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August 29, 2007

Robert S. Williams, P.E. Safety and Environmental Engineer Macquarie Longview Acquisitions LLC P.O. Box 98 Stamps, AR 71860

Re: Notice of Administrative Amendment AFIN: 37-00005, Permit No.: 1742-AOP-R4

Dear Mr. Williams:

Enclosed is revised Permit 1742-AOP-R4 completed in accordance with the provisions of Section 26.901 of Regulation No. 26, Regulations of the Arkansas Operating Air Program.

The Sulfur Recovery Unit (SN-04) and its associated emission have been removed from the permit.

Please place the revised permit in your files.

Sincerely,

Mike Bates Chief, Air Division

jwc Enclosure •

ADEQ OPERATING AIR PERMIT

Pursuant to the Regulations of the Arkansas Operating Air Permit Program, Regulation 26:

Permit No. : 1742-AOP-R4 Renewal #1 IS ISSUED TO: Longview Gas Company 213 Lafayette 36 Stamps, AR 71860 Lafayette County AFIN: 37-00005

THIS PERMIT AUTHORIZES THE ABOVE REFERENCED PERMITTEE TO INSTALL, OPERATE, AND MAINTAIN THE EQUIPMENT AND EMISSION UNITS DESCRIBED IN THE PERMIT APPLICATION AND ON THE FOLLOWING PAGES. THIS PERMIT IS VALID BETWEEN:

November 4, 2003

and

November 3, 2008

THE PERMITTEE IS SUBJECT TO ALL LIMITS AND CONDITIONS CONTAINED HEREIN.

Signed:

Mike Bates Chief, Air Division <u>August 29, 2007</u> Date Amended

Table of Contents

SECTION I: FACILITY INFORMATION	
SECTION II: INTRODUCTION	
Summary of Permit Activity	
Process Description	
Regulations	
Emission Summary	
SECTION III: PERMIT HISTORY	9
SECTION IV: SPECIFIC CONDITIONS	
SN-06A, 06B, 07A & 07B	
SN-03	
SN-05	
SN-11	
SN-12	
SN-13A and SN-13B	
SECTION V: COMPLIANCE PLAN AND SCHEDULE	
SECTION VI: PLANTWIDE CONDITIONS	
Title VI Provisions	
SECTION VII: INSIGNIFICANT ACTIVITIES	
SECTION VIII: GENERAL PROVISIONS	
Appendix A	,
Appendix B	

Appendix B Appendix C

List of Acronyms and Abbreviations

A.C.A.	Arkansas Code Annotated
AFIN	ADEQ Facility Identification Number
CFR	Code of Federal Regulations
СО	Carbon Monoxide
HAP	Hazardous Air Pollutant
lb/hr	Pound Per Hour
MVAC	Motor Vehicle Air Conditioner
No.	Number
NO _x	Nitrogen Oxide
PM	Particulate Matter
PM10	Particulate Matter Smaller Than Ten Microns
SNAP	Significant New Alternatives Program (SNAP)
SO ₂	Sulfur Dioxide
SSM	Startup, Shutdown, and Malfunction Plan
Тру	Tons Per Year
UTM	Universal Transverse Mercator
VOC	Volatile Organic Compound

SECTION I: FACILITY INFORMATION

PERMITTEE:

Longview Gas Company

AFIN: 37-00005

PERMIT NUMBER: 1742-AOP-R4

FACILITY ADDRESS: 213 Lafayette 36 Stamps, AR 71860

MAILING ADDRESS:

213 Lafayette 36 Stamps, Arkansas 71860

COUNTY:

Lafayette

CONTACT POSITION: Jim Craighead, Technical Services Manager

TELEPHONE NUMBER: (870) 533-2226

REVIEWING ENGINEER: Wesley Crouch, P.E.

UTM North South (Y): Zone 15: 3679.2

UTM East West (X): Zone 15: 453.9

SECTION II: INTRODUCTION

Summary of Permit Activity

Longview Gas Company operates a natural gas processing plant near Stamps, Lafayette County, Arkansas. With this administrative amendment, Longview Gas proposes to remove the Sulfur Recovery Unit (SN-04) and its associated emissions from the permit.

Process Description

This facility processes low-pressure sour gas and liquids from the McKamie-Patton Unit, and high pressure sweet gas and liquids from the Dorcheat-Macedonia Field. The facility removes the condensate from the incoming gas. The condensate from both separators is then separated into different components and sent to storage. The sour gas and volatilized light ends are compressed upstream of the facility and combined with the high-pressure sweet gas stream onsite. This gas stream is sent to the amine contactor where hydrogen sulfide and carbon dioxide are removed. This "acid gas" is sent to a new, electric motor driven acid gas compressor where the gas is compressed to 1500 psi and pumped back into a well.

The sweetened natural gas then flows to the triethylene glycol (TEG) contactor for dehydration. The water and condensible VOCs (mostly benzene, toluene, ethylbenzene and xylene - BTEX) are removed and sent to storage. The sweetened, dry natural gas is then sent to a mole sieve dehydration unit for additional water vapor removal in preparation for the cryogenic plant. The regeneration gas heater (SN-09) is used to regenerate the mole sieve beds. The natural gas stream is then sent to the Joule-Thompson cryogenic plant where ethane and heavier components are extracted from the gas in liquid form, and sent to pressurized storage.

Two compressors (SN-06A and B) drive the refrigeration system. Propane is used as the refrigerant. A portion of the residue natural gas is routed as plant fuel, and the remainder of the residue gas is compressed into the sales pipeline by two residual compressors (SN-07A and B). The ethane is separated out of the heavy liquids stream and mixed with the residue gas for compression into the sales pipeline. The butane, propane, and pentane are separated from the heavy liquid stream and sent to pressurized storage. Propane, butane, and natural gasoline are periodically loaded into trucks and sold. A direct-fired heater (SN-10) provides the process heat for the de-ethanizer, de-propanizer, and de-butanizer.

Longview operates a nitrogen rejection unit (NRU) for the removal of nitrogen in the sales gas stream. The emissions are designated (SN-12) and consist mostly of nitrogen which is not required to be permitted.

The emergency flare (SN-05) is used to safely vent the gas that would be blown down in an emergency. The flare is not used to burn acid gas in the event that the acid gas compressor is not operating, unless otherwise authorized by the ADEQ.

Regulations

The following table contains the regulations applicable to this permit.

Regulations

Arkansas Air Pollution Control Code, Regulation 18, effective February 15, 1999

Regulations of the Arkansas Plan of Implementation for Air Pollution Control, Regulation 19, effective February 15, 1999

Regulations of the Arkansas Operating Air Permit Program, Regulation 26, effective September 26, 2002

40 CFR Part 52.21, Prevention of Significant Deterioration of Air Quality (PSD)

40 CFR Part 60, Subpart Dc, Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units

40 CFR Part 60, Subpart KKK, Standards for Performance for Equipment Leaks of VOC From Onshore Natural Gas Processing Plants

40 CFR Part 60, Subpart VV, Standards of Performance for Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry

The following table is a summary of emissions from the facility. This table, in itself, is not an enforceable condition of the permit.

Date Amended: August 22, 2007

EMISSION SUMMARY				
Source		Dellestert	Emission Rates	
Number	Description	Pollutant	lb/hr	tpy
		PM	0.3	0.5
		PM_{10}	0.3	0.5
Tata	1 Allowship Designing	SO_2	0.6	0.6
1018	I Allowable Emissions	VOC	54.0	30.1
		CO	13.0	54.9
		NO _X	14.2	59.8
	HAPs*	Hexane*	0.43	0.7
01	Inlet Compressor Engine	Source Deleted		
02	Inlet Compressor Engine	So	urce Deleted	
		PM	0.2	0.4
		PM ₁₀	0.2	0.4
		SO_2	0.1	0.1
03	Steam Boiler	VOC	0.1	0.3
		CO	1.3	3.7
		NO _x	1.5	4.4
		Hexane*	0.01	0.01
04	Sulfur Recovery Unit	So	urce Deleted	
		PM	0.1	0.1
		PM_{10}	0.1	0.1
		SO_2	0.1	0.1
05	Emergency Flare	VOC	0.1	0.1
		CO	0.1	0.2
		NO _x	0.1	0.2
		Hexane*	0.01	0.01
06A	Fast Refrigerant	SO_2	0.1	0.1
	Compressor Engine	VOC	0.2	0.9
L		CO	1.5	6.6

Emission Summary

Date Amended: August 22, 2007

		NO _x	1.6	7.0
		SO ₂	0.1	0.1
060	West Refrigerant	VOC	0.2	0.9
00B	Compressor Engine	CO	1.5	6.6
		NO _x	1.6	7.0
		SO ₂	0.1	0.1
074	East Residue Compressor	VOC	0.6	2.7
0/A	Engine	CO	4.3	18.9
		NO _x	4.7	20.6
		SO_2	0.1	0.1
07D	West Residue Compressor	VOC	0.6	2.7
U/D	Engine	CO	4.3	18.9
		NO _x	4.7	20.6
11	Plant Engitive Emissions	VOC	5.0	22.1
11	Fiant Fugitive Emissions	Hexane*	0.15	0.65
12	Nitrogen Rejection Unit	Methane**	Not Quantified	l in this Permit
12.4	Stabilized Condensate	VOC	23.6	0.2
15A	Storage Tank	Hexane*	0.13	0.01
120	Stabilized Concentrate	VOC	23.6	0.2
138	Storage Tank	Hexane*	0.13	0.01

*HAPs included in the VOC totals. Other HAPs are not included in any other totals unless specifically stated.

SECTION III: PERMIT HISTORY

The Longview Gas Company (formerly the McKamie Gas Plant) was constructed in the 1940's to be a dedicated provider of natural gas to the Stamps power plant. Since the natural gas in the geographic area is high in hydrogen sulfide, the facility has always had a gas sweetening step in the process. Originally, acid tail gas was returned to the formation. At some point in time in 1950's or early 1960's, a one stage Claus unit was installed to recover the sulfur from the acid gas. The one stage unit operated with a recovery efficiency of only 73%. Over 3,000 tpy of SO₂ was being discharged to the atmosphere at that time.

In 1981, the facility replaced the single stage Claus unit with a three stage Claus unit. The newer unit had a recovery efficiency of 95%. It was decided by the Department at that time that the facility did not need a permit since the modification would be a significant emission decrease.

Permit 1742-AOP-R0 was issued on August 24, 1998 to McKamie Gas Plant. This was the first air permit for this facility.

Permit 1742-AOP-R1 was issued on June 29, 2000. The facility's name has changed from McKamie Gas Plant to Longview Gas Company due to a buyout. In this modification, the facility replaced 4 of the old compressor engines with 6 new engines. The permittee triggered PSD netting procedure with this action, however, they were able to net out of PSD review by taking enforceable limits on the steam boiler. They also installed a governor on two of the engines to limit the emissions further.

On September 17, 2001, an Administrative Amendment was approved to remove two compressor engines (SN-01 and SN-02).

Permit 1742-AOP-R2 was issued on February 21, 2002. A process optimization study of the Sulfur Recovery Unit (SRU, SN-04) was completed at the plant. The results indicated that a significant reduction of sulfur dioxide emissions could be obtained by modifying the ratio of air to acid gas flow rates. However, the reduction was also accompanied by an increase in carbon monoxide emissions. The emissions increase of carbon monoxide was below the PSD significance threshold of 100 tpy, and therefore did not require PSD review. The hazardous air pollutants and quantity of each reported by this facility were considered insignificant in Air Permit 1742-AOP-R0. However, reexamination of the initial application concluded that hexane emissions were emitted in quantities above minimum permit thresholds. The hexane emissions from SN-11 were not associated with the requested modification. Emission changes for this modification included a 93.6 ton/yr increase in CO and a 68.7 ton/yr decrease in SO₂.

Permit 1742-AOP-R3 was issued on January 14, 2004. This was the first Title V permit renewal for this facility. Emission limits were revised using up to date emission factor information and stack test data available. Some sources were reclassified as insignificant activities. Emission

Date Amended: August 22, 2007

changes included a 0.3 tpy increase in PM/PM₁₀, a 22.2 tpy increase in VOC, a 7.3 tpy increase in NO_x, and an 0.7 tpy increase in hexane. Emissions of SO₂ decreased by 0.1 tpy and CO emissions decreased by 0.2 tpy.

SECTION IV: SPECIFIC CONDITIONS

SN-06A, 06B, 07A & 07B Compressor Engines

Source Description

Longview Gas Company operates two refrigerant compressor engines (SN-06A, SN-06B), and two residue compressor engines (SN-07A, SN-07B). Two inlet compressor engines were removed from service in 2001. SN-06A and SN-06B are 482 HP Waukesha F2895G engines which will be load limited to 296 HP by the use of a Woodward Model UG8L Hydro-Mechanical Governor in conjunction with an Electronic Overspeed Shutdown manufactured by Altronic Controls, which will limit these two engines to 900 RPM. SN-07A and SN-07B are 889 HP Waukesha 7042GU engines. All four engines are equipped with catalytic converters to reduce CO and NO_x emissions.

Specific Conditions

1. The permittee shall not exceed the emission rates set forth in the following table. The permittee shall demonstrate compliance with this condition through compliance with Specific Conditions 2 and 3. [Regulation 19, §19.501 et seq., effective February 15, 1999 and 40 CFR Part 52, Subpart E]

SN	Pollutant	lb/hr	tpy
	SO ₂	0.1	0.1
064	VOC	0.2	0.9
UOA	СО	1.5	6.6
	NO _x	1.6	7.0
	SO ₂	0.1	0.1
06R	VOC	0.2	0.9
000	СО	1.5	6.6
	NO _x	1.6	7.0
07A	SO ₂	0.1	0.1
·	VOC	0.6	2.7

Date Amended: August 22, 2007

	СО	4.3	18.9
	NO _x	4.7	20.6
	SO ₂	0.1	0.1
07D	VOC	0.6	2.7
0/B	СО	4.3	18.9
	NO _x	4.7	20.6

- 2. The permittee shall conduct performance testing on SN-06A, SN-06B, SN-07A, and SN-07B. Each engine shall be tested at least once every five years. The permittee shall test for NO_X and CO simultaneously at each engine, using EPA Reference Methods 7E and 10, respectively. The engine being tested shall be operating at a level of at least 90% of its permitted capacity during testing. All testing shall be done in accordance with Plantwide Conditions 3 and 4 of this permit. [Regulation 19, §19.702 and 40 CFR Part 52, Subpart E]
- 3. The Waukesha F2895G engines (SN-06A and SN-06B) shall be limited to 296 horsepower. The permittee shall accomplish this by limiting these engines to a maximum of 900 RPM through the use of a Woodward Model UG8L Hydro-Mechanical Governor or equivalent device, and an Electronic Overspeed Shutdown manufactured by Altronic Controls, Inc or equivalent device. These control devices are necessary so that the permittee could net out of PSD review. Therefore, in the event that these engines ever exceed 900 RPM, then this would be considered a PSD violation. [Regulation 19, §19.705, A.C.A. §8-4-203 as referenced by A.C.A. §8-4-304 and §8-4-311, and 40 CFR Part 70.6]
- 4. In the event that any of the compressor engines fail an emission performance test for NO_X , the Department may consider this a PSD violation since the permittee netted out of PSD review with a 38.6 tpy increase for NO_X (significance level for NO_X is 40 tpy). In the event that an emission performance test is failed for NO_X , the Department reserves the right to assume that the particular engine in question was emitting at the measured level of emissions since the previous performance test, unless proven otherwise by facility records. [Regulation 19, §19.901 et seq., and 40 CFR Part 52, Subpart E]
- 5. The permittee shall measure the temperature of the exhaust from the catalytic converter at each engine (SN-06A, SN-06B, SN-07A and SN-07B). The temperature shall be recorded a minimum of once per shift and reported as a daily average. The permittee shall maintain the temperature exiting each catalytic converter between 750 °F and 1200 °F. In the event that a daily average temperature is outside the established range, the

Date Amended: August 22, 2007

permittee shall take immediate corrective action to identify the cause of excess emissions, implement corrective action, and document that temperature levels were returned to normal following the corrective action. The permittee shall maintain these records on site, updated quarterly, and made available to the Department personnel upon request. [Regulation 19, §19.901 et seq. and 40 CFR Part 52, Subpart E]

6. The permittee shall follow a monthly maintenance and inspection schedule around each residue compressor engine and its associated catalytic converter to ensure proper operation. This schedule and monthly records demonstrating that the items in the maintenance and inspection schedule were followed must be kept on site and made available to Department personnel upon request. The permittee shall update these records by the fifteenth day of the month following the month to which the records pertain. [Regulation 19, §19.901 et seq. and 40 CFR Part 52, Subpart E]

SN-03

Steam Boiler

Source Description

SN-03 is a 12.6 MMBtu/hr natural gas fired steam boiler. It was installed in 1996. This boiler is subject to NSPS-Subpart Dc, which requires daily natural gas fuel rate to be monitored and recorded.

Specific Conditions

7. The permittee shall not exceed the emission rates set forth in the following table. The permittee shall demonstrate compliance with this condition through compliance with Specific Condition 10. [Regulation 19, §19.501 et seq. and 40 CFR Part 52, Subpart E]

Pollutant	lb/hr	tpy
PM ₁₀	0.2	0.4
SO ₂	0.1	0.1
VOC	0.1	0.3
СО	1.3	3.7
NO _x	1.5	4.4

8. The permittee shall not exceed the emission rates set forth in the following table. The permittee shall demonstrate compliance with this condition through compliance with Specific Condition 10. [Regulation 18, §18.801, and A.C.A. §8-4-203 as referenced by A.C.A. §8-4-304 and §8-4-311]

Pollutant	lb/hr	tpy
PM	0.2	0.4

9. Visible emissions may not exceed the limits specified in the following table of this permit as measured by EPA Reference Method 9. Compliance shall be demonstrated by burning only natural gas as fuel at SN-03. [A.C.A. §8-4-203 as referenced by A.C.A. §8-4-304 and §8-4-311]

Date Amended: August 22, 2007

SN	Limit	Regulatory Citation
03	5%	§18.501

- 10. The total amount of natural gas fired in the boiler shall not exceed 87,652,000 standard cubic feet during any consecutive twelve month period. Any exceedance of this limit shall be considered a PSD violation since this is a reduced capacity limit necessary so that the permittee could net out of PSD review. [Regulation 19, §19.705, A.C.A. §8-4-203 as referenced by A.C.A. §8-4-304 and §8-4-311, and 40 CFR Part 70.6]
- 11. The permittee shall record the amount of natural gas fired in the boiler on a daily basis. These records shall be updated monthly so that a new twelve month rolling sum is available for inspection by the 15th day of the month following the reported twelve months. These records shall be kept on site, made available to Department personnel upon request, and submitted in accordance with General Provision 7. A copy of NSPS Subpart Dc is presented in Appendix D of this permit. [Regulation 19, §19.304 and §19.705, 40 CFR Part 52, Subpart E, and 40 CFR 60.48c(g)]

SN-05

Emergency Flare

Source Description

Sn-05 is used to safely vent the gas that would be blown down in an emergency. It has been in operation since 1944. It was last modified in 1994.

The flare is subject to 40 CFR 60, Subpart VV §60.482-10 as referenced by Subpart KKK. As a related requirement, the flare will be required to comply with the provisions of §60.18.

Specific Conditions

 The permittee shall not exceed the emission rates set forth in the following table. Emission rates are based on pilot gas only. [Regulation 19, §19.501 et seq. and 40 CFR Part 52, Subpart E]

Pollutant	lb/hr	tpy
PM ₁₀	0.1	0.1
SO ₂	0.1	0.1
VOC	0.1	0.1
СО	0.1	0.2
NO _x	0.1	0.2

 The permittee shall not exceed the emission rates set forth in the following table. Emission rates are based on pilot gas only. [Regulation 18, §18.801, and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

Pollutant	lb/hr	tpy
PM	0.1	0.1
Hexane	0.01	0.01

14. The permittee shall operate the flare in accordance with all requirements stated in 40 CFR §60.18 (general control device requirements). A copy of this section is presented in Appendix A of this permit. [Regulation 19, §19.304 and 40 CFR §60.18]

Date Amended: August 22, 2007

- 15. The permittee shall only flare sour gas during emergency conditions. The permittee shall keep records of any flaring of sour gas. These records shall include the date and time of the flaring, the duration of the flaring, and an estimate of the emissions resulting from the gas flared. The permittee shall submit a report to ADEQ whenever sour gas is vented to the flare for 30 or more minutes, in the aggregate, during a 24-hour period, in accordance with §19.601(c). [Regulation 19, §19.705 and A.C.A. §8-4-203 as referenced by A.C.A. §8-4-304 and §8-4-311]
- 16. The opacity of the flare shall not exceed 5%. Compliance shall be demonstrated by burning only natural gas as fuel for the pilot flame. [Regulation 18, §18.501 and A.C.A. §8-4-203 as referenced by A.C.A. §8-4-304 and §8-4-311]
- The permittee shall not simultaneously operate the Emergency Flare (SN-05) and the Sulfur Recovery Unit (SN-04) at any given time. [Regulation 19, §19.705 and A.C.A. §8-4-203 as referenced by A.C.A. §8-4-304 and §8-4-311]

SN-11

Plant Fugitive Emissions

Source Description

SN-11 is a compilation of fugitive emissions from compressors, pumps, valves, and connections at the facility. Fugitive methane emissions were estimated at 64.2 tpy. However, methane emissions will not be quantified in this permit pursuant to instructions in a Department memo dated March 31, 1998.

Specific Conditions

18. The permittee shall not exceed the emission rates set forth in the following table. The permittee shall demonstrate compliance with this condition through compliance with Specific Conditions 20 through 33. [Regulation 19, §19.501 et seq. and 40 CFR Part 52, Subpart E]

Pollutant	lb/hr	tpy
VOC	5.0	22.1

19. The permittee shall not exceed the emission rates set forth in the following table. The permittee shall demonstrate compliance with this condition through compliance with Specific Conditions 20 through 33. [Regulation 18, §18.801, and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

Pollutant	lb/hr	tpy
Hexane	0.15	0.65

- 20. The facility shall demonstrate compliance with the applicable standards for each pump, pressure relief device, sampling connection system, open-ended valve or line, valve, and flange or any other connector in VOC service and any devices or systems required by Subpart VV §60.482-1 to §482-10 as required by Subpart KKK within 180 days of initial startup of the equipment. Compliance with the required standards shall be determined by a review of records and reports, performance tests and inspection using the methods and procedures specified in §60.485 (See Appendices B and C). Testing was completed as a condition of permit 1741-AOP-R0. [40 CFR 60, §60.482-1]
- 21. Pumps in light liquid service shall follow the leak detection requirements for monitoring, operation and repair. Leaks shall be repaired within 15 calendar days of detection except

Date Amended: August 22, 2007

as provided in §60.482-9. A first attempt at repair shall be made within 5 calendar days of leak detection. Pumps that are subject to §60.482-2(d)(5) shall follow the record keeping requirements of §60.486(h). [40 CFR 60, Subpart VV §60.482-2 as referenced by Subpart KKK]

- 22. The reciprocating compressors at this facility are exempt from the requirements of Subpart VV §60.482-3. However, as specified by the record keeping requirements of §60.635(c), the facility shall record in a log that is kept readily accessible, information and data used to demonstrate that a reciprocating compressor is in wet gas service and is therefore exempted from other requirements. [40 CFR 60, Subpart KKK §60.633(f)]
- 23. The pressure relief devices in gas/vapor service shall follow the operation and monitoring standards of §60.482-4 with the exception of §60.633. [40 CFR 60, Subpart VV and Subpart KKK]
- 24. The sampling connection systems are exempt from the requirements of Subpart VV §60.482-5. [40 CFR 60, Subpart VV as referenced by Subpart KKK]
- 25. The open-ended valves or lines shall be equipped and operated as required by §60.482-6. [40 CFR 60, Subpart KKK, §60.633]
- 26. The valves in gas/vapor service and light liquid service shall be monitored, operated and repaired as required by §60.482-7. Leaks shall be repaired within 15 calendar days of detection except as provided in §60.482-9. The first attempt at repair shall be made within 5 calendar days of leak detection. The valves subject to §60.482-7(g) and (h) are subject to the reporting requirements of §60.486(f). [40 CFR 60, Subpart VV as referenced by Subpart KKK]
- 27. The pumps and valves in heavy liquid service, pressure relief devices in light liquid or heavy liquid service, and flanges and other connectors shall be monitored and repaired as required by §60.482-8. [40 CFR 60, Subpart VV as referenced by Subpart KKK]
- 28. The closed vent systems and control devices shall comply with the provisions of §60.482-10. The vapor recovery systems and combustion devices shall be designed to recover VOC's at ≥95% efficiency. These closed vent systems and control devices shall be operated and maintained in accordance with design specifications and kept in good working order at all times. These systems and devices shall be operated at all times when emissions may be vented to them. The facility shall also keep, in a readily accessible location, the information required in the reporting requirements of §60.486(d). [40 CFR 60, Subpart VV as referenced by Subpart KKK]

19

Date Amended: August 22, 2007

- 29. In accordance with §60.482-10 (f), the closed vent systems shall be designed and operated with no detectable emissions. Within 60 days of achieving the maximum production rate, but not later than 180 days of the startup of the affected equipment, the performance tests required in §60.18 and §60.485 shall be conducted. This testing shall be repeated on an annual basis.
- 30. All of the sources contained in SN-11 are subject to the recordkeeping requirements of §60.486. For each leak detected, the facility shall: [40 CFR 60, Subpart VV as referenced by Subpart KKK]
 - a. Attach a readily visible, waterproof identification marked with the equipment identification number to the leaking equipment.
 - b. Record the following information in a log to be kept for 2 years in a readily accessible location:
 - i. The instrument and operator identification numbers and the equipment identification number.
 - ii. The date the leak was detected and the dates of each attempt to repair the leak.
 - iii. Repair methods applied in each attempt to repair the leak.
 - iv. "Above 10,000 ppm" if the maximum instrument reading measured by the methods specified in §60.485(a) after each repair attempt is equal to or greater than 10,000 ppm.
 - v. "Repair delayed" and the reason for the delay if a leak is not repaired within 15 calendar days after discovery of the leak.
 - vi. The signature of the owner or operator or designate whose decision it was that the repair could not be effected without a process shutdown.
 - vii. The expected date of successful repair of the leak if a leak is not repaired within 15 days.
 - iix. Dates of process unit shutdown that occur while the equipment is unrepaired.
 - ix. The date of successful repair of the leak.

The facility shall also record and keep in a readily accessible location the information required in the reporting requirements of §60.486(e).

31. In addition to the recordkeeping requirements of §60.486 the facility is subject to the recordkeeping requirements of §60.635. For all pressure relief devices subject to §60.633(b)(1), the following shall apply: [40 CFR 60, Subpart KKK]

Date Amended: August 22, 2007

b.

a. When a leak is detected, a readily visible, weatherproof identification, marked with the equipment ID number shall be attached to the leaking equipment.

When each leak is detected, the following information shall be recorded in a log and kept for 2 years in a readily accessible location:

- i. The instrument and operator identification numbers and the equipment identification number.
- ii. The date the leak was detected and the dates of each attempt to repair the leak.
- iii. Repair methods applied in each attempt to repair the leak.
- iv. "Above 10,000 ppm" if the maximum instrument reading measured after each repair attempt is 10,000 ppm or greater.
- v. "Repair delayed" and the reason for the delay if a leak is not repaired within 15 calendar days after the discovery of the leak.
- vi. The signature of the owner or operator or designate whose decision it was that repair could not be effected without a process shutdown.
- vii. The expected date of successful repair of the leak if a leak is not repaired within 15 days.
- viii. Dates of process unit shutdowns that occur while the equipment is unrepaired.
- ix. The date of successful repair of the leak.
- x. A list of identification numbers for equipment that are designated for no detectable emissions. This designation shall be signed by the owner or operator.
- 32. Each owner or operator subject to the provisions of this subpart submit an initial report and semiannual reports to the Department beginning six months after the initial startup date. [40 CFR 60, Subpart VV § 60.487 as referenced by Subpart KKK]

The initial report should include:

- a. Process unit identification.
- b. Number of valves subject to §60.482-7 including the valves exempted in §60.482-7(f).
- c. Number of pumps subject to the requirements of §60.482-2.
- d. Number of compressors subject to §60.482-3.

All semi-annual reports to the Department shall include the following information:

- a. Process unit identification.
- b. For each month during the semiannual period,
 - i. Number of valves for which leaks were detected.
 - ii. Number of valves for which leaks were not repaired as required.
 - iii. Number of pumps for which leaks were detected.
 - iv. Number of pumps for which leaks were not repaired as required.
 - v. Number of compressors for which leaks were detected.

Date Amended: August 22, 2007

- vi. Number of compressors for which leaks were not repaired as required.
- vii. The facts that explain each delay of repair, and where appropriate, why a process unit shutdown was technically infeasible.
- c. Dates of process unit shutdowns which occurred within the semiannual reporting period.
- d. Revisions to items reported in the initial report if changes have occurred since the initial report or subsequent revisions to the initial report.
- 33. In addition to the reporting requirements of §60.487 the facility is subject to the reporting requirements of §60.636. An owner or operator shall include the following information in the initial semiannual report: [40 CFR 60, Subpart KKK]
 - a. Number of pressure relief devices subject to the requirements of §60.633(b) except those exempted as described in §60.636(b).

In addition to the information required in 60.487(c)(2)(i) through (vi), the owner or operator shall include in all semiannual reports, in accordance with General Provision #7, the following information:

- a. Number of pressure relief devices for which leaks were detected.
- b. Number of pressure relief devices for which leaks were not repaired as required.

Date Amended: August 22, 2007

SN-12

Nitrogen Rejection Unit

Source Description

Historically, the plant produced low BTU, high nitrogen-content natural gas for sale at reduced rates to a local power plant. However, in recent years, gas sales to this power plant have ceased. Currently, there is no available market for this high nitrogen-content gas. Therefore, the nitrogen will have to be removed prior to sale. The plant has an inactive nitrogen rejection unit (NRU) which will be reactivated with this permit, in order to produce pipeline quality natural gas. The only new emission source associated with the NRU is the NRU vent (SN-12). The emissions will consist mostly of nitrogen (96%) and methane (4%). There will be no VOC emissions. The methane emissions were estimated in the application as being 217.2 tpy. However, methane emissions will not be quantified in this permit pursuant to instructions in a Department memo dated March 31, 1998.

SN-13A and SN-13B Condensate Storage Tanks

Source Description

Longview Gas Company utilizes two 4000 barrel tanks for condensate storage.

Specific Conditions

34. The permittee shall not exceed the emission rates set forth in the following table. The permittee shall demonstrate compliance with this condition through compliance with Specific Condition 36. [Regulation 19, §19.501 et seq. and 40 CFR Part 52, Subpart E]

SN	Pollutant	lb/hr	tpy
13A	VOC	3.4	2.0
13B	VOC	3.4	2.0

35. The permittee shall not exceed the emission rates set forth in the following table. The permittee shall demonstrate compliance with this condition through compliance with Specific Condition 36. [Regulation 18, §18.801, and A.C.A. §8-4-203 as referenced by A.C.A. §8-4-304 and §8-4-311]

SN	Pollutant	lb/hr	tpy
13A	Hexane	0.02	0.02
13B	Hexane	0.02	0.02

- 36. The permittee shall not exceed an annual throughput rate of 4,599,000 gallons of condensate per consecutive twelve month period at SN-13A and SN-13B. [Regulation 19, §19.705 and A.C.A. §8-4-203 as referenced by A.C.A. §8-4-304 and §8-4-311]
- 37. The permittee shall maintain monthly records which demonstrate compliance with Specific Condition 36. These records shall be updated by the 15th day of the month following the month to which the records pertain. A twelve-month rolling total and each individual month's data shall be kept on site and made available to Department personnel upon request. A copy of these records shall be submitted in accordance with General Provision 7.

SECTION V: COMPLIANCE PLAN AND SCHEDULE

Longview Gas Company will continue to operate in compliance with those identified regulatory provisions. The facility will examine and analyze future regulations that may apply and determine their applicability with any necessary action taken on a timely basis.

SECTION VI: PLANTWIDE CONDITIONS

- The permittee shall notify the Director in writing within thirty (30) days after commencing construction, completing construction, first placing the equipment and/or facility in operation, and reaching the equipment and/or facility target production rate. [Regulation 19, §19.704, 40 CFR Part 52, Subpart E, and A.C.A. §8-4-203 as referenced by A.C.A. §8-4-304 and §8-4-311]
- 2. If the permittee fails to start construction within eighteen months or suspends construction for eighteen months or more, the Director may cancel all or part of this permit. [Regulation 19, §19.410(B) and 40 CFR Part 52, Subpart E]
- 3. The permittee must test any equipment scheduled for testing, unless stated in the Specific Conditions of this permit or by any federally regulated requirements, within the following time frames: (1) new equipment or newly modified equipment within sixty (60) days of achieving the maximum production rate, but no later than 180 days after initial start up of the permitted source or (2) operating equipment according to the time frames set forth by the Department or within 180 days of permit issuance if no date is specified. The permittee must notify the Department of the scheduled date of compliance testing at least fifteen (15) days in advance of such test. The permittee shall submit the compliance test results to the Department within thirty (30) days after completing the testing. [Regulation 19, §19.702 and/or Regulation 18 §18.1002 and A.C.A. §8-4-203 as referenced by A.C.A. §8-4-304 and §8-4-311]
- 4. The permittee must provide: [Regulation 19, §19.702 and/or Regulation 18, §18.1002 and A.C.A. §8-4-203 as referenced by A.C.A. §8-4-304 and §8-4-311]
 - a. Sampling ports adequate for applicable test methods;
 - b. Safe sampling platforms;
 - c. Safe access to sampling platforms; and
 - d. Utilities for sampling and testing equipment.
- 5. The permittee must operate the equipment, control apparatus and emission monitoring equipment within the design limitations. The permittee shall maintain the equipment in good condition at all times. [Regulation 19, §19.303 and A.C.A. §8-4-203 as referenced by A.C.A. §8-4-304 and §8-4-311]
- 6. This permit subsumes and incorporates all previously issued air permits for this facility. [Regulation 26 and A.C.A. §8-4-203 as referenced by A.C.A. §8-4-304 and §8-4-311]

Title VI Provisions

7. The permittee must comply with the standards for labeling of products using ozonedepleting substances. [40 CFR Part 82, Subpart E]

- a. All containers containing a class I or class II substance stored or transported, all products containing a class I substance, and all products directly manufactured with a class I substance must bear the required warning statement if it is being introduced to interstate commerce pursuant to §82.106.
- b. The placement of the required warning statement must comply with the requirements pursuant to §82.108.
- c. The form of the label bearing the required warning must comply with the requirements pursuant to §82.110.
- d. No person may modify, remove, or interfere with the required warning statement except as described in §82.112.
- 8. The permittee must comply with the standards for recycling and emissions reduction, except as provided for MVACs in Subpart B. [40 CFR Part 82, Subpart F]
 - a. Persons opening appliances for maintenance, service, repair, or disposal must comply with the required practices pursuant to §82.156.
 - b. Equipment used during the maintenance, service, repair, or disposal of appliances must comply with the standards for recycling and recovery equipment pursuant to §82.158.
 - c. Persons performing maintenance, service repair, or disposal of appliances must be certified by an approved technician certification program pursuant to §82.161.
 - d. Persons disposing of small appliances, MVACs, and MVAC like appliances must comply with record keeping requirements pursuant to §82.166. ("MVAC like appliance" as defined at §82.152)
 - e. Persons owning commercial or industrial process refrigeration equipment must comply with leak repair requirements pursuant to §82.156.
 - f. Owners/operators of appliances normally containing 50 or more pounds of refrigerant must keep records of refrigerant purchased and added to such appliances pursuant to §82.166.
- 9. If the permittee manufactures, transforms, destroys, imports, or exports a class I or class II substance, the permittee is subject to all requirements as specified in 40 CFR Part 82, Subpart A, Production and Consumption Controls.
- 10. If the permittee performs a service on motor (fleet) vehicles when this service involves ozone depleting substance refrigerant (or regulated substitute substance) in the motor vehicle air conditioner (MVAC), the permittee is subject to all the applicable requirements as specified in 40 CFR part 82, Subpart B, Servicing of Motor Vehicle Air Conditioners.

The term "motor vehicle" as used in Subpart B does not include a vehicle in which final assembly of the vehicle has not been completed. The term "MVAC" as used in Subpart B does not include the air tight sealed refrigeration system used as refrigerated cargo, or the system used on passenger buses using HCFC 22 refrigerant.

11. The permittee can switch from any ozone depleting substance to any alternative listed in the Significant New Alternatives Program (SNAP) promulgated pursuant to 40 CFR Part 82, Subpart G.

SECTION VII: INSIGNIFICANT ACTIVITIES

The following sources are insignificant activities. Any activity that has a state or federal applicable requirement shall be considered a significant activity even if this activity meets the criteria of §26.304 of Regulation 26 or listed in the table below. Insignificant activity determinations rely upon the information submitted by the permittee in an application dated June 28, 2004.

Description	Category
Glycol Reconcentrator Heater (0.335 MMBtu/hr)	Group A, 1
Regeneration Gas Heater (1.1 MM Btu/hr)	Group A, 1
Heat Medium Heater (5.861 MM Btu/hr)	Group A, 1

SECTION VIII: GENERAL PROVISIONS

- 1. Any terms or conditions included in this permit which specify and reference Arkansas Pollution Control & Ecology Commission Regulation 18 or the Arkansas Water and Air Pollution Control Act (A.C.A. §8-4-101 et seq.) as the sole origin of and authority for the terms or conditions are not required under the Clean Air Act or any of its applicable requirements, and are not federally enforceable under the Clean Air Act. Arkansas Pollution Control & Ecology Commission Regulation 18 was adopted pursuant to the Arkansas Water and Air Pollution Control Act (A.C.A. §8-4-101 et seq.). Any terms or conditions included in this permit which specify and reference Arkansas Pollution Control & Ecology Commission Regulation 18 or the Arkansas Water and Air Pollution Control & Ecology Commission Regulation 18 or the Arkansas Water and Air Pollution Control Act (A.C.A. §8-4-101 et seq.) as the origin of and authority for the terms or conditions are enforceable under this Arkansas statute. [40 CFR 70.6(b)(2)]
- 2. This permit shall be valid for a period of five (5) years beginning on the date this permit becomes effective and ending five (5) years later. [40 CFR 70.6(a)(2) and §26.701(B) of the Regulations of the Arkansas Operating Air Permit Program (Regulation 26), effective August 10, 2000]
- 3. The permittee must submit a complete application for permit renewal at least six (6) months before permit expiration. Permit expiration terminates the permittee's right to operate unless the permittee submitted a complete renewal application at least six (6) months before permit expiration. If the permittee submits a complete application, the existing permit will remain in effect until the Department takes final action on the renewal application. The Department will not necessarily notify the permittee when the permit renewal application is due. [Regulation 26, §26.406]
- 4. Where an applicable requirement of the Clean Air Act, as amended, 42 U.S.C. 7401, et seq. (Act) is more stringent than an applicable requirement of regulations promulgated under Title IV of the Act, the permit incorporates both provisions into the permit, and the Director or the Administrator can enforce both provisions. [40 CFR 70.6(a)(1)(ii) and Regulation 26, §26.701(A)(2)]
- 5. The permittee must maintain the following records of monitoring information as required by this permit. [40 CFR 70.6(a)(3)(ii)(A) and Regulation 26, §26.701(C)(2)]
 - a. The date, place as defined in this permit, and time of sampling or measurements;
 - b. The date(s) analyses performed;
 - c. The company or entity performing the analyses;
 - d. The analytical techniques or methods used;
 - e. The results of such analyses; and
 - f. The operating conditions existing at the time of sampling or measurement.
- 6. The permittee must retain the records of all required monitoring data and support information for at least five (5) years from the date of the monitoring sample,

measurement, report, or application. Support information includes all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, and copies of all reports required by this permit. [40 CFR 70.6(a)(3)(ii)(B) and Regulation 26, §26.701(C)(2)(b)]

7. The permittee must submit reports of all required monitoring every six (6) months. If permit establishes no other reporting period, the reporting period shall end on the last day of the anniversary month of the initial Title V permit. The report is due within thirty (30) days of the end of the reporting period. Although the reports are due every six months, each report shall contain a full year of data. The report must clearly identify all instances of deviations from permit requirements. A responsible official as defined in Regulation No. 26, §26.2 must certify all required reports. The permittee will send the reports to the address below: [40 C.F.R. 70.6(a)(3)(iii)(A) and Regulation 26, §26.701(C)(3)(a)]

Arkansas Department of Environmental Quality Air Division ATTN: Compliance Inspector Supervisor 5301 Northshore Drive North Little Rock, AR 72118

8. The permittee shall report to the Department all deviations from permit requirements, including those attributable to upset conditions as defined in the permit.

- a. For all upset conditions (as defined in Regulation19, § 19.601), the permittee will make an initial report to the Department by the next business day after the discovery of the occurrence. The initial report my be made by telephone and shall include:
 - i. The facility name and location
 - ii. The process unit or emission source deviating from the permit limit,
 - iii. The permit limit, including the identification of pollutants, from which deviation occurs,
 - iv. The date and time the deviation started,
 - v. The duration of the deviation,
 - vi. The average emissions during the deviation,
 - vii. The probable cause of such deviations,
 - viii. Any corrective actions or preventive measures taken or being taken to prevent such deviations in the future, and
 - ix. The name of the person submitting the report.

The permittee shall make a full report in writing to the Department within five (5) business days of discovery of the occurrence. The report must include, in addition to the information required by the initial report, a schedule of actions taken or planned to eliminate future occurrences and/or to minimize the amount the permit's limits were exceeded and to reduce the length of time the limits were exceeded. The

permittee may submit a full report in writing (by facsimile, overnight courier, or other means) by the next business day after discovery of the occurrence, and the report will serve as both the initial report and full report.

b. For all deviations, the permittee shall report such events in semi-annual reporting and annual certifications required in this permit. This includes all upset conditions reported in 8a above. The semi-annual report must include all the information as required by the initial and full reports required in 8a.

[Regulation 19, §19.601 and §19.602, Regulation 26, §26.701(C)(3)(b), and 40 CFR 70.6(a)(3)(iii)(B)]

- 9. If any provision of the permit or the application thereof to any person or circumstance is held invalid, such invalidity will not affect other provisions or applications hereof which can be given effect without the invalid provision or application, and to this end, provisions of this Regulation are declared to be separable and severable. [40 CFR 70.6(a)(5), Regulation 26, §26.701(E), and A.C.A. §8-4-203 as referenced by A.C.A. §8-4-304 and §8-4-311]
- 10. The permittee must comply with all conditions of this Part 70 permit. Any permit noncompliance with applicable requirements as defined in Regulation 26 constitutes a violation of the Clean Air Act, as amended, 42 U.S.C. §7401, et seq. and is grounds for enforcement action; for permit termination, revocation and reissuance, for permit modification; or for denial of a permit renewal application. [40 CFR 70.6(a)(6)(i) and Regulation 26, §26.701(F)(1)]
- 11. It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity to maintain compliance with the conditions of this permit. [40 CFR 70.6(a)(6)(ii) and Regulation 26, §26.701(F)(2)]
- 12. The Department may modify, revoke, reopen and reissue the permit or terminate the permit for cause. The filing of a request by the permittee for a permit modification, revocation and reissuance, termination, or of a notification of planned changes or anticipated noncompliance does not stay any permit condition. [40 CFR 70.6(a)(6)(iii) and Regulation 26, §26.701(F)(3)]
- 13. This permit does not convey any property rights of any sort, or any exclusive privilege. [40 CFR 70.6(a)(6)(iv) and Regulation 26, §26.701(F)(4)]
- 14. The permittee must furnish to the Director, within the time specified by the Director, any information that the Director may request in writing to determine whether cause exists for modifying, revoking and reissuing, or terminating the permit or to determine compliance with the permit. Upon request, the permittee must also furnish to the Director copies of records required by the permit. For information the permittee claims confidentiality, the Department may require the permittee to furnish such records directly to the Director

along with a claim of confidentiality. [40 CFR 70.6(a)(6)(v) and Regulation 26, §26.701(F)(5)]

- 15. The permittee must pay all permit fees in accordance with the procedures established in Regulation 9. [40 CFR 70.6(a)(7) and Regulation 26, §26.701(G)]
- 16. No permit revision shall be required, under any approved economic incentives, marketable permits, emissions trading and other similar programs or processes for changes provided for elsewhere in this permit. [40 CFR 70.6(a)(8) and Regulation 26, §26.701(H)]
- 17. If the permit allows different operating scenarios, the permittee shall, contemporaneously with making a change from one operating scenario to another, record in a log at the permitted facility a record of the operational scenario. [40 CFR 70.6(a)(9)(i) and Regulation 26, §26.701(I)(1)]
- 18. The Administrator and citizens may enforce under the Act all terms and conditions in this permit, including any provisions designed to limit a source's potential to emit, unless the Department specifically designates terms and conditions of the permit as being federally unenforceable under the Act or under any of its applicable requirements. [40 CFR 70.6(b) and Regulation 26, §26.702(A) and (B)]
- 19. Any document (including reports) required by this permit must contain a certification by a responsible official as defined in Regulation 26, §26.2. [40 CFR 70.6(c)(1) and Regulation 26, §26.703(A)]
- 20. The permittee must allow an authorized representative of the Department, upon presentation of credentials, to perform the following: [40 CFR 70.6(c)(2) and Regulation 26, §26.703(B)]
 - a. Enter upon the permittee's premises where the permitted source is located or emissions related activity is conducted, or where records must be kept under the conditions of this permit;
 - b. Have access to and copy, at reasonable times, any records required under the conditions of this permit;
 - c. Inspect at reasonable times any facilities, equipment (including monitoring and air pollution control equipment), practices, or operations regulated or required under this permit; and
 - d. As authorized by the Act, sample or monitor at reasonable times substances or parameters for assuring compliance with this permit or applicable requirements.
- 21. The permittee shall submit a compliance certification with the terms and conditions contained in the permit, including emission limitations, standards, or work practices. The permittee must submit the compliance certification annually within 30 days following the last day of the anniversary month of the initial Title V permit. The permittee must also

> submit the compliance certification to the Administrator as well as to the Department. All compliance certifications required by this permit must include the following: [40 CFR 70.6(c)(5) and Regulation 26, §26.703(E)(3)]

- a. The identification of each term or condition of the permit that is the basis of the certification;
- b. The compliance status;
- c. Whether compliance was continuous or intermittent;
- d. The method(s) used for determining the compliance status of the source, currently and over the reporting period established by the monitoring requirements of this permit;
- e. and Such other facts as the Department may require elsewhere in this permit or by \$114(a)(3) and \$504(b) of the Act.
- 22. Nothing in this permit will alter or affect the following: [Regulation 26, §26.704(C)]
 - a. The provisions of Section 303 of the Act (emergency orders), including the authority of the Administrator under that section;
 - b. The liability of the permittee for any violation of applicable requirements prior to or at the time of permit issuance;
 - c. The applicable requirements of the acid rain program, consistent with §408(a) of the Act or,
 - d. The ability of EPA to obtain information from a source pursuant to §114 of the Act.
- 23. This permit authorizes only those pollutant emitting activities addressed in this permit. [A.C.A. §8-4-203 as referenced by A.C.A. §8-4-304 and §8-4-311]
APPENDIX A

CODE OF FEDERAL REGULATIONS TITLE 40--PROTECTION OF ENVIRONMENT CHAPTER I--ENVIRONMENTAL PROTECTION AGENCY SUBCHAPTER C--AIR PROGRAMS PART 60--STANDARDS OF PERFORMANCE FOR NEW STATIONARY SOURCES SUBPART A--GENERAL PROVISIONS

§ 60.1 Applicability.

(a) Except as provided in Subparts B and C, the provisions of this part apply to the owner or operator of any stationary source which contains an affected facility, the construction or modification of which is commenced after the date of publication in this part of any standard (or, if earlier, the date of publication of any proposed standard) applicable to that facility.

(b) Any new or revised standard of performance promulgated pursuant to section 111(b) of the Act shall apply to the owner or operator of any stationary source which contains an affected facility, the construction or modification of which is commenced after the date of publication in this part of such new or revised standard (or, if earlier, the date of publication of any proposed standard) applicable to that facility.

(c) In addition to complying with the provisions of this part, the owner or operator of an affected facility may be required to obtain an operating permit issued to stationary sources by an authorized State air pollution control agency or by the Administrator of the U.S. Environmental Protection Agency (EPA) pursuant to title V of the Clean Air Act (Act) as amended November 15, 1990 (42 U.S.C. 7661). For more information about obtaining an operating permit see part 70 of this chapter.

(d) Site-specific standard for Merck & Co., Inc.'s Stonewall Plant in Elkton, Virginia.

(1) This paragraph applies only to the pharmaceutical manufacturing facility, commonly referred to as the Stonewall Plant, located at Route 340 South, in Elkton, Virginia ("site").

(2) Except for compliance with 40 CFR 60.49b(u), the site shall have the option of either complying directly with the requirements of this part, or reducing the site-wide emissions caps in accordance with the procedures set forth in a permit issued pursuant to 40 CFR 52.2454. If the site chooses the option of reducing the site-wide emissions caps in accordance with the procedures set forth in such permit, the requirements of such permit shall apply in lieu of the otherwise applicable requirements of this part.

(3) Notwithstanding the provisions of paragraph (d)(2) of this section, for any provisions of this part except for Subpart Kb, the owner/operator of the site shall comply with the applicable provisions of this part if the Administrator determines that compliance with the provisions of this part is necessary for achieving the objectives of the regulation and the Administrator notifies the site in accordance with the provisions of the permit issued pursuant to 40 CFR 52.2454.

[40 FR 53346, Nov. 17, 1975; <u>55 FR 51382</u>, Dec. 13, 1990; <u>59 FR 12427</u>, March 16, 1994; <u>62</u> FR 52641, Oct. 8, 1997]

§ 60.2 Definitions.

The terms used in this part are defined in the Act or in this section as follows:

"Act" means the Clean Air Act (42 U.S.C. 7401 et seq.)

"Administrator" means the Administrator of the Environmental Protection Agency or his authorized representative.

"Affected facility" means, with reference to a stationary source, any apparatus to which a standard is applicable.

"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 the Administrator's satisfaction to, in specific cases, produce results adequate for his determination of compliance. "Approved permit program means" a State permit program approved by the Administrator as meeting the requirements of part 70 of this chapter or a Federal permit program established in this chapter pursuant to title V of the Act (42 U.S.C. 7661).

"Capital expenditure" means an expenditure for a physical or operational change to an existing facility which exceeds the product of the applicable "annual asset guideline repair allowance percentage" specified in the latest edition of Internal Revenue Service (IRS) Publication 534 and the existing facility's basis, as defined by <u>section 1012 of the Internal Revenue Code</u>. 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.

"Clean coal technology demonstration project" means a project using funds appropriated under the heading 'Department of Energy-Clean Coal Technology', up to a total amount of \$2,500,000,000 for commercial demonstrations of clean coal technology, or similar projects funded through appropriations for the Environmental Protection Agency.

"Commenced" means, with respect to the definition of "new source" in section 111(a)(2) of the Act, 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. "Construction" means fabrication, erection, or installation of an affected facility.

"Continuous monitoring system" means the total equipment, required under the emission monitoring sections in applicable subparts, used to sample and condition (if applicable), to analyze, and to provide a permanent record of emissions or process parameters.

"Electric utility steam generating unit" means any steam electric generating unit that is constructed for the purpose of supplying more than one-third of its potential electric output capacity and more than 25 MW electrical output to any utility power distribution system for sale. Any steam supplied to a steam distribution system for the purpose of providing steam to a steamelectric generator that would produce electrical energy for sale is also considered in determining the electrical energy output capacity of the affected facility.

"Equivalent method" means any method of sampling and analyzing for an air pollutant which has been demonstrated to the Administrator's satisfaction to have a consistent and quantitatively known relationship to the reference method, under specified conditions.

"Excess Emissions and Monitoring Systems Performance Report" is a report that must be submitted periodically by a source in order to provide data on its compliance with stated emission limits and operating parameters, and on the performance of its monitoring systems. "Existing facility" means, with reference to a stationary source, any apparatus of the type for which a standard is promulgated in this part, and the construction or modification of which was commenced before the date of proposal of that standard; or any apparatus which could be altered in such a way as to be of that type.

"Isokinetic sampling" means sampling in which the linear velocity of the gas entering the sampling nozzle is equal to that of the undisturbed gas stream at the sample point.

"Issuance" of a part 70 permit will occur, if the State is the permitting authority, in accordance with the requirements of part 70 of this chapter and the applicable, approved State permit program. When the EPA is the permitting authority, issuance of a title V permit occurs immediately after the EPA takes final action on the final permit.

"Malfunction" means any sudden, infrequent, and not reasonably preventable failure of air pollution control equipment, process equipment, or a process to operate in a normal or usual manner. Failures that are caused in part by poor maintenance or careless operation are not malfunctions.

"Modification" means any physical change in, or change in the method of operation of, an existing facility which increases the amount of any air pollutant (to which a standard applies) emitted into the atmosphere by that facility or which results in the emission of any air pollutant (to which a standard applies) into the atmosphere not previously emitted.

"Monitoring device" means the total equipment, required under the monitoring of operations sections in applicable subparts, used to measure and record (if applicable) process parameters. "Nitrogen oxides" means all oxides of nitrogen except nitrous oxide, as measured by test methods set forth in this part.

"One-hour period" means any 60-minute period commencing on the hour.

"Opacity" means the degree to which emissions reduce the transmission of light and obscure the view of an object in the background.

"Owner or operator" means any person who owns, leases, operates, controls, or supervises an affected facility or a stationary source of which an affected facility is a part.

"Part 70 permit" means any permit issued, renewed, or revised pursuant to part 70 of this chapter. "Particulate matter" means any finely divided solid or liquid material, other than uncombined water, as measured by the reference methods specified under each applicable subpart, or an equivalent or alternative method.

"Permit program" means a comprehensive State operating permit system established pursuant to title V of the Act (<u>42 U.S.C. 7661</u>) and regulations codified in part 70 of this chapter and applicable State regulations, or a comprehensive Federal operating permit system established pursuant to title V of the Act and regulations codified in this chapter.

"Permitting authority" means:

The State air pollution control agency, local agency, other State agency, or other agency authorized by the Administrator to carry out a permit program under part 70 of this chapter; or
 The Administrator, in the case of EPA-implemented permit programs under title V of the Act (42 U.S.C. 7661).

"Proportional sampling" means sampling at a rate that produces a constant ratio of sampling rate to stack gas flow rate.

"Reactivation of a very clean coal-fired electric utility steam generating unit" means any physical change or change in the method of operation associated with the commencement of commercial operations by a coal-fired utility unit after a period of discontinued operation where the unit: (1) Has not been in operation for the two-year period prior to the enactment of the Clean Air Act Amendments of 1990, and the emissions from such unit continue to be carried in the permitting

authority's emissions inventory at the time of enactment;

(2) Was equipped prior to shut-down with a continuous system of emissions control that achieves a removal efficiency for sulfur dioxide of no less than 85 percent and a removal efficiency for particulates of no less than 98 percent;

(3) Is equipped with low-NO subx burners prior to the time of commencement of operations following reactivation; and

(4) Is otherwise in compliance with the requirements of the Clean Air Act.

"Reference method" means any method of sampling and analyzing for an air pollutant as specified in the applicable subpart.

"Repowering" means replacement of an existing coal-fired boiler with one of the following clean coal technologies: atmospheric or pressurized fluidized bed combustion, integrated gasification combined cycle, magnetohydrodynamics, direct and indirect coal-fired turbines, integrated gasification fuel cells, or as determined by the Administrator, in consultation with the Secretary of Energy, a derivative of one or more of these technologies, and any other technology capable of controlling multiple combustion emissions simultaneously with improved boiler or generation efficiency and with significantly greater waste reduction relative to the performance of technology in widespread commercial use as of November 15, 1990. Repowering shall also include any oil and/or gas-fired unit which has been awarded clean coal technology demonstration funding as of January 1, 1991, by the Department of Energy.

"Run" means the net period of time during which an emission sample is collected. Unless otherwise specified, a run may be either intermittent or continuous within the limits of good engineering practice.

"Shutdown" means the cessation of operation of an affected facility for any purpose.

"Six-minute period" means any one of the 10 equal parts of a one-hour period.

"Standard" means a standard of performance proposed or promulgated under this part. "Standard conditions" means a temperature of 293 K (68° F) and a pressure of 101.3 kilopascals (29.92 in Hg).

"Startup" means the setting in operation of an affected facility for any purpose.

"State" means all non-Federal authorities, including local agencies, interstate associations, and State-wide programs, that have delegated authority to implement: (1) The provisions of this part; and/or (2) the permit program established under part 70 of this chapter. The term State shall have its conventional meaning where clear from the context.

"Stationary source" means any building, structure, facility, or installation which emits or may emit any air pollutant.

"Title V permit" means any permit issued, renewed, or revised pursuant to Federal or State regulations established to implement title V of the Act (<u>42 U.S.C. 7661</u>). A title V permit issued by a State permitting authority is called a part 70 permit in this part.

"Volatile Organic Compound" means any organic compound which participates in atmospheric photochemical reactions; or which is measured by a reference method, an equivalent method, an alternative method, or which is determined by procedures specified under any subpart.

[<u>44 FR 55173</u>, Sept. 25, 1979, as amended at 45 FR 5617, Jan. 23, 1980; <u>45 FR 85415</u>, Dec. 24, 1980; 54 FR 6662, Feb. 14, 1989; <u>55 FR 51382</u>, Dec. 13, 1990; <u>57 FR 32338</u>, July 21, 1992; <u>59 FR 12427</u>, March 16, 1994]

§ 60.3 Units and abbreviations.

Used in this part are abbreviations and symbols of units of measure. These are defined as follows: (a) System International (SI) units of measure:

A--ampere g--gram Hz--hertz J--joule K--degree Kelvin kg--kilogram m--meter m super3 --cubic meter mg--milligram--10 super-3 gram mm--millimeter--10 super-3 meter Mg--megagram--10 super6 gram mol--mole N--newton ng--nanogram--10 super-9 gram nm--nanometer--10 super-9 meter Pa--pascal s--second V--volt W--watt omega--ohm mug--microgram--10 super-6 gram (b) Other units of measure: Btu-British thermal unit ^o C--degree Celsius (centigrade) cal--calorie cfm--cubic feet per minute cu ft--cubic feet dcf-dry cubic feet dcm--dry cubic meter dscf--dry cubic feet at standard conditions dscm--dry cubic meter at standard conditions eq--equivalent ^o F--degree Fahrenheit ft--feet gal--gallon gr--grain g-eq--gram equivalent hr--hour in--inch k--1.000 l--liter lpm--liter per minute

lb--pound meq-milliequivalent min--minute ml--milliliter mol. wt.--molecular weight ppb-parts per billion ppm--parts per million psia-pounds per square inch absolute psig--pounds per square inch gage ° R--degree Rankine scf--cubic feet at standard conditions scfh-cubic feet per hour at standard conditions scm--cubic meter at standard conditions sec-second sq ft--square feet std--at standard conditions (c) Chemical nomenclature: CdS--cadmium sulfide CO carbon monoxide CO sub2 -- carbon dioxide HCl--hydrochloric acid Hg--mercury H sub2 O--water H sub2 2S--hydrogen sulfide H sub2 SO sub4 --sulfuric acid N sub2 --nitrogen NO--nitric oxide NO sub2 -- nitrogen dioxide NO subx --nitrogen oxides O sub2 --oxygen SO sub2 --sulfur dioxide SO--L3%L--sulfur trioxide SO subx --sulfur oxides (d) Miscellaneous: A.S.T.M .- American Society for Testing and Materials

[42 FR 37000, July 19, 1977; <u>42 FR 38178</u>, July 27, 1977]

§ 60.4 Address.

(a) All requests, reports, applications, submittals, and other communications to the Administrator pursuant to this part shall be submitted in duplicate to the appropriate Regional Office of the U.S. Environmental Protection Agency to the attention of the Director of the Division indicated in the following list of EPA Regional Offices.

Region I (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont), Director, Air Management Division, U.S. Environmental Protection Agency, John F. Kennedy Federal Building, Boston, MA 02203.

Region II (New Jersey, New York, Puerto Rico, Virgin Islands), Director, Air and Waste Management Division, U.S. Environmental Protection Agency, Federal Office Building, 26 Federal Plaza (Folev Square), New York, NY 10278.

Region III (Delaware, District of Columbia, Maryland, Pennsylvania, Virginia, West Virginia), Director, Air and Waste Management Division, U.S. Environmental Protection Agency, Curtis Building, Sixth and Walnut Streets, Philadelphia, PA 19106.

Region IV (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee), Director, Air and Waste Management Division, U.S. Environmental Protection Agency, 345 Courtland Street, NE., Atlanta, GA 30365.

Region V (Illinois, Indiana, Michigan, Minnesota, Ohio, Wisconsin), Director, Air and Radiation Division, U.S. Environmental Protection Agency, 77 West Jackson Boulevard, Chicago, IL 60604-3590.

Region VI (Arkansas, Louisiana, New Mexico, Oklahoma, Texas); Director; Air, Pesticides, and Toxics Division; U.S. Environmental Protection Agency, 1445 Ross Avenue, Dallas, TX 75202. Region VII (Iowa, Kansas, Missouri, Nebraska), Director, Air and Toxics Division, U.S. Environmental Protection Agency, 726 Minnesota Avenue, Kansas City, KS 66101.

Region VIII (Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming) Assistant Regional Administrator, Office of Enforcement, Compliance and Environmental Justice, 999 18th Street, Suite 300, Denver, CO 80202-2466.

Region IX (American Samoa, Arizona, California, Guam, Hawaii, Nevada, Northern Mariana Islands), Director, Air Division, U.S. Environmental Protection Agency, 75 Hawthorne Street, San Francisco, CA 94105.

Region X (Alaska, Idaho, Oregon, Washington), Director, Air and Waste Management Division, U.S. Environmental Protection Agency, 1200 Sixth Avenue, Seattle, WA 98101.

(b) Section 111(c) directs the Administrator to delegate to each State, when appropriate, the authority to implement and enforce standards of performance for new stationary sources located in such State. All information required to be submitted to EPA under paragraph (a) of this section, must also be submitted to the appropriate State Agency of any State to which this authority has been delegated (provided, that each specific delegation may except sources from a certain Federal or State reporting requirement). The appropriate mailing address for those States whose delegation request has been approved is as follows:

(A) [Reserved]

(B) State of Alabama, Air Pollution Control Division, Air Pollution Control Commission, 645 S. McDonough Street, Montgomery, Alabama 36104.

(C) State of Alaska, Department of Environmental Conservation, Pouch O, Juneau, Alaska 99811.

(D) Arizona:

Arizona Department of Environmental Quality, Office of Air Quality, P.O. Box 600, Phoenix, AZ 85001-0600.

Maricopa County Air Pollution Control, 2406 S. 24th Street, Suite E-214, Phoenix, AZ 85034. Pima County Department of Environmental Quality, 130 West Congress Street, 3rd Floor, Tucson, AZ 85701-1317.

Pinal County Air Quality Control District, Building F, 31 North Pinal Street, Florence, AZ 85232.

Note: For tables listing the delegation status of agencies in Region IX, see paragraph (d) of this

section.

(E) State of Arkansas: Chief, Air Division, Arkansas Department of Environmental Quality, 8001 National Drive, P.O. Box 8913, Little Rock, Arkansas 72219.

(F) California:

Amador County Air Pollution Control District, 500 Argonaut Lane, Jackson, CA 95642. Antelope Valley Air Pollution Control District, 43301 Division Street, Suite 206, P.O. Box 4409, Lancaster, CA 93539-4409.

Bay Area Air Quality Management District, 939 Ellis Street, San Francisco, CA 94109. Butte County Air Pollution Control District, 2525 Dominic Drive, Suite J, Chico, CA 95928-7184.

Calaveras County Air Pollution Control District, 891 Mountain Ranch Rd., San Andreas, CA 95249.

Colusa County Air Pollution Control District, 100 Sunrise Blvd., Suite F, Colusa, CA 95932-3246.

El Dorado County Air Pollution Control District, 2850 Fairlane Court, Bldg. C, Placerville, CA 95667-4100.

Feather River Air Quality Management District, 938 14th Street, Marysville, CA 95901-4149. Glenn County Air Pollution Control District, 720 N. Colusa Street, P.O. Box 351, Willows, CA 95988-0351.

Great Basin Unified Air Pollution Control District, 157 Short Street, Suite 6, Bishop, CA 93514-3537.

Imperial County Air Pollution Control District, 150 South Ninth Street, El Centro, CA 92243-2801.

Kern County Air Pollution Control District (Southeast Desert), 2700 M. Street, Suite 302, Bakersfield, CA 93301-2370.

Lake County Air Quality Management District, 885 Lakeport Blvd., Lakeport, CA 95453-5405. Lassen County Air Pollution Control District, 175 Russell Avenue, Susanville, CA 96130-4215. Mariposa County Air Pollution Control District, P.O. Box 5, Mariposa, CA 95338.

Mendocino County Air Pollution Control District, 306 E. Gobbi Street, Ukiah, CA 95482-5511. Modoc County Air Pollution Control District, 202 W. 4th Street, Alturas, CA 96101-3915.

Mojave Desert Air Quality Management District, 14306 Part Avenue, Victorville, CA 92392-2310.

Monterey Bay Unified Air Pollution Control District, 24580 Silver Cloud Ct., Monterey, CA 93940-6536.

North Coast Unified Air Pollution Control District, 2300 Myrtle Avenue, Eureka, CA 95501-3327.

Northern Sierra Air Quality Management District, 200 Litton Drive, P.O. Box 2509, Grass Valley, CA 95945-2509.

Northern Sonoma County Air Pollution Control District, 150 Matheson Street, Healdsburg, CA 95448-4908.

Placer County Air Pollution Control District, DeWitt Center, 11464 "B" Avenue, Auburn, CA 95603-2603.

Sacramento Metropolitan Air Quality Management District, 777 12th Street, Third Floor, Sacramento, CA 95814-1908.

San Diego County Air Pollution Control District, 9150 Chesapeake Drive, San Diego, CA 92123-1096.

San Joaquin Valley Unified Air Pollution Control District, 1999 Tuolumne Street, 1990 E. Gettysburg, Fresno, CA 93726.

San Luis Obispo County Air Pollution Control District, 3433 Roberto Court, San Luis Obispo, CA 93401-7126.

Santa Barbara County Air Pollution Control District, 26 Castilian Drive, B-23, Goleta, CA 93117-3027.

Shasta County Air Quality Management District, 1855 Placer Street, Suite 101, Redding, CA 96001-1759.

Siskiyou County Air Pollution Control District, 525 So. Foothill Drive, Yreka, CA 96097-3036. South Coast Air Quality Management District, 21865 E. Copley Drive, Diamond Bar, CA 91765-4182.

Tehama County Air Pollution Control District, P.O. Box 38 (1750 Walnut Street), Red Bluff, CA 96080-0038.

Tuolumne County Air Pollution Control District, 2 South Green Street, Sonora, CA 95370-4618. Ventura County Air Pollution Control District, 669 County Square Drive, Ventura, CA 93003-5417.

Yolo-Solano Air Quality Management District, 1947 Galileo Ct., Suite 103, Davis, CA 95616-4882.

Note: For tables listing the delegation status of agencies in Region IX, see paragraph (d) of this section.

(G) State of Colorado, Department of Public Health and Environment, 4300 Cherry Creek Drive South, Denver, CO 80222-1530.

(H) State of Connecticut, Bureau of Air Management, Department of Environmental Protection, State Office Building, 165 Capitol Avenue, Hartford, CT 06106.

(I) State of Delaware, Delaware Department of Natural Resources and Environmental Control, 89 Kings Highway, P.O. Box 1401. Dover, Delaware 19901.

(J) District of Columbia, Department of Consumer and Regulatory Affairs, 5000 Overlook Avenue SW., Washington, DC 20032.

(K) Bureau of Air Quality Management, Department of Environmental Regulation, Twin Towers Office Building, 2600 Blair Stone Road, Tallahassee, Florida 32301.

(L) State of Georgia, Environmental Protection Division, Department of Natural Resources, 270 Washington Street, S.W., Atlanta, Georgia 30334.

(M) Hawaii:

Hawaii State Agency, Clean Air Branch, 919 Ala Moana Blvd., 3rd Floor, Post Office Box 3378, Honolulu, HI 96814.

Note: For tables listing the delegation status of agencies in Region IX, see paragraph (d) of this section.

(N) State of Idaho, Department of Health and Welfare, Statehouse, Boise, Idaho 83701.

(O) State of Illinois, Bureau of Air, Division of Air Pollution Control, Illinois Environmental Protection Agency, 2200 Churchill Road, Springfield, IL 62794-9276.

(P) State of Indiana, Indiana Department of Environmental Management, 100 North Senate Avenue, P.O. Box 6015, Indianapolis, Indiana 46206-6015.

(Q) State of Iowa: Iowa Department of Natural Resources, Environmental Protection Division, Henry A. Wallace Building, 900 East Grand, Des Moines, Iowa 50319. (R) State of Kansas: Kansas Department of Health and Environment, Bureau of Air Quality and Radiation Control, Forbes Field, Topeka, Kansas 66620.

(S) Division of Air Pollution Control, Department for Natural Resources and Environmental Protection, U.S. 127, Frankfort, Ky. 40601.

(T) State of Louisiana: Program Administrator, Air Quality Division, Louisiana Department of Environmental Quality, P.O. Box 44096, Baton Rouge, Louisiana 70804.

