V_i = Inlet gas volume ($ft.^3$).

F = Dilution Factor.

51.8×10^{-6} = Multiplication factor to convert parts per million by volume as propane to grams per cubic foot at 68°F. (52.7×10^{-6} at 68°F)

4.5.1 Calculate the standard total gas volume (V_s) at the burner inlet for each test. (Standard temperature 68°F, standard pressure 29.92 in Hg)

$$V_s = V_i \text{ X } \frac{(P_i + P_b)}{(T_i)} \text{ x } \frac{528}{29.92} \text{ (SCF)} \qquad (1)$$

4.5.2 Calculate an average vapor volume to liquid volume (v/1) at the inlet for each test.

$$(v/1)_i = \frac{V_s}{L_d} \text{ , (SCF/gal)} \qquad (2)$$

4.5.3 Calculate the mass emission rate $(m/l)_i$ at the inlet for each test.

$$(m/l)_i = 51.8 \times 10^{-6} \text{ x } HC_i \text{ x } (v/l)_i \text{, (g/gal)} \qquad (3)$$

4.5.4 A carbon dilution factor (F) can be calculated for the incinerator using the inlet and outlet HC concentrations and the ambient CO_2 concentration. The important criterion for this is that all the significant carbon sources be measured. The values used in the calculation should represent average values obtained from strip chart readings using integration techniques. Some systems have more than one burning mode of operation. For these, it is desirable to have high and low emission levels calculated. This requires that corresponding dilution factors, (v/l) values and $(m/l)_i$ values be calculated for each period in question.

$$F = \frac{HC_i}{HC_e + \frac{(CO_{2e} - CO_{2a})}{3}} \qquad (4)$$

4.5.5 The mass emission rate at the exhaust, $(m/l)_e$, is calculated using the inlet $(m/l)_i$ from equation (3) and the carbon dilution factor from equation (4). The exhaust HC concentration will vary with time and operation of the system. It is likely that, in addition to an overall average mass emission rate using an average HCi, several peak values of $(m/l)_e$ will be required as discussed above. If some correlations between HC_i and HC_e occur over the burning cycle of the system, this calculation should be used to show the change in mass emission rate.

$$(m/l)_e = F \times \frac{HC_e}{HC_i} \times (m/l)_i \text{ g/gal} \qquad (5)$$

4.5.6 Mass control efficiency (E%) can be calculated for an average value over each interval. It represents the reduction of hydrocarbon mass achieved by the incinerator system and this efficiency can vary depending on the loading cycle or the inlet loading.

$$E\% = 100\,[1 - (F \times HC_e)/(HC_i)] \qquad (6)$$

5.0 Acceptance of Systems:

When a system is accepted, it will have certain physical features, such as piping sizes and configurations, which may have to be modified to accommodate the requirements of each installation. Because the pressure drops and other characteristics of the system are influenced by these features and these in turn influence effectiveness, it may be necessary to condition acceptance upon certain criteria which account for physical parameters such as pressure drops and flow rates. When systems are tested for acceptance, these parameters must be ascertained. Some of the conditions that may be imposed upon an acceptance are:

5.1 Allowable pressure drop in the lines leading from the dispensing nozzle to the underground tank.

5.2 The method of calculating the pressure drop.

5.3 The model of dispensing nozzle which may be used.

5.4 The manner in which vapor return lines may be manifolded.

5.5 The type of restriction to be placed on the vent of the underground tank.

5.6 The number of dispensing nozzles which may be serviced by a secondary system.

5.7 Allowable delivery rates.

5.8 Use of the system on full-service stations only.

6.0 Calibration of Equipment:

6.1 Standard methods of equipment shall be used to calibrate the flow meters. The calibration curves to be traceable to National Institute of Standards & Technology (NIST) standards.

6.2 Calibrate temperature recording instruments immediately prior to test period and immediately following test period using ice water (32°F) and a known temperature source about 100°F.

6.3 Calibrate pressure sensing and recording instructions (transducers) prior to the Phase I test with a static pressure calibrator for a range of -3 to +3 inches water or appropriate range of operation. Zero the transducers after each individual test.

6.4 Flame ionization detectors or equivalent total hydrocarbon analyzers are acceptable for measurement of exhaust hydrocarbon concentrations. Calibrations should be performed following the manufacturer's instructions for warm-up time and adjustments. Calibration gases should be propane in hydrocarbon-free air prepared with measured quantities of 100 percent propane. A calibration curve shall be produced using a minimum of five (5) prepared calibration gases in the range of concentrations expected during testing. The calibration of the instrument need not be performed on site, but shall be performed prior to and immediately following the test program. During the test program, the HC analyzer shall be spanned on site with zero gas (3 ppmv C) and with 30 percent and 70 percent concentrations of propane in hydrocarbon-free air at a level near the highest concentration expected. The spanning procedure shall be performed at least twice each test day.

The HC calibration cylinders must be checked against a reference cylinder maintained in the laboratory before each field test. This information must be entered into a log identifying each cylinder by serial number. The reference cylinder must be checked against a primary standard every six months and the results recorded. The reference cylinder is to be discarded when the assayed value changes more than one percent. and when the cylinder pressure drops to 10 percent of the original pressure.

6.5 Non-dispersive infrared analyzers are acceptable for measurement of exhaust CO_2 concentrations. Calibrations should be performed following the manufacturer's instructions. Calibration gases should be known concentrations of CO_2 in the air. A calibration shall be prepared using a minimum of five prepared calibration gases in the range of concentration expected. The calibration of the instrument need not be performed on site but shall be performed immediately prior to and immediately following the test program. During the testing, the analyzer shall be spanned with a known concentration of CO_2 in the air at a level near the highest concentration expected. The spanning procedure shall occur at least twice per test day.

6.6 The barometer shall be calibrated against an NIST traceable standard at least once every 6 months.

6.7 A record of all calibrations must be maintained and submitted with the test report.

7.0 Alternate Equipment

Alternate equipment and techniques may be used if prior written approval is obtained from DEQ.

8.0 Recordkeeping:

A record of the results for tests which are performed for compliance determination shall be maintained at the facility site according to OAR 340-232-0080 and 340-232-0100.

FIGURE A – DISPLACEMENT SYSTEM

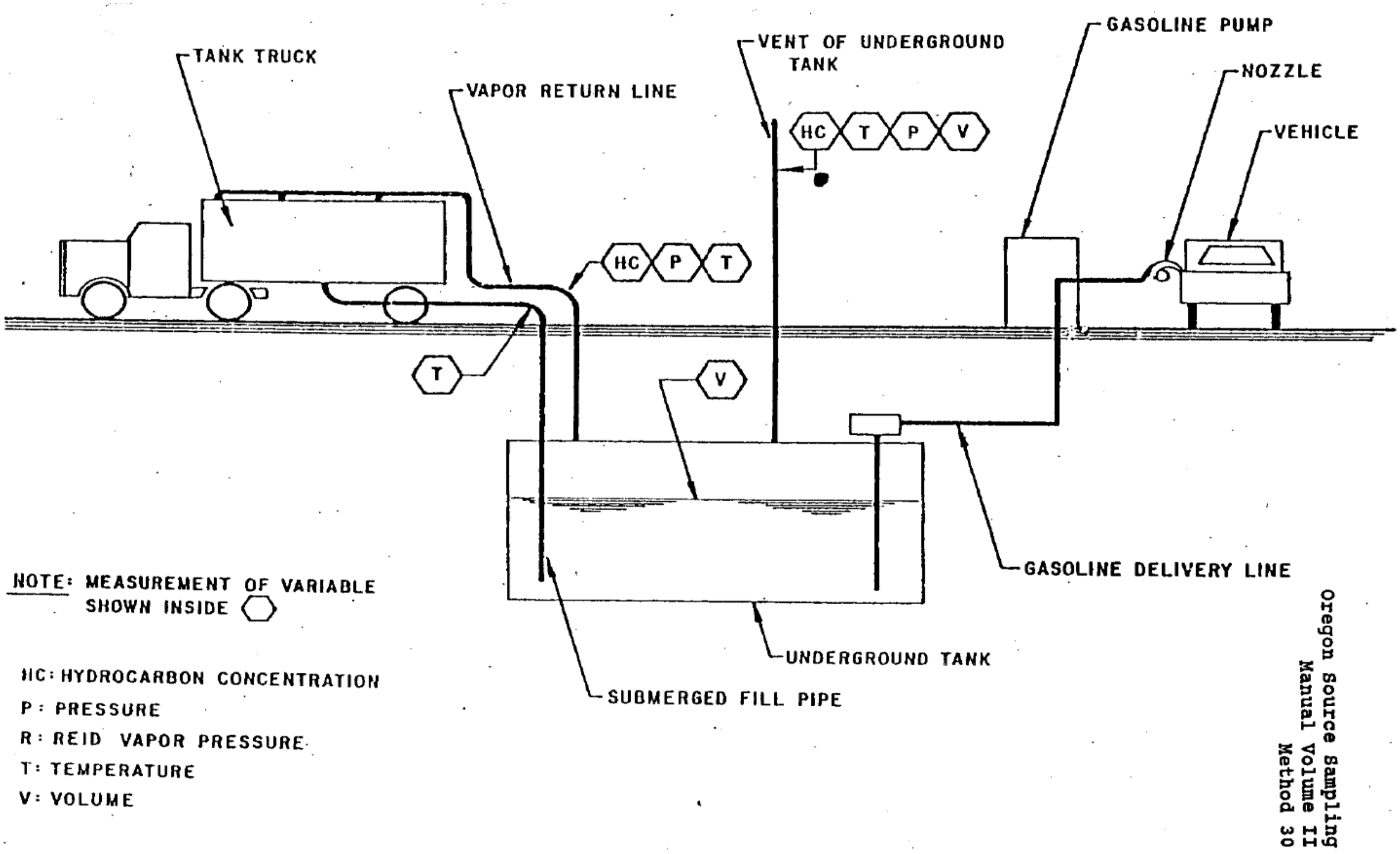


FIGURE A DISPLACEMENT SYSTEM

FIGURE B – VACUUM ASSISTED SECONDARY

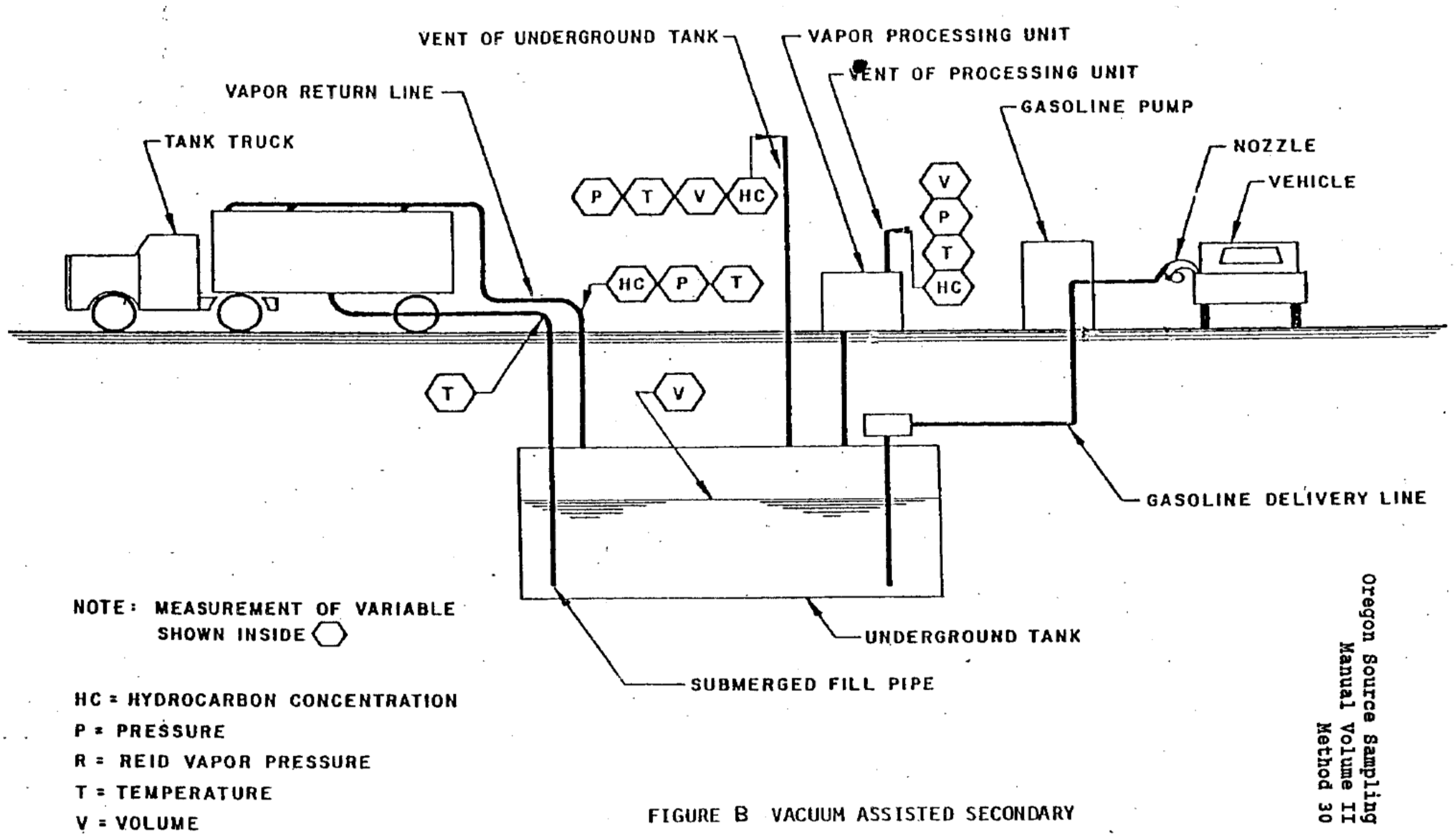


FIGURE B VACUUM ASSISTED SECONDARY

Oregon Source Sampling
Manual Volume II
Method 30

DEQ METHOD 31

Test Procedures for Determining the Efficiency of
Vapor Control Systems at Gasoline Bulk Plants

STATE OF OREGON
DEPARTMENT OF ENVIRONMENTAL QUALITY

DEQ Air Quality Program
Portland, Oregon
December 1, 1980

Revisions:
May 15, 1981
January 23, 1992

Method 31

Test Procedures for Determining the Efficiency of Vapor Control Systems at Gasoline Bulk Plants

1.0 Introduction:

1.1 Principle:

Hydrocarbon mass emissions are determined directly using flowmeters and hydrocarbon analyzers.

The mass of hydrocarbon vapor to be controlled or recovered is determined from the volume of gasoline dispensed (either to the bulk storage tank or delivery tank) by pressure, temperature, and concentration measurements of the vapor.

The efficiency of the gasoline vapor control system is determined from the mass of the hydrocarbons emitted and the mass of hydrocarbons controlled.

For purposes of determining compliance with applicable Administrative Rules, equipment on systems with 90 percent or greater control efficiency shall be considered to be vapor tight.

1.2 Applicability:

These procedures are applicable for testing gasoline vapor recovery systems installed at bulk plants for controlling gasoline vapors emitted during the load of bulk storage tanks and for loading of delivery tanks from bulk tanks. Filling of storage tanks will be by submerged fill.

2.0 Acceptance Of Test Results:

2.1 Results of this method will be accepted as a demonstration of compliance of the equipment tested, provided that the methods included or referenced in this procedure are strictly adhered to. A statement containing at least the minimum amount of information regarding the test procedures applied should be included with the results.

Deviations from the procedure described herein will be permitted only if permission from DEQ is obtained in writing in advance of the test.

3.0 Definitions:

3.1 Bulk Gasoline Plant:

"Bulk Gasoline Plant" means a gasoline storage and distribution facility which receives gasoline from bulk terminals by railroad car or trailer transport, stores it in tanks, and subsequently dispenses it via account trucks to local farms, businesses, and gasoline dispensing facilities.

3.2 Delivery Vessel:

"Delivery Vessel" means any tank truck or trailer used for the transport of gasoline from sources of supply to stationary storage tanks.

3.3 Vapor Balance System:

"Vapor Balance System" means a combination of pipes and/or hoses which create a closed system between the vapor spaces of an unloading tank and a receiving tank such that vapors displaced from the receiving tank are transferred to the tank being unloaded.

3.4 Secondary Processing Unit:

"Secondary Processing Unit" means a gasoline vapor control system which utilizes some process as a means of elimination or recovering gasoline vapors which otherwise would be vented to the atmosphere during the transfer of gasoline to or from a bulk plant.

4.0 Test Of Vapor Recovery System For Delivery Of Gasoline To The Bulk Plants:

4.1 Application:

The following test procedures are for determining the efficiency of vapor recovery systems controlling gasoline vapors emitted during the loading of bulk plant storage tanks.

4.2 Principle and Test Conditions:

4.2.1 Principle: During a fuel delivery to the bulk plant, direct measurements of hydrocarbon concentrations and volume of hydrocarbon vapors vented (including emissions from any vapor processing unit) are made. All possible points of emission are checked for vapor leads. The volume of gasoline delivery from the delivery tank to the bulk plant is recorded and the concentration of the hydrocarbon vapors returned to the delivery tank is measured. The efficiency of control is calculated from these determinations.

4.2.2 Test Conditions: The number of transport deliveries to be tested shall be established by DEQ based on an engineering evaluation of the system. As close as possible, the system shall be tested under normal operating conditions. (Dispensing rates shall be at the maximum rate possible consistent with safe and normal operating practices. The processing unit, if any, shall be operated in accordance with the manufacturer's established parameters. Simultaneous use of more than one dispenser during loading of bulk storage tanks shall occur to the extent that such would normally occur.)

4.3 Equipment Required for Bulk Plant Testing:

4.3.1 Two (2) positive displacement dry gas meters each with a capacity of 3,000 standard cubic feet per hour (SCFH) a readability of one cubic foot and a maximum pressure drop of not more than 0.50 inches of water at a flowrate of 30 SCFH.

4.3.2 Two (2) hydrocarbon (HC) analyzers with recorders and with the capability of measuring total gasoline vapor concentration of 100 percent as propane. Both analyzers to be of same make and model, either Flame Ionization Detector or a DEQ approved equivalent.

4.3.3 Three (3) flexible thermocouples or thermistors (0-150^{o}F) with a temperature recorder system having a readability of 1^{o}.

4.3.4 Barometer (Aneroid or Mercury), ± 0.1 in. Hg. readability.

4.3.5 Two (2) manometers or other pressure sensing devices capable of measuring zero to ten inches of water with a readability of 0.1 inches of water.

4.3.6 Coupling for the vent vapor line to accommodate the gas meter, with thermocouple and pressure taps. Coupling to be sized for a minimum pressure drop.

4.3.7 Coupling for the vent of the secondary processing unit, if used, to accommodate the flow measuring device with the thermocouple, pressure and hydrocarbon analyzer taps. Coupling to be sized for a minimum pressure drop.

4.3.8 Coupling for delivery tank vapor return line with thermocouple, pressure and hydrocarbon analyzer taps. Coupling to be the same diameter as the vapor return line.

4.3.9 Two (2) adjustable pressure/vacuum (PV) relief valves capable of replacing the PV relief valve on the storage tank vent.

4.3.10 Coupling for attaching the PV value to the dry gas meter. (Appendix Figure A)

4.3.11 Explosimeter.

4.4 Bulk Plant Storage Tank Loading Test Procedure (Figure A):

4.4.1 Connect appropriate coupler to vent of bulk plant, or if the vent has a PV valve, remove the PV valve and then connect the coupler to the vent. If a Secondary Processing Unit is used, also connect a coupler to the vent of the secondary processing unit.

4.4.2 Connect the appropriate gas meter, HC analyzer with recorder, thermocouple and manometer to the vent coupler and connect the PV valve to the gas meter.

4.4.3 Connect appropriate coupler to the delivery tank vapor return lines.

4.4.4 Connect the HC analyzer with a recorder, a manometer and a thermocouple to the taps on the vapor return line.

4.4.5 Connect delivery tank fuel and vapor return lines to appropriate bulk tank lines in accordance with the owner's or operator's established procedures for the system.

4.4.6 Check the delivery tank and all connections for a tight seal with explosimeter before and during the test.

4.4.7 Record the initial reading of the gas meter(s).

4.4.8 Start loading of the bulk tank in accordance with owner's or operator's established normal procedure.

4.4.9 Hydrocarbon concentrations, temperature and pressure measurements should be recorded starting after the first 15 seconds of the loading periods followed by 60 second intervals. The gas meter readings must be taken at least every 120 seconds.

4.4.10 Record barometric pressure and ambient temperature during the test.

4.4.11 At the end of the bulk tank delivery, disconnect the delivery tank from the bulk tank in accordance with owner's or operator's instructions (normal procedure). Leave the bulk tank vent instrumentation in place.

4.4.12 Continue recording hydrocarbon concentrations, temperature, pressure, and gas meter readings at the bulk tank vent at 20 minute intervals for one hour after the last bulk transfer is made.

4.4.13 Disconnect instrumentation from the vent.

4.4.14 Record volume of gasoline that is delivered.

4.4.15 Record final reading of gas meter(s).

4.5 Calculations:

4.5.1 Volume of gas discharged through "i th" vent. This includes bulk tank vent and any control system vent.

$$V_{vsi} = \frac{V_{vi} \times 528 \times P_b}{T_{vi} \times 29.92}$$

Where:

V_{vsi} = Volume of gas discharged through "i th" vent corrected to 68°F and 29.92 in. Hg, \ (ft^3).

P_b = Barometric pressure, (in. Hg).

V_{vi} = Volume of gas recorded by meter on "ith" vent corrected for amount of vapor removed for the hydrocarbon analysis, (ft^3).

T_{vi} = Average temperature in "i th" vent line, (°R).

4.5.2 Volume of gasoline vapor returned to the tank truck.

$$V_t = \underline{0.1337G_t \times 528(P_b + P)}$$

$$T_t \times 29.92$$

Where:

P_b = Barometric pressure, (in. Hg).

V_t = Volume of gasoline vapor, corrected to 68°F and 29.92 in. Hg., (ft^3)

G_t = Volume of gasoline delivered, (gal.).

P = Final Gauge pressure of tank truck, (in. Hg).

T_t = Average temperature of vapor returned to tank truck (°R).

0.1337 = Conversion factor, (gallons to ft^3). 1 US gal. = 0.1337 ft^3.

4.5.3 Efficiency of Vapor Control System

$$E = \frac{V_t \times C_t - (C_{vi} \times V_{vsi})\ 100}{(V_t \times C_t)}$$

Where:

E = the efficiency of control in percent.

C_t = The average fractional volumetric concentration of gasoline vapors in the return line to the truck as determined by the hydrocarbon analyzer, (decimal fraction).

C_{vi} = The average fractional volumetric concentration of gasoline vapors in the "i_{th}" vent as determined by the hydrocarbon analyzer, (decimal fraction).

5.0 Testing Of Vapor Recovery System For Filling of A Delivery Tank At A Bulk Plant:

5.1 Application:

The following test procedures shall be used for determining the efficiency of vapor recovery systems controlling gasoline vapors emitted during the filling of delivery tanks at a bulk plant.

5.2 Principle and Test Conditions:

5.2.1 Principle: During loading of a delivery tank at the bulk plant, direct measurements of hydrocarbon concentrations and volume of hydrocarbons vented (including emissions from any vapor processing unit) are made. All possible points of emission are checked for vapor leaks. The volume of gasoline dispensed to the delivery tank is recorded and the concentration of the hydrocarbon vapors returned to the bulk storage tank is measured. The efficiency of control is calculated from these determinations.

5.2.2 **Test Conditions:** The number of delivery tank loadings to be testing shall be established by DEQ based on an engineering evaluation. The system shall be tested under normal operating conditions as close as possible. (Dispensing rates shall be at the maximum rate possible consistent with safe and normal operating practices, and simultaneous use of more than one dispenser during loading of delivery tanks shall occur to the extent that such use would represent normal operation of the system).

5.3 Equipment Required for Delivery Tank Testing at the Bulk Plant:

5.3.1 Same as that required in Section 4.3.

5.4 Delivery Tank Loading Test Procedures:

5.4.1 Connect coupler to vent of bulk tank, or if the vent has a PV valve, remove the PV valve and then connect the coupler to the vent. If a secondary processing unit is used, also connect a coupler to the vent of the secondary processing unit.

5.4.2 Connect the appropriate gas meter, HC analyzer with recorder, thermocouple and manometer to the vent coupler and connect the PV valve to the gas meter.

5.4.3 Connect a coupler to the bulk storage tank vapor return lines.

5.4.4 Connect a HC analyzer with a recorder, a manometer and a thermocouple to the taps on the coupler on the vapor return line.

5.4.5 Connect bulk storage tank fill and vapor return lines to the delivery tank in accordance with owner's or operator's established procedures for the system.

5.4.6 Check the delivery tank and all connections for a tight seal with the explosimeter before and during the test.

5.4.7 Record the initial reading of the gas meter(s).

5.4.8 Start fueling of the delivery tank in accordance with manufacturer's established normal procedure.

5.4.9 Hydrocarbon concentrations, temperature and pressure measurements are to be recorded starting after the first 15 seconds of the unloading period followed by 60 second intervals. The gas meter readings may be taken at 120 second intervals.

5.4.10 Record the barometric pressure and ambient temperature before and after the test.

5.4.11 At the end of the delivery tank loading disconnect the delivery tank from the bulk tank in accordance with owner's or operator's instructions (normal procedure). Leave the bulk tank vent instrumentation in place.

5.4.12 Continue recording hydrocarbon concentrations, temperatures, pressure and gas meter readings at the bulk tank vent at 20 minute intervals for one hour, or until the system returns to normal conditions as specified by the manufacturer.

5.4.13 Disconnect instrumentation from the vent.

5.4.14 Record volume of gasoline that is delivered.

5.4.15 Record final reading of gas meter.

5.4.16 Repeat procedure as necessary for additional delivery tank loading.

5.5 Calculations:

5.5.1 Volume of gas discharged through "i th" vent. This includes bulk tank vent and any control system vent.

$$V_{vsi} = \frac{V_{vi} \times 528 \times P_b}{T_{vi} \times 29.92}$$

Where:

V_{vsi} = Volume of gas discharged through "i_{th}" vent corrected to 68° F and 29.92 in. Hg, (ft^3).

P_b = Barometric pressure, (in. Hg).

V_{vi} = Volume of gas recorded by meter on "i_{th}" vent (ft^3, corrected for amount of vapor removed for the hydrocarbon analysis).

T_{vi} = Average temperature in "i_{th}" vent line, (°R).

"i_{th}"= The vent under consideration.

5.5.2 Volume of gas returned to the bulk storage tank.

$$V_t = \frac{0.1337G_t \times 528(P_b + P)}{T_t \times 29.92}$$

Where:

P_b = Barometric pressure, (in. Hg).

V_t = Volume of gas returned to the bulk storage tank corrected to 68°F and 29.92 in. Hg, (ft^3).

G_t = Volume of gasoline delivered, (gallons).

P = Final gauge pressure of bulk storage tank, (in. Hg).

T_t = Average temperature of vapor returned to bulk storage tank, (°R).

0.1337 = Conversion factor, (gallons to Ft^3). 1 US gal. = 0.1337 ft^3.

5.5.3 Efficiency of Vapor Control System

$$E_j = \frac{V_t \times C_t - \Sigma(C_{vi} \times V_{vsi}) \times 100}{(V_t \times C_t)}$$

Where:

E_j = The efficiency of control per individual fueling in percent.

C_t = The average fractional volume concentration of gasoline vapors in the return line to the bulk storage tank as determined by the hydrocarbon analyzer, (decimal fraction).

C_{vi} = The average fractional volume concentration of gasoline vapors in the "i_{th}" vent as determined by the hydrocarbon analyzer, (decimal fraction).

$_j$ = The individual loading considered.

$$E_{ave} = \frac{\sum_{j=1}^{n} E_j}{n}$$

Where:

E_{ave} = The average efficiency of control in percent.

E_j = From 5.5.3 above.

n = Number of Loadings Tested.

6.0 Calibrations

6.1 Flow meters

Standard methods and equipment shall be used to calibrate the flow meters within thirty (30) days prior to any test or test series. The calibration curves are to be traceable to NIST.

6.2 Temperature measuring instruments

Calibrate immediately prior to any test period and immediately following test period using ice water (32^oF.) and a known temperature source of about 100^oF.

6.3 Pressure measuring instruments

Calibrate pressure transducers within thirty (30) days prior to the test period and immediately after the test period with a static pressure calibrator of known accuracy.

6.4 Total hydrocarbon analyzer

Follow the manufacturer's instruction concerning warm-up time and adjustments. On each test day prior to testing and at the end of the day's testing, zero the analyzer with a zero gas (3 ppm C) and span with 30 percent and 70 percent concentrations of propane.

6.5 A record of all calibrations made is to be maintained.

7.0 Recordkeeping

A copy of the results of these tests which are performed for compliance determination shall be maintained at the facility site according to OAR 340-232-0080 and 340-232-0100.