(U) State of Maine, Bureau of Air Quality Control, Department of Environmental Protection, State House, Station No. 17, Augusta, ME 04333.

(V) State of Maryland: Bureau of Air Quality and Noise Control, Maryland State Department of Health and Mental Hygiene, 201 West Preston Street, Baltimore, Maryland 21201.

(W) Commonwealth of Massachusetts, Division of Air Quality Control, Department of Environmental Protection, One Winter Street, 7th floor, Boston, MA 02108.

(X) State of Michigan, Air Quality Division, Michigan Department of Environmental Quality, P.O. Box 30260, Lansing, Michigan 48909.

(Y) Minnesota Pollution Control Agency, Division of Air Quality, 520 Lafayette Road, St. Paul, Minnesota 55155.

(Z) Bureau of Pollution Control, Department of Natural Resources, P.O. Box 10385, Jackson, Mississippi 39209.

(AA) State of Missouri: Missouri Department of Natural Resources, Division of Environmental Quality, P.O. Box 176, Jefferson City, Missouri 65102.

(BB) State of Montana, Department of Environmental Quality, 1520 E. 6th Ave., PO Box 200901, Helena, MT 59620-0901.

Note: For a table listing Region VIII's NSPS delegation status, see paragraph (c) of this section. (CC) State of Nebraska, Nebraska Department of Environmental Control, P.O. Box 94877, State House Station, Lincoln, Nebraska 68509.

Lincoln-Lancaster County Health Department, Division of Environmental Health, 2200 St. Marys Avenue, Lincoln, Nebraska 68502.

(DD) Nevada:

Nevada State Agency, Air Pollution Control, Bureau of Air Quality/Division of Environmental Protection, 333 West Nye Lane, Carson City, NV 89710.

Clark County Department of Air Quality Management, 500 S. Grand Central Parkway, First floor, Las Vegas, NV 89155-1776.

Washoe County Air Pollution Control, Washoe County District Air Quality Management, P.O. Box 11130, 1001 E. Ninth Street, Reno, NV 89520.

Note: For tables listing the delegation status of agencies in Region IX, see paragraph (d) of this section.

(EE) State of New Hampshire, Air Resources Division, Department of Environmental Services, 64 North Main Street, Caller Box 2033, Concord, NH 03302-2033.

(FF) State of New Jersey: New Jersey Department of Environmental Protection, Division of Environmental Quality, Enforcement Element, John Fitch Plaza, CN- 027, Trenton, New Jersey 08625.

(1) The following table lists the specific source and pollutant categories that have been delegated to the states in Region II. The (X) symbol is used to indicate each category that has been delegated.

-			S	tate .	
-	Subpart	New Jersey	New York	Puerto Rico	Virgin Islands
D	Fossil-Fuel Fired Steam Generators for Which Construction Commenced After August 17, 1971 (Steam Generators and Lignite Fired	Χ	X	Χ	X
Da	Electric Utility Steam Generating Units for Which Construction Commenced After September 18, 1978	Х	•	х	
Db	Industrial-Commercial-Institutional Steam Generating Units	x	X	X	х
Е	Incinerators	Χ	х	х	х
F	Portland Cement Plants	x	х	x	х
Ĝ	Nitric Acid Plants	X	X	X	x
ਪ	Sulfuric Acid Plants	x	x	x	x
·T	Apphalt Congrete Diante	*** * * * * * * * *	V V	v	v
- -	Reputer Concrete Figures	v	л v	A	X V
·U	Petroreum Relineries(All	A	Δ	A	Δ
ĸ	Storage Vessels for Petroleum Liquids Constructed After June 11, 1973, and prior to May 19,	Χ	x	X	x
Vo	Ctorpeo Modeolo for Detroloum				
nd	Liquids Constructed After May 18, 1978	A	Δ	- <u></u>	
т.	Secondary Lead Smelters	x	Y	v	v
M .	Secondary Brass and Bronze Ingot Production Plants	X	X	X	X
N	Tron and Steel Plants	x ·	v	v	.
<u>N</u>	Course Prostmont Dista	л v	д v	м	A V
D D	Devage freatment Francs	A	A		A
P	Primary Copper Smelters	A	A	A	X
õ	Primary Zinc Smelters	X	X	X	X
R	Primary Lead Smelters	X	X	X	X
S	Primary Aluminum Reduction	x	X	x	X
T	Phosphate Fertilizer Industry: Wet Process Phosphoric Acid	X	X	x	X
U	Plants Phosphate Fertilizer Industry: Superphosphoric Acid Plants	x	x	x	х
v	Phosphate Fertilizer Industry: Diammonium Phosphate Plants	x	x	x	x
W	Phosphate Fertilizer Industry:	x	x	x	х
X	Phosphate Prilizer Industry: Granular Triple	X	x	X	X
	superphosphate				
Y	Coal Preparation Plants	X	x	Χ	Х
Z	Ferroally Production Facilities	X	X	X	Х
AA	Steel Plants: Electric Arc	Χ	X	Χ	X
AAa	Electric Arc Furnaces and Argon-Oxygen Decarburization Vessels in Steel Plants	x	X	x	

BB CC DD EE	Kraft Pulp Mills Glass Manufacturing Plants Grain Elevators Surface Coating of Metal Furniture	X X X X	X X X X	X X X
GG	Stationary Gas Turbines	X	X	X
HH	Lime Plants	X	X	X
KK	Lead Acid Battery Manufacturing	X	X	
LL	Metallic Mineral Processing Plants	x	X	x
MM	Automobile and Light-Duty Truck	X	x	
NN	Phosphate Rock Plants	х	x	
pp	Ammonium Sulfate Manufacturing	X	X	
	Plants.			
QQ	Graphic Art Industry Publication	x	x	x x
ממ	Rocogravure Frincing	v	v	v
Γſ	Surface Costing Operations	д	A	A
99	Industrial Surface Coating: Large	x	x	x
55	Annliances	42	21	220.00***
- Thurn	Metal Coil Surface Coating	x	x	X
τπτ	Asphalt Processing and Asphalt	X.	X	X
00	Roofing Manufacture	*** * * * * * * *	22	22
177	Equipment Leaks of Volatile Organic	x		X
vv	Compounds in Synthetic Organic			1
	Chemical Manufacturing			
	Industry			•
TATTAT -	Beverage Can Surface Costing	x	x	x
8424	Industry	*** * * * * * * *	*** • • • •	4 2 6 6 6 6 6 6 6 7
vv	Bulk Casoline Terminals	x ·	x	x
ਨਨ ਬੁਦੂਬ	Elevible Vinvl and Urethane Coating	X	x	X
T.T.T.	and Printing		11	41
CCC	Equipment Leaks of VOC in Petroleum	X		X
	Refineries			
ици	Synthetic Fiber Production	x		X
111111	Facilities	*** * * * * * * *		
	Petroleum Dry Cleapers	x	x	x
000 777	Equipment Leaks of VOC from Onshore	*** * * * * * * * *		
1/1/1/	Natural Cac Processing Plants			
T.T.7.	Onshore Natural Cas Processing		x	
يدبيانيا	Dlante. SO Emissions		11	
000	Normetallic Mineral Processing		x	x
000	Diante Diante		*** • • • •	*** * * * * * * *
חתם	Wool Fiberglage Ingulation		X	X
	Manufacturing Plants			

(GG) State of New Mexico: Director, New Mexico Environmental Improvement Division, Health and Environment Department, 1190 St. Francis Drive, Santa Fe, New Mexico 87503.
(i) The City of Albuquerque and Bernalillo County: Director, The Albuquerque Environmental Health Department, The City of Albuquerque, P.O. Box 1293, Albuquerque, New Mexico 87103.
(HH) New York: New York State Department of Environmental Conservation, 50 Wolf Road, New York 12233, attention: Division of Air Resources.

(II) North Carolina Environmental Management Commission, Department of Natural and Economic Resources, Division of Environmental Management, P.O. Box 27687, Raleigh, North Carolina 27611. Attention: Air Quality Section.

(JJ) State of North Dakota, Division of Air Quality, North Dakota Department of Health, P.O.

Box 5520, Bismarck, ND 58506-5520.

Note: For a table listing Region VIII's NSPS delegation status, see paragraph (c) of this section. (KK) State of Ohio--

(i) Medina, Summit and Portage Counties; Director, Akron Regional Air Quality Management District, 177 South Broadway, Akron, Ohio 44308.

(ii) Stark County: Air Pollution Control Division, 420 Market Avenue North, Canton, Ohio 44702-3335.

(iii) Butler, Clermont, Hamilton, and Warren Counties: Air Program Manager, Hamilton County Department of Environmental Services, 1632 Central Parkway, Cincinnati, Ohio 45210.

(iv) Cuyahoga County: Commissioner, Department of Public Health & Welfare, Division of Air Pollution Control, 1925 Saint Clair, Cleveland, Ohio 44114.

(v) Belmont, Carroll, Columbiana, Harrison, Jefferson, and Monroe Counties: Director, North Ohio Valley Air Authority (NOVAA), 814 Adams Street, Steubenville, Ohio 43952.

(vi) Clark, Darke, Greene, Miami, Montgomery, and Preble Counties: Director, Regional Air Pollution Control Agency (RAPCA) 451 West Third Street, Dayton, Ohio 45402.

(vii) Lucas County and the City of Rossford (in Wood County): Director, Toledo Environmental Services Agency, 26 Main Street, Toledo, Ohio 43605.

(viii) Adams, Brown, Lawrence, and Scioto Counties; Engineer-Director, Air Division, Portsmouth City Health Department, 740 Second Street, Portsmouth, Ohio 45662.

(ix) Allen, Ashland, Auglaize, Crawford, Defiance, Erie, Fulton, Hancock, Hardin, Henry, Huron, Marion, Mercer, Ottawa, Paulding, Putnam, Richland, Sandusky, Seneca, Van Wert, Williams, Wood (except City of Rossford), and Wyandot Counties: Ohio Environmental Protection Agency, Northwest District Office, Air Pollution Control, 347 Dunbridge Rd., Bowling Green, Ohio 43402.

(x) Ashtabula, Holmes, Lorain, and Wayne Counties: Ohio Environmental Protection Agency, Northeast District Office, Air Pollution Unit, 2110 East Aurora Road, Twinsburg, Ohio 44087.
(xi) Athens, Coshocton, Gallia, Guernsey, Hocking, Jackson, Meigs, Morgan, Muskingum, Noble, Perry, Pike, Ross, Tuscarawas, Vinton, and Washington Counties: Ohio Environmental Protection Agency, Southeast District Office, Air Pollution Unit, 2195 Front Street, Logan, Ohio 43138.

(xii) Champaign, Clinton, Highland, Logan, and Shelby Counties: Ohio Environmental Protection Agency, Southwest District Office, Air Pollution Unit, 401 East Fifth Street, Dayton, Ohio 45402-2911.

(xiii) Delaware, Fairfield, Fayette, Franklin, Knox, Licking, Madison, Morrow, Pickaway, and Union Counties: Ohio Environmental Protection Agency, Central District Office, Air Pollution Control, 3232 Alum Creek Drive, Columbus, Ohio, 43207-3417.

(xiv) Geauga and Lake Counties: Lake County General Health District, Air Pollution Control, 105 Main Street, Painesville, Ohio 44077.

(xv) Mahoning and Trumbull Counties: Mahoning-Trumbull Air Pollution Control Agency, 9 West Front Street, Youngstown, Ohio 44503.

(LL) State of Oklahoma, Oklahoma State Department of Health, Air Quality Service, P.O. Box 53551, Oklahoma City, Oklahoma 73152.

(i) Oklahoma City and County: Director, Oklahoma City-County Health Department, 921 Northeast 23rd Street, Oklahoma City, Oklahoma 73105.

(ii) Tulsa County: Tulsa City-County Health Department, 4616 East Fifteenth Street, Tulsa,

Oklahoma 74112.

(MM) State of Oregon Department of Environmental Quality, Yeon Building, 522 S.W. Fifth, Portland, Oregon 97204.

(i) to (viii) [Reserved]

(ix) Lane Regional Air Pollution Authority, 225 North Fifth, Suite 501, Springfield, Oregon 97477.

(NN)(a) City of Philadelphia: Philadelphia Department of Public Health, Air Management Services, 500 S. Broad Street, Philadelphia, PA 19146.

(b) Commonwealth of Pennsylvania: Department of Environmental Resources, Post Office Box 2063, Harrisburg, Pennsylvania 17120.

(c) Allegheny County: Allegheny County Health Department, Bureau of Air Pollution Control, 301 Thirty-ninth Street, Pittsburgh, Pennsylvania 15201.

(OO) State of Rhode Island, Division of Air and Hazardous Materials, Department of Environmental Management, 291 Promenade Street, Providence, RI 02908.

(PP) State of South Carolina, Office of Environmental Quality Control, Department of Health and Environmental Control, 2600 Bull Street, Columbia, South Carolina 29201.

(QQ) State of South Dakota, Air Quality Program, Department of Environment and Natural Resources, Joe Foss Building, 523 East Capitol, Pierre, SD 57501-3181.

Editorial Note: For a table listing Region VIII's NSPS delegation status, see paragraph (c) of this section.

(RR) Division of Air Pollution Control, Tennessee Department of Public Health, 256 Capitol Hill Building, Nashville, Tennessee 37219.

Knox County Department of Air Pollution, City/County Building, Room L222, 400 Main Avenue, Knoxville, Tennessee 37902.

Air Pollution Control Bureau, Metropolitan Health Department, 311 23rd Avenue North, Nashville, Tennessee 37203.

(SS) State of Texas, Texas Air Control Board, 6330 Highway 290 East, Austin, Texas 78723 (TT) State of Utah, Division of Air Quality, Department of Environmental Quality, P.O. Box 144820, Salt Lake City, UT 84114-4820.

Note: For a table listing Region VIII's NSPS delegation status, see paragraph (c) of this section. (UU) State of Vermont, Air Pollution Control Division, Agency of Natural Resources, Building 3 South, 103 South Main Street, Waterbury, VT 05676.

(VV) Commonwealth of Virginia, Virginia State Air Pollution Control Board, Room 1106, Ninth Street Office Building, Richmond, Virginia 23219.

(WW)(i) Washington: Washington Department of Ecology, Post Office Box 47600, Olympia, WA 98504.

(ii) Benton-Franklin Counties Clean Air Authority (BFCCAA), 650 George Washington Way, Richland, WA 99352.

(iii) Northwest Air Pollution Authority (NWAPA), 302 Pine Street, #207, Mt. Vernon, WA 98273-3852.

(iv) Olympic Air Pollution Control Authority (OAPCA), 909 Sleater-Kinney Rd. SE - Suite 1, Lacey, WA 98503.

(v) Puget Sound Air Pollution Control Authority (PSAPCA), 110 Union Street, Suite 500, Seattle, WA 98101.

(vi) Southwest Air Pollution Control Authority (SWAPCA), 1308 N.E. 134th Street, Suite D, Vancouver, WA 98685-2747. (vii) Spokane County Air Pollution Control Authority (SCAPCA), West 1101 College Avenue, Health Building, Room 403, Spokane, WA 99201. (viii) [Reserved] (ix) The following is a table indicating the delegation status of the New Source Performance Standards for the State of Washington. [Note: The following TABLE/FORM is too wide to be displayed on one screen. You must print it for a meaningful review of its contents. The table has been divided into multiple pieces with each piece containing information to help yo 11 assemble a printout of the table. The information for each piece includes: (1) a three line message preceding the tabular data showing by line # and character # the position of the upper left-hand corner of the piece and the position of the piece within the entire table; and (2) a numeric scale following the tabular data displaying the character positions.] ******* This is piece 1. --It begins at character 1 of table line 1. ******* Delegation of Authority--New Source Performance Standards ____ SUBPART Description#WDOE [FN1] BFCCAA NWAPCA [FN2] [FN3] 01/01/93 01/01/93 01/01/93 General Provisions Α. Fossil-Fuel-D Fired Steam Generators 01/01/93 01/01/93 01/01/93 Electric Utility Steam Generating 01/01/93 01/01/93 01/01/93 Da Units Industrial-Commercial-Db Institutional 01/01/93 01/01/93 01/01/93 Steam Generating Units 01/01/93 01/01/93 01/01/93 Dc · Small Industrial-Commercial-Institutional Steam Generating Units 01/01/93 01/01/93 01/01/93 E Incinerators Muncipal Waste Combustion 01/01/93 01/01/93 01/01/93 Ea F Portland Cement Plants 01/01/93 01/01/93 01/01/93 Nitric Acid Plants 01/01/93 01/01/93 01/01/93 G Ή Sulfuric Acid Plants 01/01/93 01/01/93 01/01/93

I	Asphalt Concrete Plants	01/01/93	01/01/93	01/01/93
J	Petroleum Refineries	01/01/93	01/01/93	01/01/93
K	Petroleum Liquid Storage Vessels	01/01/93	01/01/93	.01/01/93
Ka	6/11/73-5/19/78 Petroleum Liquid Storage Vessels	01/01/93	01/01/93	01/01/93
Kb	After 5/17/78-7/23/84 Volatile Organic Liquid Storage	01/01/93	01/01/93	01/01/93
Ŀ	Vessels After 7/23/84 Secondary Lead Smelters	01/01/93	01/01/93	01/01/93
M	Brass & Bronze Ingot Production	01/01/93	01/01/93	01/01/93
N	Plants Iron & Steel Plants: BOPF Particulate	01/01/93	01/01/93	01/01/93
Na	Iron & Steel Plants: BOPF, Hot Metal	01/01/93	01/01/93	01/01/93
0	& Skimming Stations Sewage Treatment Plants	01/01/03	01/01/93	01/01/93
P	Primary Copper Smelters	01/01/93	01/01/93	01/01/93
Q	Primary Zinc Smelters	01/01/93	01/01/93	01/01/93
R	Primary Lead Smelters	01/01/93	01/01/93	01/01/93
S	Primary Aluminum Reduction Plants	01/01/93	01/01/93	.01/01/93
т	Wet Process Phosphoric Acid Plants	01/01/93	01/01/93	01/01/93
υ	Superphosphoric Acid Plants	01/01/93	01/01/93	01/01/93
v	Diammonium Phosphate Plants	01/01/93	01/01/93	01/01/93
W	Triple Superphosphate Plants	01/01/93	01/01/93	01/01/93
x	Granular Triple Superphosphate	01/01/93	01/01/93	01/01/93
Y	Storage Facilities Coal Preparation Plants	01/01/93	01/01/93	01/01/93
Z .	Ferroalloy Production Facilities	01/01/93	01/01/93	01/01/93
AA	Steel Plant Electric Arc Furnaces	01/01/93	01/01/93	01/01/93
AAa	10/21/74-8/17/83 Steel Plant Electric Arc Furnaces &	01/01/93	01/01/93	01/01/93
BB	Argon-Oxygen Decarburization Vessels after 8/7/83 Kraft Pulp Mills	01/01/93	01/01/93	01/01/93
CC	Glass Manufacturing Plants	01/01/93	01/01/93	01/01/93
DD	Grain Elevators	01/01/93	01/01/93	01/01/93
EE	Surface Coating of Metal Furniture	01/01/93	01/01/93	01/01/93
GG	Stationary Gas Turbines	01/01/93	01/01/93	01/01/93
	· · · · · · · · · · · · · · · · · · ·			

	HH	Lime Manufacturing Plants	01/01/93	01/01/93	01/01/93
	KK Acid Bat LL	Lead- tery Manufacturing Plant 01/01/93 01 Metallic Mineral Processing Plants	/01/93 01 01/01/93	/01/93 01/01/93	01/01/93
	MM	Automobile & Light Duty Truck Surface	01/01/93	01/01/93	01/01/93
	NN	Coating Operations Phosphate Rock Plants	01/01/93	01/01/93	01/01/93
	PP	Ammonium Sulfate Manufacture	01/01/93	01/01/93	01/01/93
	QQ	Graphic Arts Industry: Publication	01/01/93	01/01/93	01/01/93
	RR	Rotogravure Printing Pressure Sensitive Tape & Label	01/01/93	01/01/93	01/01/93
	SS	Surface Coating Opertions Industrial Surface Coating: Large	01/01/93	01/01/93	01/01/93
	TT	Appliances Metal Coil Surface Coating	01/01/93	01/01/93	01/01/93
	טט	Asphalt Processing & Asphalt Roofing	01/01/93	01/01/93	01/01/93
يەرىپ 1	vv	Manufacturer SOCMI Equipment Leaks (VOC)	01/01/93	01/01/93	01/01/93
2	WW	Beverage Can Surface Coating	01/01/93	01/01/93	01/01/93
	XX	Operations Bulk Gasoline Terminals	01/01/93	01/01/93	01/01/93
:	AAA	Residential Wood Heaters	01/01/93	01/01/93	01/01/93
·	BBB	Rubber Tire Manufacturing	01/01/93	01/01/93	01/01/93
	DDD	Polymer Manufacturing Industry (VOC)	01/01/93	01/01/93	01/01/93
	FFF	Flexible Vinyl and Urethane Coating	01/01/93	01/01/93	01/01/93
	GGG	and Printing Equipment Leaks of VOC in Petroleum	01/01/93	01/01/93	01/01/93
	ннн	Refineries Synthetic Fiber Production Facilities	01/01/93	01/01/93	01/01/93
	III	VOC Emissions from SOCMI Air	01/01/93	01/01/93	01/01/93
	ບບັ	Oxidation Unit Processes Petroleum Dry Cleaners	01/01/93	01/01/93	01/01/93
	KKK	VOC Emissions from Onshore Natural	01/01/93	01/01/93	01/01/93
	LL	Gas Production Onshore Natural Gas Production (SO2)	01/01/93	01/01/93	01/01/93
	NNN	VOC Emissions from SOCMI Distillation	01/01/93	01/01/93	01/01/93
	000	Facilities Nonmetallic Mineral Processing Plants	01/01/93	01/01/93	01/01/93

PPP	Wool Fibergla	ss Insulatio	n	01/01/93	01/01/93	01/01/93							
QQQ	Manufacturin VOC Emissions	ng Plants from Petrol	eum Refinery	01/01/93	01/01/93	01/01/93							
SSS	Wastewater ; Magnetic Tape	Systems Coating Fac	ilities	01/01/93	01/01/93	01/01/93							
TTT	Surface Coatin	ng of Plasti	c Parts for	01/01/93	01/01/93	01/01/93							
ַטטט	Business Ma Calciners & D	chines ryers in Min	eral	01/01/93	01/01/93	01/01/93							
vvv	Industries Polymeric Coa	ting of Supp	port	01/01/93	01/01/93	01/01/93							
	Substrates	Facilities											
FN2 BFC FN3 NWA FN4 OAP FN5 PSA FN6 SWA FN7 SCA 1+ ******* * ******* It beg	CABenton Fran PCANorthwest CAOlympic Air PCAPuget Soun PCASouthwest PCASpokane Co .10+20 ********************************	<pre>klin College Air Pollution Pollution C d Air Pollutio air Pollutic unty Air Pol +30 ******************************</pre>	e Counties Cla on Control Author Control Author tion Control Author Lution Control Author the control Author	ean Air Aut thority. rity. Agency. thority. ol Authority. 50+ *******	nority. .60+ ***********	<pre>FN2 BFCCABenton Franklin College Counties Clean Air Authority. FN3 NWAPCANorthwest Air Pollution Control Authority. FN4 OAPCAOlympic Air Pollution Control Authority. FN5 PSAPCAPuget Sound Air Pollution Control Agency. FN6 SWAPCASouthwest Air Pollution Control Authority. FN7 SCAPCASpokane County Air Pollution Control Authority. 1+10+20+30+40+50+60+70+ ******** This is piece 2 It begins at character 80 of table line 1. ******</pre>							
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	-												
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01/01/93	01/01/93	01/01/93	01/01/93

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(XX) State of West Virginia: Air Pollution Control Commission, 1558 Washington Street East, Charleston, West Virginia 25311.

(YY) Wisconsin--Wisconsin Department of Natural Resources, P.O. Box 7921, Madison, Wisconsin 53707.

(ZZ) State of Wyoming, Department of Environmental Quality, Air Quality Division, Herschler Building, 122 West 25th Street, Cheyenne, WY 82002

Editorial Note: For a table listing Region VIII's NSPS delegation status, see paragraph (c) of this section.

(AAA) Territory of Guam: Guam Environmental Protection Agency, Post Office Box 2999, Agana, Guam 96910.

Note: For tables listing the delegation status of agencies in Region IX, see paragraph (d) of this section.

(BBB) Commonwealth of Puerto Rico: Commonwealth of Puerto Rico Environmental Quality Board, P.O. Box 11488, Santurce, Puerto Rico 00910, attention: Air Quality area Director. (see table under Part 60.4(b)(FF)(1))

(CCC) U.S. Virgin Islands: U.S. Virgin Islands Department of Conservation and Cultural Affairs, P.O. Box 578, Charlotte Amalie, St. Thomas, U.S. Virgin Islands 00801.

(DDD) American Samoa Environmental Protection Agency, Pago Pago, American Samoa 96799.

Note: For tables listing the delegation status of agencies in Region IX, see paragraph (d) of this section.

(EEE) Commonwealth of the Northern Mariana Islands, Division of Environmental Quality, P.O. Box 1304, Saipan, MP 96950.

Note: For tables listing the delegation status of agencies in Region IX, see paragraph (d) of this section.

(c) The following is a table indicating the delegation status of New Source Performance Standards for Region VIII.

<Text of table as amended by <u>67 FR 57321</u>, effective Oct. 11, 2002; <u>67</u> <u>FR 59000</u>, effective Nov. 18, 2002.>

Delegation Status of New Source Performance Standards

		J 					
- Subpart	co	MT	ND	SD		UT	MX
A General Provisions (*)	(*)	(*)		(*)	(*)	((*)
Fossil Fuel Fired Steam Generators (*)	(*)	(*)		(*)	(*)		(*)
Electric Utility Steam Generators (*)	(*)	(*)		(*)	(*)	(*	*) .
Steam Generators	(*)	(*)	(*)		(*)	(*)	(*
) DcIndustrialCommercial Institutional Steam Generators	(*)	(*)	(*)		(*)	(*)	· • •
E Incinerators (*)	(*)	(*)		(*)	(*)	1	(*)
Ea Municipal Waste Combustors (*)	(*)	(*)		(*)	(*)	(7	*)
Large Municipal Waste Combustors Ec-Hospital/Medical/Infectious Waste	••••	••••	••••	. (*)	(*)		(*)
Incinerators	(*)		`(*)		(*)	(*)	
Portland Cement Plants (*) GNitric Acid Plants (*) (*) (*)	(*) (*)	(*) (*)	(*)	(*)	(*) 		(*)
HSulfuric Acid Plants	(*)	(*)	(*)	•••			
T					•		
Asphalt Concrete Plants (*) JPetroleum Refineries (*)	(*) (*)	(*) (*)	(*)	(*) 	(*) 		(*)
					•		
KPetroleum Storage Vessels (after 6/11/73 & prior to 5/19/78)	(*)	(*)	(*)		(*)	(*)	(*
KaPetroleum Storage Vessels (after 5/18/78 & prior to 7/23/84)	(*)	(*)	(*)		(*)	(*)	(*
<pre>/ KbPetroleum Storage Vessels (after 7/23/84)</pre>	(*)	(*)	(*)	•••	(*)	(*)	(*
) LSecondary Lead Smelters	(*)	(*)	(*)		• , =		
					•		
MSecondary Brass & Bronze Production Plants	(*)	(*)	(*)		• • -		
N-Primary Emissions from Basic Ovygen					•		
Process Furnaces (after 6/11/73)	(*)	(*)	(*)		• • -		

NaSecondary Emissions from Basic Oxygen Process Furnaces (after 1/20/83) (*) (*) (*) (*)	·····
O Sewage Treatment Plants (*) (*) (*) PPrimary Copper Smelters (*) (*) (*) (*) (*)	(*) (*) (*)
QPrimary Zinc Smelters (*) (*) (*) (*) (*)	····
RPrimary Lead Smelters (*) (*) (*) (*) (*)	••••
SPrimary Aluminum Reduction Plants (*) (*) (*) (*)	· · · · · · · · · · · · · · · · · · ·
	· · · ·
TPhosphate Fertilizer Industry: wet Process Phosphoric Plants (*) (*) (*) (*) (*)	
	• • •
UPhosphate Fertilizer Industry: Superphosphoric Acid Plants (*) (*) (*) (*) (*)	
VPhosphate Fertilizer Industry: Diammonium Phosphate Plants (*) (*) (*) (*) (*)	••••••
	• • •
<pre>WPhosphate Fertilizer Industry: Triple Superphosphate Plants</pre>	
XPhosphate Fertilizer Industry: Granular Triple Superphosphate Storage Facilities (*) (*) (*) (*)	
	• .• •
Y	
Coal Preparation Plants	(*) (*) (*)
	• • •
AASteel Plants: Electric Arc Furnaces (10/21/74-8/17/83) (*) (*) (*) (*) (*)	· · · · · · · · · · · ·
AAaSteel Plants: Electric Arc Furnaces and	· .
Argon-Oxygen Decarburization Vessels (after 8/7/83) (*) (*) (*)	
BBKraft Pulp Mills (*) (*) (*) (*)	••••
CCGlass Manufacturing Plants (*) (*) (*) (*) (*)	•••
	• • •
DD Grain Elevator (*) (*) (*) EESurface Coating of Metal Furniture (*) (*) (*) (*) (*)	(*) (*) (*) ~

GG Stationary Gas Turbines (*)	(*)	(*)		(*) (*)	(*)		
Lime Manufacturing Plants (*) KKLead-Acid Battery Manufacturing Plants (*) (*)	(*) (*)	(*) (*)	(*)	(*) (*)	(*)		
Τ.Τ				• • •			
Metallic Mineral Processing Plants (*)	(*)	(*)		(*) (*)	(*)	÷	
Coating Operations	(*)	(*)	(*)	····· ·			
NNPhosphate Rock Plants	(*)	(*)	(*)				
<pre>PPAmmonium Sulfate Manufacturing (*) (*)</pre>	(*)	(*)	(*)				
QQGraphic Arts Industry: Publication Rotogravure Printing	(*)	(*)	(*)	(*)	(*)	(*	,
RRPressure Sensitive Tape & Label Surface Coating	(*)	(*)	(*)	(*)	(*)	(*	
<pre>/ SSIndustrial Surface Coating: Large Applications (*) (*)</pre>	(*)	(*)	(*)				
TTMetal Coil Surface Coating	(*)	(*)	(*)				
UUAsphalt Processing & Asphalt Roofing Manufacture	(*)	(*)	(*)				
VVSynthetic Organic Chemicals Manufacturing: Equipment Leaks of VOC	(*)	(*)	(*)	(*)	(*)	(*	
) WWBeverage Can Surface Coating Industry (*) (*)	(*)	(*)	(*)	• • • • • • •			
XX							
Bulk Gasoline Terminals (*)	(*)	(*)		(*) (*) ·	• (*)		
Residential Wood Heaters (*) BBBRubber Tires (*) (*) (*)	(*) (*)	(*) (*)	(*)	(*) (*) 	(*)		
DDMOC Friggians from Polymer				• • •			
Manufacturing Industry	(*)	(*)	(*)	· · · · · · · -			
FFFFlexible Vinyl & Urethane Coating &							
Printing	(*)	(*)	(*)	• • • • • • • •			
GGGEquipment Leaks of VOC in Petroleum				•••			
Ketineries	(*)	(*)	(*)	· · · · · · · -			
HHHSynthetic Fiber Production	(*)	(*)	(*)	· · · · · · -			

<pre>IIIVOC Emissions from the Synthetic Organic Chemical Manufacturing Industry Air Oxidation Unit Processes</pre>	• • •	(*)	(*)			
111				•••		
KKKEquipment Leaks of VOC from Onshore	(*)	(*)	•	(*) (*)	(*)	
Natural Gas Processing Plants	(*)	(*)	(*)			
LLLOnshore Natural Gas Processing: SO ₂ Emissions	(*)	(*)	(*)	· · · · · · · -		
Organic Chemical Manufacturing Industry						
Distillation Operations)	(*)	(*)	(*)	(*)	(*)	(*
000		-				
Nonmetallic Mineral Processing Plants (*) PPPWool Fiberglass Insulation	(*)	(*)		(*) (*)	(*)	
Manufacturing Plants	(*)	(*)	(*)	· · · · · · ·		
000 MOO Triggions from Detrolour Definer						
Wastewater Systems	(*)	(*)	(*)	•••••		
RRRVOC Emissions from Synthetic Organic						
Reactor Processes	(*)	(*)	(*)	(*)	(*)	(*
SSS						
Magnetic Tape Industry (*) TTTPlastic Parts for Business Machine	(*)	(*)		(*) (*)	(*)	
Coatings	(*)	(*)	(*)			
WWW Colsiners and Drugge in Mineral				• • • .		
Industries	(*)	(*)	(*)	(*)	(*)	(*
/ VVVPolymeric Coating of Supporting Substrates	(*)	(*)	(*)			
· · · · ·						
WWW Municipal Solid Waste Landfills (*)	(*)	(*)		(*) (*)	(*)	
					•	

(*) Indicates approval of State regulation.

(d) The following tables list the specific Part 60 standards that have been delegated unchanged to the air pollution control agencies in Region IX. The (X) symbol is used to indicate each standard that has been delegated. The following provisions of this subpart are not delegated: §§ 60.4(b), 60.8(b), 60.9, 60.11(b), 60.11(e), 60.13(a), 60.13(d)(2), 60.13(g), 60.13(i).
(1) Arizona. The following table identifies delegations as of June 15, 2001:

Delegation Status for New Source Performance Standards for Arizona

Subpart

Air pollution control agency

-					_, _
		Arizona	Maricopa	Pima	Pinal
		DEQ	County	County	County
		•			
			· · · · · · · · · · · · · · · · · · ·		
				37	37
A	General Provisions	X	X	X	X
D	Fossil-Fuel Fired Steam				
	Generators Constructed After				
	August 17, 1971	X .	X	x	Х
Da	Electric Utility Steam				
	Generating Units Constructed				
	After September 18, 1978	X	X	х	X
ъb	Industrial-Commercial-			•	
	Institutional Steam				
	Generating Units	x	x	x	X
Da	Cmall Industrial Steam	· · · ·			
DC	Concreting Units	·x	X	. 🕱	x
-	Traineratore	v v	Y	x	x
E .	Municipal Maste Openators	· · · A		23	
Ea	Municipal waste compusions				
	Constructed Alter December				
	20, 1989 and On or Before		77	• .	77
	September 20, 1994	X	. X		4
Eb	Municipal Waste Combustors				
	Constructed After September				
	20, 1994	X			
· • •					
$\mathbf{E}\mathbf{C}$	Hospital/Medical/Infectious				
	Waste Incinerators for Which			•	
	Construction is Commenced			1 a	•
	After June 20, 1996				
F	Portland Cement Plants	X	X	x	X
Ğ	Nitric Acid Plants	x	X	x	X
н	Sulfuric Acid Plant	хх	X	X	X
Ť	Hot Mix Asphalt Facilities	x	x	x	x
Ť	Petroleum Refineries	x	x	x	x
7 7	Storage Messals for Petroleum	· · · · · ·			
г	Scorage vessers for rectoreum				
	Construction Desenstruction				
	construction, Reconstruction,				
	or Modification Commenced				
	Arter June 11, 1973, and				
	Prior to May 19, 1978	X	X	X	X
Ka	Storage Vessels for Petroleum	•			
	Liquids for Which				
	Construction, Reconstruction,				
	or Modification Commenced		Υ.		
	After May 18, 1978, and Prior				
	to July 23, 1984	X	Х	X	Х
Kb	Volatile Organic Liquid Storage			••	
	Vessels (Including Petroleum				
	Liquid Storage Vessels) for				
	Which Construction.				
	Reconstruction or				
	Modification Commenced After				
	Tuly 22 100/	v	v	v	v
	Capandary I and Smaltare	• • • • • • • •	A V	~ *	A V
يا. م	Secondary Leau Smelters	A	A	, A	A
ы	Secondary prass and Bronze		~~	**	**
	Production Plants	X	X	X	X
N	Primary Emissions from Basic				
	Oxygen Process Furnaces for				
	Which Construction is			_	
	Commenced After June 11, 1973	X	X	X	Х

Na	Secondary Emissions from Basic Oxygen Process Steelmaking Facilities for Which Construction is Commenced		•		
	After January 20, 1983	X	х		х
0	Sewage Treatment Plants	X	X	X	x
Р	Primary Copper Smelters	х	X	X	X
Q	Primary Zinc Smelters	X	X	X	x
R	Primary Lead Smelters	X	X	X	x
S	Primary Aluminum Reduction				
	Plants	х	X ·	X	x
т	Phosphate Fertilizer Industry: Wet Process Phosphoric Acid		· · ·	-	
	Plants	X	X	X	Х
υ	Phosphate Fertilizer Industry:			· ·	
	Superphosphoric Acid Plants	Х	X	X	Х
v	Phosphate Fertilizer Industry:				
	Diammonium Phosphate Plants	X	X	X	х
W	Phosphate Fertilizer Industry:				,
	Triple Superphosphate Plants	х	Х	х	x
X	Phosphate Fertilizer Industry:				
	Granular Triple				
	Superphosphate Storage				
	Facilities	х	X	x	х
Y	Coal Preparation Plants	x	X	X	x ·
Z	Ferroalloy Production				
	Facilities	X	х	х	х
AA	Steel Plants: Electric Arc				
	Furnaces Constructed After				
	October 21, 1974 and On or				
	Before August 17, 1983	X	X	X	х
AAa	Steel Plants: Electric Arc				
	Furnaces and Argon-Oxygen				
	Decarburization Vessels				
	Constructed After August 7,			· .	
	1983	X	X	X	Х
BB	Kraft pulp Mills	x	X	X	Х
CC	Glass Manufacturing Plants	Х	Х	х	Х
DD	Grain Elevators	Х	Х	X	Х
EE	Surface Coating of Metal	•			
	Furniture	х	Х	х	X
FF	(Reserved)			• • • • • • • • • • • • • • • • • • •	
•					
GG	Stationary Gas Turbines	X	X	Х	Х
HH	Lime Manufacturing Plants	Х	X	X	Х
KK	Lead-Acid Battery Manufacturing				
	Plants	X	X	X	Х
LL	Metallic Mineral Processing				
	Plants	X	X	X	Х
MM	Automobile and Light Duty				
	Trucks Surface Coating				
	Operations	х	Х	X	Х
NN	Phosphate Rock Plants	Х	X	Х	Х
PP	Ammonium Sulfate Manufacture	X	X	Х	X
QQ	Graphic Arts Industry:				
	Publication Rotogravure				
	Printing	X ·	X	X	Х
RR	Pressure Sensitive Tape and				
	Label Surface Coating				
	Operations	Х	X	Х	Х
SS	Industrial Surface Coating:				
	Large Appliances	Х	X	Х	Х
\mathbf{TT}	Metal Coil Surface Coating	Х	X	Х	X
UU	Asphalt Processing and Asphalt				

vv	Roofing Manufacture Equipment Leaks of VOC in the	X	х	X	X
TATTA7	Manufacturing Industry	X	x	x .	х
-AA AA	Industry	х	X	X	X
XX	Bulk Gasoline Terminals	X	x	X	X
AAA	New Residential Wool Heaters	Х.	X	X	Х
BBB	Rubber Tire Manufacturing				
•	Industry	х	X	X.	Х
CCC	(Reserved)	*****			• • • • • •
	Velatila Organic Compounds				
עטע	(VOC) Emiggions from the				
	(VOC) MINISTONS FION CHE				
	Todustro	x	x	Χ.	x
ppp	(Pererved)	24			
	(reserved)				
न्दन	Flexible Vinvl and Urethane				
	Coating and Printing	x	X	X .	x
GGG	Equipment Leaks of VOC in	*			• •
400	Petroleum Refineries	X	X	X .	X
ннн	Synthetic Fiber Production				
	Facilities	X	X	X	x
TTI	Volatile Organic Compound (VOC)				
	Emissions From the Synthetic				
	Organic Chemical			÷	
	Manufacturing Industry				
	(SOCMI) Air Oxidation Unit				
	Processes	Х	Х	X	X
រូរូរ	Petroleum Dry Cleaners	Х	X	X	х ·
KKK	Equipment Leaks of VOC From				
	Onshore Natural Gas				
	Processing Plants	Х	X	x	X
LLL ·	Onshore Natural Gas Processing:		,		
	SO2 Emissions	X	X		x
MMM	(Reserved)	x	X	X	x
NNN	Volatile Organic Compound (VOC)				
	Emissions From Synthetic	-			
	Organic Chemical				
	Manufacturing Industry				
	(SOCMI) Distillation				**
	Operations	x	X	X	A
000	Nonmetallic Mineral Processing	~~			
	Plants	x	X	X	Δ.
PPP	Wool Fiberglass Insulation		57	37	
	Manufacturing Plants	X	· A	A	A
QQQ	VOC Emissions From Petroleum		77		~
	Refinery Wastewater Systems	X	A	A	<u>A</u>
RKR	Volatile Organic Compound				
	Emissions from Synthetic				
	Monufacturing Industry			. · ·	
	(COGMI) Beaston Drogoggog				
	(SOUMI) REACTOR PROCESSES				
	Magnetic Tape Coating				
000	Racilities	x	x	x	x
بلابليك	Industrial Surface Coating.	* *	<u> </u>		**
<u>ـــــ</u>	Surface Coating of Plastic				
	Parts for Business Machines	х	X	х	x
ບບບ	Calciners and Drvers in Mineral	- ·	•		
	Industries	х			
			•		

VVV Polymeric Coating of Supporting

	Substrates Facilities	Х	X	x	x	
www	Municipal Solid Waste Landfills	Х				
-						

(2) California. The following tables identify delegations for each of the local air pollution control agencies of California.

(i) Delegations for Amador County Air Pollution Control District, Antelope Valley Air Pollution Control District, Bay Area Air Quality Management District, and Butte County Air Pollution Control District are shown in the following table:

Delegation Status for New Source Performance Standards for Amador County APCD,

Antelope Valley APCD, Bay Area AQMD, and Butte County AQMD Subpart Air pollution control agency Amador Antelope Bay Butte Valley County Area County APCD AQMD APCD APCD А General Provisions х . D Fossil-Fuel Fired Steam Generators X Constructed After August 17, 1971 Da Electric Utility Steam Generating х Units Constructed After September 18, 1978 Db Industrial-Commercial-..... X Institutional Steam Generating Units DC Small Industrial Steam GeneratingX • Units Е Incinerators х . Municipal Waste Combustors Ea Х . Constructed After December 20, 1989 and On or Before September 20, 1994 Eb Municipal Waste Combustors . Constructed After September 20, 1994 Hospital/Medical/Infectious Waste Ec . Incinerators for Which Construction is Commenced After June 20, 1996 F Portland Cement Plants XX G Nitric Acid Plants

	H	Sulfuric Acid Plants	• • • • • • • • •		X	·
	ī	Hot MiX Asphalt Facilities	••••	• • • • • • • • • •	X	• • • • • • •
•	J	Petroleum Refineries			X	• • • • • • •
-	ĸ	Storage Vessels for Petroleum			Х	
	Ka	Liquids for Which Construction, Reconstruction, or Modification Commenced After June 11, 1973, and Prior to May 19, 1978 Storage Vessels for Petroleum			X.	· · · · · · ·
•	к.	Liquids for Which Construction, Reconstruction, or Modification Commenced After May 18, 1978, and Prior to July 23, 1984	· · ·		v	
	κD	Versels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification	•••••		Δ	· ·
	L	Commenced After July 23, 1984 Secondary Lead Smelters			X	
	M	Secondary Brass and Bronze	•••••		x	· · · · · · · · · · · ·
· .	N	Production Plants Primary Emissions from Basic		······································	X .	• • • • • • •
	Na	Oxygen Process Furnaces for Which Construction is Commenced After June 11, 1973 Secondary Emissions from Basic			x	
		Oxygen Process Steelmaking Facilities for Which Construction is Commenced After January 20, 1983				
	0 •	Sewage Treatment Plants	• • • • • • • • •	• • • • • • • • •	x	•••••
•	P .	Primary Copper Smelters			X	• • • • • • •
	Q ·	Primary Zinc Smelters	• • • • • • • •	••••	X	• • • • • • •
	R	Primary Lead Smelters	• • • • • • • • •	• • • • • • • • •	x	••••
	S	Primary Aluminum Reduction Plants	• • • • • • • • •	• • • • • • • • • •	х	
	T	Phosphate Fertilizer Industry: Wet Process Phosphoric Acid Plants				
	•	Superphosphoric Acid Plants	• • • • • • • • •	••••	Х	• • • • • • •
. :	V ·	Phosphate Fertilizer Industry:		· · · · · · · · · · · · · · ·	x	· · · · · · · ·
	W	Diammonium Phosphate Plants Phosphate Fertilizer Industry:	* • • • • • • •		x	• • • • • • •
	X	Triple Superphosphate Plants Phosphate Fertilizer Industry:		•••••	x	• • • • • • • •
	•					

.

Y	Granular Triple Superphosphate Storage Facilities Coal Preparation Plants			x	
ż	Ferroalloy Production Facilities			x	
AA	Steel Plants: Electric Arc			x	
AAa	Furnaces Constructed After October 21, 1974 and On or Before August 17, 1983 Steel Plants: Electric Arc			x	
BB	Furnaces and Argon-Oxygen Decarburization Vessels Constructed After August 7, 1983 Kraft pulp Mills			X	
ċc	Glass Manufacturing Plants			X	
DD	Grain Elevators			x	• • • • • • • •
EE	Surface Coating of Metal Furniture			X	
FF	(Reserved)		• • • • • • • • • • • •	••••	
GG	Stationary Gas Turbines	• • • • • • • •	********	x	
нн	Lime Manufacturing Plants		• • • • • • • • • • •	x	
KK Acid	Lead- Battery Manufacturing Plants		. x .		
LL	Metallic Mineral Processing Plants		• • • • • • • • • • •	x	
MM	Automobile and Light Duty Trucks	• • • • • • • • •		X	••••••
NN	Surface Coating Operations Phosphate Rock Plants	· • • • • • • • • • •		x	
PP	Ammonium Sulfate Manufacture			x	
QQ	Graphic Arts Industry: Publication			Х	
RR	Rotogravure Printing Pressure Sensitive Tape and Label		••••••	x	 .
SS	Surface Coating Operations Industrial Surface Coating: Large			X	
TT	Appliances Metal Coil Surface Coating			х	
ບັບ	Asphalt Processing and Asphalt		·	X	
vv	Roofing Manufacture Equipment Leaks of VOC in the		• • • • • • • • • •	x	•••••
ww	Synthetic Organic Chemicals Manufacturing Industry Beverage Can Surface Coating			×X	,
•	Industry				
XX	Bulk Gasoline Terminals				

AAA	New Residential Wool Heaters			X	
BBB	Rubber Tire Manufacturing Industry			х	
ccc	(Reserved)		• • • • • • • • • •		
DDD	Volatile Organic Compounds (VOC)			x	
	Emissions from the Polymer Manufacturing Industry (Paserwed)	·			
FFF	Flexible Vinul and Urethane			x	
	Genting and Drinting			24	
GGG	Equipment Leaks of VOC in	•••••		X	• • • • • •
ННН	Petroleum Refineries Synthetic Fiber Production			X	
III	Facilities Volatile Organic Compound (VOC) Emissions From the Synthetic			•	
-	Organic Chemical Manufacturing Industry (SOCMI) Air Oxidation Unit Processes	•			
JJJ	Petroleum Dry Cleaners	••••		X	
KKK	Equipment Leaks of VOC From		• • • • • • • • • • • •	. X	· · · · · · · ·
	Onshore Natural Gas Processing Plants				
LLL	Onshore Natural Gas Processing:	• • • • • • • •			• • • • • • •
MMM	SO2 Emissions (Reserved)	• • • • • • • • •			
NNN	Volatile Organic Compound (VOC)			X	
•	Emissions From Synthetic Organic Chemical Manufacturing Industry (SOCMI) Distillation Operations				· ·
	Nonmetallic Mineral Processing			x	
PPP	Plants Wool Fiberglass Insulation	• • • • • • • • •		x	• • • • • • • •,
QQQ	Manufacturing Plants VOC Emissions From Petroleum	•••••		×	
RRR	Refinery Wastewater Systems Volatile Organic Compound	• • • • • • •			· • • • • • • • •
	Emissions from Synthetic Organic Chemical Manufacturing Industry (SOCMI) Reactor Processes				
	Magnetic Tape Coating Facilities	• • • • • • • • •		A.	· · · · · · ·
• .TŦ.,T.	industrial Surface Coating:	••••		A	
טטט	Surface Coating of Plastic Parts for Business Machines Calciners and Dryers in Mineral			x	

vvv	Industries Polymeric Coating of Supporting	 	X	
WWW	Substrates Facilities Municipal Solid Waste Landfills	 		
. · 		 		

(ii) [Reserved]

(iii) Delegations for Glenn County Air Pollution Control District, Great Basin Unified Air Pollution Control District, Imperial County Air Pollution Control District, and Kern County Air Pollution Control District are shown in the following table:

Delegation Status for New Source Performance Standards for Glenn County APCD,

Great Basin Unified APCD, Imperial County APCD, and Kern County APCD

	Subpart	Air pollution control agency				
-		Glenn County	Great Basin	Imperial County	Kern County	
	-	APCD	Unified APCD	APCD	APCD	
 A	General Provisions		X		x	
D	Fossil-Fuel Fired Steam Generators Constructed After					
Da	August 17, 1971 Electric Utility Steam		Х.		X	
л'n	After September 18, 1978		x		x	
	Institutional Steam Generating Units		x		x	
DC	Small Industrial Steam Generating Units		X		x	
E Ea	Incinerators Municipal Waste Combustors Constructed After December	•••••	x		x	
	20, 1989 and On or Before September 20, 1994	••••	x			
Eb	Municipal Waste Combustors Constructed After September					
		• • • • • • • •		••••		
EC	Waste Incinerators for Which Construction is Commenced		· · ·			
•	Destland Coment Diante		••••	•••••		
г G H	Nitric Acid Plants Sulfuric Acid Plants	· · · · · · · · · · ·	X X	· · · · · · · · · · · · · · · · · · ·	x x	
I J	Hot Mix Asphalt Facilities Petroleum Refineries		X X		X X	

<u>.</u>	K	Storage Vessels for Petroleum					
		Liquids for Which					
		Construction, Reconstruction,					
		or Modification Commenced					
		After June 11, 1973, and					
		Prior to May 19, 1978		X		X	
	Ka	Storage Vessels for Petroleum					
		Liquids for Which					
		Construction, Reconstruction,					
		or Modification Commenced				÷	1 1
		After May 18, 1978, and Prior					
		to July 23, 1984		X		X	
	Kb	Volatile Organic Liquid Storage					
		Vessels (Including Petroleum					
		Liquid Storage Vessels) for					•
		Which Construction,			1		
-		Reconstruction, or					
		Modification Commenced After		· .		17	
	-	July 23, 1984	• • • • • • • • •	X		X	
	上 37	secondary Lead Smelters	••••	X	* * * * * * * * * *	A	
	M	Secondary Brass and Bronze		77			
	37	Production Plants		Δ.	*******	A	
	N.	Primary Emissions from Basic		•	•		
	· .	Oxygen Process Furnaces for					
		Which Construction is		v		v	
	NT	Commenced Arter June II, 1973	•••••	Δ		~	4
	Na	Secondary Emissions from Basic					
		Dxygen Flocess Steelmaking Recilition for Which					
		Construction is Commonsod	•				
·· •		After Transmi 20 1993		· • •		·v	
	~	Reuras Prostmont Dianta	• • • • • • • • •	A V		v ·	
	D	Drimary Copper Smelters		A Y	• • • • • • • • • •	x	
	P	Primary Copper Smercers	• • • • • • • • •	A V		· 😴	
	V P	Brimary Load Smelters	• • • • • • • • •	А Ý	•••••	x v	
	с С	Drimary Deau Smetters		-22		77	
	5	Dante		v		x	
	τ ι	Dhoenhate Fertilizer Industry	••••		*********	11	
	Ŧ	Net Process Phosphoric Acid			۰.		
		Plante		x		x	
	TT	Phosphate Fertilizer Industry.				22	
	0	Superphosphoric Acid Plants		x		x	-
	v	Phosphate Fertilizer Industry		**			•
	v	Diammonium Phosphate Plants		x		x	
	W	Phosphate Fertilizer Industry:					
· · · ·		Triple Superphosphate Plants		x		x.	
	x	Phosphate Fertilizer Industry.					
	**	Granular Triple					
		Superphosphate Storage					
		Facilities		×		x	
	v	Coal Preparation Plants		x		x	
	7.	Ferroallov Production					
	-	Facilities		x		x	
	AA	Steel Plants: Electric Arc		**			
		Furnaces Constructed After					
		October 21, 1974 and On or					
		Before August 17, 1983		х		х	
	AAa	Steel Plants: Electric Arc					
		Furnaces and Argon-Oxygen					
		Decarburization Vessels					
		Constructed After August 7.			•		
		1983		X		x	
	BB	Kraft pulp Mills		X		x	
	CC	Glass Manufacturing Plants		X		X	
	•	-					
		•		1			

DD	Grain Elevators		X		x
تيد قيار	Furniture		x		X
FF.	(Reserved)				• • • • • • • •
GG	Stationary Gas Turbines		X		x
HH	Lime Manufacturing Plants		x		x
KK	Lead-Acid Battery Manufacturing		x		x
$\mathbf{L}\mathbf{L}$	Metallic Mineral Processing		*1		
	Plants		X .	• • • • • • • • • •	x
MM	Automobile and Light Duty Trucks Surface Coating				
	Operations		Х		x
NN	Phosphate Rock Plants		X		x
PP	Ammonium Sulfate Manufacture	******	X		Х
QQ	Bublication Botogravure				
	Printing		X		x
RR	Pressure Sensitive Tape and			· · ·	
	Label Surface Coating			•	v
	Uperations	• • • • • • • •	, A		22
55	Large Appliances		Χ.	·	x
\mathbf{TT}	Metal Coil Surface Coating		X		x
υU	Asphalt Processing and Asphalt		37	•	v
TT T	Rooting Manufacture		А		A
vv	Synthetic Organic Chemicals		•		
	Manufacturing Industry		X		X
WW	Beverage Can Surface Coating		v		·
vv	Bulk Gasoline Terminals		A		
<u>.</u>	bur dustrine remainers				
AAA	New Residential Wool Heaters		X		x
BBB	Rubber Tire Manufacturing		×	•	x
CCC	(Reserved)				
DDD	Volatile Organic Compounds				
	(VOC) Emissions from the Polymer Manufacturing				
	Industry		х		x
EEE	(Reserved)				
F.F.F.	Coating and Printing		x		x
GGG	Equipment Leaks of VOC in				
	Petroleum Refineries		x		x
HHH	Synthetic Fiber Production		v		x
***	Volatile Organic Compound (VOC)		A		11
* * *	Emissions From the Synthetic				
	Organic Chemical				
	Manufacturing Industry				
	Processes		×X		x
រូរូរ	Petroleum Dry Cleaners		X		x
KKK	Equipment Leaks of VOC From				
	Onshore Natural Gas		x	· · · · · · · · · · · · · · · · · · ·	x
T.T. T.	Onshore Natural Gas Processing:		<u> </u>		
لبك ليد ايت	SO2 Emissions				x
MMM	(Reserved)	`		· • • • • • • • • • •	
NNN	Volatile Organic Compound (VOC) Emissions From Synthetic		•		
----------------------------------	---	---	-----------	-------	---
	Organic Chemical				
	Manufacturing Industry				
	(SOCMI) Distillation				
	Operations		X		X
000	Nonmetallic Mineral Processing				
	Plants		X.		X
PPP	Wool Fiberglass Insulation	•			
	Manufacturing Plants		X		х
QQQ	VOC Emissions From Petroleum			,	
	Refinery Wastewater Systems		X		X
RRR	Volatile Organic Compound				
	Emissions from Synthetic			· · ·	
	Organic Chemical				
	Manufacturing Industry				
	(SOCMI) Reactor Processes	·	 '		X
SSS	Magnetic Tape Coating	1		• .	
	Facilities		Х		x
$\mathbf{T}\mathbf{T}\mathbf{T}$	Industrial Surface Coating:				
	Surface Coating of Plastic		·	· .	
	Parts for Business Machines		X		Х
υυυ	Calciners and Dryers in Mineral			η.	
	Industries		Х.		Х
VVV	Polymeric Coating of Supporting		·		
	Substrates Facilities		х		X
WWW	Municipal Solid Waste Landfills				х

(iv) Delegations for Lake County Air Quality Management District, Lassen County Air Pollution Control District, Mariposa County Air Pollution Control District, and Mendocino County Air Pollution Control District are shown in the following table:

Delegation Status for New Source Performance Standards for Lake County Air Quality Management District, Lassen County Air Pollution Control District, Mariposa County Air Pollution Control District, and Mendocino County Air Pollution Control District

1 000	Subpart	. Ai	r pollutio	n control ag	ency
-		Lake	Lassen	Mariposa	Mendocino
		County AQMD	County APCD	County AQMD	County AQMD
-		· · · · · · · · · · · · · · · · · · ·		== == == == == == == == == == == =	
A D	General Provisions Fossil-Fuel Fired Steam Generators Constructed	X	••••	•••••	X
Da	Electric Utility Steam Generating Units	X	•••••	• • • • • • • • •	X
Db	Constructed After September 18, 1978 Industrial-Commercial-	x	•••••		x
	Generating Units	X	•••••		,

Dc Small Industrial Steam

E Ea	Generating Units X Incinerators X Municipal Waste Combustors Constructed After December		· · · · · · · · · · · · · · · · · · ·	X X
Eb	20, 1989 and On or Before September 20, 1994 X Municipal Waste Combustors Constructed After September 20, 1994		••••••	х
Ec	Hospital/Medical/Infectious Waste Incinerators for Which Construction is Commenced After June 20,		•	
	1996			••••••
F G H I	Portland Cement Plants X Nitric Acid Plants X Sulfuric Acid Plants X Hot Mix Asphalt Facilities X	•••••	· · · · · · · · · · · · · · · · · · ·	X X X X
ĸ	Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced After June 11, 1973, and			•
Ka	Prior to May 19, 1978 X Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced After May 18, 1978, and Drive to July 22, 1984		•••••	.Χ
Kb	Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction,			Δ
T,	Modification Commenced After July 23, 1984 X Secondary Lead Smelters			X X
M	Secondary Brass and Bronze			
N	Production Plants X Primary Emissions from Basic Oxygen Process Furnaces for Which Construction is Commenced After June 11, 1972	•••••		X
Na	Secondary Emissions from Basic Oxygen Process Steelmaking Facilities for Which Construction is Commenced After January 20,			•
~	1983 X			X
υ P	Sewage Treatment Plants X Primary Copper Smelters			A X
ō	Primary Zinc Smelters X			x
r S	Primary Lead Smelters X Primary Aluminum Reduction			X
т	Phosphate Fertilizer			11

	Industry: Wet Process	•		v	
	Phosphoric Acid Plants X	• • • • • • •		Δ.	
υ	Phosphate Fertilizer	•			
	Industry: Superphosphoric			1 7	
	Acid Plants X		• • • • • • • • • •	A	
V	Phosphate Fertilizer	•		•	
	Industry: Diammonium			**	
	Phosphate Plants X			A	
W	Phosphate Fertilizer	•			
	Industry: Triple			~~	
	Superphosphate Plants X	- · · · · · · ·		X	•
Х	Phosphate Fertilizer				
	😪 Industry: Granular Triple				
	Superphosphate Storage				
	Facilities X			X	
Y	Coal Preparation Plants X			X	
Z	Ferroalloy Production	- 1			
	Facilities X			X	
AA	Steel Plants: Electric Arc				
	Furnaces Constructed After				
	October 21, 1974 and On or				
	Before August 17, 1983 X			X	
AAa	Steel Plants: Electric Arc				
	Furnaces and Argon-Oxygen		· ·		
	Decarburization Vessels		· ·		
	Constructed After August 7.				
•	1983			х	
 RR	Kraft Puln Mills X			x	
	Glass Manufacturing Plants X			x	
	Grain Flevators X			x	
rr Fr	Surface Coating of Metal				• • • •
5£	Furniture			v	•
TT	(Perorged)			27	
E E	(Reserved)				
cc	Stationary Cas Turbines X			v	
<u>сс</u> цц	Lime Manufacturing Plants		• • • • • • • • •	x · ·	
7171 7272	Lead-Joid Bettery			А	
πn	Manufacturing Diants V			v	
	Matallia Minaral Dragagging		•••••	A	
ىنىز	Dianta Processing			v	· · ·
1010	Planus A	• • • • • • •	••••	A	
MM	Automobile and Light Duty		•		
	Trucks Surface Coating	•			
	Operations X			X	
NN	Phosphate Rock Plants X	• • • • • • •		X	
PP	Ammonium Sulfate Manufacture X	• • • • • • •		Х	
QQ	Graphic Arts Industry:				
	Publication Rotogravure				
	Printing X		. .	Х	
RR	Pressure Sensitive Tape and				
	Label Surface Coating				
	OperationsX			Х	
SS	Industrial Surface Coating:				
	Large AppliancesX			X	
TT	Metal Coil Surface Coating X			х	
UU	Asphalt Processing and				
	Asphalt Roofing Manufacture X			x	
WV	Equipment Leaks of VOC in the				
	Synthetic Organic Chemicals	,			
	Manufacturing Industry Y			x	
TATTAT	Beverage Can Surface Costing			4 2	
	Industry V		·	Y	
xx	Bulk Gasoline Terminals	• • • • • • • •		Λ	
	ouponand tothethed sissis system	••••			
777	New Residential Wool Heaters Y			v	
				4 2	

BBB	Rubber Tire Manufacturing		37
000	(Deserved)	 •••••••••	. A
	(Reserved)	 • • • • • • • • •	
םמם	Volatile Organic Compounds		•
	(VOC) Emissions from the		-
	Polymer Manufacturing		
	Industry X	 	. X
EEE	(Reserved)	 	
FFF	Flexible Vinyl and Urethane		
	Coating and Printing X	 	X
GGG	Equipment Leaks of VOC in		
	Petroleum Refineries X	 	x
HHH	Synthetic Fiber Production		
	Facilities X	 *******	X
III	Volatile Organic Compound		
	(VOC) Emissions From the		
	Synthetic Organic Chemical	•	and the second
	(ROCMI) Nir Ovidation Unit		
	(SOCMI) AIL OXIDALION DALL		x
т.т.т.	Petroleum Dry Cleaners X	 	x
KKK	Equipment Leaks of VOC From		
	Onshore Natural Gas		
	Processing Plants X	 	X
LLL	Onshore Natural Gas		
	Processing: SO2 Emissions X	 	X
MMM	(Reserve)	 	
-			
NNN	Volatile Organic Compound		
	(VOC) Emissions From		
	Synthetic Organic Chemical		
	Manufacturing industry		
	(SOCHI) DISCILLATION		x
000	Nonmetallic Mineral	 	
000	Processing Plants	 	x
PPP	Wool Fiberglass Insulation	 	
	Manufacturing Plants X	 	Χ.
QQQ	VOC Emissions From Petroleum		
	Refinery Wastewater Systems X	 	X
RRR	Volatile Organic Compound		
	Emissions from Synthetic		
	Organic Chemical		
	Manufacturing Industry		
	(SOCMI) Reactor Processes X	 	
000	Nemetic Mene Conting		
222	Regilition V		x
ուսեւ	Industrial Surface Coating.	 	·
TÌT	Surface Coating of Plastic	•	
	Parts for Business Machines		
ບບັບ	Calciners and Dryers in		
	Mineral Industries X	 · · · · · · · · · ·	х
$\nabla \nabla \nabla$	Polymeric Coating of		
	Supporting Substrates		
	Facilities X	 ••••	Х
www	Municipal Solid Waste		
	LandfillsX	 * * * * * * * * * *	
-	·	 	

(v) Delegations for Modoc County Air Pollution Control District, Mojave Desert Air Quality Management District, Monterey Bay Unified Air Pollution Control District, and North Coast Unified Air Pollution Control District are shown in the following table:

Delegation Status for New Source Performance Standards for Modoc County Air Pollution Control District, Mojave Desert Air Quality Management District, Monterey Bay Unified Air Pollution Control District, and North Coast Unified Air Pollution Control District

-	Subpart	Air pollution control agency			
-		Modoc County APCD	Mojave Desert AQMD	Monterey Bay Unified	North Coast Unified
				APCD	AQMD
A D	General Provisions Fossil-Fuel Fired Steam Generators Constructed After	X	•••••	X	x
Da	August 17, 1971 Electric Utility Steam	X	X	X	X
	Generating Units Constructed		-		
Db	After September 18, 1978 Industrial-Commercial-	x	••••••••••	X	X
Da	Generating Units	x	· · · · · · · · ·	X	X
	Generating Units		•••••	x	
E Ea	Incinerators Municipal Waste Combustors Constructed After December 20, 1989 and On or Before	x	X	Х.	X
	September 20, 1994		• • • • • • •		
Eb	Municipal Waste Combustors Constructed After September 20, 1994	• • • • • • •			• • • • • • • •
Ec	Hospital/Medical/Infectious Waste Incinerators for Which Construction is Commenced				
	After June 20, 1996		•••••		
F	Portland Cement Plants	X	X	X	X
ы н	Sulfuric Acid Plants	••• A	X	X ·	X
I	Hot Mix Asphalt Facilities	X	X	x	× X
J	Petroleum Refineries	x	X	X	X
ĸ	Storage Vessels for Petroleum Liquids for Which Construction Reconstruction			**	21
	or Modification Commenced After June 11, 1973, and				
Ka	Prior to May 19, 1978 Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced	x	X	X	Х

	After May 10 1070 and Drier	. •			
	ALLEL May 10, 1970, and Prior			**	
~~1	to July 23, 1984	X.	* * * * * * *	X	x
KD	Volatile Organic Liquid Storage				
	Vessels (Including Petroleum				
	Liquid Storage Vessels) for				
	Which Construction.				
	Reconstruction or				
	Modification Commenced After				
	Tulte 22 100/	÷ .		v .	
Ŧ	Oury 25, 1904	A 	••••	A	A
يل	Secondary Lead Smelters	X .	X	Х	X
М	Secondary Brass and Bronze				
	Production Plants	X	X	X	X
N	Primary Emissions from Basic				
	Oxygen Process Furnaces for				
	Which Construction is				
	Commenced After June 11 1973	v	v	v	v
37-	Commenced Arter June 11, 1975	А	A	Δ.	~
Na	Secondary Emissions from Basic				
	Oxygen Process Steelmaking				
	Facilities for Which				
	Construction is Commenced		,		
	After January 20, 1983	x		х	х
0	Sewage Prestment Plants	v	v	v	v
D D	Drimare Connor Smalters	X	A	v	
P	Primary copper Smercers	A 	• • • • • • •	A.	A.
Q	Primary Zind Smelters	,X.	• • • • • • •	X	X
R	Primary Lead Smelters	X .		X	X
S	Primary Aluminum Reduction				
	Plants	x		X	X
T	Phosphate Fertilizer Industry:				
-	Wat Process Phosphoric Acid				
	Net Hotess Hosphorit Acid	77	v	v	-0
		A	A .	A .	~
U	Phosphate Fertilizer Industry:		·	-	`
	Superphosphoric Acid Plants	X	X	X	x
V	Phosphate Fertilizer Industry:				
	Diammonium Phosphate Plants	х -	X	X	X
W	Phosphate Fertilizer Industry:			· .	
	Triple Superphosphate Plants	х	x	X	x
· Y	Phognhate Fertilizer Industry.				
42	Cronular Mainle	-			
	Superphosphate Storage				
	Facilities	x	X	X	x
Y	Coal Preparation Plants	X	X	X	x
Z	Ferroalloy Production				
	Facilities	х		Х	х
ΔΔ	Steel Plants, Electric Arc				
	Furrages Constructed After			1. A 1.4	
	Ostohor 21 1074 and On on			• •	
			-7	77	
	Before August 17, 1983	X	X	Δ.	
AAa	Steel Plants: Electric Arc				
	Furnaces and Argon-Oxygen				
	Decarburization Vessels				
	Constructed After August 7.				
	1983	x		X	x
-	π	**		TT TT	v
DD	Alar purp mills	A 77		A V	
CC	Glass Manufacturing Plants	A	• • • • • • •	A 	A
DD	Grain Elevators	х		Х	X
EE	Surface Coating of Metal				
	Furniture	х		X	х
मम	(Reserved)				
	,,,				
	Stationary Cas Murbines	x		x	x
35	Line Monufacturing Diesta	v.	• • • • • • •	v	v
nH	Dime Manufacturing Plants	A	•••••	A	· •
KK	Lead-Acid Battery Manufacturing				
	Plants	X		X	Х
$\mathbf{L}\mathbf{L}$	Metallic Mineral Processing				

.* .