FIGURE A - BULK TANK TEST APPARATUS

Oregon Source Sampling
Manual Volume II
Method 31

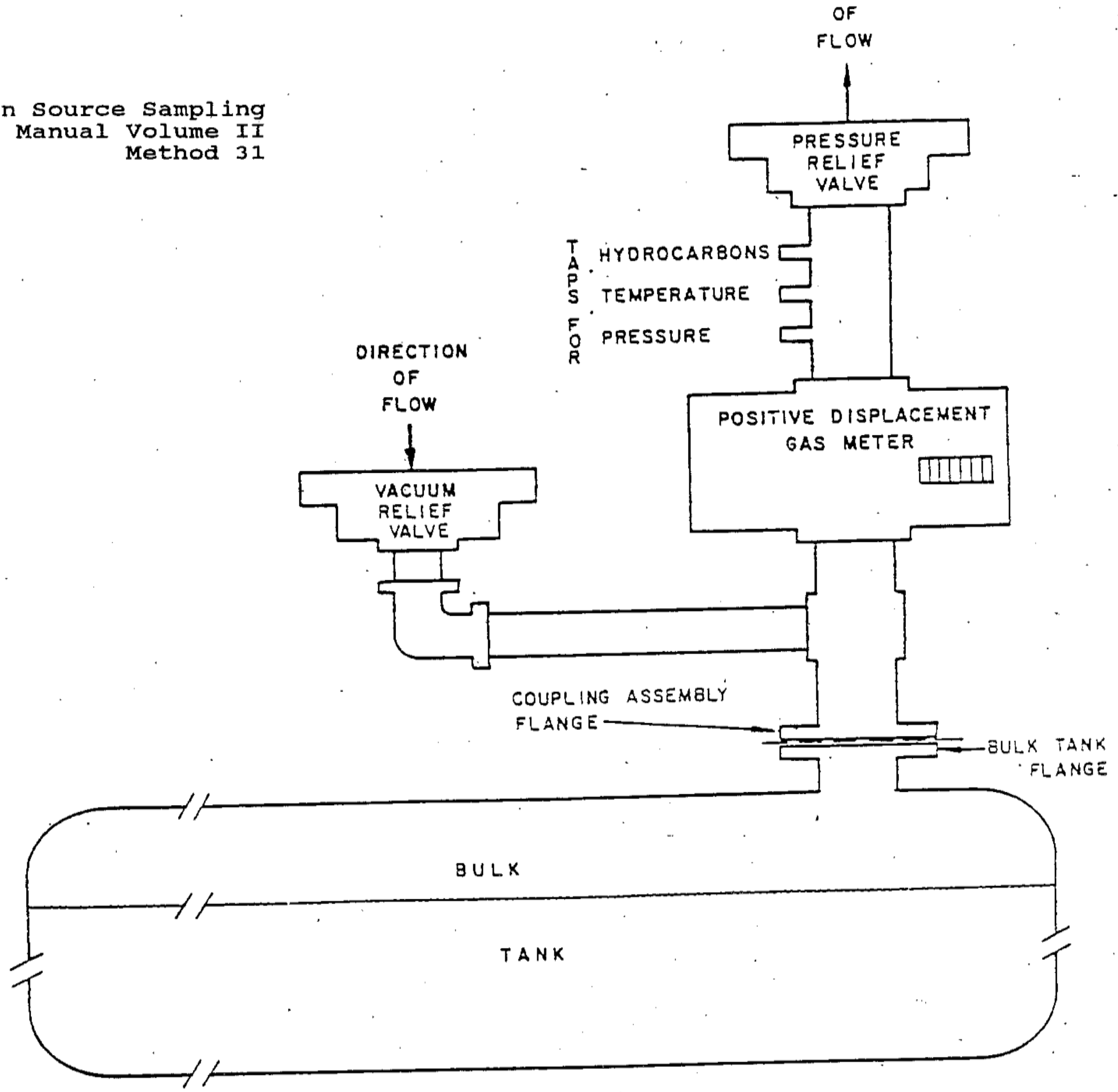


FIGURE A
BULK TANK
TEST APPARATUS

METHOD 31

FIGURE B - GASOLINE TRANSFER FROM DELIVERY TANK TO BULK PLANT

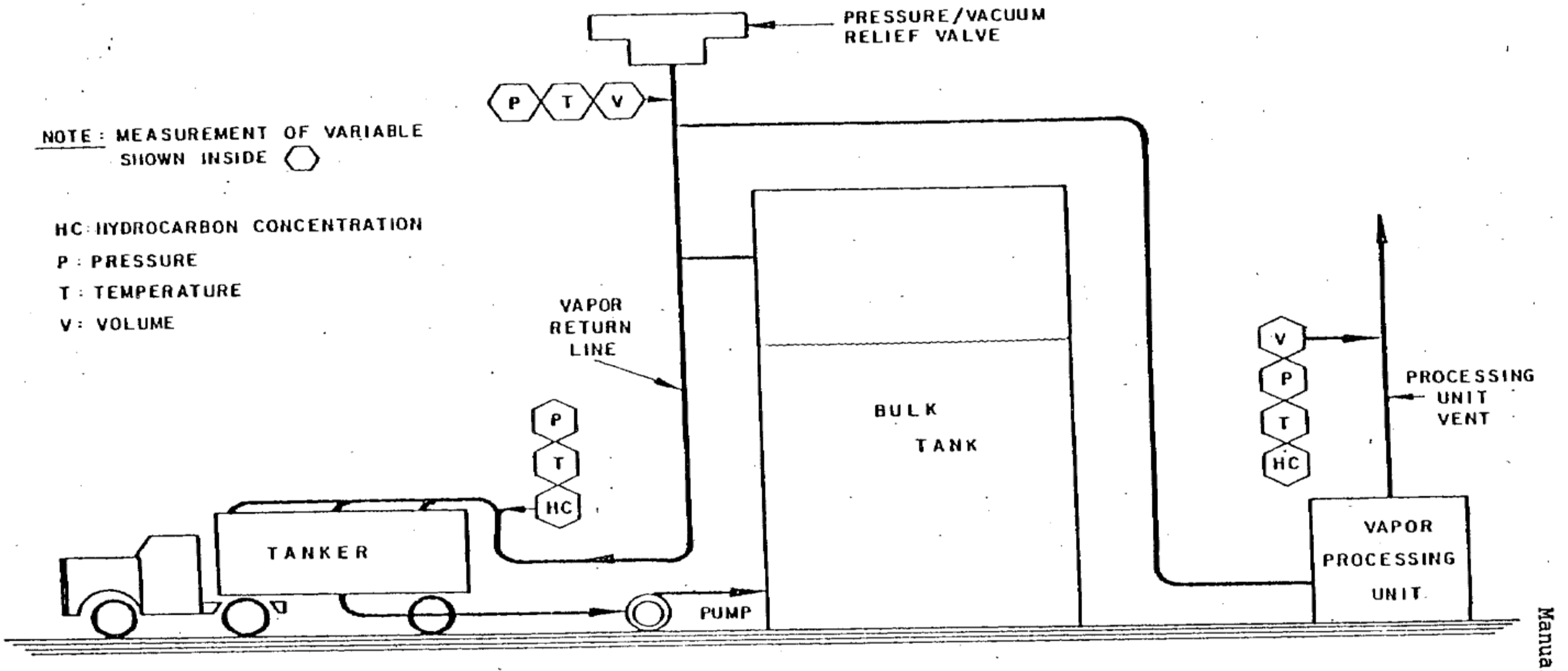


FIGURE B
GASOLINE TRANSFER
FROM DELIVERY TANK TO BULK PLANT

METHOD 31

Manual Volume 11
Method 31

FIGURE C - GASOLINE TRANSFER FROM BULK PLANT TO DELIVERY TANK

Oregon Source Sampling
Manual Volume II
Method 30

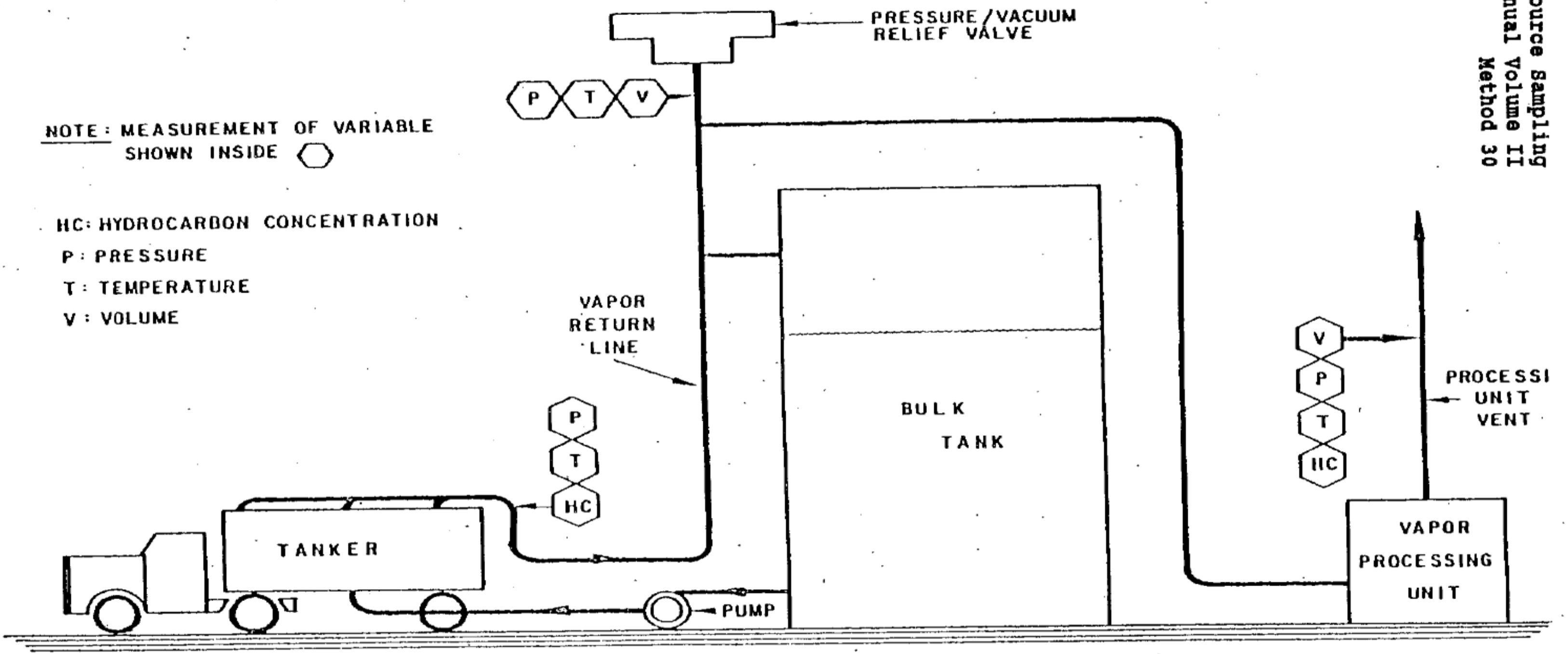
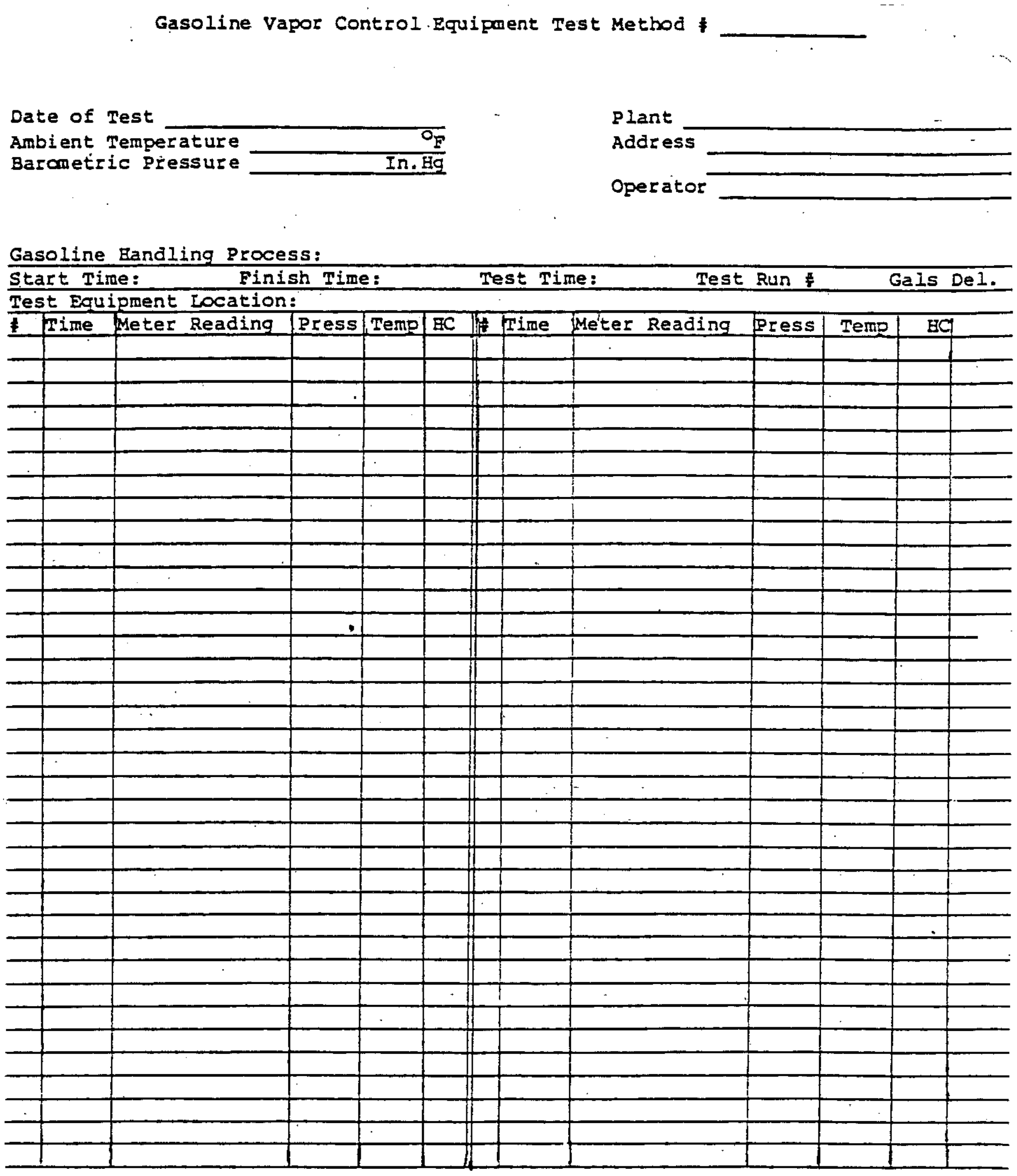


FIGURE-C
GASOLINE TRANSFER
FROM BULK PLANT TO DELIVERY TANK

METHOD 31

FIGURE D – DATA SHEET



Gasoline Vapor Control Equipment Test Method # ____________

Date of Test ______________________

Ambient Temperature ______________ °F

Barometric Pressure ______________ In.Hg

Plant ______________________

Address ______________________

____

Operator ______________________

Gasoline Handling Process: ______________________

Start Time: Finish Time: Test Time: Test Run # Gals Del.

Test Equipment Location: ______________________

#	Time	Meter Reading	Press	Temp	HC	#	Time	Meter Reading	Press	Temp	HC	

FIGURE E – CALCULATION SHEET

Vapor Control Equipment Efficiency Determination

Test Method: ________

Date: ________________

Test Run # ___________

Plant ______________________________

Address ____________________________

____

Test Equipment Location: ____

____

Calculations: (Refer to Paragraphs 4.5 or 5.5 in test Procedure.)

Volume of gas discharged through "i th" vent.

$$V_{si} = \frac{V_{vi} \times 520 \times P_b}{T_{vi} \times 29.92}$$

Volume of gasoline vapor returned to bulk tank or tank truck

$$V_t = \frac{0.1337\ G_t \times 520\ (P_b + \Delta P)}{T_t \times 29.92}$$

Efficiency of Vapor Control System

$$E \text{ or } E_j = \frac{\left[V_t \times C_t - \sum(C_{vi} \times V_{vs})\right]}{V_t \times C_t} \times 100$$

E = Bulk Plant Loading Test

E_j = Delivery Tank Loading Test

Average Efficiency of All Loadings Tested

$$E_{ave} \quad \frac{\sum_{j=1}^{n} E_j}{n}$$

METHOD 31

DEQ METHOD 32

Test Procedures for Vapor Control Effectiveness of Gasoline Delivery Tanks

STATE OF OREGON
DEPARTMENT OF ENVIRONMENTAL QUALITY

DEQ Air Quality Program
Portland, Oregon
December 1, 1980

Revisions:
May 15, 1981
January 23, 1992

Method 32

Test Procedures for Vapor Control Effectiveness of Gasoline Delivery Tanks

1.0 Introduction:

1.1 Principles:

Pressure and vacuum are applied to the compartments of gasoline truck tanks and the change in pressure/vacuum is recorded after a specified period of time.

1.2 Applicability:

This method is applicable to determining the leak tightness of gasoline truck tanks in use and equipped with vapor collected equipment.

2.0 Acceptance Of Test Results

2.1 Results from this method will be accepted as a demonstration of compliance provided that the methods included or referenced in this procedure are strictly adhered to. A report containing at least the minimum amount of information regarding the test should be included with the results. Deviations from the procedures described herein will be permitted only if permission from DEQ is obtained in writing in advance of the test.

3.0 Definitions

3.1 Delivery Tank:

Any container, including associated pipes and fittings, that is used for the transport of gasoline.

3.2 Compartment

A liquid-tight division in a delivery tank.

3.3 Delivery Tank Vapor Collection System

The entire delivery tank, including domes, dome vents, cargo tank, piping, hose connections, hoses and delivery elbow, and vapor recovery lines.

4.0 Apparatus

4.1 Pressure Source (See Figure B)

Pump or compressed gas cylinder of air or inert gas sufficient to pressurize the delivery tank to 6250 Pascals (25 inches H_2O) above atmospheric pressure.

4.2 Regulator

Low pressure regulator for controlling pressurization tank.

4.3 Vacuum Source

Vacuum pump of sufficient capacity to evacuate a tank to 2500 Pascals (10 inches H_2O) below atmospheric pressure. (The intake manifold of an "idling" gasoline engine is a very good vacuum source).

4.4 Manometer

Liquid manometer, or equivalent, capable of measuring up to 6250 Pascals (25 inches H_2O) gauge pressure with ± 25 Pascals (± 0.1 inches H_2O) readability. Manometer must be positioned vertically.

4.5 Test Cap for Vapor Recovery Hose Fittings

This cap should have a tap for the manometer connection with a fitting with shut-off valve and pressure/vacuum relief valves for connection to the pressure/vacuum supply hose.

4.6 Cap for Liquid Delivery Hose Fitting

4.7 Pressure/Vacuum Supply Hose

4.8 Pressure/Vacuum Relief Valves

The test apparatus shall be equipped with an in-line pressure/vacuum relief valve set to activate at 7000 Pascals (28 inches H_2O) above atmospheric pressure or 3000 Pascals (12 inches H_2O) below atmospheric pressure, with a capacity equal to the pressurizing or evacuating pumps.

5.0 Pretest Condition

5.1 Purging of Vapor

The delivery tank shall be purged of gasoline vapors and tested empty. The tank may be purged by any safe method such as flushing with diesel fuel, heating fuel or jet fuel. (Hauling a load of above fuel before test may be performed.)

5.2 Location

The delivery tank shall be tested where it will be protected from direct sunlight or any other heat source which may affect the pressure/vacuum test results.

6.0 Visual Inspection

6.1 Inspection Procedure

The entire delivery tank including domes, dome vents, cargo tank, piping, hose connections, hoses and delivery elbow shall be inspected for any evidence of wear, damage or misadjustment that could be a potential lead source. Any part found to be defective shall be adjusted, repaired or replaced, as necessary, before the test.

7.0 Pressure Test Procedure

7.1 Pressure Test

7.1.1 The dome covers are to be opened and closed.

7.1.2 Connect static electrical ground connections to delivery tank. Attach the delivery and vapor hoses, remove the delivery elbows and plug the liquid delivery hose fitting with cap.

7.1.3 Attach the test cap vapor recovery hose of the delivery tank.

7.1.4 Connect the pressure/vacuum supply hose to the pressure/vacuum relief valve and the shut-off valve. Attach the pressure source to the supply hose. Attach a manometer to the pressure tap.

7.1.5 Connect compartments of the tank internally to each other, if possible.

7.1.6 Applying air pressure slowly, pressurize the tank, or alternatively the first compartment, to 4500 Pascals (18 inches of water).

7.1.7 Close the shut-off valve, allow the pressure in the delivery tank to stabilize. Adjust the pressure, if necessary, to maintain 4500 Pascals (18 inches of H_2O). Record the initial time and pressure.

7.1.8 At the end of five minutes, record the final time and pressure and then slowly vent tank to atmospheric pressure.

7.1.9 Repeat for each compartment if they were not interconnected.

7.1.10 If the reading is less than 3750 Pascals (15 inches of water), the tank or compartment fails the test. Delivery tanks which do not pass the pressure test are to be repaired and retested.

8.0 Vacuum Test Procedure

8.1 Connect vacuum source to pressure and vacuum supply hose.

8.2 Slowly evacuate the tank, or alternatively the first compartment to 1500 Pascals (6 inches of H_2O) vacuum.

8.3 Close the shut-off valve, allow the pressure in the delivery tank to stabilize. Adjust the vacuum, if necessary, to maintain 1500 Pascals (6 inches of water). Record initial time and pressure.

8.4 At the end of five minutes, record the final time and pressure and then slowly vent back to atmospheric pressure.

8.5 Repeat for each compartment if they were not interconnected.

8.6 If the reading is less than 750 Pascals (3 inches of water) vacuum, the tank or compartment fails the test. Delivery tanks which do not pass the vacuum test are to be repaired and retested.

9.0 Alternative Test Methods

9.1 Techniques, other than those specified above, may be used for purging, pressurizing, or evacuating the delivery tanks, if prior approval is obtained from DEQ. Such approval will be based upon demonstrated equivalency with the methods above.

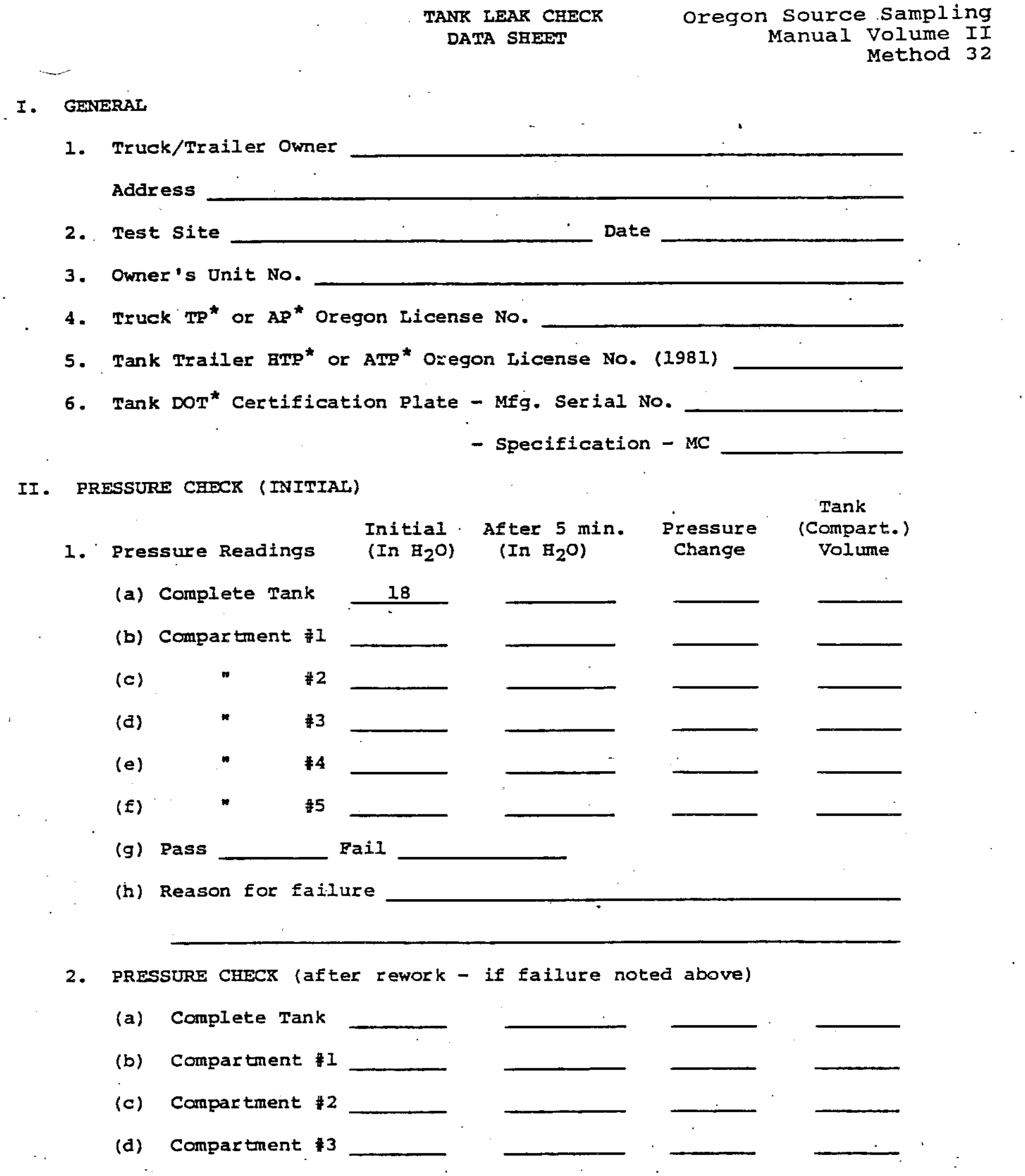
10.0 Test Reports

The contents of the following report form example shall be considered the minimum acceptable contents for reporting the results of the tests.

11.0 Recordkeeping

A copy of the results of these tests which are performed for compliance determination shall be maintained at the facility site and by the delivery tank owner according to OAR 340-232-0080 and 340-232-0100.

FIGURE A - DATA SHEET



TANK LEAK CHECK
DATA SHEET

Oregon Source Sampling
Manual Volume II
Method 32

I. GENERAL

1. Truck/Trailer Owner ______________________

   Address ______________________

2. Test Site ______________ Date ____________

3. Owner's Unit No. ______________________

4. Truck TP* or AP* Oregon License No. ______________

5. Tank Trailer HTP* or ATP* Oregon License No. (1981) __________

6. Tank DOT* Certification Plate – Mfg. Serial No. ____________

   – Specification – MC ____________

II. PRESSURE CHECK (INITIAL)

1. Pressure Readings	Initial (In H_2O)	After 5 min. (In H_2O)	Pressure Change	Tank (Compart.) Volume
(a) Complete Tank	18			
(b) Compartment #1				
(c) " #2				
(d) " #3				
(e) " #4				
(f) " #5				

(g) Pass __________ Fail ______________

(h) Reason for failure ______________________

____

2. PRESSURE CHECK (after rework – if failure noted above)

(a) Complete Tank				
(b) Compartment #1				
(c) Compartment #2				
(d) Compartment #3				

FIGURE A - DATA SHEET (Con't)

	Initial (In H_2O)	After 5 min. (In H_2O)	Pressure Change	Tank (Compart.) Volume
(e) Compartment #4	________	________	________	________
(f) Compartment #5	________	________	________	________

(g) Pass ________ Fail ____________

(h) Reason for failure ______________________________

____

3. VACUUM CHECK

(a) Complete Tank	________	________	________	________
(b) Compartment #1	________	________	________	________
(c) Compartment #2	________	________	________	________
(d) Compartment #3	________	________	________	________
(e) Compartment #4	________	________	________	________
(f) Compartment #5	________	________	________	________

(g) Pass ________ Fail ____________

(h) Reason for Failure ______________________________

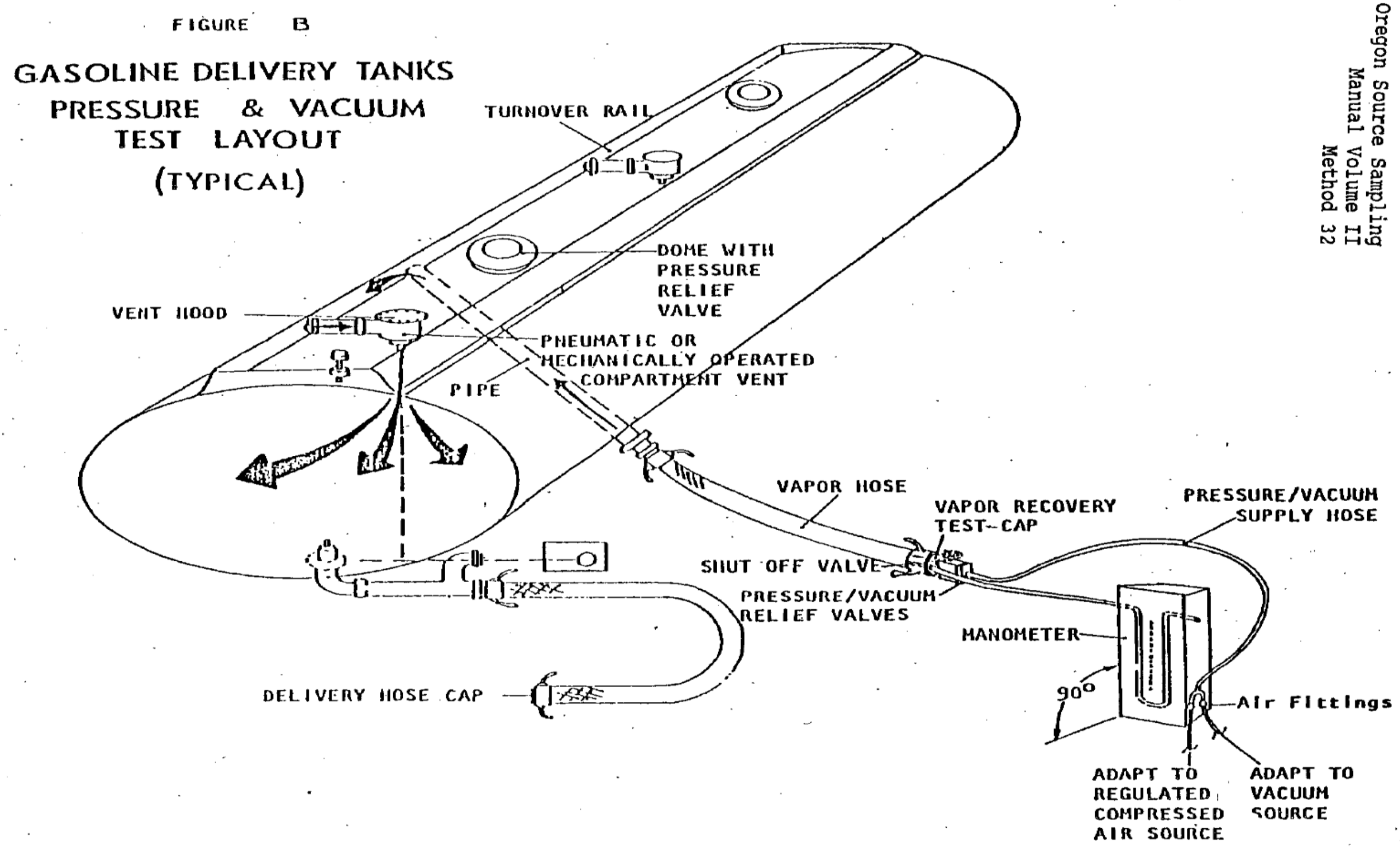
____

Signature of Person Conducting Test ____________________

Date ____________________

*TP - Truck Plate (use Item 4 if truck and tank are on the same chassis)
AP - Apportionment Plate (use Item 4 if truck and tank are on the same chassis)
HTP - Heavy Trailer Plate (use Item 5 for a tank trailer)
ATP - Apportionment Trailer Plate (use Item 5 for a tank trailer)
DOT - Department of Transportation

FIGURE B – GASOLINE TANKS



DEQ METHOD 33

Test Procedures for Gasoline Vapor Control Systems at Bulk Gasoline Terminals

STATE OF OREGON
DEPARTMENT OF ENVIRONMENTAL QUALITY

DEQ Air Quality Program
Portland, Oregon
December 1, 1980

Revisions:
January 23, 1992

METHOD 33

1.0 Introduction

1.1 Principle:

Hydrocarbon mass emissions are determined directly, using flowmeters and hydrocarbon analyzers.

The mass of hydrocarbon vapor to be controlled or recovered is determined from the volume of gasoline dispensed (either to the bulk terminal facilities or to delivery tanks), and by temperature, pressure and concentration measurements of the released vapor.

The efficiency of the gasoline vapor control systems is determined from the mass of the hydrocarbons emitted and the mass of the hydrocarbons controlled.

1.2 Applicability:

These test procedures are applicable for gasoline vapor recovery systems installed at bulk gasoline terminals for controlling gasoline vapors emitted during the loading of delivery tanks or from the loading of fixed roof gasoline storage tanks as a result of fixed roof tank breathing. These procedures are also applicable for marketing operations at refineries.

2.0 Acceptance Of Test Results

2.1 Results of these tests will be accepted as a demonstration of compliance determination of the equipment tested provided that the methods included or referred to in this procedure are strictly adhered to. A statement containing at least the minimum amount of information regarding the test procedures applied should be included with the report of the test results.

Deviations from the procedure described herein will be permitted only if permission from DEQ is obtained in writing in advance of the test.

3.0 Definitions

3.1 Bulk Gasoline Terminal

"Bulk gasoline terminal" means a gasoline storage facility which receives gasoline from refineries primarily by pipeline, rail, ship, or barge, and delivers gasoline to bulk gasoline plants or to commercial or retail accounts primarily by tank truck.

3.2 Delivery Vessel

"Delivery vessel" means any tank truck or trailer unit for the transport of gasoline from sources of supply to stationary storage tanks.

3.3 Vapor Balance System

"Vapor balance system" means a combination of pipes or hoses which create a closed system between the vapor spaces of an unloading tank and receiving tank such that vapors displaced from the receiving tank are transferred to the tank being unloaded.

4.0 Test Procedures For Determining the Efficiency of Gasoline Vapor Control Systems at Terminals

4.1 Application

The following test procedures are for determining the efficiency of vapor recovery systems controlling gasoline vapors emitted during the storage of gasoline and the filling of delivery tanks at terminals.

4.2 Principle

During the normal operations at a terminal (loadings of delivery tanks and loadings of the storage tanks), all possible points of emission are checked for vapor leaks. The volume of gasoline delivered from the terminal storage tanks to the delivery tanks is recorded, the volume of gasoline delivered to any fixed roof storage tank(s) is recorded (as required), and the mass of the hydrocarbon vapors emitted from the processing unit measured. The mass emission of hydrocarbons is calculated from these determinations.

4.3 Test Conditions

The processing unit may be tested for a series of 24 consecutive one hour periods and pressures in the vapor holder and any fixed roof gasoline storage tanks may be monitored for 30 consecutive days. DEQ shall determine whether testing for longer or shorter periods may be necessary for properly evaluating any system's compliance with performance3 standards. During the test of the processing unit, the pressure during the filling of a number of delivery tanks will be monitored. As much as possible, the system shall be tested under normal operating conditions. Dispensing rate shall be at the maximum rate possible consistent with safe and normal operating practices. Simultaneous use of more than one dispenser during transfer operations shall occur to the extent that such would normally occur and the processing unit shall be operated in accordance with the manufacturer's established parameters as well as in accordance with the owner's or operator's established operating procedures.

4.4 Calibrations

4.4.1 Flowmeters

Standard methods and equipment shall be used to calibrate the flowmeters every month or every five tests, whichever comes first. The calibration curves are to be traceable to NIST standards.

4.4.2 Temperature measuring instruments

Calibrate prior4 to test period and immediately following test period using ice water (32°F) and a known temperature source of about 100°F.

4.4.3 Pressure measuring instruments

Calibrate pressure transducers every month and immediately after each test with a static pressure calibrator of known accuracy.

4.4.4 Total hydrocarbon analyzer

Follow the manufacturer's instructions concerning warm-up time and adjustments. On each test day prior to testing and at the end of the day's testing, zero the analyzer with a zero gas (<3ppm C) and span with 5, 10, 30, and 70 percent concentrations of propane.

4.4.5 A record of all calibration is to be maintained by the source testing person for at least 1 year.

5.0 Testing Vapor Control Systems (Other Than Incineration Units) When Loading Delivery Tanks

5.1 Equipment Required

5.1.1 Flowmeter with a capacity sufficient to determine the volume of exhaust from the vent of processing unit.

5.1.2 Coupler for attaching the flowmeter to vent of processing unit with thermocouple and HC analyzer taps.

5.1.3 Coupler for delivery tank vapor return line with pressure tap.

5.1.4 One hydrocarbon analyzer (either FID or DEQ approved equivalent) with recorder and with a capability of measuring total gasoline vapor concentration of 30 percent as propane.

5.1.5 One (1) flexible thermocouple or thermistor (0-150°F) with recorder system having a readability of 1°F.

5.1.6 Two (2) pressure sensing devices (transducers or equivalent) capable of measuring zero to ten inches of water with recorder systems having a readability of 0.01 in. H_2O.

5.1.7 Coupler with pressure tap for use between pressure-vacuum (PV) relief valve and fixed roof storage tank vent.

5.1.8 Coupler with pressure tap for use between PV valve and vent on vapor holder tank.

5.1.9 One manometer capable of measuring zero to ten inches of water with a readability of 0.1 in. H_2O.

5.1.10 Explosimeter.

5.1.11 Barometer (Aneroid or Mercury), ± 0.1 in. Hg. readability.

5.2 Test Procedure

5.2.1 Connect appropriate coupler to vent of processing unit and connect flowmeter.

5.2.2 Connect hydrocarbon analyzer, with recorder, to appropriate tap on coupler on processing unit vent.

5.2.3 Connect thermocouple with recorder to appropriate tap on coupler on processing unit vent.

5.2.4 Connect coupler between PV valve and vent of vapor holder tank and connect pressure sensing device, with recorder, to coupler.

5.2.5 Connect coupler between PV valve and fixed roof bulk storage tank and connect pressure sensing device, with recorder, to coupler.

5.2.6 Connect the appropriate coupler to vapor return line from delivery tank. Connect the manometer to the coupling in vapor return line from delivery tank. Check the delivery tank and all connections for a tight seal, before and during fueling, with the explosimeter. Record the pressure in the vapor return line from the delivery tank at 5 minute intervals during the filling of the delivery tank. Repeat for the required number of delivery tanks.

5.2.7 Record the pressure on the bulk storage at the start and finish of the test period.

5.2.8 Record the pressure on the vapor-holder tank at the start and the finish of the test period.

5.2.9 Record the hydrocarbon concentrations, temperature and exhaust gas flowrate from the processor vent at the start and the finish of the test period.

5.2.10 At the end of the specified times, disconnect all instrumentation and couplings from the vapor recovery systems.

5.2.11 Record the volume of gasoline that is delivered over the time of the test period.

5.3 Calculations

5.3.1 Review pressures recorded during the filling of delivery tanks to determine if any equaled or exceeded one (1) pound per square inch.

5.3.2 Volume of gas discharged through the processing unit vent.

$$V = \frac{V_p \times 528 \times P_b}{T_p \times 29.92}$$

Where:

V = Volume of gas discharged through processor vent, corrected to 68°F and 29.92 in. Hg, (ft^3).

P_b = Barometric pressure, (in. Hg).

V_p = Volume of gas determined by flowmeter on the processing vent, corrected for amount of vapor removed for the hydrocarbon analysis, (ft^3).