	Plants X		Х	X
MM	Automobile and Light Duty Trucks Surface Coating			
	OperationsX		Х	X
NN	Phosphate Rock Plants X		X	X
PP	Ammonium Sulfate Manufacture X		X	X
QQ	Graphic Arts Industry:			
-	Publication Rotogravure		77	71
	Printing X		A	A
KK.	Fressure Sensitive Tape and	•		
	Operations V		v	x
CC	Industrial Surface Coating.	• • • • • • • •		. 21
55	Large Appliances		X	X
ጥጥ	Metal Coil Surface Coating		x	x
ົ້ນບົ	Asphalt Processing and Asphalt			
	Roofing ManufactureX		· X	X
vv	Equipment Leaks of VOC in the			
	Synthetic Organic Chemicals			
	Manufacturing Industry X		X	X
WW	Beverage Can Surface Coating	•		
	Industry X	• • • • • • •	X	X
XX	Bulk Gasoline Terminals	•••••	• • • • • • • • •	• • • • • • •
ר ה ה ה	New Regidential Wool Heaters X		v	x
BBB	Rubber Tire Manufacturing			<u>71</u>
	IndustryX		х	x
CCC	(Reserved)			
DDD	Volatile Organic Compounds			· ·
	(VOC) Emissions from the			
	Polymer manufacturing		· • •	
			77	
	Industry X		X	
EEE	(Reserved)		X	
EEE	(Reserved)		X 	••••••
eee FFF	Industry X (Reserved) Flexible Vinyl and Urethane	•••••	X 	•••••
EEE FFF	Industry X (Reserved) X Flexible Vinyl and Urethane Coating and Printing X		x x	 x
EEE FFF GGG	Industry X (Reserved) X Flexible Vinyl and Urethane Coating and Printing X Equipment Leaks of VOC in	•••••	x x	x
EEE FFF GGG	Industry X (Reserved) X Flexible Vinyl and Urethane Coating and Printing X Equipment Leaks of VOC in Petroleum Refineries X	· · · · · · · · · · · · · · · · · · ·	x x x	x x
EEE FFF GGG HHH	Industry X (Reserved) X Flexible Vinyl and Urethane Coating and Printing X Equipment Leaks of VOC in Petroleum Refineries X Synthetic Fiber Production	· · · · · · · · · · · · · · · · · · ·	x x x	 X X
EEE FFF GGG HHH	Industry X (Reserved) X Flexible Vinyl and Urethane Coating and Printing X Equipment Leaks of VOC in Petroleum Refineries X Synthetic Fiber Production Facilities X Volatile Organic Compound (VOC)		x x x x x	x x x x
EEE FFF GGG HHH III	Industry X (Reserved) X Flexible Vinyl and Urethane Coating and Printing X Equipment Leaks of VOC in Petroleum Refineries X Synthetic Fiber Production Facilities X Volatile Organic Compound (VOC) Emissions From the Synthetic	· · · · · · · · · · · · · · · · · · ·	x x x x x	x x x x
EEE FFF GGG HHH III	Industry X (Reserved) X Flexible Vinyl and Urethane Coating and Printing X Equipment Leaks of VOC in Petroleum Refineries X Synthetic Fiber Production Facilities X Volatile Organic Compound (VOC) Emissions From the Synthetic Organic Chemical	· · · · · · · · · · · · · · · · · · ·	x x x x x	x x x x
EEE FFF GGG HHH III	Industry X (Reserved) X Flexible Vinyl and Urethane Coating and Printing X Equipment Leaks of VOC in Petroleum Refineries X Synthetic Fiber Production Facilities X Volatile Organic Compound (VOC) Emissions From the Synthetic Organic Chemical Manufacturing Industry	· · · · · · · · · · · · · · · · · · ·	x x x x x	x x x x
EEE FFF GGG HHH III	Industry X (Reserved) X Flexible Vinyl and Urethane Coating and Printing X Equipment Leaks of VOC in Petroleum Refineries X Synthetic Fiber Production Facilities X Volatile Organic Compound (VOC) Emissions From the Synthetic Organic Chemical Manufacturing Industry (SOCMI) Air Oxidation Unit	· · · · · · · · · · · · · · · · · · ·	x x x x x	x x x x
EEE FFF GGG HHH III	Industry X (Reserved) X Flexible Vinyl and Urethane Coating and Printing X Equipment Leaks of VOC in Petroleum Refineries X Synthetic Fiber Production Facilities X Volatile Organic Compound (VOC) Emissions From the Synthetic Organic Chemical Manufacturing Industry (SOCMI) Air Oxidation Unit Processes		x x x x	
EEE FFF GGG HHH III	Industry X (Reserved) X Flexible Vinyl and Urethane Coating and Printing X Equipment Leaks of VOC in Petroleum Refineries X Synthetic Fiber Production Facilities X Volatile Organic Compound (VOC) Emissions From the Synthetic Organic Chemical Manufacturing Industry (SOCMI) Air Oxidation Unit Processes		x x x x	 x x x
EEE FFF GGG HHH III	Industry X (Reserved) X Flexible Vinyl and Urethane Coating and Printing X Equipment Leaks of VOC in Petroleum Refineries X Synthetic Fiber Production Facilities X Volatile Organic Compound (VOC) Emissions From the Synthetic Organic Chemical Manufacturing Industry (SOCMI) Air Oxidation Unit Processes X Petroleum Dry Cleaners X		x x x x x	x x x x
EEE FFF GGG HHH III	Industry X (Reserved) X Flexible Vinyl and Urethane Coating and Printing X Equipment Leaks of VOC in Petroleum Refineries X Synthetic Fiber Production Facilities X Volatile Organic Compound (VOC) Emissions From the Synthetic Organic Chemical Manufacturing Industry (SOCMI) Air Oxidation Unit Processes X Petroleum Dry Cleaners X Equipment Leaks of VOC From Onshore Natural Cas	· · · · · · · · · · · · · · · · · · ·	x x x x x	x x x x
EEE FFF GGG HHH III JJJ KKK	Industry X (Reserved) X Flexible Vinyl and Urethane Coating and Printing X Equipment Leaks of VOC in Petroleum Refineries X Synthetic Fiber Production Facilities X Volatile Organic Compound (VOC) Emissions From the Synthetic Organic Chemical Manufacturing Industry (SOCMI) Air Oxidation Unit Processes X Petroleum Dry Cleaners X Equipment Leaks of VOC From Onshore Natural Gas Processing Plants	· · · · · · · · · · · · · · · · · · ·	x x x x x	x x x x x
EEE FFF GGG HHH III JJJJ KKK	Industry X (Reserved) X Flexible Vinyl and Urethane Coating and Printing X Equipment Leaks of VOC in Petroleum Refineries X Synthetic Fiber Production Facilities X Volatile Organic Compound (VOC) Emissions From the Synthetic Organic Chemical Manufacturing Industry (SOCMI) Air Oxidation Unit Processes X Petroleum Dry Cleaners X Equipment Leaks of VOC From Onshore Natural Gas Processing Plants X	· · · · · · · · · · · · · · · · · · ·	x x x x x	x x x x x x x x
EEE FFF GGG HHH III JJJ KKK	Industry X (Reserved) X Flexible Vinyl and Urethane Coating and Printing X Equipment Leaks of VOC in Petroleum Refineries X Synthetic Fiber Production Facilities X Volatile Organic Compound (VOC) Emissions From the Synthetic Organic Chemical Manufacturing Industry (SOCMI) Air Oxidation Unit Processes X Petroleum Dry Cleaners X Equipment Leaks of VOC From Onshore Natural Gas Processing Plants X Onshore Natural Gas Processing: SO2 Emissions X	· · · · · · · · · · · · · · · · · · ·	x x x x x	x x x x x x x x x x
EEE FFF GGG HHH III JJJJ KKK LLL MMM	Industry X (Reserved) X Flexible Vinyl and Urethane Coating and Printing X Equipment Leaks of VOC in Petroleum Refineries X Synthetic Fiber Production Facilities X Volatile Organic Compound (VOC) Emissions From the Synthetic Organic Chemical Manufacturing Industry (SOCMI) Air Oxidation Unit Processes X Petroleum Dry Cleaners X Equipment Leaks of VOC From Onshore Natural Gas Processing Plants X Onshore Natural Gas Processing: SO2 Emissions X		X X X X X	 X X X X X X X X
EEE FFF GGG HHH III JJJJ KKK LLL MMM	Industry X (Reserved) X Flexible Vinyl and Urethane Coating and Printing X Equipment Leaks of VOC in Petroleum Refineries X Synthetic Fiber Production Facilities X Volatile Organic Compound (VOC) Emissions From the Synthetic Organic Chemical Manufacturing Industry (SOCMI) Air Oxidation Unit Processes X Petroleum Dry Cleaners X Equipment Leaks of VOC From Onshore Natural Gas Processing Plants X Onshore Natural Gas Processing: SO2 Emissions X	· · · · · · · · · · · · · · · · · · ·	x x x x x	······ X X X X
EEE FFF GGG HHH III JJJJ KKK LLL MMM NNN	Industry X (Reserved) X Flexible Vinyl and Urethane Coating and Printing X Equipment Leaks of VOC in Petroleum Refineries X Synthetic Fiber Production Facilities X Volatile Organic Compound (VOC) Emissions From the Synthetic Organic Chemical Manufacturing Industry (SOCMI) Air Oxidation Unit Processes X Petroleum Dry Cleaners X Equipment Leaks of VOC From Onshore Natural Gas Processing Plants X Onshore Natural Gas Processing: SO2 Emissions X Volatile Organic Compound (VOC)	· · · · · · · · · · · · · · · · · · ·	x x x x x	x x x x x
EEE FFF GGG HHH III JJJJ KKK LLL MMM NNN	Industry X (Reserved) X Flexible Vinyl and Urethane Coating and Printing X Equipment Leaks of VOC in Petroleum Refineries X Synthetic Fiber Production Facilities X Volatile Organic Compound (VOC) Emissions From the Synthetic Organic Chemical Manufacturing Industry (SOCMI) Air Oxidation Unit Processes X Petroleum Dry Cleaners X Equipment Leaks of VOC From Onshore Natural Gas Processing Plants X Onshore Natural Gas Processing: SO2 Emissions X (Reserved) X	· · · · · · · · · · · · · · · · · · ·	x x x x x	x x x x
EEE FFF GGG HHH III JJJJ KKK LLL MMM NNN	Industry X (Reserved) X Flexible Vinyl and Urethane Coating and Printing X Equipment Leaks of VOC in Petroleum Refineries X Synthetic Fiber Production Facilities X Volatile Organic Compound (VOC) Emissions From the Synthetic Organic Chemical Manufacturing Industry (SOCMI) Air Oxidation Unit Processes X Petroleum Dry Cleaners X Equipment Leaks of VOC From Onshore Natural Gas Processing Plants X Onshore Natural Gas Processing: SO2 Emissions X (Reserved) X Volatile Organic Compound (VOC) Emissions From Synthetic Organic Chemical Manufacturing Industry		x x x x x	x x x x x x
EEE FFF GGG HHH III JJJJ KKK LLL MMM NNN	Industry X (Reserved) X Flexible Vinyl and Urethane Coating and Printing X Equipment Leaks of VOC in Petroleum Refineries X Synthetic Fiber Production Facilities X Volatile Organic Compound (VOC) Emissions From the Synthetic Organic Chemical Manufacturing Industry (SOCMI) Air Oxidation Unit Processes X Equipment Leaks of VOC From Onshore Natural Gas Processing Plants X Onshore Natural Gas Processing: SO2 Emissions X (Reserved) X Volatile Organic Compound (VOC) Emissions From Synthetic Organic Chemical Manufacturing Industry (SOCMI) Distillation		x x x x x	x x x x x x
EEE FFF GGG HHH III JJJJ KKK LLL MMM NNN	Industry X (Reserved) X Flexible Vinyl and Urethane Coating and Printing X Equipment Leaks of VOC in Petroleum Refineries X Synthetic Fiber Production Facilities X Volatile Organic Compound (VOC) Emissions From the Synthetic Organic Chemical Manufacturing Industry (SOCMI) Air Oxidation Unit Processes X Petroleum Dry Cleaners X Equipment Leaks of VOC From Onshore Natural Gas Processing Plants X Onshore Natural Gas Processing: SO2 Emissions X (Reserved) X Volatile Organic Compound (VOC) Emissions From Synthetic Organic Chemical Manufacturing Industry (SOCMI) Distillation Operations X		x x x x x x x x x x	x x x x x x x x x x x

000	Nonmetallic Mineral Processing			
	Plants X		X	X
$\mathbf{P}\mathbf{P}\mathbf{P}$	Wool Fiberglass Insulation		·	
~~~	Manufacturing Plants X	• • • • • • •	X	X
QQQ	VUC Emissions From Petroleum			
מחת	Reinery Wastewater Systems X	•••••	X	X
KKK	Friegions from Sumthoring			
	Organic Chemical			
	Manufacturing Industry			
	(SOCMI) Reactor Processes			
SSS	Magnetic Tape Coating			
	Facilities X	····	X	Х
TTT	Industrial Surface Coating:			
	Surface Coating of Plastic		v	v
TTTTT	Calciners and Dryers in Mineral		A	Δ
000	Industries		x	
VVV	Polymeric Coating of Supporting	-		
	Substrates Facilities		X	X
www	Municipal Solid Waste Landfills	· · · · · · ·		
•			· ·	

(vi) Delegations for Northern Sierra Air Quality Management District, Northern Sonoma County Air Pollution Control District, Placer County Air Pollution Control District, and Sacramento Metropolitan Air Quality Management District are shown in the following table:

Delegation Status for New Source Performance Standards for Northern Sierra Air

Quality Management District, Northern Sonoma County Air Pollution Control District, Placer County Air Pollution Control District, and Sacramento Metropolitan Air Quality Management District

-	Subpart	Air pollution control agency				
-		Northern	Northern	Placer	Sacramento	
		Sierra AQMD	Sonoma County APCD	County APCD	Metro- politan AQMD	
					· ·	
A D	Fossil-Fuel Fired Steam		A .			
	Generators Constructed After August 17, 1971		X		x	
Da	Electric Utility Steam Generating Units					
	Constructed After September 18, 1978		x		x	
Db	Industrial-Commercial-					
	Institutional Steam Generating Units				x	
DC	Small Industrial Steam	•••••		•••••		
	Generating Units		<i></i> .		X	
E	Incinerators		X		x	
Ea	Municipal Waste Combustors					

	Constructed After December 20, 1989 and On or Before September 20,		·			x
Eb	Municipal Waste Combustors Constructed After					
Ec	September 20, 1994 Hospital/Medical/	· · · · · · · · · · ·		· • • • • • • •		X
	Infectious Waste					
	Incinerators for Which Construction is	•				
	Commenced After June 20.					
	1996					Х
F	Portland Cement Plants		X			X
G	Nitric Acid Plants		ž			X
H	Sulfuric Acid Plants		¥. v			x ` x
1	Hot Mix Asphalt Facilities	••••	· x		•	X
. U K	Storage Vessels for	* * * * * * * * * *				
10	Petroleum Liquids for					
	Which Construction,		5			
•	Reconstruction, or					
	Modification Commenced					
	After June 11, 1973, and Prior to May 19, 1978		×			х
Ka	Storage Vessels for					
104	Petroleum Liquids for					
	Which Construction,					
	Reconstruction, or					
	Modification Commenced		· .			•
	Arter May 18, 1978, and Prior to July 23, 1984		x			x
КЪ	Volatile Organic Liquid					
1.00	Storage Vessels					
	(Including Petroleum					
	Liquid Storage Vessels)					
	tor Which Construction,					
	Modification Commenced					
	After July 23, 1984					x
L	Secondary Lead Smelters		x			X
М	Secondary Brass and Bronze					77
	Production Plants	••••	X			X
N	Primary Emissions from					
	Furnaces for Which					
	Construction is					
	Commenced After June 11,					
	1973	* * * * * * * * * * *	X			X
Na	Secondary Emissions from			-		
	Steelmaking Facilities					
	for Which Construction					
	is Commenced After		4			
	January 20, 1983		· · · · · · · · · ·			X
0	Sewage Treatment Plants		X			X
P	Primary Copper Smelters	• • • • • • • • • •	. X			X V
2 P	Primary Lead Smelters		X	• • • • • • •		x
S	Primary Aluminum Reduction	• • • • • • • • • •				
~	Plants		X			х
T	Phosphate Fertilizer					
	Industry: Wet Process					v
	Phosphoric Acid Plants	•••••	Х			A

ê.

υ	Phosphate Fertilizer				
	Industry:				
	Superphosphoric Acid		**		
v	Phosphate Fertilizer		X	• • • • • • •	X
•	Industry: Diammonium				
	Phosphate Plants		x		x
W	Phosphate Fertilizer				
	Industry: Triple				
v	Superphosphate Plants	······	Х		x
А	Industry Cranular				
	Triple Superphosphate				
	Storage Facilities		v		v
Y	Coal Preparation Plants		x	••••	· v
Z	Ferroalloy Production				-22
	Facilities		X		x
AA	Steel Plants: Electric Arc				
	Furnaces Constructed				
	Alter Uctober 21, 1974				
	17. 1983		v		37
AAa	Steel Plants: Electric Arc	• • • • • • • • •	A		A
	Furnaces and Argon-				
	Oxygen Decarburization				
	Vessels Constructed				
	After August 7, 1983	*******	• • • • • • • • • •		X
BB	Kraft pulp Mills		X	••••	X
	Glass Manufacturing Plants Grain Elevators	•••••	X		x
EE	Surface Coating of Metal	••••••	X		x
	Furniture			·	x
$\mathbf{FF}$	(Reserved)				· · · · · · · · ·
•					
GG	Stationary Gas Turbines	· · · · · · · · · · ·	X		X
HH	Lime Manuracturing Plants .		X		X
LL L	Manufacturing Plants				
$\mathbf{L}\mathbf{L}$	Metallic Mineral	* * * * * * * * *		• • • • • • • •	A
	Processing Plants				x
MM	Automobile and Light Duty				
	Trucks Surface Coating				•.
	Operations		X		X
NN	Phosphate Rock Plants		• • • • • • • • • •		x
PP	Manufacture		37		
00	Granhic Arts Industry	• • • • • • • • •	A		X
××	Publication Rotogravure				
	Printing				x
RR	Pressure Sensitive Tape				
	and Label Surface				
	Coating Operations	• • • • • • • • • •	• • • • • • • • • • • • • • • • • • •		X
SS	Industrial Surface				
	Coating: Large				
որդ	Metal Coil Surface Coating		* * * * * * * * * *		X V
ບັບ	Asphalt Processing and				A
	Asphalt Roofing				
	Manufacture	• • • • • • • • • • •	· • • • • • • • • • •		х
vv	Equipment Leaks of VOC in				1
	the Synthetic Organic				•
	Chemicals Manufacturing				77

•

.

	Coating Industry		•••••		X
			*******		
AAA	New Residential Wool Heaters				X
BBB	Rubber Tire Manufacturing				X
CCC	(Reserved)				
DDD	Volatile Organic Compounds (VOC) Emissions from the Polymer Manufacturing			· .	
999	Industry		••••		X
	(Reserved)		********	•••••	
FFF	Flexible Vinyl and Urethane Coating and				. <u>1</u>
GGG	Printing Equipment Leaks of VOC in	• <b>- • • • • • • •</b> •	• • • • • • • • • •	• • • • • • •	X
HHH	Petroleum Refineries Synthetic Fiber Production	• • • • • • • • • •	*******		x
III	Facilities Volatile Organic Compound	••••		• • • • • • • •	x
•	(VOC) Emissions From the Synthetic Organic Chemical Manufacturing	•			
	Industry (SOCMI) Air		. ·		v
JJJ	Petroleum Dry Cleaners	• • • • • • • • • • • • • • • • • • •			X
KKK	Equipment Leaks of VOC From Onshore Natural Gas				
<b></b> -	Processing Plants				X
ىلىلەك	Processing: SO2		· ·	•	*7
MMM	(Reserved)	• • • • • • • • • • •	• • • • • • • • • • •		<u>م</u> • • • • • • • • • •
NNN	Volatile Organic Compound			•	
	(VOC) Emissions From		. * •		
	Chemical Manufacturing Industry (SOCMI)	· · ·			
000	Distillation Operations . Nonmetallic Mineral	· • • • • • • • • • • •		• • • • • • •	x
PPP	Processing Plants Wool Fiberglass Insulation		• • • • • • • • • •	• • • • • • •	Х
000	Manufacturing Plants		• • • • • • • • • •		X
222	Petroleum Refinery				
RRR	Volatile Organic Compound Emissions from Synthetic		• • • • • • • • • • • •	* * • • • • •	. X
	Organic Chemical Manufacturing Industry (SOCMI) Reactor			•	
SSS	Processes Magnetic Tape Coating	• • • • • • • • • •	••••	• • • • • • • •	X
$\mathbf{T}\mathbf{T}\mathbf{T}$	Facilities Industrial Surface			• • • • • • • •	X
	Coating: Surface Coating of Plastic Parts for				
טטט	Business Machines Calciners and Dryers in			• • • • • • •	X
	Mineral Industries	• • • • • • • • • •		••••	X

.

	1989 and On or Before September 20, 1994		X	
Eb	Municipal Waste Combustors Constructed After September 20, 1994		X	
Ec	Hospital/Medical/Infectious Waste Incinerators for Which Construction is Commenced After June 20, 1996		X	
F	Portland Cement Plants X	• • • • • • • • • • •	x	• • • • • •
G	Nitric Acid Plants X		x	
H	Sulfuric Acid Plants X		x	• • • • • • •
i	Hot Mix Asphalt Facilities X		. X	
J	Petroleum Refineries X		Χ.	• • • • • • •
K	Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced After June 11, 1973, and Prior to May 19, 1978 X		X	· · · · · · · ·
Ka	Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced After May 18, 1978, and Prior to July 23, 1984		x	ین در ۲
Kb	Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984		X	
L	Secondary Lead Smelters X		x	
M	Secondary Brass and Bronze Production Plants X		X	
N	Primary Emissions from Basic Oxygen Process Furnaces for Which Construction is Commenced After June 11, 1973X	· · · · · · · · · · · · · · · · · · ·	X	
Na	Secondary Emissions from Basic Oxygen Process Steelmaking Facilities for Which Construction is Commenced After		X	
·	Gouago Treatment Plants		x	
÷	Dewaye Treatment Flants A		x	
	Primary Copper Dimercers		X	· • • • • •
2 •	Drimary Lead Smelters X	· · · · · · · · · · · · · · · · · · ·	X	
n.	EFTWOTA REAM AWELFERS			

s	Primary Aluminum Reduction Plants X		х	
T	Phosphate Fertilizer Industry: Wet Process Phosphoric Acid		v	
	Plants A	••••••••	A	
U	Phosphate Fertilizer Industry: Superphosphoric Acid Plants X		x	•••••••
v	Phosphate Fertilizer Industry: Diammonium Phosphate Plants X	· · · · · · · · · · · ·	X	•••••
Ŵ	Phosphate Fertilizer Industry: Triple Superphosphate Plants X		x .	
x	Phosphate Fertilizer Industry: Granular Triple Superphosphate Storage FacilitiesX	•••••	x	
Y	Coal Preparation Plants X		X	•••••
Z	Ferroalloy Production Facilities X	••••	X	
AA	Steel Plants: Electric Arc Furnaces Constructed After October 21, 1974 and On or			. , .
ААа	Before August 17, 1983 X Steel Plants: Electric Arc Furnaces and Argon-Oxygen	••••	Χ.	
	Decarburization Vessels Constructed After August 7, 1983		x	
BB	Kraft pulp Mills X		x	
cc	Glass Manufacturing Plants	- <b></b> .	x	
DD	Grain ElevatorsX	· · · · · · · · · ·	X	••••
EE	Surface Coating of Metal Furniture		x	· · · · · · · ·
FF	(Reserved)			
GG	Stationary Gas Turbines	••••••	X.	
нн	Lime Manufacturing Plants X		X	· · · · · · ·
KK	Lead-Acid Battery Manufacturing Plants		x	• • • •;• •
LL	Metallic Mineral Processing Plants	· · · · · · · · · · · · ·	x	• • • • • •
MM	Automobile and Light Duty Trucks Surface Coating Operations	· · · · · · · · · · · ·	x	
NN	Phosphate Rock Plants		X	
PP	Ammonium Sulfate Manufacture		X	
QQ	Graphic Arts Industry: Publication Rotogravure			

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· . • . /

	Printing			x	
RR	Pressure Sensitive Tape and Label Surface Coating Operations			X	
SS	Industrial Surface Coating: Large Appliances			X	••••
TT	Metal Coil Surface Coating			X	· · · · · · ·
บบ	Asphalt Processing and Asphalt Roofing Manufacture			x	• • • • • • • • • • • •
vv	Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry	•••••	••••••	X	•••••
ŴŴ	Beverage Can Surface Coating Industry			X	
XX	Bulk Gasoline Terminals				
AAA	New Residential Wool Heaters		X	X	••••
BBB	Rubber Tire Manufacturing Industry		x	X	•••••
CCC DDD	(Reserved) Volatile Organic Compounds (VOC) Emissions from the Polymer Manufacturing Industry			X	
EEE	(Reserved)		·•		••••
FFF	Flexible Vinyl and Urethane Coating and Printing		· · · · · · · · · · · · · · · ·	x	
GGG	Equipment Leaks of VOC in Petroleum Refineries	• • • • • • • •	<i></i>	x	
ННН	Synthetic Fiber Production Facilities			x	
iII	Volatile Organic Compound (VOC) Emissions From the Synthetic Organic Chemical Manufacturing Industry (SOCMI) Air Oxidation Unit Processes		· · · · · · · · · · · · · · · · · · ·	х	
JJJ	Petroleum Dry Cleaners			x	
KKK	Equipment Leaks of VOC From Onshore Natural Gas Processing	• .		<b>X</b>	алар (1997) • Д
LLL	Onshore Natural Gas Processing: S02 Emissions		· · · · · · · · · · · · · · ·	X	• • • • • • •
MMM	(Reserved)			· · · · · · · ·	
NNN	Volatile Organic Compound (VOC) Emissions From Synthetic Organic Chemical Manufacturing Industry (SOCMI) Distillation				

	Operations	·	••••	X	
000	Nonmetallic Mineral Processing Plants			x	• • • • • •
PPP	Wool Fiberglass Insulation Manufacturing Plants	• • • • • • •		X	, <b></b>
<u>0</u> 00	VOC Emissions From Petroleum Refinery Wastewater Systems		X	X	• • • • • • • •
RRR	Volatile Organic Compound Emissions from Synthetic Organic Chemical Manufacturing Industry (SOCMI) Reactor Processes		•	X	•••••
SSS	Magnetic Tape Coating Facilities .	; •`• • • • • •	x	x	
TTT	Industrial Surface Coating: Surface Coating of Plastic Parts for Business Machines	••••••••	x	X	
טטט	Calciners and Dryers in Mineral Industries			Х	
vvv	Polymeric Coating of Supporting Substrates Facilities	• • • • • • • •		X	
www	Municipal Solid Waste Landfills	• • • • • • • •		<b>X</b>	• • • • • • •

(ix) Delegations for Tuolumne County Air Pollution Control District, Ventura County Air Pollution Control District, and Yolo-Solano Air Quality Management District are shown in the following table:

Delegation Status for New Source Performance Standards for Tuolumne County Air

Pollution Control District, Ventura County Air Pollution Control District, and Yolo-Solano Air Quality Management District

-	Subpart	Air pol	lution cont	rol agency
<u> </u>		Tuolumne	Ventura	Yolo-
Sola	ano	County APCD	County APCD	AQMD
- A D	General Provisions		x [`]	x
ע ס-	Constructed After August 17, 1971 .	•••••	X	Х
Da .	Units Constructed After September 18, 1978	• • • • • • • • • •	X	•••••••••
Db	Industrial-Commercial-Institutional Steam Generating Units	· · · · · · · · · · · · · · ·	x	X
DC	Small Industrial Steam Generating			

	Units		x	•
•				
E	Incinerators	• • • • • • • • •	X	• • • • • • • • • • • •
Ea	Municipal Waste Combustors Constructed After December 20, 1989 and On or Before September			
	20, 1994		X	• • • • • • • • • • •
Eb	Municipal Waste Combustors Constructed After September 20,	e .		· ·
	1994		• • • • • • • •	
Ec	Hospital/Medical/Infectious Waste Incinerators for Which Construction is Commenced After	, •		
	June 20, 1996	• • • • • • • • • •	• • • • • • • • •	• • • • • • • • • • • •
F	Portland Cement Plants	••••	х	
G	Nitric Acid Plants	• • • • • • • • • •	х	
- H	Sulfuric Acid Plants		x	
• T	Hot Mix Asphalt Facilities		×	Y
Ĵ	Petroleum Refineries	• • • • • • • • • • •	X	. X
K	Storage Vessels for Petroleum Liquids for Which Construction,			
	Commenced After June 11, 1973, and			
Ka	Prior to May 19, 1978 Storage Vessels for Petroleum Liquids for Which Construction.	••••	X	X
	Reconstruction, or Modification Commenced After May 18, 1978, and Prior to July 23, 1984		X	• • • • • • • • • • • • •
Kb	Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984		X	· · · · · · · · · · · · · · · · · · ·
Г	Secondary Lead Smelters		Х	
•				
М	Secondary Brass and Bronze Production Plants		x	
N	Primary Emissions from Basic Oxygen Process Furnaces for Which Construction is Commenced After			
	June 11, 19/3	• • • • • • • • • •	X	• • • • • • • • • • • • •
Na	Secondary Emissions from Basic Oxygen Process Steelmaking Facilities for Which Construction is Commenced After January 20,			
	1983	•••••	x	
0	Sewage Treatment Plants	•••••	x	
Ρ	Primary Copper Smelters		X	

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Q	Primary Zinc Smelters		x	
R	Primary Lead Smelters		X	• • • • • • • • • • • • • • • • • • • •
S	Primary Aluminum Reduction Plants		X	
T	Phosphate Fertilizer Industry: Wet Process Phosphoric Acid Plants		X	
Ū	Phosphate Fertilizer Industry: Superphosphoric Acid Plants	· · · · · · · · · · · · · ·	x	• • • • • • • • • • • •
v	Phosphate Fertilizer Industry: Diammonium Phosphate Plants		x	· • • • • • • • • • • •
W,	Phosphate Fertilizer Industry: Triple Superphosphate Plants		X	
X	Phosphate Fertilizer Industry: Granular Triple Superphosphate Storage Facilities	· · · · · · · · · · · · · ·	x	
Y	Coal Preparation Plants	· • • • • • • • • •	X	
ż	Ferroalloy Production Facilities	••••••	x	
AA	Steel Plants: Electric Arc Furnaces Constructed After October 21, 1974		۳	v
AAa	and On or Before August 17, 1983 Steel Plants: Electric Arc Furnaces and Argon-Oxygen Decarburization Vessels Constructed After August		A	Δ
	7, 1983		X	
BB ·	Kraft pulp Mills		X	
CC	Glass Manufacturing Plants		X	
DD	Grain Elevators	• • • • • • • • •	×X	
EE	Surface Coating of Metal Furniture	********	X	
FF	(Reserved)	• • • • • • • • • •	• • • • • • • •	
GG	Stationary Gas Turbines		X .	· · · · · · · · · · · · · · · ·
нн	Lime Manufacturing Plants	• • • • • • • • •	x	·
KK	Lead-Acid Battery Manufacturing Plants		x	
LL	Metallic Mineral Processing Plants		x	
MM	Automobile and Light Duty Trucks Surface Coating Operations		X	
NN	Phosphate Rock Plants		x	• • • • • • • • • • • • •
PP	Ammonium Sulfate Manufacture	• • • • • • • • • •	X	
QQ	Graphic Arts Industry: Publication Rotogravure Printing		x	· · · · · · · · · · · · · · · · · · ·
RR	Pressure Sensitive Tape and Label			

. . •

	Surface Coating Operations		X	• • • • • • • • • • •	
SS	Industrial Surface Coating: Large Appliances		x		
TT	Metal Coil Surface Coating		x		÷
ບັບ	Asphalt Processing and Asphalt		x		
1717	Equipment Leaks of VOC in the		, <b>**</b>	••••	
	Synthetic Organic Chemicals Manufacturing Industry		X	· · · · · · · · · · · · · · · · · · ·	
ŴŴ	Beverage Can Surface Coating Industry		X	· · · · · · · · · · · ·	
xx	Bulk Gasoline Terminals				
AAA	New Residential Wool Heaters		X		
BBB	Rubber Tire Manufacturing Industry		X		
ccc	(Reserved)				
	Volatile Organic Compounds (VOC) Emissions from the Polymer Manufacturing Industry		X		
EEE	(Reserved)			• .• • • • • • • • •	•
FFF	Flexible Vinyl and Urethane Coating and Printing	•••••	x		•
ĠGG	Equipment Leaks of VOC in Petroleum Refineries		x		
ннн	Synthetic Fiber Production Facilities	•••••	X	· · · · · · · · · · · · · · · · · · ·	:
iII	Volatile Organic Compound (VOC) Emissions From the Synthetic Organic Chemical Manufacturing Industry (SOCMI) Air Oxidation Unit Processes		x		
JJJ	Petroleum Dry Cleaners		X	• • • <u>•</u> • • • • • • •	
KKK	Equipment Leaks of VOC From Onshore Natural Gas Processing Plants		X		
LLL	Onshore Natural Gas Processing: SO2 Emissions		x		
MMM	(Reserved)	• • • • • • • • •			
NNN	Volatile Organic Compound (VOC) Emissions From Synthetic Organic Chemical Manufacturing Industry (SOCMI) Distillation Operations		x		
000	Nonmetallic Mineral Processing			77	
PPP	Plants Wool Fiberglass Insulation		X	A	

	Manufacturing Plants	X	
QQQ	VOC Emissions From Petroleum Refinery Wastewater Systems	X	••••••
RRR	Volatile Organic Compound Emissions from Synthetic Organic Chemical Manufacturing Industry (SOCMI)	·	
	Reactor Processes	X	
SSS	Magnetic Tape Coating Facilities	Х	• • • • • • • • • • • •
TTT	Industrial Surface Coating: Surface Coating of Plastic Parts for		
	Business Machines	х	
ົບບບ	Calciners and Dryers in Mineral Industries	X	÷••••
vvv	Polymeric Coating of Supporting Substrates Facilities	x.	
WWW	Municipal Solid Waste Landfills	X	Х

(3) Hawaii. The following table identifies delegations as of June 15, 2001:

Delegation Status for New Source Performance Standards for Hawaii

	Subpart Hawai
i	
- 7	Ceneral Provisions
ñ	Fossil-Fuel Fired Steam Generators Constructed After August 17.
	1971 X
Da	Electric Utility Steam Generating Units Constructed After
	September 18, 1978 X
Db	Industrial-Commercial-Institutional Steam Generating Units X
DC	Small Industrial Steam Generating UnitsX
Ε	Incinerators X
Ea	Municipal Waste Combustors Constructed After December 20, 1989 and
	On or Before September 20, 1994 X
ED	Municipal Waste Combustors Constructed Alter September 20, 1994 A
EC	Hospital/Medical/Infectious waste incinerators for which
	Construction is commenced Arter bune 20, 1990
ਸ	Portland Cement Plants
Ĝ	Nitric Acid Plants
H	Sulfuric Acid Plants
•	
I	Hot Mix Asphalt Facilities X
J	Petroleum Refineries X
K	Storage Vessels for Petroleum Liquids for Which Construction,
	Reconstruction, or Modification Commenced After June 11, 1973,
	and Prior to May 19, 1978
Ka ·	Storage Vessels for Petroleum Liquids for Which Construction.
I'LL	Reconstruction, or Modification Commenced After May 18, 1978,
	and Prior to July 23, 1984 X
Kb	Volatile Organic Liquid Storage Vessels (Including Petroleum

L	Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984
M	Secondary Brass and Bronze Production Plants
N	Primary Emissions from Basic Oxygen Process Furnaces for Which Construction is Commenced After June 11, 1973
Na	Secondary Emissions from Basic Oxygen Process Steelmaking Facilities for Which Construction is Commenced After January 20, 1983
O P	Sewage Treatment Plants X Primary Copper Smelters
Q	Primary Zinc Smelters
R	Primary Lead Smelters
s	Primary Aluminum Reduction Plants
T	Phosphate Fertilizer Industry: Wet Process Phosphoric Acid Plants
ט	Phosphate Fertilizer Industry: Superphosphoric Acid Plants
v	Phosphate Fertilizer Industry: Diammonium Phosphate Plants
Ŵ	Phosphate Fertilizer Industry: Triple Superphosphate Plants
ż	Phosphate Fertilizer Industry: Granular Triple Superphosphate Storage Facilities
Y Z	Coal Preparation Plants X Ferroalloy Production Facilities
AA AAa BB	Steel Plants: Electric Arc Furnaces Constructed After October 21, 1974 and On or Before August 17, 1983 X Steel Plants: Electric Arc Furnaces and Argon-Oxygen Decarburization Vessels Constructed After August 7, 1983 X Kraft pulp Mills
cc	Glass Manufacturing Plants
DD	Grain Elevators
EE	Surface Coating of Metal Furniture
FF	(Reserved)
GG нн	Stationary Gas TurbinesX
KK Acio LL	Lead- 1 Battery Manufacturing Plants Metallic Mineral Processing Plants
MM	Automobile and Light Duty Trucks Surface Coating Operations
NN	Phosphate Rock Plants
PP	Ammonium Sulfate Manufacture
QQ	Graphic Arts Industry: Publication Rotogravure Printing

RR	Pressure Sensitive Tape and Label Surface Coating Operations
SS	Industrial Surface Coating: Large Appliances
TT	Metal Coil Surface Coating
UU	Asphalt Processing and Asphalt Roofing Manufacture
VV WW XX AAA	Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry X Beverage Can Surface Coating Industry X Bulk Gasoline Terminals X New Residential Wool Heaters
BBB	Rubber Tire Manufacturing Industry
ccc	(Reserved)
	Volatile Organic Compounds (VOC) Emissions from the Polymer Manufacturing Industry
EEE	(Reserved)
FFF	Flexible Vinyl and Urethane Coating and Printing
GGG HHH	Equipment Leaks of VOC in Petroleum RefineriesX Synthetic Fiber Production Facilities
III	Volatile Organic Compound (VOC) Emissions From the Synthetic Organic Chemical Manufacturing Industry (SOCMI) Air Oxidation Unit Processes
JJJ KKK	Petroleum Dry Cleaners X Equipment Leaks of VOC From Onshore Natural Gas Processing Plants
LLL	Onshore Natural Gas Processing: SO2 Emissions
MMM	(Reserved)
NNN OOO PPP	Volatile Organic Compound (VOC) Emissions From Synthetic Organic Chemical Manufacturing Industry (SOCMI) Distillation Operations X Nonmetallic Mineral Processing Plants
QQQ RRR	VOC Emissions From Petroleum Refinery Wastewater Systems X Volatile Organic Compound Emissions from Synthetic Organic Chemical Manufacturing Industry (SOCMI) Reactor Processes
SSS .	Magnetic Tape Coating Facilities
TTT	Industrial Surface Coating: Surface Coating of Plastic Parts for Business Machines
UUU VVV WWW	Calciners and Dryers in Mineral IndustriesX Polymeric Coating of Supporting Substrates FacilitiesX Municipal Solid Waste Landfills
• • • • • • •	
•••	

(4) Nevada. The following table identifies delegations as of June 15, 2001:

Delegation Status for New Source Performance Standards for Nevada

- У	Subpart Air pollu	tion contro	ol agenc
-	Novada	Clark	Maghoo
	Nevada	CIALY	washoe
	DEP	County	County
A D	General ProvisionsX Fossil-Fuel Fired Steam Generators	X	x
Da	Constructed After August 17, 1971 X	Х	X
Du	Constructed After September 18, 1978 X		
Db	Industrial-Commercial-Institutional Steam Generating Units		
· Dc	Small Industrial Steam Congrating Units		
•	Small industrial Steam Generating Units		
E Ea	IncineratorsX Municipal Waste Combustors Constructed After December 20, 1989 and On or Before	X	X
	September 20, 1994	• • • • • • •	•••••
Eb	Municipal Waste Combustors Constructed After September 20, 1994		
• Fa	Hognital /Modical /Infoctions Worth		
200	Incinerators for Which Construction is		•
	Conditioned Arber Sune 20, 1990		•••••
F.	Portland Cement Plants X	X	X
н	Sulfuric Acid Plants		x
I	Hot Mix Asphalt Facilities X	х	X
J K	Petroleum Refineries X Storage Vessels for Petroleum Liquids for Which Construction Reconstruction or	<b></b> .	X
	Modification Commenced After June 11,		
Ka	1973, and Prior to May 19, 1978 X Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or	X	X
	Modification Commenced After May 18, 1978, and Prior to July 23, 1984	v	v
Kb	Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction or Modification Commenced	A .	Δ
	After July 23, 1984 X		
т.	Secondary Lead Smelters	v	v
M	Secondary Brass and Bronze Production Plants X	A 	X
N	Primary Emissions from Basic Oxygen Process Furnaces for Which Construction is		
Na	Commenced After June 11, 1973 X Secondary Emissions from Basic Oxygen Process Steelmaking Facilities for Which Construction is Commenced After January		X
	20, 1983 $\ldots$ X		

O P Q R S	Sewage Treatment Plants	X X X X	X X X X X
т т	Phosphate Fertilizer Industry: wet Process Phosphoric Acid Plants X Phosphate Fertilizer Industry:		X
v	Superphosphoric Acid Plants	• • • • • • •	X
W	Phosphate Plants X Phosphate Fertilizer Industry: Triple	• • • • • • •	x
x	Superphosphate Plants X Phosphate Fertilizer Industry: Granular	•••••	X
Y	Triple Superphosphate Storage Facilities X Coal Preparation Plants X	X	X X
Z AA	Ferroalloy Production Facilities X Steel Plants: Electric Arc Furnaces Constructed After October 21, 1974 and On or Before August 17, 1983	•••••	X
AAa	Steel Plants: Electric Arc Furnaces and Argon-Oxygen Decarburization Vessels Constructed After August 7, 1983 X	· · · · · · · · ·	
BB CC	Kraft pulp Mills X Glass Manufacturing Plants		X
DD EE FF	Grain Elevators X Surface Coating of Metal Furniture X (Reserved)	x x	X X
GG	Stationary Gas Turbines X	x	x
HH KK LL	Lime Manufacturing Plants X Lead-Acid Battery Manufacturing Plants X Metallic Mineral Processing Plants X	X X X	X X X X
MM	Automobile and Light Duty Trucks Surface Coating Operations X	X	X
NN PP OO	Ammonium Sulfate Manufacture X Graphic Arts Industry: Publication	X 	X
RR	Rotogravure PrintingX Pressure Sensitive Tape and Label Surface	x	X
SS	Coating Operations X Industrial Surface Coating: Large Appliances X	X	X X
${}^{\mathrm{TT}}$ UU	Metal Coil Surface Coating X Asphalt Processing and Asphalt Roofing	x	X
vv	Manufacture X Equipment Leaks of VOC in the Synthetic	X	X .
WW	Organic Chemicals Manufacturing Industry X Beverage Can Surface Coating Industry X	X	x x
XX AAA	Bulk Gasoline TerminalsX New Residential Wool Heaters	•••••	• X
BBB	Rubber Tire Manufacturing Industry		
ccc	(Reserved)		• • • • • •
	Volatile Organic Compounds (VOC) Emissions from the Polymer Manufacturing Industry		· · · · · · ·
EEE	(Reserved)	• • • • • • •	• • • • • •
FFF	Flexible Vinyl and Urethane Coating and		
GGG	Equipment Leaks of VOC in Petroleum	• • • • • • •	X

HHH III	RefineriesX Synthetic Fiber Production FacilitiesX Volatile Organic Compound (VOC) Emissions From the Synthetic Organic Chemical Manufacturing Industry (SOCMI) Air	•••••	X X	
ЈЈЈ ККК	Oxidation Unit Processes X Petroleum Dry Cleaners X Equipment Leaks of VOC From Onshore Natural Gas Processing Plants X	X	x	
LLL	Onshore Natural Gas Processing: SO2 Emissions X			
MMM	(Reserved)			
NNN	Volatile Organic Compound (VOC) Emissions From Synthetic Organic Chemical Manufacturing Industry (SOCMI) Distillation Operations			
000 PPP	Nonmetallic Mineral Processing Plants X Wool Fiberglass Insulation Manufacturing		x	
QQQ	Plants X VOC Emissions From Petroleum Refinery Wastewater Systems		X	
RRR	Volatile Organic Compound Emissions from Synthetic Organic Chemical Manufacturing Industry (SOCMI) Reactor Processes			
SSS	Magnetic Tape Coating Facilities			
TTT	Industrial Surface Coating: Surface Coating of Plastic Parts for Business Machines	• • • • • •	• • • • • • •	
បបប	Calciners and Dryers in Mineral Industries	• • • • • • • •		
vvv	Polymeric Coating of Supporting Substrates Facilities		• • • • • •	
WWW	Municipal Solid Waste Landfills		• • • • • • •	
(5) (	(5) Guam. The following table identifies delegations as of June 15, 2001:			
	Delegation Status for New Source Performance Standard	is for Gua	m 	
-	Subpart	G	uam	
A D Da	General Provisions Fossil-Fuel Fired Steam Generators Constructed After August 17, 1971 Electric Utility Steam Generating Units Constructed After September 18, 1978		X X	

# Db Industrial-Commercial-Institutional Steam Generating Units Dc Small Industrial Steam Generating Units .....

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Е	Incinerators
Ea	Municipal Waste Combustors Constructed After December 20, 1989 and On or Before September 20, 1994
Eb	Municipal Waste Combustors Constructed After September 20, 1994
Ec	Hospital/Medical/Infectious Waste Incinerators for Which Construction is Commenced After June 20, 1996
F G	Portland Cement Plants X Nitric Acid Plants
н	Sulfuric Acid Plants
I J K	Hot Mix Asphalt FacilitiesX Petroleum RefineriesX Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced
	After June 11, 1973, and Prior to May 19, 1978 X

[40 FR 18169, April 25, 1975, as amended at <u>40 FR 26677</u>, June 25, 1975; <u>47 FR 50863</u>, Nov. 10, 1982; <u>48 FR 20694</u>, May 9, 1983; <u>48 FR 33868</u>, July 26, 1983; <u>48 FR 36582</u>, Aug. 12, 1983; 48 FR 41408, Sept. 15, 1983; 48 FR 41766, Sept. 19, 1983; 49 FR 13878, April 9, 1984; 49 FR 22284, May 29, 1984; 49 FR 23837, June 8, 1984; 49 FR 28716, July 16, 1984; 49 FR 36369, Sept. 17, 1984; 49 FR 49290, Dec. 19, 1984; 50 FR 15425, April 18, 1985; 50 FR 47733, Nov. 20, 1985; 51 FR 4344, Feb. 4, 1986; 51 FR 15770, April 28, 1986, 51 FR 23419, June 27, 1986; 51 FR 26547, July 24, 1986; 51 FR 37910, Oct. 27, 1986; 52 FR 19512, May 26, 1987; 53 FR 12520, April 15, 1988; 53 FR 18985, May 26, 1988; 53 FR 24449, June 29, 1988; 53 FR 50527, Dec. 16, 1988; 54 FR 32445, Aug. 8, 1989; 54 FR 40664, Oct. 3, 1989; 54 FR 52032, Dec. 20, 1989; 55 FR 29016, July 17, 1990; 55 FR 39406, Sept. 27, 1990; 56 FR 28324, June 20, 1991; 56 FR 41391, Aug. 20, 1991; 57 FR 1226, Jan. 13, 1992; 58 FR 5298, Jan. 21, 1993; 58 FR 64160, Dec. 6, 1993; 59 FR 47265, Sept. 15, 1994; 61 FR 52868, Oct. 8, 1996; 62 FR 1833, Jan. 14, 1997; <u>62 FR 6619</u>, Feb. 12, 1997; <u>62 FR 24826</u>, May 7, 1997; <u>63 FR 45727</u>, Aug. 27, 1998; 63 FR 49382, Sept. 15, 1998; 63 FR 56707, Oct. 22, 1998; 64 FR 47401, Aug. 31, 1999; 65 FR 1325, Jan. 10, 2000; 65 FR 32035, May 22, 2000; 66 FR 13440, March 6, 2001; 66 FR 17599, April 2, 2001; 66 FR 32554, June 15, 2001; 66 FR 42427, 42437, Aug. 13, 2001; 67 FR 20655, April 26, 2002; 67 FR 57521, Sept. 11, 2002; 67 FR 59000, Sept. 19, 2002]

§ 60.5 Determination of construction or modification.

(a) When requested to do so by an owner or operator, the Administrator will make a determination of whether action taken or intended to be taken by such owner or operator constitutes construction (including reconstruction) or modification or the commencement thereof within the meaning of this part.

(b) The Administrator will respond to any request for a determination under paragraph (a) of this section within 30 days of receipt of such request.

[40 FR 58418, Dec. 16, 1975]

§ 60.6 Review of plans.

(a) When requested to do so by an owner or operator, the Administrator will review plans for construction or modification for the purpose of providing technical advice to the owner or operator.

(b)(1) A separate request shall be submitted for each construction or modification project. (2) Each request shall identify the location of such project, and be accompanied by technical information describing the proposed nature, size, design, and method of operation of each affected facility involved in such project, including information on any equipment to be used for measurement or control of emissions.

(c) Neither a request for plans review nor advice furnished by the Administrator in response to such request shall (1) relieve an owner or operator of legal responsibility for compliance with any provision of this part or of any applicable State or local requirement, or (2) prevent the Administrator from implementing or enforcing any provision of this part or taking any other action authorized by the Act.

[36 FR 24877, Dec. 23, 1971, as amended at 39 FR 9314, Mar. 8, 1974]

§ 60.7 Notification and recordkeeping.

(a) Any owner or operator subject to the provisions of this part shall furnish the Administrator written notification or, if acceptable to both the Administrator and the owner or operator of a source, electronic notification, as follows:

(1) A notification of the date construction (or reconstruction as defined under § 60.15) of an affected facility is commenced postmarked no later than 30 days after such date. This requirement shall not apply in the case of mass- produced facilities which are purchased in completed form.

(2) [Reserved]

(3) A notification of the actual date of initial startup of an affected facility postmarked within 15 days after such date.

(4) A notification of any physical or operational change to an existing facility which may increase the emission rate of any air pollutant to which a standard applies, unless that change is specifically exempted under an applicable subpart or in § 60.14(e). This notice shall be postmarked 60 days or as soon as practicable before the change is commenced and shall include information describing the precise nature of the change, present and proposed emission control systems, productive capacity of the facility before and after the change, and the expected completion date of the change. The Administrator may request additional relevant information subsequent to this notice.

(5) A notification of the date upon which demonstration of the continuous monitoring system performance commences in accordance with § 60.13(c). Notification shall be postmarked not less than 30 days prior to such date.

(6) A notification of the anticipated date for conducting the opacity observations required by § 60.11(e)(1) of this part. The notification shall also include, if appropriate, a request for the Administrator to provide a visible emissions reader during a performance test. The notification shall be postmarked not less than 30 days prior to such date.

(7) A notification that continuous opacity monitoring system data results will be used to determine compliance with the applicable opacity standard during a performance test required by § 60.8 in lieu of Method 9 observation data as allowed by § 60.11(e)(5) of this part. This notification shall be postmarked not less than 30 days prior to the date of the performance test.
(b) Any owner or operator subject to the provisions of this part shall maintain records of the occurrence and duration of any startup, shutdown, or malfunction in the operation of an affected facility; any malfunction of the air pollution control equipment; or any periods during which a continuous monitoring system or monitoring device is inoperative.

(c) Each owner or operator required to install a continuous monitoring device shall submit excess emissions and monitoring systems performance report (excess emissions are defined in applicable subparts) and or summary report form (see paragraph (d) of this section) to the Administrator semiannually, except when: more frequent reporting is specifically required by an applicable subpart; or the Administrator, on a case-by-case basis, determines that more frequent reporting is necessary to accurately assess the compliance status of the source. All reports shall be postmarked by the 30th day following the end of each six-month period. Written reports of excess emissions shall include the following information:

(1) The magnitude of excess emissions computed in accordance with § 60.13(h), any conversion factor(s) used, and the date and time of commencement and completion of each time period of excess emissions. The process operating time during the reporting period.

(2) Specific identification of each period of excess emissions that occurs during startups, shutdowns, and malfunctions of the affected facility. The nature and cause of any malfunction (if known), the corrective action taken or preventative measures adopted.

(3) The date and time identifying each period during which the continuous monitoring system was inoperative except for zero and span checks and the nature of the system repairs or adjustments.

(4) When no excess emissions have occurred or the continuous monitoring system(s) have not been inoperative, repaired, or adjusted, such information shall be stated in the report.

(d) The summary report form shall contain the information and be in the format shown in figure 1 unless otherwise specified by the Administrator. One summary report form shall be submitted for each pollutant monitored at each affected facility.

(1) If the total duration of excess emissions for the reporting period is less than 1 percent of the total operating time for the reporting period and CMS downtime for the reporting period is less than 5 percent of the total operating time for the reporting period, only the summary report form shall be submitted and the excess emission report described in § 60.7(c) need not be submitted unless requested by the Administrator.

(2) If the total duration of excess emissions for the reporting period is 1 percent or greater of the total operating time for the reporting period or the total CMS downtime for the reporting period is 5 percent or greater of the total operating time for the reporting period, the summary report form and the excess emission report described in § 60.7(c) shall both be submitted.

Figure 1--Summary Report--Gaseous and Opacity Excess Emission and Monitoring System Performance

Pollutant (Circle One--SO sub2 /NO subx /TRS/H sub2 S/CO/Opacity) Reporting period dates: From ______ to _____ Company: Emission Limitation_____ Address:

Monitor Manufacturer and Model No._____

Date of Latest CMS Certification or Audit____ Process Unit(s) Description:

Total source operating time in reporting period [FN1]

[FN1] For opacity, record all times in minutes. For gases, record all times in hours.

,

-	Emission data summary [FN1]	CMS performance summary [FN1]	
-' 1. e	Duration of excess emissions in 1.	CMS downtime in reporting period du	
	reporting period due to: a. Startup/shutdown	to: a. Monitor equipment malfunctions	
•	b. Control equipment problems	b. Non-Monitor equipment malfunctions	
•	c. Process problems	c. Quality assurance calibration	
•	d. Other known causes	d. Other known causes	
•	e. Unknown causes	e. Unknown causes	
2.	Total duration of excess emission 2.	Total CMS Downtime	
3.	Total duration of 3.	[Total CMS Downtime]	
•	excess emissions x	x (100) [Total	
•	(100) [Total source	source operating	
]	operating time] % [FN2]	time] % [FN2	
FN1 For opacity, record all times in minutes. For gases, record all times in hours. FN2 For the reporting period: If the total duration of excess emissions is 1 percent or greater of the total operating time or the total CMS downtime is 5			
	percent or greater of the total operatin	g time, both the summary report form	
	and the excess emission report described	in § 60.7(c) shall be submitted.	

On a separate page, describe any changes since last quarter in CMS, process or controls. I certify that the information contained in this report is true, accurate, and complete.

#### Name

#### Signature

Title

# Date

(e)(1) Notwithstanding the frequency of reporting requirements specified in paragraph (c) of this section, an owner or operator who is required by an applicable subpart to submit excess emissions and monitoring systems performance reports (and summary reports) on a quarterly (or more frequent) basis may reduce the frequency of reporting for that standard to semiannual if the following conditions are met:

(i) For 1 full year (e.g., 4 quarterly or 12 monthly reporting periods) the affected facility's excess emissions and monitoring systems reports submitted to comply with a standard under this part continually demonstrate that the facility is in compliance with the applicable standard;

(ii) The owner or operator continues to comply with all recordkeeping and monitoring requirements specified in this subpart and the applicable standard; and

(iii) The Administrator does not object to a reduced frequency of reporting for the affected facility, as provided in paragraph (e)(2) of this section.

(2) The frequency of reporting of excess emissions and monitoring systems performance (and summary) reports may be reduced only after the owner or operator notifies the Administrator in writing of his or her intention to make such a change and the Administrator does not object to the intended change. In deciding whether to approve a reduced frequency of reporting, the Administrator may review information concerning the source's entire previous performance history during the required recordkeeping period prior to the intended change, including performance test results, monitoring data, and evaluations of an owner or operator's conformance with operation and maintenance requirements. Such information may be used by the Administrator disapproves the owner or operator's request to reduce the frequency of reporting, the Administrator will notify the owner or operator in writing within 45 days after receiving notice of the owner or operator's intention. The notification from the Administrator to the absence of a notice of disapproval within 45 days, approval is automatically granted.

(3) As soon as monitoring data indicate that the affected facility is not in compliance with any emission limitation or operating parameter specified in the applicable standard, the frequency of reporting shall revert to the frequency specified in the applicable standard, and the owner or operator shall submit an excess emissions and monitoring systems performance report (and

summary report, if required) at the next appropriate reporting period following the noncomplying event. After demonstrating compliance with the applicable standard for another full year, the owner or operator may again request approval from the Administrator to reduce the frequency of reporting for that standard as provided for in paragraphs (e)(1) and (e)(2) of this section. (f) Any owner or operator subject to the provisions of this part shall maintain a file of all measurements, including continuous monitoring system, monitoring device, and performance testing measurements; all continuous monitoring system performance evaluations; all continuous monitoring system or monitoring device calibration checks; adjustments and maintenance performed on these systems or devices; and all other information required by this part recorded in a permanent form suitable for inspection. The file shall be retained for at least two years following the date of such measurements, maintenance, reports, and records, except as follows; (1) This paragraph applies to owners or operators required to install a continuous emissions monitoring system (CEMS) where the CEMS installed is automated, and where the calculated data averages do not exclude periods of CEMS breakdown or malfunction. An automated CEMS records and reduces the measured data to the form of the pollutant emission standard through the use of a computerized data acquisition system. In lieu of maintaining a file of all CEMS subhourly measurements as required under paragraph (f) of this section, the owner or operator shall retain the most recent consecutive three averaging periods of subhourly measurements and a file that contains a hard copy of the data acquisition system algorithm used to reduce the measured data into the reportable form of the standard.

(2) This paragraph applies to owners or operators required to install a CEMS where the measured data is manually reduced to obtain the reportable form of the standard, and where the calculated data averages do not exclude periods of CEMS breakdown or malfunction. In lieu of maintaining a file of all CEMS subhourly measurements as required under paragraph (f) of this section, the owner or operator shall retain all subhourly measurements for the most recent reporting period. The subhourly measurements shall be retained for 120 days from the date of the most recent summary or excess emission report submitted to the Administrator.

(3) The Administrator or delegated authority, upon notification to the source, may require the owner or operator to maintain all measurements as required by paragraph (f) of this section, if the Administrator or the delegated authority determines these records are required to more accurately assess the compliance status of the affected source.

(g) If notification substantially similar to that in paragraph (a) of this section is required by any other State or local agency, sending the Administrator a copy of that notification will satisfy the requirements of paragraph (a) of this section.

(h) Individual subparts of this part may include specific provisions which clarify or make inapplicable the provisions set forth in this section.

[36 FR 24877, Dec. 28, 1971, as amended at <u>40 FR 46254</u>, Oct. 6, <u>1975</u>; <u>40 FR 58418</u>, Dec. 16, 1975; <u>43 FR 8800</u>, March 3, 1978; <u>45 FR 5617</u>, Jan. 23, 1980; <u>48 FR 48335</u>, Oct. 18, 1983; 50 FR 53113, Dec. 27, 1985; 52 FR 9781, March 26, 1987; <u>55 FR 51382</u>, Dec. 13, 1990; <u>59 FR 12428</u>, March 16, 1994; <u>64 FR 7463</u>, Feb. 12, 1999]

#### § 60.8 Performance tests.

(a) Within 60 days after achieving the maximum production rate at which the affected facility will be operated, but not later than 180 days after initial startup of such facility and at such other times as may be required by the Administrator under section 114 of the Act, the owner or operator of such facility shall conduct performance test(s) and furnish the Administrator a written report of the results of such performance test(s).

(b) Performance tests shall be conducted and data reduced in accordance with the test methods and procedures contained in each applicable subpart unless the Administrator (1) specifies or approves, in specific cases, the use of a reference method with minor changes in methodology, (2) approves the use of an equivalent method, (3) approves the use of an alternative method the results of which he has determined to be adequate for indicating whether a specific source is in compliance, (4) waives the requirement for performance tests because the owner or operator of a source has demonstrated by other means to the Administrator's satisfaction that the affected facility is in compliance with the standard, or (5) approves shorter sampling times and smaller sample volumes when necessitated by process variables or other factors. Nothing in this paragraph shall be construed to abrogate the Administrator's authority to require testing under section 114 of the Act.

(c) Performance tests shall be conducted under such conditions as the Administrator shall specify to the plant operator based on representative performance of the affected facility. The owner or

operator shall make available to the Administrator such records as may be necessary to

determine the conditions of the performance tests. Operations during periods of startup,

shutdown, and malfunction shall not constitute representative conditions for the purpose of a

performance test nor shall emissions in excess of the level of the applicable emission limit during

periods of startup, shutdown, and malfunction be considered a violation of the applicable emission limit unless otherwise specified in the applicable standard.

(d) The owner or operator of an affected facility shall provide the Administrator at least 30 days prior notice of any performance test, except as specified under other subparts, to afford the Administrator the opportunity to have an observer present. If after 30 days notice for an initially scheduled performance test, there is a delay (due to operational problems, etc.) in conducting the scheduled performance test, the owner or operator of an affected facility shall notify the Administrator (or delegated State or local agency) as soon as possible of any delay in the original test date, either by providing at least 7 days prior notice of the rescheduled date of the performance test, or by arranging a rescheduled date with the Administrator (or delegated State or local agency) by mutual agreement.

(e) The owner or operator of an affected facility shall provide, or cause to be provided, performance testing facilities as follows:

(1) Sampling ports adequate for test methods applicable to such facility. This includes (i) constructing the air pollution control system such that volumetric flow rates and pollutant emission rates can be accurately determined by applicable test methods and procedures and (ii) providing a stack or duct free of cyclonic flow during performance tests, as demonstrated by applicable test methods and procedures.

(2) Safe sampling platform(s).

(3) Safe access to sampling platform(s).

(4) Utilities for sampling and testing equipment.

(f) Unless otherwise specified in the applicable subpart, each performance test shall consist of

three separate runs using the applicable test method. Each run shall be conducted for the time and under the conditions specified in the applicable standard. For the purpose of determining compliance with an applicable standard, the arithmetic means of results of the three runs shall apply. In the event that a sample is accidentally lost or conditions occur in which one of the three runs must be discontinued because of forced shutdown, failure of an irreplaceable portion of the sample train, extreme meteorological conditions, or other circumstances, beyond the owner or operator's control, compliance may, upon the Administrator's approval, be determined using the arithmetic mean of the results of the two other runs.

[36 FR 24877, Dec. 23, 1971, as amended at 39 FR 9314, March 8, 1974; <u>42 FR 57126</u>, Nov. 1, 1977; 43 FR 8800, March 3, 1978; <u>44 FR 33612</u>, June 11, 1979; 54 FR 6662, Feb. 14, 1989; 54 FR 21344, May 17, 1989; <u>64 FR 7463</u>, Feb. 12, 1999]

§ 60.9 Availability of information.

The availability to the public of information provided to, or otherwise obtained by, the Administrator under this Part shall be governed by Part 2 of this chapter. (Information submitted voluntarily to the Administrator for the purposes of §§ 60.5 and 60.6 is governed by § 2.201 through § 2.213 of this chapter and not by § 2.301 of this chapter.)

[41 FR 36918, Sept. 1, 1976, as amended at 43 FR 8800, Mar. 3, 1978]

§ 60.10 State authority.

The provisions of this part shall not be construed in any manner to preclude any State or political subdivision thereof from:

(a) Adopting and enforcing any emission standard or limitation applicable to an affected facility, provided that such emission standard or limitation is not less stringent than the standard applicable to such facility.

(b) Requiring the owner or operator of an affected facility to obtain permits, licenses, or approvals prior to initiating construction, modification, or operation of such facility.

[36 FR 24877, Dec. 23, 1971, as amended at 43 FR 8800, Mar. 3, 1978]

§ 60.11 Compliance with standards and maintenance requirements.

(a) Compliance with standards in this part, other than opacity standards, shall be determined in accordance with performance tests established by § 60.8, unless otherwise specified in the applicable standard.

(b) Compliance with opacity standards in this part shall be determined by conducting observations in accordance with Method 9 in Appendix A of this part, any alternative method that is approved by the Administrator, or as provided in paragraph (e)(5) of this section. For purposes of determining initial compliance, the minimum total time of observations shall be 3 hours (30 6- minute averages) for the performance test or other set of observations (meaning those fugitive-type emission sources subject only to an opacity standard).

(c) The opacity standards set forth in this part shall apply at all times except during periods of

startup, shutdown, malfunction, and as otherwise provided in the applicable standard. (d) At all times, including periods of startup, shutdown, and malfunction, owners and operators shall, to the extent practicable, maintain and operate any affected facility including associated air pollution control equipment in a manner consistent with good air pollution control practice for minimizing emissions. Determination of whether acceptable operating and maintenance procedures are being used will be based on information available to the Administrator which may include, but is not limited to, monitoring results, opacity observations, review of operating and maintenance procedures, and inspection of the source.

(e)(1) For the purpose of demonstrating initial compliance, opacity observations shall be conducted concurrently with the initial performance test required in § 60.8 unless one of the following conditions apply. If no performance test under § 60.8 is required, then opacity observations shall be conducted within 60 days after achieving the maximum production rate at which the affected facility will be operated but no later than 180 days after initial startup of the facility. If visibility or other conditions prevent the opacity observations from being conducted concurrently with the initial performance test required under § 60.8, the source owner or operator shall reschedule the opacity observations as soon after the initial performance test as possible, but not later than 30 days thereafter, and shall advise the Administrator of the rescheduled date. In these cases, the 30-day prior notification to the Administrator required in § 60.7(a)(6) shall be waived. The rescheduled opacity observations shall be conducted (to the extent possible) under the same operating conditions that existed during the initial performance test conducted under § 60.8. The visible emissions observer shall determine whether visibility or other conditions prevent the opacity observations from being made concurrently with the initial performance test in accordance with procedures contained in Method 9 of Appendix B of this part. Opacity readings of portions of plumes which contain condensed, uncombined water vapor shall not be used for purposes of determining compliance with opacity standards. The owner or operator of an affected facility shall make available, upon request by the Administrator, such records as may be necessary to determine the conditions under which the visual observations were made and shall provide evidence indicating proof of current visible observer emission certification. Except as provided in paragraph (e)(5) of this section, the results of continuous monitoring by transmissometer which indicate that the opacity at the time visual observations were made was not in excess of the standard are probative but not conclusive evidence of the actual opacity of an emission, provided that the source shall meet the burden of proving that the instrument used meets (at the time of the alleged violation) Performance Specification 1 in Appendix B of this part, has been properly maintained and (at the time of the alleged violation) that the resulting data have not been altered in any way.

(2) Except as provided in paragraph (e)(3) of this section, the owner or operator of an affected facility to which an opacity standard in this part applies shall conduct opacity observations in accordance with paragraph (b) of this section, shall record the opacity of emissions, and shall report to the Administrator the opacity results along with the results of the initial performance test required under § 60.8. The inability of an owner or operator to secure a visible emissions observer shall not be considered a reason for not conducting the opacity observations concurrent with the initial performance test.

(3) The owner or operator of an affected facility to which an opacity standard in this part applies may request the Administrator to determine and to record the opacity of emissions from the affected facility during the initial performance test and at such times as may be required. The owner or operator of the affected facility shall report the opacity results. Any request to the Administrator to determine and to record the opacity of emissions from an affected facility shall be included in the notification required in § 60.7(a)(6). If, for some reason, the Administrator cannot determine and record the opacity of emissions from the affected facility during the performance test, then the provisions of paragraph (e)(1) of this section shall apply. (4) An owner or operator of an affected facility using a continuous opacity monitor (transmissometer) shall record the monitoring data produced during the initial performance test required by § 60.8 and shall furnish the Administrator a written report of the monitoring results along with Method 9 and § 60.8 performance test results.

(5) An owner or operator of an affected facility subject to an opacity standard may submit, for compliance purposes, continuous opacity monitoring system (COMS) data results produced during any performance test required under § 60.8 in lieu of Method 9 observation data. If an owner or operator elects to submit COMS data for compliance with the opacity standard, he shall notify the Administrator of that decision, in writing, at least 30 days before any performance test required under § 60.8 is conducted. Once the owner or operator of an affected facility has notified the Administrator to that effect, the COMS data results will be used to determine opacity compliance during subsequent tests required under § 60.8 until the owner or operator notifies the Administrator, in writing, to the contrary. For the purpose of determining compliance with the opacity standard during a performance test required under § 60.8 using COMS data, the minimum total time of COMS data collection shall be averages of all 6-minute continuous periods within the duration of the mass emission performance test. Results of the COMS opacity determinations shall be submitted along with the results of the performance test required under § 60.8. The owner or operator of an affected facility using a COMS for compliance purposes is responsible for demonstrating that the COMS meets the requirements specified in § 60.13(c) of this part, that the COMS has been properly maintained and operated, and that the resulting data have not been altered in any way. If COMS data results are submitted for compliance with the opacity standard for a period of time during which Method 9 data indicates noncompliance, the Method 9 data will be used to determine compliance with the opacity standard. (6) Upon receipt from an owner or operator of the written reports of the results of the performance tests required by § 60.8, the opacity observation results and observer certification required by § 60.11(e)(1), and the COMS results, if applicable, the Administrator will make a finding concerning compliance with opacity and other applicable standards. If COMS data results are used to comply with an opacity standard, only those results are required to be submitted along with the performance test results required by § 60.8. If the Administrator finds that an affected facility is in compliance with all applicable standards for which performance tests are conducted in accordance with § 60.8 of this part but during the time such performance tests are being conducted fails to meet any applicable opacity standard, he shall notify the owner or operator and advise him that he may petition the Administrator within 10 days of receipt of notification to make appropriate adjustment to the opacity standard for the affected facility. (7) The Administrator will grant such a petition upon a demonstration by the owner or operator that the affected facility and associated air pollution control equipment was operated and maintained in a manner to minimize the opacity of emissions during the performance tests; that the performance tests were performed under the conditions established by the Administrator; and that the affected facility and associated air pollution control equipment were incapable of being adjusted or operated to meet the applicable opacity standard.

(8) The Administrator will establish an opacity standard for the affected facility meeting the above requirements at a level at which the source will be able, as indicated by the performance

and opacity tests, to meet the opacity standard at all times during which the source is meeting the mass or concentration emission standard. The Administrator will promulgate the new opacity standard in the Federal Register.

(f) Special provisions set forth under an applicable subpart shall supersede any conflicting provisions in paragraphs (a) through (e) of this section.

(g) For the purpose of submitting compliance certifications or establishing whether or not a person has violated or is in violation of any standard in this part, nothing in this part shall preclude the use, including the exclusive use, of any credible evidence or information, relevant to whether a source would have been in compliance with applicable requirements if the appropriate performance or compliance test or procedure had been performed.

[38 FR 28565, Oct. 15, 1973, as amended at <u>39 FR 3987</u>3, Nov. 12, 1974; 42 FR 26206, May 23, 1977; 43 FR 8800, March 3, 1978; 45 FR 23379, April 4, 1980; <u>48 FR 48335</u>, Oct. 18, 1983; 50 FR 53113, Dec. 27, 1985; 51 FR 1790, Jan. 15, 1986; 52 FR 9781, March 26, 1987; 62 FR 8328, Feb. 24, 1997; 63 FR 414, Jan. 6, 1998; 65 FR 61749, Oct. 17, 2000]

## § 60.12 Circumvention.

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No owner or operator subject to the provisions of this part shall build, erect, install, or use any article, machine, equipment or process, the use of which conceals an emission which would - 54 - 1 786-9 - 1 otherwise constitute a violation of an applicable standard. Such concealment includes, but is not limited to, the use of gaseous diluents to achieve compliance with an opacity standard or with a standard which is based on the concentration of a pollutant in the gases discharged to the atmosphere.

[39 FR 9314, Mar. 8, 1974]

§ 60.13 Monitoring requirements.

(a) For the purposes of this section, all continuous monitoring systems required under applicable subparts shall be subject to the provisions of this section upon promulgation of performance specifications for continuous monitoring systems under Appendix B to this part and, if the continuous monitoring system is used to demonstrate compliance with emission limits on a continuous basis, Appendix F to this part, unless otherwise specified in an applicable subpart or by the Administrator. Appendix F is applicable December 4, 1987.

(b) All continuous monitoring systems and monitoring devices shall be installed and operational prior to conducting performance tests under § 60.8. Verification of operational status shall, as a minimum, include completion of the manufacturer's written requirements or recommendations for installation, operation, and calibration of the device.

(c) If the owner or operator of an affected facility elects to submit continuous opacity monitoring system (COMS) data for compliance with the opacity standard as provided under § 60.11(e)(5), he shall conduct a performance evaluation of the COMS as specified in Performance Specification 1, Appendix B, of this part before the performance test required under § 60.8 is conducted. Otherwise, the owner or operator of an affected facility shall conduct a performance evaluation of the COMS or continuous emission monitoring system (CEMS) during any performance test required under § 60.8 or within 30 days thereafter in accordance with the

applicable performance specification in Appendix B of this part, The owner or operator of an affected facility shall conduct COMS or CEMS performance evaluations at such other times as may be required by the Administrator under section 114 of the Act.

(1) The owner or operator of an affected facility using a COMS to determine opacity compliance during any performance test required under § 60.8 and as described in § 60.11(e)(5) shall furnish the Administrator two or, upon request, more copies of a written report of the results of the COMS performance evaluation described in paragraph (c) of this section at least 10 days before the performance test required under § 60.8 is conducted.

(2) Except as provided in paragraph (c)(1) of this section, the owner or operator of an affected facility shall furnish the Administrator within 60 days of completion two or, upon request, more copies of a written report of the results of the performance evaluation.

(d)(1) Owners and operators of a CEMS installed in accordance with the provisions of this part, must automatically check the zero (or low level value between 0 and 20 percent of span value) and span (50 to 100 percent of span value) calibration drifts at least once daily in accordance with a written procedure. The zero and span must, as a minimum, be adjusted whenever either the 24-hour zero drift or the 24-hour span drift exceeds two times the limit of the applicable performance specification in appendix B of this part. The system must allow the amount of the excess zero and span drift to be recorded and quantified whenever specified. Owners and operators of a COMS installed in accordance with the provisions of this part, must automatically, intrinsic to the opacity monitor, check the zero and upscale (span) calibration drifts at least once daily. For a particular COMS, the acceptable range of zero and upscale calibration materials is as defined in the applicable version of PS-1 in appendix B of this part. For a COMS, the optical surfaces, exposed to the effluent gases, must be cleaned before performing the zero and upscale drift adjustments, except for systems using automatic zero adjustments. The optical surfaces must be cleaned when the cumulative automatic zero compensation exceeds 4 percent opacity. (2) Unless otherwise approved by the Administrator, the following procedures must be followed for a COMS. Minimum procedures must include an automated method for producing a simulated zero opacity condition and an upscale opacity condition using a certified neutral density filter or other related technique to produce a known obstruction of the light beam. Such procedures must provide a system check of all active analyzer internal optics with power or curvature, all active electronic circuitry including the light source and photodetector assembly, and electronic or electro-mechanical systems and hardware and or software used during normal measurement operation.

(e) Except for system breakdowns, repairs, calibration checks, and zero and span adjustments required under paragraph (d) of this section, all continuous monitoring systems shall be in continuous operation and shall meet minimum frequency of operation requirements as follows: (1) All continuous monitoring systems referenced by paragraph (c) of this section for measuring opacity of emissions shall complete a minimum of one cycle of sampling and analyzing for each successive 10-second period and one cycle of data recording for each successive 6-minute period. (2) All continuous monitoring systems referenced by paragraph (c) of this section for measuring emissions, except opacity, shall complete a minimum of one cycle of operation (sampling, analyzing, and data recording) for each successive 15-minute period.

(f) All continuous monitoring systems or monitoring devices shall be installed such that representative measurements of emissions or process parameters from the affected facility are obtained. Additional procedures for location of continuous monitoring systems contained in the applicable Performance Specifications of Appendix B of this part shall be used.
(g) When the effluents from a single affected facility or two or more affected facilities subject to the same emission standards are combined before being released to the atmosphere, the owner or operator may install applicable continuous monitoring systems on each effluent or on the combined effluent. When the affected facilities are not subject to the same emission standards, separate continuous monitoring systems shall be installed on each effluent. When the effluent from one affected facility is released to the atmosphere through more than one point, the owner or operator shall install an applicable continuous monitoring system on each separate effluent unless the installation of fewer systems is approved by the Administrator. When more than one continuous monitoring system is used to measure the emissions from one affected facility (e.g., multiple breechings, multiple outlets), the owner or operator shall report the results as required from each continuous monitoring system.

(h) Owners or operators of all continuous monitoring systems for measurement of opacity shall reduce all data to 6-minute averages and for continuous monitoring systems other than opacity to 1-hour averages for time periods as defined in § 60.2. Six-minute opacity averages shall be calculated from 36 or more data points equally spaced over each 6-minute period. For continuous monitoring systems other than opacity, 1-hour averages shall be computed from four or more data points equally spaced over each 1-hour period. Data recorded during periods of continuous system breakdown, repair, calibration checks, and zero and span adjustments shall not be included in the data averages computed under this paragraph. For owners and operators complying with the requirements in § 60.7(f)(1) or (2), data averages must include any data recorded during periods of monitor breakdown or malfunction. An arithmetic or integrated average of all data may be used. The data may be recorded in reduced or nonreduced form (e.g., ppm POLLUTANT and percent  $O_2$  or ng of pollutant per J of heat input). All excess emissions shall be converted into units of the standard using the applicable conversion procedures specified

shall be converted into units of the standard using the applicable conversion procedures specified in subparts. After conversion into units of the standard, the data may be rounded to the same number of significant digits as used in the applicable subparts to specify the emission limit (e.g., rounded to the nearest 1 percent opacity).

(i) After receipt and consideration of written application, the Administrator may approve alternatives to any monitoring procedures or requirements of this part including, but not limited to the following:

2

(1) Alternative monitoring requirements when installation of a continuous monitoring system or monitoring device specified by this part would not provide accurate measurements due to liquid water or other interferences caused by substances in the effluent gases.

(2) Alternative monitoring requirements when the affected facility is infrequently operated.(3) Alternative monitoring requirements to accommodate continuous monitoring systems that require additional measurements to correct for stack moisture conditions.

(4) Alternative locations for installing continuous monitoring systems or monitoring devices when the owner or operator can demonstrate that installation at alternate locations will enable accurate and representative measurements.

(5) Alternative methods of converting pollutant concentration measurements to units of the standards.

(6) Alternative procedures for performing daily checks of zero and span drift that do not involve use of span gases or test cells.

(7) Alternatives to the A.S.T.M. test methods or sampling procedures specified by any subpart.

(8) Alternative continuous monitoring systems that do not meet the design or performance requirements in Performance Specification 1, Appendix B, but adequately demonstrate a definite

and consistent relationship between its measurements and the measurements of opacity by a system complying with the requirements in Performance Specification 1. The Administrator may require that such demonstration be performed for each affected facility.

(9) Alternative monitoring requirements when the effluent from a single affected facility or the combined effluent from two or more affected facilities is released to the atmosphere through more than one point.

(j) An alternative to the relative accuracy (RA) test specified in Performance Specification 2 of Appendix B may be requested as follows:

(1) An alternative to the reference method tests for determining RA is available for sources with emission rates demonstrated to be less than 50 percent of the applicable standard. A source owner or operator may petition the Administrator to waive the RA test in Section 8.4 of Performance Specification 2 and substitute the procedures in Section 16.0, if the results of a performance test conducted according to the requirements in § 60.8 of this subpart or other tests performed following the criteria in § 60.8 demonstrate that the emission rate of the pollutant of interest in the units of the applicable standard is less than 50 percent of the applicable standard. For sources subject to standards expressed as control efficiency levels, a source owner or operator may petition the Administrator to waive the relative accuracy test and substitute the procedures in Section 16.0, of Performance Specification 2 if the control device exhaust emission rate is less than 50 percent of the level needed to meet the control efficiency requirement. The alternative procedures do not apply if the continuous emission monitoring system is used to determine compliance continuously with the applicable standard. The petition to waive the relative accuracy test shall include a detailed description of the procedures to be applied. Included shall be location and procedure for conducting the alternative, the concentration or response levels of the alternative RA materials, and the other equipment checks included in the alternative procedure. The Administrator will review the petition for completeness and applicability. The determination to grant a waiver will depend on the intended use of the CEMS data (e.g., data collection purposes other than NSPS) and may require specifications more stringent than in Performance Specification 2 (e.g., the applicable emission limit is more stringent than NSPS).

(2) The waiver of a CEMS RA test will be reviewed and may be rescinded at such time. following successful completion of the alternative RA procedure, that the CEMS data indicate that the source emissions are approaching the level. The criterion for reviewing the waiver is the collection of CEMS data showing that emissions have exceeded 70 percent of the applicable standard for seven, consecutive, averaging periods as specified by the applicable regulation(s). For sources subject to standards expressed as control efficiency levels, the criterion for reviewing the waiver is the collection of CEMS data showing that exhaust emissions have exceeded 70 percent of the level needed to meet the control efficiency requirement for seven, consecutive, averaging periods as specified by the applicable regulation(s) [e.g.,  $\S$  60.45(g)(2) and (3),  $\S$ 60.73(e), and § 60.84(e)]. It is the responsibility of the source operator to maintain records and determine the level of emissions relative to the criterion on the waiver of RA testing. If this criterion is exceeded, the owner or operator must notify the Administrator within 10 days of such occurrence and include a description of the nature and cause of the increasing emissions. The Administrator will review the notification and may rescind the waiver and require the owner or operator to conduct a RA test of the CEMS as specified in Section 8.4 of Performance Specification 2.

[40 FR 46255, Oct. 6, 1975; 40 FR 59205, Dec. 22, 1975, as amended at 41 FR 35185, Aug. 20, 1976; 42 FR 5936, Jan. 31, 1977; 43 FR 7572, Feb. 23, 1978; 43 FR 8800, March 3, 1978; <u>48 FR 13326</u>, March 30, 1983; <u>48 FR 23610</u>, May 25, 1983; <u>48 FR 32986</u>, July 20, 1983; <u>50 FR 53114</u>, Dec. 27, 1985; <u>51 FR 21765</u>, June 16, 1986; <u>52 FR 9782</u>, March 26, 1987; <u>52 FR 17555</u>, May 11, 1987; <u>52 FR 21007</u>, June 4, 1987; <u>64 FR 7463</u>, Feb. 12, 1999; <u>65 FR 48920</u>, Aug. 10, 2000; <u>65 FR 61749</u>, Oct. 17, 2000; <u>66 FR 9034</u>, Feb. 6, 2001; <u>66 FR 44980</u>, Aug. 27, 2001]

## § 60.14 Modification.

(a) Except as provided under paragraphs (e) and (f) of this section, any physical or operational change to an existing facility which results in an increase in the emission rate to the atmosphere of any pollutant to which a standard applies shall be considered a modification within the meaning of section 111 of the Act. Upon modification, an existing facility shall become an affected facility for each pollutant to which a standard applies and for which there is an increase in the emission rate to the atmosphere.

(b) Emission rate shall be expressed as kg/hr of any pollutant discharged into the atmosphere for which a standard is applicable. The Administrator shall use the following to determine emission rate:

(1) Emission factors as specified in the latest issue of "Compilation of Air Pollutant Emission Factors," EPA Publication No. AP-42, or other emission factors determined by the Administrator to be superior to AP-42 emission factors, in cases where utilization of emission factors demonstrates that the emission level resulting from the physical or operational change will either clearly increase or clearly not increase.

(2) Material balances, continuous monitor data, or manual emission tests in cases where utilization of emission factors as referenced in paragraph (b)(1) of this section does not demonstrate to the Administrator's satisfaction whether the emission level resulting from the physical or operational change will either clearly increase or clearly not increase, or where an owner or operator demonstrates to the Administrator's satisfaction that there are reasonable grounds to dispute the result obtained by the Administrator utilizing emission factors as referenced in paragraph (b)(1) of this section. When the emission rate is based on results from manual emission tests or continuous monitoring systems, the procedures specified in Appendix C of this part shall be used to determine whether an increase in emission rate has occurred. Tests shall be conducted under such conditions as the Administrator shall specify to the owner or operator based on representative performance of the facility. At least three valid test runs must be conducted before and at least three after the physical or operational change. All operating parameters which may affect emissions must be held constant to the maximum feasible degree for all test runs.

(c) The addition of an affected facility to a stationary source as an expansion to that source or as a replacement for an existing facility shall not by itself bring within the applicability of this part any other facility within that source.

(d) [Reserved]

(e) The following shall not, by themselves, be considered modifications under this part:

Maintenance, repair, and replacement which the Administrator determines to be routine for a source category, subject to the provisions of paragraph (c) of this section and § 60.15.
 An increase in production rate of an existing facility, if that increase can be accomplished without a capital expenditure on that facility.

(3) An increase in the hours of operation.

(4) Use of an alternative fuel or raw material if, prior to the date any standard under this part becomes applicable to that source type, as provided by § 60.1, the existing facility was designed to accommodate that alternative use. A facility shall be considered to be designed to accommodate an alternative fuel or raw material if that use could be accomplished under the facility's construction specifications as amended prior to the change. Conversion to coal required for energy considerations, as specified in section 111(a)(8) of the Act, shall not be considered a modification.

(5) The addition or use of any system or device whose primary function is the reduction of air pollutants, except when an emission control system is removed or is replaced by a system which the Administrator determines to be less environmentally beneficial.

(6) The relocation or change in ownership of an existing facility.

(f) Special provisions set forth under an applicable subpart of this part shall supersede any conflicting provisions of this section.

(g) Within 180 days of the completion of any physical or operational change subject to the control measures specified in paragraph (a) of this section, compliance with all applicable standards must be achieved.

(h) No physical change, or change in the method of operation, at an existing electric utility steam generating unit shall be treated as a modification for the purposes of this section provided that such change does not increase the maximum hourly emissions of any pollutant regulated under this section above the maximum hourly emissions achievable at that unit during the 5 years prior to the change.

(i) Repowering projects that are awarded funding from the Department of Energy as permanent clean coal technology demonstration projects (or similar projects funded by EPA) are exempt from the requirements of this section provided that such change does not increase the maximum hourly emissions of any pollutant regulated under this section above the maximum hourly emissions achievable at that unit during the five years prior to the change.

(j)(1) Repowering projects that qualify for an extension under section 409(b) of the Clean Air Act are exempt from the requirements of this section, provided that such change does not increase the actual hourly emissions of any pollutant regulated under this section above the actual hourly emissions achievable at that unit during the 5 years prior to the change.

(2) This exemption shall not apply to any new unit that:

(i) Is designated as a replacement for an existing unit;

(ii) Qualifies under section 409(b) of the Clean Air Act for an extension of an emission limitation compliance date under section 405 of the Clean Air Act; and

(iii) Is located at a different site than the existing unit.

(k) The installation, operation, cessation, or removal of a temporary clean coal technology demonstration project is exempt from the requirements of this section. A temporary clean coal control technology demonstration project, for the purposes of this section is a clean coal technology demonstration project that is operated for a period of 5 years or less, and which complies with the State implementation plan for the State in which the project is located and other requirements necessary to attain and maintain the national ambient air quality standards during the project and after it is terminated.

(1) The reactivation of a very clean coal-fired electric utility steam generating unit is exempt from the requirements of this section.

[40 FR 58419, Dec. 16, 1975, amended at 43 FR 34347, Aug. 3, 1978; 45 FR 5617, Jan. 23, 1980; 57 FR 32339, July 21, 1992; 65 FR 61750, Oct. 17, 2000]

§ 60.15 Reconstruction.

(a) An existing facility, upon reconstruction, becomes an affected facility, irrespective of any change in emission rate.

(b) "Reconstruction" means the replacement of components of an existing facility to such an extent that:

(1) 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

(2) It is technologically and economically feasible to meet the applicable standards set forth in this part.

(c) "Fixed capital cost" means the capital needed to provide all the depreciable components.
(d) If an owner or operator of an existing facility proposes to replace components, and 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, he shall notify the Administrator of the proposed replacements. The notice must be postmarked 60 days (or as soon as practicable) before construction of the replacements is commenced and must include the following information:

(1) Name and address of the owner or operator.

(2) The location of the existing facility.

(3) A brief description of the existing facility and the components which are to be replaced.

(4) A description of the existing air pollution control equipment and the proposed air pollution control equipment.

(5) An estimate of the fixed capital cost of the replacements and of constructing a comparable entirely new facility.

(6) The estimated life of the existing facility after the replacements.

(7) A discussion of any economic or technical limitations the facility may have in complying with the applicable standards of performance after the proposed replacements.

(e) The Administrator will determine, within 30 days of the receipt of the notice required by paragraph (d) of this section and any additional information he may reasonably require, whether the proposed replacement constitutes reconstruction.

(f) The Administrator's determination under paragraph (e) shall be based on:

(1) The fixed capital cost of the replacements in comparison to the fixed capital cost that would be required to construct a comparable entirely new facility;

(2) The estimated life of the facility after the replacements compared to the life of a comparable entirely new facility;

(3) The extent to which the components being replaced cause or contribute to the emissions from the facility; and

(4) Any economic or technical limitations on compliance with applicable standards of performance which are inherent in the proposed replacements.

(g) Individual subparts of this part may include specific provisions which refine and delimit the concept of reconstruction set forth in this section.

[40 FR 58420, Dec. 16, 1975]

## § 60.16 Priority list.

	*****
Mumber	
ITN11	Source Category
[	
· _	
1.	Synthetic Organic Chemical Manufacturing Industry (SOCMI) and
	Volatile Organic Liquid Storage Vessels and Handling Equipment
	(a) SOCMI unit processes
	(b) Volatile organic liquid (VOL) storage vessels and handling
	equipment
	(C) SOCMI jugitive sources
2	(d) SOCMI Secondary Sources
2.	Petroleum Petinorios, Engitino Cources
· A	Industrial Surface Costing. Paper
5.	Dry Cleaning
21	(a) Perchloroethvlene
	(b) Petroleum solvent
6.	Graphic Arts
7.	Polymers and Resins: Acrylic Resins
8.	Mineral Wool (Deleted)
9.	Stationary Internal Combustion Engines
10.	Industrial Surface Coating: Fabric
11.	Industrial-Commercial-Institutional Steam Generating Units
12.	Incineration: Non-Municipal (Deleted)
13.	Non-Metallic Mineral Processing
14.	Secondary Copper (Delated)
16	Phognhate Rock Prenaration
17.	Foundries: Steel and Grav Iron
18.	Polymers and Resins: Polyethylene
19.	Charcoal Production
20.	Synthetic Rubber
	(a) Tire manufacture
	(b) SBR production
21.	Vegetable 0il
22.	Industrial Surface Coating: Metal Coll
23.	Petroleum Transportation and Marketing
24.	By-Product Coke Ovens
23.	Synchecic Fibers Bluwood Manufacture
20.	Trductrial Surface Costing, Automobiles
28	Industrial Surface Coating: Large Appliances
29.	Crude Oil and Natural Gas Production
30.	Secondary Aluminum
31.	Potash (Deleted)
32.	Lightweight Aggregate Industry: Clay, Shale, and Slate [FN2]
33.	Glass
34.	Gypsum
35.	Sodium Carbonate
36.	Secondary Zinc (Deleted)
37.	Polymers and Kesins: Phenolic
38. 70	Polymers and Kesins: Urea-Melamine
37. 10	Annonia (Deleted) Dolimers and Pering, Doliveturene
40. 11	Polymers and Resing: Polystytene
4×.	LOTÀNGER UN VERTIRE UDS-OUN VERTUR