T_p = Average temperature in the processing vent line, (°R.)

5.3.3 Weight of hydrocarbons discharged through the processing vent per 1,000 gallons of gasoline loaded into the delivery tanks.

$$W = \frac{C \times V \times M \times 1000}{379 \times G}$$

Where:

W = Weight of hydrocarbons discharged through the processor vent per 1000 gallons of gasoline loaded into delivery tanks, (lbs).

C = Average fractional concentration of hydrocarbons at vent, (decimal fraction)

V = From 5.3.2 above.

M = Molecular weight of hydrocarbon compound used to calibrate hydrocarbon analyzer, (lbs/lb Mole).

G = Total quantity of gasoline loaded into delivery tanks (gals).

Review the pressure recording from the transducers on the storage tanks and vapor holder and determine the number of times and total time (hours), if any, that the pressure exceeded the setting of the PV valve on either the vapor holder or on the fixed roof storage tank.

6.0 Testing Vapor Control Systems (Other Than Incineration Units) When Loading Fixed Roof Storage Tanks

6.1 Equipment Required

Same equipment as in Section 5.1.

6.2 Test Procedures

6.2.1 Connect appropriate coupler to vent of processing unit and connect flowmeter.

6.2.2 Connect hydrocarbon analyzer, with recorder, to appropriate tap on coupler on processing unit vent.

6.2.3 Connect thermocouple with recorder to appropriate tap on coupler on processing unit vent.

6.2.4 Connect coupler between PV valve and vent of vapor holding tank and connect pressure sensing device, with recorder, to coupler.

6.2.5 Connect coupler between PV valve and fixed roof storage tank and connect pressure sensing device, with recorder, to coupler.

6.2.6 Record the pressure on the bulk storage tank and connect pressure sensing device, with recorder, to coupler.

6.2.7 Record the pressure on the vapor-holding tank at the start and finish of the test period.

6.2.8 Record the hydrocarbon concentration, temperature and exhaust gas flowrate from the processor vent at the start and finish of the test.

6.2.9 At the end of the specified times, disconnect all instr4umentation and couplings from the vapor recovery systems.

6.2.10 Record the volume of gasoline that is delivered during the specified testing times.

6.2.11 Pressure monitoring of delivery tanks is to be performed, as appropriate, in accordance with Section 5.2.6.

6.3 Calculations

6.3.1 Volume of gas discharged through the processing unit vent.

$$V = \frac{V_p \times 528 \times P_b}{T_p \times 29.92}$$

Where:

V = Volume of gas discharged through processor vent, corrected to 68°F and 29.92 in. Hg, (ft^3).

P_b = Barometric pressure, (in. Hg).

V_p = Volume of gas determined by flow meter on the processing vent, corrected for amount of vapor removed by hydrocarbon analysis, (ft^3).

T_p = Average temperature in the processing vent line, (°R).

6.3.2 Weight of hydrocarbons discharged through the processing vent per 1000 gallons loaded into the delivery tanks.

$$W = \frac{C \times V \times M \times 1000}{379 \times G}$$

Where:

W = Weight of hydrocarbons discharged through the processor vent per 1000 gallons of gasoline loaded into delivery tanks, (lbs).

C = Average fractional concentration of hydrocarbons at vent, (decimal fraction).

V = From 6.3.1 above.

M = Molecular weight of hydrocarbon compound used to calibrate hydrocarbon analyzer, (lbs/lb Mole); (44 for propane).

G = Total quantity of gasoline loaded into fixed roof storage tank(s), (gals).

Review the pressure recording from the transducers on the storage tanks and vapor holder and determine the number of times and total time (hours), if any, that the pressure exceeded the setting of the PV valve on either the vapor holder or on the fixed roof storage tank.

7.0 Testing Exhaust Emissions From Incineration-Type Processing Unit

7.1 Equipment Required

7.1.1 One (1) positive displacement flowmeter (capacity of 11,000 SCFH) with a coupler with pressure and temperature taps.

7.1.2 One (1) hydrocarbon analyzer (FID or DEQ approved equivalent) capable of measuring hydrocarbons in the range 0 to 10 percent as propane.

7.1.3 One (1) oxygen analyzer (paramagnetic or DEQ approved equivalent) capable of measuring oxygen in the range 0 to 25 percent by volume.

7.1.4 Apparatus for performing the State of Oregon, DEQ source sampling Method #2 (Determination of Stack Velocity and Volumetric Flow Rate).

7.1.5 One (1) sample conditioner capable of adjusting the temperature of the exhaust gas sample to a range acceptable to the hydrocarbon and oxygen analyzers.

7.1.6 One (1) 1/4" ID stainless steel sampling probe (SS316 or equivalent), of appropriate length.

7.1.7 One (1) dry gas meter sufficiently accurate to measure the sample volume within one percent.

7.1.8 One (1) needle valve, or equivalent, to adjust flow rate.

7.1.9 One (1) rotameter, or equivalent, to measure a 0 to 10 SCFH flow range, with a readability of 0.1^{o}.

7.1.10 One (1) pump of a leak-free, vacuum type.

7.1.11 One (1) thermocouple with recorder, 0 - 150^{o}F with a readability of 1^{o}.

7.1.12 One (1) pressure sensor with recorder for a range of -2 to +2 psig.

7.1.13 Calibration of test equipment according to recommended procedure, Section 4.4, page 3.

7.2 Test Procedure

7.2.1 Insert the flowmeter (0-11,000 SCFH) into the pipe supplying the incinerator, connect thermocouple and pressure sensor and record initial volume.

7.2.2 Using the appar4atus and procedure for Method 2, 7.1.4, perform a velocity traverse of the incinerator exhaust vapor.

7.2.3 Insert the sample probe to the location of the average exhaust velocity, leaving the Method 2 apparatus in place. Connect the sample conditioner, hydrocarbon analyzer, oxygen analyzer, sample pump, rotameter, needle valve and dry gas meter to the sample probe.

7.2.4 Start analyzer recorders.

7.2.5 Adjust the sample flow rate proportional to the stack gas velocity and sample until the dry gas meter registers one (1) ft.^{3}. Mark on analyzer recorder strip charts beginning and ending of sample period.

7.2.6 At the end of the test period, record the total volume of vapors going to the incinerator and average temperature and pressure.

7.2.7 Record the average hydrocarbon and oxygen concentration in the incinerator exhaust. Repeat as required.

7.2.8 Record the volume of gasoline delivered during the test period.

7.2.9 Pressure monitoring of delivery tanks and fixed roof storage tanks is to be performed, as appropriate, in accordance with Section 5.2.6 and 6.2.6.

7.3 Calculations

7.3.1

$$V_p = \frac{V \times 528 \times PA}{T \times 29.92}$$

Where:

V_p = Volume of vapor going to the incinerator (ft.^{3})

V = Volume of gas recorded by meter (ft.^{3}).

PA = Absolute pressure in the pipe going to the incinerator, (in. Hg).

T = Average absolute temperature of the vapor, (°R).

7.3.2

$$EA = \frac{O_{2\%}}{.264N_2\% - O_2\%}$$

Where:

EA = Excess air in the incinerator exhaust gas.

$O_2\%$= Percent by volume oxygen in the incinerator exhaust.

$N_2\%$= Percent by volume nitrogen in the incinerator exhaust.

7.3.3

$$W = \frac{V_p \times C \times M \times (EA) \times 1000}{379 \times G}$$

Where:

W = Weight of hydrocarbons discharged through the incinerator vent per 1000 gallons of gasoline into delivery tanks, or, as appropriate, fixed roof tanks, (lbs).

V_p = From 7.3.1 above.

M = Molecular weight of hydrocarbon compound used to calibrate hydrocarbon analyzer, (lbs/lb Mole).

EA = From 7.3.2 above.

G = Total quantity of gasoline loaded into delivery tanks, or, as appropriate, fixed roof storage tanks, (gals).

C = Average fractional concentration of hydrocarbons at vent, (decimal fraction).

8.0 Alternative Test Methods

Techniques, other than those specified above, may be used for testing vapor recovery systems at terminals if prior written approval is obtained from DEQ Such approval will be based upon demonstrated equivalency with the methods in Section 5 through Section 8.

9.0 Recordkeeping

A record of the results for tests which are performed for compliance determination shall be maintained at the facility site according to OAR 340-232-0080 and 340-232-0100.

Appendix I, Submerged Fill Inspection Guideline, May 1, 1981

Department of Environmental Quality
Air Program
VOC Compliance Determination Guideline
Submerged Fill

Gasoline Dispensing Facilities

OAR 340-244-0240(3) requires submerged filling of gasoline storage tanks at gasoline dispensing facilities (service stations, motor pools, etc.).

“Submerged Fill” is defined in OAR 340-244-0030(29) as “the filling of a gasoline storage tank through a submerged fill pipe whose discharge is no more than the applicable distance specified in OAR 340-244-0240(3) from the bottom of the tank. Bottom filling of gasoline storage tanks is included in this definition.”

The applicable distance in OAR 340-244-0240(3) is no more than 12 inches from the bottom of the storage tank for submerged fill pipes installed on or before November 9, 2006 or no more than 6 inches from the bottom of the storage tank for submerged fill pipes installed after November 9, 2006. Submerged fill pipes not meeting these specifications are allowed if can be demonstrated that the liquid level in the tank is always above the entire opening of the fill pipe. Documentation providing such demonstration must be made available for inspection by DEQ during the course of a site visit.

Bulk Gasoline Plants

OAR 340-232-0080(1)(a) requires submerged filling at bulk gasoline plants in the Portland-Vancouver Air Quality Maintenance Area, Medford-Ashland Air Quality Maintenance Area, and Salem-Keizer Area Transportation Study (SKATS) Area.

“Submerged Fill" is defined in OAR 340-232-0030(70) as "any fill pipe or hose, the discharge opening of which is entirely submerged when the liquid is 6 inches above the bottom of the tank; or when applied to a tank which is loaded from the side, shall mean any fill pipe, the discharge of which is entirely submerged when the liquid level is 28 inches, or twice the diameter of the fill pipe, whichever is greater, above the bottom of the tank."

40 CFR 63.11086(a) requires submerged filling at bulk gasoline plants statewide.

Submerged Fill" is defined in 40 CFR 63.11100 as "the filling of a gasoline cargo tank or a stationary storage tank through a submerged fill pipe whose discharge is no more than the applicable distance specified in 40 CFR 63.11086(a) from the bottom of the tank. Bottom filling of gasoline cargo tanks or storage tanks is included in this definition.

The applicable distance in 40 CFR 63.11086(a) is no more than 12 inches from the bottom of the storage tank for submerged fill pipes installed on or before November 9, 2006 or no more than 6 inches from the bottom of the storage tank for submerged fill pipes installed after November 9, 2006. Submerged fill pipes not meeting these specifications are allowed if can be demonstrated that the liquid level in the tank is always above the entire opening of the fill pipe. Documentation providing such demonstration must be made available for inspection by DEQ during the course of a site visit.

Gasoline Delivery Vessels

OAR 340-232-0085(1)(a) requires submerged filling of delivery vessels receiving gasoline from a bulk gasoline terminal or a bulk gasoline plant, with a daily throughput of 4,000 or more gallons based on a 30-day rolling average, located in the Portland-Vancouver AQMA.

"Submerged Fill" is defined in OAR 340-232-0030(70) as "any fill pipe or hose, the discharge opening of which is entirely submerged when the liquid is 6 inches above the bottom of the tank; or when applied to a tank which is loaded from the side, shall mean any fill pipe, the discharge of which is entirely submerged when the liquid level is 28 inches, or twice the diameter of the fill pipe, whichever is greater, above the bottom of the tank."

Technique to determine compliance

(1) For underground tanks, open the fill pipe and determine that a submerged fill pipe extends down into the tank.

(2) Take a 20 foot measure tape or equivalent stick with an L extension on the bottom (11) and lower it down the fill tube, forcing the tape catch to scrape against the tube side, or catch on the bottom of the fill pipe.

(3) Note when scraping ceases; the bottom of the fill tube has been reached. Read the tape or mark the stick.

(4) Extend the tape on down to the bottom of the tank. Read the tape, or marking stick.

(5) If the difference in tape readings is at or less than the applicable distance the source is in compliance with the submerged fill pipe rule.

(6) Bulk plants or above-ground-tanks which are bottom filled can be considered in compliance, so long as the top of the fill line is less than twice the diameter of fill pipe or less than 18 inches above the tank bottom.

(7) Cylindrical tanks with horizontal fill pipes that do not meet requirements of (6) but have an elbow extending down toward the bottom of the tank must meet the requirements of (6).

(8) Horizontal tanks with side fill which do not meet the requirements of (6) but which have an elbow extending toward the bottom shall meet the requirements of (5).

(9) <u>Remember</u> gasoline is explosive, dangerous, toxic and non-spark measuring devices shall be used. Close all openings which were opened to conduct the test. A clean rag should be available for wiping during the test process to prevent gasoline burns to hands, etc.

(10) Good judgment relative to safety and courtesy is a must at all times.

Air Quality Program

Continuous Monitoring Manual

State of Oregon
Department of
Environmental
Quality

January, 1992

<u>Revisions:</u>
April, 2015

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DEQ is a leader in restoring, maintaining and enhancing the quality of Oregon's air, land and water.

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Table of Contents

Executive Summary

DEQ’s Continuous Monitoring Manual provides specifications and procedures for conducting continuous monitoring at facilities regulated by DEQ’s stationary source air quality permit program. The manual includes requirements for preparing monitoring plans that include standard operating and quality assurance procedures to ensure that continuous monitor systems will provide accurate and reliable data. The manual is applicable to continuous emission monitoring systems (CEMS), continuous parameter monitoring systems (CPMS), and continuous opacity monitoring systems (COMS). In addition to DEQ specific requirements, the manual incorporates by reference federal monitoring requirements contained in 40 CFR Parts 60, 63, and 75. The Continuous Monitoring Manual was first written in 1992 and revised in 2015. The Continuous Monitoring Manual is included in Oregon’s State Implementation Plan.

1.0 Introduction

This manual provides guidance and direction to owners and operators that are responsible for continuously monitoring air emissions, operating parameters, or opacity from their facilities. For purposes of this manual, continuous monitoring systems (CMS) are divided into three (3) main subgroups:

- Continuous Emission Monitoring Systems (CEMS),
- Continuous Parameter Monitoring Systems (CPMS), and
- Continuous Opacity Monitoring Systems (COMS).

CMS that are required by permit condition, but not subject to federal regulations are subject to the requirements of this manual. This manual also applies to CMS that are required by the following federal standards. The monitoring requirements specified in the federal standards are incorporated by reference as publsihed in the July 2012 Code of Federal Regulations (CFR. If there is an inconsistency between the requirements of this manual and the federal requirements, the federal requirement will take precedence:

- New Source Performance Standards (NSPS), 40 CFR Part 60;
- National Emissions Standards for Hazardous Air Pollutants (NESHAP), 40 CFR Part 63; and
- Acid Rain Program, 40 CFR Part 75.

When required to perform continuous monitoring by DEQ, CMS operators are required to perform the monitoring in accordance with this manual, at a minimum, to ensure reported data are complete and of high quality. Operators may choose more rigorous specifications or more sophisticated procedures appropriate for their purposes.

2.0 Monitoring Objectives

2.1 Program Objectives

The objectives of a monitoring program will vary depending on the regulation or permit, but may include one or more of the following. The CMS must be designed to meet the appropriate objectives.

- Measure air contaminant concentrations and operating parameters as required by permit or regulation;
- Ensure high quality data is collected to determine continuous compliance with permit or regulation;
- Prevent possible adverse environmental effects;
- Determine emissions improvements and trends in conjunction with process changes; or
- Provide accurate and reliable data as part of an integrated emissions inventory program.

2.2 Data Quality Objectives

Each monitoring program must meet specific data quality objectives. These are data completeness, representativeness, accuracy, precision, and comparability. A brief description of each objective is provided below.

- Completeness is the measure of the number of valid data points collected over the possible number of data points in a period of time.
- Representativeness refers to measurements which accurately depict the condition of interest. One aspect of representativeness involves the method chosen to perform the monitoring; it must be accurate in both a qualitative and quantitative sense.
- Accuracy describes how close the measurement is to the "true value" of the quantity being measured.
- Precision is a measure of variability, or scatter, of the system's response to repeated challenges by the same standard. Precision is a measure of repeatability, how closely multiple measurements agree.
- Comparability is a measure of how data sets are similar or different. It determines how data sets can be used collectively.

3.0 Continuous Monitoring Plans

The source operator must prepare and maintain written standard operating procedures (SOP) and a quality assurance plan (QAP) for each continuous monitoring system used at a source. The SOP and QAP must be submitted to DEQ prior to operation of a CMS. These documents must be reviewed periodically by the CMS operator and revised as necessary based on experience with the CMS. The SOP and QAP msut contain detailed, complete, step-by-step written procedures. Both documents msut be made available to DEQ personnel for inspection upon request.

3. 1 Standard operating procedures

Standard operating procedures (SOP) must be written for each CMS. The contents of the SOP must include, as a minimum, the following information:

a. Source owner or operator name and address.
b. Identification, description, and location of monitors in the CMS.
c. Description and location of the sample interface (i.e. sample probe).
d. Manufacturer and model number of each monitor in the CMS.
e. Equipment involved in sample transport, sample conditioning, analysis, and data recording.
f. Procedures for routine operation checks, including daily zero and span calibration drift (CD) check.
g. Procedures for routine preventive maintenance. Initially, these procedures can be taken from the manufacturer's installation and operation manuals. However, as the CMS operators gain more experience with the CMS, it may

be necessary or desirable to modify these procedures to increase or decrease frequency of maintenance and add or delete some procedures.

h. Routine maintenance spare parts inventory.
i. Procedures for calculating and converting CMS data into the reporting units of the standard.
j. Documentation of the activities described in 3.1 a – i.

3.2 Quality Assurance Plan

Prior to initiating a continuous monitoring program, a written quality assurance plan (QAP) must be prepared. The QAP must include quality control and quality assurance procedures for ensuring that the CMS will provide accurate and reliable data. For these purposes, the terms "Quality Control" (QC) and "Quality Assurance" (QA) are defined as follows:

- "Quality Control" refers to an activity carried out during routine internal operations to ensure that the data produced are within known limits of accuracy and precision. Examples of QC activities include periodic calibrations, routine zero and span checks, routine leak checks, routine check of optical alignment, etc. QC represents the core activity in a Quality Assurance program.
- "Quality Assurance" refers to all of the planned and systematic activities carried out externally and independent of routine operation to document data quality. QA activities include written documentation of operation, calibration, and QC procedures; independent system and performance audits; data validation; evaluation of QC data; etc. QA requires documentation of all aspects of the CMS effort, from the responsibilities of each person involved to how the data are reported.

The contents of the QAP are dependent on the applicable regulation or permit condition. Some systems may be subject to multiple regulations, and therefore multiple plan requirements. The plan should be reviewed annually and updated when there are changes to equipment and procedures. Plan updates should be submitted to DEQ for review. In general, a satisfactory QAP plan includes the following:

a. Data quality objectives.
b. Chain of responsibility for CMS operation, corrective action, and training program.
c. Procedure for measuring the CMS accuracy and precision including the following:
    - CMS calibrations
    - Zero and span drift checks
    - Performance audits
    - System audits
d. Quality control activities
e. Quality control documentation
f. Procedures for data recording, calculations, and reporting
g. Criteria for taking corrective actions

h. Procedures for corrective action

Monitoring plan requirements for various regulations are summarized in the following table.

REGULATIONS	AQ/QC PROGRAM PLAN REQUIREMENTS
NSPS	40 CFR Part 60, section 60.13 and appendix F, section 3
NESHAP	40 CFR Part 63, Subpart A, Section 63.8
Acid Rain Program	40 CFR Part 75, Appendix B, Section 1.

* This table may not include all references to applicable monitoring plan requirements.

4.0 Continuous Emission Monitoring Systems

4.1 CEMS Equipment and Installation Specifications

Equipment specifications, installation, and measurement location are defined according to the applicable performance specification. Refer to the following reference table for equipment specifications, installation, and measurement location requirements.

REGULATIONS	EQUIPMENT SPECIFICATIONS, INSTALLATION & MEASUREMENT LOCATION REQUIREMENTS
NSPS	40 CFR Part 60, section 60.13 and appendix B
NESHAP	40 CFR Part 63, section 63.8
Acid Rain Program	40 CFR Part 75, Subpart A – H and appendices A-J
Oregon DEQ Requirements	Appendix A of this manual

*This table may not include all references to applicable equipment and installation requirements.

4.2 Performance Assessments for CEMS

Performance assessments are utilized to determine quality of monitored data. In general, most regulations divide the assessments into four (4) separate activities:

- Initial performance specifications
- Daily performance assessments
- Quarterly performance assessments, and
- Annual performance assessments.

The requirement of each assessment depends on the applicable performance specifications and the QA/QC requirements. Performance assessments requirements are detailed below.

REGULATIONS	PERFORMANCE ASSESSMENTS
NSPS	40 CFR Part 60, Appendices B & F
NESHAP	40 CFR Part 63, section 63.8
Acid Rain Program	40 CFR Part 75, Subparts A – H and appendices A and B
Oregon DEQ Requirements	Appendix A of this manual

*This table may not include all references to applicable performance assessment requirements.

5.0 Continuous Parameter Monitoring Systems

A continuous parameter monitoring system (CPMS) continuously monitors source or pollution control device operating parameters. These may include, but are not limited to:

- Fuel consumption rates;
- Production rates;
- Oxygen concentration;
- Moisture content;
- Process temperatures;
- Pollution control device parameters (e.g., pressure drop, voltages, water flow and pressure, etc.)

There are three basic types of CPMS:

- CPMS used for the purpose of determining pollutant emissions rates (PEMS);
- CPMS used for the purpose of monitoring pollution control device operations; and,
- CPMS used for the purpose of monitoring source operations.

It is not the intention of this manual to cover each and every possible CPMS. Requirements for CPMS that are used for determining pollutant emissions rates are generally found within applicable federal regulation. CPMS requirements are detailed below.

REGULATIONS	CPMS REQUIREMENTS
NSPS	40 CFR Part 60, applicable subparts and appendices B and F
NESHAP	40 CFR Part 63, Applicable subparts
Acid Rain Program	40 CFR Part 75, Subpart E and appendices D and E
Oregon DEQ Requirements	Appendix B of this manual

*This table may not include all references to applicable CPMS performance requirements.

6.0 Continuous Opacity Monitoring Systems (COMS)

This section addresses specific requirements for the operation of continuous opacity monitoring systems (COMS). These requirements do *not* supersede any requirements specified by rule, regulation, or by permit condition**.**

Existing COMS installed prior to 6/1/91 must be maintained and operated in accordance with permit requirements; and, unless otherwise specified, are not subject to the requirements of this manual. If the COMS system is not subject to federal regulation and is installed, replaced, relocated or substantially refurbished after 6/1/91, then the COMS must satisfy 40 CFR Part 60, Spec. 1 requirements in effect at the time of the change.

All continuous opacity monitoring systems (COMS) must complete a minimum of one cycle of sampling and analyzing for each successive 10-second period (15 seconds for non-NSPS sources if approved by the DEQ).

Federal requirements for COMS can be found within the applicable federal regulations cited below.

REGULATIONS	COMS REQUIREMENTS
NSPS	40 CFR Part 60, sectin 60.13 and appendix B, specification 1
NESHAP	40 CFR Part 63, secton 63.8
Acid Rain Program -Optional Emissions Protocols	40 CFR Part 75, Subpart B

*This table may not include all references to applicable COMS performance requirements.

7.0 Recordkeeping and Reporting

This section addresses specific requirements for recordkeeping and reporting requirements for CMS. If inconsistencies exist, these requirements do not supersede any requirements specified by regulation or permit condition.

The source owner or operator must maintain records of all CMS activities in a file and/or log book. This record must be used by the CMS operator to ensure that the CMS is operating correctly. The record must also be made available to DEQ personnel upon request.

Recordkeeping and reporting requirements for various regulations are cited below.

REGULATIONS	RECORDKEEPING & REPORTING REQUIREMENTS
NSPS	40 CFR Part 60, applicable subparts and appendix F
NESHAP	40 CFR Part 63, applicable subparts
Acid Rain Program	40 CFR Part 75, subparts E, F and G and appendices B, D, and E
Oregon DEQ Requirements	Appendix C of this manual

*This table may not include all references to applicable recordkeeping and reporting requirements.

Appendix A

DEQ Continuous Emission Monitoring Requirements

General continuous emissions monitoring requirements are outlined below. These requirements do not supersede any requirements specified by regulation or permit condition. Refer to Section 4.0 of this monitoring manual.

A.1 CEMS Not Required by Federal Program and Installed after 6/1/91

1. The CEMS must continuously monitor and record the concentration of gaseous pollutant emissions on a wet or dry basis discharged into the atmosphere. The CEMS must consist of subsystems for sample extraction, conditioning, detection, analysis, and data recording/processing.
2. All CEMS must meet the requirements of 40 CFR 60 Appendix B (performance specifications) and Appendix F (QA/QC procedures).
3. All continuous emissions monitoring systems (CEMS) must complete a minimum of one cycle of sampling and analyzing for each successive 15-minute period unless the DEQ has specified a different frequency (i.e. Medford AQMA requires one minute cycle).

A.2 CEMS Not Required by Federal Program and Installed Prior to 6/1/91:

1. The CEMS must continuously monitor and record the concentration of gaseous pollutant emissions discharged to the atmosphere from any stationary source using CEMS approved by DEQ.
2. The span of the CEMS must be set:

    a. At 200% of the permit requirement concentration or the emission standard, whichever is lower. The span may be set at alternative values with DEQ approval.
    b. The CEMS must be capable of recording down-scale drift below zero.

3. The CEMS must be pollutant specific and free from interferences. (e.g.: For TRS CEMS, the measured TRS must exclude SO_2)
4. The CEMS analyzer must be maintained in an environment conducive to analyzer stability.
5. Extractive CEMS operating procedures must include automatic back-flushing of sample line and probe to purge condensed moisture and particulate material.
6. If the emissions must be corrected for diluent oxygen, periodically test and record the concentration of oxygen in the exhaust gases using an oxygen CEMS, Orsat Analyzer, or equivalent.

    a. An Oxygen CEMS, if used, must be calibrated according to written procedures, approved by the Department, at least twice each year using two calibration gases having oxygen concentrations of approximately 5 and 15 percent by volume, accurate to within 0.5% oxygen.

   b. Oxygen must be measured at least semi-annually, after any major maintenance/-repair on duct work, and frequently enough to be representative of average oxygen concentration.

7. The zero and span drift of CEMS must be measured and recorded daily when the CEMS is in operation. Span gases used for this procedure need not be NIST traceable. However, the concentration of the gases should be verified by an analyzer calibrated with certifiable calibration gases. It may be necessary to periodically certify the concentration of the zero and span drift check gases.
8. A cylinder gas audit (CGA) of the CEMS must be performed weekly with successive CGAs performed no closer than six days apart. The CGA must include a "zero" gas and a minimum of one upscale gas concentration at approximately 60 percent of analyzer full-scale. The CGA results must satisfy the audit specifications outlined within 40 CFR 60, Appendix F.

   a. If 4 consecutive weekly CGAs result in the CEMS being within the allowable specifications, the frequency of the CGAs may be reduced to once each month with successive CGAs performed no closer than 21 days apart.
   b. If three consecutive monthly CGAs result in the CEMS being within specifications, the frequency of the CGAs may be reduced to once each quarter with successive CGAs performed no closer than two months apart.
   c. If two consecutive quarterly CGAs result in the CEMS being within specifications, the CGA frequency may be reduced to once every six months with successive CGAs no closer than five months apart.
   d. The minimum CGA frequency must be once every six months with successive CGAs no closer than five months apart.
   e. The CGA frequency must revert back to a weekly frequency if a CGA results in the CEMS failing to meet the performance specifications of 40 CFR Part 60, Appendix F.

      i. The concentration of the cylinder audit gases must be traceable to National Institute of Standards and Technology (NIST) standard reference materials (SRM) or EPA certified reference materials (CRM) and reanalyzed every 6-months using EPA Reference Methods (40 CFR 60, Appendix A). Gases may be analyzed at less frequent intervals if the manufacturer guarantees their certified concentration for longer time periods.
      ii. Cylinder gases must be introduced to include as much of the monitoring system as feasible, in no case may gas conditioning subsystems (i.e. SO_2 scrubbers for TRS CEMS) be excluded or by-passed.

9. A Relative Accuracy Audit (RAA) must be performed at least once each year. The RAA may satisfy one of the CGA requirements. RAA must satisfy the audit specifications outlined within 40 CFR 60, Appendix F.
10. If the CEMS system is not subject to federal regulation and is installed, replaced, relocated or substantially refurbished after 6/1/91, then the CEMS is not applicable to the requirements of this section and must comply with section A.1 of this appendix.
11. As an alternative to complying with conditions 1 through 9 of this section, the owner/operator may choose to comply with the requirements of section A.1 of this appendix.
12. Data must be recorded in units of the standard.

APPENDIX B

DEQ CONTINUOUS PARAMETER MONITORING REQUIREMENTS

General continuous parameter monitoring requirements are outlined below. These requirements do not supersede any requirements specified by rule, regulation, or by permit condition. Refer to Section 5.0 of this manual.

B.1 CPMS General Requirements:

1. CPMS must be installed in a location that is representative of the monitored process and free from interferences.
2. CPMS must be installed and maintained in an environment conducive to CPMS stability and data reliability.
3. CPMS must be calibrated and certified by the manufacturer prior to installation. (Applies to CPMS installed after 6/1/91).
4. All CPMS must complete a minimum of one cycle of sampling and analyzing for each successive 15-minute period unless the DEQ has specified a different frequency (i.e. Medford AQMA requires one minute cycle).

B.2 Pollutant Emissions Related CPMS

1. CPMS for the purpose of determining emission rates (i.e. stack gas flow monitoring devices) require the highest level of QA/QC. If CPMS system is installed to satisfy 40CFR Parts 60 and 75, then requirements specified by those regulations must be followed.
    a. CPMS installed after 6/1/91 must meet 40 CFR Part 60 Appendix B performance specification 6. The reference methods for determining relative accuracy (RA) are EPA or DEQ methods 1 through 4.
    b. Performance audits must be conducted quarterly in conjunction with the CEMS audits. It may not be possible to conduct audits on some CPMS. Exemption from this requirement must be approved by DEQ.

2. Stack Gas Flow Monitoring

    CPMS data are necessary for converting emission concentrations to units of the standard. This is accomplished by continuously monitoring stack gas flow rates to calculate the emissions as a rate (pounds per hour) in addition to the CEMS output (percent or parts per million).

    There are several acceptable alternatives for measuring flow rates (ultrasonic sensors, pitot tubes, process rates - steam, air flows, etc.). The CPMS must include the capability to measure and/or assume the following variables for determining the stack gas flow rate.

    - Stack gas temperature,
    - Stack gas pressure (absolute),
    - Stack gas moisture content,
    - Stack gas molecular weight,
    - Stack gas velocity, and
    - Cross-sectional area of the stack at the point of velocity measurements.

Flow rate metering systems generally measure and record the velocity, or velocity pressure (fifth bullet item 5 above). Other parameters are either directly or indirectly measured. In some circumstances parameters can be accurately assumed based on historical data collected from the source.

B.3 Pollution Control Device Related CPMS

1. Pollution control device related CPMS include but are not limited to:
   - Operating pressure and/or temperature,
   - Water flow rate, temperature, and/or pressure
   - Electrical current and voltage, and
   - Cycle time.

2. Calibration checks must be performed in accordance with the manufacturer's procedures at least once per month. Depending on the CPMS, an exemption from this requirement may be obtained from the DEQ upon written request. For example, water flow devices are typically calibrated only once, prior to installation.

B.4 Source Operation Related CPMS

Source related CPMS include but are not limited to:

- Steam flow & pressure meters,
- Fuel flow meters,
- Operating temperatures & pressures,
- Excess air levels,
- Hour meters and cycle time.

At a minimum, source related CPMS must meet the general CPMS requirements listed above. Depending on the CPMS, an exemption from this requirement may be obtained from the DEQ upon written request. Temperature CPMS must be calibrated during each planned maintenance outage or annually, whichever is more frequent.

APPENDIX C

DEQ RECORDKEEPING AND REPORTING REQUIREMENTS

General DEQ CMS recordkeeping and reporting requirements are outlined below. These requirements do not supersede any requirements specified by regulation or permit condition. Refer to Section 7.0 of this monitoring manual.

C.1 Recordkeeping

The source owner or operator must maintain records of all CMS activities in a file and/or log book. This record must be used by the CMS operator to ensure that the CMS is operating correctly. The record must also be made available to DEQ personnel upon request. The record must include as a minimum the following information:

1. Records of routine observation checks.
2. Records of routine maintenance and adjustments.
3. Records of parts that are replaced.
4. Spare parts inventory for the CMS.
5. Records of CMS calibrations.
6. Records of CMS daily calibration drift.
7. Records of CMS audits.
8. Records of corrective action taken to bring an “out-of- control” (40CFR60 App F) CMS into control.
9. Records of date and time when CMS is inoperative or “out-of-control” (40CFR60 App F).

C.2 Reporting Requirements

The source owner or operator may be required, by permit condition, to submit monitoring reports to the DEQ. These reports must include as a minimum the following information:

1. Reporting period (determined by permit condition).
2. CMS type, manufacturer, serial number, and location.
3. Monitoring data must be reduced and reported as follows (unless otherwise specified by permit or rule):
   a. For opacity monitoring systems (COMS):
      i. 6-minute (clock) averages
      ii. Hourly (clock) averages
      iii. Monthly average of the hourly averages.
   b. For emissions monitoring systems (CEMS):
      i. Hourly (clock) averages.
      ii. Monthly average of the hourly averages.
4. Data completeness information. The following completeness requirements are essential for a CMS data average to be accepted (unless otherwise specified by permit or rule):
   - For a 6-minute or 1-hour reporting period, a minimum of 75% of the data must be included in the average.
   - For a 24-hour or monthly reporting period, a minimum of 90% of the data must be included in the average.

   Insufficient data completeness, excluding CMS downtime due to daily zero and span checks and performance audits, will void that data period. All data collected must be reported. Non-valid data must be highlighted. Data recorded during periods of CMS breakdowns, repairs, audits, calibration checks, and zero and span adjustments must not be included in the data averages.

5. Specific identification and supporting documentation, as required by rule or by permit condition, for each period of excess emissions that occurs.
6. The date and time identifying each period during which the CMS was inoperative (out-of-control as per 40CFR60 App F) except for zero and span checks and the nature of the CMS repairs or adjustments.
7. Reporting requirements for CMS performance assessments conducted during the reporting period are outlined below. Assessment requirements are dependent on applicable performance specifications and QA/QC requirements. Additional reporting requirements may be stipulated by permit or DEQ communication.
   - Results of initial performance assessment, submit to DEQ.
   - Results of daily performance assessments, submit to DEQ upon request.
   - Quarterly performance assessments, submit to DEQ upon request.
   - Semiannual performance assessments, submit to DEQ upon request.
   - Annual performance assessments, submit to DEQ.
   - Performance assessments not specifically listed above, submit to DEQ upon request.

AMEND: 340-200-0040

RULE TITLE: State of Oregon Clean Air Act Implementation Plan

NOTICE FILED DATE: 06/25/2021

RULE SUMMARY: Updating date for last SIP amendment to reflect incorporation of the rules in this rulemaking.

RULE TEXT:

(1) This implementation plan, consisting of Volumes 2 and 3 of the State of Oregon Air Quality Control Program, contains control strategies, rules and standards prepared by DEQ and is adopted as the State Implementation Plan (SIP) of the State of Oregon under the FCAA, 42 U.S.C.A 7401 to 7671q.

(2) Except as provided in section (3), revisions to the SIP will be made under the EQC's rulemaking procedures in OAR chapter 340, division 11 of this chapter and any other requirements contained in the SIP and will be submitted to the EPA for approval. The SIP was last modified by the EQC on July 15, 2025.

(3) Notwithstanding any other requirement contained in the SIP, DEQ may:

(a) Submit to the EPA any permit condition implementing a rule that is part of the federally-approved SIP as a source-specific SIP revision after DEQ has complied with the public hearings provisions of 40 C.F.R. 51.102; and

(b) Approve the standards submitted by LRAPA if LRAPA adopts verbatim, other than non-substantive differences, any standard that the EQC has adopted, and submit the standards to EPA for approval as a SIP revision.

(4) Revisions to the State of Oregon Clean Air Act Implementation Plan become federally enforceable upon approval by the EPA. If any provision of the federally approved State Implementation Plan conflicts with any provision adopted by the EQC, DEQ must enforce the more stringent provision.

STATUTORY/OTHER AUTHORITY: ORS 468A, ORS 468.020

STATUTES/OTHER IMPLEMENTED: ORS 468A.035, 468A.135

AMEND: 340-202-0060

RULE TITLE: Ambient Air Quality Standards: Suspended Particulate Matter

NOTICE FILED DATE: 06/12/2025

RULE SUMMARY: Modifies PM2.5 concentration threshold to match federal PM2.5 NAAQS promulgated Feb 7, 2024.

RULE TEXT:

Concentrations of the fraction of suspended particulate that is equal to or less than ten microns in aerodynamic diameter in ambient air as measured by an approved method must not exceed:

(1) 150 micrograms of PM10 per cubic meter of air as a 24-hour average concentration for any calendar day. This standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 micrograms per cubic meter as determined in accordance with Appendix K of 40 C.F.R. 50 is equal to or less than one at any site. Concentrations of the fraction of suspended particulate that is equal to or less than 2.5 microns in aerodynamic diameter in ambient air as measured by an approved method must not exceed:

(2) 35 micrograms of PM2.5 per cubic meter of air as a 3-year average of annual 98th percentile 24-hour average values recorded at each monitoring site. This standard is attained when the 3-year average of annual 98th percentile 24-hour average concentrations is equal to or less than 35 micrograms per cubic meter as determined in accordance with Appendix N of 40 C.F.R. 50.

(3) 9.0 micrograms of PM2.5 per cubic meter of air as a 3-year average of the annual arithmetic means. This standard is attained when the 3-year average of the arithmetic mean concentrations is equal to or less than 9.0 micrograms per cubic meter as determined in accordance with Appendix N of 40 C.F.R. 50.

NOTE: This rule is included in the State of Oregon Clean Air Act Implementation Plan as adopted by the Environmental Quality Commission under OAR 340-200-0040.

NOTE: View a PDF of referenced appendices by clicking on "Tables" link below.

STATUTORY/OTHER AUTHORITY: ORS 468, 468A

STATUTES/OTHER IMPLEMENTED: ORS 468A.025

State of Oregon Department of Environmental Quality

OAR 340-202-0060 Attachments

ambient temperature for the sampling site, K;
T_{std} = standard temperature, defined as 298 K;
P_{std} = standard pressure, defined as 101.3 kPa (or 760 mm Hg).

11.2 Calculate the total volume of air sampled as:

$$V_{std} = \bar{Q}_{std} \times t$$

where

V_{std} = total air sampled in standard volume units, std m^3;
t = sampling time, min.

11.3 Calculate the PM_{10} concentration as:

$$PM_{10} = (W_f - W_i) \times 10^6 / V_{std}$$

where

PM_{10} = mass concentration of $PM_{10,}$ μg/std m^3;
$W_{f,}$ W_i = final and initial weights of filter collecting PM_{1O} particles, g;
10^6 = conversion of g to μg.

NOTE: If more than one size fraction in the PM_{10} size range is collected by the sampler, the sum of the net weight gain by each collection filter $[\Sigma(W_f - W_i)]$ is used to calculate the PM_{10} mass concentration.

12.0 *References.*

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[52 FR 24664, July 1, 1987; 52 FR 29467, Aug. 7, 1987]

APPENDIX K TO PART 50—INTERPRETATION OF THE NATIONAL AMBIENT AIR QUALITY STANDARDS FOR PARTICULATE MATTER

1.0 *General.*

(a) This appendix explains the computations necessary for analyzing particulate matter data to determine attainment of the 24-hour and annual standards specified in 40 CFR 50.6. For the primary and secondary standards, particulate matter is measured in the ambient air as PM_{10} (particles with an aerodynamic diameter less than or equal to a nominal 10 micrometers) by a reference method based on appendix J of this part and designated in accordance with part 53 of this chapter, or by an equivalent method designated in accordance with part 53 of this chapter. The required frequency of measurements is specified in part 58 of this chapter.

(b) The terms used in this appendix are defined as follows:

Average refers to an arithmetic mean. All particulate matter standards are expressed in terms of expected annual values: Expected number of exceedances per year for the 24-hour standards and expected annual arithmetic mean for the annual standards.

Daily value for PM_{10} refers to the 24-hour average concentration of PM_{10} calculated or measured from midnight to midnight (local time).

Exceedance means a daily value that is above the level of the 24-hour standard after rounding to the nearest 10 μg/m^3 (i.e., values ending in 5 or greater are to be rounded up).

Expected annual value is the number approached when the annual values from an increasing number of years are averaged, in the absence of long-term trends in emissions or meteorological conditions.

Year refers to a calendar year.

(c) Although the discussion in this appendix focuses on monitored data, the same principles apply to modeling data, subject to EPA modeling guidelines.

2.0 *Attainment Determinations.*

2.1 *24-Hour Primary and Secondary Standards.*

(a) Under 40 CFR 50.6(a) the 24-hour primary and secondary standards are attained when the expected number of exceedances per year at each monitoring site is less than or equal to one. In the simplest case, the number of expected exceedances at a site is determined by recording the number of exceedances in each calendar year and then averaging them over the past 3 calendar years. Situations in which 3 years of data are not available and possible adjustments for unusual events or trends are discussed in sections 2.3 and 2.4 of this appendix. Further, when data for a year are incomplete, it is necessary to compute an estimated number of exceedances for that year by adjusting the observed number of exceedances. This procedure, performed by calendar quarter, is described in section 3.0 of this appendix. The expected number of exceedances is then estimated by averaging the individual annual estimates for the past 3 years.

(b) The comparison with the allowable expected exceedance rate of one per year is made in terms of a number rounded to the nearest tenth (fractional values equal to or greater than 0.05 are to be rounded up; e.g., an exceedance rate of 1.05 would be rounded to 1.1, which is the lowest rate for nonattainment).

2.2 *Annual Primary and Secondary Standards.* Under 40 CFR 50.6(b), the annual primary and secondary standards are attained when the expected annual arithmetic mean PM_{10} concentration is less than or equal to the level of the standard. In the simplest case, the expected annual arithmetic mean is determined by averaging the annual arithmetic mean PM_{10} concentrations for the past 3 calendar years. Because of the potential for incomplete data and the possible seasonality in PM_{10} concentrations, the annual mean shall be calculated by averaging the four quarterly means of PM_{10} concentrations within the calendar year. The equations for calculating the annual arithmetic mean are given in section 4.0 of this appendix. Situations in which 3 years of data are not available and possible adjustments for unusual events or trends are discussed in sections 2.3 and 2.4 of this appendix. The expected annual arithmetic mean is rounded to the nearest 1 μg/m^3 before comparison with the annual standards (fractional values equal to or greater than 0.5 are to be rounded up).

2.3 *Data Requirements.*

(a) 40 CFR 58.13 specifies the required minimum frequency of sampling for PM_{10}. For the purposes of making comparisons with the particulate matter standards, all data produced by National Air Monitoring Stations (NAMS), State and Local Air Monitoring Stations (SLAMS) and other sites submitted to EPA in accordance with the part 58 requirements must be used, and a minimum of 75 percent of the scheduled PM_{10} samples per quarter are required.

(b) To demonstrate attainment of either the annual or 24-hour standards at a monitoring site, the monitor must provide sufficient data to perform the required calculations of sections 3.0 and 4.0 of this appendix. The amount of data required varies with the sampling frequency, data capture rate and the number of years of record. In all cases, 3 years of representative monitoring data that meet the 75 percent criterion of the previous paragraph should be utilized, if available, and would suffice. More than 3 years may be considered, if all additional representative years of data meeting the 75 percent criterion are utilized. Data not meeting these criteria may also suffice to show attainment; however, such exceptions will have to be approved by the appropriate Regional Administrator in accordance with EPA guidance.

(c) There are less stringent data requirements for showing that a monitor has failed an attainment test and thus has recorded a violation of the particulate matter standards. Although it is generally necessary to meet the minimum 75 percent data capture requirement per quarter to use the computational equations described in sections 3.0 and 4.0 of this appendix, this criterion does not apply when less data is sufficient to unambiguously establish nonattainment. The following examples illustrate how nonattainment can be demonstrated when a site fails to meet the completeness criteria. Nonattainment of the 24-hour primary standards can be established by the observed annual number of exceedances (e.g., four observed exceedances in a single year), or by the estimated number of exceedances derived from the observed number of exceedances and the required number of scheduled samples (e.g., two observed exceedances with every other day sampling). Nonattainment of the annual standards can be demonstrated on the basis of quarterly mean concentrations developed from observed data combined with one-half the minimum detectable concentration substituted for missing values. In both cases, expected annual values must exceed the levels allowed by the standards.

2.4 *Adjustment for Exceptional Events and Trends.*

(a) An exceptional event is an uncontrollable event caused by natural sources of particulate matter or an event that is not expected to recur at a given location. Inclusion of such a value in the computation of exceedances or averages could result in inappropriate estimates of their respective expected annual values. To reduce the effect of unusual events, more than 3 years of representative data may be used. Alternatively, other techniques, such as the use of statistical models or the use of historical data could be considered so that the event may be discounted or weighted according to the likelihood that it will recur. The use of such techniques is subject to the approval of the appropriate Regional Administrator in accordance with EPA guidance.

(b) In cases where long–term trends in emissions and air quality are evident, mathematical techniques should be applied to account for the trends to ensure that the expected annual values are not inappropriately biased by unrepresentative data. In the simplest case, if 3 years of data are available under stable emission conditions, this data should be used. In the event of a trend or shift in emission patterns, either the most recent representative year(s) could be used or statistical techniques or models could be used in conjunction with previous years of data to adjust for trends. The use of less than 3 years of data, and any adjustments are subject to the approval of the appropriate Regional Administrator in accordance with EPA guidance.

3.0 *Computational Equations for the 24-hour Standards.*

3.1 *Estimating Exceedances for a Year.*

(a) If PM_{10} sampling is scheduled less frequently than every day, or if some scheduled samples are missed, a PM_{10} value will not be available for each day of the year. To account for the possible effect of incomplete data, an adjustment must be made to the data collected at each monitoring location to estimate the number of exceedances in a calendar year. In this adjustment, the assumption is made that the fraction of missing values that would have exceeded the standard level is identical to the fraction of measured values above this level. This computation is to be made for all sites that are scheduled to monitor throughout the entire year and meet the minimum data requirements of section 2.3 of this appendix. Because of possible seasonal imbalance, this adjustment shall be applied on a quarterly basis. The estimate of the expected number of exceedances for the quarter is equal to the observed number of exceedances plus an increment associated with the missing data. The following equation must be used for these computations:

Equation 1

$$e_q = v_q + \left[\left(v_q/n_q\right)\times\left(N_q - n_q\right)\right] = v_q \times N_q/n_q$$

where:

e_q = the estimated number of exceedances for calendar quarter q;

v_q = the observed number of exceedances for calendar quarter q;

N_q = the number of days in calendar quarter q;

n_q = the number of days in calendar quarter q with PM_{10} data; and

q = the index for calendar quarter, q=1, 2, 3 or 4.

(b) The estimated number of exceedances for a calendar quarter must be rounded to the nearest hundredth (fractional values equal to or greater than 0.005 must be rounded up).

(c) The estimated number of exceedances for the year, e, is the sum of the estimates for each calendar quarter.

Equation 2

$$e = \sum_{q=1}^{4} e_q$$

(d) The estimated number of exceedances for a single year must be rounded to one decimal place (fractional values equal to or greater than 0.05 are to be rounded up). The expected number of exceedances is then estimated by averaging the individual annual estimates for the most recent 3 or more representative years of data. The expected number of exceedances must be rounded to one decimal place (fractional values equal to or greater than 0.05 are to be rounded up).

(e) The adjustment for incomplete data will not be necessary for monitoring or modeling data which constitutes a complete record, i.e., 365 days per year.

(f) To reduce the potential for overestimating the number of expected exceedances, the correction for missing data will not be required for a calendar quarter in which the first observed exceedance has occurred if:

(1) There was only one exceedance in the calendar quarter;

(2) Everyday sampling is subsequently initiated and maintained for 4 calendar quarters in accordance with 40 CFR 58.13; and

(3) Data capture of 75 percent is achieved during the required period of everyday sampling. In addition, if the first exceedance is observed in a calendar quarter in which the monitor is already sampling every day, no adjustment for missing data will be made to the first exceedance if a 75 percent data capture rate was achieved in the quarter in which it was observed.

Example 1

a. During a particular calendar quarter, 39 out of a possible 92 samples were recorded, with one observed exceedance of the 24-hour standard. Using Equation 1, the estimated number of exceedances for the quarter is:

e_q=1×92/39=2.359 or 2.36.

b. If the estimated exceedances for the other 3 calendar quarters in the year were 2.30, 0.0 and 0.0, then, using Equation 2, the estimated number of exceedances for the year is 2.36=2.30=0.0=0.0 which equals 4.66 or 4.7. If no exceedances were observed for the 2 previous years, then the expected number of exceedances is estimated by: (1/3)×(4.7=0=0)=1.57 or 1.6. Since 1.6 exceeds the allowable number of expected exceedances, this monitoring site would fail the attainment test.

Example 2

In this example, everyday sampling was initiated following the first observed exceedance as required by 40 CFR 58.13. Accordingly, the first observed exceedance would not be adjusted for incomplete sampling. During the next three quarters, 1.2 exceedances were estimated. In this case, the estimated exceedances for the year would be 1.0=1.2=0.0=0.0 which equals 2.2. If, as before, no exceedances were observed for the two previous years, then the estimated exceedances for the 3–year period would then be (1/3)×(2.2=0.0=0.0)=0.7, and the monitoring site would *not* fail the attainment test.

3.2 *Adjustments for Non-Scheduled Sampling Days.*

(a) If a systematic sampling schedule is used and sampling is performed on days in addition to the days specified by the systematic sampling schedule, e.g., during episodes of high pollution, then an adjustment must be made in the eqution for the estimation of exceedances. Such an adjustment is needed to eliminate the bias in the estimate of the quarterly and annual number of exceedances that would occur if the chance of an exceedance is different for scheduled than for non-scheduled days, as would be the case with episode sampling.

(b) The required adjustment treats the systematic sampling schedule as a stratified sampling plan. If the period from one scheduled sample until the day preceding the next scheduled sample is defined as a sampling stratum, then there is one stratum for each scheduled sampling day. An average number of observed exceedances is computed for each of these sampling strata. With nonscheduled sampling days, the estimated number of exceedances is defined as:

Equation 3

$$e_q = \left(N_q/m_q\right)\times\sum_{j=1}^{m_q}\left(v_j/k_j\right)$$

where:

e_q = the estimated number of exceedances for the quarter;

N_q = the number of days in the quarter;

m_q = the number of strata with samples during the quarter;

v_j = the number of observed exceedances in stratum j; and

k_j = the number of actual samples in stratum j.

(c) Note that if only one sample value is recorded in each stratum, then Equation 3 reduces to Equation 1.

Example 3

A monitoring site samples according to a systematic sampling schedule of one sample every 6 days, for a total of 15 scheduled samples in a quarter out of a total of 92 possible samples. During one 6-day period, potential episode levels of PM_{10} were suspected, so 5 additional samples were taken. One of the regular scheduled samples was missed, so a total of 19 samples in 14 sampling strata were measured. The one 6-day sampling stratum with 6 samples recorded 2 exceedances. The remainder of the quarter with one sample per stratum recorded zero exceedances. Using Equation 3, the estimated number of exceedances for the quarter is:

e_q=(92/14)×(2/6=0=. . .=0)=2.19.

4.0 *Computational Equations for Annual Standards.*

4.1 *Calculation of the Annual Arithmetic Mean.* (a) An annual arithmetic mean value for PM_{10} is determined by averaging the quarterly means for the 4 calendar quarters of the year. The following equation is to be used for calculation of the mean for a calendar quarter:

Equation 4

$$\bar{x}_q = \left(1/n_q\right)\times\sum_{i=1}^{n_q} x_i$$

where:

$\bar{x}_q$ = the quarterly mean concentration for quarter q, q=1, 2, 3, or 4,

n_q = the number of samples in the quarter, and

x_i = the ith concentration value recorded in the quarter.

(b) The quarterly mean, expressed in μg/m^3, must be rounded to the nearest tenth (fractional values of 0.05 should be rounded up).

(c) The annual mean is calculated by using the following equation:

Equation 5

$$\bar{x} = \left(\frac{1}{4}\right) \times \sum_{q=1}^{4} \bar{x}_q$$

where:

$\bar{x}$ = the annual mean; and

$\bar{x}_q$ = the mean for calendar quarter q.

(d) The average of quarterly means must be rounded to the nearest tenth (fractional values of 0.05 should be rounded up).

(e) The use of quarterly averages to compute the annual average will not be necessary for monitoring or modeling data which results in a complete record, i.e., 365 days per year.

(f) The expected annual mean is estimated as the average of three or more annual means. This multi-year estimate, expressed in µg/m^3, shall be rounded to the nearest integer for comparison with the annual standard (fractional values of 0.5 should be rounded up).

Example 4

Using Equation 4, the quarterly means are calculated for each calendar quarter. If the quarterly means are 52.4, 75.3, 82.1, and 63.2 µg/m^3, then the annual mean is:

$\bar{x}$ = (1/4)×(52.4=75.3=82.1=63.2) = 68.25 or 68.3.

4.2 *Adjustments for Non-scheduled Sampling Days.* (a) An adjustment in the calculation of the annual mean is needed if sampling is performed on days in addition to the days specified by the systematic sampling schedule. For the same reasons given in the discussion of estimated exceedances, under section 3.2 of this appendix, the quarterly averages would be calculated by using the following equation:

Equation 6

$$\bar{x}_q = \left(\frac{1}{m_q}\right) \times \sum_{j=1}^{m_q} \sum_{i=1}^{k_j} \left(x_{ij}/k_j\right)$$

where:

$\bar{x}_q$ = the quarterly mean concentration for quarter q, q=1, 2, 3, or 4;

x_{ij} = the ith concentration value recorded in stratum j;

k_j = the number of actual samples in stratum j; and

m_q = the number of strata with data in the quarter.

(b) If one sample value is recorded in each stratum, Equation 6 reduces to a simple arithmetic average of the observed values as described by Equation 4.

Example 5

a. During one calendar quarter, 9 observations were recorded. These samples were distributed among 7 sampling strata, with 3 observations in one stratum. The concentrations of the 3 observations in the single stratum were 202, 242, and 180 µg/m^3. The remaining 6 observed concentrations were 55, 68, 73, 92, 120, and 155 µg/m^3. Applying the weighting factors specified in Equation 6, the quarterly mean is:

$\bar{x}_q$ = (1/7) × [(1/3) × (202 = 242 = 180) = 155 = 68 = 73 = 92 = 120 = 155] = 110.1

b. Although 24-hour measurements are rounded to the nearest 10 µg/m^3 for determinations of exceedances of the 24-hour standard, note that these values are rounded to the nearest 1 µg/m^3 for the calculation of means.

[62 FR 38712, July 18, 1997]

APPENDIX L TO PART 50—REFERENCE METHOD FOR THE DETERMINATION OF FINE PARTICULATE MATTER AS $PM_{2.5}$ IN THE ATMOSPHERE

1.0 *Applicability.*

1.1 This method provides for the measurement of the mass concentration of fine particulate matter having an aerodynamic diameter less than or equal to a nominal 2.5 micrometers ($PM_{2.5}$) in ambient air over a 24-hour period for purposes of determining whether the primary and secondary national ambient air quality standards for fine particulate matter specified in §50.7 of this part are met. The measurement process is considered to be nondestructive, and the $PM_{2.5}$ sample obtained can be subjected to subsequent physical or chemical analyses. Quality assessment procedures are provided in part 58, appendix A of this chapter, and quality assurance guidance are provided in references 1, 2, and 3 in section 13.0 of this appendix.

1.2 This method will be considered a reference method for purposes of part 58 of this chapter only if:

(a) The associated sampler meets the requirements specified in this appendix and the applicable requirements in part 53 of this chapter, and

(b) The method and associated sampler have been designated as a reference method in accordance with part 53 of this chapter.

1.3 $PM_{2.5}$ samplers that meet nearly all specifications set forth in this method but have minor deviations and/or modifications of the reference method sampler will be designated as ‘‘Class I’’ equivalent methods for $PM_{2.5}$ in accordance with part 53 of this chapter.

2.0 *Principle.*

2.1 An electrically powered air sampler draws ambient air at a constant volumetric flow rate into a specially shaped inlet and

APPENDIX M TO PART 50 [RESERVED]

APPENDIX N TO PART 50—INTERPRETATION OF THE NATIONAL AMBIENT AIR QUALITY STANDARDS FOR $PM_{2.5}$

1.0 GENERAL

(a) This appendix explains the data handling conventions and computations necessary for determining when the national ambient air quality standards (NAAQS) for $PM_{2.5}$ are met, specifically the primary and secondary annual and 24-hour $PM_{2.5}$ NAAQS specified in § 50.7, 50.13, and 50.18. $PM_{2.5}$ is defined, in general terms, as particles with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers. $PM_{2.5}$ mass concentrations are measured in the ambient air by a Federal Reference Method (FRM) based on appendix L of this part, as applicable, and designated in accordance with part 53 of this chapter; or by a Federal Equivalent Method (FEM) designated in accordance with part 53 of this chapter; or by an Approved Regional Method (ARM) designated in accordance with part 58 of this chapter. Only those FRM, FEM, and ARM measurements that are derived in accordance with part 58 of this chapter (i.e., that are deemed ''suitable'') shall be used in comparisons with the $PM_{2.5}$ NAAQS. The data handling and computation procedures to be used to construct annual and 24-hour NAAQS metrics from reported $PM_{2.5}$ mass concentrations, and the associated instructions for comparing these calculated metrics to the levels of the $PM_{2.5}$ NAAQS, are specified in sections 2.0, 3.0, and 4.0 of this appendix.

(b) Decisions to exclude, retain, or make adjustments to the data affected by exceptional events, including natural events, are made according to the requirements and process deadlines specified in §§ 50.1, 50.14 and 51.930 of this chapter.

(c) The terms used in this appendix are defined as follows:

Annual mean refers to a weighted arithmetic mean, based on quarterly means, as defined in section 4.4 of this appendix.

The *Air Quality System (AQS)* is EPA's official repository of ambient air data.

Collocated monitors refers to two or more air measurement instruments for the same parameter (e.g., $PM_{2.5}$ mass) operated at the same site location, and whose placement is consistent with § 53.1 of this chapter. For purposes of considering a combined site record in this appendix, when two or more monitors are operated at the same site, one monitor is designated as the ''primary'' monitor with any additional monitors designated as ''collocated.'' It is implicit in these appendix procedures that the primary monitor and collocated monitor(s) are all deemed suitable for the applicable NAAQS comparison; however, it is not a requirement that the primary and monitors utilize the same specific sampling and analysis method.

Combined site data record is the data set used for performing calculations in appendix N. It represents data for the primary monitors augmented with data from collocated monitors according to the procedure specified in section 3.0(d) of this appendix.

Creditable samples are daily values in the combined site record that are given credit for data completeness. The number of creditable samples (cn) for a given year also governs which value in the sorted series of daily values represents the 98th percentile for that year. Creditable samples include daily values collected on scheduled sampling days and valid make-up samples taken for missed or invalidated samples on scheduled sampling days.

Daily values refer to the 24-hour average concentrations of $PM_{2.5}$ mass measured (or averaged from hourly measurements in AQS) from midnight to midnight (local standard time) from suitable monitors.

Data substitution tests are diagnostic evaluations performed on an annual $PM_{2.5}$ NAAQS design value (DV) or a 24-hour $PM_{2.5}$ NAAQS DV to determine if those metrics, which are judged to be based on incomplete data in accordance with 4.1(b) or 4.2(b) of this appendix shall nevertheless be deemed valid for NAAQS comparisons, or alternatively, shall still be considered incomplete and not valid for NAAQS comparisons. There are two data substitution tests, the ''minimum quarterly value'' test and the ''maximum quarterly value'' test. *Design values (DVs)* are the 3-year average NAAQS metrics that are compared to the NAAQS levels to determine when a monitoring site meets or does not meet the NAAQS, calculated as shown in section 4. There are two separate DVs specified in this appendix:

(1) The 3-year average of $PM_{2.5}$ annual mean mass concentrations for each eligible monitoring site is referred to as the ''*annual $PM_{2.5}$ NAAQS DV*''.

(2) The 3-year average of annual 98th percentile 24-hour average $PM_{2.5}$ mass concentration values recorded at each eligible monitoring site is referred to as the ''*24-hour (or daily) $PM_{2.5}$ NAAQS DV*''.

Eligible sites are monitoring stations that meet the criteria specified in § 58.11 and § 58.30 of this chapter, and thus are approved for comparison to the annual $PM_{2.5}$ NAAQS. For the 24-hour $PM_{2.5}$ NAAQS, all site locations that meet the criteria specified in § 58.11 are approved (i.e., eligible) for NAAQS comparisons.

Extra samples are non-creditable samples. They are daily values that do not occur on scheduled sampling days and that cannot be used as make-up samples for missed or invalidated scheduled samples. Extra samples are used in mean calculations and are included in the series of all daily values subject to selection as a 98th percentile value, but are not used to determine which value in the sorted list represents the 98th percentile.

Make-up samples are samples collected to take the place of missed or invalidated required scheduled samples. Make-up samples can be made by either the primary or the collocated monitor. Make-up samples are either taken before the next required sampling day or exactly one week after the missed (or voided) sampling day.

The *maximum quarterly value data substitution test* substitutes actual ''high'' reported daily $PM_{2.5}$ values from the same site (specifically, the highest reported non-excluded quarterly value(s) (year non-specific) contained in the combined site record for the evaluated 3-year period) for missing daily values.

The *minimum quarterly value data substitution test* substitutes actual ''low'' reported daily $PM_{2.5}$ values from the same site (specifically, the lowest reported quarterly value(s) (year non-specific) contained in the combined site record for the evaluated 3-year period) for missing daily values.

98th percentile is the smallest daily value out of a year of $PM_{2.5}$ mass monitoring data below which no more than 98 percent of all daily values fall using the ranking and selection method specified in section 4.5(a) of this appendix.

Primary monitors are suitable monitors designated by a state or local agency in their annual network plan (and in AQS) as the default data source for creating a combined site record for purposes of NAAQS comparisons. If there is only one suitable monitor at a particular site location, then it is presumed to be a primary monitor.

Quarter refers to a calendar quarter (e.g., January through March).

Quarterly data capture rate is the percentage of scheduled samples in a calendar quarter that have corresponding valid reported sample values. Quarterly data capture rates are specifically calculated as the number of creditable samples for the quarter divided by the number of scheduled samples for the quarter, the result then multiplied by 100 and rounded to the nearest integer.

Scheduled $PM_{2.5}$ samples refers to those reported daily values which are consistent with the required sampling frequency (per §58.12 of this chapter) for the primary monitor, or those that meet the special exception noted in section 3.0(e) of this appendix.

Seasonal sampling is the practice of collecting data at a reduced frequency during a season of expected low concentrations.

Suitable monitors are instruments that use sampling and analysis methods approved for NAAQS comparisons. For the annual and 24-hour $PM_{2.5}$ NAAQS, suitable monitors include all FRMs, and all FEMs/ARMs except those specific continuous FEMs/ARMs disqualified by a particular monitoring agency network in accordance with §58.10(b)(13) and approved by the EPA Regional Administrator per §58.11(e) of this chapter.

Test design values (TDV) are numerical values that used in the data substitution tests described in sections 4.1(c)(i), 4.1(c)(ii) and 4.2(c)(i) of this appendix to determine if the $PM_{2.5}$ NAAQS DV with incomplete data are judged to be valid for NAAQS comparisons. There are two TDVs: TDV_{min} to determine if the NAAQS is not met and is used in the ''minimum quarterly value'' data substitution test and TDV_{max} to determine if the NAAQS is met and is used in the ''maximum quarterly value'' data substitution test. These TDV's are derived by substituting historically low or historically high daily concentration values for missing data in an incomplete year(s).

Year refers to a calendar year.

2.0 MONITORING CONSIDERATIONS

(a) Section 58.30 of this chapter provides special considerations for data comparisons to the annual $PM_{2.5}$ NAAQS.

(b) Monitors meeting the network technical requirements detailed in §58.11 of this chapter are suitable for comparison with the NAAQS for $PM_{2.5}$.

(c) Section 58.12 of this chapter specifies the required minimum frequency of sampling for $PM_{2.5}$. Exceptions to the specified sampling frequencies, such as seasonal sampling, are subject to the approval of the EPA Regional Administrator and must be documented in the state or local agency Annual Monitoring Network Plan as required in §58.10 of this chapter and also in AQS.

3.0 REQUIREMENTS FOR DATA USE AND DATA REPORTING FOR COMPARISONS WITH THE NAAQS FOR $PM_{2.5}$

(a) Except as otherwise provided in this appendix, all valid FRM/FEM/ARM $PM_{2.5}$ mass concentration data produced by suitable monitors that are required to be submitted to AQS, or otherwise available to EPA, meeting the requirements of part 58 of this chapter including appendices A, C, and E shall be used in the DV calculations. Generally, EPA will only use such data if they have been certified by the reporting organization (as prescribed by §58.15 of this chapter); however, data not certified by the reporting organization can nevertheless be used, if the deadline for certification has passed and EPA judges the data to be complete and accurate.

(b) $PM_{2.5}$ mass concentration data (typically collected hourly for continuous instruments and daily for filter-based instruments) shall be reported to AQS in micrograms per cubic meter (μg/m^3) to at least one decimal place. If concentrations are reported to one decimal place, additional digits to the right of the tenths decimal place shall be truncated. If concentrations are reported to AQS with more than one decimal place, AQS will truncate the value to one decimal place for NAAQS usage (i.e., for implementing the procedures in this appendix). In situations where suitable $PM_{2.5}$ data are available to EPA but not reported to AQS, the same truncation protocol shall be applied to that data. In situations where $PM_{2.5}$ mass data are submitted to AQS, or are otherwise available, with less precision than specified above, these data shall nevertheless still be deemed appropriate for NAAQS usage.

(c) Twenty-four-hour average concentrations will be computed in AQS from submitted hourly $PM_{2.5}$ concentration data for each corresponding day of the year and the result will be stored in the first, or start, hour (i.e., midnight, hour '0') of the 24-hour period. A 24-hour average concentration shall be considered valid if at least 75 percent of the hourly averages (i.e., 18 hourly values) for the 24-hour period are available. In the event that less than all 24 hourly average concentrations are available (i.e., less than 24, but at least 18), the 24-hour average concentration shall be computed on the basis of the hours available using the number of available hours within the 24-hour period as the divisor (e.g., 19, if 19 hourly values are available). Twenty-four-hour periods with seven or more missing hours shall also be considered valid if, after substituting zero for all missing hourly concentrations, the resulting 24-hour average daily value is greater than the level of the 24-hour $PM_{2.5}$ NAAQS (i.e., greater than or equal to 35.5 $\mu g/m^3$). Twenty-four hour average $PM_{2.5}$ mass concentrations that are averaged in AQS from hourly values will be truncated to one decimal place, consistent with the data handling procedure for the reported hourly (and also 24-hour filter-based) data.

(d) All calculations shown in this appendix shall be implemented on a site-level basis. Site level concentration data shall be processed as follows:

(1) The default dataset for $PM_{2.5}$ mass concentrations for a site shall consist of the measured concentrations recorded from the designated primary monitor(s). All daily values produced by the primary monitor are considered part of the site record; this includes all creditable samples and all extra samples.

(2) Data for the primary monitors shall be augmented as much as possible with data from collocated monitors. If a valid daily value is not produced by the primary monitor for a particular day (scheduled or otherwise), but a value is available from a collocated monitor, then that collocated value shall be considered part of the combined site data record. If more than one collocated daily value is available, the average of those valid collocated values shall be used as the daily value. The data record resulting from this procedure is referred to as the ''combined site data record.''