#### PRIORITIZED MAJOR SOURCE CATEGORIES

10	Fiberalage		
42.	Pilorgrass		
4.J. A A	For the Reserve		
44.	lextite Flocessing and lembalt Poofing Manufacture		
45.	Asphalt Processing and Asphalt Robing Mandiacture		
40.	Brick and Related City Frontess		
47.	Ceramic Clay Manufacturing (Defeted)		
48.	Antmonium Nitrate Fertilizer		
49.	Castable Refractories (Deleted)		
50.	Borax and Boric Acid (Deleted)		
51.	Polymers and Resins: Polyester Resins		
52.	Ammonium Suliate		
53.	Starch		
54.	Perlite		
55.	Phosphoric Acid: Thermal Process (Deleted)		
56.	Uranium Refining		
57.	Animal Feed Defluorination (Deleted)		
58.	Urea (for fertilizer and polymers)		
59.	Detergent (Deleted)		
	Other Source Categories		
Lead acid	battery manufacture [FN3]		
Organic so	olvent cleaning [FN3]		
Industrial	surface coating: metal furniture [FN3]		
Stationary	y gas turbines [FN4]		
Municipal	solid waste landfills. [FN4]		
FN1 Low nu	mbers have highest priority, e.g., No. 1 is high priority, No. 59 is		
low pric	prity.		
FN2 Formerly titled "Sintering: Clay and Fly Ash".			

FN3 Minor source category, but included on list since an NSPS is being

developed for that source category.

FN4 Not prioritized, since an NSPS for this major source category has already been promulgated.

[44 FR 49225, Aug. 21, 1979, as amended at <u>47 FR 951</u>, Jan. 8, 1982; <u>47 FR 31876</u>, July 23, 1982; <u>51 FR 42796</u>, Nov. 25, 1986; <u>52 FR 11428</u>, April 8, 1987; <u>61 FR 9918</u>, March 12, 1996]

§ 60.17 Incorporations by reference.

The materials listed below are incorporated by reference in the corresponding sections noted. These incorporations by reference were approved by the Director of the Federal Register on the date listed. These materials are incorporated as they exist on the date of the approval, and a notice of any change in these materials will be published in the FEDERAL REGISTER. The materials are available for purchase at the corresponding address noted below, and all are available for inspection at the Office of the Federal Register, Room 8401, 1100 L Street, N.W., Washington, DC and at the Library (MD-35), U.S. EPA, Research Triangle Park, North Carolina.

<Text of subsection (a) intro. par. effective May 29, 2003.>

(a) The following materials are available for purchase from at least one of the following addresses: American Society for Testing and Materials (ASTM), 100 Barr Harbor Drive, Post Office Box C700, West Conshohocken, PA 19428-2959; or ProQuest, 300 North Zeeb Road, Ann Arbor, MI 48106.

## <Text of subsection (a) intro. par. effective until May 29, 2003.>

(a) The following materials are available for purchase from at least one of the following addresses: American Society for Testing and Materials (ASTM), 1916 Race Street, Philadelphia, PA 19103; or University Microfilms International, 300 North Zeeb Road, Ann Arbor, MI 48106.
(1) ASTM A99-76, 82 (Reapproved 1987), Standard Specification for Ferromanganese, incorporation by reference (IBR) approved January 27, 1983 for § 60.261.

(2) ASTM A100-69, 74, 93, Standard Specification for Ferrosilicon, IBR approved January 27, 1983 for § 60.261.

(3) ASTM A101-73, 93, Standard Specification for Ferrochromium, IBR approved January 27, 1983 for § 60.261.

(4) ASTM A482-76, 93, Standard Specification for Ferrochromesilicon, IBR approved January 27, 1983 for § 60.261.

(5) ASTM A483-64, 74 (Reapproved 1988), Standard Specification for Silicomanganese, IBR approved January 27, 1983 for § 60.261.

(6) ASTM A495-76, 94, Standard Specification for Calcium-Silicon and Calcium Manganese-Silicon, IBR approved January 27, 1983 for § 60.261.

(7) ASTM D86-78, 82, 90, 93, 95, 96, Distillation of Petroleum Products, IBR approved for §§ 60.562-2(d), 60.593(d), and 60.633(h).

<Text of subsection (a)(8) effective May 29, 2003.>

(8) ASTM D129-64, 78, 95, 00, Standard Test Method for Sulfur in Petroleum Products (General Bomb Method), IBR approved for Appendix A: Method 19, 12.5.2.2.3; §§ 60.106(j)(2) and 60.335(b)(10)(i).

<Text of subsection (a)(8) effective until May 29, 2003.>

(8) ASTM D129-64, 78, 95, Standard Test Method for Sulfur in Petroleum Products (General Bomb Method), IBR approved for Appendix A: Method 19, Section 12.5.2.2.3; and § 60.106(j)(2).

(9) ASTM D240-76, 92, Standard Test Method for Heat of Combustion of Liquid Hydrocarbon Fuels by Bomb Calorimeter, IBR approved January 27, 1983 for §§ 60.46(c), 60.296(b), and Appendix A: Method 19, Section 12.5.2.2.3.

(10) ASTM D270-65, 75, Standard Method of Sampling Petroleum and Petroleum Products, IBR approved January 27, 1983 for Appendix A: Method 19, Section 12.5.2.2.1.

(11) ASTM D323-82, 94, Test Method for Vapor Pressure of Petroleum Products (Reid Method), IBR approved April 8, 1987 for §§ 60.111(l), 60.111a(g), 60.111b(g), and 60.116b(f)(2)(ii).

(12) ASTM D388-77, 90, 91, 95, 98a, Standard Specification for Classification of Coals by Rank, IBR approved for §§ 60.41(f), 60.45(f)(4)(i), 60.45(f)(4)(ii), 60.45(f)(4)(vi), 60.41a, 60.41b, and 60.251(b) and (c).

(13) ASTM D396-78, 89, 90, 92, 96, 98, Standard Specification for Fuel Oils, IBR approved for §§ 60.41b, 60.41c, 60.111(b), and 60.111a(b).

(14) ASTM D975-78, 96, 98a, Standard Specification for Diesel Fuel Oils, IBR approved January 27, 1983 for §§ 60.111(b) and 60.111a(b).

<Text of subsection (a)(15) effective May 29, 2003.>

(15) ASTM D1072-80, 90 (Reapproved 1994), Standard Test Method for Total Sulfur in Fuel Gases, IBR approved for § 60.335(b)(10)(ii).

<Text of subsection (a)(15) effective until May 29, 2003.>

(15) ASTM D1072-80, 90 (Reapproved 1994), Standard Method for Total Sulfur in Fuel Gases, IBR approved July 31, 1984 for § 60.335(d).

(16) ASTM D1137-53, 75, Standard Method for Analysis of Natural Gases and Related Types of Gaseous Mixtures by the Mass Spectrometer, IBR approved January 27, 1983 for § 60.45(f)(5)(i).
(17) ASTM D1193-77, 91, Standard Specification for Reagent Water, IBR approved for Appendix A: Method 5, Section 7.1.3; Method 5E, Section 7.2.1; Method 5F, Section 7.2.1; Method 6, Section 7.1.1; Method 7, Section 7.1.1; Method 7C, Section 7.1.1; Method 7D, Section 7.1.1; Method 10A, Section 7.1.1; Method 11, Section 7.1.3; Method 12, Section 7.1.3; Method 13A, Section 7.1.2; Method 26, Section 7.1.2; Method 26A, Section 7.1.2; and Method 29, Section 7.2.2.

<Text of subsection (a)(18) effective May 29, 2003.>

(18) ASTM D1266-87, 91, 98, Standard Test Method for Sulfur in Petroleum Products (Lamp Method), IBR approved for §§ 60.106(j)(2) and 60.335(b)(10)(i).

<Text of subsection (a)(18) effective until May 29, 2003.>

(18) ASTM D1266-87, 91, 98, Standard Test Method for Sulfur in Petroleum Products (Lamp Method), IBR approved August 17, 1989 for § 60.106(j)(2).

(19) ASTM D1475-60 (Reapproved 1980), 90, Standard Test Method for Density of Paint, Varnish Lacquer, and Related Products, IBR approved January 27, 1983 for § 60.435(d)(1), Appendix A: Method 24, Section 6.1; and Method 24A, Sections 6.5 and 7.1.

<Text of subsection (a)(20) effective May 29, 2003.>

(20) ASTM D1552-83, 95, 01, Standard Test Method for Sulfur in Petroleum Products (High-Temperature Method), IBR approved for Appendix A: Method 19, Section 12.5.2.2.3; §§ 60.106(j)(2) and 60.335(b)(10)(i).

<Text of subsection (a)(20) effective until May 29, 2003.>

(20) ASTM D1552-83, 95, Standard Test Method for Sulfur in Petroleum Products (High Temperature Method), IBR approved for Appendix A: Method 19, Section 12.5.2.2.3; and § 60.106(j)(2).

(21) ASTM D1826-77, 94, Standard Test Method for Calorific Value of Gases in Natural Gas Range by Continuous Recording Calorimeter, IBR approved January 27, 1983 for §§
60.45(f)(5)(ii), 60.46(c)(2), 60.296(b)(3), and Appendix A: Method 19, Section 12.3.2.4.
(22) ASTM D1835-87, 91, 97, Standard Specification for Liquefied Petroleum (LP) Gases, approved for §§ 60.41b and 60.41c.

(23) ASTM D1945-64, 76, 91, 96, Standard Method for Analysis of Natural Gas by Gas

Chromatography, IBR approved January 27, 1983 for § 60.45(f)(5)(i).

(24) ASTM D1946-77, 90 (Reapproved 1994), Standard Method for Analysis of Reformed Gas by Gas Chromatography, IBR approved for §§ 60.45(f)(5)(i), 60.18(f)(3), 60.614(e)(2)(ii), 60.614(e)(2)(ii), 60.664(e)(4), 60.564(f)(1), 60.704(d)(2)(ii), and 60.704(d)(4).
(25) ASTM D2013-72, 86, Standard Method of Preparing Coal Samples for Analysis, IBR approved January 27, 1983, for Appendix A: Method 19, Section 12.5.2.1.3.

(26) ASTM D2015-77 (Reapproved 1978), 96, Standard Test Method for Gross Calorific Value of Solid Fuel by the Adiabatic Bomb Calorimeter, IBR approved January 27, 1983 for § 60.45(f)(5)(ii), 60.46(c)(2), and Appendix A: Method 19, Section 12.5.2.1.3.

(27) ASTM D2016-74, 83, Standard Test Methods for Moisture Content of Wood, IBR approved for Appendix A: Method 28, Section 16.1.1.

(28) ASTM D2234-76, 96, 97b, 98, Standard Methods for Collection of a Gross Sample of Coal, IBR approved January 27, 1983 for Appendix A: Method 19, Section 12.5.2.1.1.

(29) ASTM D2369-81, 87, 90, 92, 93, 95, Standard Test Method for Volatile Content of Coatings, IBR approved January 27, 1983 for Appendix A: Method 24, Section 6.2.
(30) ASTM D2382-76, 88, Heat of Combustion of Hydrocarbon Fuels by Bomb Calorimeter

(High-Precision Method), IBR approved for  $\S 60.18(f)(3)$ , 60.485(g)(6), 60.614(e)(4), 60.664(e)(4), 60.564(f)(3), and 60.704(d)(4).

(31) ASTM D2504-67, 77, 88 (Reapproved 1993), Noncondensable Gases in C₃ and Lighter Hydrocarbon Products by Gas Chromatography, IBR approved for § 60.485(g)(5).

(32) ASTM D2584-68 (Reapproved 1985), 94, Standard Test Method for Ignition Loss of Cured Reinforced Resins, IBR approved February 25, 1985 for § 60.685(c)(3)(i).

<Text of subsection (a)(33) effective May 29, 2003.>

(33) ASTM D2622-87, 94, 98, Standard Test Method for Sulfur in Petroleum Products by Wavelength Dispersive X-Ray Fluorescence Spectrometry," IBR approved for §§ 60.106(j)(2) and 60.335(b)(10)(i).

<Text of subsection (a)(33) effective until May 29, 2003.>

(33) ASTM D2622-87, 94, 98, Standard Test Method for Sulfur in Petroleum Products by X-Ray Spectrometry, IBR approved August 17, 1989 for § 60.106(j)(2).

(34) ASTM D2879-83, 96, 97, Test Method for Vapor Pressure-Temperature Relationship and Initial Decomposition Temperature of Liquids by Isoteniscope, IBR approved April 8, 1987 for §§ 60.485(e)(1), 60.111b(f)(3), 60.116b(e)(3)(ii), and 60.116b(f)(2)(i).

(35) ASTM D2880-78, 96, Standard Specification for Gas Turbine Fuel Oils, IBR approved January 27, 1983 for §§ 60.111(b), 60.111a(b), and 60.335(d).

(36) ASTM D2908-74, 91, Standard Practice for Measuring Volatile Organic Matter in Water by Aqueous-Injection Gas Chromatography, IBR approved for § 60.564(j).

(37) ASTM D2986-71, 78, 95a, Standard Method for Evaluation of Air, Assay Media by the Monodisperse DOP (Dioctyl Phthalate) Smoke Test, IBR approved January 27, 1983 for Appendix A: Method 5, Section 7.1.1; Method 12, Section 7.1.1; and Method 13A, Section 7.1.1.2.

<Subsection (a)(38) reserved effective May 29, 2003.>

(38) [Reserved]

<Text of subsection (a)(38) effective until May 29, 2003.>

(38) ASTM D3031-81, Standard Test Method for Total Sulfur in Natural Gas by Hydrogenation, IBR approved July 31, 1984 for § 60.335(d).

(39) ASTM D3173-73, 87, Standard Test Method for Moisture in the Analysis Sample of Coal and Coke, IBR approved January 27, 1983 for Appendix A: Method 19, Section 12.5.2.1.3.
(40) ASTM D3176-74, 89, Standard Method for Ultimate Analysis of Coal and Coke, IBR approved January 27, 1983 for § 60.45(f)(5)(i) and Appendix A: Method 19, Section 12.3.2.3.
(41) ASTM D3177-75, 89, Standard Test Method for Total Sulfur in the Analysis Sample of Coal and Coke, IBR approved January 27, 1983 for Appendix A: Method 19, Section 12.5.2.1.3.
(42) ASTM D3178-73 (Reapproved 1979), 89, Standard Test Methods for Carbon and Hydrogen in the Analysis Sample of Coal and Coke, IBR approved January 27, 1983 for § 60.45(f)(5)(i).

<Text of subsection (a)(43) effective May 29, 2003.>

(43) ASTM D3246-81, 92, 96, Standard Test Method for Sulfur in Petroleum Gas by Oxidative Microcoulometry, IBR approved for § 60.335(b)(10)(ii).

<Text of subsection (a)(43) effective until May 29, 2003.>

(43) ASTM D3246-81, 92, 96, Standard Method for Sulfur in Petroleum Gas by Oxidative Microcoulometry, IBR approved July 31, 1984 for § 60.335(d).

(44) ASTM D3270-73T, 80, 91, 95, Standard Test Methods for Analysis for Fluoride Content of the Atmosphere and Plant Tissues (Semiautomated Method), IBR approved for Appendix A: Method 13A, Section 16.1.

(45) ASTM D3286-85, 96, Standard Test Method for Gross Calorific Value of Coal and Coke by the Isoperibol Bomb Calorimeter, IBR approved for Appendix A: Method 19, Section 12.5.2.1.3.
(46) ASTM D3370-76, 95a, Standard Practices for Sampling Water, IBR approved for § 60.564(j).

(47) ASTM D3792-79, 91, Standard Test Method for Water Content of Water-Reducible Paints by Direct Injection into a Gas Chromatograph, IBR approved January 27, 1983 for Appendix A: Method 24, Section 6.3.

(48) ASTM D4017-81, 90, 96a, Standard Test Method for Water in Paints and Paint Materials by the Karl Fischer Titration Method, IBR approved January 27, 1983 for Appendix A: Method 24, Section 6.4.

(49) ASTM D4057-81, 95, Standard Practice for Manual Sampling of Petroleum and Petroleum Products, IBR approved for Appendix A: Method 19, Section 12.5.2.2.3.

<Text of subsection (a)(50) effective May 29, 2003.>

(50) ASTM D4084-82, 94, Standard Test Method for Analysis of Hydrogen Sulfide in Gaseous Fuels (Lead Acetate Reaction Rate Method), IBR approved for § 60.334(h)(1).

<Text of subsection (a)(50) effective until May 29, 2003.>

(50) ASTM D4084-82, 94, Standard Method for Analysis of Hydrogen Sulfide in Gaseous Fuels (Lead Acetate Reaction Rate Method), IBR approved July 31, 1984 for § 60.335(d).

(51) ASTM D4177-95, Standard Practice for Automatic Sampling of Petroleum and Petroleum Products, IBR approved for Appendix A: Method 19, 12.5.2.2.1.

(52) ASTM D4239-85, 94, 97, Standard Test Methods for Sulfur in the Analysis Sample of Coal and Coke Using High Temperature Tube Furnace Combustion Methods, IBR approved for Appendix A: Method 19, Section 12.5.2.1.3.

(53) ASTM D4442-84, 92, Standard Test Methods for Direct Moisture Content Measurement in Wood and Wood-base Materials, IBR approved for Appendix A: Method 28, Section 16.1.1.
(54) ASTM D4444-92, Standard Test Methods for Use and Calibration of Hand-Held Moisture Meters, IBR approved for Appendix A: Method 28, Section 16.1.1.

(55) ASTM D4457-85 (Reapproved 1991), Test Method for Determination of Dichloromethane and 1, 1, 1-Trichloroethane in Paints and Coatings by Direct Injection into a Gas Chromatograph, IBR approved for Appendix A: Method 24, Section 6.5.

(56) ASTM D4809-95, Standard Test Method for Heat of Combustion of Liquid Hydrocarbon Fuels by Bomb Calorimeter (Precision Method), IBR approved for §§ 60.18(f)(3), 60.485(g)(6), 60.564(f)(3), 60.614(d)(4), 60.664(e)(4), and 60.704(d)(4).

(57) ASTM D5403-93, Standard Test Methods for Volatile Content of Radiation Curable Materials. IBR approved September 11, 1995 for Appendix A: Method 24, Section 6.6.
(58) ASTM D5865-98, Standard Test Method for Gross Calorific Value of Coal and Coke. IBR approved for § 60.45(f)(5)(ii), 60.46(c)(2), and Appendix A: Method 19, Section 12.5.2.1.3.
(59) ASTM E168-67, 77, 92, General Techniques of Infrared Quantitative Analysis, IBR approved for §§ 60.593(b)(2) and 60.632(f).

(60) ASTM E169-63, 77, 93, General Techniques of Ultraviolet Quantitative Analysis, IBR approved for §§ 60.593(b)(2) and 60.632(f).

(61) ASTM E260-73, 91, 96, General Gas Chromatography Procedures, IBR approved for §§ 60.593(b)(2) and 60.632(f).

(62) ASTM D4457-85 Test Method for Determination of Dichloromethane and 1,1,1-Trichloroethane in Paints and Coatings by Direct Injection into a Gas Chromatograph, IBR approved for appendix A, Method 24.

(63) ASTM D 5403-93 Standard Test Methods for Volatile Content of Radiation Curable Materials. IBR approved September 11, 1995 for Method 24 of Appendix A.

(64) ASTM D 6216-98 Standard Practice for Opacity Monitor Manufacturers to Certify Conformance with Design and Performance Specifications, IBR approved February 6, 2001 for appendix B, PS-1.

<Text of subsection (a)(65) effective May 29, 2003.>

(65) ASTM D2597-94 (Reapproved 1999), Standard Test Method for Analysis of Demethanized Hydrocarbon Liquid Mixtures Containing Nitrogen and Carbon Dioxide by Gas Chromatography, IBR approved for § 60.335(b)(9)(i).

<Text of subsection (a)(66) effective May 29, 2003.>

(66) ASTM D4294-02, Standard Test Method for Sulfur in Petroleum and Petroleum Products by Energy-Dispersive X-Ray Fluorescence Spectrometry, IBR approved for § 60.335(b)(10)(i).

## <Text of subsection (a)(67) effective May 29, 2003.>

(67) ASTM D4468-85 (Reapproved 2000), Standard Test Method for Total Sulfur in Gaseous Fuels by Hydrogenolysis and Rateometric Colorimetry, IBR approved for § 60.335(b)(10)(ii).

<Text of subsection (a)(68) effective May 29, 2003.>

(68) ASTM D4629-02, Standard Test Method for Trace Nitrogen in Liquid Petroleum Hydrocarbons by Syringe/Inlet Oxidative Combustion and Chemiluminescence Detection, IBR approved for § 60.335(b)(9)(i).

<Text of subsection (a)(69) effective May 29, 2003.>

(69) ASTM D5453-00, Standard Test Method for Determination of Total Sulfur in Light Hydrocarbons, Motor Fuels and Oils by Ultraviolet Fluorescence, IBR approved for § 60.335(b)(10)(i).

<Text of subsection (a)(70) effective May 29, 2003.>

(70) ASTM D5504-01, Standard Test Method for Determination of Sulfur Compounds in Natural Gas and Gaseous Fuels by Gas Chromatography and Chemiluminescence, IBR approved for § 60.334(h)(1).

<Text of subsection (a)(71) effective May 29, 2003.>

(71) ASTM D5762-02, Standard Test Method for Nitrogen in Petroleum and Petroleum Products by Boat-Inlet Chemiluminescence, IBR approved for § 60.335(b)(9)(i).

<Text of subsection (a)(72) effective May 29, 2003.>

(72) ASTM D6228-98, Standard Test Method for Determination of Sulfur Compounds in Natural Gas and Gaseous Fuels by Gas Chromatography and Flame Photometric Detection, IBR approved for § 60.334(h)(1).

<Text of subsection (a)(73) effective May 29, 2003.>

(73) ASTM D6366-99, Standard Test Method for Total Trace Nitrogen and Its Derivatives in Liquid Aromatic Hydrocarbons by Oxidative Combustion and Electrochemical Detection, IBR approved for § 60.335(b)(9)(i).

<Text of subsection (a)(74) effective May 29, 2003.>

(74) ASTM D6522-00, Standard Test Method for Determination of Nitrogen Oxides, Carbon Monoxide, and Oxygen Concentrations in Emissions from Natural Gas-Fired Reciprocating Engines, Combustion Turbines, Boilers, and Process Heaters Using Portable Analyzers, IBR approved for § 60.335(a).

<Text of subsection (a)(75) effective May 29, 2003.>

(75) ASTM D6667-01, Standard Test Method for Determination of Total Volatile Sulfur in Gaseous Hydrocarbons and Liquefied Petroleum Gases by Ultraviolet Fluorescence, IBR approved for § 60.335(b)(10)(ii).

(b) The following material is available for purchase from the Association of Official Analytical Chemists, 1111 North 19th Street, Suite 210, Arlington, Virginia 22209.

(1) AOAC Method 9, Official Methods of Analysis of the Association of Official Analytical Chemists, 11th edition, 1970, pp. 11-12, IBR approved January 27, 1983 for §§ 60.204(b)(3), 60.214(b)(3), 60.224(b)(3), 60.234(b)(3).

(c) The following material is available for purchase from the American Petroleum Institute, 1220 L Street NW., Washington, DC 20005.

(1) API Publication 2517, Evaporation Loss from External Floating Roof Tanks, Second Edition, February 1980, IBR approved January 27, 1983, for §§ 60.111(i), 60.111a(f), 60.111a(f)(1) and 60.116b(e)(2)(i).

(d) The following material is available for purchase from the Technical Association of the Pulp and Paper Industry (TAPPI), Dunwoody Park, Atlanta, Georgia 30341.

(1) TAPPI Method T624 os-68, IBR approved January 27, 1983 for § 60.285(d)(3).

(e) The following material is available for purchase from the Water Pollution Control Federation (WPCF), 2626 Pennsylvania Avenue NW., Washington, DC 20037.

Method 209A, Total Residue Dried at 103-105 ° C, in Standard Methods for the Examination of Water and Wastewater, 15th Edition, 1980, IBR approved February 25, 1985 for § 60.683(b).
 [Reserved]

(f) The following material is available for purchase from the following address: Underwriter's Laboratories, Inc. (UL), 333 Pfingsten Road, Northbrook, Illinois 60062.

(1) UL 103, Sixth Edition revised as of September 3, 1986, Standard for Chimneys, Factory-built, Residential Type and Building Heating Appliance.

(g) The following material is available for purchase from the following address: West Coast Lumber Inspection Bureau, 6980 SW. Barnes Road, Portland, Oregon 97223.

(1) West Coast Lumber Standard Grading Rules No. 16, pages 5-21 and 90 and 91, September 3, 1970, revised 1984.

(h) The following material is available for purchase from the American Society of Mechanical Engineers (ASME), 345 East 47th Street, New York, New York 10017.

(1) ASME QRO-1-1994, Standard for the Qualification and Certification of Resource Recovery Facility Operators, IBR approved for §§ 60.56a, 60.54b(a), 60.54b(b), 60.1185(a), 60.1185(c)(2), 60.1675(a), and 60.1675(c)(2).

(2) ASME PTC 4.1-1964 (Reaffirmed 1991), Power Test Codes: Test Code for Steam Generating Units (with 1968 and 1969 Addenda), IBR approved for §§ 60.46b, 60.58a(h)(6)(ii), 60.58b(i)(6)(ii), 60.1320(a)(3) and 60.1810(a)(3).

(3) ASME Interim Supplement 19.5 on Instruments and Apparatus: Application, Part II of Fluid Meters, 6th Edition (1971), IBR approved for §§ 60.58a(h)(6)(ii), 60.58b(i)(6)(ii), 60.1320(a)4), and 60.1810(a)(4).

(i) Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," EPA Publication SW-846 Third Edition (November 1986), as amended by Updates I (July 1992), II (September 1994), IIA (August, 1993), IIB (January 1995), and III (December 1996). This document may be obtained from the U.S. EPA, Office of Solid Waste and Emergency Response, Waste Characterization Branch, Washington, DC 20460, and is incorporated by reference for Appendix A to Part 60, Method 29, Sections 7.5.34; 9.2.1; 9.2.3; 10.2; 10.3; 11.1.1; 11.1.3; 13.2.1; 13.2.2; 13.3.1; and Table 29-3.

(j) "Standard Methods for the Examination of Water and Wastewater," 16th edition, 1985. Method 303F: "Determination of Mercury by the Cold Vapor Technique." This document may be obtained from the American Public Health Association, 1015 18th Street, NW., Washington, DC 20036, and is incorporated by reference for Appendix A to Part 60, Method 29, Sections. 9.2.3; 10.3; and 11.1.3.

(k) This material is available for purchase from the American Hospital Association (AHA) Service, Inc., Post Office Box 92683, Chicago, Illinois 60675-2683. You may inspect a copy at EPA's Air and Radiation Docket and Information Center (Docket A-91-61, Item IV-J-124), Room M-1500, 401 M St., SW., Washington, DC.

(1) An Ounce of Prevention: Waste Reduction Strategies for Health Care Facilities. American Society for Health Care Environmental Services of the American Hospital Association. Chicago, Illinois. 1993. AHA Catalog No. 057007. ISBN 0-87258-673-5. IBR approved for § 60.35e and § 60.55c.

(1) This material is available for purchase from the National Technical Information Services, 5285 Port Royal Road, Springfield, Virginia 22161. You may inspect a copy at EPA's Air and Radiation Docket and Information Center (Docket A-91-61, Item IV-J-125), Room M-1500, 401 M St., SW., Washington, DC.

(1) OMB Bulletin No. 93-17: Revised Statistical Definitions for Metropolitan Areas. Office of Management and Budget, June 30, 1993. NTIS No. PB 93-192-664. IBR approved for § 60.31e.

<Text of subsection (m) effective May 29, 2003.>

(m) This material is available for purchase from at least one of the following addresses: The Gas Processors Association, 6526 East 60th Street, Tulsa, OK, 74145; or Information Handling Services, 15 Inverness Way East, P.O. Box 1154, Englewood, CO 80150-1154. You may inspect a copy at EPA's Air and Radiation Docket and Information Center, Room B108, 1301 Constitution Ave., NW., Washington, DC 20460.

 (1) Gas Processors Association Method 2377-86, Test for Hydrogen Sulfide and Carbon Dioxide in Natural Gas Using Length of Stain Tubes, IBR approved for § 60.334(h)(1).
 (2) [Reserved]

[48 FR 3735, Jan. 27, 1983; 48 FR 48335, Oct. 18, 1983; 49 FR 22608, May 30, 1984; 49 FR 30672, July 31, 1984; 49 FR 38233, Sept. 27, 1984; 50 FR 7699, Feb. 25, 1985; 50 FR 26126, June 24, 1985; 51 FR 2702, Jan. 21, 1986; 51 FR 42794, Nov. 25, 1986; 52 FR 11429, April 8, 1987; 52 FR 47842, Dec. 16, 1987; 53 FR 5872, Feb. 26, 1988; 54 FR 34026, Aug. 17, 1989; 54 FR 51825, Dec. 18, 1989; 55 FR 26922, 26942, June 29, 1990; 55 FR 37683, Sept. 12, 1990; 55 FR 40175, Oct. 2, 1990; 55 FR 51053, Dec. 11, 1990; 56 FR 5506, Feb. 11, 1991; 57 FR 30656, July 10, 1992; 58 FR 45962, Aug. 31, 1993; 59 FR 19308, April 22, 1994; 60 FR 47096, Sept. 11, 1995; 60 FR 65384, Dec. 19, 1995; 60 FR 65414, Dec. 19, 1995; 61 FR 18262, April 25, 1996; 62 FR 45124, Aug. 25, 1997; 62 FR 48379, Sept. 15, 1997; 62 FR 52399, Oct. 7, 1997; 63 FR 6493, Feb. 9, 1998; 63 FR 24444, May 4, 1998; 65 FR 48920, Aug. 10, 2000; 65 FR 61750, Oct. 17, 2000; 65 FR 78275, Dec. 14, 2000; 65 FR 76355, 76383, Dec. 6, 2000; 66 FR 9034, Feb. 6, 2001; 68 FR 17997, April 14, 2003]

§ 60.18 General control device requirements.

(a) Introduction. This section contains requirements for control devices used to comply with applicable subparts of Part 60 and Part 61. The requirements are placed here for administrative convenience and only apply to facilities covered by subparts referring to this section.

(b) Flares. Paragraphs (c) through (f) apply to flares.

(c)(1) Flares shall be designed for and operated with no visible emissions as determined by the methods specified in paragraph (f), except for periods not to exceed a total of 5 minutes during any 2 consecutive hours.

(2) Flares shall be operated with a flame present at all times, as determined by the methods specified in paragraph (f).

(3) An owner/operator has the choice of adhering to either the heat content specifications in paragraph (c)(3)(ii) of this section and the maximum tip velocity specifications in paragraph (c)(4) of this section, or adhering to the requirements in paragraph (c)(3)(i) of this section. (i)(A) Flares shall be used that have a diameter of 3 inches or greater, are nonassisted, have a hydrogen content of 8.0 percent (by volume), or greater, and are designed for and operated with an exit velocity less than 37.2 m/sec (122 ft/sec) and less than the velocity, V submax, as determined by the following equation:

V submax =(X subH2 - K sub1 )* K sub2

Where:

V submax =Maximum permitted velocity, m/sec.

K sub1 =Constant, 6.0 volume-percent hydrogen.

K sub2 =Constant, 3.9(m/sec)/volume-percent hydrogen.

X subH2 =The volume-percent of hydrogen, on a wet basis, as calculated by using the American Society for Testing and Materials (ASTM) Method D1946-77. (Incorporated by reference as specified in § 60.17).

(B) The actual exit velocity of a flare shall be determined by the method specified in paragraph (f)(4) of this section.

(ii) Flares shall be used only with the net heating value of the gas being combusted being 11.2 MJ/scm (300 Btu/scf) or greater if the flare is steam- assisted or air-assisted; or with the net heating value of the gas being combusted being 7.45 MJ/scm (200 Btu/scf) or greater if the flare is nonassisted. The net heating value of the gas being combusted shall be determined by the methods specified in paragraph (f)(3) of this section.

(4)(i) Steam-assisted and nonassisted flares shall be designed for and operated with an exit velocity, as determined by the methods specified in paragraph (f)(4) of this section, less than 18.3 m/sec (60 ft/sec), except as provided in paragraphs (c)(4)(ii) and (iii) of this section.

(ii) Steam-assisted and nonassisted flares designed for and operated with an exit velocity, as determined by the methods specified in paragraph (f)(4), equal to or greater than 18.3 m/sec (60 ft/sec) but less than 122 m/sec (400 ft/sec) are allowed if the net heating value of the gas being combusted is greater than 37.3 MJ/scm (1,000 Btu/scf).

(iii) Steam-assisted and nonassisted flares designed for and operated with an exit velocity, as determined by the methods specified in paragraph (f)(4), less than the velocity, V submax, as determined by the method specified in paragraph (f)(5), and less than 122 m/sec (400 ft/sec) are allowed.

(5) Air-assisted flares shall be designed and operated with an exist velocity less than the velocity, V submax, as determined by the method specified in paragraph (f)(6).

(6) Flares used to comply with this section shall be steam-assisted, air- assisted, or nonassisted.
(d) Owners or operators of flares used to comply with the provisions of this subpart shall monitor these control devices to ensure that they are operated and maintained in conformance with their designs. Applicable subparts will provide provisions stating how owners or operators of flares shall monitor these control devices.

(e) Flares used to comply with provisions of this subpart shall be operated at all times when emissions may be vented to them.

(f)(1) Method 22 of Appendix A to this part shall be used to determine the compliance of flares with the visible emission provisions of this subpart. The observation period is 2 hours and shall be used according to Method 22.

(2) The presence of a flare pilot flame shall be monitored using a thermocouple or any other equivalent device to detect the presence of a flame.

(3) The net heating value of the gas being combusted in a flare shall be calculated using the following equation:

$$H_T = K \sum_{i=1}^n C_i H$$

where:

H subT =Net heating value of the sample, MJ/scm; where the net enthalpy per mole of offgas is based on combustion at 25 ° C and 760 mm Hg, but the standard temperature for determining the volume corresponding to one mole is 20 ° C;

K = constant

1.740 X 10⁻⁷ (1/ppm)(g-mole/scm)(MJ/kcal)

C subi =Concentration of sample component i in ppm on a wet basis, as measured for organics by Reference Method 18 and measured for hydrogen and carbon monoxide by ASTM D1946-77 or 90 (Reapproved 1994) (Incorporated by reference as specified in § 60.17); and

H subi =Net heat of combustion of sample component i, kcal/g mole at 25 ° C and 760 mm Hg. The heats of combustion may be determined using ASTM D2382-76 or 88 or D4809-95

(incorporated by reference as specified in § 60.17) if published values are not available or cannot be calculated.

(4) The actual exist velocity of a flare shall be determined by dividing the volumetric flowrate (in units of standard temperature and pressure), as determined by Reference Methods 2, 2A, 2C, or 2D as appropriate; by the unobstructed (free) cross sectional area of the flare tip.

(5) The maximum permitted velocity, V submax, for flares complying with paragraph (c)(4)(iii) shall be determined by the following equation.

Log sub10 (V submax )=(H subT +28.8)/31.7

V submax =Maximum permitted velocity, M/sec

28.8=Constant

31.7=Constant

H subT = The net heating value as determined in paragraph (f)(3).

(6) The maximum permitted velocity, V submax, for air-assisted flares shall be determined by the following equation.

V submax = 8.706 + 0.7084 (H subT)

V submax =Maximum permitted velocity, m/sec

8.706=Constant

0.7084=Constant

H subT =The net heating value as determined in paragraph (f)(3).

[51 FR 2701, Jan. 21, 1986; 63 FR 24444, May 4, 1998; 65 FR 61752, Oct. 17, 2000]

§ 60.19 General notification and reporting requirements.

(a) For the purposes of this part, time periods specified in days shall be measured in calendar days, even if the word "calendar" is absent, unless otherwise specified in an applicable requirement.

(b) For the purposes of this part, if an explicit postmark deadline is not specified in an applicable requirement for the submittal of a notification, application, report, or other written communication to the Administrator, the owner or operator shall postmark the submittal on or before the number of days specified in the applicable requirement. For example, if a notification must be submitted 15 days before a particular event is scheduled to take place, the notification shall be postmarked on or before 15 days preceding the event; likewise, if a notification must be submitted 15 days after a particular event takes place, the notification shall be delivered or postmarked on or before 15 days following the end of the event. The use of reliable non-Government mail carriers that provide indications of verifiable delivery of information required to be submitted to the Administrator, similar to the postmark provided by the U.S. Postal Service, or alternative means of delivery, including the use of electronic media, agreed to by the permitting authority, is acceptable.

(c) Notwithstanding time periods or postmark deadlines specified in this part for the submittal of information to the Administrator by an owner or operator, or the review of such information by the Administrator, such time periods or deadlines may be changed by mutual agreement between the owner or operator and the Administrator. Procedures governing the implementation of this provision are specified in paragraph (f) of this section.

(d) If an owner or operator of an affected facility in a State with delegated authority is required to submit periodic reports under this part to the State, and if the State has an established timeline for the submission of periodic reports that is consistent with the reporting frequency(ies) specified for such facility under this part, the owner or operator may change the dates by which periodic reports under this part shall be submitted (without changing the frequency of reporting) to be consistent with the State's schedule by mutual agreement between the owner or operator and the State. The allowance in the previous sentence applies in each State beginning 1 year after the affected facility is required to be in compliance with the applicable subpart in this part. Procedures governing the implementation of this provision are specified in paragraph (f) of this section.

(e) If an owner or operator supervises one or more stationary sources affected by standards set under this part and standards set under part 61, part 63, or both such parts of this chapter, he/she may arrange by mutual agreement between the owner or operator and the Administrator (or the State with an approved permit program) a common schedule on which periodic reports required by each applicable standard shall be submitted throughout the year. The allowance in the previous sentence applies in each State beginning 1 year after the stationary source is required to be in compliance with the applicable subpart in this part, or 1 year after the stationary source is required to be in compliance with the applicable 40 CFR part 61 or part 63 of this chapter standard, whichever is latest. Procedures governing the implementation of this provision are specified in paragraph (f) of this section.

(f)(1)(i) Until an adjustment of a time period or postmark deadline has been approved by the Administrator under paragraphs (f)(2) and (f)(3) of this section, the owner or operator of an affected facility remains strictly subject to the requirements of this part.

(ii) An owner or operator shall request the adjustment provided for in paragraphs (f)(2) and (f)(3) of this section each time he or she wishes to change an applicable time period or postmark deadline specified in this part.

(2) Notwithstanding time periods or postmark deadlines specified in this part for the submittal of information to the Administrator by an owner or operator, or the review of such information by the Administrator, such time periods or deadlines may be changed by mutual agreement between the owner or operator and the Administrator. An owner or operator who wishes to request a change in a time period or postmark deadline for a particular requirement shall request the adjustment in writing as soon as practicable before the subject activity is required to take place. The owner or operator shall include in the request whatever information he or she considers useful to convince the Administrator that an adjustment is warranted.

(3) If, in the Administrator's judgment, an owner or operator's request for an adjustment to a particular time period or postmark deadline is warranted, the Administrator will approve the adjustment. The Administrator will notify the owner or operator in writing of approval or disapproval of the request for an adjustment within 15 calendar days of receiving sufficient information to evaluate the request.

(4) If the Administrator is unable to meet a specified deadline, he or she will notify the owner or operator of any significant delay and inform the owner or operator of the amended schedule.

[59 FR 12428, March 16, 1994; 64 FR 7463, Feb. 12, 1999]

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# **APPENDIX B**

## CODE OF FEDERAL REGULATIONS TITLE 40--PROTECTION OF ENVIRONMENT CHAPTER I--ENVIRONMENTAL PROTECTION AGENCY SUBCHAPTER C--AIR PROGRAMS

## PART 60--STANDARDS OF PERFORMANCE FOR NEW STATIONARY SOURCES SUBPART VV--STANDARDS OF PERFORMANCE FOR EQUIPMENT LEAKS OF VOC IN THE SYNTHETIC ORGANIC CHEMICALS MANUFACTURING INDUSTRY

§ 60.480 Applicability and designation of affected facility.

(a)(1) The provisions of this subpart apply to affected facilities in the synthetic organic chemicals manufacturing industry.

(2) The group of all equipment (defined in § 60.481) within a process unit is an affected facility.
(b) Any affected facility under paragraph (a) of this section that commences construction or modification after January 5, 1981, shall be subject to the requirements of this subpart.

(c) Addition or replacement of equipment for the purpose of process improvement which is accomplished without a capital expenditure shall not by itself be considered a modification under this subpart.

(d)(1) If an owner or operator applies for one or more of the exemptions in this paragraph, then the owner or operator shall maintain records as required in § 60.486(i).

(2) Any affected facility that has the design capacity to produce less than 1,000 Mg/yr (1,102 ton/yr) is exempt from § 60.482.

(3) If an affected facility produces heavy liquid chemicals only from heavy liquid feed or raw materials, then it is exempt from § 60.482.

(4) Any affected facility that produces beverage alcohol is exempt from § 60.482.

(5) Any affected facility that has no equipment in VOC service is exempt from § 60.482.

(e) Alternative means of compliance.

(1) Option to comply with part 65. Owners or operators may choose to comply with the provisions of <u>40 CFR part 65</u>, subpart F, to satisfy the requirements of §§ 60.482 through 60.487 for an affected facility. When choosing to comply with <u>40 CFR part 65</u>, subpart F, the requirements of § 60.485(d), (e), and (f), and § 60.486(i) and (j) still apply. Other provisions applying to an owner or operator who chooses to comply with <u>40 CFR part 65</u> are provided in <u>40 CFR 65.1</u>.

(2) Part 60, subpart A. Owners or operators who choose to comply with  $\underline{40 \text{ CFR part 65, subpart}}$ <u>F</u> must also comply with §§ 60.1, 60.2, 60.5, 60.6, 60.7(a)(1) and (4), 60.14, 60.15, and 60.16 for that equipment. All sections and paragraphs of subpart A of this part that are not mentioned in this paragraph (e)(2) do not apply to owners or operators of equipment subject to this subpart complying with <u>40 CFR part 65, subpart F</u>, except that provisions required to be met prior to implementing <u>40 CFR part 65</u> still apply. Owners and operators who choose to comply with <u>40</u> <u>CFR part 65, subpart F</u>, must comply with <u>40 CFR part 65, subpart A</u>.

[49 FR 22607, May 30, 1984; 65 FR 61762, Oct. 17, 2000; 65 FR 78276, Dec. 14, 2000]

## § 60.481 Definitions.

As used in this subpart, all terms not defined herein shall have the meaning given them in the Act or in Subpart A of Part 60, and the following terms shall have the specific meanings given them. Capital expenditure means, in addition to the definition in <u>40 CFR 60.2</u>, an expenditure for a physical or operational change to an existing facility that:

(a) Exceeds P, the product of the facility's replacement cost, R, and an adjusted annual asset guideline repair allowance, A, as reflected by the following equation:  $P = R \times A$ , where

(1) The adjusted annual asset guideline repair allowance, A, is the product of the percent of the replacement cost, Y, and the applicable basic annual asset guideline repair allowance, B, divided by 100 as reflected by the following equation:

A = Y x (B / 100);

(2) The percent Y is determined from the following equation:  $Y = 1.0 - 0.575 \log X$ , where X is 1982 minus the year of construction; and

(3) The applicable basic annual asset guideline repair allowance, B, is selected from the following table consistent with the applicable subpart:

TABLE FOR DETERMINING APP	PLICABLE FOR B
Subpart applicable to facility	Value of B to be used in equation
VV	
GGG	····· 7.0 ····· 4.5

Closed vent system means a system that is not open to the atmosphere and that is composed of hard-piping, ductwork, connections, and, if necessary, flow- inducing devices that transport gas or vapor from a piece or pieces of equipment to a control device or back to a process.

Connector means flanged, screwed, welded, or other joined fittings used to connect two pipe lines or a pipe line and a piece of process equipment.

Control device means an enclosed combustion device, vapor recovery system, or flare. Distance piece means an open or enclosed casing through which the piston rod travels, separating the compressor cylinder from the crankcase.

Double block and bleed system means two block valves connected in series with a bleed valve or line that can vent the line between the two block valves.

Duct work means a conveyance system such as those commonly used for heating and ventilation systems. It is often made of sheet metal and often has sections connected by screws or crimping. Hard-piping is not ductwork.

Equipment means each pump, compressor, pressure relief device, sampling connection system, openended valve or line, valve, and flange or other connector in VOC service and any devices or systems required by this subpart.

First attempt at repair means to take rapid action for the purpose of stopping or reducing leakage of organic material to atmosphere using best practices.

Fuel gas means gases that are combusted to derive useful work or heat.

Fuel gas system means the offsite and onsite piping and flow and pressure control system that gathers gaseous stream(s) generated by onsite operations, may blend them with other sources of gas, and transports the gaseous stream for use as fuel gas in combustion devices or in-process combustion equipment, such as furnaces and gas turbines, either singly or in combination. Hard-piping means pipe or tubing that is manufactured and properly installed using good engineering judgement and standards such as ASME B31.3, Process Piping (available from the American Society of Mechanical Engineers, PO Box 2900, Fairfield, NJ 07007-2900).

In gas/vapor service means that the piece of equipment contains process fluid that is in the gaseous state at operating conditions.

In heavy liquid service means that the piece of equipment is not in gas/vapor service or in light liquid service.

In light liquid service means that the piece of equipment contains a liquid that meets the conditions specified in § 60.485(e).

In-situ sampling systems means nonextractive samplers or in-line samplers.

In vacuum service means that equipment is operating at an internal pressure which is at least 5 kilopascals (kPa)(0.7 psia) below ambient pressure.

In VOC Service means that the piece of equipment contains or contacts a process fluid that is at least 10 percent VOC by weight. (The provisions of § 60.485(d) specify how to determine that a piece of equipment is not in VOC service.)

Liquids dripping means any visible leakage from the seal including spraying, misting, clouding, and ice formation.

Open-ended valve or line means any valve, except safety relief valves, having one side of the valve seat in contact with process fluid and one side open to the atmosphere, either directly or through open piping.

Pressure release means the emission of materials resulting from system pressure being greater than set pressure of the pressure relief device.

Process improvement means routine changes made for safety and occupational health requirements, for energy savings, for better utility, for ease of maintenance and operation, for correction of design deficiencies, for bottleneck removal, for changing product requirements, or for environmental control.

Process unit means components assembled to produce, as intermediate or final products, one or more of the chemicals listed in § 60.489 of this part. A process unit can operate independently if supplied with sufficient feed or raw materials and sufficient storage facilities for the product. Process unit shutdown means a work practice or operational procedure that stops production from a process unit or part of a process unit. An unscheduled work practice or operational procedure that stops production from a process unit or part of a process unit for less than 24 hours is not a process unit shutdown. The use of spare equipment and technically feasible bypassing of equipment without stopping production are not process unit shutdowns.

Quarter means a 3-month period; the first quarter concludes on the last day of the last full month during the 180 days following initial startup.

Repaired means that equipment is adjusted, or otherwise altered, in order to eliminate a leak as indicated by one of the following: an instrument reading of 10,000 ppm or greater, indication of liquids dripping, or indication by a sensor that a seal or barrier fluid system has failed. Replacement cost means the capital needed to purchase all the depreciable components in a facility.

Sampling connection system means an assembly of equipment within a process unit used during periods of representative operation to take samples of the process fluid. Equipment used to take nonroutine grab samples is not considered a sampling connection system.

Sensor means a device that measures a physical quantity or the change in a physical quantity such as temperature, pressure, flow rate, pH, or liquid level.

Synthetic organic chemicals manufacturing industry means the industry that produces, as intermediates or final products, one or more of the chemicals listed in § 60.489.

Volatile organic compounds or VOC means, for the purposes of this subpart, any reactive organic compounds as defined in  $\S$  60.2 Definitions.

[<u>49 FR 22607</u>, May 30, 1984; <u>49 FR 26738</u>, June 29, 1984; <u>60 FR 43258</u>, Aug. 18, 1995; <u>65 FR 61762</u>, Oct. 17, 2000; <u>65 FR 78276</u>, Dec. 14, 2000]

§ 60.482-1 Standards: General.

(a) Each owner or operator subject to the provisions of this subpart shall demonstrate compliance with the requirements of §§ 60.482-1 through 60.482-10 or § 60.480(e) for all equipment within 180 days of initial startup.

(b) Compliance with § 60.482-1 to § 60.482-10 will be determined by review of records and reports, review of performance test results, and inspection using the methods and procedures specified in § 60.485.

(c)(1) An owner or operator may request a determination of equivalence of a means of emission limitation to the requirements of § 60.482-2, -3, -5, -6, -7, -8, and -10 as provided in § 60.484. (2) If the Administrator makes a determination that a means of emission limitation is at least equivalent to the requirements of § 60.482-2, -3, -5, -6, -7, -8, or -10, an owner or operator shall comply with the requirements of that determination.

(d) Equipment that is in vacuum service is excluded from the requirements of § 60.482-2 to § 60.482-10 if it is identified as required in § 60.486(e)(5).

[49 FR 22608, May 30, 1984; 65 FR 78276, Dec. 14, 2000]

§ 60.482-2 Standards: Pumps in light liquid service.

(a)(1) Each pump in light liquid service shall be monitored monthly to detect leaks by the methods specified in § 60.485(b), except as provided in § 60.482-1(c) and paragraphs (d), (e), and (f) of this section.

(2) Each pump in light liquid service shall be checked by visual inspection each calendar week for indications of liquids dripping from the pump seal.

(b)(1) If an instrument reading of 10,000 ppm or greater is measured, a leak is detected.

(2) If there are indications of liquids dripping from the pump seal, a leak is detected.

(c)(1) When a leak is detected, it shall be repaired as soon as practicable, but not later than 15 calendar days after it is detected, except as provided in § 60.482-9.

(2) A first attempt at repair shall be made no later than 5 calendar days after each leak is detected.
(d) Each pump equipped with a dual mechanical seal system that includes a barrier fluid system is exempt from the requirements of paragraph (a), provided the following requirements are met:
(1) Each dual mechanical seal system is:

(i) Operated with the barrier fluid at a pressure that is at all times greater than the pump stuffing box pressure; or

(ii) Equipment with a barrier fluid degassing reservoir that is routed to a process or fuel gas system or connected by a closed vent system to a control device that complies with the requirements of § 60.482-10; or

(iii) Equipped with a system that purges the barrier fluid into a process stream with zero VOC emissions to the atmosphere.

(2) The barrier fluid system is in heavy liquid service or is not in VOC service.

(3) Each barrier fluid system is equipped with a sensor that will detect failure of the seal system, the barrier fluid system, or both.

(4) Each pump is checked by visual inspection, each calendar week, for indications of liquids dripping from the pump seals.

(5)(i) Each sensor as described in paragraph (d)(3) is checked daily or is equipped with an audible alarm, and

(ii) The owner or operator determines, based on design considerations and operating experience, a criterion that indicates failure of the seal system, the barrier fluid system, or both.

(6)(i) If there are indications of liquids dripping from the pump seal or the sensor indicates failure of the seal system, the barrier fluid system, or both based on the criterion determined in paragraph (d)(5)(ii), a leak is detected.

(ii) When a leak is detected, it shall be repaired as soon as practicable, but not later than 15 calendar days after it is detected, except as provided in § 60.482-9.

(iii) A first attempt at repair shall be made no later than 5 calendar days after each leak is detected.

(e) Any pump that is designated, as described in § 60.486(e)(1) and (2), for no detectable emission, as indicated by an instrument reading of less than 500 ppm above background, is exempt from the requirements of paragraphs (a), (c), and (d) of this section if the pump: (1) Has no externally actuated shaft penetrating the pump housing,

(2) Is demonstrated to be operating with no detectable emissions as indicated by an instrument reading of less than 500 ppm above background as measured by the methods specified in  $\S$  60.485(c), and

(3) Is tested for compliance with paragraph (e)(2) of this section initially upon designation, annually, and at other times requested by the Administrator.

(f) If any pump is equipped with a closed vent system capable of capturing and transporting any leakage from the seal or seals to a process or to a fuel gas system or to a control device that complies with the requirements of § 60.482-10, it is exempt from paragraphs (a) through (e) of this section.

(g) Any pump that is designated, as described in § 60.486(f)(1), as an unsafe- to-monitor pump is exempt from the monitoring and inspection requirements of paragraphs (a) and (d)(4) through (6) of this section if:

(1) The owner or operator of the pump demonstrates that the pump is unsafe-to- monitor because monitoring personnel would be exposed to an immediate danger as a consequence of complying with paragraph (a) of this section; and

(2) The owner or operator of the pump has a written plan that requires monitoring of the pump as frequently as practicable during safe-to-monitor times but not more frequently than the periodic monitoring schedule otherwise applicable, and repair of the equipment according to the procedures in paragraph (c) of this section if a leak is detected.

(h) Any pump that is located within the boundary of an unmanned plant site is exempt from the weekly visual inspection requirement of paragraphs (a)(2) and (d)(4) of this section, and the daily requirements of paragraph (d)(5) of this section, provided that each pump is visually inspected as often as practicable and at least monthly.

[65 FR 61762, Oct. 17, 2000; 65 FR 78276, Dec. 14, 2000]

§ 60.482-3 Compressors.

(a) Each compressor shall be equipped with a seal system that includes a barrier fluid system and that prevents leakage of VOC to the atmosphere, except as provided in § 60.482-1(c) and paragraph (h) and (i) of this section.

(b) Each compressor seal system as required in paragraph (a) shall be:

(1) Operated with the barrier fluid at a pressure that is greater than the compressor stuffing box pressure; or

(2) Equipped with a barrier fluid system degassing reservoir that is routed to a process or fuel gas system or connected by a closed vent system to a control device that complies with the

requirements of § 60.482-10; or

(3) Equipped with a system that purges the barrier fluid into a process stream with zero VOC emissions to the atmosphere.

(c) The barrier fluid system shall be in heavy liquid service or shall not be in VOC service.

(d) Each barrier fluid system as described in paragraph (a) shall be equipped with a sensor that will detect failure of the seal system, barrier fluid system, or both.

(e)(1) Each sensor as required in paragraph (d) shall be checked daily or shall be equipped with an audible alarm.

(2) The owner or operator shall determine, based on design considerations and operating experience, a criterion that indicates failure of the seal system, the barrier fluid system, or both.(f) If the sensor indicates failure of the seal system, the barrier system, or both based on the criterion determined under paragraph (e)(2), a leak is detected.

(g)(1) When a leak is detected, it shall be repaired as soon as practicable, but not later than 15 calendar days after it is detected, except as provided in § 60.482-9.

(2) A first attempt at repair shall be made no later than 5 calendar days after each leak is detected.(h) A compressor is exempt from the requirements of paragraphs (a) and (b) of this section, if it is equipped with a closed vent system to capture and transport leakage from the compressor drive shaft back to a process or fuel gas system or to a control device that complies with the requirements of § 60.482-10, except as provided in paragraph (i) of this section.

(i) Any compressor that is designated, as described in § 60.486(e)(1) and (2), for no detectable emissions, as indicated by an instrument reading of less than 500 ppm above background; is exempt from the requirements of paragraphs (a)- (h) if the compressor:

(1) Is demonstrated to be operating with no detectable emissions, as indicated by an instrument reading of less than 500 ppm above background, as measured by the methods specified in § 60.485(c); and

(2) Is tested for compliance with paragraph (i)(1) of this section initially upon designation, annually, and at other times requested by the Administrator.

(j) Any existing reciprocating compressor in a process unit which becomes an affected facility under provisions of § 60.14 or 60.15 is exempt from § 60.482(a), (b), (c), (d), and (h), provided

the owner or operator demonstrates that recasting the distance piece or replacing the compressor are the only options available to bring the compressor into compliance with the provisions of  $\S$  60.4823(a), (b), (c), (d), (e), and (h) of this section.

[65 FR 61762, Oct. 17, 2000; 65 FR 78277, Dec. 14, 2000]

§ 60.482-4 Standards: Pressure relief devices in gas/vapor service.

(a) Except during pressure releases, each pressure relief device in gas/vapor service shall be operated with no detectable emissions, as indicated by an instrument reading of less than 500 ppm above background, as determined by the methods specified in § 60.485(c).

(b)(1) After each pressure release, the pressure relief device shall be returned to a condition of no detectable emissions, as indicated by an instrument reading of less than 500 ppm above background, as soon as practicable, but no later than 5 calendar days after the pressure release, except as provided in § 60.482-9.

(2) No later than 5 calendar days after the pressure release, the pressure relief device shall be monitored to confirm the conditions of no detectable emissions, as indicated by an instrument reading of less than 500 ppm above background, by the methods specified in § 60.485(c).
(c) Any pressure relief device that is routed to a process or fuel gas system or equipped with a closed vent system capable of capturing and transporting leakage through the pressure relief device to a control device as described in § 60.482-10 is exempted from the requirements of paragraphs (a) and (b) of this section.

(d)(1) Any pressure relief device that is equipped with a rupture disk upstream of the pressure relief device is exempt from the requirements of paragraphs (a) and (b) of this section, provided the owner or operator complies with the requirements in paragraph (d)(2) of this section. (2) After each pressure release, a new rupture disk shall be installed upstream of the pressure relief device as soon as practicable, but no later than 5 calendar days after each pressure release, except as provided in § 60.482-9.

[65 FR 61762, Oct. 17, 2000; 65 FR 78277, Dec. 14, 2000]

§ 60.482-5 Standards: Sampling connection systems.

(a) Each sampling connection system shall be equipped with a closed-purged, closed-loop, or closed-vent system, except as provided in § 60.482-1(c). Gases displaced during filling of the sample container are not required to be collected or captured.

(b) Each closed-purge, closed-loop, or closed-vent system as required in paragraph (a) of this section shall comply with the requirements specified in paragraphs (b)(1) through (4) of this section:

(1) Return the purged process fluid directly to the process line; or

(2) Collect and recycle the purged process fluid to a process; or

(3) Be designed and operated to capture and transport all the purged process fluid to a control device that complies with the requirements of § 60.482-10; or

(4) Collect, store, and transport the purged process fluid to any of the following systems or facilities:

(i) A waste management unit as defined in <u>40 CFR 63.111</u>, if the waste management unit is

subject to, and operated in compliance with the provisions of 40 CFR part 63, subpart G, applicable to Group 1 wastewater streams;

(ii) A treatment, storage, or disposal facility subject to regulation under 40 CFR part 262, 264, 265, or 266; or

(iii) A facility permitted, licensed, or registered by a State to manage municipal or industrial solid waste, if the process fluids are not hazardous waste as defined in 40 CFR part 261.(c) In situ sampling systems and sampling systems without purges are exempt from the requirements of paragraphs (a) and (b) of this section.

[60 FR 43258, Aug. 18, 1995; 65 FR 61762, Oct. 17, 2000; 65 FR 78277, Dec. 14, 2000]

§ 60.482-6 Standards: Open-ended valves or lines.

(a)(1) Each open-ended value or line shall be equipped with a cap, blind flange, plug, or a second value, except as provided in § 60.482-1(c).

(2) The cap, blind flange, plug, or second valve shall seal the open end at all times except during operations requiring process fluid flow through the open-ended valve or line.

(b) Each open-ended value or line equipped with a second value shall be operated in a manner such that the value on the process fluid end is closed before the second value is closed.

(c) When a double block-and-bleed system is being used, the bleed value or line may remain open during operations that require venting the line between the block values but shall comply with paragraph (a) at all other times.

(d) Open-ended values or lines in an emergency shutdown system which are designed to open automatically in the event of a process upset are exempt from the requirements of paragraphs (a), (b) and (c) of this section.

(e) Open-ended values or lines containing materials which would autocatalytically polymerize or would present an explosion, serious overpressure, or other safety hazard if capped or equipped with a double block and bleed system as specified in paragraphs (a) through (c) of this section are exempt from the requirements of paragraphs (a) through (c) of this section.

[<u>49 FR 22607</u>, May 30, 1984; <u>65 FR 78277</u>, Dec. 14, 2000]

§ 60.482-7 Standards: Valves in gas/vapor service in light liquid service.

(a) Each valve shall be monitored monthly to detect leaks by the methods specified in § 60.485(b) and shall comply with paragraphs (b)-(e), except as provided in paragraphs (f), (g), and (h), § 60.483-1, 2, and § 60.482-1(c).

(b) If an instrument reading of 10,000 ppm or greater is measured, a leak is detected.

(c)(1) Any value for which a leak is not detected for 2 successive months may be monitored the first month of every quarter, beginning with the next quarter, until a leak is detected.

(2) If a leak is detected, the value shall be monitored monthly until a leak is not detected for 2 successive months.

(d)(1) When a leak is detected, it shall be repaired as soon as practicable, but no later than 15 calendar days after the leak is detected, except as provided in § 60.482-9.

(2) A first attempt at repair shall be made no later than 5 calendar days after each leak is detected.(e) First attempts at repair include, but are not limited to, the following best practices where

## practicable:

(1) Tightening of bonnet bolts;

(2) Replacement of bonnet bolts;

(3) Tightening of packing gland nuts;

(4) Injection of lubricant into lubricated packing.

(f) Any value that is designated, as described in § 60.486(e)(2), for no detectable emissions, as indicated by an instrument reading of less than 500 ppm above background, is exempt from the requirements of paragraph (a) if the value:

(1) Has no external actuating mechanism in contact with the process fluid,

(2) Is operated with emissions less than 500 ppm above background as determined by the method specified in § 60.485(c), and

(3) Is tested for compliance with paragraph (f)(2) of this section initially upon designation, annually, and at other times requested by the Administrator.

(g) Any value that is designated, as described in § 60.486(f)(1), as an unsafe-to-monitor value is exempt from the requirements of paragraph (a) if:

(1) The owner or operator of the valve demonstrates that the valve is unsafe to monitor because monitoring personnel would be exposed to an immediate danger as a consequence of complying with paragraph (a), and

(2) The owner or operator of the value adheres to a written plan that requires monitoring of the value as frequently as practicable during safe-to-monitor times.

(h) Any value that is designated, as described in § 60.486(f)(2), as a difficult-to-monitor value is exempt from the requirements of paragraph (a) if:

(1) The owner or operator of the valve demonstrates that the valve cannot be monitored without elevating the monitoring personnel more than 2 meters above a support surface.

(2) The process unit within which the value is located either becomes an affected facility through  $\S$  60.14 or  $\S$  60.15 or the owner or operator designates less than 3.0 percent of the total number of values as difficult-to-monitor, and

(3) The owner or operator of the valve follows a written plan that requires monitoring of the valve at least once per calendar year.

[49 FR 22608, May 30, 1984; 65 FR 61762, Oct. 17, 2000]

§ 60.482-8 Standards: Pumps and valves in heavy liquid service, pressure relief devices in light liquid or heavy liquid service, and connectors.

(a) If evidence of a potential leak is found by visual, audible, olfactory, or any other detection method at pumps and valves in heavy liquid service, pressure relief devices in light liquid or heavy liquid service, and connectors, the owner or operator shall follow either one of the following procedures:

 (1) The owner or operator shall monitor the equipment within 5 days by the method specified in § 60.485(b) and shall comply with the requirements of paragraphs (b) through (d) of this section.
 (2) The owner or operator shall eliminate the visual, audible, olfactory, or other indication of a potential leak.

(b) If an instrument reading of 10,000 ppm or greater is measured, a leak is detected.

(c)(1) When a leak is detected, it shall be repaired as soon as practicable, but not later than 15 calendar days after it is detected, except as provided in § 60.482-9.

(2) The first attempt at repair shall be made no later than 5 calendar days after each leak is detected.

(d) First attempts at repair include, but are not limited to, the best practices described under § 60.482-7(e).

## [65 FR 78277, Dec. 14, 2000]

§ 60.482-9 Standards: Delay of repair.

(a) Delay of repair of equipment for which leaks have been detected will be allowed if repair within 15 days is technically infeasible without a process unit shutdown. Repair of this equipment shall occur before the end of the next process unit shutdown.

(b) Delay of repair of equipment will be allowed for equipment which is isolated from the process and which does not remain in VOC service.

(c) Delay of repair for valves will be allowed if:

 The owner or operator demonstrates that emissions of purged material resulting from immediate repair are greater than the fugitive emissions likely to result from delay of repair, and
 When repair procedures are effected, the purged material is collected and destroyed or recovered in a control device complying with § 60.482-10.

(d) Delay of repair for pumps will be allowed if:

(1) Repair requires the use of a dual mechanical seal system that includes a barrier fluid system, and

(2) Repair is completed as soon as practicable, but not later than 6 months after the leak was detected.

(e) Delay of repair beyond a process unit shutdown will be allowed for a valve, if valve assembly replacement is necessary during the process unit shutdown, valve assembly supplies have been depleted, and valve assembly supplies had been sufficiently stocked before the supplies were depleted. Delay of repair beyond the next process unit shutdown will not be allowed unless the next process unit shutdown occurs sooner than 6 months after the first process unit shutdown.

#### [65 FR 78277, Dec. 14, 2000]

§ 60.482-10 Standards: Closed vent systems and control devices.

(a) Owners or operators of closed vent systems and control devices used to comply with provisions of this subpart shall comply with the provisions of this section.

(b) Vapor recovery systems (for example, condensers and absorbers) shall be designed and operated to recover the VOC emissions vented to them with an efficiency of 95 percent or greater, or to an exit concentration of 20 parts per million by volume, whichever is less stringent.
(c) Enclosed combustion devices shall be designed and operated to reduce the VOC emissions vented to them with an efficiency of 95 percent or greater, or to an exit concentration of 20 parts per million by volume, whichever is less stringent or to them with an efficiency of 95 percent or greater, or to an exit concentration of 20 parts per million by volume, on a dry basis, corrected to 3 percent oxygen, whichever is less stringent or to provide a minimum residence time of 0.75 seconds at a minimum temperature of 816 ° C.
(d) Flares used to comply with this subpart shall comply with the requirements of § 60.18.
(e) Owners or operators of control devices used to comply with the provisions of this subpart shall monitor these control devices to ensure that they are operated and maintained in

conformance with their designs.

(f) Except as provided in paragraphs (i) through (k) of this section, each closed vent system shall be inspected according to the procedures and schedule specified in paragraphs (f)(1) and (f)(2) of this section.

(1) If the vapor collection system or closed vent system is constructed of hard-piping, the owner or operator shall comply with the requirements specified in paragraphs (f)(1)(i) and (f)(1)(i) of this section:

(i) Conduct an initial inspection according to the procedures in § 60.485(b); and

(ii) Conduct annual visual inspections for visible, audible, or olfactory indications of leaks.

(2) If the vapor collection system or closed vent system is constructed of ductwork, the owner or operator shall:

(i) Conduct an initial inspection according to the procedures in  $\S$  60.485(b); and

(ii) Conduct annual inspections according to the procedures in § 60.485(b).

(g) Leaks, as indicated by an instrument reading greater than 500 parts per million by volume above background or by visual inspections, shall be repaired as soon as practicable except as provided in paragraph (h) of this section.

A first attempt at repair shall be made no later than 5 calendar days after the leak is detected.
 Repair shall be completed no later than 15 calendar days after the leak is detected.

(h) Delay of repair of a closed vent system for which leaks have been detected is allowed if the repair is technically infeasible without a process unit shutdown or if the owner or operator determines that emissions resulting from immediate repair would be greater than the fugitive emissions likely to result from delay of repair. Repair of such equipment shall be complete by the end of the next process unit shutdown.

(i) If a vapor collection system or closed vent system is operated under a vacuum, it is exempt from the inspection requirements of paragraphs (f)(1)(i) and (f)(2) of this section.

(j) Any parts of the closed vent system that are designated, as described in paragraph (l)(1) of this section, as unsafe to inspect are exempt from the inspection requirements of paragraphs (f)(1)(i) and (f)(2) of this section if they comply with the requirements specified in paragraphs (j)(1) and (j)(2) of this section:

(1) The owner or operator determines that the equipment is unsafe to inspect because inspecting personnel would be exposed to an imminent or potential danger as a consequence of complying with paragraphs (f)(1)(i) or (f)(2) of this section; and

(2) The owner or operator has a written plan that requires inspection of the equipment as frequently as practicable during safe-to-inspect times.

(k) Any parts of the closed vent system that are designated, as described in paragraph (l)(2) of this section, as difficult to inspect are exempt from the inspection requirements of paragraphs (f)(1)(i) and (f)(2) of this section if they comply with the requirements specified in paragraphs (k)(1) through (k)(3) of this section:

(1) The owner or operator determines that the equipment cannot be inspected without elevating the inspecting personnel more than 2 meters above a support surface; and

(2) The process unit within which the closed vent system is located becomes an affected facility through §§ 60.14 or 60.15, or the owner or operator designates less than 3.0 percent of the total number of closed vent system equipment as difficult to inspect; and

(3) The owner or operator has a written plan that requires inspection of the equipment at least once every 5 years. A closed vent system is exempt from inspection if it is operated under a vacuum.

(1) The owner or operator shall record the information specified in paragraphs (1)(1) through (1)(5) of this section.

Identification of all parts of the closed vent system that are designated as unsafe to inspect, an explanation of why the equipment is unsafe to inspect, and the plan for inspecting the equipment.
 Identification of all parts of the closed vent system that are designated as difficult to inspect, an explanation of why the equipment is difficult to inspect, and the plan for inspecting the equipment.

(3) For each inspection during which a leak is detected, a record of the information specified in § 60.486(c).

(4) For each inspection conducted in accordance with § 60.485(b) during which no leaks are detected, a record that the inspection was performed, the date of the inspection, and a statement that no leaks were detected.

(5) For each visual inspection conducted in accordance with paragraph (f)(1)(ii) of this section during which no leaks are detected, a record that the inspection was performed, the date of the inspection, and a statement that no leaks were detected.

(m) Closed vent systems and control devices used to comply with provisions of this subpart shall be operated at all times when emissions may be vented to them.

[51 FR 2702, Jan. 21, 1986; <u>60 FR 43258</u>, Aug. 18, 1995; <u>61 FR 29878</u>, June 12, 1996; <u>65 FR 61762</u>, Oct. 17, 2000; <u>65 FR 78277</u>, Dec. 14, 2000]

§ 60.483-1 Alternative standards for valves--allowable percentage of valves leaking.

(a) An owner or operator may elect to comply with an allowable percentage of valves leaking of equal to or less than 2.0 percent.

(b) The following requirements shall be met if an owner or operator wishes to comply with an allowable percentage of valves leaking:

(1) An owner or operator must notify the Administrator that the owner or operator has elected to comply with the allowable percentage of valves leaking before implementing this alternative standard, as specified in  $\S$  60.487(d).

(2) A performance test as specified in paragraph (c) of this section shall be conducted initially upon designation, annually, and at other times requested by the Administrator.

(3) If a valve leak is detected, it shall be repaired in accordance with § 60.482-7(d) and (e).

(c) Performance tests shall be conducted in the following manner:

(1) All valves in gas/vapor and light liquid service within the affected facility shall be monitored within 1 week by the methods specified in § 60.485(b).

(2) If an instrument reading of 10,000 ppm or greater is measured, a leak is detected.

(3) The leak percentage shall be determined by dividing the number of valves for which leaks are detected by the number of valves in gas/vapor and light liquid service within the affected facility.(d) Owners and operators who elect to comply with this alternative standard shall not have an affected facility with a leak percentage greater than 2.0 percent.

[65 FR 61762, Oct. 17, 2000; 65 FR 78278, Dec. 14, 2000]

§ 60.483-2 Alternative standards for valves--skip period leak detection and repair.

(a)(1) An owner or operator may elect to comply with one of the alternative work practices specified in paragraphs (b)(2) and (3) of this section.

(2) An owner or operator must notify the Administrator before implementing one of the alternative work practices, as specified in § 60.487(d).

(b)(1) An owner or operator shall comply initially with the requirements for valves in gas/vapor service and valves in light liquid service, as described in § 60.482-7.

(2) After 2 consecutive quarterly leak detection periods with the percent of valves leaking equal to or less than 2.0, an owner or operator may begin to skip 1 of the quarterly leak detection periods for the valves in gas/vapor and light liquid service.

(3) After 5 consecutive quarterly leak detection periods with the percent of valves leaking equal to or less than 2.0, an owner or operator may begin to skip 3 of the quarterly leak detection periods for the valves in gas/vapor and light liquid service.

(4) If the percent of valves leaking is greater than 2.0, the owner or operator shall comply with the requirements as described in § 60.482-7 but can again elect to use this section.

(5) The percent of valves leaking shall be determined by dividing the sum of valves found leaking during current monitoring and valves for which repair has been delayed by the total number of valves subject to the requirements of this section.

(6) An owner or operator must keep a record of the percent of valves found leaking during each leak detection period.

[65 FR 61762, Oct. 17, 2000; 65 FR 78278, Dec. 14, 2000]

§ 60.484 Equivalence of means of emission limitation.

(a) Each owner or operator subject to the provisions of this subpart may apply to the Administrator for determination of equivalence for any means of emission limitation that achieves a reduction in emissions of VOC at least equivalent to the reduction in emissions of VOC achieved by the controls required in this subpart.

(b) Determination of equivalence to the equipment, design, and operational requirements of this subpart will be evaluated by the following guidelines:

(1) Each owner or operator applying for an equivalence determination shall be responsible for collecting and verifying test data to demonstrate equivalence of means of emission limitation.
 (2) The Administrator will compare test data for the means of emission limitation to test data for the equipment, design, and operational requirements.

(3) The Administrator may condition the approval of equivalence on requirements that may be necessary to assure operation and maintenance to achieve the same emission reduction as the equipment, design, and operational requirements.

(c) Determination of equivalence to the required work practices in this subpart will be evaluated by the following guidelines:

(1) Each owner or operator applying for a determination of equivalence shall be responsible for collecting and verifying test data to demonstrate equivalence of an equivalent means of emission limitation.

(2) For each affected facility for which a determination of equivalence is requested, the emission reduction achieved by the required work practice shall be demonstrated.

(3) For each affected facility, for which a determination of equivalence is requested, the emission reduction achieved by the equivalent means of emission limitation shall be demonstrated.

(4) Each owner or operator applying for a determination of equivalence shall commit in writing to work practice(s) that provide for emission reductions equal to or greater than the emission reductions achieved by the required work practice.

(5) The Administrator will compare the demonstrated emission reduction for the equivalent means of emission limitation to the demonstrated emission reduction for the required work practices and will consider the commitment in paragraph (c)(4).

(6) The Administrator may condition the approval of equivalence on requirements that may be necessary to assure operation and maintenance to achieve the same emission reduction as the required work practice.

(d) An owner or operator may offer a unique approach to demonstrate the equivalence of any equivalent means of emission limitation.

(e)(1) After a request for determination of equivalence is received, the Administrator will publish a notice in the Federal Register and provide the opportunity for public hearing if the Administrator judges that the request may be approved.

(2) After notice and opportunity for public hearing the Administrator will determine the equivalence of a means of emission limitation and will publish the determination in the Federal Register.

(3) Any equivalent means of emission limitations approved under this section shall constitute a required work practice, equipment, design, or operational standard within the meaning of Section 111(h)(1) of the Clean Air Act.

(f)(1) Manufacturers of equipment used to control equipment leaks of VOC may apply to the Administrator for determination of equivalence for any equivalent means of emission limitation that achieves a reduction in emissions of VOC achieved by the equipment, design, and operational requirements of this subpart.

(2) The Administrator will make an equivalence determination according to the provisions of paragraphs (b), (c), (d), and (e) of this section.

[65 FR 61762, Oct. 17, 2000]

§ 60.485 Test methods and procedures.

(a) In conducting the performance tests required in § 60.8, the owner or operator shall use as reference methods and procedures the test methods in Appendix A of this part or other methods and procedures as specified in this section, except as provided in § 60.8(b).

(b) The owner or operator shall determine compliance with the standards in §§ 60.482, 60.483, and 60.484 as follows:

(1) Method 21 shall be used to determine the presence of leaking sources. The instrument shall be calibrated before use each day of its use by the procedures specified in Method 21. The following calibration gases shall be used:

(i) Zero air (less than 10 ppm of hydrocarbon in air); and

(ii) A mixture of methane or n-hexane and air at a concentration of about, but less than, 10,000 ppm methane or n-hexane.

(c) The owner or operator shall determine compliance with the no detectable emission standards in §§ 60.482-2(e), 60.482-3(i), 60.482-4, 60.482-7(f), and 60.482-10(e) as follows:

(1) The requirements of paragraph (b) shall apply.

(2) Method 21 shall be used to determine the background level. All potential leak interfaces shall
be traversed as close to the interface as possible. The arithmetic difference between the maximum concentration indicated by the instrument and the background level is compared with 500 ppm for determining compliance.

(d) The owner or operator shall test each piece of equipment unless he demonstrates that a process unit is not in VOC service, i.e., that the VOC content would never be reasonably expected to exceed 10 percent by weight. For purposes of this demonstration, the following methods and procedures shall be used:

(1) Procedures that conform to the general methods in ASTM E260-73, 91, or 96, E168-67, 77, or 92, E169-63, 77, or 93 (incorporated by reference--see § 60.17) shall be used to determine the percent VOC content in the process fluid that is contained in or contacts a piece of equipment.

(2) Organic compounds that are considered by the Administrator to have negligible photochemical reactivity may be excluded from the total quantity of organic compounds in determining the VOC content of the process fluid.

(3) Engineering judgment may be used to estimate the VOC content, if a piece of equipment had not been shown previously to be in service. If the Administrator disagrees with the judgment, paragraphs (d)(1) and (2) of this section shall be used to resolve the disagreement.

(e) The owner or operator shall demonstrate that an equipment is in light liquid service by showing that all the following conditions apply:

(1) The vapor pressure of one or more of the components is greater than 0.3 kPa at 20 ° C (1.2 in. H sub2 O at 68 ° F). Standard reference texts or ASTM D2879-83, 96, or 97 (incorporated by reference-see § 60.17) shall be used to determine the vapor pressures.

(2) The total concentration of the pure components having a vapor pressure greater than 0.3 kPa at 20 ° C (1.2 in. H sub2 O at 68 ° F) is equal to or greater than 20 percent by weight.

(3) The fluid is a liquid at operating conditions.

(f) Samples used in conjunction with paragraphs (d), (e), and (g) of this section shall be representative of the process fluid that is contained in or contacts the equipment or the gas being combusted in the flare.

(g) The owner or operator shall determine compliance with the standards of flares as follows: (1) Method 22 shall be used to determine visible emissions.

(2) A thermocouple or any other equivalent device shall be used to monitor the presence of a pilot flame in the flare.

(3) The maximum permitted velocity for air assisted flares shall be computed using the following equation:

$$V_{\max} = K_1 + K_2 H_T$$

Where:

V submax = Maximum permitted velocity, m/sec (ft/sec)

H subT = Net heating value of the gas being combusted, MJ/scm (Btu/scf).

K sub1 = 8.706 m/sec (metric units)

= 28.56 ft/sec (English units)

K sub2 = 0.7084 m super4 /(MJ-sec) (metric units)

= 0.087 ft super4 /(Btu-sec) (English units)

(4) The net heating value (H subT) of the gas being combusted in a flare shall be computed using the following equation:

$$H_T = K \sum_{i=1}^n C_i H_i$$

Where:

K = Conversion constant, 1.740 x 10 super7 (g-mole)(MJ)/ (ppm-scm-kcal) (metric units) = 4.674 x 10 super8 [ (g-mole)(Btu)/(ppm-scf-kcal) ] (English units)

C subi = Concentration of sample component "i," ppm

H subi = net heat of combustion of sample component "i" at 25 ° C and 760 mm Hg (77 ° F and 14.7 psi), kcal/g-mole

(5) Method 18 and ASTM D2504-67, 77, or 88 (Reapproved 1993) (incorporated by reference-see § 60.17) shall be used to determine the concentration of sample component "i."

(6) ASTM D2382-76 or 88 or D4809-95 (incorporated by reference--see § 60.17) shall be used to determine the net heat of combustion of component "i" if published values are not available or cannot be calculated.

(7) Method 2, 2A, 2C, or 2D, as appropriate, shall be used to determine the actual exit velocity of a flare. If needed, the unobstructed (free) cross- sectional area of the flare tip shall be used.

[54 FR 6678, Feb. 14, 1989; 54 FR 27016, June 27, 1989; 65 FR 61763, Oct. 17, 2000]

§ 60.486 Recordkeeping requirements.

(a)(1) Each owner or operator subject to the provisions of this subpart shall comply with the recordkeeping requirements of this section.

(2) An owner or operator of more than one affected facility subject to the provisions of this subpart may comply with the recordkeeping requirements for these facilities in one recordkeeping system if the system identifies each record by each facility.

(b) When each leak is detected as specified in §§ 60.482-2, 60.482-3, 60.482-7, 60.482-8, and § 60.483-2, the following requirements apply:

(1) A weatherproof and readily visible identification, marked with the equipment identification number, shall be attached to the leaking equipment.

(2) The identification on a valve may be removed after it has been monitored for 2 successive months as specified in § 60.482-7(c) and no leak has been detected during those 2 months.

(3) The identification on equipment except on a valve, may be removed after it has been repaired.

(c) When each leak is detected as specified in §§ 60.482-2, 60.482-3, 60.482-7, 60.482-8, and § 60.483-2, the following information shall be recorded in a log and shall be kept for 2 years in a readily accessible location:

(1) The instrument and operator identification numbers and the equipment identification number.

(2) The date the leak was detected and the dates of each attempt to repair the leak.

(3) Repair methods applies in each attempt to repair the leak.

(4) "Above 10,000" if the maximum instrument reading measured by the methods specified in § 60.485(a) after each repair attempt is equal to or greater than 10,000 ppm.

(5) "Repair delayed" and the reason for the delay if a leak is not repaired within 15 calendar days after discovery of the leak.

(6) The signature of the owner or operator (or designate) whose decision it was that repair could not be effected without a process shutdown.

(7) The expected date of successful repair of the leak if a leak is not repaired within 15 days.

(8) Dates of process unit shutdowns that occur while the equipment is unrepaired.

(9) The date of successful repair of the leak.

(d) The following information pertaining to the design requirements for closed vent systems and control devices described in § 60.482-10 shall be recorded and kept in a readily accessible location:

(1) Detailed schematics, design specifications, and piping and instrumentation diagrams.

(2) The dates and descriptions of any changes in the design specifications.

(3) A description of the parameter or parameters monitored, as required in § 60.482-10(e), to ensure that control devices are operated and maintained in conformance with their design and an explanation of why that parameter (or parameters) was selected for the monitoring.

(4) Periods when the closed vent systems and control devices required in §§ 60.482-2, 60.482-3, 60.482-4, and 60.482-5 are not operated as designed, including periods when a flare pilot light does not have a flame.

(5) Dates of startups and shutdowns of the closed vent systems and control devices required in §§ 60.482-2, 60.482-3, 60.482-4 and 60.482-5.

(e) The following information pertaining to all equipment subject to the requirements in § 60.482-1 to -10 shall be recorded in a log that is kept in a readily accessible location:

(1) A list of identification numbers for equipment subject to the requirements of this subpart.

(2)(i) A list of identification numbers for equipment that are designated for no detectable emissions under the provisions of  $\S$  60.482-2(e), 60.482-3(i) and 60.482-7(f).

(ii) The designation of equipment as subject to the requirements of  $\S$  60.482-2(e), 60.482-3(i), or 60.482-7(f) shall be signed by the owner or operator.

(3) A list of equipment identification numbers for pressure relief devices required to comply with  $\S$  60.482-4.

(4)(i) The dates of each compliance test as required in §§ 60.482-2(e), 60.482-3(i), 60.482-4, and 60.482-7(f).

(ii) The background level measured during each compliance test.

(iii) The maximum instrument reading measured at the equipment during each compliance test. (5) A list of identification numbers for equipment in vacuum service.

(f) The following information pertaining to all valves subject to the requirements of § 60.482-7(g) and (h) and to all pumps subject to the requirements of § 60.482-2(g) shall be recorded in a log that is kept in a readily accessible location:

(1) A list of identification numbers for valves and pumps that are designated as unsafe-tomonitor, an explanation for each valve or pump stating why the valve or pump is unsafe-tomonitor, and the plan for monitoring each valve or pump.

(2) A list of identification numbers for valves that are designated as difficult-to-monitor, an explanation for each valve stating why the valve is difficult-to-monitor, and the schedule for monitoring each valve.

(g) The following information shall be recorded for valves complying with § 60.483-2:

(1) A schedule of monitoring.

(2) The percent of valves found leaking during each monitoring period.

(h) The following information shall be recorded in a log that is kept in a readily accessible location:

(1) Design criterion required in § 60.482-2(d)(5) and § 60.482-3(e)(2) and explanation of the design criterion; and

(2) Any changes to this criterion and the reasons for the changes.

(i) The following information shall be recorded in a log that is kept in a readily accessible location for use in determining exemptions as provided in  $\S$  60.480(d):

(1) An analysis demonstrating the design capacity of the affected facility,

(2) A statement listing the feed or raw materials and products from the affected facilities and an analysis demonstrating whether these chemicals are heavy liquids or beverage alcohol, and(3) An analysis demonstrating that equipment is not in VOC service.

(i) Information and data used to demonstrate that a piece of equipment is not in VOC service

shall be recorded in a log that is kept in a readily accessible location.

(k) The provisions of §§ 60.7(b) and (d) do not apply to affected facilities subject to this subpart.

# [65 FR 61763, Oct. 17, 2000; 65 FR 78278, Dec. 14, 2000]

§ 60.487 Reporting Requirements.

(a) Each owner or operator subject to the provisions of this subpart shall submit semiannual reports to the Administrator beginning six months after the initial start up date.

(b) The initial semiannual report to the Administrator shall include the following information: (1) Process unit identification.

(2) Number of valves subject to the requirements of § 60.482-7, excluding those valves designated for no detectable emissions under the provisions of § 60.482-7(f).

(3) Number of pumps subject to the requirements of § 60.482-2, excluding those pumps designated for no detectable emissions under the provisions of § 60.482-2(e) and those pumps complying with § 60.482-2(f).

(4) Number of compressors subject to the requirements of § 60.482-3, excluding those compressors designated for no detectable emissions under the provisions of § 60.482-3(i) and those compressors complying with § 60.482-3(h).

(c) All semiannual reports to the Administrator shall include the following information, summarized from the information in § 60.486:

(1) Process unit identification.

(2) For each month during the semiannual reporting period.

(i) Number of valves for which leaks were detected as described in § 60.482(7)(b) or § 60.483-2.

(ii) Number of values for which leaks were not repaired as required in § 60.482-7(d)(1).

(iii) Number of pumps for which leaks were detected as described in § 60.482-2(b) and (d)(6)(i).

(iv) Number of pumps for which leaks were not repaired as required in § 60.482-2(c)(1) and (d)(6)(ii).

(v) Number of compressors for which leaks were detected as described in § 60.482-3(f).

(vi) Number of compressors for which leaks were not repaired as required in § 60.482-3(g)(1), and

(vii) The facts that explain each delay of repair and, where appropriate, why a process unit shutdown was technically infeasible.

(3) Dates of process unit shutdowns which occurred within the semiannual reporting period.(4) Revisions to items reported according to paragraph (b) if changes have occurred since the

initial report or subsequent revisions to the initial report.

(d) An owner or operator electing to comply with the provisions of §§ 60.483-1 or 60.483-2 shall notify the Administrator of the alternative standard selected 90 days before implementing either

of the provisions.

(e) An owner or operator shall report the results of all performance tests in accordance with § 60.8 of the General Provisions. The provisions of § 60.8(d) do not apply to affected facilities subject to the provisions of this subpart except that an owner or operator must notify the Administrator of the schedule for the initial performance tests at least 30 days before the initial performance tests.

(f) The requirements of paragraphs (a) through (c) of this subsection remain in force until and unless EPA, in delegating enforcement authority to a State under Section 111(c) of the Act, approves reporting requirements or an alternative means of compliance surveillance adopted by such State. In that event, affected sources within the State will be relieved of the obligation to comply with the requirements of paragraphs (a) through (c) of this subsection, provided that they comply with the requirements established by the State.

[49 FR 22608, May 30, 1984; 65 FR 61763, Oct. 17, 2000]

§ 60.488 Reconstruction.

For the purposes of this subpart:

(a) The cost of the following frequently replaced components of the facility shall not be considered in calculating either the "fixed capital cost of the new components" or the "fixed capital costs that would be required to construct a comparable new facility" under § 60.15: pump seals, nuts and bolts, rupture disks, and packings.

(b) Under § 60.15, the "fixed capital cost of new components" includes the fixed capital cost of all depreciable components (except components specified in § 60.488 (a)) which are or will be replaced pursuant to all continuous programs of component replacement which are commenced within any 2-year period following the applicability date for the appropriate subpart. (See the "Applicability and designation of affected facility" section of the appropriate subpart.) For purposes of this paragraph, "commenced" means that an owner or operator has undertaken a continuous program of component replacement or that an owner or operator has entered into a contractual obligation to undertake and complete, within a reasonable time, a continuous program of component replacement.

[49 FR 22608, May 30, 1984]

§ 60.489 List of chemicals produced by affected facilities.

(a) The following chemicals are produced, as intermediates or final products, by process units covered under this subpart. The applicability date for process units producing one or more of these chemicals is January 5, 1981.

CAS No. [FNa] Chemical 105-57-7 Acetal. 75-07-0 Acetaldehyde. 107-89-1 Acetaldol.

60-35-5	Acetamide.
103-84-4	Acetanilide.
64-19-7	Acetic acid.
108-24-7	Acetic anhydride.
67-64-1	Acetone.
75-86-5	Acetone cyanohydrin.
75-05-8	Acetonitrile.
98-86-2	Acetophenone.
75-36-5	Acetyl chloride
74-86-2	Acetylene.
107-02-8	Acrolein.
79-06-1	Acrylamide.
79-10-7	Acrylic acid.
107-13-1	Acrylonitrile.
124-04-9	Adipic acid.
111-69-3	Adiponitrile.
( [FNb])	Alkyl naphthalenes.
107-18-6	Allyl alcohol.
107-05-1	Allyl chloride.
1321-11-5	Aminobenzoic acid.
111-41-1	Aminoethylethanolamine.
123-30-8	p-Aminophenol.
628-63-7, 123-92-2.	Amyl acetates.
71-41-0 [FNc]	Amyl alcohols.
110-58-7	Amyl amine.
543-59-9	Amyl chloride.
110-66-7 [FNc]	Amyl mercaptans.
1322-06-1	Amyl phenol.
62-53-3	Aniline.
142-04-1	Aniline hydrochloride.
29191-52-4	Anisidine.
100-66-3	Anisole.
118-92-3	Anthranilic acid.
84-65-1	Anthraquinone.
100-52-7	Benzaldehyde.
55-21-0	Benzamide.
71-43-2	Benzene.
98-48-6	Benzenedisulfonic acid.
98-11-3	Benzenesulfonic acid.
134-81-6	Benzil.
76-93-7	Benzilic acid.
65-85-0	Benzoic acid.
119-53-9	Benzoin.
100-47-0	Benzonitrile.
119-61-9	Benzophenone.
98-07-7	Benzotrichloride.
98-88-4	Benzoyl chloride.
100-51-6	Benzyl alcohol.
100-46-9	Benzylamine.
120-51-4	Benzyl benzoate.
100-44-7	Benzyl chloride.
. 98-87-3	Benzyl dichloride.
92-52-4	Biphenyl.
80-05-7	Bisphenol A.
10-86-1	Bromobenzene.
27497-51-4	Bromonaphthalene.
106-99-0	Butadiene.

106-98-9	1-butene.
123-86-4	n-butyl acetate.
141-32-2	n-butyl acrylate.
71-36-3	n-butyl alcohol.
78-92-2	s-butyl alcohol.
75-65-0	t-butyl alcohol.
109-73-9	n-butylamine.
13952-84-6	s-butylamine.
75-64-9	t-butylamine.
98-73-7	p-tert-butyl benzoic acid
107-88-0	1.3-butylene glycol.
123-72-8	n-butyraldehyde
107-92-6	Butyric acid
106-31-0	Butyric anbydride
109-74-0	Butwronitrile
105-50-2	Caprolactam
75-3-50	Carbon digulfide
/J-I-30 EE0-13-4	Carbon tetrahramide
550-13-4	Carbon tetrachloride
9004 35 7	Callulora pretato
5004-35-77	Cellulose accule.
	m chloroppiline
100-42-5 CE-E3 D	m-chioroaniline.
93-31-2 200 47 8	p-chioroaniline.
100-47-8	p-chioroantithe.
32913-09-8	Chlorobenzaidenyde.
	Chloropenzene.
118-91-2, 535-80-8, 74-11-3	Unioropenzoic acid.
[FNC].	
2136-81-4, 2136-89-2,	Chiorobenzourichioride.
5416-45-1 [FNC].	dblowobenzevil chlowide
	Chlorodifluoromethene
	Chiorodiliuoromethane.
	Chlorofirm
	Chlorororm.
25586-43-0	Chioronaphtnalene.
88-73-3	o-chloronitrobenzene.
100-00-5	p-chloronitrodenzene.
25167-80-0	Chiorophenois.
126-99-8	Chloroprene.
//90-94-5	Chiorosulionic acid.
108-41-8	m-chlorotoluene.
95-49-8	o-chlorotoluene.
106-43-4	p-chlorotoluene.
75-72-9	Chlorotrifluoromethane.
108-39-4	m-cresol.
95-48-7	o-cresol.
106-44-5	p-cresol.
1319-77-3	Mixed cresols.
1319-77-3	Cresylic acid.
4170-30-0	Crotonaldehyde.
3724-65-0	Crotonic acid.
98-82-8	Cumene.
80-15-9	Cumene hydroperoxide.
372-09-8	Cyanoacetic acid.
506-77-4	Cyanogen chloride.
108-80-5	Cyanuric acid.
108-77-0	Cyanuric chloride.

110-82-7 Cyclohexane. 108-93-0 Cyclohexanol. 108-94-1 Cyclohexanone. 110-83-8 Cyclohexene. 108-91-8 Cyclohexylamine. 111-78-4 Cyclooctadiene. 112-30-1 Decanol. 123-42-2 Diacetone alcohol. 27576-04-1 Diaminobenzoic acid. 95-76-1, 95-82-9, 554-00-7, Dichloroaniline. 608-27-5, 608-31-1, 626-43-7, 27134-27-6, 57311-92-9 [FNc]. 541-73-1 m-dichlorobenzene. 95-50-1 o-dichlorobenzene. 106-46-7 p-dichlorobenzene. 75-71-8 Dichlorodifluoromethane. 111-44-4 Dichloroethyl ether. 107-06-2 1,2-dichloroethane (EDC). 96-23-1 Dichlorohydrin. 26952-23-8 Dichloropropene. 101-83-7 Dicyclohexylamine. 109-89-7 Diethylamine. 111-46-6 Diethylene glycol. 112-36-7 Diethylene glycol diethyl ether. 111-96-6 Diethylene glycol dimethyl ether. 112-34-5 Diethylene glycol monobutyl ether. 124-17-4 Diethylene glycol monobutyl ether acetate. 111-90-0 Diethylene glycol monoethyl ether. 112-15-2 Diethylene glycol monoethyl ether acetate. 111-77-3 Diethylene glycol monomethyl ether. 64-67-5 Diethyl sulfate. 75-37-6 Difluoroethane. 25167-70-8 Diisobutylene. 26761-40-0 Diisodecyl phthalate. 27554-26-3 Diisooctyl phthalate. 674-82-8 Diketene. 124-40-3 Dimethylamine. 121-69-7 N,N-dimethylaniline. 115-10-6 N, N-dimethyl ether. 68-12-2 N, N-dimethylformamide. 57-14-7 Dimethylhydrazine. 77-78-1 Dimethyl sulfate. 75-18-3 Dimethyl sulfide. 67-68-5 Dimethyl sulfoxide. 120-61-6 Dimethyl terephthalate. 99-34-3 3,5-dinitrobenzoic acid. 51-28-5 Dinitrophenol. 25321-14-6 Dinitrotoluene. 123-91-1 Dioxane. 646-06-0 Dioxilane. 122-39-4 Diphenylamine. 101-84-8 Diphenyl oxide. 102-08-9 Diphenyl thiourea. 25265-71-8 Dipropylene glycol. 25378-22-7 Dodecene. 28675-17-4 Dodecylaniline.

27193-86-8 Dodecylphenol. 106-89-8 Epichlorohydrin. 64-17-5 Ethanol. Ethanolamines. 141-43-5 [FNc] 141-78-6 Ethyl acetate. 141-97-9 Ethyl acetoacetate. 140-88-5 Ethyl acrylate. 75-04-7 Ethylamine. 100-41-4 Ethylbenzene. 74-96-4 Ethyl bromide. 9004-57-3 Ethylcellulose. 75-00-3 Ethyl chloride. 105-39-5 Ethyl chloroacetate. 105-56-6 Ethylcyanoacetate. 74-85-1 Ethylene. 96-49-1 Ethylene carbonate. 107-07-3 Ethylene chlorohydrin. 107-15-3 Ethylenediamine. 106-93-4 Ethylene dibromide. 107-21-1 Ethylene glycol. 111-55-7 Ethylene glycol diacetate. 110-71-4 Ethylene glycol dimethyl ether. 111-76-2 Ethylene glycol monobutyl ether. 112-07-2 Ethylene glycol monobutyl ether acetate. 110-80-5 Ethylene glycol monoethyl ether. Ethylene glycol monethyl ether acetate. 111-15-9 109-86-4 Ethylene glycol monomethyl ether. 110-49-6 Ethylene glycol monomethyl ether acetate. 122-99-6 Ethylene glycol monophenyl ether. 2807-30-9 Ethylene glycol monopropyl ether. 75-21-8 Ethylene oxide. 60-29-7 Ethyl ether 104-76-7 2-ethylhexanol. 122-51-0 Ethyl orthoformate. 95-92-1 Bthyl oxalate. 41892-71-1 Ethyl sodium oxalacetate. 50-00-0 Formaldehyde. 75-12-7 Formamide. 64-18-6 Formic acid. 110-17-8 Fumaric acid. 98-01-1 Furfural. 56-81-5 Glycerol. 26545-73-7 Glycerol dichlorohydrin. 25791-96-2 Glycerol triether. 56-40-6 Glycine. 107-22-2 Glyoxal. 118-74-1 Hexachlorobenzene. 67-72-1 Hexachloroethane. 36653-82-4 Hexadecyl alcohol. 124-09-4 Hexamethylenediamine. 629-11-8 Hexamethylene glycol. 100-97-0 Hexamethylenetetramine. 74-90-8 Hydrogen cyanide. 123-31-9 Hydroquinone. 99-96-7 p-hydroxybenzoic acid. 26760-64-5 Isoamylene. 78-83-1 Isobutanol.

110-19-0	Teobutul acetate
115-11-7	Tsobutylene
78-84-2	Teobutyral debyde
79-31-2	Isobutyric acid
25339-17-7	Isodecanol
25952-21-6	Isouctuloi.
78-78-4	Teonentane
78-59-1	Isophorone
127-01-5	Isophthalic acid
	Laopropo
67-62-0	Isoprene.
109-07-4	Isopropator.
75 21-4	Teopropyi acetate.
75-31-0	Teopropyramitie.
15-29-0	
25168-06-3	
403-51-4 ([TRM-])	Ketene.
	Linear alkyl sullonace.
123-01-3	Malaia and
100-16-7	Maleic actu.
108-31-6	Maleic annyariae.
6915-15-7	Marite Acid.
141-/9-/	Mesityi oxide.
121-47-1	Metaniiic acid.
79-41-4	Methacrylic acid.
563-47-3	Methaliyi chloride.
67-56-1	Methanol.
79-20-9	Metnyl acetate.
105-45-3	Methyl acetoacetate.
74-89-5	Metnylamine.
100-61-8	n-methylaniline.
74-83-9	Methyl bromide.
37365-71-2	Methyl butynol.
74-87-3	Methyl Chioride.
108-87-2	Methylcyclonexane.
1331-22-2	Methylcyclohexanone.
75-09-2	Metnylene chloride.
101-77-9	Methylene dianiline.
101-68-8	Methylene dipnenyl diisocyanate.
78-93-3	Metnyl etnyl ketone.
107-31-3	Methyl formate.
108-11-2	Methyl isobutyl carbinor.
108-10-1	Methyl isobutyl ketone.
80-62-6	Methyl methacrylate.
77-75-8	Metnylpentynol.
98-83-9	a-metnyistyrene.
110-91-8	Morpholine.
85-47-2	a-naphthalene sulfonic acid
120-18-3	b-naphinalene sulfonic acid.
90-15-3	
135-19-3	
/5-98-9	Neopentanoic acia.
88-74-4	o-mitroaniime.
100-01-6	p-mitroaniiine.
91-23-6	o-nitroanisole.
100-17-4	p-nitroanisole.
98-95-3	Nitrodenzene.
27178-83-2 [FNC]	Nitropenzolc acia (o,m, and p).

	79-24-3	Nitroethane.
	75-52-5	Nitromethane.
	88-75-5	2-Nitrophenol.
. 253	322-01-4	Nitropropane.
13	321-12-6	Nitrotoluene.
272	15-95-8	Nonene.
251	154-52-3	Nonvlphenol.
271	193-28-8	Octvlphenol.
	23-63-7	Paraldehvde.
-	15-77-5	Pentaervthritol.
	09-66-0	n-pentane.
-	09-67-1	1-pentene
·	27-18-4	Perchloroethvlene.
· · · · · · · · · · · · · · · · · · ·	594-42-3	Perchloromethyl mercaptan.
· · ·	94-70-2	o-phenetidine.
	56-43-4	p-phenetidine.
	108-95-2	Phenol.
· 98-67-9 58	35-38-6	Phenolsulfonic acida.
609-46-1 13	233-39-7	
005 40 I, I	(FNc]	
	91_40_7	Phenyl anthranilic acid
	(โซพิ⊳ไ)	Phenylenediamine.
	75-44-5	Phogene
<i>.</i>	85-44-9	Phthalic anhydride
	85-41-6	Phthalimide
	108-99-6	h-nicoline
-	10-95-0	D-picoline. Diperazine
	136-39-7	Polybutanes
9003-29-0, 230	130-29-7	Forybacenes.
253	[FNC].	Polyethylene glycol
29-	22-00-3	Polymonylene divcol
- 62	123-38-2	Propional defude
-	79-09-4	Propionic acid
	77-03-4	ropronul alcohol
	107-10-9	Bronylamine
		Propylandie.
-	115-07-1	Propyl ene
•	127-00-4	Propylene. chlorobydria
•	78-87-5	Propylene dichloride
	57-55-6	Propylene diveol
•	75-56-9	Pronulene ovide
·-	110-86-1	Puridine
-	106-51-4	Quinone
	108-46-3	Pararginol
דרכ	138-57-4	Reportunit.
27.	69-72-7	Reportyfic acid
		Saircyirc actu.
	27-09-3	Sodium benzoate
- 	332-32-1 304-32-4	Sodium carbovenethul cellulore
90	375-57-7	Sodium chlorogetate
دد. -	147-52-7	Sodium formate
	130-03-4 F#T-23-1	Sodium phenete
- • •	110-44-1	Sorbia acid
	100-49-5	Styrene
	110-15-5	Succinic acid
-	110-61-0	Succinonitrile
-	121-51-2	Sulfanilia acid
_	LAL-DI-D	PHILIC CLLL.

126-33-0 Sulfolane. 1401-55-4 Tannic acid. 100-21-0 Terephthalic acid. 79-34-5 [FNc] Tetrachloroethanes. 117-08-8 Tetrachlorophthalic anhydride. 78-00-2 Tetraethyl lead. 119-64-2 Tetrahydronaphthalene. 85-43-8 Tetrahydrophthalic anhydride. 75-74-1 Tetramethyl lead. 110-60-1 Tetramethylenediamine. 110-18-9 Tetramethylethylenediamine. 108-88-3 Toluene. 95-80-7 Toluene-2,4-diamine. 584-84-9 Toluene-2,4-diisocyanate. 26471-62-5 Toluene diisocyanates (mixture). 1333-07-9 Toluenesulfonamide. 104-15-4 [FNc] Toluenesulfonic acids. 98-59-9 Toluenesulfonyl chloride. 26915-12-8 Toluidines. 87-61-6, 108-70-3, 120-82-1 Trichlorobenzenes. [FNc]. 71-55-6 1,1,1-trichloroethane. 79-00-5 1,1,2-trichloroethane. 79-01-6 Trichloroethylene. 75-69-4 Trichlorofluoromethane. 96-18-4 1,2,3-trichloropropane. 76-13-1 1,1,2-trichloro-1,2,2-trifluoroethane. 121-44-8 Triethylamine. 112-27-6 Triethylene glycol. 112-49-2 Triethylene glycol dimethyl ether. 7756-94-7 Triisobutylene. 75-50-3 Trimethylamine. 57-13-6 Urea. 108-05-4 Vinyl acetate. 75-01-4 Vinyl chloride. 75-35-4 Vinylidene chloride. 25013-15-4 Vinyl toluene. 1330-20-7 Xylenes (mixed). 95-47-6 o-xylene. 106-42-3 p-xylene. 1300-71-6 Xylenol. 1300-73-8 Xylidine.

FNa CAS numbers refer to the Chemical Abstracts Registry numbers assigned to specific chemicals, isomers, or mixtures of chemicals. Some isomers or mixtures that are covered by the standards do not have CAS numbers assigned

to them. The standards apply to all of the chemicals listed, whether CAS numbers have been assigned or not.

FNb No CAS number(s) have been assigned to this chemical, its isomers, or mixtures containing these chemicals.

FNc CAS numbers for some of the isomers are listed; the standards apply to all of the isomers and mixtures, even if CAS numbers have not been assigned

# **APPENDIX C**

# CODE OF FEDERAL REGULATIONS TITLE 40--PROTECTION OF ENVIRONMENT CHAPTER I--ENVIRONMENTAL PROTECTION AGENCY SUBCHAPTER C--AIR PROGRAMS PART 60--STANDARDS OF PERFORMANCE FOR NEW STATIONARY SOURCES SUBPART KKK--STANDARDS OF PERFORMANCE FOR EQUIPMENT LEAKS OF VOC FROM ONSHORE NATURAL GAS PROCESSING PLANTS

Current through April 23, 2003; 68 FR 19948

§ 60.630 Applicability and designation of affected facility.

(a)(1) The provisions of this subpart apply to affected facilities in onshore natural gas processing plants.

(2) A compressor in VOC service or in wet gas service is an affected facility.

(3) The group of all equipment except compressors (defined in § 60.631) within a process unit is an affected facility.

(b) Any affected facility under paragraph (a) of this section that commences construction, reconstruction, or modification after January 20, 1984, is subject to the requirements of this subpart.

(c) Addition or replacement of equipment (defined in § 60.631) for the purpose of process improvement that is accomplished without a capital expenditure shall not by itself be considered a modification under this subpart.

(d) Facilities covered by Subpart VV or Subpart GGG of 40 CFR Part 60 are excluded from this subpart.

(e) A compressor station, dehydration unit, sweetening unit, underground storage tank, field gas gathering system, or liquefied natural gas unit is covered by this subpart if it is located at an onshore natural gas processing plant. If the unit is not located at the plant site, then it is exempt from the provisions of this subpart.

§ 60.631 Definitions.

As used in this subpart, all terms not defined herein shall have the meaning given them in the Act, in Subpart or Subpart VV of Part 60; and the following terms shall have the specific meanings given them.

"Alaskan North Slope" means the approximately 69,000 square-mile area extending from the Brooks Range to the Arctic Ocean.

"Equipment" means each pump, pressure relief device, open-ended valve or line, valve, compressor, and flange or other connector that is in VOC service or in wet gas service, and any device or system required by this subpart.

"Field gas" means feedstock gas entering the natural gas processing plant.

"In light liquid service" means that the piece of equipment contains a liquid that meets the conditions specified in § 60.485(e) or § 60.633(h)(2).

"In wet gas service" means that a piece of equipment contains or contacts the field gas before the extraction step in the process.

"Natural gas liquids" means the hydrocarbons, such as ethane, propane, butane, and pentane, that are extracted from field gas.

"Natural gas processing plant" (gas plant) means any processing site engaged in the extraction of natural gas liquids from field gas, fractionation of mixed natural gas liquids to natural gas products, or both.

"Nonfractionating plant" means any gas plant that does not fractionate mixed natural gas liquids into natural gas products.

"Onshore" means all facilities except those that are located in the territorial seas or on the outer continental shelf.

"Process unit" means equipment assembled for the extraction of natural gas liquids from field gas, the fractionation of the liquids into natural gas products, or other operations associated with the processing of natural gas products. A process unit can operate independently if supplied with sufficient feed or raw materials and sufficient storage facilities for the products.

"Reciprocating compressor" means a piece of equipment that increases the pressure of a process gas by positive displacement, employing linear movement of the driveshaft.

# § 60.632 Standards.

(a) Each owner or operator subject to the provisions of this subpart shall comply with the requirements of § 60.482-1 (a), (b), and (d) and § 60.482-2 through § 60.482-10, except as provided in § 60.633, as soon as practicable, but no later than 180 days after initial startup.
(b) An owner or operator may elect to comply with the requirements of § 60.483-1 and § 60.483-2.

(c) An owner or operator may apply to the Administrator for permission to use an alternative means of emission limitation that achieves a reduction in emissions of VOC at least equivalent to that achieved by the controls required in this subpart. In doing so, the owner or operator shall comply with requirements of § 60.634 of this subpart.

(d) Each owner or operator subject to the provisions of this subpart shall comply with the provisions of § 60.485 except as provided in § 60.633(f) of this subpart.

(e) Each owner or operator subject to the provisions of this subpart shall comply with the provisions of § 60.486 and § 60.487 except as provided in § 60.633, § 60.635, and § 60.636 of this subpart.

(f) An owner or operator shall use the following provision instead of § 60.485(d)(1): Each piece of equipment is presumed to be in VOC service or in wet gas service unless an owner or operator demonstrates that the piece of equipment is not in VOC service or in wet gas service. For a piece of equipment to be considered not in VOC service, it must be determined that the VOC content can be reasonably expected never to exceed 10.0 percent by weight. For a piece of equipment to be considered in wet gas service, it must be determined that it contains or contacts the field gas before the extraction step in the process. For purposes of determining the percent VOC content of the process fluid that is contained in or contacts a piece of equipment, procedures that conform to the methods described in ASTM E169-63, 77, or 93, E168-67, 77, or 92, or E260-73, 91, or 96 (incorporated by reference as specified in § 60.17) shall be used.

[65 FR 61773, Oct. 17, 2000]

§ 60.633 Exceptions.

(a) Each owner or operator subject to the provisions of this subject may comply with the following exceptions to the provisions of Subpart VV.

(b)(1) Each pressure relief device in gas/vapor service may be monitored quarterly and within 5 days after each pressure release to detect leaks by the methods specified in § 60.485(b) except as provided in § 60.632(c), paragraph (b)(4) of this section, and § 60.482-4(a)-(c) of Subpart VV.
(2) If an instrument reading of 10,000 ppm or greater is measured, a leak is detected.

(3)(i) When a leak is detected, it shall be repaired as soon as practicable, but no later than 15 calendar days after it is detected, except as provided in § 60.482-9.

(ii) A first attempt at repair shall be made no later than 5 calendar days after each leak is detected. (4)(i) Any pressure relief device that is located in a nonfractionating plant that is monitored only by nonplant personnel may be monitored after a pressure release the next time the monitoring personnel are on site, instead of within 5 days as specified in paragraph (b)(1) of this section and  $\S$  60.482-4(b)(1) of Subpart VV.

(ii) No pressure relief device described in paragraph (b)(4)(i) of this section shall be allowed to operate for more than 30 days after a pressure release without monitoring.

(c) Sampling connection systems are exempt from the requirements of § 60.482-5.

(d) Pumps in light liquid service, values in gas/vapor and light liquid service, and pressure relief devices in gas/vapor service that are located at a nonfractionating plant that does not have the design capacity to process 283,200 standard cubic meters per day (10 million standard cubic feet per day) or more of field gas are exempt from the routine monitoring requirements of § 60.482-2(a)(1), § 60.482-7(a), and (b)(1) of this section.

(e) Pumps in light liquid service, valves in gas/vapor and light liquid service, and pressure relief devices in gas/vapor service within a process unit that is located in the Alaskan North Slope are exempt from the routine monitoring requirements of § 60.482-2(a)(1), § 60.482-7(a), and (b)(1) of this section.

(f) Reciprocating compressors in wet gas service are exempt from the compressor control requirements of § 60.482-3.

(g) Flares used to comply with this subpart shall comply with the requirements of  $\S$  60.18.

(h) An owner or operator may use the following provisions instead of § 60.485(e):

(1) Equipment is in heavy liquid service if the weight percent evaporated is 10 percent or less at 150 ° C (302 ° F) as determined by ASTM Method D86-78, 82, 90, 95, or 96 (incorporated by reference as specified in § 60.17).

(2) Equipment is in light liquid service if the weight percent evaporated is greater than 10 percent at 150 ° C (302 ° F) as determined by ASTM Method D86-78, 82, 90, 95, or 96 (incorporated by reference as specified in § 60.17).

[51 FR 2702, Jan. 21, 1986; <u>65 FR 61773</u>, Oct. 17, 2000]

§ 60.634 Alternative means of emission limitation.

(a) If, in the Administrator's judgment, an alternative means of emission limitation will achieve a reduction in VOC emissions at least equivalent to the reduction in VOC emissions achieved under any design, equipment, work practice or operational standard, the Administrator will publish, in the Federal Register a notice permitting the use of that alternative means for the

purpose of compliance with that standard. The notice may condition permission on requirements related to the operation and maintenance of the alternative means.

(b) Any notice under paragraph (a) of this section shall be published only after notice and an opportunity for a public hearing.

(c) The Administrator will consider applications under this section from either owners or operators of affected facilities, or manufacturers of control equipment.

(d) The Administrator will treat applications under this section according to the following criteria, except in cases where he concludes that other criteria are appropriate:

(1) The applicant must collect, verify and submit test data, covering a period of at least 12 months, necessary to support the finding in paragraph (a) of this section.

(2) If the applicant is an owner or operator of an affected facility, he must commit in writing to operate and maintain the alternative means so as to achieve a reduction in VOC emissions at least equivalent to the reduction in VOC emissions achieved under the design, equipment, work practice or operational standard.

§ 60.635 Recordkeeping requirements.

(a) Each owner or operator subject to the provisions of this subpart shall comply with the requirements of paragraphs (b) and (c) of this section in addition to the requirements of § 60.486.
(b) The following recordkeeping requirements shall apply to pressure relief devices subject to the requirements of § 60.633(b)(1) of this subpart.

(1) When each leak is detected as specified in § 60.633(b)(2), a weatherproof and readily visible identification, marked with the equipment identification number, shall be attached to the leaking equipment. The identification on the pressure relief device may be removed after it has been repaired.

(2) When each leak is detected as specified in § 60.633(b)(2), the following information shall be recorded in a log and shall be kept for 2 years in a readily accessible location:

(i) The instrument and operator identification numbers and the equipment identification number.

(ii) The date the leak was detected and the dates of each attempt to repair the leak.

(iii) Repair methods applied in each attempt to repair the leak.

(iv) "Above 10,000 ppm" if the maximum instrument reading measured by the methods specified in paragraph (a) of this section after each repair attempt is 10,000 ppm or greater.

(v) "Repair delayed" and the reason for the delay if a leak is not repaired within 15 calendar days after discovery of the leak.

(vi) The signature of the owner or operator (or designate) whose decision it was that repair could not be effected without a process shutdown.

(vii) The expected date of successful repair of the leak if a leak is not repaired within 15 days.

(viii) Dates of process unit shutdowns that occur while the equipment is unrepaired.

(ix) The date of successful repair of the leak.

(x) A list of identification numbers for equipment that are designated for no detectable emissions under the provisions of § 60.482-4(a). The designation of equipment subject to the provisions of § 60.482-4(a) shall be signed by the owner or operator.

(c) An owner or operator shall comply with the following requirement in addition to the requirement of § 60.486(j): Information and data used to demonstrate that a reciprocating compressor is in wet gas service to apply for the exemption in § 60.633(f) shall be recorded in a log that is kept in a readily accessible location.

# § 60.636 Reporting requirements.

(a) Each owner or operator subject to the provisions of this subpart shall comply with the requirements of paragraphs (b) and (c) of this section in addition to the requirements of § 60.487. (b) An owner or operator shall include the following information in the initial semiannual report in addition to the information required in § 60.487(b)(1)-(4): number of pressure relief devices subject to the requirements of § 60.633(b) except for those pressure relief devices designated for no detectable emissions under the provisions of § 60.482-4(a) and those pressure relief devices complying with § 60.482-4(c).

(c) An owner or operator shall include the following information in all semiannual reports in addition to the information required in § 60.487(c)(2)(i)-(vi):

(1) Number of pressure relief devices for which leaks were detected as required in § 60.633(b)(2) and

(2) Number of pressure relief devices for which leaks were not repaired as required in 60.633(b)(3).

# APPENDIX D



### Subpart Dc-Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units

SOURCE: 55 FR 37683, Sept. 12, 1990, unless otherwise noted.

# §60.40c Applicability and delegation of authority.

(a) Except as provided in paragraph (d) of this section, the affected facility to which this subpart applies is each steam generating unit for which construction, modification, or reconstruction is commenced after June 9, 1989 and that has a maximum design heat input capacity of 29 megawatts (MW) (100 million Btu per hour (Btu/hr)) or less, but greater than or equal to 2.9 MW (10 million Btu/hr).

(b) In delegating implementation and enforcement authority to a State under section 111(c) of the Clean Air Act,  $\S$  60.48c(a)(4) shall be retained by the Administrator and not transferred to a State.

(c) Steam generating units which meet the applicability requirements in paragraph (a) of this section are not subject to the sulfur dioxide  $(SO_2)$  or particulate matter (PM) emission limits, performance testing requirements, or monitoring requirements under this subpart (§§60.42c, 60.43c, 60.44c, 60.45c, 60.46c, or 60.47c) during periods of combustion research, as defined in §60.41c.

(d) Any temporary change to an existing steam generating unit for the purpose of conducting combustion research is not considered a modification under §60.14.

[55 FR. 37683, Sept. 12, 1990, as amended at 61 FR 20736, May 8, 1996]

#### §60.41c Definitions.

As used in this subpart, all terms not defined herein shall have the meaning given them in the Clean Air Act and in subpart A of this part.

Annual capacity factor means the ratio between the actual heat input to a steam generating unit from an individual fuel or combination of fuels during a period of 12 consecutive calendar months and the potential heat input to the steam generating unit from all fuels had the steam ch a separate source (such as a stationary gas turbine, internal combustion engine, or kiln) provides exhaust gas to a steam generating unit.

Combustion research means the experimental firing of any fuel or combination of fuels in a steam generating unit for the purpose of conducting research and development of more efficient combustion or more effective prevention or control of air pollutant emissions from combustion, provided that, during these periods of research and development, the heat generated is not used. for any purpose other than preheating combustion air for use by that steam generating unit (i.e., the heat generated is released to the atmosphere without being used for space heating, process heating, driving pumps, preheating combustion air for other units, generating electricity, or any other purpose).

Conventional technology means wet flue gas desulfurization technology, dry flue gas desulfurization technology, atmospheric fluidized bed combustion technology, and oil hydrodesulfurization technology.

Distillate oil means fuel oil that complies with the specifications for fuel oil numbers 1 or 2, as defined by the American Society for Testing and Materials in ASTM D396-78, "Standard Specification for Fuel Oils" (incorporated by reference—see 60.17).

Dry flue gas desulfurization technology means a sulfur dioxide (SO₂) control system that is located between the steam generating unit and the exhaust vent or stack, and that removes sulfur oxides from the combustion gases of the steam generating unit by contacting the combustion gases with an alkaline slurry or solution and forming a dry powder material. This definition includes devices where the dry powder material is subsequently converted to another form. Alkaline reagents used in dry flue gas desulfurization systems include, but are not limited to, lime and sodium compounds.

Duct burner means a device that combusts fuel and that is placed in the exhaust duct from another source (such as a stationary gas turbine, internal combustion engine, kiln, etc.) to allow the firing of additional fuel to heat the

# §60.41c

exhaust gases before the exhaust gases enter a steam generating unit.

Emerging technology means any  $SO_2$ control system that is not defined as a conventional technology under this section, and for which the owner or operator of the affected facility has received approval from the Administrator to operate as an emerging technology under §60.48c(a)(4).

Federally enforceable means all limitations and conditions that are enforceable by the Administrator, including the requirements of 40 CFR Parts 60 and 61, requirements within any applicable State implementation plan, and any permit requirements established under 40 CFR 52.21 or under 40 CFR 51.18 and 40 CFR 51.24.

Fluidized bed combustion technology means a device wherein fuel is distributed onto a bed (or series of beds) of limestone aggregate (or other sorbent materials) for combustion; and these materials are forced upward in the device by the flow of combustion air and the gaseous products of combustion. Fluidized bed combustion technology includes, but is not limited to, bubbling bed units and circulating bed units.

*Fuel pretreatment* means a process that removes a portion of the sulfur in a fuel before combustion of the fuel in a steam generating unit.

Heat input means heat derived from combustion of fuel in a steam generating unit and does not include the heat derived from preheated combustion air, recirculated flue gases, or exhaust gases from other sources (such as stationary gas turbines, internal combustion engines, and kilns).

Heat transfer medium means any material that is used to transfer heat from one point to another point.

Maximum design heat input capacity means the ability of a steam generating unit to combust a stated maximum amount of fuel (or combination of fuels) on a steady state basis as determined by the physical design and characteristics of the steam generating unit.

Natural gas means (1) a naturally occurring mixture of hydrocarbon and nonhydrocarbon gases found in geologic formations beneath the earth's surface, of which the principal con-

## 40 CFR Ch. I (7-1-98 Edition)

stituent is methane, or (2) liquefied petroleum (LP) gas, as defined by the American Society for Testing and Materials in ASTM D1835-86, "Standard Specification for Liquefied Petroleum Gases" (incorporated by reference—see  $\S60.17$ ).

Noncontinental area means the State of Hawaii, the Virgin Islands, Guam, American Samoa, the Commonwealth of Puerto Rico, or the Northern Mariana Islands.

Off means crude oil or petroleum, or a liquid fuel derived from crude oil or petroleum, including distillate oil and residual oil.

Potential sulfur dioxide emission rate means the theoretical  $SO_2$  emissions (nanograms per joule [ng/J], or pounds per million Btu [lb/million Btu] heat input) that would result from combusting fuel in an uncleaned state and without using emission control systems.

Process heater means a device that is primarily used to heat a material to initiate or promote a chemical reaction in which the material participates as a reactant or catalyst.

Residual oil means crude oil, fuel oil that does not comply with the specifications under the definition of distillate oil, and all fuel oil numbers 4, 5, and 6, as defined by the American Society for Testing and Materials in ASTM D396-78, "Standard Specification for Fuel Oils" (incorporated by reference—see §60.17).

Steam generating unit means a device that combusts any fuel and produces steam or heats water or any other heat transfer medium. This term includes any duct burner that combusts fuel and is part of a combined cycle system. This term does not include process heaters as defined in this subpart.

Steam generating unit operating day means a 24-hour period between 12:00 midnight and the following midnight during which any fuel is combusted at any time in the steam generating unit. It is not necessary for fuel to be combusted continuously for the entire 24hour period.

Wet flue gas desulfurization technology means an  $SO_2$  control system that is located between the steam generating unit and the exhaust vent or stack, and that removes sulfur oxides from the

#### Environmental Protection Agency, EPA

combustion gases of the steam generating unit by contacting the combustion gases with an alkaline slurry or solution and forming a liquid material. This definition includes devices where the liquid material is subsequently converted to another form. Alkaline reagents used in wet flue gas desulfurization systems include, but are not limited to, lime, limestone, and sodium compounds.

Wet scrubber system means any emission control device that mixes an aqueous stream or slurry with the exhaust gases from a steam generating unit to control emissions of particulate matter (PM) or  $SO_2$ .

Wood means wood, wood residue, bark, or any derivative fuel or residue thereof, in any form, including but not limited to sawdust, sanderdust, wood chips, scraps, slabs, millings, shavings, and processed pellets made from wood or other forest residues.

[55 FR 37683, Sept. 12, 1990, as amended at 61 FR 20736, May 8, 1996]

#### §60.42c Standard for sulfur dioxide.

(a) Except as provided in paragraphs (b), (c), and (e) of this section, on and after the date on which the initial performance test is completed or required to be completed under §60.8 of this part, whichever date comes first, the owner the operator of an affected facility that combusts only coal shall neither: (1) cause to be discharged into the atmosphere from that affected facility any gases that contain SO₂ in excess of 10 percent (0.10) of the potential SO₂ emission rate (90 percent reduction); nor (2) cause to be discharged into the atmosphere from that affected facility any gases that contain SO₂ in excess of 520 ng/J (1.2 lb/million Btu) heat input. If coal is combusted with other fuels, the affected facility is subject to the 90 percent SO₂ reduction requirement specified in this paragraph and the emission limit is determined pursuant to paragraph (e)(2) of this section.

(b) Except as provided in paragraphs (c) and (e) of this section, on and after the date on which the initial performance test is completed or required to be completed under  $\S 60.8$  of this part, whichever date comes first, the owner or operator of an affected facility that:

(1) Combusts coal refuse alone in a fluidized bed combustion steam generating unit shall neither:

(i) Cause to be discharged into the atmosphere from that affected facility any gases that contain  $SO_2$  in excess of 20 percent (0.20) of the potential  $SO_2$ emission rate (80 percent reduction); nor

(ii) Cause to be discharged into the atmosphere from that affected facility any gases that contain SO₂ in excess of 520 ng/J (1.2 lb/million Btu) heat input. If coal is fired with coal refuse, the affected facility is subject to paragraph (a) of this section. If oil or any other fuel (except coal) is fired with coal refuse, the affected facility is subject to the 90 percent SO₂ reduction requirement specified in paragraph (a) of this section and the emission limit determined pursuant to paragraph (e)(2) of this section.

(2) Combusts only coal and that uses an emerging technology for the control of  $SO_2$  emissions shall neither:

(i) Cause to be discharged into the atmosphere from that affected facility any gases that contain  $SO_2$  in excess of 50 percent (0.50) of the potential  $SO_2$ emission rate (50 percent reduction); nor

(ii) Cause to be discharged into the atmosphere from that affected facility any gases that contain  $SO_2$  in excess of 260 ng/J (0.60 lb/million Btu) heat input. If coal is combusted with other fuels, the affected facility is subject to the 50 percent  $SO_2$  reduction requirement specified in this paragraph and the emission limit determined pursuant to paragraph (e) (2) of this section.

(c) On and after the date on which the initial performance test is completed or required to be completed under §60.8 of this part, whichever date comes first, no owner or operator of an affected facility that combusts coal, alone or in combination with any other fuel, and is listed in paragraphs (c)(1), (2), (3), or (4) of this section shall cause to be discharged into the atmosphere from that affected facility any gases that contain SO₂ in excess of the emission limit determined pursuant to paragraph (e)(2) of this section. Percent reduction requirements are not applicable to affected facilities under this paragraph.

§60.42c

### 40 CFR Ch. I (7-1-98 Edition)

§60.42c

(1) Affected facilities that have a heat input capacity of 22 MW (75 million Btu/hr) or less.

(2) Affected facilities that have an annual capacity for coal of 55 percent (0.55) or less and are subject to a Federally enforceable requirement limiting operation of the affected facility to an annual capacity factor for coal of 55 percent (0.55) or less.

(3) Affected facilities located in a noncontinental area.

(4) Affected facilities that combust coal in a duct burner as part of a combined cycle system where 30 percent (0.30) or less of the heat entering the steam generating unit is from combustion of coal in the duct burner and 70 percent (0.70) or more of the heat entering the steam gen erating unit is from exhaust gases entering the duct burner.

(d) On and after the date on which the initial performance test is completed or required to be completed under §60.8 of this part, whichever date comes first, no owner or operator of an affected facility that combusts oil shall cause to be discharged into the atmosphere from that affected facility any gases that contain SO₂ in excess of 215 ng/J (0.50 lb/million Btu) heat input; or, as an alternative, no owner or operator of an affected facility that combusts oil shall combust oil in the affected facility that contains greater than 0.5 weight percent sulfur. The percent reduction requirements are not applicable to affected facilities under this paragraph.

(e) On and after the date on which the initial performance test is completed or required to be completed under §60.8 of this part, whichever date comes first, no owner or operator of an affected facility that combusts coal, oil, or coal and oil with any other fuel shall cause to be discharged into the atmosphere from that affected facility any gases that contain SO₂ in excess of the following:

(1) The percent of potential  $SO_2$  emission rate required under paragraph (a) or (b)(2) of this section, as applicable, for any affected facility that

(i) Combusts coal in combination with any other fuel,

(ii) Has a heat input capacity greater than 22 MW (75 million Btu/hr), and

(iii) Has an annual capacity factor for coal greater than 55 percent (0.55); and

(2) The emission limit determined according to the following formula for any affected facility that combusts coal, oil, or coal and oil with any other fuel:

 $E_s=(K_a H_s+K_b H_b+K_c H_c)/H_s+H_b+H_c)$  where:

- $E_*$  is the SO₂ emission limit, expressed in ng/J or lb/million Btu heat input,
- K, is 520 ng/J (1.2 lb/million Btu),
- K, is 260 ng/J (0.60 lb/million Btu),
- K. is 215 ng/J (0.50 lb/million Btu),
- $H_s$  is the heat input from the combustion of coal, except coal combusted in an affected facility subject to paragraph (b)(2) of this section, in Joules (J) [million Btu]
- $H_b$  is the heat input from the combustion of coal in an affected facility subject to paragraph (b)(2) of this section, in J (million Btu)
- $H_{\epsilon}$  is the heat input from the combustion of oil, in J (million Btu).

(f) Reduction in the potential  $SO_2$ emission rate through fuel pretreatment is not credited toward the percent reduction requirement under paragraph (b)(2) of this section unless:

(1) Fuel pretreatment results in a 50 percent (0.50) or greater reduction in the potential  $SO_2$  emission rate; and

(2) Emissions from the pretreated fuel (without either combustion or post-combustion  $SO_2$  control) are equal to or less than the emission limits specified under paragraph (b)(2) of this section.

(g) Except as provided in paragraph (h) of this section, compliance with the percent reduction requirements, fuel oil sulfur limits, and emission limits of this section shall be determined on a 30-day rolling average basis.

(h) For affected facilities listed under paragraphs (h)(1), (2), or (3) of this section, compliance with the emission limits or fuel oil sulfur limits under this section may be determined based on a certification from the fuel supplier, as described under  $\S60.48c(f)(1)$ , (2), or (3), as applicable.

(1) Distillate oil-fired affected facilities with heat input capacities between 2.9 and 29 MW (10 and 100 million Btu/hr).

#### Environmental Protection Agency, EPA

(2) Residual oil-fired affected facilities with heat input capacities between 2.9 and 8.7 MW (10 and 30 million Btu/ hr).

(3) Coal-fired facilities with heat input capacities between 2.9 and 8.7 MW (10 and 30 million Btu/hr).

(i) The  $SO_2$  emission limits, fuel oil sulfur limits, and percent reduction requirements under this section apply at all times, including periods of startup, shutdown, and malfunction.

(j) Only the heat input supplied to the affected facility from the combustion of coal and oil is counted under this section. No credit is provided for the heat input to the affected facility from wood or other fuels or for heat derived from exhaust gases from other sources, such as stationary gas turbines, internal combustion engines, and kilns.

#### §60.43c Standard for particulate matter.

(a) On and after the date on which the initial performance test is completed or required to be completed under §60.8 of this part, whichever date comes first, no owner or operator of an affected facility that combusts coal or combusts mixtures of coal with other fuels and has a heat input capacity of 8.7 MW (30 million Btu/hr) or greater, shall cause to be discharged into the atmosphere from that affected facility any gases that contain PM in excess of the following emission limits:

(1) 22 ng/J (0.05 lb/million Btu) heat input if the affected facility combusts only coal, or combusts coal with other fuels and has an annual capacity factor for the other fuels of 10 percent (0.10) or less.

(2) 43 ng/J (0.10 lb/million Btu) heat imput if the affected facility combusts coal with other fuels, has an annual capacity factor for the other fuels greater than 10 percent (0.10), and is subject to a federally enforceable requirement limiting operation of the affected facility to an annual capacity factor greater than 10 percent (0.10) for fuels other than coal.

(b) On and after the date on which the initial performance test is completed or required to be completed under \$60.8 of this part, whichever date comes first, no owner or operator of an

affected facility that combusts wood or combusts mixtures of wood with other fuels (except coal) and has a heat input capacity of 8.7 MW (30 million Btu/hr) or greater, shall cause to be discharged into the atmosphere from that affected facility any gases that contain PM in excess of the following emissions limits:

(1) 43 ng/J (0.10 lb/million Btu) heat input if the affected facility has an annual capacity factor for wood greater than 30 percent (0.30); or

(2) 130 ng/J (0.30 lb/million Btu) heat input if the affected facility has an annual capacity factor for wood of 30 percent (0.30) or less and is subject to a federally enforceable requirement limiting operation of the affected facility to an annual capacity factor for wood of 30 percent (0.30) or less.

(c) On and after the date on which the initial performance test is completed or required to be completed under §60.8 of this part, whichever date comes first, no owner or operator of an affected facility that combusts coal, wood, or oil and has a heat input capacity of 8.7 MW (30 million Btu/hr) or greater shall cause to be discharged into the atmosphere from that affected facility any gases that exhibit greater than 20 percent opacity (6-minute average), except for one 6-minute period per hour of not more than 27 percent opacity.

(d) The PM and opacity standards under this section apply at all times, except during periods of startup, shutdown, or malfunction.

#### §60.44c Compliance and performance test methods and procedures for sulfur dioxide.

(a) Except as provided in paragraphs (g) and (h) of this section and in  $\S60.8(b)$ , performance tests required under  $\S60.8$  shall be conducted following the procedures specified in paragraphs (b), (c), (d), (e), and (f) of this section, as applicable. Section 60.8(f) does not apply to this section. The 30-day notice required in  $\S60.8(d)$ applies only to the initial performance test unless otherwise specified by the Administrator.

(b) The initial performance test required under 60.8 shall be conducted over 30 consecutive operating days of

## §60.44c

the steam generating unit. Compliance with the percent reduction requirements and SO₂ emission limits under §60.42c shall be determined using a 30day average. The first operating day included in the initial performance test shall be scheduled within 30 days after achieving the maximum production rate at which the affect facility will be operated, but not later than 180 days after the initial startup of the facility. The steam generating unit load during the 30-day period does not have to be the maximum design heat input capacity, but must be representative of future operating conditions.

(c) After the initial performance test required under paragraph (b) and §60.8, compliance with the percent reduction requirements and SO₂ emission limits under §60.42c is based on the average percent reduction and the average SO₂ emission rates for 30 consecutive steam generating unit operating days. A separate performance test is completed at the end of each steam generating unit operating day, and a new 30-day average percent reduction and SO₂ emission rate are calculated to show compliance with the standard.

(d) If only coal, only oil, or a mixture of coal and oil is combusted in an affected facility, the procedures in Method 19 are used to determine the hourly  $SO_2$  emission rate ( $E_{ho}$ ) and the 30-day average  $SO_2$  emission rate ( $E_{ho}$ ). The hourly averages used to compute the 30-day averages are obtained from the continuous emission monitoring system (CEMS). Method 19 shall be used to calculate  $E_{ho}$  when using daily fuel sampling or Method 6B.

(e) If coal, oil, or coal and oil are combusted with other fuels:

(1) An adjusted  $E_{bo}$  ( $E_{bo}$ o) is used in Equation 19–19 of Method 19 to compute the adjusted  $E_{ao}$  ( $E_{ao}$ o). The  $E_{bo}$ o is computed using the following formula:

 $E_{ho}O = [E_{ho} - E_w(1 - X_k)]/X_k$ 

where:

 $E_{hoo}$  is the adjusted  $E_{hoo}$ , ng/J (lb/million Btu)  $E_{hoo}$  is the hourly SO₂ emission rate, ng/J

- E_{no} is the hourly SO₂ emission rate, (lb/million Btu)
- $E_w$  is the SO₂ concentration in fuels other than coal and oil combusted in the affected facility, as determined by fuel sampling and analysis procedures in Method 9, ng/J (lb/million Btu). The value  $E_w$  for each fuel lot is used for each

### 40 CFR Ch. I (7-1-98 Edition)

hourly average during the time that the lot is being combusted. The owner or operator does not have to measure  $E_w$  if the owner or operator elects to assume  $E_w=0$ .

 $X_k$  is the fraction of the total heat input from fuel combustion derived from coal and oil, as determined by applicable procedures in Method 19.

(2) The owner or operator of an affected facility that qualifies under the provisions of §60.42c(c) or (d) [where percent reduction is not required] does not have to measure the parameters  $E_w$  or  $X_k$  if the owner or operator of the affected facility elects to measure emission rates of the coal or oil using the fuel sampling and analysis procedures under Method 19.

(f) Affected facilities subject to the percent reduction requirements under  $\S60.42c(a)$  or (b) shall determine compliance with the SO₂ emission limits under  $\S60.42c$  pursuant to paragraphs (d) or (e) of this section, and shall determine compliance with the percent reduction requirements using the following procedures:

(1) If only coal is combusted, the percent of potential  $SO_2$  emission rate is computed using the following formula:

 $%P_s = 100(1 - %R_g/100)(1 - %R_f/100)$ 

where

- $\ensuremath{\ensuremath{\mathcal{S}P}}\xspace^{-1}$  is the percent of potential SO2 emission rate, in percent
- $\%R_{g}$  is the SO₂ removal efficiency of the control device as determined by Method 19, in percent
- $\%R_f$  is the SO₂ removal efficiency of fuel pretreatment as determined by Method 19, in percent

(2) If coal, oil, or coal and oil are combusted with other fuels, the same procedures required in paragraph (f)(1) of this section are used, except as provided for in the following:

(i) To compute the  $\%P_s$ , an adjusted  $\%R_g$  ( $\%R_go$ ) is computed from  $E_{so}o$  from paragraph (e)(1) of this section and an adjusted average SO₂ inlet rate ( $E_{si}o$ ) using the following formula:

 $%R_{e}o=100 [1.0 - E_{eo}o/E_{ei}o)]$ 

where:

 $%R_{g0}$  is the adjusted  $%R_{g}$ , in percent

 $E_{ao}$  is the adjusted  $E_{ao}$ , ngJ (lb/million Btu)

 $E_{ei}o~$  is the adjusted average  $SO_2$  inlet rate, ng/J (lb/million Btu)

(ii) To compute  $E_{ai}o$ , an adjusted hourly SO₂ inlet rate ( $E_{bi}o$ ) is used. The

#### Environmental Protection Agency, EPA

E_{hi}o is computed using the following formula:

 $E_{hi} O = [E_{hi} - E_w (1 - X_k)]/X_k$ 

where: E_{bi}o is the adjusted E_{bi}, ng/J (lb/million Btu)

E_{hi} is the hourly SO₂ inlet rate, ng/J (lb/ million Btu)

- $E_w$  is the SO₂ concentration in fuels other than coal and oil combusted in the affected facility, as determined by fuel sampling and analysis procedures in Method 19, ng/J (lb/million Btu). The value  $E_w$  for each fuel lot is used for each hourly average during the time that the lot is being combusted. The owner or operator does not have to measure  $E_w$  if the owner or operator elects to assume  $E_w = 0$ .
- $X_k$  is the fraction of the total heat input from fuel combustion derived from coal and oil, as determined by applicable procedures in Method 19.

(g) For oil-fired affected facilities where the owner or operator seeks to demonstrate compliance with the fuel oil sulfur limits under 60.42c based on shipment fuel sampling, the initial performance test shall consist of sampling and analyzing the oil in the initial tank of oil to be fired in the steam generating unit to demonstrate that the oil contains 0.5 weight percent sulfur or less. Thereafter, the owner or operator of the affected facility shall sample the oil in the fuel tank after each new shipment of oil is received, as described under 60.46c(d)(2).

(h) For affected facilities subject to  $\S60.42c(h)(1)$ , (2), or (3) where the owner or operator seeks to demonstrate compliance with the SO₂ standards based on fuel supplier certification, the performance test shall consist of the certification, the certification from the fuel supplier, as described under  $\S60.48c(f)(1)$ , (2), or (3), as applicable.

(i) The owner or operator of an affected facility seeking to demonstrate compliance with the SO₂ standards under  $\S60.42c(c)(2)$  shall demonstrate the maximum design heat input capacity of the steam generating unit by operating the steam generating unit at this capacity for 24 hours. This demonstration shall be made during the initial performance test, and a subsequent demonstration may be requested at any other time. If the demonstrated 24-hour averaged firing rate for the affected facility is less than the max-

imum design heat input capacity stated by the manufacturer of the affected facility, the demonstrated 24-hour average firing rate shall be used to determine the annual capacity factor for the affected facility; otherwise, the maximum design heat input capacity provided by the manufacturer shall be used.

(j) The owner or operator of an affected facility shall use all valid  $SO_2$ emissions data in calculating  $\%P_s$  and  $E_{ho}$  under paragraphs (d), (e), or (f) of this section, as applicable, whether or not the minimum emissions data requirements under §60.46c(f) are achieved. All valid emissions data, including valid data collected during periods of startup, shutdown, and malfunction, shall be used in calculating  $\%P_s$  or  $E_{hb}$  pursuant to paragraphs (d), (e), or (f) of this section, as applicable.

#### §60.45c Compliance and performance test methods and procedures for particulate matter.

(a) The owner or operator of an affected facility subject to the PM and/or opacity standards under 60.43c shall conduct an initial performance test as required under 60.8, and shall conduct subsequent performance tests as requested by the Administrator, to determine compliance with the standards using the following procedures and reference methods.

(1) Method 1 shall be used to select the sampling site and the number of traverse sampling points. The sampling time for each run shall be at least 120 minutes and the minimum sampling volume shall be 1.7 dry square cubic meters (dscm) [60 dry square cubic feet (dscf)] except that smaller sampling times or volumes may be approved by the Administrator when necessitated by process variables or other factors.

(2) Method 3 shall be used for gas analysis when applying Method 5, Method 5B, of Method 17.

(3) Method 5, Method 5B, or Method 17 shall be used to measure the concentration of PM as follows:

(i) Method 5 may be used only at affected facilities without wet scrubber systems.

(ii) Method 17 may be used at affected facilities with or without wet scrubber

#### §60.46c

systems provided the stack gas temperature does not exceed a temperature of 160 °C (320 °F). The procedures of Sections 2.1 and 2.3 of Method 5B may be used in Method 17 only if Method 17 is used in conjuction with a wet scrubber system. Method 17 shall not be used in conjuction with a wet scrubber system if the effluent is saturated or laden with water droplets.

(iii) Method 5B may be used in conjunction with a wet scrubber system.

(4) For Method 5 or Method 5B, the temperature of the sample gas in the probe and filter holder shall be monitored and maintained at 160 °C (320 °F).

(5) For determination of PM emissions, an oxygen or carbon dioxide measurement shall be obtained simultaneously with each run of Method 5, Method 5B, or Method 17 by traversing the duct at the same sampling location.

(6) For each run using Method 5, Method 5B, or Method 17, the emission rates expressed in ng/J (lb/million Btu) heat input shall be determined using:

(i) The oxygen or carbon dioxide measurements and PM measurements obtained under this section,

(ii) The dry basis F-factor, and

(iii) The dry basis emission rate calculation procedure contained in Method 19 (appendix A).

(7) Method 9 (6-minute average of 24 observations) shall be used for determining the opacity of stack emissions.

(b) The owner or operator of an affected facility seeking to demonstrate compliance with the PM standards under §60.43c(b)(2) shall demonstrate the maximum design heat input capacity of the steam generating unit by operating the steam generating unit at this capacity for 24 hours. This demonstration shall be made during the initial performance test, and a subsequent demonstration may be requested at any other time. If the demonstrated 24-hour average firing rate for the affected facility is less than the maximum design heat input capacity stated by the manufacturer of the affected facility, the demonstrated 24-hour average firing rate shall be used to determine the annual capacity factor for the affected facility; otherwise, the maximum design heat input capacity pro40 CFR Ch. I (7-1-98 Edition)

vided by the manufacturer shall be used.

#### §60.46c Emission monitoring for sulfur dioxide

(a) Except as provided in paragraphs (d) and (e) of this section, the owner or operator of an affected facility subject to the SO₂ emission limits under §60.42c shall install, calibrate, maintain, and operate a CEMS for measuring SO₂ concentrations and either oxygen or carbon dioxide concentrations at the outlet of the SO₂ control device (or the outlet of the steam generating unit if no SO2 control device is used), and shall record the output of the system. The owner or operator of an affected facility subject to the percent reduction requirements under §60.42c shall measure SO2 concentrations and either oxygen or carbon dioxide concentrations at both the inlet and outlet of the  $SO_2$  control device.

(b) The 1-hour average  $SO_2$  emission rates measured by a CEM shall be expressed in ng/J or lb/million Btu heat input and shall be used to calculate the average emission rates under §60.42c. Each 1-hour average  $SO_2$  emission rate must be based on at least 30 minutes of operation and include at least 2 data points representing two 15-minute periods. Hourly  $SO_2$  emission rates are not calculated if the affected facility is operated less than 30 minutes in a 1-hour period and are not counted toward determination of a steam generating unit operating day.

(c) The procedures under §60.13 shall be followed for installation, evaluation, and operation of the CEMS.

(1) All CEMS shall be operated in accordance with the applicable procedures under Performance Specifications 1, 2, and 3 (appendix B).

(2) Quarterly accuracy determinations and daily calibration drift tests shall be performed in accordance with Procedure 1 (appendix F).

(3) For affected facilities subject to the percent reduction requirements under §60.42c, the span value of the  $SO_2$ CEMS at the inlet to the  $SO_2$  control device shall be 125 percent of the maximum estimated hourly potential  $SO_2$ emission rate of the fuel combusted, and the span value of the  $SO_2$  CEMS at the outlet from the  $SO_2$  control device

#### Environmental Protection Agency, EPA

shall be 50 percent of the maximum estimated hourly potential  $SO_2$  emission rate of the fuel combusted.

(4) For affected facilities that are not subject to the percent reduction requirements of §60.42c, the span value of the SO₂ CEMS at the outlet from the SO₂ control device (or outlet of the steam generating unit if no SO₂ control device is used) shall be 125 percent of the maximum estimated hourly potential SO₂ emission rate of the fuel combusted.

(d) As an alternative to operating a CEMS at the inlet to the SO₂ control device (or outlet of the steam generating unit if no SO2 control device is used) as required under paragraph (a) of this section, an owner or operator may elect to determine the average SO₂ emission rate by sampling the fuel prior to combustion. As an alternative to operating a CEM at the outlet from the SO2 control device (or outlet of the steam generating unit if no SO2 control device is used) as required under paragraph (a) of this section, an owner or operator may elect to determine the average  $SO_2$  emission rate by using Method 6B. Fuel sampling shall be conducted pursuant to either paragraph (d)(1) or (d)(2) of this section. Method 6B shall be conducted pursuant to paragraph (d)(3) of this section.

(1) For affected facilities combusting coal or oil, coal or oil samples shall be collected daily in an as-fired condition at the inlet to the steam generating unit and analyzed for sulfur content and heat content according the Method 19. Method 19 provides procedures for converting these measurements into the format to be used in calculating the average  $SO_2$  input rate.

(2) As an alternative fuel sampling procedure for affected facilities combusting oil, oil samples may be collected from the fuel tank for each steam generating unit immediately after the fule tank is filled and before any oil is combusted. The owner or operator of the affected facility shall analyze the oil sample to determine the sulfur content of the oil. If a partially empty fuel tank is refilled, a new sample and analysis of the fuel in the tank would be required upon filling. Results of the fuel analysis taken after each new shipment of oil is received

shall be used as the daily value when calculating the 30-day rolling average until the next shipment is received. If the fuel analysis shows that the sulfur content in the fuel tank is greater than 0.5 weight percent sulfur, the owner or operator shall ensure that the sulfur content of subsequent oil shipments is low enough to cause the 30-day rolling average sulfur content to be 0.5 weight percent sulfur or less.

(3) Method 6B may be used in lieu of CEMS to measure  $SO_2$  at the inlet or outlet of the SO2 control system. An initial stratification test is required to verify the adequacy of the Method 6B sampling location. The stratification test shall consist of three paired runs of a suitable SO2 and carbon dioxide measurement train operated at the candidate location and a second similar train operated according to the procedures in §3.2 and the applicable pro-cedures in section 7 of Performance Specification 2 (appendix B). Method 6B, Method 6A, or a combination of Methods 6 and 3 or Methods 6C and 3A are suitable measurement techniques. If Method 6B is used for the second train, sampling time and timer operation may be adjusted for the stratification test as long as an adequate sample volume is collected; however, both sampling trains are to be operated similarly. For the location to be adequate for Method 6B 24-hour tests, the mean of the absolute difference between the three paired runs must be less than 10 percent (0.10).

(e) The monitoring requirements of paragraphs (a) and (d) of this section shall not apply to affected facilities subject to 60.42c(h) (1), (2), or (3) where the owner or operator of the affected facility seeks to demonstrate compliance with the SO₂ standards based on fuel supplier certification, as described under 60.48c(f) (1), (2), or (3), as applicable.

(f) The owner or operator of an affected facility operating a CEMS pursuant to paragraph (a) of this section, or conducting as-fired fuel sampling pursuant to paragraph (d)(1) of this section, shall obtain emission data for at least 75 percent of the operating hours in at least 22 out of 30 successive steam generating unit operating days. If this minimum data requirement is not met

#### §60.46c

#### §60.47c

with a single monitoring system, the owner or operator of the affected facility shall supplement the emission data with data collected with other monitoring systems as approved by the Administrator.

§60.47c Emission monitoring for particulate matter.

(a) The owner or operator of an affected facility combusting coal, residual oil, or wood that is subject to the opacity standards under §60.43c shall install, calibrate, maintain, and operate a CEMS for measuring the opacity of the emissions discharged to the atmosphere and record the output of the system.

(b) All CEMS for measuring opacity shall be operated in accordance with the applicable procedures under Performance Specification 1 (appendix B). The span value of the opacity CEMS shall be between 60 and 80 percent.

# §60.48c Reporting and recordkeeping requirements.

(a) The owner or operator of each affected facility shall submit notification of the date of construction or reconstruction, anticipated startup, and actual startup, as provided by  $\S60.7$  of this part. This notification shall include:

(1) The design heat input capacity of the affected facility and identification of fuels to be combusted in the affected facility.

(2) If applicable, a copy of any Federally enforceable requirement that limits the annual capacity factor for any fuel or mixture of fuels under 60.42c, or 60.43c.

(3) The annual capacity factor at which the owner or operator anticipates operating the affected facility based on all fuels fired and based on each individual fuel fired.

(4) Notification if an emerging technology will be used for controlling  $SO_2$ emissions. The Administrator will examine the description of the control device and will determine whether the technology qualifies as an emerging technology. In making this determination, the Administrator may require the owner or operator of the affected facility to submit additional information concerning the control device. The

# 40 CFR Ch. I (7-1-98 Edition)

affected facility is subject to the provisions of  $\S60.42c(a)$  or (b)(1), unless and until this determination is made by the Administrator.

(b) The owner or operator of each affected facility subject to the SO₂ emission limits of  $\S$ 60.42c, or the PM or opacity limits of  $\S$ 60.43c, shall submit to the Administrator the performance test data from the initial and any subsequent performance tests and, if applicable, the performance evaluation of the CEMS using the applicable performance specifications in appendix B.

(c) The owner or operator of each coal-fired, residual oil-fired, or woodfired affected facility subject to the opacity limits under §60.43c(c) shall submit excess emission reports for any calendar quarter for which there are excess emissions from the affected facility. If there are no excess emissions during the calendar quarter, the owner or operator shall submit a report semiannually stating that no excess emissions occurred during the semi-annual reporting period. The initial guarterly report shall be postmarked by the 30th day of the third month following the completion of the initial performance test, unless no excess emissions occur during that quarter. The initial semiannual report shall be postmarked by the 30th day of the sixth month following the completion of the initial performance test, or following the date of the previous quarterly report, as applicable. Each subsequent quarterly or semiannual report shall be postmarked by the 30th day following the end of the reporting period.

(d) The owner or operator of each affected facility subject to the  $SO_2$  emission limits, fuel oil sulfur limits, or percent reduction requirements under §60.42c shall submit quarterly reports to the Administrator. The initial quarterly report shall be postmarked by the 30th day of the third month following the completion of the initial performance test. Each subsequenty quarterly report shall be postmarked by the 30th day following the end of the reporting period.

(e) The owner or operator of each affected facility subject to the  $SO_2$  emission limits, fuel oil sulfur limits, or percent reduction requirements under

# Environmental Protection Agency, EPA

§60.43c shall keep records and submit quarterly reports as required under paragraph (d) of this section, including the following information, as applicable.

(1) Calendar dates covered in the reporting period.

(2) Each 30-day average  $SO_2$  emission rate (ng/J or lb/million Btu), or 30-day average sulfur content (weight percent), calculated during the reporting period, ending with the last 30-day period in the quarter; reasons for any noncompliance with the emission standards; and a description of corrective actions taken.

(3) Each 30-day average percent of potential  $SO_2$  emission rate calculated during the reporting period, ending with the last 30-day period in the quarter; reasons for any noncompliance with the emission standards; and a description of corrective actions taken.

(4) Identification of any steam generating unit operating days for which  $SO_2$  or diluent (oxygen or carbon dioxide) data have not been obtained by an approved method for at least 75 percent of the operating hours; justification for not obtaining sufficient data; and a description of corrective actions taken.

(5) Identification of any times when emissions data have been excluded from the calculation of average emission rates; justification for excluding data; and a description of corrective actions taken if data have been excluded for periods other than those during which coal or oil were not combusted in the steam generating unit.

(6) Identification of the F factor used in calculations, method of determination, and type of fuel combusted.

(7) Identification of whether averages have been obtained based on CEMS rather than manual sampling methods.

(8) If a CEMS is used, identification of any times when the pollutant concentration exceeded the full span of the CEMS.

(9) If a CEMS is used, description of any modifications to the CEMS that could affect the ability of the CEMS to comply with Performance Specifications 2 or 3 (appendix B).

(10) If a CEMS is used, results of daily CEMS drift tests and quarterly accuracy assessments as required under appendix F, Procedure 1.

(11) If fuel supplier certification is used to demonstrate compliance, records of fuel supplier certification as described under paragraph (f)(1), (2), or (3) of this section, as applicable. In addition to records of fuel supplier certifications, the quarterly report shall include a certified statement signed by the owner or operator of the affected facility that the records of fuel supplier certifications submitted represent all of the fuel combusted during the quarter.

(f) Fuel supplier certification shall include the following information:

(1) For distillate oil:

(i) The name of the oil supplier; and (ii) A statement from the oil supplier that the oil complies with the specifications under the definition of distillate oil in §60.41c.

(2) For residual oil:

(i) The name of the oil supplier;

(ii) The location of the oil when the sample was drawn for analysis to determine the sulfur content of the oil, specifically including whether the oil was sampled as delivered to the affected facility, or whether the sample was drawn from oil in storage at the oil supplier's or oil refiner's facility, or other location;

(iii) The sulfur content of the oil from which the shipment came (or of the shipment itself); and

(iv) The method used to determine the sulfur content of the oll.

(3) For coal:

(i) The name of the coal supplier;

(ii) The location of the coal when the sample was collected for analysis to determine the properties of the coal, specifically including whether the coal was sampled as delivered to the affected facility or whether the sample was collected from coal in storage at the mine, at a coal preparation plant, at a coal supplier's facility, or at another location. The certification shall include the name of the coal mine (and coal seam), coal storage facility, or coal preparation plant (where the sample was collected);

(iii) The results of the analysis of the coal from which the shipment came (or of the shipment itself) including the sulfur content, moisture content, ash content, and heat content; and

§ 60.48c

# §60.48c

(iv) The methods used to determine the properties of the coal. (g) The owner or operator of each af-

(g) The owner or operator of each ar-fected facility shall record and main-tain records of the amounts of each fuel combusted during each day. (h) The owner or operator of each af-fected facility subject to a Federally enforceable requirement limiting the

annual capacity factor for any fuel or mixture of fuels under §60.42c or §60.43c shall calculate the annual capacity fac-

## 40 CFR Ch. I (7-1-98 Edition)

tor individually for each fuel combusted. The annual capacity factor is determined on a 12-month rolling average basis with a new annual capacity factor calculated at the end of the calendar month.

(i) All records required under this section shall be maintained by the owner or operator of the affected facility for a period of two years following the date of such record.

8.5.3 Clean the probe with acetone and a brush or long rod and cotton balls. Wash into the container with the filter. Wash out the filter holder with acetone, and add to the same container.

9.0 Quality Control.[Reserved]

10.0 Calibration and Standardization

10.1 Sampling Train. As a procedural check, compare the sampling rate regulation with a dry gas meter, spirometer, rotameter (calibrated for prevailing atmospheric conditions), or equivalent, attached to the nozzle inlet of the complete sampling train.

10.2 Analysis. Perform the analysis standardization as suggested by the manufacturer of the instrument, or the procedures for the analytical method in use.

11.0 Analytical Procedure

Make the necessary preparation of samples and analyze for Be. Any currently acceptable method (e.g., atomic absorption, spectrographic, fluorometric, chromatographic) may be used.

12.0 Data Analysis and Calculations

12.1 Nomenclature.

 $A_s(avg) = Stack area, m^2 (ft^2).$ 

L = Length.

R = Be emission rate, g/day.

Vs(avg) = Average stack gas velocity, m/sec (ft/sec).

 $V_{total}$ = Total volume of gas sampled, m³ (ft³).

W = Width.

W_t= Total weight of Be collected, mg.

 $10^{-6}$ = Conversion factor, g/µg.

86,400 = Conversion factor, sec/day.

12.2 Calculate the equivalent diameter, De, for a rectangular cross section as follows:

$$D_e = \frac{2 \cdot L \cdot W}{L + W} \qquad \text{Eq. 103-1}$$

12.3 Calculate the Be emission rate, R, in g/day for each stack using Equation 103–2. For cyclic operations, use only the time per day each stack is in operation. The total Be emission rate from a source is the summation of results from all stacks.

$$R = \frac{W_{\rm t} V_{\rm s(wg)} A_{\rm s} (86,400) (10^{-6})}{V_{\rm total}} \qquad \text{Eq. 103-2}$$

12.4 Test Report. Prepare a test report that includes as a minimum: A detailed description of the sampling train used, results of the procedural check described in Section 10.1 with all data and calculations made, all pertinent data taken during the test, the basis for any estimates made, isokinetic sampling calculations, and emission results. Include a

description of the test site, with a block diagram and brief description of the process, location of the sample points in the stack cross section, and stack dimensions and distances from any point of disturbance.

13.0 Method Performance.[Reserved]

14.0 Pollution Prevention.[Reserved]

15.0 Waste Management.[Reserved]

- 16.0 References.[Reserved]
- 17.0 Tables, Diagrams, Flow Charts, and Validation Data



Figure 103-1. Beryllium Screening Method Sampling Train Schematic.

View or download PDF

Page 72 of 181 (Subpart FF)
Method 104-Determination of Beryllium Emissions From Stationary Sources

Note: This method does not include all of the specifications (*e.g.*, equipment and supplies) and procedures (*e.g.*, sampling and analytical) essential to its performance. Some material is incorporated by reference from methods in appendix A to 40 CFR part 60. Therefore, to obtain reliable results, persons using this method should have a thorough knowledge of at least the following additional test methods: Method 1, Method 2, Method 3, and Method 5 in appendix A, part 60.

1.0 Scope and Application

1.1 Analytes.

Analyte	CAS No.	Sensitivity
Beryllium (Be)	7440-41-7	Dependent upon recorder and spectrophotometer.

1.2 Applicability. This method is applicable for the determination of Be emissions in ducts or stacks at stationary sources. Unless otherwise specified, this method is not intended to apply to gas streams other than those emitted directly to the atmosphere without further processing.

1.3 Data Quality Objectives. Adherences to the requirements of this method will enhance the quality of the data obtained from air pollutant sampling methods.

## 2.0 Summary of Method

2.1 Particulate and gaseous Be emissions are withdrawn isokinetically from the source and are collected on a glass fiber filter and in water. The collected sample is digested in an acid solution and is analyzed by atomic absorption spectrophotometry.

3.0 Definitions[Reserved]

#### 4.0 Interferences

4.1 Matrix Effects. Analysis for Be by flame atomic absorption spectrophotometry is sensitive to the chemical composition and to the physical properties (e.g., viscosity, pH) of the sample. Aluminum and silicon in particular are known to interfere when present in appreciable quantities. The analytical procedure includes (optionally) the use of the Method of Standard Additions to check for these matrix effects, and sample analysis using the Method of Standard Additions if significant matrix effects are found to be present (see Reference 2 in Section 16.0).

## 5.0 Safety

5.1 Disclaimer. This method may involve hazardous materials, operations, and equipment. This test method may not address all of the safety problems associated with its use. It is the responsibility of the user of this test method to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to performing this test method.