(e) All daily values in a combined site data record are used in the calculations specified in this appendix; however, not all daily values are given credit towards data completeness requirements. Only creditable samples are given credit for data completeness. Creditable samples include daily values in the combined site record that are collected on scheduled sampling days and valid make-up samples taken for missed or invalidated samples on scheduled sampling days. Days are considered scheduled according to the required sampling frequency of the designated primary monitor with one exception. The exception is, if a collocated continuous FEM/ARM monitor has a more intensive sampling frequency than the primary FRM monitor, then samples contributed to the combined site record from that continuous FEM/ARM monitor are always considered scheduled and, hence, also creditable. Daily values in the combined site data record that are reported for nonscheduled days, but that are not valid make-up samples are referred to as extra samples.

4.0 COMPARISONS WITH THE ANNUAL AND 24-HOUR $PM_{2.5}$ NAAQS

4.1 Annual $PM_{2.5}$ NAAQS

(a) The primary annual $PM_{2.5}$ NAAQS is met when the annual $PM_{2.5}$ NAAQS DV is less than or equal to 12.0 $\mu g/m^3$ at each eligible monitoring site. The secondary annual $PM_{2.5}$ NAAQS is met when the annual $PM_{2.5}$ NAAQS DV is less than or equal to 15.0 $\mu g/m^3$ at each eligible monitoring site.

(b) Three years of valid annual means are required to produce a valid annual $PM_{2.5}$ NAAQS DV. A year meets data completeness requirements when quarterly data capture rates for all four quarters are at least 75 percent. However, years with at least 11 creditable samples in each quarter shall also be considered valid if the resulting annual mean or resulting annual $PM_{2.5}$ NAAQS DV (rounded according to the conventions of section 4.3 of this appendix) is greater than the level of the applicable primary or secondary annual $PM_{2.5}$ NAAQS. Furthermore, where the explicit 75 percent data capture and/or 11 sample minimum requirements are not met, the 3-year annual $PM_{2.5}$ NAAQS DV shall still be considered valid if it passes at least one of the two data substitution tests stipulated below.

(c) In the case of one, two, or three years that do not meet the completeness requirements of section 4.1(b) of this appendix and thus would normally not be useable for the calculation of a valid annual $PM_{2.5}$ NAAQS DV, the annual $PM_{2.5}$ NAAQS DV shall nevertheless be considered valid if one of the test conditions specified in sections 4.1(c)(i) and 4.1(c)(ii) of this appendix is met.

(i) An annual $PM_{2.5}$ NAAQS DV that is above the level of the NAAQS can be validated if it passes the minimum quarterly value data substitution test. This type of data substitution is permitted only if there are at least 30 days across the three quarters of the three years under consideration (e.g., collectively, quarter 1 of year 1, quarter 1 of year 2 and quarter 1 of year 3) from which to select the quarter-specific low value. Data substitution will be performed in all quarter periods that have less than 11 creditable samples.

Procedure: Identify for each deficient quarter (i.e., those with less than 11 creditable samples) the lowest reported daily value for that quarter, looking across those three months of all three years under consideration. If after substituting the lowest reported daily value for a quarter for (11− cn) daily values in the matching deficient quarter(s) (i.e., to bring the creditable number for those quarters up to 11), the procedure yields a recalculated annual $PM_{2.5}$ NAAQS test DV (TDV_{min}) that is greater than the level of the standard, then the annual $PM_{2.5}$ NAAQS DV is deemed to have passed the diagnostic test and is valid, and the annual $PM_{2.5}$ NAAQS is deemed to have been violated in that 3-year period.

(ii) An annual $PM_{2.5}$ NAAQS DV that is equal to or below the level of the NAAQS can be validated if it passes the maximum quarterly value data substitution test. This type of data substitution is permitted only if there is at least 50 percent data capture in each quarter that is deficient of 75 percent data capture in each of the three years under consideration. Data substitution will be performed in all quarter periods that have less than 75 percent data capture but at least 50 percent data capture. If any quarter has less than 50 percent data capture then this substitution test cannot be used.

Procedure: Identify for each deficient quarter (i.e., those with less than 75 percent but at least 50 percent data capture) the highest reported daily value for that quarter, excluding state-flagged data affected by exceptional events which have been approved for exclusion by the Administrator, looking across those three quarters of all three years under consideration. If after substituting the highest reported daily $PM_{2.5}$ value for a quarter for all missing daily data in the matching deficient quarter(s) (i.e., to make those quarters 100 percent complete), the procedure yields a recalculated annual $PM_{2.5}$ NAAQS test DV (TDV_{max}) that is less than or equal to the level of the standard, then the annual $PM_{2.5}$ NAAQS DV is deemed to have passed the diagnostic test and is valid, and the annual $PM_{2.5}$ NAAQS is deemed to have been met in that 3-year period.

(d) An annual $PM_{2.5}$ NAAQS DV based on data that do not meet the completeness criteria stated in 4(b) and also do not satisfy the test conditions specified in section 4(c), may also be considered valid with the approval of, or at the initiative of, the EPA Administrator, who may consider factors such as monitoring site closures/moves, monitoring diligence, the consistency and levels of the daily values that are available, and nearby concentrations in determining whether to use such data.

(e) The equations for calculating the annual $PM_{2.5}$ NAAQS DVs are given in section 4.4 of this appendix.

4.2 Twenty-four-hour $PM_{2.5}$ NAAQS

(a) The primary and secondary 24-hour $PM_{2.5}$ NAAQS are met when the 24-hour $PM_{2.5}$ NAAQS DV at each eligible monitoring site is less than or equal to 35 $\mu g/m^3$.

(b) Three years of valid annual $PM_{2.5}$ 98th percentile mass concentrations are required to produce a valid 24-hour $PM_{2.5}$ NAAQS DV. A year meets data completeness requirements when quarterly data capture rates for all four quarters are at least 75 percent. However, years shall be considered valid, notwithstanding quarters with less than complete data (even quarters with less than 11 creditable samples, but at least one creditable sample must be present for the year), if the resulting annual 98th percentile value or resulting 24-hour NAAQS DV (rounded according to the conventions of section 4.3 of this appendix) is greater than the level of the standard. Furthermore, where the explicit 75 percent quarterly data capture requirement is not met, the 24-hour $PM_{2.5}$ NAAQS DV shall still be considered valid if it passes the maximum quarterly value data substitution test.

(c) In the case of one, two, or three years that do not meet the completeness requirements of section 4.2(b) of this appendix and thus would normally not be useable for the calculation of a valid 24-hour $PM_{2.5}$ NAAQS DV, the 24-hour $PM_{2.5}$ NAAQS DV shall nevertheless be considered valid if the test conditions specified in section 4.2(c)(i) of this appendix are met.

(i) A $PM_{2.5}$ 24-hour mass NAAQS DV that is equal to or below the level of the NAAQS can be validated if it passes the maximum quarterly value data substitution test. This type of data substitution is permitted only if there is at least 50 percent data capture in each quarter that is deficient of 75 percent data capture in each of the three years under consideration. Data substitution will be performed in all quarters that have less than 75 percent data capture but at least 50 percent data capture. If any quarter has less than 50 percent data capture then this substitution test cannot be used.

Procedure: Identify for each deficient quarter (i.e., those with less than 75 percent but at least 50 percent data capture) the highest reported daily $PM_{2.5}$ value for that quarter, excluding state-flagged data affected by exceptional events which have been approved for exclusion by the Regional Administrator, looking across those three quarters of all three years under consideration. If, after substituting the highest reported daily maximum $PM_{2.5}$ value for a quarter for all missing daily data in the matching deficient quarter(s) (i.e., to make those quarters 100 percent complete), the procedure yields a recalculated 3-year 24-hour NAAQS test DV (TDV_{max}) less than or equal to the level of the standard, then the 24-hour $PM_{2.5}$ NAAQS DV is deemed to have passed the diagnostic test and is valid, and the 24-hour $PM_{2.5}$ NAAQS is deemed to have been met in that 3-year period.

(d) A 24-hour $PM_{2.5}$ NAAQS DV based on data that do not meet the completeness criteria stated in section 4(b) of this appendix and also do not satisfy the test conditions specified in section 4(c) of this appendix, may also be considered valid with the approval of, or at the initiative of, the EPA Administrator, who may consider factors such as monitoring site closures/moves, monitoring diligence, the consistency and levels of the daily values that are available, and nearby concentrations in determining whether to use such data.

(e) The procedures and equations for calculating the 24-hour $PM_{2.5}$ NAAQS DVs are given in section 4.5 of this appendix.

4.3 Rounding Conventions. For the purposes of comparing calculated $PM_{2.5}$ NAAQS DVs to the applicable level of the standard, it is necessary to round the final results of the calculations described in sections 4.4 and 4.5 of this appendix. Results for all intermediate calculations shall not be rounded.

(a) Annual $PM_{2.5}$ NAAQS DVs shall be rounded to the nearest tenth of a μg/m³ (decimals x.x5 and greater are rounded up to the next tenth, and any decimal lower than x.x5 is rounded down to the nearest tenth).

(b) Twenty-four-hour $PM_{2.5}$ NAAQS DVs shall be rounded to the nearest 1 μg/m³ (decimals 0.5 and greater are rounded up to the nearest whole number, and any decimal lower than 0.5 is rounded down to the nearest whole number).

4.4 Equations for the Annual $PM_{2.5}$ NAAQS.

(a) An annual mean value for $PM_{2.5}$ is determined by first averaging the daily values of a calendar quarter using equation 1 of this appendix:

Equation 1

$$\overline{X}_{q,y} = \frac{1}{n_q} \sum_{i=1}^{n_q} X_{i,q,y}$$

Where:

$\bar{X}_{q,y}$ = the mean for quarter q of the year y;

n_q = the number of daily values in the quarter; and

$x_{i\ q,y}$ = the i^{th} value in quarter q for year y.

(b) Equation 2 of this appendix is then used to calculate the site annual mean:

Equation 2

$$\overline{X}_{y} = \frac{1}{4} \sum_{q=1}^{4} \overline{X}_{q,y}$$

Where:

$\bar{X}_y$ = the annual mean concentration for year y (y = 1, 2, or 3); and

$\bar{X}_{q,y}$ = the mean for quarter q of year y (result of equation 1).

(c) The annual $PM_{2.5}$ NAAQS DV is calculated using equation 3 of this appendix:

Equation 3

$$\overline{X} = \frac{1}{3}\sum_{y=1}^{3}\overline{X}_y$$

Where:

$\bar{X}$ = the annual $PM_{2.5}$ NAAQS DV; and

$\bar{X}_y$ = the annual mean for year y (result of equation 2)

(d) The annual $PM_{2.5}$ NAAQS DV is rounded according to the conventions in section 4.3 of this appendix before comparisons with the levels of the primary and secondary annual $PM_{2.5}$ NAAQS are made.

4.5 Procedures and Equations for the 24-Hour $PM_{2.5}$ NAAQS

(a) When the data for a particular site and year meet the data completeness requirements in section 4.2 of this appendix, calculation of the 98th percentile is accomplished by the steps provided in this subsection. Table 1 of this appendix shall be used to identify annual 98th percentile values.

Identification of annual 98th percentile values using the Table 1 procedure will be based on the creditable number of samples (as described below), rather than on the actual number of samples. Credit will not be granted for extra (non-creditable) samples. Extra samples, however, are candidates for selection as the annual 98th percentile. [The creditable number of samples will determine how deep to go into the data distribution, but all samples (creditable and extra) will be considered when making the percentile assignment.] The annual creditable number of samples is the sum of the four quarterly creditable number of samples.

Procedure: Sort all the daily values from a particular site and year by descending value. (For example: (x[1], x[2], x[3], * * *, x[n]). In this case, x[1] is the largest number and x[n] is the smallest value.) The 98th percentile value is determined from this sorted series of daily values which is ordered from the highest to the lowest number. Using the left column of Table 1, determine the appropriate range for the annual creditable number of samples for year y (cn_y) (e.g., for 120 creditable samples per year, the appropriate range would be 101 to 150). The corresponding "n" value in the right column identifies the rank of the annual 98th percentile value in the descending sorted list of site specific daily values for year y (e.g., for the range of 101 to 150, n would be 3). Thus, $P_{0.98,\ y}$ = the n^{th} largest value (e.g., for the range of 101 to 150, the 98th percentile value would be the third highest value in the sorted series of daily values.

TABLE 1

Annual number of creditable samples for year *y* (cn_y)	The 98th percentile for year y ($P_{0.98,y}$), is the n^{th} maximum 24-hour average value for the year where *n* is the listed number
1 to 50	1
51 to 100	2
101 to 150	3
151 to 200	4
201 to 250	5
251 to 300	6
301 to 350	7
351 to 366	8

(b) The 24-hour $PM_{2.5}$ NAAQS DV is then calculated by averaging the annual 98th percentiles using equation 4 of this appendix: $P_{0.98,y}$

Equation 4

$$\overline{P}_{0.98} = \frac{1}{3}\sum_{y=1}^{3}P_{0.98,y}$$

Where:

$\bar{P}_{0.98}$ = the 24-hour $PM_{2.5}$ NAAQS DV; and

$P_{0.98,\ y}$ = the annual 98th percentile for year y

(c) The 24-hour $PM_{2.5}$ NAAQS DV is rounded according to the conventions in section 4.3 of this appendix before a comparison with the level of the primary and secondary 24-hour NAAQS are made.

[78 FR 3277, Jan. 15, 2013]

APPENDIX O TO PART 50—REFERENCE METHOD FOR THE DETERMINATION OF COARSE PARTICULATE MATTER AS $PM_{10-2.5}$ IN THE ATMOSPHERE

1.0 Applicability and Definition

1.1 This method provides for the measurement of the mass concentration of coarse particulate matter ($PM_{10-2.5}$) in ambient air over a 24-hour period. In conjunction with additional analysis, this method may be used to develop speciated data.

1.2 For the purpose of this method, $PM_{10-2.5}$ is defined as particulate matter having an aerodynamic diameter in the nominal range of 2.5 to 10 micrometers, inclusive.

1.3 For this reference method, $PM_{10-2.5}$ concentrations shall be measured as the arithmetic difference between separate but concurrent, collocated measurements of PM_{10} and $PM_{2.5}$, where the PM_{10} measurements are obtained with a specially approved sampler, identified as a "PM_{10c} sampler," that meets more demanding performance requirements than conventional PM_{10} samplers described in appendix J of this part. Measurements obtained with a PM_{10c} sampler are identified as "PM_{10c} measurements" to distinguish them from conventional PM_{10} measurements obtained with conventional PM_{10} samplers. Thus, $PM_{10-2.5} = PM_{10c} - PM_{2.5}$.

1.4 The PM_{10c} and $PM_{2.5}$ gravimetric measurement processes are considered to be nondestructive, and the PM_{10c} and $PM_{2.5}$ samples obtained in the $PM_{10-2.5}$ measurement process can be subjected to subsequent physical or chemical analyses.

1.5 Quality assessment procedures are provided in part 58, appendix A of this chapter. The quality assurance procedures and guidance provided in reference 1 in section 13 of this appendix, although written specifically for $PM_{2.5}$, are generally applicable for PM_{10c}, and, hence, $PM_{10-2.5}$ measurements under this method, as well.

1.6 A method based on specific model PM_{10c} and $PM_{2.5}$ samplers will be considered a reference method for purposes of part 58 of this chapter only if:

(a) The PM_{10c} and $PM_{2.5}$ samplers and the associated operational procedures meet the requirements specified in this appendix and all applicable requirements in part 53 of this chapter, and

(b) The method based on the specific samplers and associated operational procedures have been designated as a reference method in accordance with part 53 of this chapter.

1.7 $PM_{10-2.5}$ methods based on samplers that meet nearly all specifications set forth in this method but have one or more significant but minor deviations or modifications from those specifications may be designated as "Class I" equivalent methods for $PM_{10-2.5}$ in accordance with part 53 of this chapter.

1.8 $PM_{2.5}$ measurements obtained incidental to the $PM_{10-2.5}$ measurements by this method shall be considered to have been obtained with a reference method for $PM_{2.5}$ in accordance with appendix L of this part.

1.9 PM_{10c} measurements obtained incidental to the $PM_{10-2.5}$ measurements by this method shall be considered to have been obtained with a reference method for PM_{10} in accordance with appendix J of this part, provided that:

(a) The PM_{10c} measurements are adjusted to EPA reference conditions (25 °C and 760 millimeters of mercury), and

(b) Such PM_{10c} measurements are appropriately identified to differentiate them from PM_{10} measurements obtained with other (conventional) methods for PM_{10} designated in accordance with part 53 of this chapter as reference or equivalent methods for PM_{10}.

2.0 Principle

2.1 Separate, collocated, electrically powered air samplers for PM_{10c} and $PM_{2.5}$ concurrently draw ambient air at identical, constant volumetric flow rates into specially shaped inlets and through one or more inertial particle size separators where the suspended particulate matter in the PM_{10} or $PM_{2.5}$ size range, as applicable, is separated for collection on a polytetrafluoroethylene (PTFE) filter over the specified sampling period. The air samplers and other aspects of this $PM_{10-2.5}$ reference method are specified either explicitly in this appendix or by reference to other applicable regulations or quality assurance guidance.

2.2 Each PM_{10c} and $PM_{2.5}$ sample collection filter is weighed (after moisture and temperature conditioning) before and after sample collection to determine the net weight (mass) gain due to collected PM_{10c} or $PM_{2.5}$. The total volume of air sampled by each sampler is determined by the sampler from the measured flow rate at local ambient temperature and pressure and the sampling time. The mass concentrations of both PM_{10c} and $PM_{2.5}$ in the ambient air are computed as the total mass of collected particles in the PM_{10} or $PM_{2.5}$ size range, as appropriate, divided by the total volume of air sampled by the respective samplers, and expressed in micrograms per cubic meter ($\mu g/m^3$)at local temperature and pressure conditions. The mass concentration of $PM_{10-2.5}$ is determined as the PM_{10c} concentration value less the corresponding, concurrently measured $PM_{2.5}$ concentration value.

2.3 Most requirements for $PM_{10-2.5}$ reference methods are similar or identical to the requirements for $PM_{2.5}$ reference methods as set forth in appendix L to this part. To insure uniformity, applicable appendix L

AMEND: 340-202-0070

RULE TITLE: Ambient Air Quality Standards: Sulfur Dioxide

NOTICE FILED DATE: 06/12/2025

RULE SUMMARY: Modifies SO2 concentration threshold and units and removes statistics to match federal SO2 NAAQS promulgated Dec 27, 2004.

RULE TEXT:

Concentrations of sulfur dioxide in ambient air as measured by an approved method for each averaging time must not exceed the following concentrations:

(1) Annual average: 10 ppb as a three-year average of annual arithmetic means for any calendar year at any monitoring site as determined by appendix T of 40 C.F.R. part 50, and as measured by the reference method described in appendix A-1 of 40 C.F.R. part 50 or as measured by an equivalent method designated in accordance with 40 C.F.R. part 53.

(2) 1-hour average: 75 ppb as a three-year average of the annual 99th percentile of the daily maximum 1-hour average concentrations recorded at any monitoring site as determined by appendix T of 40 C.F.R. part 50, and as measured by a reference method based on appendix A-1 of 40 C.F.R. part 50, or as measured by an equivalent method designated in accordance with 40 C.F.R. part 53.

NOTE: This rule is included in the State of Oregon Clean Air Act Implementation Plan that EQC adopted under OAR 340-200-0040.

NOTE: View a PDF of referenced EPA Methods by clicking on "Tables" link below.

STATUTORY/OTHER AUTHORITY: ORS 468.020, 468A

STATUTES/OTHER IMPLEMENTED: ORS 468A.025, 468A.035

State of Oregon Department of Environmental Quality

OAR 340-202-0070

EPA Reference Methods

Appendix A-1 to Part 50 - Reference Measurement Principle and Calibration Procedure for the Measurement of Sulfur Dioxide in the Atmosphere (Ultraviolet Fluorescence Method)

1.0 APPLICABILITY

1.1 This ultraviolet fluorescence (UVF) method provides a measurement of the concentration of sulfur dioxide (SO_2) in ambient air for determining compliance with the national primary and secondary ambient air quality standards for sulfur oxides (sulfur dioxide) as specified in § 50.4, § 50.5, and § 50.17 of this chapter. The method is applicable to the measurement of ambient SO_2 concentrations using continuous (real-time) sampling. Additional quality assurance procedures and guidance are provided in part 58, appendix A, of this chapter and in Reference 3.

2.0 PRINCIPLE

2.1 This reference method is based on automated measurement of the intensity of the characteristic fluorescence released by SO_2 in an ambient air sample contained in a measurement cell of an analyzer when the air sample is irradiated by ultraviolet (UV) light passed through the cell. The fluorescent light released by the SO_2 is also in the ultraviolet region, but at longer wavelengths than the excitation light. Typically, optimum instrumental measurement of SO_2 concentrations is obtained with an excitation wavelength in a band between approximately 190 to 230 nm, and measurement of the SO_2 fluorescence in a broad band around 320 nm, but these wavelengths are not necessarily constraints of this reference method. Generally, the measurement system (analyzer) also requires means to reduce the effects of aromatic hydrocarbon species, and possibly other compounds, in the air sample to control measurement interferences from these compounds, which may be present in the ambient air. References 1 and 2 describe UVF method.

2.2 The measurement system is calibrated by referencing the instrumental fluorescence measurements to SO_2 standard concentrations traceable to a National Institute of Standards and Technology (NIST) primary standard for SO_2 (*see* Calibration Procedure below).

2.3 An analyzer implementing this measurement principle is shown schematically in Figure 1. Designs should include a measurement cell, a UV light source of appropriate wavelength, a UV detector system with appropriate wave length sensitivity, a pump and flow control system for sampling the ambient air and moving it into the measurement cell, sample air conditioning components as necessary to minimize measurement interferences, suitable control and measurement processing capability, and other apparatus as may be necessary. The analyzer must be designed to provide accurate, repeatable, and continuous measurements of SO_2 concentrations in ambient air, with measurement performance as specified in Subpart B of Part 53 of this chapter.

2.4 *Sampling considerations:* The use of a particle filter on the sample inlet line of a UVF SO_2 analyzer is required to prevent interference, malfunction, or damage due to particles in the sampled air.

3.0 INTERFERENCES

3.1 The effects of the principal potential interferences may need to be mitigated to meet the interference equivalent requirements of part 53 of this chapter. Aromatic hydrocarbons such as xylene and naphthalene can fluoresce and act as strong positive interferences. These gases can be removed by using a permeation type scrubber (hydrocarbon “kicker”). Nitrogen oxide (NO) in high concentrations can also fluoresce and cause positive interference. Optical filtering can be employed to improve the rejection of interference from high NO. Ozone can absorb UV light given off by the SO_2 molecule and cause a measurement offset. This effect can be reduced by minimizing the measurement path length between the area where SO_2 fluorescence occurs and the photomultiplier tube detector (e.g., <5 cm). A hydrocarbon scrubber, optical filter and appropriate distancing of the measurement path length may be required method components to reduce interference.

4.0 CALIBRATION PROCEDURE

Atmospheres containing accurately known concentrations of sulfur dioxide are prepared using a compressed gas transfer standard diluted with accurately metered clean air flow rates.

4.1 *Apparatus:* Figure 2 shows a typical generic system suitable for diluting a SO_2 gas cylinder concentration standard with clean air through a mixing chamber to produce the desired calibration concentration standards. A valve may be used to conveniently divert the SO_2 from the sampling manifold to provide clean zero air at the output manifold for zero adjustment. The system may be made up using common laboratory components, or it may be a commercially manufactured system. In either case, the principle components are as follows:

4.1.1 SO_2 standard gas flow control and measurement devices (or a combined device) capable of regulating and maintaining the standard gas flow rate constant to within ±2 percent and measuring the gas flow rate accurate to within ±2, properly calibrated to a NIST-traceable standard.

4.1.2 Dilution air flow control and measurement devices (or a combined device) capable of regulating and maintaining the air flow rate constant to within ±2 percent and measuring the air flow rate accurate to within ±2, properly calibrated to a NIST-traceable standard.

4.1.3 Mixing chamber, of an inert material such as glass and of proper design to provide thorough mixing of pollutant gas and diluent air streams.

4.1.4 Sampling manifold, constructed of glass, polytetrafluoroethylene (PTFE Teflon TM), or other suitably inert material and of sufficient diameter to insure a minimum pressure drop at the analyzer connection, with a vent designed to insure a minimum over-pressure (relative to ambient air pressure) at the analyzer connection and to prevent ambient air from entering the manifold.

4.1.5 Standard gas pressure regulator, of clean stainless steel with a stainless steel diaphragm, suitable for use with a high pressure SO_2 gas cylinder.

4.1.6 Reagents

4.1.6.1 SO_2 gas concentration transfer standard having a certified SO_2 concentration of not less than 10 ppm, in N_2, traceable to a NIST Standard Reference Material (SRM).

4.1.6.2 Clean zero air, free of contaminants that could cause a detectable response or a change in sensitivity of the analyzer. Since ultraviolet fluorescence analyzers may be sensitive to aromatic hydrocarbons and O_2-to-N_2 ratios, it is important that the clean zero air contains less than 0.1 ppm aromatic hydrocarbons and O_2 and N_2 percentages approximately the same as in ambient air. A procedure for generating zero air is given in reference 1.

4.2 Procedure

4.2.1 Obtain a suitable calibration apparatus, such as the one shown schematically in Figure 1, and verify that all materials in contact with the pollutant are of glass, Teflon TM, or other suitably inert material and completely clean.

4.2.2 Purge the SO_2 standard gas lines and pressure regulator to remove any residual air.

4.2.3 Ensure that there are no leaks in the system and that the flow measuring devices are properly and accurately calibrated under the conditions of use against a reliable volume or flow rate standard such as a soap-bubble meter or a wet-test meter traceable to a NIST standard. All volumetric flow rates should be corrected to the same reference temperature and pressure by using the formula below:

$$F_c = F_m \frac{298.15 P_m}{760(T_m + 273.15)}$$

Where:
F_c = corrected flow rate (L/min at 25 °C and 760 mm Hg),
F_m = measured flow rate, (at temperature, T_m and pressure, P_m),

Pm = measured pressure in mm Hg, (absolute), and
Tm = measured temperature in degrees Celsius.

4.2.4 Allow the SO_2 analyzer under calibration to sample zero air until a stable response is obtained, then make the proper zero adjustment.

4.2.5 Adjust the airflow to provide an SO_2 concentration of approximately 80 percent of the upper measurement range limit of the SO_2 instrument and verify that the total air flow of the calibration system exceeds the demand of all analyzers sampling from the output manifold (with the excess vented).

4.2.6 Calculate the actual SO_2 calibration concentration standard as:

$$[SO_2] = C\frac{F_p}{F_t}$$

Where:
C = the concentration of the SO_2 gas standard
Fp = the flow rate of SO_2 gas standard
Ft = the total air flow rate of pollutant and diluent gases

4.2.7 When the analyzer response has stabilized, adjust the SO_2 span control to obtain the desired response equivalent to the calculated standard concentration. If substantial adjustment of the span control is needed, it may be necessary to re-check the zero and span adjustments by repeating steps 4.2.4 through 4.2.7 until no further adjustments are needed.

4.2.8 Adjust the flow rate(s) to provide several other SO_2 calibration concentrations over the analyzer's measurement range. At least five different concentrations evenly spaced throughout the analyzer's range are suggested.

4.2.9 Plot the analyzer response (vertical or Y-axis) versus SO_2 concentration (horizontal or X-axis). Compute the linear regression slope and intercept and plot the regression line to verify that no point deviates from this line by more than 2 percent of the maximum concentration tested.

NOTE:
Additional information on calibration and pollutant standards is provided in Section 12 of Reference 3.

5.0 FREQUENCY OF CALIBRATION

The frequency of calibration, as well as the number of points necessary to establish the calibration curve and the frequency of other performance checking will vary by analyzer; however, the minimum frequency, acceptance criteria, and subsequent actions are specified in Reference 3, Appendix D: Measurement Quality Objectives and Validation Template for SO_2 (page 9 of 30). The user's quality control program should provide guidelines for initial establishment of these variables and for subsequent alteration as operational experience is accumulated. Manufacturers of analyzers should include in their instruction/operation manuals information and guidance as to these variables and on other matters of operation, calibration, routine maintenance, and quality control.

6.0 REFERENCES FOR SO_2 METHOD

1. H. Okabe, P. L. Splitstone, and J. J. Ball, “Ambient and Source SO_2 Detector Based on a Fluorescence Method”, *Journal of the Air Control Pollution Association,* vol. 23, p. 514-516 (1973).
2. F. P. Schwarz, H. Okabe, and J. K. Whittaker, “Fluorescence Detection of Sulfur Dioxide in Air at the Parts per Billion Level,” *Analytical Chemistry,* vol. 46, pp. 1024-1028 (1974).
3. *QA Handbook for Air Pollution Measurement Systems - Volume II. Ambient Air Quality Monitoring Programs.* U.S.

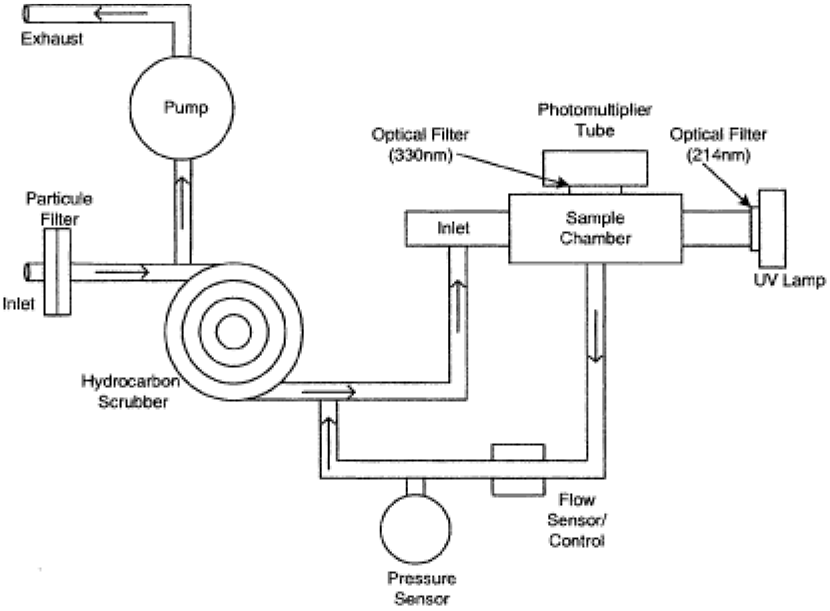

Figure 1. UVF SO_2 analyzer schematic diagram.

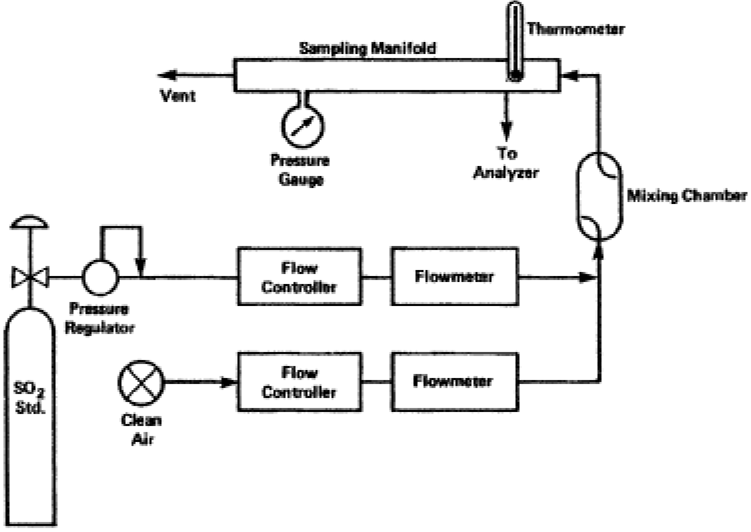

Figure 2. Calibration system using a compressed gas standard.

[75 FR 35593, June 22, 2010]

Appendix A-2 to Part 50 - Reference Method for the Determination of Sulfur Dioxide in the Atmosphere (Pararosaniline Method)

1.0 Applicability.

1.1 This method provides a measurement of the concentration of sulfur dioxide (SO2) in ambient air for determining compliance with the primary and secondary national ambient air quality standards for sulfur oxides (sulfur dioxide) as specified in § 50.4 and § 50.5 of this chapter. The method is applicable to the measurement of ambient SO2 concentrations using sampling periods ranging from 30 minutes to 24 hours. Additional quality assurance procedures and guidance are provided in part 58, appendixes A and B, of this chapter and in references 1 and 2.

2.0 Principle.

2.1 A measured volume of air is bubbled through a solution of 0.04 M potassium tetrachloromercurate (TCM). The SO2 present in the air stream reacts with the TCM solution to form a stable monochlorosulfonatomercurate(3) complex. Once formed, this complex resists air oxidation(4, 5) and is stable in the presence of strong oxidants such as ozone and oxides of nitrogen. During subsequent analysis, the complex is reacted with acid-bleached pararosaniline dye and formaldehyde to form an intensely colored pararosaniline methyl sulfonic acid.

(6) The optical density of this species is determined spectrophotometrically at 548 nm and is directly related to the amount of SO2 collected. The total volume of air sampled, corrected to EPA reference conditions (25 °C, 760 mm Hg [101 kPa]), is determined from the measured flow rate and the sampling time. The concentration of SO2 in the ambient air is computed and expressed in micrograms per standard cubic meter (µg/std m 3).

3.0 Range.

3.1 The lower limit of detection of SO2 in 10 mL of TCM is 0.75 µg (based on collaborative test results).(7) This represents a concentration of 25 µg SO2/m 3 (0.01 ppm) in an air sample of 30 standard liters (short-term sampling) and a concentration of 13 µg SO2/m 3 (0.005 ppm) in an air sample of 288 standard liters (long-term sampling). Concentrations less than 25 µg SO2/m 3 can be measured by sampling larger volumes of ambient air; however, the collection efficiency falls off rapidly at low concentrations.(8, 9) Beer's law is adhered to up to 34 µg of SO2 in 25 mL of final solution. This upper limit of the analysis range represents a concentration of 1,130 µg SO2/m 3 (0.43 ppm) in an air sample of 30 standard liters and a concentration of 590 µg SO2/m 3 (0.23 ppm) in an air sample of 288 standard liters. Higher concentrations can be measured by collecting a smaller volume of air, by increasing the volume of absorbing solution, or by diluting a suitable portion of the collected sample with absorbing solution prior to analysis.