5.2 Corrosive reagents. The following reagents are hazardous. Personal protective equipment and safe procedures are useful in preventing chemical splashes. If contact occurs, immediately flush with copious amounts of water at least 15 minutes. Remove clothing under shower and decontaminate. Treat residual chemical burn as thermal burn.

5.2.1 Hydrochloric Acid (HC_i). Highly toxic. Vapors are highly irritating to eyes, skin, nose, and lungs, causing severe damage. May cause bronchitis, pneumonia, or edema of lungs. Exposure to concentrations of 0.13 to 0.2 percent can be lethal to humans in a few minutes. Provide ventilation to limit exposure. Reacts with metals, producing hydrogen gas.

5.2.2 Hydrogen Peroxide (H₂O₂). Irritating to eyes, skin, nose, and lungs.

5.2.3 Nitric Acid (HNO₃). Highly corrosive to eyes, skin, nose, and lungs. Vapors cause bronchitis, pneumonia, or edema of lungs. Reaction to inhalation may be delayed as long as 30 hours and still be fatal. Provide ventilation to limit exposure. Strong oxidizer. Hazardous reaction may occur with organic materials such as solvents.

5.2.4 Sodium Hydroxide (NaOH). Causes severe damage to eyes and skin. Inhalation causes irritation to nose, throat, and lungs. Reacts exothermically with limited amounts of water.

5.3 Beryllium is hazardous, and precautions should be taken to minimize exposure.

6.0 Equipment and Supplies

6.1 Sample Collection. Same as Method 5, Section 6.1, with the exception of the following:

6.1.1 Sampling Train. Same as Method 5, Section 6.1.1, with the exception of the following:

6.1.2 Probe Liner. Borosilicate or quartz glass tubing. A heating system capable of maintaining a gas temperature of 120  $\pm$ 14 °C (248  $\pm$ 25 °F) at the probe exit during sampling to prevent water condensation may be used.

Note: Do not use metal probe liners.

6.1.3 Filter Holder. Borosilicate glass, with a glass frit filter support and a silicone rubber gasket. Other materials of construction (*e.g.*, stainless steel, Teflon, Viton) may be used, subject to the approval of the Administrator. The holder design shall provide a positive seal against leakage from the outside or around the filter. The holder shall be attached immediately at the outlet of the probe. A heating system capable of maintaining the filter at a minimum temperature in the range of the stack temperature may be used to prevent condensation from occurring.

6.1.4 Impingers. Four Greenburg-Smith impingers connected in series with leak-free ground glass fittings or any similar leak-free noncontaminating fittings. For the first, third, and fourth impingers, use impingers that are modified by replacing the tip with a 13 mm-ID (0.5 in.) glass tube extending to 13 mm (0.5 in.) from the bottom of the flask may be used.

6.2 Sample Recovery. The following items are needed for sample recovery:

6.2.1 Probe Cleaning Rod. At least as long as probe.

6.2.2 Glass Sample Bottles. Leakless, with Teflon-lined caps, 1000 ml.

6.2.3 Petri Dishes. For filter samples, glass or polyethylene, unless otherwise specified by the Administrator.

6.2.4 Graduated Cylinder. 250 ml.

6.2.5 Funnel and Rubber Policeman. To aid in transfer of silica gel to container; not necessary if silica gel is weighed in the field.

6.2.6 Funnel. Glass, to aid in sample recovery.

6.2.7 Plastic Jar. Approximately 300 ml.

6.3 Analysis. The following items are needed for sample analysis:

6.3.1 Atomic Absorption Spectrophotometer. Perkin-Elmer 303, or equivalent, with nitrous oxide/acetylene burner.

6.3.2 Hot Plate.

6.3.3 Perchloric Acid Fume Hood.

7.0 Reagents and Standards

Page 74 of 181 (Subpart FF)

Note: Unless otherwise indicated, it is intended that all reagents conform to the specifications established by the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available; otherwise, use the best available grade.

7.1 Sample Collection. Same as Method 5, Section 7.1, including deionized distilled water conforming to ASTM D 1193– 77 or 91 (incorporated by reference—see §61.18), Type 3. The Millipore AA filter is recommended.

7.2 Sample Recovery. Same as Method 5 in appendix A, part 60, Section 7.2, with the addition of the following:

7.2.1 Wash Acid, 50 Percent (V/V) Hydrochloric Acid (HCI). Mix equal volumes of concentrated HCI and water, being careful to add the acid slowly to the water.

7.3 Sample Preparation and Analysis. The following reagents and standards and standards are needed for sample preparation and analysis:

7.3.1 Water. Same as in Section 7.1.

7.3.2. Perchloric Acid (HClO₄). Concentrated (70 percent V/V).

7.3.3 Nitric Acid (HNO₃). Concentrated.

7.3.4 Beryllium Powder. Minimum purity 98 percent.

7.3.5 Sulfuric Acid (H₂SO₄) Solution, 12 N. Dilute 33 ml of concentrated H₂SO₄to 1 liter with water.

7.3.6 Hydrochloric Acid Solution, 25 Percent HCl (V/V).

7.3.7 Stock Beryllium Standard Solution, 10 µg Be/ml. Dissolve 10.0 mg of Be in 80 ml of 12 N H₂SO₄in a 1000-ml volumetric flask. Dilute to volume with water. This solution is stable for at least one month. Equivalent strength Be stock solutions may be prepared from Be salts such as BeCl₂and Be(NO₃)₂(98 percent minimum purity).

7.3.8 Working Beryllium Standard Solution, 1 µg Be/ml. Dilute a 10 ml aliquot of the stock beryllium standard solution to 100 ml with 25 percent HCl solution to give a concentration of 1 mg/ml. Prepare this dilute stock solution fresh daily.

8.0 Sample Collection, Preservation, Transport, and Storage

The amount of Be that is collected is generally small, therefore, it is necessary to exercise particular care to prevent contamination or loss of sample.

8.1 Pretest Preparation. Same as Method 5, Section 8.1, except omit Section 8.1.3.

8.2 Preliminary Determinations. Same as Method 5, Section 8.2, with the exception of the following:

8.2.1 Select a nozzle size based on the range of velocity heads to assure that it is not necessary to change the nozzle size in order to maintain isokinetic sampling rates below 28 liters/min (1.0 cfm).

8.2.2 Obtain samples over a period or periods of time that accurately determine the maximum emissions that occur in a 24-hour period. In the case of cyclic operations, perform sufficient sample runs for the accurate determination of the emissions that occur over the duration of the cycle. A minimum sample time of 2 hours per run is recommended.

8.3 Preparation of Sampling Train. Same as Method 5, Section 8.3, with the exception of the following:

8.3.1 Prior to assembly, clean all glassware (probe, impingers, and connectors) by first soaking in wash acid for 2 hours, followed by rinsing with water.

8.3.2 Save a portion of the water for a blank analysis.

8.3.3 Procedures relating to the use of metal probe liners are not applicable.

Page 75 of 181 (Subpart FF)

8.3.4 Probe and filter heating systems are needed only if water condensation is a problem. If this is the case, adjust the heaters to provide a temperature at or above the stack temperature. However, membrane filters such as the Millipore AA are limited to about 107 °C (225 °F). If the stack gas is in excess of about 93 °C (200 °F), consideration should be given to an alternate procedure such as moving the filter holder downstream of the first impinger to insure that the filter does not exceed its temperature limit. After the sampling train has been assembled, turn on and set the probe heating system, if applicable, at the desired operating temperature. Allow time for the temperatures to stabilize. Place crushed ice around the impingers.

Note: An empty impinger may be inserted between the third impinger and the silica gel to remove excess moisture from the sample stream.

8.4 Leak Check Procedures, Sampling Train Operation, and Calculation of Percent Isokinetic. Same as Method 5, Sections 8.4, 8.5, and 8.6, respectively.

8.5 Sample Recovery. Same as Method 5, Section 8.7, except treat the sample as follows: Transfer the probe and impinger assembly to a cleanup area that is clean, protected from the wind, and free of Be contamination. Inspect the train before and during this assembly, and note any abnormal conditions. Treat the sample as follows: Disconnect the probe from the impinger train.

8.5.1 Container No. 1. Same as Method 5, Section 8.7.6.1.

8.5.2 Container No. 2. Place the contents (measured to 1 ml) of the first three impingers into a glass sample bottle. Use the procedures outlined in Section 8.7.6.2 of Method 5, where applicable, to rinse the probe nozzle, probe fitting, probe liner, filter holder, and all glassware between the filter holder and the back half of the third impinger with water. Repeat this procedure with acetone. Place both water and acetone rinse solutions in the sample bottle with the contents of the impingers.

8.5.3 Container No. 3. Same as Method 5, Section 8.7.6.3.

8.6 Blanks.

8.6.1 Water Blank. Save a portion of the water as a blank. Take 200 ml directly from the wash bottle being used and place it in a plastic sample container labeled "H₂O blank."

8.6.2 Filter. Save two filters from each lot of filters used in sampling. Place these filters in a container labeled "filter blank."

8.7 Post-test Glassware Rinsing. If an additional test is desired, the glassware can be carefully double rinsed with water and reassembled. However, if the glassware is out of use more than 2 days, repeat the initial acid wash procedure.

9.0 Quality Control

9.1 Miscellaneous Quality Control Measures.

Section	Quality control measure	Effect
8.4, 10.1	Sampling equipment leak checks and calibration	Ensure accuracy and precision of sampling measurements.
10.2	Spectrophotometer calibration	Ensure linearity of spectrophotometer response to standards.
11.5	Check for matrix effects	Eliminate matrix effects.
11.6	Audit sample analysis	Evaluate analyst's technique and standards preparation.

9.2 Volume Metering System Checks. Same as Method 5, Section 9.2.

Page 76 of 181 (Subpart FF)

# 10.0 Calibration and Standardization

# Note: Maintain a laboratory log of all calibrations.

10.1 Sampling Equipment. Same as Method 5, Section 10.0.

10.2 Preparation of Standard Solutions. Pipet 1, 3, 5, 8, and 10 ml of the 1.0 µg Be/ml working standard solution into separate 100 ml volumetric flasks, and dilute to the mark with water. The total amounts of Be in these standards are 1, 3, 5, 8, and 10 µg, respectively.

10.3 Spectrophotometer and Recorder. The Be response may be measured by either peak height or peak area. Analyze an aliquot of the 10-µg standard at 234.8 nm using a nitrous oxide/acetylene flame. Determine the maximum absorbance of the standard, and set this value to read 90 percent of the recorder full scale.

10.4 Calibration Curve.

10.4.1 After setting the recorder scale, analyze an appropriately sized aliquot of each standard and the BLANK (see Section 11) until two consecutive peaks agree within 3 percent of their average value.

10.4.3 Subtract the average peak height (or peak area) of the blank—which must be less than 2 percent of recorder full scale—from the averaged peak heights of the standards. If the blank absorbance is greater than 2 percent of full-scale, the probable cause is Be contamination of a reagent or carry-over of Be from a previous sample. Prepare the calibration curve by plotting the corrected peak height of each standard solution versus the corresponding total Be weight in the standard (in µg).

10.5 Spectrophotometer Calibration Quality Control. Calculate the least squares slope of the calibration curve. The line must pass through the origin or through a point no further from the origin than  $\pm 2$  percent of the recorder full scale. Multiply the corrected peak height by the reciprocal of the least squares slope to determine the distance each calibration point lies from the theoretical calibration line. The difference between the calculated concentration values and the actual concentrations (i.e., 1, 3, 5, 8, and 10 µg Be) must be less than 7 percent for all standards.

11.0 Analytical Procedure

11.1 Sample Loss Check. Prior to analysis, check the liquid level in Container No. 2. Note on the analytical data sheet whether leakage occurred during transport. If a noticeable amount of leakage occurred, either void the sample or take steps, subject to the approval of the Administrator, to adjust the final results.

11.2 Glassware Cleaning. Before use, clean all glassware according to the procedure of Section 8.3.1.

11.3 Sample Preparation. The digestion of Be samples is accomplished in part in concentrated HCIO₄.

Note: The sample must be heated to light brown fumes after the initial HNO3 addition; otherwise, dangerous perchlorates may result from the subsequent HClO₄digestion. HClO₄should be used only under a hood.

11.3.1 Container No. 1. Transfer the filter and any loose particulate matter from Container No. 1 to a 150-ml beaker. Add 35 ml concentrated  $HNO_3$ . To oxidize all organic matter, heat on a hotplate until light brown fumes are evident. Cool to room temperature, and add 5 ml 12 N H₂SO₄ and 5 ml concentrated HClO₄.

11.3.2 Container No. 2. Place a portion of the water and acetone sample into a 150 ml beaker, and put on a hotplate. Add portions of the remainder as evaporation proceeds and evaporate to dryness. Cool the residue, and add 35 ml concentrated  $HNO_3$ . To oxidize all organic matter, heat on a hotplate until light brown fumes are evident. Cool to room temperature, and add 5 ml 12 N H₂SO₄ and 5 ml concentrated  $HCO_4$ . Then proceed with step 11.3.4.

11.3.3 Final Sample Preparation. Add the sample from Section 11.3.2 to the 150-ml beaker from Section 11.3.1. Replace on a hotplate, and evaporate to dryness in a HCIO₄hood. Cool the residue to room temperature, add 10.0 ml of 25 percent V/V HCI, and mix to dissolve the residue.

11.3.4 Filter and Water Blanks. Cut each filter into strips, and treat each filter individually as directed in Section 11.3.1. Treat the 200-ml water blank as directed in Section 11.3.2. Combine and treat these blanks as directed in Section 11.3.3.

11.4 Spectrophotometer Preparation. Turn on the power; set the wavelength, slit width, and lamp current; and adjust the background corrector as instructed by the manufacturer's manual for the particular atomic absorption spectrophotometer. Adjust the burner and flame characteristics as necessary.

11.5 Analysis. Calibrate the analytical equipment and develop a calibration curve as outlined in Sections 10.4 and 10.5.

11.5.1 Beryllium Samples. Repeat the procedure used to establish the calibration curve with an appropriately sized aliquot of each sample (from Section 11.3.3) until two consecutive peak heights agree within 3 percent of their average value. The peak height of each sample must be greater than 10 percent of the recorder full scale. If the peak height of the sample is off scale on the recorder, further dilute the original source sample to bring the Be concentration into the calibration range of the spectrophotometer.

11.5.2 Run a blank and standard at least after every five samples to check the spectrophotometer calibration. The peak height of the blank must pass through a point no further from the origin than ±2 percent of the recorder full scale. The difference between the measured concentration of the standard (the product of the corrected peak height and the reciprocal of the least squares slope) and the actual concentration of the standard must be less than 7 percent, or recalibration of the analyzer is required.

11.5.3 Check for Matrix Effects (optional). Use the Method of Standard Additions (see Reference 2 in Section 16.0) to check at least one sample from each source for matrix effects on the Be results. If the results of the Method of Standard Additions procedure used on the single source sample do not agree to within 5 percent of the value obtained by the routine atomic absorption analysis, then reanalyze all samples from the source using the Method of Standard Additions procedure.

11.6 Container No. 2 (Silica Gel). Weigh the spent silica gel (or silica gel plus impinger) to the nearest 0.5 g using a balance. (This step may be conducted in the field.)

12.0 Data Analysis and Calculations

Carry out calculations, retaining at least one extra decimal significant figure beyond that of the acquired data. Round off figures only after the final calculation. Other forms of the equations may be used as long as they give equivalent results.

12.1 Nomenclature.

K₁= 0.3858 °K/mm Hg for metric units.

= 17.64 °R/in. Hg for English units.

 $K_3 = 10^{-6} g/\mu g$  for metric units.

=  $2.2046 \times 10^{-9}$ lb/µg for English units.

m_{Be}= Total weight of beryllium in the source sample.

P_s= Absolute stack gas pressure, mm Hg (in. Hg).

t = Daily operating time, sec/day.

T_s= Absolute average stack gas temperature, °K (°R).

Vm(std)= Dry gas sample volume at standard conditions, scm (scf).

Vw(std)= Volume of water vapor at standard conditions, scm (scf).

12.2 Average Dry Gas Meter Temperature and Average Orifice Pressure Drop, Dry Gas Volume, Volume of Water Vapor Condensed, Moisture Content, Isokinetic Variation, and Stack Gas Velocity and Volumetric Flow Rate. Same as Method 5, Sections 12.2 through 12.5, 12.11, and 12.12, respectively.

12.3 Total Beryllium. For each source sample, correct the average maximum absorbance of the two consecutive samples whose peak heights agree within 3 percent of their average for the contribution of the solution blank (see Sections 11.3.4

and 11.5.2). Correcting for any dilutions if necessary, use the calibration curve and these corrected averages to determine the total weight of Be in each source sample.

12.4 Beryllium Emission Rate. Calculate the daily Hg emission rate, R, using Equation 104–1. For continuous operations, the operating time is equal to 86,400 seconds per day. For cyclic operations, use only the time per day each stack is in operation. The total Hg emission rate from a source will be the summation of results from all stacks.

$$R = \frac{K_1 K_3 t m_{Be} P_s v_s A_s}{T_s \left( V_{m(std)} + V_{m(std)} \right)} \qquad \text{Eq. 104-1}$$

12.5 Determination of Compliance. Each performance test consists of three sample runs. For the purpose of determining compliance with an applicable national emission standard, use the average of the results of all sample runs.

13.0 Method Performance.[Reserved]

14.0 Pollution Prevention. [Reserved]

15.0 Waste Management.[Reserved]

16.0 References

Same as References 1, 2, and 4–11 of Section 16.0 of Method 101 with the addition of the following:

1. Amos, M.D., and J.B. Willis. Use of High-Temperature Pre-Mixed Flames in Atomic Absorption Spectroscopy. Spectrochim. Acta. 22:1325. 1966.

2. Fleet, B., K.V. Liberty, and T. S. West. A Study of Some Matrix Effects in the Determination of Beryllium by Atomic Absorption Spectroscopy in the Nitrous Oxide-Acetylene Flame. Talanta 17:203. 1970.

17.0 Tables, Diagrams, Flowcharts, And Validation Data[Reserved]

Method 105-Determination of Mercury in Wastewater Treatment Plant Sewage Sludges

Note: This method does not include all of the specifications (*e.g.*, equipment and supplies) and procedures (*e.g.*, sampling and analytical) essential to its performance. Some material is incorporated by reference from other methods in this part. Therefore, to obtain reliable results, persons using this method should also have a thorough knowledge of at least the following additional test methods: Method 101 and Method 101A.

1.0 Scope and Application

1.1 Analytes.

Analyte	CAS No.	Sensitivity
Mercury (Hg)	7439–97–6	Dependent upon spectrophotometer and recorder.

1.2 Applicability. This method is applicable for the determination of total organic and inorganic Hg content in sewage sludges.

1.3 Data Quality Objectives. Adherence to the requirements of this method will enhance the quality of the data obtained from air pollutant sampling methods.

2.0 Summary of Method

2.1 Time-composite sludge samples are withdrawn from the conveyor belt subsequent to dewatering and before incineration or drying. A weighed portion of the sludge is digested in aqua regia and is oxidized by potassium permanganate (KMnO₄). Mercury in the digested sample is then measured by the conventional spectrophotometric cold-vapor technique.

3.0 Definitions[Reserved]

4.0 Interferences[Reserved]

5.0 Safety

5.1 Disclaimer. This method may involve hazardous materials, operations, and equipment. This test method may not address all of the safety problems associated with its use. It is the responsibility of the user of this test method to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to performing this test method.

5.2 Corrosive Reagents. The following reagents are hazardous. Personal protective equipment and safe procedures are useful in preventing chemical splashes. If contact occurs, immediately flush with copious amounts of water at least 15 minutes. Remove clothing under shower and decontaminate. Treat residual chemical burn as thermal burn.

5.2.1 Hydrochloric Acid (HCI). Highly toxic. Vapors are highly irritating to eyes, skin, nose, and lungs, causing severe damage. May cause bronchitis, pneumonia, or edema of lungs. Exposure to concentrations of 0.13 to 0.2 percent can be lethal to humans in a few minutes. Provide ventilation to limit exposure. Reacts with metals, producing hydrogen gas.

5.2.2 Nitric Acid (HNO₃). Highly corrosive to eyes, skin, nose, and lungs. Vapors cause bronchitis, pneumonia, or edema of lungs. Reaction to inhalation may be delayed as long as 30 hours and still be fatal. Provide ventilation to limit exposure. Strong oxidizer. Hazardous reaction may occur with organic materials such as solvents.

6.0 Equipment and Supplies

6.1 Sample Collection and Mixing. The following items are required for collection and mixing of the sludge samples:

6.1.1 Container. Plastic, 50-liter.

6.1.2 Scoop. To remove 950-ml (1 quart.) sludge sample.

6.1.3 Mixer. Mortar mixer, wheelbarrow-type, 57-liter (or equivalent) with electricity-driven motor.

6.1.4 Blender. Waring-type, 2-liter.

6.1.5 Scoop. To remove 100-mi and 20-mi samples of blended sludge.

6.1.6 Erlenmeyer Flasks. Four, 125-ml.

6.1.7 Beakers. Glass beakers in the following sizes: 50 ml (1), 200 ml (1), 400 ml (2).

6.2 Sample Preparation and Analysis. Same as Method 101, Section 6.3, with the addition of the following:

6.2.1 Hot Plate.

6.2.2 Desiccator.

6.2.3 Filter Paper. S and S No. 588 (or equivalent).

6.2.4 Beakers. Glass beakers, 200 ml and 400 ml (2 each).

7.0 Reagents and Standards

Page 80 of 181 (Subpart FF)

Note: Unless otherwise indicated, it is intended that all reagents conform to the specifications established by the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available; otherwise, use the best available grade.

7.1 Sample Analysis. Same as Method 101A, Section 7.2, with the following additions and exceptions:

7.1.1 Hydrochloric Acid. The concentrated HCI specified in Method 101A, Section 7.2.4, is not required.

7.1.2 Aqua Regia. Prepare immediately before use. Carefully add one volume of concentrated HNO₃to three volumes of concentrated HCI.

8.0 Sample Collection, Preservation, Storage, and Transport

8.1 Sludge Sampling. Withdraw equal volume increments of sludge [for a total of at least 15 liters (16 quarts)] at intervals of 30 min over an 8-hr period, and combine in a rigid plastic container.

8.2 Sludge Mixing. Transfer the entire 15-liter sample to a mortar mixer. Mix the sample for a minimum of 30 min at 30 rpm. Take six 100-ml portions of sludge, and combine in a 2-liter blender. Blend sludge for 5 min; add water as necessary to give a fluid consistency. Immediately after stopping the blender, withdraw four 20-ml portions of blended sludge, and place them in separate, tared 125-ml Erlenmeyer flasks. Reweigh each flask to determine the exact amount of sludge added.

8.3 Sample Holding Time. Samples shall be analyzed within the time specified in the applicable subpart of the regulations.

9.0 Quality Control

Section	Quality control measure	Effect
10.0	Spectrophotometer calibration	Ensure linearity of spectrophotometer response to standards.
11.0	Check for matrix effects	Eliminate matrix effects.

10.0 Calibration and Standardization

Same as Method 101A, Section 10.2.

11.0 Analytical Procedures

11.1 Solids Content of Blended Sludge. Dry one of the 20-ml blended samples from Section 8.2 in an oven at 105 °C (221 °F) to constant weight. Cool in a desiccator, weigh and record the dry weight of the sample.

11.2 Aqua Regia Digestion of Blended Samples.

11.2.1 To each of the three remaining 20-ml samples from Section 8.2 add 25 ml of aqua regia, and digest the on a hot plate at low heat (do not boil) for 30 min, or until samples are a pale yellow-brown color and are void of the dark brown color characteristic of organic matter. Remove from hotplate and allow to cool.

11.2.2 Filter each digested sample separately through an S and S No. 588 filter or equivalent, and rinse the filter contents with 50 ml of water. Transfer the filtrate and filter washing to a 100-ml volumetric flask, and carefully dilute to volume with water.

11.3 Solids Content of the Sludge Before Blending. Remove two 100-ml portions of mixed sludge from the mortar mixer and place in separate, tared 400-ml beakers. Reweigh each beaker to determine the exact amount of sludge added. Dry in oven at 105 °C (221 °F) and cool in a desiccator to constant weight.

11.4 Analysis for Mercury. Analyze the three aqua regia-digested samples using the procedures outlined in Method 101A, Section 11.0.

12.0 Data Analysis and Calculations

12.1 Nomenclature.

 $C_m$ = Concentration of Hg in the digested sample,  $\mu g/g$ .

 $F_{sb}$ = Weight fraction of solids in the blended sludge.

F_{sm}= Weight fraction of solids in the collected sludge after mixing.

M = Hg content of the sewage sludge (on a dry basis),  $\mu$ g/g.

m = Mass of Hg in the aliquot of digested sample analyzed,  $\mu$ g.

n = number of digested samples (specified in Section 11.2 as three).

V_a= Volume of digested sample analyzed, ml.

V_s= Volume of digested sample, ml.

W_b= Weight of empty sample beaker, g.

W_{bs}= Weight of sample beaker and sample, g.

Wtd= Weight of sample beaker and sample after drying, g.

W_f= Weight of empty sample flask, g.

W_{fd}= Weight of sample flask and sample after drying, g.

W_{fs}= Weight of sample flask and sample, g.

12.2 Mercury Content of Digested Sample (Wet Basis).

12.2.1 For each sample analyzed for Hg content, calculate the arithmetic mean maximum absorbance of the two consecutive samples whose peak heights agree ±3 percent of their average. Correct this average value for the contribution of the blank. Use the calibration curve and these corrected averages to determine the final Hg concentration in the solution cell for each sludge sample.

12.2.2 Calculate the average Hg concentration of the digested samples by correcting for any dilutions made to bring the sample into the working range of the spectrophotometer and for the weight of the sludge portion digested, using Equation 105–1.

$$\overline{C}_{m} = \sum_{i=1}^{n} \left[ \frac{mV_{i}}{V_{a} \left( W_{ji} - W_{j} \right)} \right]_{i} \qquad \text{Eq. 105-1}$$

12.3 Solids Content of Blended Sludge. Determine the solids content of the blended sludge using Equation 105-2.

$$F_{sb} = 1 - \frac{W_{fs} - W_{fd}}{W_{fs} - W_f}$$
 Eq. 105-2

Page 82 of 181 (Subpart FF)

12.4 Solids Content of Bulk Sample (before blending but, after mixing in mortar mixer). Determine the solids content of each 100 ml aliquot (Section 11.3), and average the results.

$$F_{sm} = 1 - \frac{W_{bs} - W_{bd}}{W_{bs} - W_{b}}$$
 Eq. 105-3

12.5 Mercury Content of Bulk Sample (Dry Basis). Average the results from the three samples from each 8-hr composite sample, and calculate the Hg concentration of the composite sample on a dry basis.

$$M = \frac{\overline{C}_{m}}{F_{sb}} \qquad \text{Eq. 105-4}$$

# 13.0 Method Performance

13.1 Range. The range of this method is 0.2 to 5 micrograms per gram; it may be extended by increasing or decreasing sample size.

14.0 Pollution Prevention.[Reserved]

15.0 Waste Management.[Reserved]

16.0 References

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5. Analytical Quality Control Laboratory (AQCL). Mercury in Sediment (Cold Vapor Technique) (Provisional Method). U.S. Environmental Protection Agency. Cincinnati, Ohio. April 1972.

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7. Manual of Methods for Chemical Analysis of Water and Wastes. U.S. Environmental Protection Agency. Cincinnati, Ohio. Publication No. EPA-624/2-74-003. December 1974. pp. 118-138.

8. Mitchell, W.J., M.R. Midgett, J. Suggs, R.J. Velton, and D. Albrink. Sampling and Homogenizing Sewage for Analysis. Environmental Monitoring and Support Laboratory, Office of Research and Development, U.S. Environmental Protection Agency. Research Triangle Park, N.C. March 1979. p. 7.

17.0 Tables, Diagrams, Flowcharts, and Validation Data.[Reserved]

Method 106-Determination of Vinyl Chloride Emissions From Stationary Sources

1.0 Scope and Application

1.1 Analytes.

1	1	
Analyte	CAS No.	Sensitivity

Vinyl Chloride (CH ₂ :CHCl) 75–01–4	Dependent upon analytical equipment.
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1.2 Applicability. This method is applicable for the determination of vinyl chloride emissions from ethylene dichloride, vinyl chloride, and polyvinyl chloride manufacturing processes. This method does not measure vinyl chloride contained in particulate matter.

1.3 Data Quality Objectives. Adherence to the requirements of this method will enhance the quality of the data obtained from air pollutant sampling methods.

# 2.0 Summary of Method

2.1 An integrated bag sample of stack gas containing vinyl chloride is subjected to GC analysis using a flame ionization detector (FID).

3.0 Definitions.[Reserved]

4.0 Interferences

4.1 Resolution interferences of vinyl chloride may be encountered on some sources. Therefore, the chromatograph operator should select the column and operating parameters best suited to the particular analysis requirements. The selection made is subject to approval of the Administrator. Approval is automatic, provided that confirming data are produced through an adequate supplemental analytical technique, and that the data are available for review by the Administrator. An example of this would be analysis with a different column or GC/mass spectroscopy.

5.0 Safety

5.1 Disclaimer. This method may involve hazardous materials, operations, and equipment. This test method may not address all of the safety problems associated with its use. It is the responsibility of the user of this test method to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to performing this test method.

5.2 Toxic Analyte. Care must be exercised to prevent exposure of sampling personnel to vinyl chloride, which is a carcinogen.

6.0 Equipment and Supplies

6.1 Sample Collection (see Figure 106–1). The sampling train consists of the following components:

6.1.1 Probe. Stainless steel, borosilicate glass, Teflon tubing (as stack temperature permits), or equivalent, equipped with a glass wool plug to remove particulate matter.

6.1.2 Sample Lines. Teflon, 6.4-mm outside diameter, of sufficient length to connect probe to bag. Use a new unused piece for each series of bag samples that constitutes an emission test, and discard upon completion of the test.

6.1.3 Quick Connects. Stainless steel, male (2) and female (2), with ball checks (one pair without), located as shown in Figure 106-1.

6.1.4 Tedlar Bags. 50- to 100-liter capacity, to contain sample. Aluminized Mylar bags may be used if the samples are analyzed within 24 hours of collection.

6.1.5 Bag Containers. Rigid leak-proof containers for sample bags, with covering to protect contents from sunlight.

6.1.6 Needle Valve. To adjust sample flow rates.

6.1.7 Pump. Leak-free, with minimum of 2-liter/min capacity.

6.1.8 Charcoal Tube. To prevent admission of vinyl chloride and other organics to the atmosphere in the vicinity of samplers.

Page 84 of 181 (Subpart FF)

6.1.9 Flowmeter. For observing sampling flow rate; capable of measuring a flow range from 0.10 to 1.00 liter/min.

6.1.10 Connecting Tubing. Teflon, 6.4-mm outside diameter, to assemble sampling train (Figure 106-1).

6.1.11 Tubing Fittings and Connectors. Teflon or stainless steel, to assemble sampling training.

6.2 Sample Recovery. Teflon tubing, 6.4-mm outside diameter, to connect bag to GC sample loop. Use a new unused piece for each series of bag samples that constitutes an emission test, and discard upon conclusion of analysis of those bags.

6.3 Analysis. The following equipment is required:

6.3.1 Gas Chromatograph. With FID potentiometric strip chart recorder and 1.0 to 5.0-ml heated sampling loop in automatic sample valve. The chromatographic system shall be capable of producing a response to 0.1-ppmv vinyl chloride that is at least as great as the average noise level. (Response is measured from the average value of the base line to the maximum of the wave form, while standard operating conditions are in use.)

6.3.2 Chromatographic Columns. Columns as listed below. Other columns may be used provided that the precision and accuracy of the analysis of vinyl chloride standards are not impaired and that information is available for review confirming that there is adequate resolution of vinyl chloride peak. (Adequate resolution is defined as an area overlap of not more than 10 percent of the vinyl chloride peak by an interferent peak. Calculation of area overlap is explained in Procedure 1 of appendix C to this part: "Determination of Adequate Chromatographic Peak Resolution.")

6.3.2.1 Column A. Stainless steel, 2.0 m by 3.2 mm, containing 80/100-mesh Chromasorb 102.

6.3.2.2 Column B. Stainless steel, 2.0 m by 3.2 mm, containing 20 percent GE SF-96 on 60/ip-mesh Chromasorb P AW; or stainless steel, 1.0 m by 3.2 mm containing 80/100-mesh Porapak T. Column B is required as a secondary column if acetaldehyde is present. If used, column B is placed after column A. The combined columns should be operated at 120 °C (250 °F).

6.3.3 Rate Meters (2). Rotameter, or equivalent, 100-ml/min capacity, with flow control valves.

6.3.4 Gas Regulators. For required gas cylinders.

6.3.5 Temperature Sensor. Accurate to ±1 °C (±2 °F), to measure temperature of heated sample loop at time of sample injection.

6.3.6 Barometer. Accurate to ±5 mm Hg, to measure atmospheric pressure around GC during sample analysis.

6.3.7 Pump. Leak-free, with minimum of 100-ml/min capacity.

6.3.8 Recorder. Strip chart type, optionally equipped with either disc or electronic integrator.

6.3.9 Planimeter. Optional, in place of disc or electronic integrator on recorder, to measure chromatograph peak areas.

6.4 Calibration and Standardization.

6.4.1 Tubing. Teflon, 6.4-mm outside diameter, separate pieces marked for each calibration concentration.

Note: The following items are required only if the optional standard gas preparation procedures (Section 10.1) are followed.

6.4.2 Tedlar Bags. Sixteen-inch-square size, with valve; separate bag marked for each calibration concentration.

6.4.3 Syringes. 0.5-ml and 50-ul, gas tight, individually calibrated to dispense gaseous vinyl chloride.

6.4.4 Dry Gas Meter with Temperature and Pressure Gauges. Singer Model DTM-115 with 802 index, or equivalent, to meter nitrogen In preparation of standard gas mixtures, calibrated at the flow rate used to prepare standards.

#### 7.0 Reagents and Standards

7.1 Analysis. The following reagents are required for analysis.

7.1.1 Helium or Nitrogen. Purity 99.9995 percent or greater, for chromatographic carrier gas.

7.1.2 Hydrogen. Purity 99.9995 percent or greater.

7.1.3 Oxygen or Air. Either oxygen (purity 99.99 percent or greater) or air (less than 0.1 ppmv total hydrocarbon content), as required by detector.

7.2 Calibration. Use one of the following options: either Sections 7.2.1 and 7.2.2, or Section 7.2.3.

7.2.1 Vinyl Chloride. Pure vinyl chloride gas certified by the manufacturer to contain a minimum of 99.9 percent vinyl chloride. If the gas manufacturer maintains a bulk cylinder supply of 99.9+ percent vinyl chloride, the certification analysis may have been performed on this supply, rather than on each gas cylinder prepared from this bulk supply. The date of gas cylinder preparation and the certified analysis must have been affixed to the cylinder before shipment from the gas manufacturer to the buyer.

7.2.2 Nitrogen. Same as described in Section 7.1.1.

7.2.3 Cylinder Standards. Gas mixture standards (50-,10-, and 5 ppmv vinyl chloride) in nitrogen cylinders may be used to directly prepare a chromatograph calibration curve as described in Section 10.3 if the following conditions are met: (a) The manufacturer certifies the gas composition with an accuracy of ±3 percent or better. (b) The manufacturer recommends a maximum shelf life over which the gas concentration does not change by greater than ±5 percent from the certified value. (c) The manufacturer affixes the date of gas cylinder preparation, certified vinyl chloride concentration, and recommended maximum shelf to the cylinder before shipment to the buyer.

7.2.3.1 Cylinder Standards Certification. The manufacturer shall certify the concentration of vinyl chloride in nitrogen in each cylinder by (a) directly analyzing each cylinder and (b) calibrating his analytical procedure on the day of cylinder analysis. To calibrate his analytical procedure, the manufacturer shall use as a minimum, a three point calibration curve. It is recommended that the manufacturer maintain (1) a high concentration calibration standard (between 50 and 100 ppmv) to prepare his calibration curve by an appropriate dilution technique and (2) a low-concentration calibration standard (between 5 and 10 ppmv) to verify the dilution technique used. If the difference between the apparent concentration read from the calibration curve and the true concentration assigned to the low-concentration standard exceeds 5 percent of the true concentration, the manufacturer shall determine the source of error and correct it, then repeat the three-point calibration.

7.2.3.2 Verification of Manufacturer's Calibration Standards. Before using a standard, the manufacturer shall verify each calibration standard (a) by comparing it to gas mixtures prepared (with 99 mole percent vinyl chloride) in accordance with the procedure described in Section 7.2.1 or (b) calibrating it against vinyl chloride cylinder Standard Reference Materials (SRM's) prepared by the National Institute of Standards and Technology, if such SRM's are available. The agreement between the initially determined concentration value and the verification concentration value must be ±5 percent. The manufacturer must reverify all calibration standards on a time interval consistent with the shelf life of the cylinder standards sold.

7.2.4 Audit Cylinder Standards.

7.2.4.1 Gas mixture standards with concentrations known only to the person supervising the analysis of samples. The concentrations of the audit cylinders should be: one low-concentration cylinder in the range of 5 to 20 ppmv vinyl chloride and one high-concentration cylinder in the range of 20 to 50 ppmv. When available, obtain audit samples from the appropriate EPA Regional Office or from the responsible enforcement authority.

Note: The responsible enforcement agency should be notified at least 30 days prior to the test date to allow sufficient time for sample delivery.

7.2.4.2 Alternatively, audit cylinders obtained from a commercial gas manufacturer may be used provided: (a) the gas meets the conditions described in Section 7.2.3. (b) the gas manufacturer certifies the audit cylinder as described in Section 7.2.3.1, and (c) the gas manufacturer obtains an independent analysis of the audit cylinders to verify this analysis. Independent analysis is defined here to mean analysis performed by an individual different than the individual who performs the gas manufacturer's analysis, while using calibration standards and analysis equipment different from those used for the gas manufacturer's analysis. Verification is complete and acceptable when the independent analysis concentration, is within 5 percent of the gas manufacturer's concentration.

Page 86 of 181 (Subpart FF)

8.0 Sample Collection, Preservation, Storage, and Transport

Note: Performance of this method should not be attempted by persons unfamiliar with the operation of a gas chromatograph (GC) nor by those who are unfamiliar with source sampling, because knowledge beyond the scope of this presentation is required.

8.1 Bag Leak-Check. The following leak-check procedure is recommended, but not required, prior to sample collection. The post-test leak-check procedure is mandatory. Connect a water manometer and pressurize the bag to 5 to 10 cm  $H_2O$  (2 to 4 in.  $H_2O$ ). Allow to stand for 10 min. Any displacement in the water manometer indicates a leak. Also, check the rigid container for leaks in this manner.

Note: An alternative leak-check method is to pressurize the bag to 5 to 10 cm H2O and allow it to stand overnight. A deflated bag indicates a leak. For each sample bag in its rigid container, place a rotameter in line between the bag and the pump inlet. Evacuate the bag. Failure of the rotameter to register zero flow when the bag appears to be empty indicates a leak.

8.2 Sample Collection. Assemble the sample train as shown in Figure 106–1. Join the quick connects as illustrated, and determine that all connection between the bag and the probe are tight. Place the end of the probe at the centroid of the stack and start the pump with the needle valve adjusted to yield a flow that will fill over 50 percent of bag volume in the specific sample period. After allowing sufficient time to purge the line several times, change the vacuum line from the container to the bag and evacuate the bag until the rotameter indicates no flow. Then reposition the sample and vacuum lines and begin the actual sampling, keeping the rate proportional to the stack velocity. At all times, direct the gas exiting the rotameter away from sampling personnel. At the end of the sample period, shut off the pump, disconnect the sample line from the bag container. Protect the bag container from sunlight.

8.3 Sample Storage. Keep the sample bags out of direct sunlight. When at all possible, analysis is to be performed within 24 hours, but in no case in excess of 72 hours of sample collection. Aluminized Mylar bag samples must be analyzed within 24 hours.

8.4 Post-test Bag Leak-Check. Subsequent to recovery and analysis of the sample, leak-check the sample bag according to the procedure outlined in Section 8.1.

9.0 Quality Control

9.1 Miscellaneous Quality Control

Section	Quality control measure	Effect
10.3	Chromatograph calibration	Ensure precision and accuracy of chromatograph.
11.1	Audit sample analysis	Evaluate analytical technique and standards preparation.

9.2 Immediately after the preparation of the calibration curve and prior to the sample analyses, perform the analysis audit described in appendix C, Procedure 2: "Procedure for Field Auditing GC Analysis."

10.0 Calibration and Standardization

Note: Maintain a laboratory log of all calibrations.

10.1 Preparation of Vinyl Chloride Standard Gas Mixtures. (Optional Procedure-delete if cylinder standards are used.) Evacuate a 16-inch square Tedlar bag that has passed a leak-check (described in Section 8.1) and meter in 5.0 liters of nitrogen. While the bag is filling, use the 0.5-ml syringe to inject 250 µl of 99.9+ percent vinyl chloride gas through the wall of the bag. Upon withdrawing the syringe, immediately cover the resulting hole with a piece of adhesive tape. The bag now contains a vinyl chloride concentration of 50 ppmv. In a like manner use the 50 µl syringe to prepare gas mixtures having 10-and 5-ppmv vinyl chloride concentrations. Place each bag on a smooth surface and alternately depress opposite sides of the bag 50 times to further mix the gases. These gas mixture standards may be used for 10 days from the date of preparation, after which time new gas mixtures must be prepared. (Caution: Contamination may be a problem when a bag is reused if the new gas mixture standard is a lower concentration than the previous gas mixture standard.)

10.2 Determination of Vinyl Chloride Retention Time. (This section can be performed simultaneously with Section 10.3.) Establish chromatograph conditions identical with those in Section 11.3. Determine proper attenuator position. Flush the sampling loop with helium or nitrogen and activate the sample valve. Record the injection time, sample loop temperature, column temperature, carrier gas flow rate, chart speed, and attenuator setting. Record peaks and detector responses that occur in the absence of vinyl chloride. Maintain conditions with the equipment plumbing arranged identically to Section 11.2, and flush the sample loop for 30 seconds at the rate of 100 ml/min with one of the vinyl chloride calibration mixtures. Then activate the sample valve. Record the injection time. Select the peak that corresponds to vinyl chloride. Measure the distance on the chart from the injection time to the time at which the peak maximum occurs. This quantity divided by the chart speed is defined as the retention time. Since other organics may be present in the sample, positive identification of the vinyl chloride peak must be made.

10.3 Preparation of Chromatograph Calibration Curve. Make a GC measurement of each gas mixture standard (described in Section 7.2.3 or 10.1) using conditions identical to those listed in Sections 11.2 and 11.3. Flush the sampling loop for 30 seconds at the rate of 100 ml/min with one of the standard mixtures, and activate the sample valve. Record the concentration of vinyl chloride injected ( $C_c$ ), attenuator setting, chart speed, peak area, sample loop temperature, column temperature, carrier gas flow rate, and retention time. Record the barometric pressure. Calculate  $A_c$ , the peak area multiplied by the attenuator setting. Repeat until two consecutive injection areas are within 5 percent, then plot the average of those two values versus  $C_c$ . When the other standard gas mixtures have been similarly analyzed and plotted, draw a straight line through the points derived by the least squares method. Perform calibration daily, or before and after the analysis of each emission test set of bag samples, whichever is more frequent. For each group of sample concentrations. If the two calibration curves differ by more than 5 percent from their mean value, then report the final results by both calibration curves.

# 11.0 Analytical Procedure

11.1 Audit Sample Analysis. Immediately after the preparation of the calibration curve and prior to the sample analyses, perform the analysis audit described in Procedure 2 of appendix C to this part: "Procedure for Field Auditing GC Analysis."

11.2 Sample Recovery. With a new piece of Teflon tubing identified for that bag, connect a bag inlet valve to the gas chromatograph sample valve. Switch the valve to receive gas from the bag through the sample loop. Arrange the equipment so the sample gas passes from the sample valve to 100-ml/min rotameter with flow control valve followed by a charcoal tube and a 1-in. H₂O pressure gauge. Maintain the sample flow either by a vacuum pump or container pressurization if the collection bag remains in the rigid container. After sample loop purging is ceased, allow the pressure gauge to return to zero before activating the gas sampling valve.

# 11.3 Analysis.

11.3.1 Set the column temperature to 100 °C (210 °F) and the detector temperature to 150 °C (300 °F). When optimum hydrogen and oxygen (or air) flow rates have been determined, verify and maintain these flow rates during all chromatography operations. Using helium or nitrogen as the carrier gas, establish a flow rate in the range consistent with the manufacturer's requirements for satisfactory detector operation. A flow rate of approximately 40 ml/min should produce adequate separations. Observe the base line periodically and determine that the noise level has stabilized and that base line drift has ceased. Purge the sample loop for 30 seconds at the rate of 100 ml/min, shut off flow, allow the sample loop pressure to reach atmospheric pressure as indicated by the H₂O manometer, then activate the sample valve. Record the injection time (the position of the pen on the chart at the time of sample injection), sample number, sample loop temperature, column temperature, carrier gas flow rate, chart speed, and attenuator setting. Record the barometric pressure. From the chart, note the peak having the retention time corresponding to vinyl chloride as determined in Section 10.2. Measure the vinyl chloride peak area, A_m, by use of a disc integrator, electronic integrator, or a planimeter. Measure and record the peak heights, H_m. Record A_mand retention time. Repeat the injection at least two times or until two consecutive values for the total area of the vinyl chloride peak agree within 5 percent of their average. Use the average value for these two total areas to compute the bag concentration.

11.3.2 Compare the ratio of  $H_m$ to  $A_m$ for the vinyl chloride sample with the same ratio for the standard peak that is closest in height. If these ratios differ by more than 10 percent, the vinyl chloride peak may not be pure (possibly acetaldehyde is present) and the secondary column should be employed (see Section 6.3.2.2).

11.4 Determination of Bag Water Vapor Content. Measure the ambient temperature and barometric pressure near the bag. From a water saturation vapor pressure table, determine and record the water vapor content of the bag,  $B_{wb}$ , as a decimal figure. (Assume the relative humidity to be 100 percent unless a lesser value is known.)

12.0 Calculations and Data Analysis

Page 88 of 181 (Subpart FF)

12.1 Nomenclature.

A_m= Measured peak area.

 $A_f$  = Attenuation factor.

B_{wb}= Water vapor content of the bag sample, as analyzed, volume fraction.

C_b= Concentration of vinyl chloride in the bag, ppmv.

C_c= Concentration of vinyl chloride in the standard sample, ppmv.

P_i= Laboratory pressure at time of analysis, mm Hg.

Pr= Reference pressure, the laboratory pressure recorded during calibration, mm Hg.

T_i= Absolute sample loop temperature at the time of analysis, °K (°R).

Tr= Reference temperature, the sample loop temperature recorded during calibration, °K (°R).

12.2 Sample Peak Area. Determine the sample peak area, Ac, as follows:

$$A_{r} = A_{m}A_{f} \qquad \text{Eq. 106-1}$$

12.3 Vinyl Chloride Concentration. From the calibration curves prepared in Section 10.3, determine the average concentration value of vinyl chloride,  $C_c$ , that corresponds to  $A_c$ , the sample peak area. Calculate the concentration of vinyl chloride in the bag,  $C_b$ , as follows:

$$C_{\delta} = \frac{C_{c}P_{r}T_{i}}{P_{i}T_{r}\left(1 - B_{\psi\delta}\right)} \qquad \text{Eq. 106-2}$$

13.0 Method Performance

13.1 Analytical Range. This method is designed for the 0.1 to 50 parts per million by volume (ppmv) range. However, common gas chromatograph (GC) instruments are capable of detecting 0.02 ppmv vinyl chloride. With proper calibration, the upper limit may be extended as needed.

14.0 Pollution Prevention, [Reserved]

15.0 Waste Management,[Reserved]

### 16.0 References

1. Brown D.W., E.W. Loy, and M.H. Stephenson. Vinyl Chloride Monitoring Near the B. F. Goodrich Chemical Company in Louisville, KY. Region IV, U.S. Environmental Protection Agency, Surveillance and Analysis Division, Athens, GA. June 24, 1974.

2. G.D. Clayton and Associates. Evaluation of a Collection and Analytical Procedure for Vinyl Chloride in Air. U.S. Environmental Protection Agency, Research Triangle Park, N.C. EPA Contract No. 68–02–1408, Task Order No. 2, EPA Report No. 75–VCL–1. December 13, 1974.

3. Midwest Research Institute. Standardization of Stationary Source Emission Method for Vinyl Chloride. U.S. Environmental Protection Agency, Research Triangle Park, N.C. Publication No. EPA–600/4–77–026. May 1977.

4. Scheil, G. and M.C. Sharp. Collaborative Testing of EPA Method 106 (Vinyl Chloride) that Will Provide for a Standardized Stationary Source Emission Measurement Method. U.S. Environmental Protection Agency, Research Triangle Park, N.C. Publication No. EPA 600/4–78–058. October 1978.

# 17.0 Tables, Diagrams Flowcharts, and Validation Data.



Figure 106-1. Integrated-bag sampling train.

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Method 107—Determination of Vinyl Chloride Content of In-Process Wastewater Samples, and Vinyl Chloride Content of Polyvinyl Chloride Resin Slurry, Wet Cake, and Latex Samples

Note: Performance of this method should not be attempted by persons unfamiliar with the operation of a gas chromatograph (GC) nor by those who are unfamiliar with source sampling, because knowledge beyond the scope of this presentation is required. This method does not include all of the specifications (*e.g.*, equipment and supplies) and procedures (*e.g.*, sampling and analytical) essential to its performance. Some material is incorporated by reference from other methods in this part. Therefore, to obtain reliable results, persons using this method should have a thorough knowledge of at least the following additional test methods: Method 106.

Page 90 of 181 (Subpart FF)

### 1.0 Scope and Application

#### 1.1 Analytes.

Analyte	CAS No.	Sensitivity
Vinyl Chloride (CH ₂ :CHCl)	75-01-4	Dependent upon analytical equipment.

1.2 Applicability. This method is applicable for the determination of the vinyl chloride monomer (VCM) content of inprocess wastewater samples, and the residual vinyl chloride monomer (RCVM) content of polyvinyl chloride (PVC) resins, wet, cake, slurry, and latex samples. It cannot be used for polymer in fused forms, such as sheet or cubes. This method is not acceptable where methods from section 304(h) of the Clean Water Act, 33 U.S.C. 1251 *et seq.* (the Federal Water Pollution Control Amendments of 1972 as amended by the Clean Water Act of 1977) are required.

1.3 Data Quality Objectives. Adherence to the requirements of this method will enhance the quality of the data obtained from air pollutant sampling methods.

#### 2.0 Summary of Method

2.1 The basis for this method relates to the vapor equilibrium that is established at a constant known temperature in a closed system between RVCM, PVC resin, water, and air. The RVCM in a PVC resin will equilibrate rapidly in a closed vessel, provided that the temperature of the PVC resin is maintained above the glass transition temperature of that specific resin.

2.2 A sample of PVC or in-process wastewater is collected in a vial or bottle and is conditioned. The headspace in the vial or bottle is then analyzed for vinyl chloride using gas chromatography with a flame ionization detector.

#### 3.0 Definitions[Reserved]

4.0 Interferences

4.1 The chromatograph columns and the corresponding operating parameters herein described normally provide an adequate resolution of vinyl chloride; however, resolution interferences may be encountered on some sources. Therefore, the chromatograph operator shall select the column and operating parameters best suited to his particular analysis requirements, subject to the approval of the Administrator. Approval is automatic provided that confirming data are produced through an adequate supplemental analytical technique, such as analysis with a different column or GC/mass spectroscopy, and that these data are made available for review by the Administrator.

5.0 Safety

5.1 Disclaimer. This method may involve hazardous materials, operations, and equipment. This test method may not address all of the safety problems associated with its use. It is the responsibility of the user of this test method to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to performing this test method.

5.2 Toxic Analyte. Care must be exercised to prevent exposure of sampling personnel to vinyl chloride, which is a carcinogen. Do not release vinyl chloride to the laboratory atmosphere during preparation of standards. Venting or purging with VCM/air mixtures must be held to a minimum. When they are required, the vapor must be routed to outside air. Vinyl chloride, even at low ppm levels, must never be vented inside the laboratory. After vials have been analyzed, the gas must be vented prior to removal of the vial from the instrument turntable. Vials must be vented through a hypodermic needle connected to an activated charcoal tube to prevent release of vinyl chloride into the laboratory atmosphere. The charcoal must be replaced prior to vinyl chloride breakthrough.

# 6.0 Equipment and Supplies

6.1 Sample Collection. The following equipment is required:

6.1.1 Glass bottles. 60-ml (2-oz) capacity, with wax-lined screw-on tops, for PVC samples.

6.1.2 Glass Vials. Headspace vials, with Teflon-faced butyl rubber sealing discs, for water samples.

6.1.3 Adhesive Tape. To prevent loosening of bottle tops.

6.2 Sample Recovery. The following equipment is required:

6.2.1 Glass Vials, Headspace vials, with butyl rubber septa and aluminum caps. Silicone rubber is not acceptable.

6.2.2 Analytical Balance. Capable of determining sample weight within an accuracy of ±1 percent.

6.2.3 Vial Sealer. To seal headspace vials.

6.2.4 Syringe. 100-ml capacity.

6.3 Analysis. The following equipment is required:

6.3.1 Headspace Sampler and Chromatograph. Capable of sampling and analyzing a constant amount of headspace gas from a sealed vial, while maintaining that vial at a temperature of 90 °C ±0.5 °C (194 °F ±0.9 °F). The chromatograph shall be equipped with a flame ionization detector (FID). Perkin-Elmer Corporation Models F–40, F–42, F–45, HS–6, and HS–100, and Hewlett-Packard Corporation Model 19395A have been found satisfactory. Chromatograph backflush capability may be required.

6.3.2 Chromatographic Columns. Stainless steel 1 m by 3.2 mm and 2 m by 3.2 mm, both containing 50/80-mesh Porapak Q. Other columns may be used provided that the precision and accuracy of the analysis of vinyl chloride standards are not impaired and information confirming that there is adequate resolution of the vinyl chloride peak are available for review. (Adequate resolution is defined as an area overlap of not more than 10 percent of the vinyl chloride peak by an interferant peak. Calculation of area overlap is explained in Procedure 1 of appendix C to this part: "Determination of Adequate Chromatographic Peak Resolution.") Two 1.83 m columns, each containing 1 percent Carbowax 1500 on Carbopak B, have been found satisfactory for samples containing acetaldehyde.

6.3.3 Temperature Sensor. Range 0 to 100 °C (32 to 212 °F) accurate to 0.1 °C.

6.3.4 Integrator-Recorder. To record chromatograms.

6.3.5 Barometer. Accurate to 1 mm Hg.

6.3.6 Regulators. For required gas cylinders.

6.3.7 Headspace Vial Pre-Pressurizer. Nitrogen pressurized hypodermic needle inside protective shield.

7.0 Reagents and Standards

7.1 Analysis. Same as Method 106, Section 7.1, with the addition of the following:

7.1.1 Water. Interference-free.

7.2 Calibration. The following items are required for calibration:

7.2.1 Cylinder Standards (4). Gas mixture standards (50-, 500-, 2000- and 4000-ppm vinyl chloride in nitrogen cylinders). Cylinder standards may be used directly to prepare a chromatograph calibration curve as described in Section 10.3, if the following conditions are met: (a) The manufacturer certifies the gas composition with an accuracy of ±3 percent or better (see Section 7.2.1.1). (b) The manufacturer recommends a maximum shelf life over which the gas concentration does not change by greater than ±5 percent from the certified value. (c) The manufacturer affixes the date of gas cylinder preparation, certified vinyl chloride concentration, and recommended maximum shelf life to the cylinder before shipment to the buyer.

7.2.1.1 Cylinder Standards Certification. The manufacturer shall certify the concentration of vinyl chloride in nitrogen in each cylinder by (a) directly analyzing each cylinder and (b) calibrating the analytical procedure on the day of cylinder analysis. To calibrate the analytical procedure, the manufacturer shall use, as a minimum, a 3-point calibration curve. It is recommended that the manufacturer maintain (1) a high-concentration calibration standard (between 4000 and 8000 ppm) to prepare the calibration curve by an appropriate dilution technique and (2) a low-concentration calibration standard (between 50 and 500 ppm) to verify the dilution technique used. If the difference between the apparent concentration read from the calibration curve and the true concentration assigned to the low-concentration standard exceeds 5

Page 92 of 181 (Subpart FF)

percent of the true concentration, the manufacturer shall determine the source of error and correct it, then repeat the 3point calibration.

7.2.1.2 Verification of Manufacturer's Calibration Standards. Before using, the manufacturer shall verify each calibration standard by (a) comparing it to gas mixtures prepared (with 99 mole percent vinyl chloride) in accordance with the procedure described in Section 10.1 of Method 106 or by (b) calibrating it against vinyl chloride cylinder Standard Reference Materials (SRMs) prepared by the National Institute of Standards and Technology, if such SRMs are available. The agreement between the initially determined concentration value and the verification concentration value must be within 5 percent. The manufacturer must reverify all calibration standards on a time interval consistent with the shelf life of the cylinder standards sold.

8.0 Sample Collection, Preservation, Storage, and Transport

8.1 Sample Collection.

8.1.1 PVC Sampling. Allow the resin or slurry to flow from a tap on the tank or silo until the tap line has been well purged. Extend and fill a 60-ml sample bottle under the tap, and immediately tighten a cap on the bottle. Wrap adhesive tape around the cap and bottle to prevent the cap from loosening. Place an identifying label on each bottle, and record the date, time, and sample location both on the bottles and in a log book.

8.1.2 Water Sampling. At the sampling location fill the vials bubble-free to overflowing so that a convex meniscus forms at the top. The excess water is displaced as the sealing disc is carefully placed, with the Teflon side down, on the opening of the vial. Place the aluminum seal over the disc and the neck of the vial, and crimp into place. Affix an identifying label on the bottle, and record the date, time, and sample location both on the vials and in a log book.

8.2 Sample Storage. All samples must be analyzed within 24 hours of collection, and must be refrigerated during this period.

9.0 Quality Control

Section	Quality control measure	Effect
10.3	Chromatograph calibration	Ensure precision and accuracy of chromatograph.

10.0 Calibration and Standardization

Note: Maintain a laboratory log of all calibrations.

10.1 Preparation of Standards. Calibration standards are prepared as follows: Place 100 µl or about two equal drops of distilled water in the sample vial, then fill the vial with the VCM/nitrogen standard, rapidly seat the septum, and seal with the aluminum cap. Use a1/8-in. stainless steel line from the cylinder to the vial. Do not use rubber or Tygon tubing. The sample line from the cylinder must be purged (into a properly vented hood) for several minutes prior to filling the vials. After purging, reduce the flow rate to between 500 and 1000 cc/min. Place end of tubing into vial (near bottom). Position a septum on top of the vial, pressing it against the1/8-in. filling tube to minimize the size of the vent opening. This is necessary to minimize mixing air with the standard in the vial. Each vial is to be purged with standard for 90 seconds, during which time the filling tube is gradually slid to the top of the vial. After the 90 seconds, the tube is removed with the septum, simultaneously sealing the vial. Practice will be necessary to develop good technique. Rubber gloves should be worn during the above operations. The sealed vial must then be pressurized for 60 seconds using the vial prepressurizer. Test the vial for leakage by placing a drop of water on the septum at the needle hole. Prepressurization of standards is not required unless samples have been prepressurized.

10.2 Analyzer Calibration. Calibration is to be performed each 8-hour period the chromatograph is used. Alternatively, calibration with duplicate 50-, 500-, 2,000-, and 4,000-ppm standards (hereafter described as a four-point calibration) may be performed on a monthly basis, provided that a calibration confirmation test consisting of duplicate analyses of an appropriate standard is performed once per plant shift, or once per chromatograph carrousel operation (if the chromatograph operation is less frequent than once per shift). The criterion for acceptance of each calibration confirmation test is that both analyses of 500-ppm standards [2,000-ppm standards if dispersion resin (excluding latex resin) samples are being analyzed] must be within 5 percent of the most recent four-point calibration curve. If this criterion is not met, then a complete four-point calibration must be performed before sample analyses can proceed.

10.3 Preparation of Chromatograph Calibration Curve. Prepare two vials each of 50-, 500-, 2,000-, and 4,000-ppm standards. Run the calibration samples in exactly the same manner as regular samples. Plot  $A_s$ , the integrator area

counts for each standard sample, versus C_o, the concentration of vinyl chloride in each standard sample. Draw a straight line through the points derived by the least squares method.

## 11.0 Analytical Procedure

11.1 Preparation of Equipment. Install the chromatographic column and condition overnight at 160 °C (320 °F). In the first operation, Porapak columns must be purged for 1 hour at 230 °C (450 °F).

Do not connect the exit end of the column to the detector while conditioning. Hydrogen and air to the detector must be turned off while the column is disconnected.

11.2 Flow Rate Adjustments. Adjust flow rates as follows:

11.2.1. Nitrogen Carrier Gas. Set regulator on cylinder to read 50 psig. Set regulator on chromatograph to produce a flow rate of 30.0 cc/min. Accurately measure the flow rate at the exit end of the column using the soap film flowmeter and a stopwatch, with the oven and column at the analysis temperature. After the instrument program advances to the "B" (backflush) mode, adjust the nitrogen pressure regulator to exactly balance the nitrogen flow rate at the detector as was obtained in the "A" mode.

11.2.2. Vial Prepressurizer Nitrogen.

11.2.2.1 After the nitrogen carrier is set, solve the following equation and adjust the pressure on the vial prepressurizer accordingly.

$$P = \frac{T_1}{T_2} \left[ P_1 - \frac{P_{w1} - P_{w2}}{7.50} \right] - 10kPa \qquad \text{Eq. 107-1}$$

Where:

T₁= Ambient temperature, °K (°R).

T₂= Conditioning bath temperature, °K (°R).

P₁= Gas chromatograph absolute dosing pressure (analysis mode), k Pa.

Pw1= Water vapor pressure 525.8 mm Hg @ 90 °C.

Pw2= Water vapor pressure 19.8 mm Hg @ 22 °C.

7.50 = mm Hg per k Pa.

10 kPa = Factor to adjust the prepressurized pressure to slightly less than the dosing pressure.

11.2.2.2 Because of gauge errors, the apparatus may over-pressurize the vial. If the vial pressure is at or higher than the dosing pressure, an audible double injection will occur. If the vial pressure is too low, errors will occur on resin samples because of inadequate time for head-space gas equilibrium. This condition can be avoided by running several standard gas samples at various pressures around the calculated pressure, and then selecting the highest pressure that does not produce a double injection. All samples and standards must be pressurized for 60 seconds using the vial prepressurizer. The vial is then placed into the 90 °C conditioning bath and tested for leakage by placing a drop of water on the septum at the needle hole. A clean, burr-free needle is mandatory.

11.2.3. Burner Air Supply. Set regulator on cylinder to read 50 psig. Set regulator on chromatograph to supply air to burner at a rate between 250 and 300 cc/min. Check with bubble flowmeter.

11.2.4. Hydrogen Supply. Set regulator on cylinder to read 30 psig. Set regulator on chromatograph to supply approximately 35 ±5 cc/min. Optimize hydrogen flow to yield the most sensitive detector response without extinguishing the flame. Check flow with bubble meter and record this flow.

11.3 Temperature Adjustments. Set temperatures as follows:

Page 94 of 181 (Subpart FF)

11.3.1. Oven (chromatograph column), 140 °C (280 °F).

11.3.2. Dosing Line, 150 °C (300 °F).

11.3.3. Injection Block, 170 °C (340 °F).

11.3.4. Sample Chamber, Water Temperature, 90 °C ±1.0 °C (194 °F ±1.8 °F).

11.4 Ignition of Flame Ionization Detector. Ignite the detector according to the manufacturer's instructions.

11.5 Amplifier Balance. Balance the amplifier according to the manufacturer's instructions.

11.6 Programming the Chromatograph. Program the chromatograph as follows:

11.6.1. I—Dosing or Injection Time. The normal setting is 2 seconds.

11.6.2. A—Analysis Time. The normal setting is approximately 70 percent of the VCM retention time. When this timer terminates, the programmer initiates backflushing of the first column.

11.6.3. B-Backflushing Time. The normal setting is double the analysis time.

11.6.4. W-Stabilization Time. The normal setting is 0.5 min to 1.0 min.

11.6.5. X—Number of Analyses Per Sample. The normal setting is one.

11.7. Sample Treatment. All samples must be recovered and analyzed within 24 hours after collection.

11.7.1 Resin Samples. The weight of the resin used must be between 0.1 and 4.5 grams. An exact weight must be obtained (within ±1 percent) for each sample. In the case of suspension resins, a volumetric cup can be prepared for holding the required amount of sample. When the cup is used, open the sample bottle, and add the cup volume of resin to the tared sample vial (tared, including septum and aluminum cap). Obtain the exact sample weight, add 100 ml or about two equal drops of water, and immediately seal the vial. Report this value on the data sheet; it is required for calculation of RVCM. In the case of dispersion resins, the cup cannot be used. Weigh the sample in an aluminum dish, transfer the sample to the tared vial, and accurately weigh it in the vial. After prepressurization of the samples, condition them for a minimum of 1 hour in the 90 °C (190 °F) bath. Do not exceed 5 hours. Prepressurization is not required if the sample weight, as analyzed, does not exceed 0.2 gram. It is also not required if solution of the prepressurization equation yields an absolute prepressurization value that is within 30 percent of the atmospheric pressure.

Note: Some aluminum vial caps have a center section that must be removed prior to placing into sample tray. If the cap is not removed, the injection needle will be damaged.

11.7.2 Suspension Resin Slurry and Wet Cake Samples. Decant the water from a wet cake sample, and turn the sample bottle upside down onto a paper towel. Wait for the water to drain, place approximately 0.2 to 4.0 grams of the wet cake sample in a tared vial (tared, including septum and aluminum cap) and seal immediately. Then determine the sample weight (1 percent). All samples weighing over 0.2 gram, must be prepressurized prior to conditioning for 1 hour at 90 °C (190 °F), except as noted in Section 11.7.1. A sample of wet cake is used to determine total solids (TS). This is required for calculating the RVCM.

11.7.3 Dispersion Resin Slurry and Geon Latex Samples. The materials should not be filtered. Sample must be thoroughly mixed. Using a tared vial (tared, including septum and aluminum cap) add approximately eight drops (0.25 to 0.35 g) of slurry or latex using a medicine dropper. This should be done immediately after mixing. Seal the vial as soon as possible. Determine sample weight (1 percent). Condition the vial for 1 hour at 90 °C (190 °F) in the analyzer bath. Determine the TS on the slurry sample (Section 11.10).

11.7.4 In-process Wastewater Samples. Using a tared vial (tared, including septum and aluminum cap) quickly add approximately 1 cc of water using a medicine dropper. Seal the vial as soon as possible. Determine sample weight (1 percent). Condition the vial for 1 hour at 90 °C (190 °F) in the analyzer bath.

11.8 Preparation of Sample Turntable.

11.8.1 Before placing any sample into turntable, be certain that the center section of the aluminum cap has been removed. The numbered sample vials should be placed in the corresponding numbered positions in the turntable. Insert samples in the following order:

11.8.1.1 Positions 1 and 2. Old 2000-ppm standards for conditioning. These are necessary only after the analyzer has not been used for 24 hours or longer.

11.8.1.2 Position 3. 50-ppm standard, freshly prepared.

11.8.1.3 Position 4. 500-ppm standard, freshly prepared.

11.8.1.4 Position 5. 2000-ppm standard, freshly prepared.

11.8.1.5 Position 6. 4000-ppm standard, freshly prepared.

11.8.1.6 Position 7. Sample No. 7 (This is the first sample of the day, but is given as 7 to be consistent with the turntable and the integrator printout.)

11.8.2 After all samples have been positioned, insert the second set of 50-, 500-, 2000-, and 4000-ppm standards. Samples, including standards, must be conditioned in the bath of 90 °C (190 °F) for a minimum of one hour and a maximum of five hours.

11.9 Start Chromatograph Program. When all samples, including standards, have been conditioned at 90 °C (190 °F) for at least one hour, start the analysis program according to the manufacturer's instructions. These instructions must be carefully followed when starting and stopping a program to prevent damage to the dosing assembly.

11.10 Determination of Total Solids. For wet cake, slurry, resin solution, and PVC latex samples, determine TS for each sample by accurately weighing approximately 3 to 4 grams of sample in an aluminum pan before and after placing in a draft oven (105 to 110 °C (221 to 230 °F)). Samples must be dried to constant weight. After first weighing, return the pan to the oven for a short period of time, and then reweigh to verify complete dryness. The TS are then calculated as the final sample weight divided by initial sample weight.

12.0 Calculations and Data Analysis

12.1 Nomenclature.

As= Chromatogram area counts of vinyl chloride for the sample, area counts.

As= Chromatogram area counts of vinyl chloride for the sample.

C_e= Concentration of vinyl chloride in the standard sample, ppm.

 $K_{o}$ = Henry's Law Constant for VCM in PVC 90 °C, 6.52 × 10⁻⁶g/g/mm Hg.

K_w= Henry's Law Constant for VCM in water 90 °C, 7 × 10⁻⁷g/g/mm Hg.

M_v= Molecular weight of VCM, 62.5 g/mole.

m = Sample weight, g.

P_a= Ambient atmospheric pressure, mm Hg.

R = Gas constant, (62360³ ml) (mm Hg)/(mole)(°K).

R_f= Response factor in area counts per ppm VCM.

R_s= Response factor, area counts/ppm.

T_I= Ambient laboratory temperature, °K.

Page 96 of 181 (Subpart FF)

TS = Total solids expressed as a decimal fraction.

T₂= Equilibrium temperature, °K.

V_g= Volume of vapor phase, ml.

$$= V_{y} - \frac{m(TS)}{1.36} - \frac{m(1 - TS)}{0.9653}$$

 $V_v$  = Vial volume,³ ml.

1.36 = Density of PVC at 90 °C, g/3 ml.

 $0.9653 = \text{Density of water at 90 °C, g/}^3 \text{ ml.}$ 

12.2 Response Factor. If the calibration curve described in Section 10.3 passes through zero, an average response factor, R_t, may be used to facilitate computation of vinyl chloride sample concentrations.

12.2.1 To compute R_f, first compute a response factor, R_s, for each sample as follows:

$$R_s = \frac{A_s}{C_c} \qquad \text{Eq. 107-2}$$

12.2.2 Sum the individual response factors, and calculate R_f. If the calibration curve does not pass through zero, use the calibration curve to determine each sample concentration.

12.3 Residual Vinyl Chloride Monomer Concentration, (Crvc) or Vinyl Chloride Monomer Concentration. Calculate Crvcin ppm or mg/kg as follows:

$$C_{rw} = \frac{A_{s}P_{a}}{R_{f}T_{1}} \left[ \frac{M_{v}V_{g}}{Rm} + K_{y}(TS)T_{2}K_{w}(1-TS)T_{2} \right] \qquad \text{Eq. 107-3}$$

Note: Results calculated using these equations represent concentration based on the total sample. To obtain results based on dry PVC content, divide by TS.

# 13.0 Method Performance

13.1 Range and Sensitivity. The lower limit of detection of vinyl chloride will vary according to the sampling and chromatographic system. The system should be capable of producing a measurement for a 50-ppm vinyl chloride standard that is at least 10 times the standard deviation of the system background noise level.

13.2 An interlaboratory comparison between seven laboratories of three resin samples, each split into three parts, yielded a standard deviation of 2.63 percent for a sample with a mean of 2.09 ppm, 4.16 percent for a sample with a mean of 1.66 ppm, and 5.29 percent for a sample with a mean of 62.66 ppm.

14.0 Pollution Prevention[Reserved]

15.0 Waste Management[Reserved]

## 16.0 References

1. B.F. Goodrich, Residual Vinyl Chloride Monomer Content of Polyvinyl Chloride Resins, Latex, Wet Cake, Slurry and Water Samples. B.F. Goodrich Chemical Group Standard Test Procedure No. 1005-E. B.F. Goodrich Technical Center, Avon Lake, Ohio. October 8, 1979.

2. Berens, A.R. The Diffusion of Vinyl Chloride in Polyvinyl Chloride. ACS-Division of Polymer Chemistry, Polymer Preprints 15 (2):197. 1974.

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5. Mansfield, R.A. The Evaluation of Henry's Law Constant (Kp) and Water Enhancement in the Perkin-Elmer Multifract F–40 Gas Chromatograph. B.F. Goodrich. Avon Lake, Ohio. February 10, 1978.

17.0 Tables, Diagrams, Flowcharts, and Validation Data[Reserved]

Method 107A—Determination of Vinyl Chloride Content of Solvents, Resin-Solvent Solution, Polyvinyl Chloride Resin, Resin Slurry, Wet Resin, and Latex Samples

#### Introduction

Performance of this method should not be attempted by persons unfamiliar with the operation of a gas chromatograph (GC) or by those who are unfamiliar with source sampling because knowledge beyond the scope of this presentation is required. Care must be exercised to prevent exposure of sampling personnel to vinyl chloride, a carcinogen.

### 1. Applicability and Principle

1.1 Applicability. This is an alternative method and applies to the measurement of the vinyl chloride content of solvents, resin solvent solutions, polyvinyl chloride (PVC) resin, wet cake slurries, latex, and fabricated resin samples. This method is not acceptable where methods from Section 304(h) of the Clean Water Act, 33 U.S.C. 1251 et seq., (the Federal Water Pollution Control Act Amendments of 1972 as amended by the Clean Water Act of 1977) are required.

1.2 Principle. The basis for this method lies in the direct injection of a liquid sample into a chromatograph and the subsequent evaporation of all volatile material into the carrier gas stream of the chromatograph, thus permitting analysis of all volatile material including vinyl chloride.

## 2. Range and Sensitivity

The lower limit of detection of vinyl chloride in dry PVC resin is 0.2 ppm. For resin solutions, latexes, and wet resin, this limit rises inversely as the nonvolatile (resin) content decreases.

With proper calibration, the upper limit may be extended as needed.

#### 3. Interferences

The chromatograph columns and the corresponding operating parameters herein described normally provide an adequate resolution of vinyl chloride. In cases where resolution interferences are encountered, the chromatograph operator shall select the column and operating parameters best suited to his particular analysis problem, subject to the approval of the Administrator. Approval is automatic, provided that the tester produces confirming data through an adequate supplemental analytical technique, such as analysis with a different column or GC/mass spectroscopy, and has the data available for review by the Administrator.

# 4. Precision and Reproducibility

A standard sample of latex containing 181.8 ppm vinyl chloride analyzed 10 times by the alternative method showed a standard deviation of 7.5 percent and a mean error of 0.21 percent.

A sample of vinyl chloride copolymer resin solution was analyzed 10 times by the alternative method and showed a standard deviation of 6.6 percent at a level of 35 ppm.

5. Safety

Do not release vinyl chloride to the laboratory atmosphere during preparation of standards. Venting or purging with vinyl chloride monomer (VCM) air mixtures must be held to minimum. When purging is required, the vapor must be routed to outside air. Vinyl chloride, even at low-ppm levels, must never be vented inside the laboratory.

6. Apparatus

6.1 Sampling. The following equipment is required:

6.1.1 Glass Bottles. 16-oz wide mouth wide polyethylene-lined, screw-on tops.

- 6.1.2 Adhesive Tape. To prevent loosening of bottle tops.
- 6.2 Sample Recovery. The following equipment is required:
- 6.2.1 Glass Vials. 20-ml capacity with polycone screw caps.
- 6.2.2 Analytical Balance. Capable of weighing to ±0.01 gram.
- 6.2.3 Syringe. 50-microliter size, with removable needle.
- 6.2.4 Fritted Glass Sparger. Fine porosity.
- 6.2.5 Aluminum Weighing Dishes.
- 6.2.6 Sample Roller or Shaker. To help dissolve sample.
- 6.3 Analysis. The following equipment is required:
- 6.3.1 Gas Chromatograph. Hewlett Packard Model 5720A or equivalent.

6.3.2 Chromatograph Column. Stainless steel, 6.1 m by 3.2 mm, packed with 20 percent Tergitol E–35 on Chromosorb W AW 60/80 mesh. The analyst may use other columns provided that the precision and accuracy of the analysis of vinyl chloride standards are not impaired and that he has available for review information confirming that there is adequate resolution of the vinyl chloride peak. (Adequate resolution is defined as an area overlap of not more than 10 percent of the vinyl chloride peak by an interfering peak. Calculation of area overlap is explained in Apendix C, Procedure 1: "Determination of Adequate Chromatographic Peak Resolution.")

6.3.3 Valco Instrument Six-Port Rotary Valve. For column back flush.

6.3.4 Septa. For chromatograph injection port.

6.3.5 Injection Port Liners. For chromatograph used.

6.3.6 Regulators. For required gas cylinders.

6.3.7 Soap Film Flowmeter. Hewlett Packard No. 0101-0113 or equivalent.

- 6.4 Calibration. The following equipment is required:
- 6.4.1 Analytical Balance. Capable of weighing to ±0.0001 g.
- 6.4.2 Erlenmeyer Flask With Glass Stopper. 125 ml.
- 6.4.3 Pipets. 0.1, 0.5, 1, 5, 10, and 50 ml.
- 6.4.4 Volumetric Flasks, 10 and 100 ml.
- 7. Reagents

Use only reagents that are of chromatograph grade.

7.1 Analysis. The following items are required:

7.1.1 Hydrogen Gas. Zero grade.

7.1.2 Nitrogen Gas. Zero grade.

7.1.3 Air. Zero grade.

7.1.4 Tetrahydrofuran (THF). Reagent grade.

Analyze the THF by injecting 10 microliters into the prepared gas chromatograph. Compare the THF chromatogram with that shown in Figure 107A–1. If the chromatogram is comparable to A, the THF should be sparged with pure nitrogen for approximately 2 hours using the fritted glass sparger to attempt to remove the interfering peak. Reanalyze the sparged THF to determine whether the THF is acceptable for use. If the scan is comparable to B, the THF should be acceptable for use in the analysis.



7.1.5 N, N-Dimethylacetamide (DMAC). Spectrographic grade. For use in place of THF.

7.2 Calibration. The following item is required:

7.2.1 Vinyl Chloride 99.9 Percent. Ideal Gas Products lecture bottle, or equivalent. For preparation of standard solutions.

#### 8. Procedure

8.1 Sampling. Allow the liquid or dried resin to flow from a tap on the tank, silo, or pipeline until the tap has been purged. Fill a wide-mouth pint bottle, and immediately tightly cap the bottle. Place an identifying label on each bottle and record the date, time, sample location, and material.

8.2 Sample Treatment. Sample must be run within 24 hours.

8.2.1 Resin Samples. Weigh 9.00 ±0.01 g of THF or DMAC in a tared 20-ml vial. Add 1.00 ±0.01 g of resin to the tared vial containing the THF or DMAC. Close the vial tightly with the screw cap, and shake or otherwise agitate the vial until complete solution of the resin is obtained. Shaking may require several minutes to several hours, depending on the nature of the resin.

8.2.2 Suspension Resin Slurry and Wet Resin Sample. Slurry must be filtered using a small Buchner funnel with vacuum to yield a wet resin sample. The filtering process must be continued only as long as a steady stream of water is exiting from the funnel. Excessive filtration time could result in some loss of VCM. The wet resin sample is weighed into a tared 20-ml vial with THF or DMAC as described earlier for resin samples (8.2.1) and treated the same as the resin sample. A sample of the wet resin is used to determine total solids as required for calculating the residual VCM (Section 8.3.4).

8.2.3 Latex and Resin Solvent Solutions. Samples must be thoroughly mixed. Weigh 1.00  $\pm$ 0.01 g of the latex or resinsolvent solution into a 20-ml vial containing 9.00  $\pm$ 0.01 g of THF or DMAC as for the resin samples (8.2.1). Cap and shake until complete solution is obtained. Determine the total solids of the latex or resin solution sample (Section 8.3.4). 8.2.4 Solvents and Non-viscous Liquid Samples. No preparation of these samples is required. The neat samples are injected directly into the GC.

8.3 Analysis.

8.3.1 Preparation of GC. Install the chromatographic column, and condition overnight at 70 °C. Do not connect the exit end of the column to the detector while conditioning.

8.3.1.1 Flow Rate Adjustments. Adjust the flow rate as follows:

a. Nitrogen Carrier Gas. Set regulator on cylinder to read 60 psig. Set column flow controller on the chromatograph using the soap film flowmeter to yield a flow rate of 40 cc/min.

b. Burner Air Supply. Set regulator on the cylinder at 40 psig. Set regulator on the chromatograph to supply air to the burner to yield a flow rate of 250 to 300 cc/min using the flowmeter.

c. Hydrogen. Set regulator on cylinder to read 60 psig. Set regulator on the chromatograph to supply 30 to 40 cc/min using the flowmeter. Optimize hydrogen flow to yield the most sensitive detector response without extinguishing the flame. Check flow with flowmeter and record this flow.