4.0 Interferences.

4.1 The effects of the principal potential interferences have been minimized or eliminated in the following manner: Nitrogen oxides by the addition of sulfamic acid,(10, 11) heavy metals by the addition of ethylenediamine tetracetic acid disodium salt (EDTA) and phosphoric acid,(10, 12) and ozone by time delay.(10) Up to 60 µg Fe (III), 22 µg V (V), 10 µg Cu (II), 10 µg Mn (II), and 10 µg Cr (III) in 10 mL absorbing reagent can be tolerated in the procedure.(10) No significant interference has been encountered with 2.3 µg NH3.(13)

5.0 Precision and Accuracy.

5.1 The precision of the analysis is 4.6 percent (at the 95 percent confidence level) based on the analysis of standard sulfite samples.(10)

5.2 Collaborative test results (14) based on the analysis of synthetic test atmospheres (SO2 in scrubbed air) using the 24-hour sampling procedure and the sulfite-TCM calibration procedure show that:

- The replication error varies linearly with concentration from ±2.5 µg/m 3 at concentrations of 100 µg/m 3 to ±7 µg/m 3 at concentrations of 400 µg/m 3.

- The day-to-day variability within an individual laboratory (repeatability) varies linearly with concentration from ±18.1 µg/m 3 at levels of 100 µg/m 3 to ±50.9 µg/m 3 at levels of 400 µg/m 3.

- The day-to-day variability between two or more laboratories (reproducibility) varies linearly with concentration from ±36.9 µg/m 3 at levels of 100 µg/m 3 to ±103.5 µ g/m 3 at levels of 400 µg/m 3.

- The method has a concentration-dependent bias, which becomes significant at the 95 percent confidence level at the high concentration level. Observed values tend to be lower than the expected SO2 concentration level.

6.0 Stability.

6.1 By sampling in a controlled temperature environment of 15° ±10 °C, greater than 98.9 percent of the SO2-TCM complex is retained at the completion of sampling. (15) If kept at 5 °C following the completion of sampling, the collected sample has been found to be stable for up to 30 days. (10) The presence of EDTA enhances the stability of SO2 in the TCM solution and the rate of decay is independent of the concentration of SO2. (16)

7.0 Apparatus.

7.1 Sampling.

7.1.1 Sample probe: A sample probe meeting the requirements of section 7 of 40 CFR part 58, appendix E (Teflon ® or glass with residence time less than 20 sec.) is used to transport ambient air to the sampling train location. The end of the probe should be designed or oriented to preclude the sampling of precipitation, large particles, etc. A suitable probe can be constructed from Teflon ® tubing connected to an inverted funnel.

7.1.2 Absorber - short-term sampling: An all glass midget impinger having a solution capacity of 30 mL and a stem clearance of 4 ±1 mm from the bottom of the vessel is used for sampling periods of 30 minutes and 1 hour (or any period considerably less than 24 hours). Such an impinger is shown in Figure 1. These impingers are commercially available from distributors such as Ace Glass, Incorporated.

7.1.3 Absorber - 24-hour sampling: A polypropylene tube 32 mm in diameter and 164 mm long (available from Bel Art Products, Pequammock, NJ) is used as the absorber. The cap of the absorber must be a polypropylene cap with two ports (rubber stoppers are unacceptable because the absorbing reagent can react with the stopper to yield erroneously high SO2 concentrations). A glass impinger stem, 6 mm in diameter and 158 mm long, is inserted into one port of the absorber cap. The tip of the stem is tapered to a small diameter orifice (0.4 ±0.1 mm) such that a No. 79 jeweler's drill bit will pass through the opening but a No. 78 drill bit will not. Clearance from the bottom of the absorber to the tip of the stem must be 6 ±2 mm. Glass stems can be fabricated by any reputable glass blower or can be obtained from a scientific supply firm. Upon receipt, the orifice test should be performed to verify the orifice size. The 50 mL volume level should be permanently marked on the absorber. The assembled absorber is shown in Figure 2.

7.1.4 Moisture trap: A moisture trap constructed of a glass trap as shown in Figure 1 or a polypropylene tube as shown in Figure 2 is placed between the absorber tube and flow control device to prevent entrained liquid from reaching the flow control device. The tube is packed with indicating silica gel as shown in Figure 2. Glass wool may be substituted for silica gel when collecting short-term samples (1 hour or less) as shown in Figure 1, or for long term (24 hour) samples if flow changes are not routinely encountered.

7.1.5 Cap seals: The absorber and moisture trap caps must seal securely to prevent leaks during use. Heat-shrink material as shown in Figure 2 can be used to retain the cap seals if there is any chance of the caps coming loose during sampling, shipment, or storage.

7.1.6 Flow control device: A calibrated rotameter and needle valve combination capable of maintaining and measuring air flow to within ±2 percent is suitable for short-term sampling but may not be used for long-term sampling. A critical orifice can be used for regulating flow rate for both long-term and short-term sampling. A 22-gauge hypodermic needle 25 mm long may be used as a critical orifice to yield a flow rate of approximately 1 L/min for a 30-minute sampling period. When sampling for 1 hour, a 23-gauge hypodermic needle 16 mm in length will provide a flow rate of approximately 0.5 L/min. Flow control for a 24-hour sample may be provided by a 27-gauge hypodermic needle critical orifice that is 9.5 mm in length. The flow rate should be in the range of 0.18 to 0.22 L/min.

7.1.7 Flow measurement device: Device calibrated as specified in 9.4.1 and used to measure sample flow rate at the monitoring site.

7.1.8 Membrane particle filter: A membrane filter of 0.8 to 2 µm porosity is used to protect the flow controller from particles during long-term sampling. This item is optional for short-term sampling.

7.1.9 Vacuum pump: A vacuum pump equipped with a vacuum gauge and capable of maintaining at least 70 kPa (0.7 atm) vacuum differential across the flow control device at the specified flow rate is required for sampling.

7.1.10 Temperature control device: The temperature of the absorbing solution during sampling must be maintained at 15° ±10 °C. As soon as possible following sampling and until analysis, the temperature of the collected sample must be maintained at 5° ±5 °C. Where an extended period of time may elapse before the collected sample can be moved to the lower storage temperature, a collection temperature near the lower limit of the 15 ±10 °C range should be used to minimize losses during this period. Thermoelectric coolers specifically designed for this temperature control are available commercially and normally operate in the range of 5° to 15 °C. Small refrigerators can be modified to provide the required temperature control; however, inlet lines must be insulated from the lower temperatures to prevent condensation when sampling under humid conditions. A small heating pad may be necessary when sampling at low temperatures (<7 °C) to prevent the absorbing solution from freezing.(17)

7.1.11 Sampling train container: The absorbing solution must be shielded from light during and after sampling. Most commercially available sampler trains are enclosed in a light-proof box.

7.1.12 Timer: A timer is recommended to initiate and to stop sampling for the 24-hour period. The timer is not a required piece of equipment; however, without the timer a technician would be required to start and stop the sampling manually. An elapsed time meter is also recommended to determine the duration of the sampling period.

7.2 Shipping.

7.2.1 Shipping container: A shipping container that can maintain a temperature of 5° ±5 °C is used for transporting the sample from the collection site to the analytical laboratory. Ice coolers or refrigerated shipping containers have been found to be satisfactory. The use of eutectic cold packs instead of ice will give a more stable temperature control. Such equipment is available from Cole-Parmer Company, 7425 North Oak Park Avenue, Chicago, IL 60648.

7.3 Analysis.

7.3.1 Spectrophotometer: A spectrophotometer suitable for measurement of absorbances at 548 nm with an effective spectral bandwidth of less than 15 nm is required for analysis. If the spectrophotometer reads out in transmittance, convert to absorbance as follows:

$$A = \log_{10}(1/T) \qquad (1)$$

where:

A = absorbance, and

T = transmittance ($0 < \geq T < 1$).

A standard wavelength filter traceable to the National Bureau of Standards is used to verify the wavelength calibration according to the procedure enclosed with the filter. The wavelength calibration must be verified upon initial receipt of the instrument and after each 160 hours of normal use or every 6 months, whichever occurs first.

7.3.2 Spectrophotometer cells: A set of 1-cm path length cells suitable for use in the visible region is used during analysis. If the cells are unmatched, a matching correction factor must be determined according to Section 10.1.

7.3.3 Temperature control device: The color development step during analysis must be conducted in an environment that is in the range of 20° to 30 °C and controlled to ±1 °C. Both calibration and sample analysis must be performed under identical conditions (within 1 °C). Adequate temperature control may be obtained by means of constant temperature baths, water baths with manual temperature control, or temperature controlled rooms.

7.3.4 Glassware: Class A volumetric glassware of various capacities is required for preparing and standardizing reagents and standards and for dispensing solutions during analysis. These included pipets, volumetric flasks, and burets.

7.3.5 TCM waste receptacle: A glass waste receptacle is required for the storage of spent TCM solution. This vessel should be stoppered and stored in a hood at all times.

8.0 Reagents.

8.1 Sampling.

8.1.1 Distilled water: Purity of distilled water must be verified by the following procedure:(18)

- Place 0.20 mL of potassium permanganate solution (0.316 g/L), 500 mL of distilled water, and 1mL of concentrated sulfuric acid in a chemically resistant glass bottle, stopper the bottle, and allow to stand.

- If the permanganate color (pink) does not disappear completely after a period of 1 hour at room temperature, the water is suitable for use.

- If the permanganate color does disappear, the water can be purified by redistilling with one crystal each of barium hydroxide and potassium permanganate in an all glass still.

8.1.2 Absorbing reagent (0.04 M potassium tetrachloromercurate [TCM]): Dissolve 10.86 g mercuric chloride, 0.066 g EDTA, and 6.0 g potassium chloride in distilled water and dilute to volume with distilled water in a 1,000-mL volumetric flask. (Caution: Mercuric chloride is highly poisonous. If spilled on skin, flush with water immediately.) The pH of this reagent should be between 3.0 and 5.0 (10) Check the pH of the absorbing solution by using pH indicating paper or a pH meter. If the pH of the solution is not between 3.0 and 5.0, dispose of the solution according to one of the disposal techniques described in Section 13.0. The absorbing reagent is normally stable for 6 months. If a precipitate forms, dispose of the reagent according to one of the procedures described in Section 13.0.

8.2 Analysis.

8.2.1 Sulfamic acid (0.6%): Dissolve 0.6 g sulfamic acid in 100 mL distilled water. Perpare fresh daily.

8.2.2 Formaldehyde (0.2%): Dilute 5 mL formaldehyde solution (36 to 38 percent) to 1,000 mL with distilled water. Prepare fresh daily.

8.2.3 Stock iodine solution (0.1 N): Place 12.7 g resublimed iodine in a 250-mL beaker and add 40 g potassium iodide and 25 mL water. Stir until dissolved, transfer to a 1,000 mL volumetric flask and dilute to volume with distilled water.

8.2.4 Iodine solution (0.01 N): Prepare approximately 0.01 N iodine solution by diluting 50 mL of stock iodine solution (Section 8.2.3) to 500 mL with distilled water.

8.2.5 Starch indicator solution: Triturate 0.4 g soluble starch and 0.002 g mercuric iodide (preservative) with enough distilled water to form a paste. Add the paste slowly to 200 mL of boiling distilled water and continue boiling until clear. Cool and transfer the solution to a glass stopperd bottle.

8.2.6 1 N hydrochloric acid: Slowly and while stirring, add 86 mL of concentrated hydrochloric acid to 500 mL of distilled water. Allow to cool and dilute to 1,000 mL with distilled water.

8.2.7 Potassium iodate solution: Accurately weigh to the nearest 0.1 mg, 1.5 g (record weight) of primary standard grade potassium iodate that has been previously dried at 180 °C for at least 3 hours and cooled in a dessicator. Dissolve, then dilute to volume in a 500-mL volumetric flask with distilled water.

8.2.8 Stock sodium thiosulfate solution (0.1 N): Prepare a stock solution by dissolving 25 g sodium thiosulfate ($Na2\ S2\ O3 \div 5H2\ O$) in 1,000 mL freshly boiled, cooled, distilled water and adding 0.1 g sodium carbonate to the solution. Allow the solution to stand at least 1 day before standardizing. To standardize, accurately pipet 50 mL of potassium iodate solution (Section 8.2.7) into a 500-mL iodine flask and add 2.0 g of potassium iodide and 10 mL of 1 N HCl. Stopper the flask and allow to stand for 5 minutes. Titrate the solution with stock sodium thiosulfate solution (Section 8.2.8) to a pale yellow color. Add 5 mL of starch solution (Section 8.2.5) and titrate until the blue color just disappears. Calculate the normality (Ns) of the stock sodium thiosulfate solution as follows:

$$N_S = \frac{W}{M} \times 2.80 \qquad (2)$$

where:

M = volume of thiosulfate required in mL, and

W = weight of potassium iodate in g (recorded weight in Section 8.2.7).

$$2.80 = \frac{10^3 \,(\mathit{conversion\ of\ g\ to\ mg}) \times 0.1 (\mathit{fraction\ iodate\ used})}{35.67 \,(\mathit{equivalent\ weight\ of\ potassiumiodate})}$$

8.2.9 Working sodium thiosulfate titrant (0.01 N): Accurately pipet 100 mL of stock sodium thiosulfate solution (Section 8.2.8) into a 1,000-mL volumetric flask and dilute to volume with freshly boiled, cooled, distilled water. Calculate the normality of the working sodium thiosulfate titrant (NT) as follows:

$$N_T = N_S \times 0.100 \qquad (3)$$

8.2.10 Standardized sulfite solution for the preparation of working sulfite-TCM solution: Dissolve 0.30 g sodium metabisulfite (Na2 S2 O5) or 0.40 g sodium sulfite (Na2 SO3) in 500 mL of recently boiled, cooled, distilled water. (Sulfite solution is unstable; it is therefore important to use water of the highest purity to minimize this instability.) This solution contains the equivalent of 320 to 400 µg SO2/mL. The actual concentration of the solution is determined by adding excess iodine and back-titrating with standard sodium thiosulfate solution. To back-titrate, pipet 50 mL of the 0.01 N iodine solution (Section 8.2.4) into each of two 500-mL iodine flasks (A and B). To flask A (blank) add 25 mL distilled water, and to flask B (sample) pipet 25 mL sulfite solution. Stopper the flasks and allow to stand for 5 minutes. Prepare the working sulfite-TCM solution (Section 8.2.11) immediately prior to adding the iodine solution to the flasks. Using a buret containing standardized 0.01 N thiosulfate titrant (Section 8.2.9), titrate the solution in each flask to a pale yellow color. Then add 5 mL starch solution (Section 8.2.5) and continue the titration until the blue color just disappears.

8.2.11 Working sulfite-TCM solution: Accurately pipet 5 mL of the standard sulfite solution (Section 8.2.10) into a 250-mL volumetric flask and dilute to volume with 0.04 M TCM. Calculate the concentration of sulfur dioxide in the working solution as follows:

$$C_{TCM/SO2}\left(\mu g\, SO_2/mL\right) = \frac{(A-B)\left(N_T\right)(32,000)}{25} \times 0.02 \qquad (4)$$

where:

A = volume of thiosulfate titrant required for the blank, mL;

B = volume of thiosulfate titrant required for the sample, mL;

NT = normality of the thiosulfate titrant, from equation (3);

32,000 = milliequivalent weight of SO2, µg;

25 = volume of standard sulfite solution, mL; and

0.02 = dilution factor.

This solution is stable for 30 days if kept at 5 °C. (16) If not kept at 5 °C, prepare fresh daily.

8.2.12 Purified pararosaniline (PRA) stock solution (0.2% nominal):

8.2.12.1 Dye specifications -

- The dye must have a maximum absorbance at a wavelength of 540 nm when assayed in a buffered solution of 0.1 M sodium acetate-acetic acid;

- The absorbance of the reagent blank, which is temperature sensitive (0.015 absorbance unit/ °C), must not exceed 0.170 at 22 °C with a 1-cm optical path length when the blank is prepared according to the specified procedure;

- The calibration curve (Section 10.0) must have a slope equal to 0.030 ±0.002 absorbance unit/µg SO2 with a 1-cm optical path length when the dye is pure and the sulfite solution is properly standardized.

8.2.12.2 Preparation of stock PRA solution - A specially purified (99 to 100 percent pure) solution of pararosaniline, which meets the above specifications, is commercially available in the required 0.20 percent concentration (Harleco Co.). Alternatively, the dye may be purified, a stock solution prepared, and then assayed according to the procedure as described below.(10)

8.2.12.3 Purification procedure for PRA -

1. Place 100 mL each of 1-butanol and 1 N HCl in a large separatory funnel (250-mL) and allow to equilibrate. Note: Certain batches of 1-butanol contain oxidants that create an SO2 demand. Before using, check by placing 20 mL of 1-butanol and 5 mL of 20 percent potassium iodide (KI) solution in a 50-mL separatory funnel and shake thoroughly. If a yellow color appears in the alcohol phase, redistill the 1-butanol from silver oxide and collect the middle fraction or purchase a new supply of 1-butanol.

2. Weigh 100 mg of pararosaniline hydrochloride dye (PRA) in a small beaker. Add 50 mL of the equilibrated acid (drain in acid from the bottom of the separatory funnel in 1.) to the beaker and let stand for several minutes. Discard the remaining acid phase in the separatory funnel.

3. To a 125-mL separatory funnel, add 50 mL of the equilibrated 1-butanol (draw the 1-butanol from the top of the separatory funnel in 1.). Transfer the acid solution (from 2.) containing the dye to the funnel and shake carefully to extract. The violet impurity will transfer to the organic phase.

4. Transfer the lower aqueous phase into another separatory funnel, add 20 mL of equilibrated 1-butanol, and extract again.

5. Repeat the extraction procedure with three more 10-mL portions of equilibrated 1-butanol.

6. After the final extraction, filter the acid phase through a cotton plug into a 50-mL volumetric flask and bring to volume with 1 N HCl. This stock reagent will be a yellowish red.

7. To check the purity of the PRA, perform the assay and adjustment of concentration (Section 8.2.12.4) and prepare a reagent blank (Section 11.2); the absorbance of this reagent blank at 540 nm should be less than 0.170 at 22 °C. If the absorbance is greater than 0.170 under these conditions, further extractions should be performed.

8.2.12.4 PRA assay procedure - The concentration of pararosaniline hydrochloride (PRA) need be assayed only once after purification. It is also recommended that commercial solutions of pararosaniline be assayed when first purchased. The assay procedure is as follows:(10)

1. Prepare 1 M acetate-acetic acid buffer stock solution with a pH of 4.79 by dissolving 13.61 g of sodium acetate trihydrate in distilled water in a 100-mL volumetric flask. Add 5.70 mL of glacial acetic acid and dilute to volume with distilled water.

2. Pipet 1 mL of the stock PRA solution obtained from the purification process or from a commercial source into a 100-mL volumetric flask and dilute to volume with distilled water.

3. Transfer a 5-mL aliquot of the diluted PRA solution from 2. into a 50-mL volumetric flask. Add 5mL of 1 M acetate-acetic acid buffer solution from 1. and dilute the mixture to volume with distilled water. Let the mixture stand for 1 hour.

4. Measure the absorbance of the above solution at 540 nm with a spectrophotometer against a distilled water reference. Compute the percentage of nominal concentration of PRA by

$$\%PRA = \frac{A \times K}{W} \qquad (5)$$

where:

A = measured absorbance of the final mixture (absorbance units);

W = weight in grams of the PRA dye used in the assay to prepare 50 mL of stock solution (for example, 0.100 g of dye was used to prepare 50 mL of solution in the purification procedure; when obtained from commercial sources, use the stated concentration to compute W; for 98% PRA, W = .098 g.); and

K = 21.3 for spectrophotometers having a spectral bandwidth of less than 15 nm and a path length of 1 cm.

8.2.13 Pararosaniline reagent: To a 250-mL volumetric flask, add 20 mL of stock PRA solution. Add an additional 0.2 mL of stock solution for each percentage that the stock assays below 100 percent. Then add 25 mL of 3 M phosphoric acid and dilute to volume with distilled water. The reagent is stable for at least 9 months. Store away from heat and light.

9.0 Sampling Procedure.

9.1 General Considerations. Procedures are described for short-term sampling (30-minute and 1-hour) and for long-term sampling (24-hour). Different combinations of absorbing reagent volume, sampling rate, and sampling time can be selected to meet special needs. For combinations other than those specifically described, the conditions must be adjusted so that linearity is maintained between absorbance and concentration over the dynamic range. Absorbing reagent volumes less than 10 mL are not recommended. The collection efficiency is above 98 percent for the conditions described; however, the efficiency may be substantially lower when sampling concentrations below 25 μγSO2/m 3.(8,9)

9.2 30-Minute and 1-Hour Sampling. Place 10 mL of TCM absorbing reagent in a midget impinger and seal the impinger with a thin film of silicon stopcock grease (around the ground glass joint). Insert the sealed impinger into the sampling train as shown in Figure 1, making sure that all connections between the various components are leak tight. Greaseless ball joint fittings, heat shrinkable Teflon ® tubing, or Teflon ® tube fittings may be used to attain leakfree conditions for portions of the sampling train that come into contact with air containing SO2. Shield the absorbing reagent from direct sunlight by covering the impinger with aluminum foil or by enclosing the sampling train in a light-proof box. Determine the flow rate according to Section 9.4.2. Collect the sample at 1 ±0.10 L/min for 30-minute sampling or 0.500 ±0.05 L/min for 1-hour sampling. Record the exact sampling time in minutes, as the sample volume will later be determined using the sampling flow rate and the sampling time. Record the atmospheric pressure and temperature.

9.3 24-Hour Sampling. Place 50 mL of TCM absorbing solution in a large absorber, close the cap, and, if needed, apply the heat shrink material as shown in Figure 3. Verify that the reagent level is at the 50 mL mark on the absorber. Insert the sealed absorber into the sampling train as shown in Figure 2. At this time verify that the absorber temperature is controlled to 15 ±10 °C. During sampling, the absorber temperature must be controlled to prevent decomposition of the collected complex. From the onset of sampling until analysis, the absorbing solution must be protected from direct sunlight. Determine the flow rate according to Section 9.4.2. Collect the sample for 24 hours from midnight to midnight at a flow rate of 0.200 ±0.020 L/min. A start/stop timer is helpful for initiating and stopping sampling and an elapsed time meter will be useful for determining the sampling time.

9.4 Flow Measurement.

9.4.1 Calibration: Flow measuring devices used for the on-site flow measurements required in 9.4.2 must be calibrated against a reliable flow or volume standard such as an NBS traceable bubble flowmeter or calibrated wet test meter. Rotameters or critical orifices used in the sampling train may be calibrated, if desired, as a quality control check, but such calibration shall not replace the on-site flow measurements required by 9.4.2. In-line rotameters, if they are to be calibrated, should be calibrated in situ, with the appropriate volume of solution in the absorber.

9.4.2 Determination of flow rate at sampling site: For short-term samples, the standard flow rate is determined at the sampling site at the initiation and completion of sample collection with a calibrated flow measuring device connected to the inlet of the absorber. For 24-hour samples, the standard flow rate is determined at the time the absorber is placed in the sampling train and again when the absorber is removed from the train for shipment to the analytical laboratory with a calibrated flow measuring device connected to the inlet of the sampling train. The flow rate determination must be made with all components of the sampling system in operation (e.g., the absorber temperature controller and any sample box heaters must also be operating). Equation 6 may be used to determine the standard flow rate when a calibrated positive displacement meter is used as the flow measuring device. Other types of calibrated flow measuring devices may also be used to determine the flow rate at the sampling site provided that the user applies any appropriate corrections to devices for which output is dependent on temperature or pressure.

$$Q_{std} = Q_{act} \times \frac{P_b - (1 - RH)P_{H_2O}}{P_{std}} \times \frac{298.16.}{(T_{meter} + 273.16).} \qquad (6)$$

where:

Qstd = flow rate at standard conditions, std L/min (25 °C and 760 mm Hg);

Qact = flow rate at monitoring site conditions, L/min;

Pb = barometric pressure at monitoring site conditions, mm Hg or kPa;

RH = fractional relative humidity of the air being measured;

PH2O = vapor pressure of water at the temperature of the air in the flow or volume standard, in the same units as Pb, (for wet volume standards only, i.e., bubble flowmeter or wet test meter; for dry standards, i.e., dry test meter, PH2O = 0);

Pstd = standard barometric pressure, in the same units as Pb (760 mm Hg or 101 kPa); and

Tmeter = temperature of the air in the flow or volume standard, °C (e.g., bubble flowmeter).

If a barometer is not available, the following equation may be used to determine the barometric pressure:

$$P_b = 760 - .076(H)\, mm\, Hg, or\ P_b = 101 - .01(H)\, kPa \qquad (7)$$

where:

H = sampling site elevation above sea level in meters.

If the initial flow rate (Qi) differs from the flow rate of the critical orifice or the flow rate indicated by the flowmeter in the sampling train (Qc) by more than 5 percent as determined by equation (8), check for leaks and redetermine Qi.

$$\%\ Diff = \frac{Q_i - Q_c}{Q_c} \times 100 \qquad (8)$$

Invalidate the sample if the difference between the initial (Qi) and final (Qf) flow rates is more than 5 percent as determined by equation (9):

$$\%\ Diff = \frac{Q_i - Q_f}{Q_f} \times 100 \qquad (9)$$

9.5 Sample Storage and Shipment. Remove the impinger or absorber from the sampling train and stopper immediately. Verify that the temperature of the absorber is not above 25 °C. Mark the level of the solution with a temporary (e.g., grease pencil) mark. If the sample will not be analyzed within 12 hours of sampling, it must be stored at 5° ±5 °C until analysis. Analysis must occur within 30 days. If the sample is transported or shipped for a period exceeding 12 hours, it is recommended that thermal coolers using eutectic ice packs, refrigerated shipping containers, etc., be used for periods up to 48 hours. (17) Measure the temperature of the absorber solution when the shipment is received. Invalidate the sample if the temperature is above 10 °C. Store the sample at 5° ±5 °C until it is analyzed.

10.0 Analytical Calibration.

10.1 Spectrophotometer Cell Matching. If unmatched spectrophotometer cells are used, an absorbance correction factor must be determined as follows:

1. Fill all cells with distilled water and designate the one that has the lowest absorbance at 548 nm as the reference. (This reference cell should be marked as such and continually used for this purpose throughout all future analyses.)

2. Zero the spectrophotometer with the reference cell.

3. Determine the absorbance of the remaining cells (Ac) in relation to the reference cell and record these values for future use. Mark all cells in a manner that adequately identifies the correction.

The corrected absorbance during future analyses using each cell is determining as follows:

$$A = A_{obs} - A_c \qquad (10)$$

where:

A = corrected absorbance,

Aobs = uncorrected absorbance, and

Ac = cell correction.

10.2 Static Calibration Procedure (Option 1). Prepare a dilute working sulfite-TCM solution by diluting 10 mL of the working sulfite-TCM solution (Section 8.2.11) to 100 mL with TCM absorbing reagent. Following the table below, accurately pipet the indicated volumes of the sulfite-TCM solutions into a series of 25-mL volumetric flasks. Add TCM absorbing reagent as indicated to bring the volume in each flask to 10 mL.

Sulfite-TCM solution	Volume of sulfite-TCM solution	Volume of TCM, mL	Total µg SO2 (approx.*
Working	4.0	6.0	28.8
Working	3.0	7.0	21.6
Working	2.0	8.0	14.4

Dilute working	10.0	0.0	7.2
Dilute working	5.0	5.0	3.6
	0.0	10.0	0.0

*Based on working sulfite-TCM solution concentration of 7.2 µg SO2/mL; the actual total µg SO2 must be calculated using equation 11 below.

To each volumetric flask, add 1 mL 0.6% sulfamic acid (Section 8.2.1), accurately pipet 2 mL 0.2% formaldehyde solution (Section 8.2.2), then add 5 mL pararosaniline solution (Section 8.2.13). Start a laboratory timer that has been set for 30 minutes. Bring all flasks to volume with recently boiled and cooled distilled water and mix thoroughly. The color must be developed (during the 30-minute period) in a temperature environment in the range of 20° to 30 °C, which is controlled to ±1 °C. For increased precision, a constant temperature bath is recommended during the color development step. After 30 minutes, determine the corrected absorbance of each standard at 548 nm against a distilled water reference (Section 10.1). Denote this absorbance as (A). Distilled water is used in the reference cell rather than the reagant blank because of the temperature sensitivity of the reagent blank. Calculate the total micrograms SO2 in each solution:

$$\mu g\ SO_2 = V_{TCM/SO2} \times C_{TCM/SO2} \times D \qquad (11)$$

where:

VTCM/SO2 = volume of sulfite-TCM solution used, mL;

CTCM/SO2 = concentration of sulfur dioxide in the working sulfite-TCM, µg SO2/mL (from equation 4); and

D = dilution factor (D = 1 for the working sulfite-TCM solution; D = 0.1 for the diluted working sulfite-TCM solution).

A calibration equation is determined using the method of linear least squares (Section 12.1). The total micrograms SO2 contained in each solution is the x variable, and the corrected absorbance (eq. 10) associated with each solution is the y variable. For the calibration to be valid, the slope must be in the range of 0.030 ±0.002 absorbance unit/µg SO2, the intercept as determined by the least squares method must be equal to or less than 0.170 absorbance unit when the color is developed at 22 °C (add 0.015 to this 0.170 specification for each °C above 22 °C) and the correlation coefficient must be greater than 0.998. If these criteria are not met, it may be the result of an impure dye and/or an improperly standardized sulfite-TCM solution. A calibration factor (Bs) is determined by calculating the reciprocal of the slope and is subsequently used for calculating the sample concentration (Section 12.3).

10.3 Dynamic Calibration Procedures (Option 2). Atmospheres containing accurately known concentrations of sulfur dioxide are prepared using permeation devices. In the systems for generating these atmospheres, the permeation device emits gaseous SO2 at a known, low, constant rate, provided the temperature of the device is held constant (±0.1 °C) and the device has been accurately calibrated at the temperature of use. The SO2 permeating from the device is carried by a low flow of dry carrier gas to a mixing chamber where it is diluted with SO2-free air to the desired concentration and supplied to a vented manifold. A typical system is shown schematically in Figure 4 and this system and other similar systems have been described in detail by O'Keeffe and Ortman; (19) Scaringelli, Frey, and Saltzman, (20) and Scaringelli, O'Keeffe, Rosenberg, and Bell. (21) Permeation devices may be prepared or purchased and in both cases must be traceable either to a National Bureau of Standards (NBS) Standard Reference Material (SRM 1625, SRM 1626, SRM 1627) or to an NBS/EPA-approved commercially available Certified Reference Material (CRM). CRM's are described in Reference 22, and a list of CRM sources is available from the address shown for Reference 22. A recommended protocol for certifying a permeation device to an NBS SRM or CRM is given in Section 2.0.7 of Reference 2. Device permeation rates of 0.2 to 0.4 µg/min, inert gas flows of about 50 mL/min, and dilution air flow rates from 1.1 to 15 L/min conveniently yield standard atmospheres in the range of 25 to 600 µg SO2/m 3 (0.010 to 0.230 ppm).

10.3.1 Calibration Option 2A (30-minute and 1-hour samples): Generate a series of six standard atmospheres of SO2 (e.g., 0, 50, 100, 200, 350, 500, 750 µg/m 3) by adjusting the dilution flow rates appropriately. The concentration of SO2 in each atmosphere is calculated as follows:

$$C_a = \frac{P_r \times 10^3}{Q_d + Q_p} \qquad (12)$$

where:

Ca = concentration of SO2 at standard conditions, µg/m 3;

Pr = permeation rate, µg/min;

Qd = flow rate of dilution air, std L/min; and

Qp = flow rate of carrier gas across permeation device, std L/min.

Be sure that the total flow rate of the standard exceeds the flow demand of the sample train, with the excess flow vented at atmospheric pressure. Sample each atmosphere using similar apparatus as shown in Figure 1 and under the same conditions as field sampling (i.e., use same absorbing reagent volume and sample same volume of air at an equivalent flow rate). Due to the length of the sampling periods required, this method is not recommended for 24-hour sampling. At the completion of sampling, quantitatively transfer the contents of each impinger to one of a series of 25-mL volumetric flasks (if 10 mL of absorbing solution was used) using small amounts of distilled water for rinse (<5mL). If >10 mL of absorbing solution was used, bring the absorber solution in each impinger to orginal volume with distilled H2 O and pipet 10-mL portions from each impinger into a series of 25-mL volumetric flasks. If the color development steps are not to be started within 12 hours of sampling, store the solutions at 5° ±5 °C. Calculate the total micrograms SO2 in each solution as follows:

$$\mu g SO_2 = \frac{C_a \times Q_s \times t \times V_a \times 10^{-3}}{V_b} \qquad (13)$$

where:

Ca = concentration of SO2 in the standard atmosphere, µg/m 3;

Os = sampling flow rate, std L/min;

t = sampling time, min;

Va = volume of absorbing solution used for color development (10 mL); and

Vb = volume of absorbing solution used for sampling, mL.

Add the remaining reagents for color development in the same manner as in Section 10.2 for static solutions. Calculate a calibration equation and a calibration factor (Bg) according to Section 10.2, adhering to all the specified criteria.

10.3.2 Calibration Option 2B (24-hour samples): Generate a standard atmosphere containing approximately 1,050 µg SO2/m 3 and calculate the exact concentration according to equation 12. Set up a series of six absorbers according to Figure 2 and connect to a common manifold for sampling the standard atmosphere. Be sure that the total flow rate of the standard exceeds the flow demand at the sample manifold, with the excess flow vented at atmospheric pressure. The absorbers are then allowed to sample the atmosphere for varying time periods to yield solutions containing 0, 0.2, 0.6, 1.0, 1.4, 1.8, and 2.2 µg SO2/mL solution. The sampling times required to attain these solution concentrations are calculated as follows:

$$t = \frac{V_b \times C_s}{C_a \times Q_s \times 10^{-3}} \qquad (14)$$

where:

t = sampling time, min;

Vb = volume of absorbing solution used for sampling (50 mL);

Cs = desired concentration of SO2 in the absorbing solution, µg/mL;

Ca = concentration of the standard atmosphere calculated according to equation 12, µg/m 3; and

Qs = sampling flow rate, std L/min.

At the completion of sampling, bring the absorber solutions to original volume with distilled water. Pipet a 10-mL portion from each absorber into one of a series of 25-mL volumetric flasks. If the color development steps are not to be started within 12 hours of sampling, store the solutions at 5° ±5 °C. Add the remaining reagents for color development in the same manner as in Section 10.2 for static solutions. Calculate the total µg SO2 in each standard as follows:

$$\mu g SO_2 = \frac{C_a \times Q_s \times t \times V_a \times 10^{-3}}{V_b} \qquad (15)$$

where:

Va = volume of absorbing solution used for color development (10 mL).

All other parameters are defined in equation 14.

Calculate a calibration equation and a calibration factor (Bt) according to Section 10.2 adhering to all the specified criteria.

11.0 Sample Preparation and Analysis.

11.1 Sample Preparation. Remove the samples from the shipping container. If the shipment period exceeded 12 hours from the completion of sampling, verify that the temperature is below 10 °C. Also, compare the solution level to the temporary level mark on the absorber. If either the temperature is above 10 °C or there was significant loss (more than 10 mL) of the sample during shipping, make an appropriate notation in the record and invalidate the sample. Prepare the samples for analysis as follows:

1. For 30-minute or 1-hour samples: Quantitatively transfer the entire 10 mL amount of absorbing solution to a 25-mL volumetric flask and rinse with a small amount (<5 mL) of distilled water.

2. For 24-hour samples: If the volume of the sample is less than the original 50-mL volume (permanent mark on the absorber), adjust the volume back to the original volume with distilled water to compensate for water lost to evaporation during sampling. If the final volume is greater than the original volume, the volume must be measured using a graduated cylinder. To analyze, pipet 10 mL of the solution into a 25-mL volumetric flask.

11.2 Sample Analysis. For each set of determinations, prepare a reagent blank by adding 10 mL TCM absorbing solution to a 25-mL volumetric flask, and two control standards containing approximately 5 and 15 µg SO2, respectively. The control standards are prepared according to Section 10.2 or 10.3. The analysis is carried out as follows:

1. Allow the sample to stand 20 minutes after the completion of sampling to allow any ozone to decompose (if applicable).

2. To each 25-mL volumetric flask containing reagent blank, sample, or control standard, add 1 mL of 0.6% sulfamic acid (Section 8.2.1) and allow to react for 10 min.

3. Accurately pipet 2 mL of 0.2% formaldehyde solution (Section 8.2.2) and then 5 mL of pararosaniline solution (Section 8.2.13) into each flask. Start a laboratory timer set at 30 minutes.

4. Bring each flask to volume with recently boiled and cooled distilled water and mix thoroughly.

5. During the 30 minutes, the solutions must be in a temperature controlled environment in the range of 20° to 30 °C maintained to ±1 °C. This temperature must also be within 1 °C of that used during calibration.

6. After 30 minutes and before 60 minutes, determine the corrected absorbances (equation 10) of each solution at 548 nm using 1-cm optical path length cells against a distilled water reference (Section 10.1). (Distilled water is used as a reference instead of the reagent blank because of the sensitivity of the reagent blank to temperature.)

7. Do not allow the colored solution to stand in the cells because a film may be deposited. Clean the cells with isopropyl alcohol after use.

8. The reagent blank must be within 0.03 absorbance units of the intercept of the calibration equation determined in Section 10.

11.3 Absorbance range. If the absorbance of the sample solution ranges between 1.0 and 2.0, the sample can be diluted 1:1 with a portion of the reagent blank and the absorbance redetermined within 5 minutes. Solutions with higher absorbances can be diluted up to sixfold with the reagent blank in order to obtain scale readings of less than 1.0 absorbance unit. However, it is recommended that a smaller portion (<10 mL) of the original sample be reanalyzed (if possible) if the sample requires a dilution greater than 1:1.

11.4 Reagent disposal. All reagents containing mercury compounds must be stored and disposed of using one of the procedures contained in Section 13. Until disposal, the discarded solutions can be stored in closed glass containers and should be left in a fume hood.

12.0 Calculations.

12.1 Calibration Slope, Intercept, and Correlation Coefficient. The method of least squares is used to calculate a calibration equation in the form of:

$$y = mx + b \qquad (16)$$

where:

y = corrected absorbance,

m = slope, absorbance unit/µg SO2,

x = micrograms of SO2,

b = y intercept (absorbance units).

The slope (m), intercept (b), and correlation coefficient (r) are calculated as follows:

$$m = \frac{n\sum xy - (\sum x)(\sum y)}{n\sum x^2 - (\sum x)^2} \qquad (17)$$

$$b = \frac{\sum y - m\sum x}{n} \qquad (18)$$

$$r = \sqrt{\frac{m(\sum xy - \sum x \sum y / n)}{\sum y^2 - (\sum y)^2 / n}} \qquad (19)$$

where n is the number of calibration points.

A data form (Figure 5) is supplied for easily organizing calibration data when the slope, intercept, and correlation coefficient are calculated by hand.

12.2 Total Sample Volume. Determine the sampling volume at standard conditions as follows:

$$V_{std} = \frac{Q_i + Q_f}{2} \times t \qquad (20)$$

where:

Vstd = sampling volume in std L,

Qi = standard flow rate determined at the initiation of sampling in std L/min,

Qf = standard flow rate determined at the completion of sampling is std L/min, and

t = total sampling time, min.

12.3 Sulfur Dioxide Concentration. Calculate and report the concentration of each sample as follows:

$$\mu g\ SO_2/m^3 = \frac{(A - A_o)(B_x)(10^3)}{V_{std}} \times \frac{V_b}{V_a} \qquad (21)$$

where:

A = corrected absorbance of the sample solution, from equation (10);

Ao = corrected absorbance of the reagent blank, using equation (10);

BX = calibration factor equal to Bs, Bg, or Bt depending on the calibration procedure used, the reciprocal of the slope of the calibration equation;

Va = volume of absorber solution analyzed, mL;

Vb = total volume of solution in absorber (see 11.1-2), mL; and

Vstd = standard air volume sampled, std L (from Section 12.2).

Data Form

[For hand calculations]

Calibration point no.	Micro- grams So2	Absor- bance units			
	(x)	(y)	x 2	xy	y 2
1					
2					
3					
4					
5					
6					

Σ x=___ Σ y=___ Σ x 2=___ Σxy___ Σy 2___

n=___ (number of pairs of coordinates.)

Figure 5. Data form for hand calculations.

12.4 Control Standards. Calculate the analyzed micrograms of SO2 in each control standard as follows:

$$C_q = (A - A_o) \times B_x \qquad (22)$$

where:

Cq = analyzed µg SO2 in each control standard,

A = corrected absorbance of the control standard, and

Ao = corrected absorbance of the reagent blank.

The difference between the true and analyzed values of the control standards must not be greater than 1 µg. If the difference is greater than 1 µg, the source of the discrepancy must be identified and corrected.

12.5 Conversion of µg/m 3 to ppm (v/v). If desired, the concentration of sulfur dioxide at reference conditions can be converted to ppm SO2 (v/v) as follows:

$$ppm\ SO_2 = \frac{\mu g\ SO_2}{m^3} \times 3.82 \times 10^{-4} \qquad (23)$$

13.0 The TCM absorbing solution and any reagents containing mercury compounds must be treated and disposed of by one of the methods discussed below. Both methods remove greater than 99.99 percent of the mercury.

13.1 Disposal of Mercury-Containing Solutions.

13.2 Method for Forming an Amalgam.

1. Place the waste solution in an uncapped vessel in a hood.
2. For each liter of waste solution, add approximately 10 g of sodium carbonate until neutralization has occurred (NaOH may have to be used).
3. Following neutralization, add 10 g of granular zinc or magnesium.
4. Stir the solution in a hood for 24 hours. Caution must be exercised as hydrogen gas is evolved by this treatment process.
5. After 24 hours, allow the solution to stand without stirring to allow the mercury amalgam (solid black material) to settle to the bottom of the waste receptacle.
6. Upon settling, decant and discard the supernatant liquid.
7. Quantitatively transfer the solid material to a container and allow to dry.
8. The solid material can be sent to a mercury reclaiming plant. It must not be discarded.

13.3 Method Using Aluminum Foil Strips.

1. Place the waste solution in an uncapped vessel in a hood.
2. For each liter of waste solution, add approximately 10 g of aluminum foil strips. If all the aluminum is consumed and no gas is evolved, add an additional 10 g of foil. Repeat until the foil is no longer consumed and allow the gas to evolve for 24 hours.
3. Decant the supernatant liquid and discard.
4. Transfer the elemental mercury that has settled to the bottom of the vessel to a storage container.
5. The mercury can be sent to a mercury reclaiming plant. It must not be discarded.

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Appendix T to Part 50 - Interpretation of the Primary National Ambient Air Quality Standards for Oxides of Sulfur (Sulfur Dioxide)

1. GENERAL

(a) This appendix explains the data handling conventions and computations necessary for determining when the primary national ambient air quality standards for Oxides of Sulfur as measured by Sulfur Dioxide ("SO_2 NAAQS") specified in § 50.17 are met at an ambient air quality monitoring site. Sulfur Dioxide (SO_2) is measured in the ambient air by a Federal reference method (FRM) based on appendix A or A-1 to this part or by a Federal equivalent method (FEM) designated in accordance with part 53 of this chapter. Data handling and computation procedures to be used in making comparisons between reported SO_2 concentrations and the levels of the SO_2 NAAQS are specified in the following sections.

(b) Decisions to exclude, retain, or make adjustments to the data affected by exceptional events, including natural events, are made according to the requirements and process deadlines specified in §§ 50.1, 50.14 and 51.930 of this chapter.

(c) The terms used in this appendix are defined as follows:

Daily maximum 1-hour values for SO_2 refers to the maximum 1-hour SO_2 concentration values measured from midnight to midnight (local standard time) that are used in NAAQS computations.

Design values are the metrics (*i.e.,* statistics) that are compared to the NAAQS levels to determine compliance, calculated as specified in section 5 of this appendix. The design value for the primary 1-hour NAAQS is the 3-year average of annual 99th percentile daily maximum 1-hour values for a monitoring site (referred to as the "1-hour primary standard design value").

99th percentile daily maximum 1-hour value is the value below which nominally 99 percent of all daily maximum 1-hour concentration values fall, using the ranking and selection method specified in section 5 of this appendix.

Pollutant Occurrence Code (POC) refers to a numerical code (1, 2, 3, *etc.*) used to distinguish the data from two or more monitors for the same parameter at a single monitoring site.

Quarter refers to a calendar quarter.

Year refers to a calendar year.

2. REQUIREMENTS FOR DATA USED FOR COMPARISONS WITH THE SO_2 NAAQS AND DATA REPORTING CONSIDERATIONS

(a) All valid FRM/FEM SO_2 hourly data required to be submitted to EPA's Air Quality System (AQS), or otherwise available to EPA, meeting the requirements of part 58 of this chapter including appendices A, C, and E shall be used in design value calculations. Multi-hour average concentration values collected by wet chemistry methods shall not be used.

(b) Data from two or more monitors from the same year at the same site reported to EPA under distinct Pollutant Occurrence Codes shall not be combined in an attempt to meet data completeness requirements. The Administrator will combine annual 99th percentile daily maximum concentration values from different monitors in different years, selected as described here, for the purpose of developing a valid 1-hour primary standard design value. If more than one of the monitors meets the completeness requirement for all four quarters of a year, the steps specified in section 5(a) of this appendix shall be applied to the data from the monitor with the highest average of the four quarterly completeness values to derive a valid annual 99th percentile daily maximum concentration. If no monitor is complete for all four quarters in a year, the steps specified in section 3(c) and 5(a) of this appendix shall be applied to the data from the monitor with the highest average of the four quarterly completeness values in an attempt to derive a valid annual 99th percentile daily maximum concentration. This paragraph does not prohibit a monitoring agency from making a local designation of one physical monitor as the primary monitor for a Pollutant Occurrence Code and substituting the 1-hour data from a second physical monitor whenever a valid concentration value is not obtained from the primary monitor; if a monitoring agency substitutes data in this manner, each substituted value must be accompanied by an AQS qualifier code indicating that substitution with a value from a second physical monitor has taken place.

(c) Hourly SO_2 measurement data shall be reported to AQS in units of parts per billion (ppb), to at most one place after the decimal, with additional digits to the right being truncated with no further rounding.

3. COMPARISONS WITH THE 1-HOUR PRIMARY SO_2 NAAQS

(a) The 1-hour primary SO_2 NAAQS is met at an ambient air quality monitoring site when the valid 1-hour primary standard design value is less than or equal to 75 parts per billion (ppb).

(b) An SO_2 1-hour primary standard design value is valid if it encompasses three consecutive calendar years of complete data. A year meets data completeness requirements when all 4 quarters are complete. A quarter is complete when at least 75 percent of the sampling days for each quarter have complete data. A sampling day has complete data if 75 percent of the hourly concentration values, including State-flagged data affected by exceptional events which have been approved for exclusion by the Administrator, are reported.

(c) In the case of one, two, or three years that do not meet the completeness requirements of section 3(b) of this appendix and thus would normally not be useable for the calculation of a valid 3-year 1-hour primary standard design value, the 3-year 1-hour primary standard design value shall nevertheless be considered valid if one of the following conditions is true.

(i) At least 75 percent of the days in each quarter of each of three consecutive years have at least one reported hourly value, and the design value calculated according to the procedures specified in section 5 is above the level of the primary 1-hour standard.

(ii)

(A) A 1-hour primary standard design value that is equal to or below the level of the NAAQS can be validated if the substitution test in section 3(c)(ii)(B) results in a “test design value” that is below the level of the NAAQS. The test substitutes actual “high” reported daily maximum 1-hour values from the same site at about the same time of the year (specifically, in the same calendar quarter) for unknown values that were not successfully measured. *Note* that the test is merely diagnostic in nature, intended to confirm that there is a very high likelihood that the original design value (the one with less than 75 percent data capture of hours by day and of days by quarter) reflects the true under-NAAQS-level status for that 3-year period; the result of this data substitution test (the “test design value”, as defined in section 3(c)(ii)(B)) is not considered the actual design value. For this test, substitution is permitted only if there are at least 200 days across the three matching quarters of the three years under consideration (which is about 75 percent of all possible daily values in those three quarters) for which 75 percent of the hours in the day, including State-flagged data affected by exceptional events which have been approved for exclusion by the Administrator, have reported concentrations. However, maximum 1-hour values from days with less than 75 percent of the hours reported shall also be considered in identifying the high value to be used for substitution.

(B) The substitution test is as follows: Data substitution will be performed in all quarter periods that have less than 75 percent data capture but at least 50 percent data capture, including State-flagged data affected by exceptional events which have been approved for exclusion by the Administrator; if any quarter has less than 50 percent data capture then this substitution test cannot be used. Identify for each quarter (e.g., January-March) the highest reported daily maximum 1-hour value for that quarter, excluding State-flagged data affected by exceptional events which have been approved for exclusion by the Administrator, looking across those three months of all three years under consideration. All daily maximum 1-hour values from all days in the quarter period shall be considered when identifying this highest value, including days with less than 75 percent data capture. If after substituting the highest reported daily maximum 1-hour value for a quarter for as much of the missing daily data in the matching deficient quarter(s) as is needed to make them 100 percent complete, the procedure in section 5 yields a recalculated 3-year 1-hour standard "test design value" less than or equal to the level of the standard, then the 1-hour primary standard design value is deemed to have passed the diagnostic test and is valid, and the level of the standard is deemed to have been met in that 3-year period. As noted in section 3(c)(i), in such a case, the 3-year design value based on the data actually reported, not the "test design value", shall be used as the valid design value.

(iii)

(A) A 1-hour primary standard design value that is above the level of the NAAQS can be validated if the substitution test in section 3(c)(iii)(B) results in a "test design value" that is above the level of the NAAQS. The test substitutes actual "low" reported daily maximum 1-hour values from the same site at about the same time of the year (specifically, in the same three months of the calendar) for unknown hourly values that were not successfully measured. Note that the test is merely diagnostic in nature, intended to confirm that there is a very high likelihood that the original design value (the one with less than 75 percent data capture of hours by day and of days by quarter) reflects the true above-NAAQS-level status for that 3-year period; the result of this data substitution test (the "test design value", as defined in section 3(c)(iii)(B)) is not considered the actual design value. For this test, substitution is permitted only if there are a minimum number of available daily data points from which to identify the low quarter-specific daily maximum 1-hour values, specifically if there are at least 200 days across the three matching quarters of the three years under consideration (which is about 75 percent of all possible daily values in those three quarters) for which 75 percent of the hours in the day have reported concentrations. Only days with at least 75 percent of the hours reported shall be considered in identifying the low value to be used for substitution.

(B) The substitution test is as follows: Data substitution will be performed in all quarter periods that have less than 75 percent data capture. Identify for each quarter (e.g., January-March) the lowest reported daily maximum 1-hour value for that quarter, looking across those three months of all three years under consideration. All daily maximum 1-hour values from all days with at least 75 percent capture in the quarter period shall be considered when identifying this lowest value. If after substituting the lowest reported daily maximum 1-hour value for a quarter for as much of the missing daily data in the matching deficient quarter(s) as is needed to make them 75 percent complete, the procedure in section 5 yields a recalculated 3-year 1-hour standard "test design value" above the level of the standard, then the 1-hour primary standard design value is deemed to have passed the diagnostic test and is valid, and the level of the standard is deemed to have been exceeded in that 3-year period. As noted in section 3(c)(i), in such a case, the 3-year design value based on the data actually reported, not the "test design value", shall be used as the valid design value.

(d) A 1-hour primary standard design value based on data that do not meet the completeness criteria stated in 3(b) and also do not satisfy section 3(c), may also be considered valid with the approval of, or at the initiative of, the Administrator, who may consider factors such as monitoring site closures/moves, monitoring diligence, the consistency and levels of the valid concentration measurements that are available, and nearby concentrations in determining whether to use such data.

(e) The procedures for calculating the 1-hour primary standard design values are given in section 5 of this appendix.

4. ROUNDING CONVENTIONS FOR THE 1-HOUR PRIMARY SO_2 NAAQS

(a) Hourly SO_2 measurement data shall be reported to AQS in units of parts per billion (ppb), to at most one place after the decimal, with additional digits to the right being truncated with no further rounding.

(b) Daily maximum 1-hour values and therefore the annual 99th percentile of those daily values are not rounded.

(c) The 1-hour primary standard design value is calculated pursuant to section 5 and then rounded to the nearest whole number or 1 ppb (decimals 0.5 and greater are rounded up to the nearest whole number, and any decimal lower than 0.5 is rounded down to the nearest whole number).

5. CALCULATION PROCEDURES FOR THE 1-HOUR PRIMARY SO_2 NAAQS

(a)*Procedure for identifying annual 99th percentile values.* When the data for a particular ambient air quality monitoring site and year meet the data completeness requirements in section 3(b), or if one of the conditions of section 3(c) is met, or if the Administrator exercises the discretionary authority in section 3(d), identification of annual 99th percentile value is accomplished as follows.

(i) The annual 99th percentile value for a year is the higher of the two values resulting from the following two procedures.

(1)*Procedure 1.* For the year, determine the number of days with at least 75 percent of the hourly values reported.

(A) For the year, determine the number of days with at least 75 percent of the hourly values reported including State-flagged data affected by exceptional events which have been approved for exclusion by the Administrator.

(B) For the year, from only the days with at least 75 percent of the hourly values reported, select from each day the maximum hourly value excluding State-flagged data affected by exceptional events which have been approved for exclusion by the Administrator.

(C) Sort all these daily maximum hourly values from a particular site and year by descending value. (For example: (x[1], x[2], x[3], * * *, x[n]). In this case, x[1] is the largest number and x[n] is the smallest value.) The 99th percentile is determined from this sorted series of daily values which is ordered from the highest to the lowest number. Using the left column of Table 1, determine the appropriate range (*i.e.,* row) for the annual number of days with valid data for year y (cn_y). The corresponding "n" value in the right column identifies the rank of the annual 99th percentile value in the descending sorted list of daily site values for year y. Thus, $P_{0.99,\,y}$ = the nth largest value.

(2)*Procedure 2.* For the year, determine the number of days with at least one hourly value reported.

(A) For the year, determine the number of days with at least one hourly value reported including State-flagged data affected by exceptional events which have been approved for exclusion by the Administrator.

(B) For the year, from all the days with at least one hourly value reported, select from each day the maximum hourly value excluding State-flagged data affected by exceptional events which have been approved for exclusion by the Administrator.

(C) Sort all these daily maximum values from a particular site and year by descending value. (For example: (x[1], x[2], x[3], * * *, x[n]). In this case, x[1] is the largest number and x[n] is the smallest value.) The 99th percentile is determined from this sorted series of daily values which is ordered from the highest to the lowest number. Using the left column of Table 1, determine the appropriate range (*i.e.,* row) for the annual number of days with valid data for year y (cn_y). The corresponding "n" value in the right column identifies the rank of the annual 99th percentile value in the descending sorted list of daily site values for year y. Thus, $P_{0.99,y}$ = the nth largest value.

(b) The 1-hour primary standard design value for an ambient air quality monitoring site is mean of the three annual 99th percentile values, rounded according to the conventions in section 4.

Table 1

Annual number of days with valid data for year "y" (cn_y)	$P_{0.99,y}$ is the nth maximum value of the year, where n is the listed number
1-100	1
101-200	2
201-300	3
301-366	4

[75 FR 35595, June 23, 2010]

AMEND: 340-214-0300

RULE TITLE: Excess Emissions and Emergency Provision: Purpose and Applicability

NOTICE FILED DATE: 06/12/2025

RULE SUMMARY: The rule cross references need to change since OAR 340-214-0360 is being repealed. Affirmative defense due to an emergency for Title V sources is no longer allowed by EPA rule. Clarification regarding enforcement for EPA or citizens has been added.

RULE TEXT:
(1) Emissions of air contaminants in excess of applicable standards or permit conditions, described in OAR 340-214-0310 through OAR 340-214-0330, are unauthorized and subject to enforcement action.
(2) OAR 340-214-0300 through 340-214-0350 apply to any source that emits air contaminants in excess of any applicable air quality rule or permit condition, including but not limited to excess emissions resulting from the breakdown of air pollution control devices or operating equipment, process upset, startup, shutdown, or scheduled maintenance.
(3) Sources that do not emit air contaminants in excess of any applicable air quality rule or permit condition are not subject to the recordkeeping and reporting requirements in 340-214-0300 through 340-214-0350.
(4) DEQ’s decisions regarding whether procedures were adequate or followed or whether enforcement action is appropriate under OAR 340-214-0310 through OAR 340-214-0330 are not binding on the EPA.

NOTE: This rule is included in the State of Oregon Clean Air Act Implementation Plan that EQC adopted under OAR 340-200-0040.

STATUTORY/OTHER AUTHORITY: ORS 468.020, 468A.050, 468A.310

STATUTES/OTHER IMPLEMENTED: ORS 468A.050, 468A.310

AMEND: 340-214-0330

RULE TITLE: Excess Emissions and Emergency Provision: All Other Excess Emissions

NOTICE FILED DATE: 06/12/2025

RULE SUMMARY: The rule cross references need to change since OAR 340-214-0360 is being repealed. Clarification regarding enforcement for a request to continue operation has been added.

RULE TEXT:

(1) This rule applies to all excess emissions not addressed in OAR 340-214-0310 and 340-214-0320.

(a) The owner or operator of a large source, as defined by OAR 340-214-0010, must immediately notify DEQ of the first onset per calendar day of any excess emissions event, unless otherwise specified by a permit condition.

(b) The owner or operator of a small source, as defined by OAR 340-214-0010, need not immediately notify DEQ of excess emissions events unless otherwise required by a permit condition, written notice by DEQ, or if the excess emission is of a nature that could endanger public health.

(c) Additional reporting and recordkeeping requirements are specified in OAR 340-214-0340.

(2) During any period of excess emissions, the owner or operator of the source must immediately reduce emissions to the greatest extent practicable or cease operation of the equipment or facility until the condition causing the excess emissions has been corrected or brought under control. The owner or operator must cease operation of the equipment or facility within 8 hours of the beginning of the period of excess emissions unless:

(a) Ceasing operation could result in physical damage to the equipment or facility;

(b) Ceasing operation could cause injury to employees; or

(c) Emissions associated with shutdown and the subsequent startup will exceed those emissions resulting from continued operation.

(3) An owner or operator may request continued operations under the conditions in section (2) by submitting to DEQ a written request to continue operation along with the following information within 8 hours of the beginning of the period of excess emissions:

(a) A description or plan of how the owner or operator will minimize the excess emissions to the greatest extent practicable;

(b) A plan and timeline for returning the equipment or facility back to the applicable compliant emission limits as soon as possible; and either:

(A) Information verifying that reducing or ceasing operation could result in physical damage to the equipment or facility or injury to employees; or

(B) Calculations of emissions associated with shutdown and the subsequent startup and emissions resulting from continued operation.

(4)(a) If DEQ disapproves the request to continue operation, the owner or operator must cease operation of the equipment or facility within one hour of receiving DEQ's written disapproval (e.g., email or telephone conversation with email backup), until the condition causing the excess emissions has been corrected or brought under control.

(b) If DEQ approves the request to continue operation, the owner or operator must follow the approved plans and timeline to minimize excess emissions and return the equipment or facility back to the applicable compliant emission limits as required in DEQ's written approval (e.g., email or telephone conversation with email backup).

(c) The owner or operator must report excess emissions under OAR 340-214-0340 within 5 days of the date of the event.

(5) Notwithstanding section (2), at any time during the period of excess emissions, DEQ may require the owner or operator to cease operation of the equipment or facility.

(6) Approval of a request to continue operation does not shield the owner or operator from an enforcement action, but DEQ will consider whether the approved plans and timelines to minimize excess emissions and return the equipment or facility back to the applicable compliant emission limits were followed in determining whether an enforcement action is appropriate.

NOTE: This rule is included in the State of Oregon Clean Air Act Implementation Plan that EQC adopted under OAR 340-200-0040.

STATUTORY/OTHER AUTHORITY: ORS 468.020, 468A.025, 468A.040, 468A.310

STATUTES/OTHER IMPLEMENTED: ORS 468A.025, 468A.040, 468A.310

AMEND: 340-214-0340

RULE TITLE: Excess Emissions and Emergency Provision: Reporting Requirements

NOTICE FILED DATE: 06/12/2025

RULE SUMMARY: Affirmative defense due to an emergency for Title V sources is no longer allowed by EPA rule.

RULE TEXT:

(1) For any excess emissions event at a source with an Oregon Title V Operating Permit and for any other source as required by permit, the owner or operator must submit a written report of excess emissions for each calendar day of the event. The report must be submitted within 15 days of the date of the event and include the following:

(a) The date and time of the beginning of the excess emissions event and the duration or best estimate of the time until return to normal operation;

(b) The date and time the owner or operator notified DEQ of the event;

(c) The equipment involved;

(d) Whether the event occurred during planned startup, planned shutdown, scheduled maintenance, or as a result of a breakdown, malfunction, or emergency;

(e) Steps taken to mitigate emissions and corrective actions taken, including whether the approved procedures for a planned startup, shutdown, or maintenance activity were followed;

(f) The magnitude and duration of each occurrence of excess emissions during the course of an event and the increase over normal rates or concentrations as determined by continuous monitoring or a best estimate, supported by operating data and calculations; and

(g) The final resolution of the cause of the excess emissions.

(2) Based on the severity of event, DEQ may specify a shorter time period for report submittal.

(3) All source owners or operators must keep an excess emissions log of all planned and unplanned excess emissions. The log must include all pertinent information as required in section (1) and be kept by the owner or operator for five calendar years.

(4) At each annual reporting period specified in a permit, or sooner if DEQ requires, the owner or operator must submit:

(a) A copy of the excess emissions log entries for the reporting period; unless previously submitted in accordance with section (1); and

(b) Where applicable, current procedures to minimize emissions during startup, shutdown, or maintenance as outlined in OAR 340-214-0310 and 340-214-0320. The owner or operator must specify in writing whether these procedures are new, modified, or have already been approved by DEQ.

NOTE: This rule is included in the State of Oregon Clean Air Act Implementation Plan that EQC adopted under OAR 340-200-0040.

STATUTORY/OTHER AUTHORITY: ORS 468.020, 468A.050, 468A.310

STATUTES/OTHER IMPLEMENTED: ORS 468A.025, 468A.050, 468A.310

REPEAL: 340-214-0360

RULE TITLE: Excess Emissions and Emergency Provision: Emergency as an Affirmative Defense for Title V Permitted Sources

NOTICE FILED DATE: 06/12/2025

RULE SUMMARY: Affirmative defense due to an emergency for Title V sources is no longer allowed by EPA rule.

RULE TEXT:
(1) An emergency constitutes an affirmative defense to penalty actions due to noncompliance with technology-based emission limits in an Oregon Title V Operating Permit if the owner or operator notifies DEQ immediately of the emergency condition and provides and demonstrates through properly signed, contemporaneous operating logs, excess emission logs, or other relevant evidence that:
(a) An emergency occurred and caused the excess emissions;
(b) The cause of the emergency;
(c) The facility was at the time being properly operated;
(d) During the occurrence of the emergency, the owner or operator took all reasonable steps to minimize levels of excess emissions; and
(e) The notification to DEQ contained a description of the emergency, any steps taken to mitigate emissions, and corrective actions taken.
(2) The person seeking to establish the occurrence of an emergency has the burden of proof by a preponderance of the evidence.
(3) This provision is in addition to any emergency or any other excess emissions provision contained in any applicable requirement.

STATUTORY/OTHER AUTHORITY: ORS 468.020, 468A.310

STATUTES/OTHER IMPLEMENTED: ORS 468A.310

AMEND: 340-238-0040

RULE TITLE: Definitions

NOTICE FILED DATE: 06/12/2025

RULE SUMMARY: To update adoption to a more recent version of NSPS regulations, the defined term ‘CFR’ in rule needs to be updated with a more recent date. Change “C.F.R.” to “CFR” throughout.

RULE TEXT:

The definitions in OAR 340-200-0020 and this rule apply to this division. If the same term is defined in this rule and 340-200-0020, the definition in this rule applies to this division.

(1) "Administrator" means the Administrator of the EPA or authorized representative.

(2) "Affected facility" means, with reference to a stationary source, any apparatus to which a standard is applicable.

(3) "Capital expenditures" means an expenditure for a physical or operational change to an existing facility that exceeds the product of the applicable "annual asset guideline repair allowance percentage" specified in the December 1984 edition of Internal Revenue Service (IRS) Publication 534 and the existing facility's basis, as defined by section 1012 of the Internal Revenue Code. However, the total expenditure for a physical or operational change to an existing facility must not be reduced by any "excluded additions" as defined in IRS Publication 534, as would be done for tax purposes.

(4) "CFR" means the January 1, 2025 edition Code of Federal Regulations unless otherwise identified.

(5) "Closed municipal solid waste landfill" (closed landfill) means a landfill in which solid waste is no longer being placed, and in which no additional solid wastes will be placed without first filing a notification of modification as prescribed under 40 CFR 60.7(a)(4). Once a notification of modification has been filed, and additional solid waste is placed in the landfill, the landfill is no longer closed.

(6) "Commenced", with respect to the definition of "new source" in section 111(a)(2) of the federal Clean Air Act, means that an owner or operator has undertaken a continuous program of construction or modification or that an owner or operator has entered into a contractual obligation to undertake and complete, within a reasonable time, a continuous program of construction or modification.

(7) "Existing municipal solid waste landfill" (existing landfill) means a municipal solid waste landfill that began construction, reconstruction or modification before 5/30/91 and has accepted waste at any time since 11/08/87 or has additional design capacity available for future waste deposition.

(8) "Existing facility", with reference to a stationary source, means any apparatus of the type for which a standard is promulgated in 40 CFR Part 60, and the construction or modification of which commenced before the date of proposal by EPA of that standard; or any apparatus that could be altered in such a way as to be of that type.

(9) "Fixed capital cost" means the capital needed to provide all the depreciable components.

(10) "Large municipal solid waste landfill" (large landfill) means a municipal solid waste landfill with a design capacity greater than or equal to 2.5 million megagrams or 2.5 million cubic meters.

(11) "Modification:"

(a) except as provided in subsection (b) of this section, means any physical change in, or change in the method of operation of, an existing facility that increases the amount of any air pollutant (to which a standard applies) emitted into the atmosphere by that facility or that results in the emission of any air pollutant (to which a standard applies) into the atmosphere not previously emitted;

(b) As used in OAR 340-238-0100 means an action that results in an increase in the design capacity of a landfill.

(12) "Municipal solid waste landfill" (landfill) means an entire disposal facility in a contiguous geographical space where household waste is placed in or on land. A municipal solid waste landfill may also receive other types of RCRA Subtitle D wastes such as commercial solid waste, nonhazardous sludge, conditionally exempt small quantity generator waste, and industrial solid waste. Portions of a municipal solid waste landfill may be separated by access roads and may be publicly or privately owned. A municipal solid waste landfill may be a new municipal solid waste landfill, an existing municipal solid waste landfill, or a lateral expansion (modification).

(13) "New municipal solid waste landfill" (new landfill) means a municipal solid waste landfill that began construction,

reconstruction or modification or began accepting waste on or after 5/30/91.

(14) "Reconstruction" means the replacement of components of an existing facility to such an extent that:

(a) The fixed capital cost of the new components exceeds 50 percent of the fixed capital cost that would be required to construct a comparable entirely new facility; and

(b) It is technologically and economically feasible to meet the applicable standards set forth in 40 CFR Part 60.

(15) "Reference method" means any method of sampling and analyzing for an air pollutant as specified in 40 CFR Part 60.

(16) "Small municipal solid waste landfill" (small landfill) means a municipal solid waste landfill with a design capacity less than 2.5 million megagrams or 2.5 million cubic meters.

(17) "Standard" means a standard of performance proposed or promulgated under 40 CFR Part 60.

(18) "State Plan" means a plan developed for the control of a designated pollutant provided under 40 CFR Part 60.

STATUTORY/OTHER AUTHORITY: ORS 468.020

STATUTES/OTHER IMPLEMENTED: ORS 468A.025

AMEND: 340-238-0060

RULE TITLE: Federal Regulations Adopted by Reference

NOTICE FILED DATE: 06/12/2025

RULE SUMMARY: New federal regulations proposed for adoption are being added. The names of several regulations are being adjusted to more closely align with the name of the federal regulation as promulgated by US EPA.

RULE TEXT:

(1) Except as provided in section (2) of this rule, 40 CFR Part 60 Subparts A, D through EE, GG, HH, KK through NN, PP through XXa, BBB, DDD, FFF through LLL, NNN through XXX, AAAA, CCCC, EEEE, KKKK, LLLL, OOOO, OOOOa and TTTT are by this reference adopted and incorporated herein.

(a) 40 CFR Part 60 Subpart OOO is by this reference adopted and incorporated herein for major sources only; and

(b) 40 CFR Part 60 Subpart IIII and JJJJ are by this reference adopted and incorporated herein only for sources required to have a Title V or ACDP permit and excluding the requirements for engine manufacturers.

(2) The definitions in OAR 340-200-0020 and 340-238-0040 do not apply to the Subparts of 40 CFR Part 60 incorporated by reference in this rule, except for the definition of ‘CFR’ in OAR 340-238-0040. Where "Administrator" or "EPA" appears in 40 CFR Part 60, "DEQ" is substituted, except in any section of 40 CFR Part 60 for which a federal rule or delegation specifically indicates that authority must not be delegated to the state.

(3) 40 CFR Part 60 Subparts adopted by this rule are titled as follows:

(a) Subpart A — General Provisions;

(b) Subpart D — Fossil-fuel-fired steam generators;

(c) Subpart Da — Electric utility steam generating units;

(d) Subpart Db — Industrial-commercial-institutional steam generating units;

(e) Subpart Dc — Small industrial-commercial-institutional steam generating units;

(f) Subpart E — Incinerators;

(g) Subpart Ea — Municipal waste combustors for which construction is commenced after December 20, 1989 and on or before September 20, 1994;

(h) Subpart Eb — Large municipal waste combustors for which construction is commenced after September 20, 1994 or for which modification or reconstruction is commenced after June 19, 1996;

(i) Subpart Ec — Hospital/Medical/Infectious waste incinerators;

(j) Subpart F — Portland cement plants;

(k) Subpart G — Nitric acid plants;

(l) Subpart Ga — Nitric acid plants for which construction, reconstruction, or modification commenced after October 14, 2011;

(m) Subpart H — Sulfuric acid plants;

(n) Subpart I — Hot mix asphalt facilities;

(o) Subpart J — Petroleum refineries;

(p) Subpart Ja — Petroleum refineries for which construction, reconstruction, or modification commenced after May 14, 2007;

(q) Subpart K — Storage vessels for petroleum liquids for which construction, reconstruction, or modification commenced after June 11, 1973, and prior to May 19, 1978;

(r) Subpart Ka — Storage vessels for petroleum liquids for which construction, reconstruction, or modification commenced after May 18, 1978, and prior to July 23, 1984;

(s) Subpart Kb — Volatile organic liquid storage vessels (including petroleum liquid storage vessels) for which construction, reconstruction, or modification commenced after July 23, 1984 and on or before October 4, 2023;

(t) Subpart Kc — Volatile organic liquid storage vessels (including petroleum liquid storage vessels) for which construction, reconstruction, or modification commenced after October 4, 2023;

(u Subpart L — Secondary lead smelters for which construction, reconstruction, or modification commenced after June

11, 1973 and on or before December 1, 2022;
(v) Subpart La — Secondary lead smelters for which construction, reconstruction, or modification commenced after December 1, 2022;
(w) Subpart M — Secondary brass and bronze production plants;
(x) Subpart N — Primary emissions from basic oxygen process furnaces for which construction is commenced after June 11, 1973;
(y) Subpart Na — Secondary emissions from basic oxygen process steelmaking facilities for which construction is commenced after January 20, 1983;
(z) Subpart O — Sewage treatment plants;
(aa) Subpart P — Primary copper smelters;
(bb) Subpart Q — Primary zinc smelters;
(cc) Subpart R — Primary lead smelters;
(dd) Subpart S — Primary aluminum reduction plants;
(ee) Subpart T — Phosphate fertilizer industry: Wet-process phosphoric acid plants;
(ff) Subpart U — Phosphate fertilizer industry: Superphosphoric acid plants;
(gg) Subpart V — Phosphate fertilizer industry: Diammonium phosphate plants;
(hh) Subpart W — Phosphate fertilizer industry: Triple superphosphate plants;
(ii) Subpart X — Phosphate fertilizer industry: Granular triple superphosphate storage facilities;
(jj) Subpart Y — Coal preparation and processing plants;
(kk) Subpart Z — Ferroalloy production facilities;
(ll) Subpart AA — Steel plants: Electric arc furnaces constructed after October 21, 1974 and on or before August 17, 1983;
(mm) Subpart AAa — Steel plants: Electric arc furnaces and argon-oxygen decarburization vessels constructed after August 7, 1983 and on or before May 16, 2022;
(nn) Subpart AAb — Steel plants: Electric arc furnaces and argon-oxygen decarburization vessels constructed after May 16, 2022;
(oo) Subpart BB — Kraft pulp mills;
(pp) Subpart BBa – Kraft pulp mills affected sources for which construction, reconstruction, or modification commences after May 23, 2013;
(qq) Subpart CC — Glass manufacturing plants;
(rr) Subpart DD — Grain elevators;
(ss) Subpart EE — Surface coating of metal furniture;
(tt) Subpart GG — Stationary gas turbines;
(uu) Subpart HH — Lime manufacturing plants;
(vv) Subpart KK — Lead-acid battery manufacturing plants for which construction, reconstruction, or modification commenced after January 14, 1980 and on or before February 23, 2022;
(ww) Subpart KKa — Lead acid battery manufacturing plants for which construction, modification, or reconstruction commenced after February 23, 2022;
(xx) Subpart LL — Metallic mineral processing plants;
(yy) Subpart MM — Automobile and light duty truck surface coating operations for which construction, modification, or reconstruction commenced after October 5, 1979 and on or before May 18, 2022;
(zz) Subpart MMa — Automobile and light duty truck surface coating operations for which construction, modification, or reconstruction commenced after May 18, 2022;
(aaa) Subpart NN — Phosphate rock plants;
(bbb) Subpart PP — Ammonium sulfate manufacture;
(ccc) Subpart QQ — Graphic arts industry: Publication rotogravure printing;
(ddd) Subpart RR — Pressure sensitive tape and label surface coating operations;

(eee) Subpart SS — Industrial surface coating: large appliances;
(fff) Subpart TT — Metal coil surface coating;
(ggg) Subpart UU — Asphalt processing and asphalt roofing manufacture;
(hhh) Subpart VV — Equipment leaks of VOC in the synthetic organic chemicals manufacturing industry for which construction, reconstruction, or modification commenced after January 5, 1981 and on or before November 7, 2006;
(iii) Subpart VVa — Equipment leaks of VOC in the synthetic organic chemicals manufacturing industry for which construction, reconstruction, or modification commenced after November 7, 2006 and on or before April 25, 2023;
(jjj) Subpart VVb — Equipment leaks of VOC in the synthetic organic chemicals manufacturing industry for which construction, reconstruction, or modification commenced after April 25, 2023;
(kkk) Subpart WW — Beverage can surface coating industry;
(lll) Subpart XX — Bulk gasoline terminals that commenced construction, modification, or reconstruction after December 17, 1980 and on or before June 10, 2022;
(mmm) Subpart XXa — Bulk gasoline terminals that commenced construction, modification, or reconstruction after June 10, 2022;
(nnn) Subpart BBB — Rubber tire manufacturing industry;
(ooo) Subpart DDD — Volatile organic compound (VOC) emissions from the polymer manufacturing industry;
(ppp) Subpart FFF — Flexible vinyl and urethane coating and printing;
(qqq) Subpart GGG — Equipment leaks of VOC in petroleum refineries for which construction, reconstruction, or modification commenced January 4, 1983 and on or before November 7, 2006;
(rrr) Subpart GGGa — Equipment leaks of VOC in petroleum refineries for which construction, reconstruction, or modification commenced after November 7, 2006;
(sss) Subpart HHH — Synthetic fiber production facilities;
(ttt) Subpart III — Volatile organic compound (VOC) emissions from the synthetic organic chemical manufacturing industry (SOCMI) air oxidation unit processes after October 21, 1983 and on or before April 25, 2023;
(uuu) Subpart IIIa — Volatile organic compound (VOC) emissions from the synthetic organic chemical manufacturing industry (SOCMI) air oxidation unit processes for which construction, reconstruction, or modification commenced after April 25, 2023;
(vvv) Subpart JJJ — Petroleum dry cleaners;
(www) Subpart KKK — Equipment leaks of VOC from onshore natural gas processing plants for which construction, reconstruction, or modification commenced after January 20, 1984 and on or before August 23, 2011;
(xxx) Subpart LLL — SO2 emissions from Onshore natural gas processing for which construction, reconstruction, or modification commenced after January 20, 1984 and on or before August 23, 2011;
(yyy) Subpart NNN — Volatile organic compound (VOC) emissions from synthetic organic chemical manufacturing industry (SOCMI) distillation operations after December 30, 1983 and on or before April 25, 2023;
(zzz) Subpart NNNa — Volatile organic compound (VOC) emissions from synthetic organic chemical manufacturing industry (SOCMI) distillation operations for which construction, reconstruction, or modification commenced after April 25, 2023;
(aaaa) Subpart OOO — Nonmetallic mineral processing plants (adopted by reference for major sources only);
(bbbb) Subpart PPP — Wool fiberglass insulation manufacturing plants;
(cccc) Subpart QQQ — VOC emissions from petroleum refinery wastewater systems;
(dddd) Subpart RRR — Volatile organic compound (VOC) emissions from synthetic organic chemical manufacturing industry (SOCMI) reactor processes after June 29, 1990 and on or before April 25, 2023;
(eeee) Subpart RRRa — Volatile organic compound (VOC) emissions from synthetic organic chemical manufacturing industry (SOCMI) reactor processes for which construction, reconstruction, or modification commenced after April 25, 2023;
(ffff) Subpart SSS — Magnetic tape coating facilities;
(gggg) Subpart TTT — Industrial surface coating: Surface coating of plastic parts for business machines;

(hhhh) Subpart TTTa — Industrial surface coating: Surface coating of plastic parts for business machines for which construction, reconstruction, or modification commenced after June 21, 2022;
(iiii) Subpart UUU — Calciners and dryers in mineral industries;
(jjjj) Subpart VVV — Polymeric coating of supporting substrates facilities;
(kkkk) Subpart WWW — Municipal solid waste landfills that commenced construction, reconstruction, or modification on or after May 30, 1991 but before July 18, 2014, as clarified by OAR 340-238-0100;
(llll) Subpart XXX – Municipal solid waste landfills that commenced construction, reconstruction, or modification after July 17, 2014;
(mmmm) Subpart AAAA — Small municipal waste combustion units for which construction is commenced after August 30, 1999 or for which modification or reconstruction is commenced after June 6, 2001;
(nnnn) Subpart CCCC — Commercial and industrial solid waste incineration units;
(oooo) Subpart EEEE — Other solid waste incineration units;
(pppp) Subpart IIII — Stationary compression ignition internal combustion engines (adopted only for sources required to have a Title V or ACDP permit), excluding the requirements for engine manufacturers (40 CFR 60.4201 through 60.4203, 60.4210, 60.4215, and 60.4216);
(qqqq) Subpart JJJJ — Stationary spark ignition internal combustion engines (adopted only for sources required to have a Title V or ACDP permit), excluding the requirements for engine manufacturers (40 CFR 60.4231 through 60.4232, 60.4238 through 60.4242, and 60.4247);
(rrrr) Subpart KKKK — Stationary combustion turbines;
(ssss) Subpart LLLL — New sewage sludge incineration units;
(tttt) Subpart OOOO — Crude oil and natural gas production, transmission and distribution for which construction, modification, or reconstruction commenced after August 23, 2011, and on or before September 18, 2015. Standards adopted include final rule promulgations through July 1, 2020 of the CFR;
(uuuu) Subpart OOOOa — Crude oil and natural gas facilities for which construction, modification, or reconstruction commenced after September 18, 2015 and on or before December 6, 2022. Standards adopted include final rule promulgations through July 1, 2020 of the CFR; and
(vvvv) Subpart TTTT — Greenhouse gas emissions for electric generating units. Standards adopted include final rule promulgations through July 1, 2020 of the CFR.

STATUTORY/OTHER AUTHORITY: ORS 468.020

STATUTES/OTHER IMPLEMENTED: ORS 468A.025

AMEND: 340-244-0030

RULE TITLE: General Provisions for Stationary Sources: Definitions

NOTICE FILED DATE: 06/12/2025

RULE SUMMARY: To update adoption to a more recent version of the NESHAP regulations, the defined term 'CFR' in rule needs to be updated with a more recent date. Change "C.F.R." to "CFR" throughout.

RULE TEXT:

Except as provided in OAR 340-244-0220 and -0232, the definitions in OAR 340-200-0020, 340-218-0030 and this rule apply to this division. If the same term is defined in this rule and OAR 340-200-0020 or 340-218-0030, the definition in this rule applies to this division.

(1) "Affected source" is as defined in 40 CFR 63.2.

(2) "Area Source" means any stationary source which has the potential to emit hazardous air pollutants but is not a major source of hazardous air pollutants.

(3) "CFR" means the January 1, 2025 edition Code of Federal Regulations unless otherwise identified.

(4) "Construct a major source" means to fabricate, erect, or install at any greenfield site a stationary source or group of stationary sources which is located within a contiguous area and under common control and which emits or has the potential to emit 10 tons per year of any HAPs or 25 tons per year of any combination of HAP, or to fabricate, erect, or install at any developed site a new process or production unit which in and of itself emits or has the potential to emit 10 tons per year of any HAP or 25 tons per year of any combination of HAP, unless the process or production unit satisfies criteria in paragraphs (a) through (f) of this definition:

(a) All HAP emitted by the process or production unit that would otherwise be controlled under the requirements of 40 CFR Part 63, Subpart B will be controlled by emission control equipment which was previously installed at the same site as the process or production unit;

(b) DEQ has determined within a period of 5 years prior to the fabrication, erection, or installation of the process or production unit that the existing emission control equipment represented the best available control technology (BACT), lowest achievable emission rate (LAER) under 40 CFR Part 51 or 52, toxics-best available control technology (T-BACT), or MACT based on State air toxic rules for the category of pollutants which includes those HAP to be emitted by the process or production unit; or DEQ determines that the control of HAP emissions provided by the existing equipment will be equivalent to that level of control currently achieved by other well-controlled similar sources (i.e., equivalent to the level of control that would be provided by a current BACT, LAER, T-BACT, or State air toxic rule MACT determination).

(c) DEQ determines that the percent control efficiency for emission of HAP from all sources to be controlled by the existing control equipment will be equivalent to the percent control efficiency provided by the control equipment prior to the inclusion of the new process or production unit;

(d) DEQ has provided notice and an opportunity for public comment concerning its determination that criteria in paragraphs (a), (b), and (c) of this definition apply and concerning the continued adequacy of any prior LAER, BACT, T-BACT, or State air toxic rule MACT determination;

(e) If any commenter has asserted that a prior LAER, BACT, T-BACT, or State air toxic rule MACT determination is no longer adequate, DEQ has determined that the level of control required by that prior determination remains adequate; and

(f) Any emission limitations, work practice requirements, or other terms and conditions upon which the above determinations by DEQ are predicated will be construed by DEQ as applicable requirements under section 504(a) and either have been incorporated into any existing Title V permit for the affected facility or will be incorporated into such permit upon issuance.

(5) "Emissions Limitation" and "Emissions Standard" mean a requirement adopted by DEQ or Regional Agency, or proposed or promulgated by the Administrator of the EPA, which limits the quantity, rate, or concentration of emissions of air pollutants on a continuous basis, including any requirements which limit the level of opacity, prescribe equipment,

set fuel specifications, or prescribe operation or maintenance procedures for a source to assure continuous emission reduction.

(6) "Equipment leaks" means leaks from pumps, compressors, pressure relief devices, sampling connection systems, open ended valves or lines, valves, connectors, agitators, accumulator vessels, and instrumentation systems in hazardous air pollutant service.

(7) "Existing Source" means any source, the construction of which commenced prior to proposal of an applicable standard under sections 112 or 129 of the FCAA.

(8) "Facility" means all or part of any public or private building, structure, installation, equipment, or vehicle or vessel, including but not limited to ships.

(9) "Gasoline" means any petroleum distillate or petroleum distillate/alcohol blend having a Reid vapor pressure of 27.6 kilopascals (4.0 psi) or greater, which is used as a fuel for internal combustion engines.

(10) "Hazardous Air Pollutant" (HAP) means an air pollutant listed by the EPA under section 112(b) of the FCAA or determined by the Commission to cause, or reasonably be anticipated to cause, adverse effects to human health or the environment.

(11) "Major Source" means any stationary source or group of stationary sources located within a contiguous area and under common control that emits or has the potential to emit considering controls, in the aggregate, 10 tons per year or more of any hazardous air pollutant or 25 tons per year or more of any combination of hazardous air pollutants. The EPA may establish a lesser quantity, or in the case of radionuclides different criteria, for a major source on the basis of the potency of the air pollutant, persistence, potential for bioaccumulation, other characteristics of the air pollutant, or other relevant factors.

(12) "Maximum Achievable Control Technology (MACT)" means an emission standard applicable to major sources of hazardous air pollutants that requires the maximum degree of reduction in emissions deemed achievable for either new or existing sources.

(13) "Motor vehicle" means any self-propelled vehicle designed for transporting persons or property on a street or highway.

(14) "Nonroad engine" means an internal combustion engine (including the fuel system) that is not used in a motor vehicle or a vehicle used solely for competition, or that is not subject to standards promulgated under section 7411 or 7521 of title 40 of the CFR.

(15) "Nonroad vehicle" means a vehicle that is powered by a nonroad engine, and that is not a motor vehicle or a vehicle used solely for competition.

(16) "New Source" means a stationary source, the construction of which is commenced after proposal of a federal MACT or January 3, 1993 of this Division, whichever is earlier.

(17) "Potential to Emit" means the maximum capacity of a stationary source to emit any air pollutant under its physical and operational design. Any physical or operational limitation on the capacity of a source to emit an air pollutant, including air pollution control equipment and restrictions on hours of operation or on the type or amount of material combusted, stored, or processed, must be treated as part of its design if the limitation is enforceable by the EPA. This section does not alter or affect the use of this section for any other purposes under the Act, or the term "capacity factor" as used in Title IV of the Act or the regulations promulgated thereunder. Secondary emissions shall not be considered in determining the potential to emit of a source.

(18) "Reconstruct a Major Source" means the replacement of components at an existing process or production unit that in and of itself emits or has the potential to emit 10 tons per year of any HAP or 25 tons per year of any combination of HAP, whenever: the fixed capital cost of the new components exceeds 50 percent of the fixed capital cost that would be required to construct a comparable process or production unit; and; it is technically and economically feasible for the reconstructed major source to meet the applicable maximum achievable control technology emission limitation for new sources established under 40 CFR Part 63 Subpart B.

(19) "Regulated Air Pollutant" as used in this Division means:

(a) Any pollutant listed under OAR 340-244-0040; or

(b) Any pollutant that is subject to a standard promulgated under Section 129 of the Act.
(20) "Section 112(n)" means that subsection of the FCAA that includes requirements for the EPA to conduct studies on the hazards to public health prior to developing emissions standards for specified categories of hazardous air pollutant emission sources.
(21) "Section 112(r)" means that subsection of the FCAA that includes requirements for the EPA promulgate regulations for the prevention, detection and correction of accidental releases.
(22) "Solid Waste Incineration Unit" as used in this Division has the same meaning as given in Section 129(g) of the FCAA.
(23) "Stationary Source", as used in OAR 340 division 244, means any building, structure, facility, or installation which emits or may emit any regulated air pollutant;

Publications: Publications referenced are available from DEQ.
NOTE: This rule is included in the State of Oregon Clean Air Act Implementation Plan that EQC adopted under OAR 340-200-0040.

STATUTORY/OTHER AUTHORITY: ORS 468.020, 468A.025

STATUTES/OTHER IMPLEMENTED: ORS 468A.040

AMEND: 340-244-0220

RULE TITLE: Emission Standards: Federal Regulations Adopted by Reference

NOTICE FILED DATE: 06/12/2025

RULE SUMMARY: While no new NESHAP regulations are proposed for adoption, the names of several regulations are being adjusted to more closely align with the name of the federal regulation as promulgated by US EPA.

RULE TEXT:

(1) Except as provided in sections (2) and (3) of this rule, 40 CFR Part 61, Subparts A, C through F, J, L, N through P, V, Y, BB, and FF and 40 CFR Part 63, Subparts A, F through J, L through O, Q through U, W through Y, AA through EE, GG through YY, CCC through EEE, GGG through JJJ, LLL through RRR, TTT through VVV, XXX, AAAA, CCCC through KKKK, MMMM through YYYY, AAAAA through NNNNN, PPPPP through UUUUU, WWWWW, YYYYY, ZZZZZ, BBBBBB, DDDDDD through HHHHHH, LLLLLL through TTTTTT, VVVVVV through EEEEEEE, and HHHHHHH are adopted by reference and incorporated herein. 40 CFR Part 63, Subparts ZZZZ and JJJJJJ are by this reference adopted and incorporated herein only for sources required to have a Title V or ACDP permit.

(2) The definitions in OAR 340-200-0020 and 340-244-0030 do not apply to the Subparts of 40 CFR Parts 61 and 63 incorporated by reference in this rule, except for the definition of ‘CFR’ in OAR 340-244-0030. Where "Administrator" or "EPA" appears in 40 CFR Part 61 or 63, "DEQ" is substituted, except in any section of 40 CFR Part 61 or 63, for which a federal rule or delegation specifically indicates that authority will not be delegated to the state.

(3) 40 CFR Part 63 Subpart M — Perchloroethylene Air Emission Standards for Dry Cleaning Facilities: The exemptions in 40 CFR 63.320(d) and (e) do not apply.

(4) 40 CFR Part 61 Subparts adopted by this rule are titled as follows:

(a) Subpart A — General Provisions.

(b) Subpart C — Beryllium;

(c) Subpart D — Beryllium Rocket Motor Firing;

(d) Subpart E — Mercury;

(e) Subpart F — Vinyl Chloride;

(f) Subpart J — Equipment Leaks (Fugitive Emission Sources) of Benzene;

(g) Subpart L — Benzene Emissions from Coke By-Product Recovery Plants;

(h) Subpart N — Inorganic Arsenic Emissions from Glass Manufacturing Plants;

(i) Subpart O — Inorganic Arsenic Emissions from Primary Copper Smelters;

(j) Subpart P — Inorganic Arsenic Emissions from Arsenic Trioxide and Metallic Arsenic Production Facilities;

(k) Subpart V — Equipment Leaks (Fugitive Emission Sources);

(l) Subpart Y — Benzene Emissions from Benzene Storage Vessels;

(m) Subpart BB — Benzene Emissions from Benzene Transfer Operations; and

(n) Subpart FF — Benzene Waste Operations.

(5) 40 CFR Part 63 Subparts adopted by this rule are titled as follows:

(a) Subpart A — General Provisions. Standards adopted include final rule promulgations through July 1, 2020 of the CFR;

(b) Subpart F — Synthetic Organic Chemical Manufacturing Industry (SOCMI);

(c) Subpart G — SOCMI Process Vents, Storage Vessels, Transfer Operations, and Wastewater;

(d) Subpart H — Equipment Leaks and Fenceline Monitoring for All Emission Sources;

(e) Subpart I — Certain Processes Subject to the Negotiated Regulation for Equipment Leaks;

(f) Subpart J — Polyvinyl Chloride and Copolymers Production;

(g) Subpart L — Coke Oven Batteries;

(h) Subpart M — Perchloroethylene Air Emission Standards for Dry Cleaning Facilities;

(i) Subpart N — Chromium Emissions from Hard and Decorative Chromium Electroplating and Chromium Anodizing Tanks;

(j) Subpart O — Ethylene Oxide Emissions Standards for Sterilization Facilities;
(k) Subpart Q — Industrial Process Cooling Towers;
(l) Subpart R — Gasoline Distribution Facilities (Bulk Gasoline Terminals and Pipeline Breakout Stations);
(m) Subpart S — Pulp and Paper Industry;
(n) Subpart T — Halogenated Solvent Cleaning;
(o) Subpart U — Emissions: Group I Polymers and Resins;
(p) Subpart W — Epoxy Resins and Non-Nylon Polyamides Production;
(q) Subpart X — Secondary Lead Smelting;
(r) Subpart Y — Marine Tank Vessel Loading Operations;
(s) Subpart AA — Phosphoric Acid Manufacturing Plants;
(t) Subpart BB — Phosphate Fertilizer Production Plants;
(u) Subpart CC — Petroleum Refineries;
(v) Subpart DD — Off-Site Waste and Recovery Operations;
(w) Subpart EE — Magnetic Tape Manufacturing Operations;
(x) Subpart GG — Aerospace Manufacturing and Rework Facilities;
(y) Subpart HH — Oil and Natural Gas Production Facilities;
(z) Subpart II — Shipbuilding and Ship Repair (Surface Coating);
(aa) Subpart JJ — Wood Furniture Manufacturing Operations;
(bb) Subpart KK — Printing and Publishing Industry;
(cc) Subpart LL — Primary Aluminum Reduction Plants;
(dd) Subpart MM — Chemical Recovery Combustion Sources at Kraft, Soda, Sulfite and Stand-Alone Semichemical Pulp Mills;
(ee) Subpart NN — Wool Fiberglass Manufacturing at Area Sources;
(ff) Subpart OO — Tanks — Level 1;
(gg) Subpart PP — Containers;
(hh) Subpart QQ — Surface Impoundments;
(ii) Subpart RR — Individual Drain Systems;
(jj) Subpart SS — Closed Vent Systems, Control Devices, Recovery Devices and Routing to a Fuel Gas System or a Process;
(kk) Subpart TT — Equipment Leaks — Control Level 1;
(ll) Subpart UU — Equipment Leaks — Control Level 2;
(mm) Subpart VV — Oil-Water Separators and Organic-Water Separators;
(nn) Subpart WW — Storage Vessels (Tanks) — Control Level 2;
(oo) Subpart XX — Ethylene Manufacturing Process Units: Heat Exchange Systems and Waste Operations;
(pp) Subpart YY — Generic Maximum Achievable Control Technology Standards;
(qq) Subpart CCC — Steel Pickling — HCl Process Facilities and Hydrochloric Acid Regeneration Plants;
(rr) Subpart DDD — Mineral Wool Production;
(ss) Subpart EEE — Hazardous Waste Combustors;
(tt) Subpart GGG — Pharmaceuticals Production;
(uu) Subpart HHH — Natural Gas Transmission and Storage Facilities;
(vv) Subpart III — Flexible Polyurethane Foam Production;
(ww) Subpart JJJ — Group IV Polymers and Resins;
(xx) Subpart LLL — Portland Cement Manufacturing Industry;
(yy) Subpart MMM — Pesticide Active Ingredient Production;
(zz) Subpart NNN — Wool Fiberglass Manufacturing;
(aaa) Subpart OOO — Manufacture of Amino/Phenolic Resins. The standards adopted by reference replaces the language of §63.1405(b)(2)(i) with: The owner or operator of a back-end continuous process vent shall reduce total

organic HAP emissions to less than or equal to 0.95 kilograms of total organic HAP per megagram of resin produced (1.9 pounds of total organic HAP per ton of resin produced);
(bbb) Subpart PPP — Polyether Polyols Production;
(ccc) Subpart QQQ — Primary Copper Smelting;
(ddd) Subpart RRR — Secondary Aluminum Production;
(eee) Subpart TTT — Primary Lead Smelting;
(fff) Subpart UUU — Petroleum Refineries: Catalytic Cracking Units, Catalytic Reforming Units, and Sulfur Recovery Units;
(ggg) Subpart VVV — Publicly Owned Treatment Works;
(hhh) Subpart XXX — Ferroalloys Production: Ferromanganese and Silicomanganese;
(iii) Subpart AAAA — Municipal Solid Waste Landfills;
(jjj) Subpart CCCC — Manufacturing of Nutritional Yeast;
(kkk) Subpart DDDD — Plywood and Composite Wood Products;
(lll) Subpart EEEE — Organic Liquids Distribution (non-gasoline);
(mmm) Subpart FFFF — Miscellaneous Organic Chemical Manufacturing;
(nnn) Subpart GGGG — Solvent Extraction for Vegetable Oil Production;
(ooo) Subpart HHHH — Wet-Formed Fiberglass Mat Production;
(ppp) Subpart IIII — Surface Coating of Automobiles and Light-Duty Trucks;
(qqq) Subpart JJJJ — Paper and Other Web Coating;
(rrr) Subpart KKKK — Surface Coating of Metal Cans;
(sss) Subpart MMMM — Surface Coating of Miscellaneous Metal Parts and Products;
(ttt) Subpart NNNN — Surface Coating of Large Appliances;
(uuu) Subpart OOOO — Printing, Coating, and Dyeing of Fabrics and Other Textiles;
(vvv) Subpart PPPP — Surface Coating of Plastic Parts and Products;
(www) Subpart QQQQ — Surface Coating of Wood Building Products;
(xxx) Subpart RRRR — Surface Coating of Metal Furniture;
(yyy) Subpart SSSS — Surface Coating of Metal Coil;
(zzz) Subpart TTTT — Leather Finishing Operations;
(aaaa) Subpart UUUU — Cellulose Products Manufacturing;
(bbbb) Subpart VVVV — Boat Manufacturing;
(cccc) Subpart WWWW — Reinforced Plastic Composites Production;
(dddd) Subpart XXXX — Rubber Tire Manufacturing;
(eeee) Subpart YYYY — Stationary Combustion Turbines;
(ffff) Subpart ZZZZ — Stationary Reciprocating Internal Combustion Engines (adopted only for sources required to have a Title V or ACDP permit);
(gggg) Subpart AAAAA — Lime Manufacturing Plants;
(hhhh) Subpart BBBBB — Semiconductor Manufacturing;
(iiii) Subpart CCCCC — Coke Ovens: Pushing, Quenching and Battery Stacks;
(jjjj) Subpart DDDDD – Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters;
(kkkk) Subpart EEEEE — Iron and Steel Foundries;
(llll) Subpart FFFFF — Integrated Iron and Steel Manufacturing Facilities;
(mmmm) Subpart GGGGG — Site Remediation;
(nnnn) Subpart HHHHH — Miscellaneous Coating Manufacturing;
(oooo) Subpart IIIII — Mercury Cell Chlor-Alkali Plants;
(pppp) Subpart JJJJJ — Brick and Structural Clay Products Manufacturing;
(qqqq) Subpart KKKKK — Clay Ceramics Manufacturing;
(rrrr) Subpart LLLLL — Asphalt Processing and Asphalt Roofing Manufacturing;

(ssss) Subpart MMMMM — Flexible Polyurethane Foam Fabrication Operations;
(tttt) Subpart NNNNN — Hydrochloric Acid Production;
(uuuu) Subpart PPPPP — Engine Tests Cells/Stands;
(vvvv) Subpart QQQQQ — Friction Materials Manufacturing Facilities;
(wwww) Subpart RRRRR — Taconite Iron Ore Processing;
(xxxx) Subpart SSSSS — Refractory Products Manufacturing;
(yyyy) Subpart TTTTT — Primary Magnesium Refining;
(zzzz) Subpart UUUUU — Coal- and Oil-Fired Electric Utility Steam Generating Units. Standards adopted include final rule promulgations through July 1, 2018 of the CFR;
(aaaaa) Subpart WWWWW — Hospital Ethylene Oxide Sterilizers;
(bbbbb) Subpart YYYYY — Area Sources: Electric Arc Furnace Steelmaking Facilities;
(ccccc) Subpart ZZZZZ — Iron and Steel Foundries Area Sources;
(ddddd) Subpart BBBBBB — Gasoline Distribution Bulk Terminals, Bulk Plants, and Pipeline Facilities;
(eeeee) Subpart DDDDDD — Polyvinyl Chloride and Copolymers Production Area Sources;
(fffff) Subpart EEEEEE — Primary Copper Smelting Area Sources;
(ggggg) Subpart FFFFFF — Secondary Copper Smelting Area Sources;
(hhhhh) Subpart GGGGGG — Primary Nonferrous Metals Area Sources — Zinc, Cadmium, and Beryllium;
(iiiii) Subpart HHHHHH — Paint Stripping and Miscellaneous Surface Coating Operations at Area Sources;
(jjjjj) Subpart JJJJJJ — Industrial, Commercial, and Institutional Boilers Area Sources (adopted only for sources required to have a Title V or ACDP permit);
(kkkkk) Subpart LLLLLL — Acrylic and Modacrylic Fibers Production Area Sources;
(lllll) Subpart MMMMMM — Carbon Black Production Area Sources;
(mmmmm) Subpart NNNNNN — Chemical Manufacturing Area Sources: Chromium Compounds;
(nnnnn) Subpart OOOOOO — Flexible Polyurethane Foam Production and Fabrication Area Sources;
(ooooo) Subpart PPPPPP — Lead Acid Battery Manufacturing Area Sources;
(ppppp) Subpart QQQQQQ — Wood Preserving Area Sources;
(qqqqq) Subpart RRRRRR — Clay Ceramics Manufacturing Area Sources;
(rrrrr) Subpart SSSSSS — Glass Manufacturing Area Sources;
(sssss) Subpart TTTTTT — Secondary Nonferrous Metals Processing Area Sources;
(ttttt) Subpart VVVVVV — Chemical Manufacturing Area Sources;
(uuuuu) Subpart WWWWWW — Area Source Standards for Plating and Polishing Operations;
(vvvvv) Subpart XXXXXX — Area Source Standards for Nine Metal Fabrication and Finishing Source Categories;
(wwwww) Subpart YYYYYY — Area Sources: Ferroalloys Production Facilities;
(xxxxx) Subpart ZZZZZZ — Area Source Standards for Aluminum, Copper, and Other Nonferrous Foundries;
(yyyyy) Subpart AAAAAAA – Area Sources: Asphalt Processing and Asphalt Roofing Manufacturing;
(zzzzz) Subpart BBBBBBB — Area Sources: Chemical Preparations Industry;
(aaaaaa) Subpart CCCCCCC — Area Sources: Paints and Allied Products Manufacturing;
(bbbbbb) Subpart DDDDDDD — Area Sources: Prepared Feeds Manufacturing;
(cccccc) Subpart EEEEEEE — Gold Mine Ore Processing and Production Area Source Category;
(dddddd) Subpart HHHHHHH — Polyvinyl Chloride and Copolymers Production.

STATUTORY/OTHER AUTHORITY: ORS 468.020

STATUTES/OTHER IMPLEMENTED: ORS 468A.025