d. Nitrogen Back Flush Gas. Set regulator on the chromatograph using the soap film flowmeter to yield a flow rate of 40 cc/min.

8.3.1.2 Temperature Adjustments. Set temperature as follows:

a. Oven (chromatographic column) at 70 °C.

b. Injection Port at 100 °C.

c. Detector at 300 °C.

8.3.1.3 Ignition of Flame Ionization Detector. Ignite the detector according to the manufacturer's instructions. Allow system to stabilize approximately 1 hour.

8.3.1.4 Recorder. Set pen at zero and start chart drive.

8.3.1.5 Attenuation. Set attenuation to yield desired peak height depending on sample VCM content.

8.3.2 Chromatographic Analyses.

a. Sample Injection. Remove needle from 50-microliter syringe. Open sample vial and draw 50-microliters of THF or DMAC sample recovery solution into the syringe. Recap sample vial. Attach needle to the syringe and while holding the syringe vertically (needle uppermost), eject 40 microliters into an absorbent tissue. Wipe needle with tissue. Now inject 10 microliters into chromatograph system. Repeat the injection until two consecutive values for the height of the vinyl chloride peak do not vary more than 5 percent. Use the average value for these two peak heights to compute the sample concentration.

b. Back Flush. After 4 minutes has elapsed after sample injection, actuate the back flush valve to purge the first 4 feet of the chromatographic column of solvent and other high boilers.

c. Sample Data. Record on the chromatograph strip chart the data from the sample label.

d. Elution Time. Vinyl chloride elutes at 2.8 minutes. Acetaldehyde elutes at 3.7 minutes. Analysis is considered complete when chart pen becomes stable. After 5 minutes, reset back flush valve and inject next sample.

8.3.3 Chromatograph Servicing.

a. Septum. Replace after five sample injections.

b. Sample Port Liner. Replace the sample port liner with a clean spare after five sample injections.

c. Chromatograph Shutdown. If the chromatograph has been shut down overnight, rerun one or more samples from the preceding day to test stability and precision prior to starting on the current day's work.

8.3.4 Determination of Total Solids (TS). For wet resin, resin solution, and PVC latex samples, determine the TS for each sample by accurately weighing approximately 3 to 5 grams of sample into a tared aluminum pan. The initial procedure is as follows:

a. Where water is the major volatile component: Tare the weighing dish, and add 3 to 5 grams of sample to the dish. Weigh to the nearest milligram.

b. Where volatile solvent is the major volatile component: Transfer a portion of the sample to a 20-ml screw cap vial and cap immediately. Weigh the vial to the nearest milligram. Uncap the vial and transfer a 3- to 5-gram portion of the sample to a tared aluminum weighing dish. Recap the vial and reweigh to the nearest milligram. The vial weight loss is the sample weight.

To continue, place the weighing pan in a 130 °C oven for 1 hour. Remove the dish and allow to cool to room temperature in a desiccator. Weigh the pan to the nearest 0.1 mg. Total solids is the weight of material in the aluminum pan after heating divided by the net weight of sample added to the pan originally times 100.

9. Calibration of the Chromatograph

9.1 Preparation of Standards. Prepare a 1 percent by weight (approximate) solution of vinyl chloride in THF or DMAC by bubbling vinyl chloride gas from a cylinder into a tared 125-ml glass-stoppered flask containing THF or DMAC. The weight of vinyl chloride to be added should be calculated prior to this operation, i.e., 1 percent of the weight of THF or DMAC contained in the tared flask. This must be carried out in a laboratory hood. Adjust the vinyl chloride flow from the cylinder so that the vinyl chloride dissolves essentially completely in the THF or DMAC and is not blown to the atmosphere. Take particular care not to volatize any of the solution. Stopper the flask and swirl the solution to effect complete mixing. Weigh the stoppered flask to nearest 0.1 mg to determine the exact amount of vinyl chloride added.

Pipet 10 ml of the approximately 1 percent solution into a 100-ml glass-stoppered volumetric flask, and add THF or DMAC to fill to the mark. Cap the flask and invert 10 to 20 times. This solution contains approximately 1,000 ppm by weight of vinyl chloride (note the exact concentration).

Pipet 50-, 10-, 5-, 1-, 0.5-, and 0.1-ml aliquots of the approximately 1,000 ppm solution into 10 ml glass stoppered volumetric flasks. Dilute to the mark with THF or DMAC, cap the flasks and invert each 10 to 20 times. These solutions contain approximately 500, 100, 50, 10, 5, and 1 ppm vinyl chloride. Note the exact concentration of each one. These standards are to be kept under refrigeration in stoppered bottles, and must be renewed every 3 months.

9.2 Preparation of Chromatograph Calibration Curve.

Obtain the GC for each of the six final solutions prepared in Section 9.1 by using the procedure in Section 8.3.2. Prepare a chart plotting peak height obtained from the chromatogram of each solution versus the known concentration. Draw a straight line through the points derived by the least squares method.

10. Calculations

10.1 Response Factor. From the calibration curve described in Section 9.2, select the value of  $C_c$  that corresponds to  $H_c$  for each sample. Compute the response factor,  $R_f$ , for each sample as follows:

$$R_f = \frac{C_c}{H_c} \qquad \qquad \text{Eq. 107A-1}$$

where:

R_f=Chromatograph response factor, ppm/mm.

C_c=Concentration of vinyl chloride in the standard sample, ppm.

H_c=Peak height of the standard sample, mm.

Page 102 of 181 (Subpart FF)

10.2 Residual vinyl chloride monomer concentration (Crvc) or vinyl chloride monomer concentration in resin:

$$C_{nc} = 10H_s R_f$$
 Eq. 107A-2

Where:

Crvc=Concentration of residual vinyl chloride monomer, ppm.

H_s=Peak height of sample, mm.

R_f=Chromatograph response factor.

10.3 Samples containing volatile material, i.e., resin solutions, wet resin, and latexes:

$$C_{mc} = \frac{H_s R_f(1,000)}{TS}$$
 Eq. 107A-3

where:

TS=Total solids in the sample, weight fraction.

10.4 Samples of solvents and in process wastewater:

$$C_{rec} = \frac{H_s R_f}{0.888}$$
 Eq. 107A-4

Where:

0.888=Specific gravity of THF.

11. Bibliography

1. Communication from R. N. Wheeler, Jr.; Union Carbide Corporation. Part 61 National Emissions Standards for Hazardous Air Pollutants appendix B, Method 107---Alternate Method, September 19, 1977.

Method 108-Determination of Particulate and Gaseous Arsenic Emissions

Note: This method does not include all of the specifications (*e.g.*, equipment and supplies) and procedures (*e.g.*, sampling and analytical) essential to its performance. Some material is incorporated by reference from other methods in appendix A to 40 CFR part 60. Therefore, to obtain reliable results, persons using this method should have a thorough knowledge of at least the following additional test methods: Method 1, Method 2, Method 3, Method 5, and Method 12.

1.0 Scope and Application.

1.1 Analytes.

Analyte	CAS No.	Sensitivity
Arsenic compounds as arsenic (As)	7440–38–2	Lower limit 10 µg/ml or less.

1.2 Applicability. This method is applicable for the determination of inorganic As emissions from stationary sources as specified in an applicable subpart of the regulations.

1.3 Data Quality Objectives. Adherence to the requirements of this method will enhance the quality of the data obtained from air pollutant sampling methods.

## 2.0 Summary of Method

Particulate and gaseous As emissions are withdrawn isokinetically from the source and are collected on a glass mat filter and in water. The collected arsenic is then analyzed by means of atomic absorption spectrophotometry (AAS).

3.0 Definitions.[Reserved]

4.0 Interferences

Analysis for As by flame AAS is sensitive to the chemical composition and to the physical properties (*e.g.*, viscosity, pH) of the sample. The analytical procedure includes a check for matrix effects (Section 11.5).

5.0 Safety

5.1 This method may involve hazardous materials, operations, and equipment. This test method may not address all of the safety problems associated with its use. It is the responsibility of the user to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to performing this test method.

5.2 Corrosive reagents. The following reagents are hazardous. Personal protective equipment and safe procedures that prevent chemical splashes are recommended. If contact occurs, immediately flush with copious amounts of water for at least 15 minutes. Remove clothing under shower and decontaminate. Treat residual chemical burns as thermal burns.

5.2.1 Hydrochloric Acid (HCI). Highly corrosive liquid with toxic vapors. Vapors are highly irritating to eyes, skin, nose, and lungs, causing severe damage. May cause bronchitis, pneumonia, or edema of lungs. Exposure to concentrations of 0.13 to 0.2 percent can be lethal to humans in a few minutes. Provide ventilation to limit exposure. Reacts with metals, producing hydrogen gas.

5.2.2 Hydrogen Peroxide (H₂O₂). Very harmful to eyes. 30% H₂O₂can burn skin, nose, and lungs.

5.2.3 Nitric Acid (HNO₃). Highly corrosive to eyes, skin, nose, and lungs. Vapors are highly toxic and can cause bronchitis, pneumonia, or edema of lungs. Reaction to inhalation may be delayed as long as 30 hours and still be fatal. Provide ventilation to limit exposure. Strong oxidizer. Hazardous reaction may occur with organic materials such as solvents.

5.2.4 Sodium Hydroxide (NaOH). Causes severe damage to eyes and skin. Inhalation causes irritation to nose, throat, and lungs. Reacts exothermically with small amounts of water.

6.0 Equipment and Supplies

6.1 Sample Collection. A schematic of the sampling train used in performing this method is shown in Figure 108–1; it is similar to the Method 5 sampling train of 40 CFR part 60, appendix A. The following items are required for sample collection:

6.1.1 Probe Nozzle, Probe Liner, Pitot Tube, Differential Pressure Gauge, Filter Holder, Filter Heating System, Temperature Sensor, Metering System, Barometer, and Gas Density Determination Equipment. Same as Method 5, Sections 6.1.1.1 to 6.1.1.7, 6.1.1.9, 6.1.2, and 6.1.3, respectively.

6.1.2 Impingers. Four impingers connected in series with leak-free ground-glass fittings or any similar leak-free noncontaminating fittings. For the first, third, and fourth impingers, use the Greenburg-Smith design, modified by replacing the tip with a 1.3-cm ID (0.5-in.) glass tube extending to about 1.3 cm (0.5 in.) from the bottom of the flask. For the second impinger, use the Greenburg-Smith design with the standard tip. Modifications (*e.g.*, flexible connections between the impingers, materials other than glass, or flexible vacuum lines to connect the filter holder to the condenser) are subject to the approval of the Administrator.

6.1.3 Temperature Sensor. Place a temperature sensor, capable of measuring temperature to within 1 °C (2 °F), at the outlet of the fourth impinger for monitoring purposes.

6.2 Sample Recovery. The following items are required for sample recovery:

Page 104 of 181 (Subpart FF)

6.2.1 Probe-Liner and Probe-Nozzle Brushes, Petri Dishes, Graduated Cylinder and/or Balance, Plastic Storage Containers, and Funnel and Rubber Policeman. Same as Method 5, Sections 6.2.1 and 6.2.4 to 6.2.8, respectively.

6.2.2 Wash Bottles. Polyethylene (2).

6.2.3 Sample Storage Containers. Chemically resistant, polyethylene or polypropylene for glassware washes, 500- or 1000-ml.

6.3 Analysis. The following items are required for analysis:

6.3.1 Spectrophotometer. Equipped with an electrodeless discharge lamp and a background corrector to measure absorbance at 193.7 nanometers (nm). For measuring samples having less than 10 µg As/ml, use a vapor generator accessory or a graphite furnace.

6.3.2 Recorder. To match the output of the spectrophotometer.

6.3.3 Beakers. 150 ml.

6.3.4 Volumetric Flasks. Glass 50-, 100-, 200-, 500-, and 1000-ml; and polypropylene, 50-ml.

6.3.5 Balance. To measure within 0.5 g.

6.3.6 Volumetric Pipets. 1-, 2-, 3-, 5-, 8-, and 10-ml.

6.3.7 Oven.

6.3.8 Hot Plate.

7.0 Reagents and Standards

Unless otherwise indicated, it is intended that all reagents conform to the specifications established by the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available; otherwise, use the best available grade.

7.1 The following reagents are required for sample collection:

7.1.1 Filters. Same as Method 5, Section 7.1.1, except that the filters need not be unreactive to SO₂.

7.1.2 Silica Gel, Crushed Ice, and Stopcock Grease. Same as Method 5, Sections 7.1.2, 7.1.4, and 7.1.5, respectively.

7.1.3 Water. Deionized distilled to meet ASTM D 1193–77 or 91 (incorporated by reference-see §61.18), Type 3. When high concentrations of organic matter are not expected to be present, the KMnO4test for oxidizable organic matter may be omitted.

7.2 Sample Recovery.

7.2.1 0.1 N NaOH. Dissolve 4.00 g of NaOH in about 500 ml of water in a 1-liter volumetric flask. Then, dilute to exactly 1.0 liter with water.

7.3 Analysis. The following reagents and standards are required for analysis:

7.3.1 Water. Same as Section 7.1.3.

7.3.2 Sodium Hydroxide, 0.1 N. Same as in Section 7.2.1.

7.3.3 Sodium Borohydride (NaBH₄), 5 Percent Weight by Volume (W/V). Dissolve 50.0 g of NaBH₄in about 500 ml of 0.1 N NaOH in a 1-liter volumetric flask. Then, dilute to exactly 1.0 liter with 0.1 N NaOH.

7.3.4 Hydrochloric Acid, Concentrated.

Page 105 of 181 (Subpart FF)

7.3.5 Potassium lodide (KI), 30 Percent (W/V). Dissolve 300 g of KI in 500 ml of water in a 1 liter volumetric flask. Then, dilute to exactly 1.0 liter with water.

7.3.6 Nitric Acid, Concentrated.

7.3.7 Nitric Acid, 0.8 N. Dilute 52 ml of concentrated HNO₃to exactly 1.0 liter with water.

7.3.8 Nitric Acid, 50 Percent by Volume (V/V). Add 50 ml concentrated HNO₃to 50 ml water.

7.3.9 Stock Arsenic Standard, 1 mg As/ml. Dissolve 1.3203 g of primary standard grade  $As_2O_sin 20$  ml of 0.1 N NaOH in a 150 ml beaker. Slowly add 30 ml of concentrated HNO₃. Heat the resulting solution and evaporate just to dryness. Transfer the residue quantitatively to a 1-liter volumetric flask, and dilute to 1.0 liter with water.

7.3.10 Arsenic Working Solution, 1.0  $\mu$ g As/ml. Pipet exactly 1.0 ml of stock arsenic standard into an acid-cleaned, appropriately labeled 1-liter volumetric flask containing about 500 ml of water and 5 ml of concentrated HNO₃. Dilute to exactly 1.0 liter with water.

7.3.11 Air. Suitable quality for AAS analysis.

7.3.12 Acetylene. Suitable quality for AAS analysis.

7.3.13 Nickel Nitrate, 5 Percent Ni (W/V). Dissolve 24.780 g of nickel nitrate hexahydrate [Ni(NO₃)₂ $6H_2O$ ] in water in a 100-ml volumetric flask, and dilute to 100 ml with water.

7.3.14 Nickel Nitrate, 1 Percent Ni (W/V). Pipet 20 ml of 5 percent nickel nitrate solution into a 100-ml volumetric flask, and dilute to exactly 100 ml with water.

7.3.15 Hydrogen Peroxide, 3 Percent by Volume. Pipet 50 ml of 30 percent  $H_2O_2$ into a 500-ml volumetric flask, and dilute to exactly 500 ml with water.

7.3.16 Quality Assurance Audit Samples. When making compliance determinations, and upon availability, audit samples may be obtained from the appropriate EPA regional Office or from the responsible enforcement authority.

Note: The responsible enforcement authority should be notified at least 30 days prior to the test date to allow sufficient time for sample delivery.

8.0 Sample Collection, Preservation, Transport, and Storage

8.1 Pretest Preparation. Follow the general procedure given in Method 5, Section 8.1, except the filter need not be weighed, and the 200 ml of 0.1N NaOH and Container 4 should be tared to within 0.5 g.

8.2 Preliminary Determinations. Follow the general procedure given in Method 5, Section 8.2, except select the nozzle size to maintain isokinetic sampling rates below 28 liters/min (1.0 cfm).

8.3 Preparation of Sampling Train. Follow the general procedure given in Method 5, Section 8.3.

8.4 Leak-Check Procedures. Same as Method 5, Section 8.4.

8.5 Sampling Train Operation. Follow the general procedure given in Method 5, Section 8.5, except maintain isokinetic sampling flow rates below 28 liters/min (1.0 cfm). For each run, record the data required on a data sheet similar to the one shown in Figure 108–2.

8.6 Calculation of Percent Isokinetic. Same as Method 5, Section 8.6.

8.7 Sample Recovery. Same as Method 5, Section 8.7, except that 0.1 N NaOH is used as the cleanup solvent instead of acetone and that the impinger water is treated as follows:

8.7.1 Container Number 4 (Impinger Water). Clean each of the first three impingers and connecting glassware in the following manner:

Page 106 of 181 (Subpart FF)

8.7.1.1 Wipe the impinger ball joints free of silicone grease, and cap the joints.

8.7.1.2 Rotate and agitate each of the first two impingers, using the impinger contents as a rinse solution.

8.7.1.3 Transfer the liquid from the first three impingers to Container Number 4. Remove the outlet ball-joint cap, and drain the contents through this opening. Do not separate the impinger parts (inner and outer tubes) while transferring their contents to the container.

8.7.1.4 Weigh the contents of Container No. 4 to within 0.5 g. Record in the log the weight of liquid along with a notation of any color or film observed in the impinger catch. The weight of liquid is needed along with the silica gel data to calculate the stack gas moisture content.

Note: Measure and record the total amount of 0.1 N NaOH used for rinsing under Sections 8.7.1.5 and 8.7.1.6.

8.7.1.5 Pour approximately 30 ml of 0.1 NaOH into each of the first two impingers, and agitate the impingers. Drain the 0.1 N NaOH through the outlet arm of each impinger into Container Number 4. Repeat this operation a second time; Inspect the impingers for any abnormal conditions.

8.7.1.6 Wipe the ball joints of the glassware connecting the impingers and the back half of the filter holder free of silicone grease, and rinse each piece of glassware twice with 0.1 N NaOH; transfer this rinse into Container Number 4. (DO NOT RINSE or brush the glass-fritted filter support.) Mark the height of the fluid level to determine whether leakage occurs during transport. Label the container to identify clearly its contents.

8.8 Blanks.

8.8.1 Sodium Hydroxide. Save a portion of the 0.1 N NaOH used for cleanup as a blank. Take 200 ml of this solution directly from the wash bottle being used and place it in a plastic sample container labeled "NaOH blank."

8.8.2 Water. Save a sample of the water, and place it in a container labeled "H₂O blank."

8.8.3 Filter. Save two filters from each lot of filters used in sampling. Place these filters in a container labeled "filter blank."

9.0 Quality Control

9.1 Miscellaneous Quality Control Measures.

Section	Quality control measure	Effect
8.4, 10.1	Sampling equipment leak-checks and calibration	Ensures accuracy and precision of sampling measurements.
10.4	Spectrophotometer calibration	Ensures linearity of spectrophotometer response to standards.
11.5	Check for matrix effects	Eliminates matrix effects.
11.6	Audit sample analysis	Evaluates analyst's technique and standards preparation.

9.2 Volume Metering System Checks. Same as Method 5, Section 9.2.

10.0 Calibration and Standardization

Note: Maintain a laboratory log of all calibrations.

10.1 Sampling Equipment. Same as Method 5, Section 10.0.

Page 107 of 181 (Subpart FF)

10.2 Preparation of Standard Solutions.

10.2.1 For the high level procedure, pipet 1, 3, 5, 8, and 10 ml of the 1.0 mg As/ml stock solution into separate 100 ml volumetric flasks, each containing 5 ml of concentrated HNO₃. Dilute to the mark with water.

10.2.2 For the low level vapor generator procedure, pipet 1, 2, 3, and 5 ml of 1.0 µg As/ml standard solution into separate reaction tubes. Dilute to the mark with water.

10.2.3 For the low level graphite furnace procedure, pipet 1, 5, 10 and 15 ml of 1.0  $\mu$ g As/ml standard solution into separate flasks along with 2 ml of the 5 percent nickel nitrate solution and 10 ml of the 3 percent H₂O₂solution. Dilute to the mark with water.

10.3 Calibration Curve. Analyze a 0.8 N HNO₃blank and each standard solution according to the procedures outlined in section 11.4.1. Repeat this procedure on each standard solution until two consecutive peaks agree within 3 percent of their average value. Subtract the average peak height (or peak area) of the blank—which must be less than 2 percent of recorder full scale—from the averaged peak height of each standard solution. If the blank absorbance is greater than 2 percent of full-scale, the probable cause is As contamination of a reagent or carry-over of As from a previous sample. Prepare the calibration curve by plotting the corrected peak height of each standard solution versus the corresponding final total As weight in the solution.

10.4 Spectrophotometer Calibration Quality Control. Calculate the least squares slope of the calibration curve. The line must pass through the origin or through a point no further from the origin than  $\pm 2$  percent of the recorder full scale. Multiply the corrected peak height by the reciprocal of the least squares slope to determine the distance each calibration point lies from the theoretical calibration line. The difference between the calculated concentration values and the actual concentrations (*e.g.*, 1, 3, 5, 8, and 10 mg As for the high-level procedure) must be less than 7 percent for all standards.

Note: For instruments equipped with direct concentration readout devices, preparation of a standard curve will not be necessary. In all cases, follow calibration and operational procedures in the manufacturers' instruction manual.

11.0 Analytical Procedure

11.1 Sample Loss Check. Prior to analysis, check the liquid level in Containers Number 2 and Number 4. Note on the analytical data sheet whether leakage occurred during transport. If a noticeable amount of leakage occurred, either void the sample or take steps, subject to the approval of the Administrator, to adjust the final results.

11.2 Sample Preparation.

11.2.1 Container Number 1 (Filter). Place the filter and loose particulate matter in a 150 ml beaker. Also, add the filtered solid material from Container Number 2 (see Section 11.2.2). Add 50 ml of 0.1 N NaOH. Then stir and warm on a hot plate at low heat (do not boil) for about 15 minutes. Add 10 ml of concentrated HNO₃, bring to a boil, then simmer for about 15 minutes. Filter the solution through a glass fiber filter. Wash with hot water, and catch the filtrate in a clean 150 ml beaker. Boil the filtrate, and evaporate to dryness. Cool, add 5 ml of 50 percent HNO₃, and then warm and stir. Allow to cool. Transfer to a 50-ml volumetric flask, dilute to volume with water, and mix well.

11.2.2 Container Number 2 (Probe Wash).

11.2.2.1 Filter (using a glass fiber filter) the contents of Container Number 2 into a 200 ml volumetric flask. Combine the filtered (solid) material with the contents of Container Number 1 (Filter).

11.2.2.2 Dilute the filtrate to exactly 200 ml with water. Then pipet 50 ml into a 150 ml beaker. Add 10 ml of concentrated HNO₃, bring to a boil, and evaporate to dryness. Allow to cool, add 5 ml of 50 percent HNO₃, and then warm and stir. Allow the solution to cool, transfer to a 50-ml volumetric flask, dilute to volume with water, and mix well.

11.2.3 Container Number 4 (Impinger Solution). Transfer the contents of Container Number 4 to a 500 ml volumetric flask, and dilute to exactly 500-ml with water. Pipet 50 ml of the solution into a 150-ml beaker. Add 10 ml of concentrated HNO₃, bring to a boil, and evaporate to dryness. Allow to cool, add 5 ml of 50 percent HNO₃, and then warm and stir. Allow the solution to cool, transfer to a 50-ml volumetric flask, dilute to volume with water, and mix well.

11.2.4 Filter Blank. Cut each filter into strips, and treat each filter individually as directed in Section 11.2.1, beginning with the sentence, "Add 50 ml of 0.1 N NaOH."

Page 108 of 181 (Subpart FF)
11.2.5 Sodium Hydroxide and Water Blanks. Treat separately 50 ml of 0.1 N NaOH and 50 ml water, as directed under Section 11.2.3, beginning with the sentence, "Pipet 50 ml of the solution into a 150-ml beaker."

11.3 Spectrophotometer Preparation. Turn on the power; set the wavelength, slit width, and lamp current. Adjust the background corrector as instructed by the manufacturer's manual for the particular atomic absorption spectrophotometer. Adjust the burner and flame characteristics as necessary.

11.4 Analysis. Calibrate the analytical equipment and develop a calibration curve as outlined in Sections 10.2 through 10.4.

11.4.1 Arsenic Samples. Analyze an appropriately sized aliquot of each diluted sample (from Sections 11.2.1 through 11.2.3) until two consecutive peak heights agree within 3 percent of their average value. If applicable, follow the procedures outlined in Section 11.4.1.1. If the sample concentration falls outside the range of the calibration curve, make an appropriate dilution with 0.8 N HNO₃so that the final concentration falls within the range of the curve. Using the calibration curve, determine the arsenic concentration in each sample fraction.

Note: Because instruments vary between manufacturers, no detailed operating instructions will be given here. Instead, the instrument manufacturer's detailed operating instructions should be followed.

11.4.1.1 Arsenic Determination at Low Concentration. The lower limit of flame AAS is 10 µg As/ml. If the arsenic concentration of any sample is at a lower level, use the graphite furnace or vapor generator which is available as an accessory component. Flame, graphite furnace, or vapor generators may be used for samples whose concentrations are between 10 and 30 µg/ml. Follow the manufacturer's instructions in the use of such equipment.

11.4.1.1.1 Vapor Generator Procedure. Place a sample containing between 0 and 5 µg of arsenic in the reaction tube, and dilute to 15 ml with water. Since there is some trial and error involved in this procedure, it may be necessary to screen the samples by conventional atomic absorption until an approximate concentration is determined. After determining the approximate concentration, adjust the volume of the sample accordingly. Pipet 15 ml of concentrated HCl into each tube. Add 1 ml of 30 percent Kl solution. Place the reaction tube into a 50 °C (120 °F) water bath for 5 minutes. Cool to room temperature. Connect the reaction tube to the vapor generator assembly. When the instrument response has returned to baseline, inject 5.0 ml of 5 percent NaBH₄, and integrate the resulting spectrophotometer signal over a 30-second time period.

11.4.1.1.2 Graphite Furnace Procedure. Dilute the digested sample so that a 5 ml aliquot contains less than 1.5 µg of arsenic. Pipet 5 ml of this digested solution into a 10-ml volumetric flask. Add 1 ml of the 1 percent nickel nitrate solution, 0.5 ml of 50 percent HNO₃, and 1 ml of the 3 percent hydrogen peroxide and dilute to 10 ml with water. The sample is now ready for analysis.

11.4.1.2 Run a blank (0.8 N HNO₃) and standard at least after every five samples to check the spectrophotometer calibration. The peak height of the blank must pass through a point no further from the origin than ±2 percent of the recorder full scale. The difference between the measured concentration of the standard (the product of the corrected average peak height and the reciprocal of the least squares slope) and the actual concentration of the standard must be less than 7 percent, or recalibration of the analyzer is required.

11.4.1.3 Determine the arsenic concentration in the filter blank (i.e., the average of the two blank values from each lot).

11.4.2 Container Number 3 (Silica Gel). This step may be conducted in the field. Weigh the spent silica gel (or silica gel plus impinger) to the nearest 0.5 g; record this weight.

11.5 Check for matrix effects on the arsenic results. Same as Method 12, Section 11.5.

11.6 Audit Sample Analysis.

11.6.1 When the method is used to analyze samples to demonstrate compliance with a source emission regulation, a set of EPA audit samples must be analyzed, subject to availability.

11.6.2 Concurrently analyze the audit samples and the compliance samples in the same manner to evaluate the technique of the analyst and the standards preparation.

Note: It is recommended that known quality control samples be analyzed prior to the compliance and audit sample analyses to optimize the system accuracy and precision. These quality control samples may be obtained by contacting the appropriate EPA regional Office or the responsible enforcement authority.

11.6.3 The same analyst, analytical reagents, and analytical system shall be used for the compliance samples and the EPA audit samples. If this condition is met, duplicate auditing of subsequent compliance analyses for the same enforcement agency within a 30-day period is waived. An audit sample set may not be used to validate different sets of compliance samples under the jurisdiction of separate enforcement agencies, unless prior arrangements have been made with both enforcement agencies.

11.7 Audit Sample Results.

11.7.1 Calculate the audit sample concentrations in g/mand submit results using the instructions provided with the audit samples.

11.7.2 Report the results of the audit samples and the compliance determination samples along with their identification numbers, and the analyst's name to the responsible enforcement authority. Include this information with reports of any subsequent compliance analyses for the same enforcement authority during the 30-day period.

11.7.3 The concentrations of the audit samples obtained by the analyst shall agree within 10 percent of the actual concentrations. If the 10 percent specification is not met, reanalyze the compliance and audit samples, and include initial and reanalysis values in the test report.

11.7.4 Failure to meet the 10 percent specification may require retests until the audit problems are resolved. However, if the audit results do not affect the compliance or noncompliance status of the affected facility, the Administrator may waive the reanalysis requirement, further audits, or retests and accept the results of the compliance test. While steps are being taken to resolve audit analysis problems, the Administrator may also choose to use the data to determine the compliance or noncompliance status of the affected facility.

12.0 Data Analysis and Calculations

12.1 Nomenclature.

B_{ws}= Water in the gas stream, proportion by volume.

Ca= Concentration of arsenic as read from the standard curve, µg/ml.

C_c= Actual audit concentration, g/m³.

 $C_d$ = Determined audit concentration, g/m³.

Cs= Arsenic concentration in stack gas, dry basis, converted to standard conditions, g/dsm³ (gr/dscf).

E_a= Arsenic mass emission rate, g/hr (lb/hr).

F_d= Dilution factor (equals 1 if the sample has not been diluted).

I = Percent of isokinetic sampling.

m_b= Total mass of all four impingers and contents before sampling, g.

m_i= Total mass of all four impingers and contents after sampling, g.

m_n= Total mass of arsenic collected in a specific part of the sampling train, µg.

mt= Total mass of arsenic collected in the sampling train, µg.

T_m= Absolute average dry gas meter temperature (see Figure 108–2), °K (°R).

 $V_m$  = Volume of gas sample as measured by the dry gas meter, dry basis, m³ (ft³).

Page 110 of 181 (Subpart FF)

Vm(std)= Volume of gas sample as measured by the dry gas meter, corrected to standard conditions, m³ (ft³).

 $V_n$ = Volume of solution in which the arsenic is contained, ml.

Vw(std)= Volume of water vapor collected in the sampling train, corrected to standard conditions, m³ (ft³).

 $\Delta$ H = Average pressure differential across the orifice meter (see Figure 108–2), mm H₂O (in. H₂O).

12.2 Average Dry Gas Meter Temperatures ( $T_m$ ) and Average Orifice Pressure Drop ( $\Delta H$ ). See data sheet (Figure 108–2).

12.3 Dry Gas Volume. Using data from this test, calculate Vm(std)according to the procedures outlined in Method 5, Section 12.3.

12.4 Volume of Water Vapor.

$$V_{w(std)} = K_2 (m_{fi} - m_{bi})$$
 Eq. 108-1

Where:

 $K_2$ = 0.001334 m³/g for metric units.

= 0.047012 ft³/g for English units.

12.5 Moisture Content.

$$B_{ws} = \frac{V_{w(s2d)}}{V_{m(s2d)} + V_{w(s2d)}}$$
 Eq. 108-2

12.6 Amount of Arsenic Collected.

12.6.1 Calculate the amount of arsenic collected in each part of the sampling train, as follows:

$$m_n = C_a F_d V_n \qquad \text{Eq. 108-3}$$

12.6.2 Calculate the total amount of arsenic collected in the sampling train as follows:

$$m_{t} = m_{(\text{fihers})} + m_{(\text{probe})} + m_{(\text{impingers})} \qquad \text{Eq. 108-4}$$
$$= m_{(\text{fiherblank})} - m_{(\text{NoHblank})} - m_{(\text{waterblank})}$$

12.7 Calculate the arsenic concentration in the stack gas (dry basis, adjusted to standard conditions) as follows:

$$C_{s} = K_{3} \left( m_{t} / V_{m(szi)} \right)$$
 Eq. 108-5

Where:

 $K_3 = 10^{-6} g/\mu g$  for metric units

=  $1.54 \times 10^{-5}$  gr/µg for English units

Page 111 of 181 (Subpart FF)

12.8 Stack Gas Velocity and Volumetric Flow Rate. Calculate the average stack gas velocity and volumetric flow rate using data obtained in this method and the equations in Sections 12.2 and 12.3 of Method 2.

12.9 Pollutant Mass Rate. Calculate the arsenic mass emission rate as follows:

# $E_a = C_s Q_{sd}$ Eq. 108-6

12.10 Isokinetic Variation. Same as Method 5, Section 12.11.

13.0 Method Performance

13.1 Sensitivity. The lower limit of flame AAS 10 µg As/ml. The analytical procedure includes provisions for the use of a graphite furnace or vapor generator for samples with a lower arsenic concentration.

14.0 Pollution Prevention.[Reserved]

15.0 Waste Management.[Reserved]

16.0 References.

Same as References 1 through 9 of Method 5, Section 17.0, with the addition of the following:

1. Perkin Elmer Corporation. Analytical Methods for Atomic Absorption Spectrophotometry. 303–0152. Norwalk, Connecticut. September 1976. pp. 5–6.

2. Standard Specification for Reagent Water. In: Annual Book of American Society for Testing and Materials Standards. Part 31: Water, Atmospheric Analysis. American Society for Testing and Materials. Philadelphia, PA. 1974. pp. 40–42.

3. Stack Sampling Safety Manual (Draft). U.S. Environmental Protection Agency, Office of Air Quality Planning and Standard, Research Triangle Park, NC. September 1978.

17.0 Tables, Diagrams, Flowcharts, and Validation Data

Page 112 of 181 (Subpart FF)



Figure 108-1. Arsenic Sampling Train

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Method 108A—Determination of Arsenic Content in Ore Samples From Nonferrous Smelters

Note: This method does not include all of the specifications (*e.g.*, equipment and supplies) and procedures (*e.g.*, sampling and analytical) essential to its performance. Some material is incorporated by reference from other methods in appendix A to 40 CFR part 60. Therefore, to obtain reliable results, persons using this method should have a thorough knowledge of Method 12.

1.0 Scope and Application

1.1 Analytes.

Page 114 of 181 (Subpart FF)

Analyte	CAS No.	Sensitivity
Arsenic compounds as arsenic (As)	7440382	Lower limit 10 µg/ml or less.

1.2 Applicability. This method applies to the determination of inorganic As content of process ore and reverberatory matte samples from nonferrous smelters and other sources as specified in an applicable subpart of the regulations.

1.3 Data Quality Objectives. Adherence to the requirements of this method will enhance the quality of the data obtained from air pollutant sampling methods.

#### 2.0 Summary of Method

Arsenic bound in ore samples is liberated by acid digestion and analyzed by flame atomic absorption spectrophotometry (AAS).

3.0 Definitions[Reserved]

#### 4.0 Interferences

Analysis for As by flame AAS is sensitive to the chemical composition and to the physical properties (*e.g.*, viscosity, pH) of the sample. The analytical procedure includes a check for matrix effects (section 11.5).

### 5.0 Safety

5.1 Disclaimer. This method may involve hazardous materials, operations, and equipment. This test method may not address all of the safety problems associated with its use. It is the responsibility of the user to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to performing this test method.

5.2 Corrosive Reagents. The following reagents are hazardous. Personal protective equipment and safe procedures that prevent chemical splashes are recommended. If contact occurs, immediately flush with copious amounts of water for at least 15 minutes. Remove clothing under shower and decontaminate. Treat residual chemical burns as thermal burns.

5.2.1 Hydrochloric Acid (HCI). Highly corrosive liquid with toxic vapors. Vapors are highly irritating to eyes, skin, nose, and lungs, causing severe damage. May cause bronchitis, pneumonia, or edema of lungs. Exposure to concentrations of 0.13 to 0.2 percent can be lethal to humans in a few minutes. Provide ventilation to limit exposure. Reacts with metals, producing hydrogen gas.

5.2.2 Hydrofluoric Acid (HF). Highly corrosive to eyes, skin, nose, throat, and lungs. Reaction to exposure may be delayed by 24 hours or more. Provide ventilation to limit exposure.

5.2.3 Hydrogen Peroxide (H₂O₂). Very harmful to eyes. 30% H₂O₂can burn skin, nose, and lungs.

5.2.4 Nitric Acid (HNO₃). Highly corrosive to eyes, skin, nose, and lungs. Vapors are highly toxic and can cause bronchitis, pneumonia, or edema of lungs. Reaction to inhalation may be delayed as long as 30 hours and still be fatal. Provide ventilation to limit exposure. Strong oxidizer. Hazardous reaction may occur with organic materials such as solvents.

5.2.5 Sodium Hydroxide (NaOH). Causes severe damage to eyes and skin. Inhalation causes irritation to nose, throat, and lungs. Reacts exothermically with limited amounts of water.

#### 6.0 Equipment and Supplies

6.1 Sample Collection and Preparation. The following items are required for sample collection and preparation:

6.1.1 Parr Acid Digestion Bomb. Stainless steel with vapor-tight Teflon cup and cover.

6.1.2 Volumetric Pipets. 2- and 5-ml sizes.

6.1.3 Volumetric Flask. 50-ml polypropylene with screw caps, (one needed per standard).

6.1.4 Funnel. Polyethylene or polypropylene.

6.1.5 Oven. Capable of maintaining a temperature of approximately 105 °C (221 °F).

6.1.6 Analytical Balance. To measure to within 0.1 mg.

6.2 Analysis. The following items are required for analysis:

6.2.1 Spectrophotometer and Recorder. Equipped with an electrodeless discharge lamp and a background corrector to measure absorbance at 193.7 nm. For measuring samples having less than 10  $\mu$ g As/ml, use a graphite furnace or vapor generator accessory. The recorder shall match the output of the spectrophotometer.

6.2.2 Volumetric Flasks. Class A, 50-ml (one needed per sample and blank), 500-ml, and 1-liter.

6.2.3 Volumetric Pipets. Class A, 1-, 5-, 10-, and 25-ml sizes.

7.0 Reagents and Standards.

Unless otherwise indicated, it is intended that all reagents conform to the specifications established by the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available; otherwise, use the best available grade.

7.1 Sample Collection and Preparation. The following reagents are required for sample collection and preparation:

7.1.1 Water. Deionized distilled to meet ASTM D 1193–77 or 91 Type 3 (incorporated by reference—See §61.18). When high concentrations of organic matter are not expected to be present, the KMnO4test for oxidizable organic matter may be omitted. Use in all dilutions requiring water.

7.1.2 Nitric Acid Concentrated.

7.1.3 Nitric Acid, 0.5 N. In a 1-liter volumetric flask containing water, add 32 ml of concentrated HNO₃ and dilute to volume with water.

7.1.4 Hydrofluoric Acid, Concentrated.

7.1.5 Potassium Chloride (KCI) Solution, 10 percent weight by volume (W/V). Dissolve 10 g KCI in water, add 3 ml concentrated HNO₃, and dilute to 100 ml.

7.1.6 Filter. Teflon filters, 3-micron porosity, 47-mm size. (Available from Millipore Co., type FS, Catalog Number FSLW04700.)

7.1.7 Sodium Borohydride (NaBH₄), 5 Percent (W/V). Dissolve 50.0 g of NaBH₄in about 500 ml of 0.1 N NaOH in a 1-liter volumetric flask. Then, dilute to exactly 1.0 liter with 0.1 N NaOH.

7.1.8 Nickel Nitrate, 5 Percent Ni (W/V). Dissolve 24.780 g of nickel nitrate hexahydrate [Ni(NO₃)₂6H₂O] in water in a 100-ml volumetric flask, and dilute to 100 ml with water.

7.1.9 Nickel Nitrate, 1 Percent Ni (W/V). Pipet 20 ml of 5 percent nickel nitrate solution into a 100-ml volumetric flask, and dilute to 100 ml with water.

7.2 Analysis. The following reagents and standards are required for analysis:

7.2.1 Water. Same as in Section 7.1.1.

7.2.2 Sodium Hydroxide, 0.1 N. Dissolve 2.00 g of NaOH in water in a 500-ml volumetric flask. Dilute to volume with water.

7.2.3 Nitric Acid, 0.5 N. Same as in Section 7.1.3.

Page 116 of 181 (Subpart FF)

7.2.4 Potassium Chloride Solution, 10 percent. Same as in Section 7.1.5.

7.2.5 Hydrochloric Acid, Concentrated.

7.2.6 Potassium lodide (KI), 30 Percent (W/V). Dissolve 300 g of KI in about 500 ml of water in a 1-liter volumetric flask. Then, dilute to exactly 1.0 liter with water.

7.2.7 Hydrogen Peroxide, 3 Percent by Volume. Pipet 50 ml of 30 percent  $H_2O_2$ into a 500-ml volumetric flask, and dilute to exactly 500 ml with water.

7.2.8 Stock Arsenic Standard, 1 mg As/ml. Dissolve 1.3203 g of primary grade  $A_{s_2}O_{3}$ in 20 ml of 0.1 N NaOH. Slowly add 30 ml of concentrated HNO₃, and heat in an oven at 105 °C (221 °F) for 2 hours. Allow to cool, and dilute to 1 liter with deionized distilled water.

7.2.9 Nitrous Oxide. Suitable quality for AAS analysis.

7.2.10 Acetylene. Suitable quality for AAS analysis.

7.2.11 Quality Assurance Audit Samples. When making compliance determinations, and upon availability, audit samples may be obtained from the appropriate EPA regional Office or from the responsible enforcement authority.

Note: The responsible enforcement authority should be notified at least 30 days prior to the test date to allow sufficient time for sample delivery.

8.0 Sample Collection, Preservation, Transport, and Storage

8.1 Sample Collection. A sample that is representative of the ore lot to be tested must be taken prior to analysis. (A portion of the samples routinely collected for metals analysis may be used provided the sample is representative of the ore being tested.)

8.2 Sample Preparation. The sample must be ground into a finely pulverized state.

9.0 Quality Control

Section	Quality control measure	Effect
10.2	Spectrophotometer calibration	Ensure linearity of spectrophotometer response to standards.
11.5	Check for matrix effects	Eliminate matrix effects
11.6	Audit sample analysis	Evaluate analyst's technique and standards preparation.

10.0 Calibration and Standardizations

Note: Maintain a laboratory log of all calibrations.

10.1 Preparation of Standard Solutions. Pipet 1, 5, 10, and 25 ml of the stock As solution into separate 100-ml volumetric flasks. Add 10 ml KCl solution and dilute to the mark with 0.5 N HNO₃. This will give standard concentrations of 10, 50, 100, and 250 µg As/ml. For low-level arsenic samples that require the use of a graphite furnace or vapor generator, follow the procedures in Section 11.3;1. Dilute 10 ml of KCl solution to 100 ml with 0.5 N HNO₃ and use as a reagent blank.

10.2 Calibration Curve. Analyze the reagent blank and each standard solution according to the procedures outlined in Section 11.3. Repeat this procedure on each standard solution until two consecutive peaks agree within 3 percent of their average value. Subtract the average peak height (or peak area) of the blank—which must be less than 2 percent of recorder full scale—from the averaged peak heights of each standard solution. If the blank absorbance is greater than 2 percent of full-scale, the probable cause is Hg contamination of a reagent or carry-over of As from a previous sample.

Prepare the calibration curve by plotting the corrected peak height of each standard solution versus the corresponding final total As weight in the solution.

10.3 Spectrophotometer Calibration Quality Control, Calculate the least squares slope of the calibration curve. The line must pass through the origin or through a point no further from the origin than ±2 percent of the recorder full scale. Multiply the corrected peak height by the reciprocal of the least squares slope to determine the distance each calibration point lies from the theoretical calibration line. The difference between the calculated concentration values and the actual concentrations must be less than 7 percent for all standards.

Note: For instruments equipped with direct concentration readout devices, preparation of a standard curve will not be necessary. In all cases, follow calibration and operational procedures in the manufacturer's instruction manual.

#### 11.0 Analytical Procedure

11.1 Sample Preparation. Weigh 50 to 500 mg of finely pulverized sample to the nearest 0.1 mg. Transfer the sample into the Teflon cup of the digestion bomb, and add 2 ml each of concentrated HNO₃and HF. Seal the bomb immediately to prevent the loss of any volatile arsenic compounds that may form. Heat in an oven at 105 °C (221 °F) for 2 hours. Remove the bomb from the oven and allow to cool. Using a Teflon filter, quantitatively filter the digested sample into a 50-ml polypropylene volumetric flask. Rinse the bomb three times with small portions of 0.5 N HNO₃, and filter the rinses into the flask. Add 5 ml of KCl solution to the flask, and dilute to 50 ml with 0.5 N HNO₃.

11.2 Spectrophotometer Preparation.

11.2.1 Turn on the power; set the wavelength, slit width, and lamp current. Adjust the background corrector as instructed by the manufacturer's manual for the particular atomic absorption spectrophotometer. Adjust the burner and flame characteristics as necessary.

11.2.2 Develop a spectrophotometer calibration curve as outlined in Sections 10.2 and 10.3.

11.3 Arsenic Determination. Analyze an appropriately sized aliquot of each diluted sample (from Section 11.1) until two consecutive peak heights agree within 3 percent of their average value. If applicable, follow the procedures outlined in Section 11.3.1. If the sample concentration falls outside the range of the calibration curve, make an appropriate dilution with 0.5 N HNO₃so that the final concentration falls within the range of the curve. Using the calibration curve, determine the As concentration in each sample.

Note: Because instruments vary between manufacturers, no detailed operating instructions will be given here. Instead, the instrument manufacturer's detailed operating instructions should be followed.

11.3.1 Arsenic Determination at Low Concentration. The lower limit of flame AAS is 10 µg As/ml. If the arsenic concentration of any sample is at a lower level, use the vapor generator or graphite furnace which is available as an accessory component. Flame, graphite furnace, or vapor generators may be used for samples whose concentrations are between 10 and 30 µg/ml. Follow the manufacturer's instructions in the use of such equipment.

11.3.1.1 Vapor Generator Procedure. Place a sample containing between 0 and 5  $\mu$ g of arsenic in the reaction tube, and dilute to 15 ml with water. Since there is some trial and error involved in this procedure, it may be necessary to screen the samples by conventional AAS until an approximate concentration is determined. After determining the approximate concentration, adjust the volume of the sample accordingly. Pipet 15 ml of concentrated HCl into each tube. Add 1 ml of 30 percent KI solution. Place the reaction tube into a 50 °C (120 °F) water bath for 5 minutes. Cool to room temperature. Connect the reaction tube to the vapor generator assembly. When the instrument response has returned to baseline, inject 5.0 ml of 5 percent NaBH₄ and integrate the resulting spectrophotometer signal over a 30-second time period.

11.3.1.2 Graphite Furnace Procedure. Pipet 5 ml of the digested solution into a 10-ml volumetric flask. Add 1 ml of the 1 percent nickel nitrate solution, 0.5 ml of 50 percent HNO₃, and 1 ml of the 3 percent  $H_2O_2$ , and dilute to 10 ml with water. The sample is now ready to inject in the furnace for analysis.

11.4 Run a blank and standard at least after every five samples to check the spectrophotometer calibration. The peak height of the blank must pass through a point no further from the origin than ±2 percent of the recorder full scale. The difference between the measured concentration of the standard (the product of the corrected average peak height and the reciprocal of the least squares slope) and the actual concentration of the standard must be less than 7 percent, or recalibration of the analyzer is required.

Page 118 of 181 (Subpart FF)

11.5 Mandatory Check for Matrix Effects on the Arsenic Results. Same as Method 12, Section 11.5,

11.6 Audit Sample Analysis.

11.6.1 When the method is used to analyze samples to demonstrate compliance with a source emission regulation, a set of EPA audit samples must be analyzed, subject to availability.

11.6.2 Concurrently analyze the audit samples and the compliance samples in the same manner to evaluate the technique of the analyst and the standards preparation.

Note: It is recommended that known quality control samples be analyzed prior to the compliance and audit sample analyses to optimize the system accuracy and precision. These quality control samples may be obtained by contacting the appropriate EPA regional Office or the responsible enforcement authority.

11.6.3 The same analyst, analytical reagents, and analytical system shall be used for the compliance samples and the EPA audit samples. If this condition is met, duplicate auditing of subsequent compliance analyses for the same enforcement agency within a 30-day period is waived. An audit sample set may not be used to validate different sets of compliance samples under the jurisdiction of separate enforcement agencies, unless prior arrangements have been made with both enforcement agencies.

11.7 Audit Sample Results.

11.7.1 Calculate the audit sample concentrations in g/m³ and submit results using the instructions provided with the audit samples.

11.7.2 Report the results of the audit samples and the compliance determination samples along with their identification numbers, and the analyst's name to the responsible enforcement authority. Include this information with reports of any subsequent compliance analyses for the same enforcement authority during the 30-day period.

11.7.3 The concentrations of the audit samples obtained by the analyst shall agree within 10 percent of the actual concentrations. If the 10 percent specification is not met, reanalyze the compliance and audit samples, and include initial and reanalysis values in the test report.

11.7.4 Failure to meet the 10 percent specification may require retests until the audit problems are resolved. However, if the audit results do not affect the compliance or noncompliance status of the affected facility, the Administrator may waive the reanalysis requirement, further audits, or retests and accept the results of the compliance test. While steps are being taken to resolve audit analysis problems, the Administrator may also choose to use the data to determine the compliance or noncompliance status of the affected facility.

12.0 Data Analysis and Calculations

12.1 Calculate the percent arsenic in the ore sample as follows:

$$\% As = \frac{5C_a F_d}{W} \qquad Eq. \ 108A-1$$

Where:

C_a= Concentration of As as read from the standard curve, µg/ml.

 $F_d$ = Dilution factor (equals to 1 if the sample has not been diluted).

W = Weight of ore sample analyzed, mg.

 $5 = (50 \text{ ml sample} + 100)/(10^3 \mu g/mg).$ 

13.0 Method Performance

Page 119 of 181 (Subpart FF)

13.1 Sensitivity. The lower limit of flame AAS is 10 µg As/ml. The analytical procedure includes provisions for the use of a graphite furnace or vapor generator for samples with a lower arsenic concentration.

14.0 Pollution Prevention.[Reserved]

15.0 Waste Management.[Reserved]

16.0 References

Same as References 1 through 9 of Section 17.0 of Method 5, with the addition of the following:

1. Perkin Elmer Corporation. Analytical Methods of Atomic Absorption Spectrophotometry. 303–0152. Norwalk, Connecticut, September 1976. pp 5–6.

2. Ringwald, D. Arsenic Determination on Process Materials from ASARCO's Copper Smelter in Tacoma, Washington. Unpublished Report. Prepared for Emission Measurement Branch, Emission Standards and Engineering Division, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina. August 1980. 35 pp.

3. Stack Sampling Safety Manual (Draft). U.S. Environmental Protection Agency, Office of Air Quality Planning and Standard, Research Triangle Park, NC. September 1978.

17.0 Tables, Diagrams, Flowcharts, and Validation Data.[Reserved]

Method 108B—Determination of Arsenic Content in Ore Samples From Nonferrous Smelters

Note: This method does not include all of the specifications (*e.g.*, equipment and supplies) and procedures (*e.g.*, sampling and analytical) essential to its performance. Some material is incorporated by reference from other methods in this appendix and in appendix A to 40 CFR part 60. Therefore, to obtain reliable results, persons using this method should have a thorough knowledge of at least the following additional test methods: Method 12 and Method 108A.

1.0 Scope and Application

1.1 Analytes.

Analyte	CAS No.	Sensitivity
Arsenic compounds as arsenic (As)	7440-38-2	Lower limit 10 µg/ml.

1.2 Applicability. This method applies to the determination of inorganic As content of process ore and reverberatory matter samples from nonferrous smelters and other sources as specified in an applicable subpart of the regulations. Samples resulting in an analytical concentration greater than 10 μg As/ml may be analyzed by this method. For lower level arsenic samples, Method 108C should be used.

1.3 Data Quality Objectives. Adherence to the requirements of this method will enhance the quality of the data obtained from air pollutant sampling methods.

2.0 Summary of Method

Arsenic bound in ore samples is liberated by acid digestion and analyzed by flame atomic absorption spectrophotometry (AAS).

3.0 Definitions[Reserved]

4.0 Interferences

Analysis for As by flame AAS is sensitive to the chemical composition and to the physical properties (*e.g.*, viscosity, pH) of the sample. The analytical procedure includes a check for matrix effects (Section 11.4).

5.0 Safety

5.1 Disclaimer. This method may involve hazardous materials, operations, and equipment. This test method may not address all of the safety problems associated with its use. It is the responsibility of the user to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to performing this test method.

5.2 Corrosive Reagents. The following reagents are hazardous. Personal protective equipment and safe procedures that prevent chemical splashes are recommended. If contact occurs, immediately flush with copious amounts of water for at least 15 minutes. Remove clothing under shower and decontaminate. Treat residual chemical burns as thermal burns.

5.2.1 Hydrochloric acid (HCI). Highly corrosive liquid with toxic vapors. Vapors are highly irritating to eyes, skin, nose, and lungs, causing severe damage. May cause bronchitis, pneumonia, or edema of lungs. Exposure to concentrations of 0.13 to 0.2 percent can be lethal to humans in a few minutes. Provide ventilation to limit exposure. Reacts with metals, producing hydrogen gas.

5.2.2 Hydrofluoric Acid (HF). Highly corrosive to eyes, skin, nose, throat, and lungs. Reaction to exposure may be delayed by 24 hours or more. Provide ventilation to limit exposure.

5.2.3 Nitric Acid (HNO₃). Highly corrosive to eyes, skin, nose, and lungs. Vapors are highly toxic and can cause bronchitis, pneumonia, or edema of lungs. Reaction to inhalation may be delayed as long as 30 hours and still be fatal. Provide ventilation to limit exposure. Strong oxidizer. Hazardous reaction may occur with organic materials such as solvents.

5.2.4 Perchloric Acid (HCIO₄). Corrosive to eyes, skin, nose, and throat. Provide ventilation to limit exposure. Very strong oxidizer. Keep separate from water and oxidizable materials to prevent vigorous evolution of heat, spontaneous combustion, or explosion. Heat solutions containing HCIO₄only in hoods specifically designed for HCIO₄.

6.0 Equipment and Supplies

6.1 Sample Preparation. The following items are required for sample preparation:

6.1.1 Teflon Beakers. 150-ml.

6.1.2 Graduated Pipets. 5-ml disposable.

6.1.3 Graduated Cylinder. 50-ml.

6.1.4 Volumetric Flask. 100-ml.

6.1.5 Analytical Balance. To measure within 0.1 mg.

6.1.6 Hot Plate.

6.1.7 Perchloric Acid Fume Hood.

6.2 Analysis. The following items are required for analysis:

6.2.1 Spectrophotometer. Equipped with an electrodeless discharge lamp and a background corrector to measure absorbance at 193.7 nm.

6.2.2 Beaker and Watch Glass, 400-ml.

6.2.3 Volumetric Flask. 1-liter.

6.2.4 Volumetric Pipets. 1-, 5-, 10-, and 25-ml.

7.0 Reagents and Standards

Unless otherwise indicated, it is intended that all reagents conform to the specifications established by the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available; otherwise, use the best available grade.

7.1 Sample Preparation. The following reagents are required for sample preparation:

7.1.1 Water, Deionized distilled to meet ASTM D 1193-77 or 91 Type 3 (incorporated by reference-see §61.18).

7.1.2 Nitric Acid, Concentrated.

7.1.3 Hydrofluoric Acid, Concentrated.

7.1.4 Perchloric Acid, 70 Percent.

7.1.5 Hydrochloric Acid, Concentrated.

7.2 Analysis. The following reagents and standards are required for analysis:

7.2.1 Water. Same as in Section 7.1.1.

7.2.2 Stock Arsenic Standard, 1.0 mg As/ml. Dissolve 1.3203 g of primary grade  $As_20_3$ [dried at 105 °C (221 °F)] in a 400-ml beaker with 10 ml of HNO₃and 5 ml of HCl. Cover with a watch glass, and heat gently until dissolution is complete. Add 10 ml of HNO₃and 25 ml of HClO₄, evaporate to strong fumes of HClO₄, and reduce to about 20 ml volume. Cool, add 100 ml of water and 100 ml of HCl, and transfer quantitatively to a 1-liter volumetric flask. Dilute to volume with water and mix.

7.2.3 Acetylene. Suitable quality for AAS analysis.

7.2.4 Air. Suitable quality for AAS analysis.

7.2.5 Quality Assurance Audit Samples. Same as in Method 108A, Section 7.2.11.

8.0 Sample Collection, Preservation, Transport, and Storage

Same as in Method 108A, Sections 8.1 and 8.2.

9.0 Quality Control

Section	Quality control measure	Effect
10.2	Spectrophotometer calibration	Ensure linearity of spectrophotometer response to standards.
11.4	Check for matrix effects	Eliminate matrix effects.
11.5	Audit sample analysis	Evaluate analyst's technique and standards preparation.

10.0 Calibration and Standardization

Note: Maintain a laboratory log of all calibrations.

10.1 Preparation of Standard Solutions. Pipet 1, 5, 10, and 25 ml of the stock As solution into separate 100-ml volumetric flasks. Add 2 ml of HClO₄, 10 ml of HCl, and dilute to the mark with water. This will provide standard concentrations of 10, 50, 100, and 250 µg As/ml.

10.2 Calibration Curve and Spectrophotometer Calibration Quality Control. Same as Method 108A, Sections 10.2 and 10.3

Page 122 of 181 (Subpart FF)

11.0 Analytical Procedure

11.1 Sample Preparation. Weigh 100 to 1000 mg of finely pulverized sample to the nearest 0.1 mg. Transfer the sample to a 150-ml Teflon beaker. Dissolve the sample by adding 15 ml of HNO₃, 10 ml of HCl, 10 ml of HF, and 10 ml of HClO₄in the exact order as described, and let stand for 10 minutes. In a HClO₄fume hood, heat on a hot plate until 2–3 ml of HClO₄remain, then cool. Add 20 ml of water and 10 ml of HCl. Cover and warm until the soluble salts are in solution. Cool, and transfer quantitatively to a 100-ml volumetric flask. Dilute to the mark with water.

11.2 Spectrophotometer Preparation. Same as in Method 108A, Section 11.2.

11.3 Arsenic Determination. If the sample concentration falls outside the range of the calibration curve, make an appropriate dilution with 2 percent HClO₄/10 percent HCl (prepared by diluting 2 ml concentrated HClO₄and 10 ml concentrated HCl to 100 ml with water) so that the final concentration falls within the range of the curve. Using the calibration curve, determine the As concentration in each sample.

Note: Because instruments vary between manufacturers, no detailed operating instructions will be given here. Instead, the instrument manufacturer's detailed operating instructions should be followed.

Run a blank and standard at least after every five samples to check the spectrophotometer calibration. The peak height of the blank must pass through a point no further from the origin than ±2 percent of the recorder full scale. The difference between the measured concentration of the standard (the product of the corrected average peak height and the reciprocal of the least squares slope) and the actual concentration of the standard must be less than 7 percent, or recalibration of the analyzer is required.

11.4 Mandatory Check for Matrix Effects on the Arsenic Results. Same as Method 12, Section 11.5.

11.5 Audit Sample Analysis. Same as in Method 108A, Section 11.6.

12.0 Data Analysis and Calculations

Same as in Method 108A, Section 12.0.

13.0 Method Performance

13.1 Sensitivity. The lower limit of flame AAS is 10 µg As/ml.

14.0 Pollution Prevention[Reserved]

15.0 Waste Management[Reserved]

16.0 References

Same as in Method 108A, Section 16.0.

17.0 Tables, Diagrams, Flowcharts, and Validation Data[Reserved]

Method 108C—Determination of Arsenic Content in Ore Samples From Nonferrous Smelters (Molybdenum Blue Photometric Procedure)

Note: This method does not include all of the specifications (*e.g.*, equipment and supplies) and procedures (*e.g.*, sampling and analytical) essential to its performance. Some material is incorporated by reference from other methods in this part. Therefore, to obtain reliable results, persons using this method should have a thorough knowledge of at least Method 108A.

1.0 Scope and Application

1.1 Analytes.

Analyte	CAS No.	Sensitivity
Arsenic compounds as arsenic (As)	7440–38–2	Lower limit 0.0002 percent As by weight.

1.2 Applicability. This method applies to the determination of inorganic As content of process ore and reverberatory matter samples from nonferrous smelters and other sources as specified in an applicable subpart of the regulations.

1.3 Data Quality Objectives. Adherence to the requirements of this method will enhance the quality of the data obtained from air pollutant sampling methods.

2.0 Summary of Method

Arsenic bound in ore samples is liberated by acid digestion and analyzed by the molybdenum blue photometric procedure.

3.0 Definitions.[Reserved]

4.0 Interferences.[Reserved]

5.0 Safety

5.1 Disclaimer. This method may involve hazardous materials, operations, and equipment. This test method may not address all of the safety problems associated with its use. It is the responsibility of the user to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to performing this test method.

5.2 Corrosive Reagents. The following reagents are hazardous. Personal protective equipment and safe procedures that prevent chemical splashes are recommended. If contact occurs, immediately flush with copious amounts of water for at least 15 minutes. Remove clothing under shower and decontaminate. Treat residual chemical burns as thermal burns.

5.2.1 Hydrochloric Acid (HCI). Highly corrosive liquid with toxic vapors. Vapors are highly irritating to eyes, skin, nose, and lungs, causing severe damage. May cause bronchitis, pneumonia, or edema of lungs. Exposure to concentrations of 0.13 to 0.2 percent can be lethal to humans in a few minutes. Provide ventilation to limit exposure. Reacts with metals, producing hydrogen gas.

5.2.2 Hydrofluoric Acid (HF). Highly corrosive to eyes, skin, nose, throat, and lungs. Reaction to exposure may be delayed by 24 hours or more. Provide ventilation to limit exposure.

5.2.3 Nitric Acid (HNO₄). Highly corrosive to eyes, skin, nose, and lungs. Vapors are highly toxic and can cause bronchitis, pneumonia, or edema of lungs. Reaction to inhalation may be delayed as long as 30 hours and still be fatal. Provide ventilation to limit exposure. Strong oxidizer. Hazardous reaction may occur with organic materials such as solvents.

5.2.4 Perchloric Acid (HCIO₄). Corrosive to eyes, skin, nose, and throat. Provide ventilation to limit exposure. Very strong oxidizer. Keep separate from water and oxidizable materials to prevent vigorous evolution of heat, spontaneous combustion, or explosion. Heat solutions containing HCIO₄only in hoods specifically designed for HCIO₄.

5.2.5 Sulfuric acid (H₂SO₄). Rapidly destructive to body tissue. Will cause third degree burns. Eye damage may result in blindness. Inhalation may be fatal from spasm of the larynx, usually within 30 minutes. May cause lung tissue damage with edema. 3 mg/m³ will cause lung damage in uninitiated. 1 mg/m³ for 8 hours will cause lung damage or, in higher concentrations, death. Provide ventilation to limit inhalation. Reacts violently with metals and organics.

6.0 Equipment and Supplies

6.1 Sample Preparation. The following items are required for sample preparation:

6.1.1 Analytical Balance. To measure to within 0.1 mg.

6.1.2 Erlenmeyer Flask. 300-ml.

6.1.3 Hot Plate.

Page 124 of 181 (Subpart FF)

6.1.4 Distillation Apparatus. No. 6, in ASTM E 50–82, 86, or 90 (Reapproved 1995)(incorporated by reference—see §61.18); detailed in Figure 108C–1.

6.1.5 Graduated Cylinder. 50-ml.

6.1.6 Perchloric Acid Fume Hood.

6.2 Analysis. The following items are required for analysis:

6.2.1 Spectrophotometer. Capable of measuring at 660 nm.

6.2.2 Volumetric Flasks. 50- and 100-ml.

7.0 Reagents and Standards

Unless otherwise indicated, it is intended that all reagents conform to the specifications established by the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available; otherwise, use the best available grade.

7.1 Sample Preparation. The following reagents are required for sample preparation:

7.1.1 Water. Deionized distilled to meet ASTM D 1193–77 or 91 Type 3 (incorporated by reference—see §61.18). When high concentrations of organic matter are not expected to be present, the KMnO4test for oxidizable organic matter may be omitted. Use in all dilutions requiring water.

7.1.2 Nitric Acid, Concentrated.

7.1.3 Hydrofluoric Acid, Concentrated.

7.1.4 Sulfuric Acid, Concentrated.

7.1.5 Perchloric Acid, 70 Percent.

7.1.6 Hydrochloric Acid, Concentrated.

7.1.7 Dilute Hydrochloric Acid. Add one part concentrated HCl to nine parts water.

7.1.8 Hydrazine Sulfate ((NH₂)₂·H₂SO₄).

7.1.9 Potassium Bromide (KBr).

7.1.10 Bromine Water, Saturated.

7.2 Analysis. The following reagents and standards are required for analysis:

7.2.1 Water. Same as in Section 7.1.1.

7.2.2 Methyl Orange Solution, 1 g/liter.

7.2.3 Ammonium Molybdate Solution, 5 g/liter. Dissolve 0.5 g (NH₄)Mo₇O₂₄·4H₂O in water in a 100-ml volumetric flask, and dilute to the mark. This solution must be freshly prepared.

7.2.4 Standard Arsenic Solution, 10  $\mu$ g As/ml. Dissolve 0.13203 g of As₂O₃in 100 ml HCl in a 1-liter volumetric flask. Add 200 ml of water, cool, dilute to the mark with water, and mix. Transfer 100 ml of this solution to a 1-liter volumetric flask, add 40 ml HCl, cool, dilute to the mark, and mix.

7.2.5 Hydrazine Sulfate Solution, 1 g/liter. Dissolve 0.1 g of  $[(NH_2)_2 \cdot H_2SO_4]$  in water, and dilute to 100 ml in a volumetric flask. This solution must be freshly prepared.

Page 125 of 181 (Subpart FF)

7.2.6 Potassium Bromate (KBrO₃) Solution, 0.03 Percent Weight by Volume (W/V). Dissolve 0.3 g KBrO₃in water, and dilute to 1 liter with water.

7.2.7 Ammonium Hydroxide (NH₄OH), Concentrated.

7.2.8 Boiling Granules.

7.2.9 Hydrochloric Acid, 50 percent by volume. Dilute equal parts concentrated HCI with water.

7.2.10 Quality Assurance Audit Samples. Same as in Method 108A, Section 7.2.11.

8.0 Sample Collection, Preservation, Transport, and Storage

Same as in Method 108A, Sections 8.1 and 8.2.

9.0 Quality Control

Section	Quality control measure	Effect
10.2	Calibration curve preparation	Ensure linearity of spectrophotometric analysis of standards.
11.3	Audit sample analysis	Evaluate analyst's technique and standards preparation.

10.0 Calibration and Standardizations

Note: Maintain a laboratory log of all calibrations.

10.1 Preparation of Standard Solutions. Transfer 1.0, 2.0, 4.0, 8.0, 12.0, 16.0, and 20.0 ml of standard arsenic solution (10  $\mu$ g/ml) to each of seven 50-ml volumetric flasks. Dilute to 20 ml with dilute HCl. Add one drop of methyl orange solution and neutralize to the yellow color with dropwise addition of NH₄OH. Just bring back to the red color by dropwise addition of dilute HCl, and add 10 ml in excess. Proceed with the color development as described in Section 11.2.

10.2 Calibration Curve. Plot the spectrophotometric readings of the calibration solutions against µg As per 50 ml of solution. Use this curve to determine the As concentration of each sample.

10.3 Spectrophotometer Calibration Quality Control. Calculate the least squares slope of the calibration curve. The line must pass through the origin or through a point no further from the origin than ±2 percent of the recorder full scale. Multiply the corrected peak height by the reciprocal of the least squares slope to determine the distance each calibration point lies from the theoretical calibration line. The difference between the calculated concentration values and the actual concentrations must be less than 7 percent for all standards.

11.0 Analytical Procedure

11.1 Sample Preparation.

11.1.1 Weigh 1.0 g of finely pulverized sample to the nearest 0.1 mg. Transfer the sample to a 300 ml Erlenmeyer flask and add 15 ml of HNO₃, 4 ml HCl, 2 ml HF, 3 ml HClO₄, and 15 ml H₂SO₄, in the order listed. In a HClO₄fume hood, heat on a hot plate to decompose the sample. Then heat while swirling over an open flame until dense white fumes evolve. Cool, add 15 ml of water, swirl to hydrate the H₂SO₄completely, and add several boiling granules. Cool to room temperature.

11.1.2 Add 1 g of KBr, 1 g hydrazine sulfate, and 50 ml HCl. Immediately attach the distillation head with thermometer and dip the side arm into a 50-ml graduated cylinder containing 25 ml of water and 2 ml of bromine water. Keep the graduated cylinder immersed in a beaker of cold water during distillation. Distill until the temperature of the vapor in the flask reaches 107 °C (225 °F). When distillation is complete, remove the flask from the hot plate, and simultaneously wash down the side arm with water as it is removed from the cylinder.

Page 126 of 181 (Subpart FF)

11.1.3 If the expected arsenic content is in the range of 0.0020 to 0.10 percent, dilute the distillate to the 50-ml mark of the cylinder with water, stopper, and mix. Transfer a 5.0-ml aliquot to a 50-ml volumetric flask. Add 10 ml of water and a boiling granule. Place the flask on a hot plate, and heat gently until the bromine is expelled and the color of methyl orange indicator persists upon the addition of 1 to 2 drops. Cool the flask to room temperature. Neutralize just to the yellow color of the indicator with dropwise additions of NH₄OH. Bring back to the red color by dropwise addition of dilute HCl, and add 10 ml excess. Proceed with the molybdenum blue color development as described in Section 11.2.

11.1.4 If the expected arsenic content is in the range of 0.0002 to 0.0010 percent As, transfer either the entire initial distillate or the measured remaining distillate from Section 11.1.2 to a 250-ml beaker. Wash the cylinder with two successive portions of concentrated HNO₃, adding each portion to the distillate in the beaker. Add 4 ml of concentrated HClO₄, a boiling granule, and cover with a flat watch glass placed slightly to one side. Boil gently on a hot plate until the volume is reduced to approximately 10 ml. Add 3 ml of HNO₃, and continue the evaporation until HClO₄ is refluxing on the beaker cover. Cool briefly, rinse the underside of the watch glass and the inside of the beaker with about 3–5 ml of water, cover, and continue the evaporation to expel all but 2 ml of the HClO₄.

Note: If the solution appears cloudy due to a small amount of antimony distilling over, add 4 ml of 50 percent HCl and 5 ml of water, cover, and warm gently until clear. If cloudiness persists, add 5 ml of HNO₃ and 2 ml H₂SO₄. Continue the evaporation of volatile acids to solubilize the antimony until dense white fumes of H₂SO₄ appear. Retain at least 1 ml of the H₂SO₄.

11.1.5 To the 2 ml of HCIO₄solution or 1 ml of  $H_2SO_4$ solution, add 15 ml of water, boil gently for 2 minutes, and then cool. Proceed with the molybdenum blue color development by neutralizing the solution directly in the beaker just to the yellow indicator color by dropwise addition of NH₄OH. Obtain the red color by dropwise addition of dilute HCl. Transfer the solution to a 50-ml volumetric flask. Rinse the beaker successively with 10 ml of dilute HCl, followed by several small portions of water. At this point the volume of solution in the flask should be no more than 40 ml. Continue with the color development as described in Section 11.2.

11.2 Analysis.

11.2.1 Add 1 ml of KBrO₃solution to the flask and heat on a low-temperature hot plate to about 50 °C (122 °F) to oxidize the arsenic and methyl orange. Add 5.0 ml of ammonium molybdate solution to the warm solution and mix. Add 2.0 ml of hydrazine sulfate solution, dilute until the solution comes within the neck of the flask, and mix. Place the flask in a 400 ml beaker, 80 percent full of boiling water, for 10 minutes. Enough heat must be supplied to prevent the water bath from cooling much below the boiling point upon inserting the volumetric flask. Remove the flask, cool to room temperature, dilute to the mark, and mix.

11.2.2 Transfer a suitable portion of the reference solution to an absorption cell, and adjust the spectrophotometer to the initial setting using a light band centered at 660 nm. While maintaining this spectrophotometer adjustment, take the readings of the calibration solutions followed by the samples.

11.3 Audit Sample Analysis. Same as in Method 108A, Section 11.6.

12.0 Data Analysis and Calculations

Same as in Method 108A, Section 12.0.

13.0 Method Performance.[Reserved]

14.0 Pollution Prevention.[Reserved]

15.0 Waste Management.[Reserved]

16.0 References

1. Ringwald, D. Arsenic Determination on Process Materials from ASARCO's Copper Smelter in Tacoma, Washington. Unpublished Report. Prepared for the Emission Measurement Branch, Technical Support Division, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina. August 1980. 35 pp.





Data

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Method 111-Determination of Polonium-210 Emissions From Stationary Sources

Note: This method does not include all of the specifications (e.g., equipment and supplies) and procedures (e.g., sampling and analytical) essential to its performance. Some material is incorporated by reference from methods in appendix A to 40 CFR part 60. Therefore, to obtain reliable results, persons using this method should have a thorough knowledge of at least the following additional test methods: Method 1, Method 2, Method 3, and Method 5.

1.0 Scope and Application

1.1 Analytes.

Analyte	CAS No.	Sensitivity
Polonium	7440-08-6	Not specified.

1.2 Applicability. This method is applicable for the determination of the polonium-210 content of particulate matter samples collected from stationary source exhaust stacks, and for the use of these data to calculate polonium-210 emissions from individual sources and from all affected sources at a facility.

1.3 Data Quality Objectives. Adherence to the requirements of this method will enhance the quality of the data obtained from air pollutant sampling methods.

## 2.0 Summary of Method

A particulate matter sample, collected according to Method 5, is analyzed for polonium-210 content: the polonium-210 in the sample is put in solution, deposited on a metal disc, and the radioactive disintegration rate measured. Polonium in acid solution spontaneously deposits on surfaces of metals that are more electropositive than polonium. This principle is routinely used in the radiochemical analysis of polonium-210. Data reduction procedures are provided, allowing the

calculation of polonium-210 emissions from individual sources and from all affected sources at a facility, using data obtained from Methods 2 and 5 and from the analytical procedures herein.

3.0 Definitions[Reserved]

4.0 Interferences[Reserved]

5.0 Safety

5.1 Disclaimer. This method may involve hazardous materials, operations, and equipment. This test method may not address all of the safety problems associated with its use. It is the responsibility of the user of this test method to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to performing this test method.

5.2 Corrosive Reagents. The following reagents are hazardous. Personal protective equipment and safe procedures are useful in preventing chemical splashes. If contact occurs, immediately flush with copious amounts of water at least 15 minutes. Remove clothing under shower and decontaminate. Treat residual chemical burns as thermal burns.

5.2.1 Hydrochloric Acid (HCI). Highly corrosive liquid with toxic vapors. Vapors are highly irritating to eyes, skin, nose, and lungs, causing severe damage. May cause bronchitis, pneumonia, or edema of lungs. Exposure to concentrations of 0.13 to 0.2 percent can be lethal to humans in a few minutes. Provide ventilation to limit exposure. Reacts with metals, producing hydrogen gas.

5.2.2 Hydrofluoric Acid (HF). Highly corrosive to eyes, skin, nose, throat, and lungs. Reaction to exposure may be delayed by 24 hours or more. Provide ventilation to limit exposure.

5.2.3 Nitric Acid (HNO₃). Highly corrosive to eyes, skin, nose, and lungs. Vapors cause bronchitis, pneumonia, or edema of lungs. Reaction to inhalation may be delayed as long as 30 hours and still be fatal. Provide ventilation to limit exposure. Strong oxidizer. Hazardous reaction may occur with organic materials such as solvents.

5.2.4 Perchloric Acid (HCIO₄). Corrosive to eyes, skin, nose, and throat. Provide ventilation to limit exposure. Keep separate from water and oxidizable materials to prevent vigorous evolution of heat, spontaneous combustion, or explosion. Heat solutions containing HCIO₄only in hoods specifically designed for HCIO₄.

6.0 Equipment and Supplies

6.1 Alpha Spectrometry System. Consisting of a multichannel analyzer, biasing electronics, silicon surface barrier detector, vacuum pump and chamber.

6.2 Constant Temperature Bath at 85 °C (185 °F).

6.3 Polished Silver Discs. 3.8 cm diameter, 0.4 mm thick with a small hole near the edge.

6.4 Glass Beakers. 400 ml, 150 ml.

6.5 Hot Plate, Electric.

6.6 Fume Hood.

- 6.7 Teflon Beakers, 150 ml.
- 6.8 Magnetic Stirrer.
- 6.9 Stirring Bar.
- 6.10 Hooks. Plastic or glass, to suspend plating discs.

6.11 Internal Proportional Counter. For measuring alpha particles.

6.12 Nucleopore Filter Membranes. 25 mm diameter, 0.2 micrometer pore size or equivalent.

6.13 Planchets. Stainless steel, 32 mm diameter with 1.5 mm lip.

6.14 Transparent Plastic Tape. 2.5 cm wide with adhesive on both sides.

6.15 Epoxy Spray Enamel.

6.16 Suction Filter Apparatus. For 25 mm diameter filter.

6.17 Wash Bottles, 250 ml capacity.

6.18 Graduated Cylinder, plastic, 25 ml capacity.

6.19 Volumetric Flasks, 100 ml, 250 ml.

7.0 Reagents and Standards

Unless otherwise indicated, it is intended that all reagents conform to the specifications established by the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available; otherwise, use the best available grade.

7.1 Ascorbic Acid.

7.2 Ammonium Hydroxide (NH₄OH), 15 M.

7.3 Water. Deionized distilled, to conform to ASTM D 1193–77 or 91 (incorporated by reference—see §61.18), Type 3. Use in all dilutions requiring water.

7.4 Ethanol (C₂H₅OH), 95 percent.

7.5 Hydrochloric Acid, 12 M.

7.6 Hydrochloric Acid, 1 M. Dilute 83 ml of the 12 M HCl to 1 liter with distilled water.

7.7 Hydrofluoric Acid, 29 M.

7.8 Hydrofluoric Acid, 3 M. Dilute 52 ml of the 29 M HF to 500 ml with distilled water. Use a plastic graduated cylinder and storage bottle.

7.9 Lanthanum Carrier, 0.1 mg La+3/ml. Dissolve 0.078 gram lanthanum nitrate, La(NO₃)₃ 6H₂O in 250 ml of 1 M HCl.

7.10 Nitric Acid, 16 M.

7.11 Perchloric Acid, 12 M.

7.12 Polonium-209 Solution.

7.13 Silver Cleaner. Any mild abrasive commercial silver cleaner.

7.14 Degreaser.

7.15 Standard Solution. Standardized solution of an alpha-emitting actinide element, such as plutonium-239 or americium-241.

8.0 Sample Collection, Preservation, Transport, and Storage.[Reserved]

9.0 Quality Control

9.1 General Requirement.

Page 130 of 181 (Subpart FF)

9.1.1 All analysts using this method are required to demonstrate their ability to use the method and to define their respective accuracy and precision criteria.

9.2 Miscellaneous Quality Control Measures.

Section	Quality control measure	Effect
10.1	Standardization of alpha spectrometry system	Ensure precision of sample analyses.
10.3	Standardization of internal proportional counter	Ensure precise sizing of sample aliquot.
11.1, 11.2	Determination of procedure background and instrument background	Minimize background effects.
11.3	Audit sample analysis	Evaluate analyst's technique.

10.0 Calibration and Standardization

10.1 Standardization of Alpha Spectrometry System.

10.1.1 Add a quantity of the actinide standard solution to a 100 ml volumetric flask so that the final concentration when diluted to a volume of 100 ml will be approximately  $1_p$ Ci/ml.

10.1.2 Add 10 ml of 16 M HNO₃ and dilute to 100 ml with water.

10.1.3 Add 20 ml of 1 M HCl to each of six 150 ml beakers. Add 1.0 ml of lanthanum carrier, 0.1 mg lanthanum per ml, to the acid solution in each beaker.

10.1.4 Add 1.0 ml of the 1 pCi/ml working solution (from Section 10.1.1) to each beaker. Add 5.0 ml of 3 M HF to each beaker.

10.1.5 Cover beakers and allow solutions to stand for a minimum of 30 minutes. Filter the contents of each beaker through a separate filter membrane using the suction filter apparatus. After each filtration, wash the filter membrane with 10 ml of distilled water and 5 ml of ethanol, and allow the filter membrane to air dry on the filter apparatus.

10.1.6 Carefully remove the filter membrane and mount it, filtration side up, with double-side tape on the inner surface of a planchet. Place planchet in an alpha spectrometry system and count each planchet for 1000 minutes.

10.1.7 Calculate the counting efficiency of the detector for each aliquot of the 1 pCi/ml actinide working solution using Eq. 111-1 in Section 12.2.

10.1.8 Determine the average counting efficiency of the detector,  $E_{e_1}$  by calculating the average of the six determinations.

10.2 Preparation of Standardized Solution of Polonium-209.

10.2.1 Add a quantity of the Po-209 solution to a 100 ml volumetric flask so that the final concentration when diluted to a 100 ml volume will be approximately 1 pCi/ml.

10.2.2 Follow the procedures outlined in Sections 10.1.2 through 10.1.6, except substitute 1.0 ml of polonium-209 tracer solution (Section 10.2.1) and 3.0 ml of 15 M ammonium hydroxide for the 1 pCi/ml actinide working solution and the 3 M HF, respectively.

10.2.3 Calculate the activity of each aliquot of the polonium-209 tracer solution using Eq. 111-2 in Section 12.3.

Page 131 of 181 (Subpart FF)

10.2.4 Determine the average activity of the polonium-209 tracer solution, F, by averaging the results of the six determinations.

10.3 Standardization of Internal Proportional Counter

10.3.1 Add a quantity of the actinide standard solution to a 100 ml volumetric flask so that the final concentration when diluted to a 100 ml volume will be approximately 100 pCi/ml.

10.3.2 Follow the procedures outlined in Sections 10.1.2 through 10.1.6, except substitute the 100 pCi/ml actinide working solution for the 1 pCi/ml solution, place the planchet in an internal proportional counter (instead of an alpha spectrometry system), and count for 100 minutes (instead of 1000 minutes).

10.3.3 Calculate the counting efficiency of the internal proportional counter for each aliquot of the 100 pCi/ml actinide working solution using Eq. 111–3 in 12.4.

10.3.4 Determine the average counting efficiency of the internal proportional counter, E_i, by averaging the results of the six determinations.

11.0 Analytical Procedure

Note: Perform duplicate analyses of all samples, including background counts, quality assurance audit samples, and Method 5 samples. Duplicate measurements are considered acceptable when the difference between them is less than two standard deviations as described in EPA 600/4–77–001 or subsequent revisions.

11.1 Determination of Procedure Background. Background counts used in all equations are determined by performing the specific analysis required using the analytical reagents only. All procedure background counts and sample counts for the internal proportional counter should utilize a counting time of 100 minutes; for the alpha spectrometry system, 1000 minutes. These background counts should be performed no less frequently than once per 10 sample analyses.

11.2 Determination of Instrument Background. Instrument backgrounds of the internal proportional counter and the alpha spectrometry system should be determined on a weekly basis. Instrument background should not exceed procedure background. If this occurs, it may be due to a malfunction or contamination, and should be corrected before use.

11.3 Quality Assurance Audit Samples. An externally prepared performance evaluation sample shall be analyzed no less frequently than once per 10 sample analyses, and the results reported with the test results.

11.4. Sample Preparation. Treat the Method 5 samples [*i.e.*, the glass fiber filter (Container No. 1) and the acetone rinse (Container No. 2)] as follows:

11.4.1 Container No. 1. Transfer the filter and any loose particulate matter from the sample container to a 150-ml Teflon beaker.

11.4.2 Container No. 2. Note the level of liquid in the container, and confirm on the analysis sheet whether leakage occurred during transport. If a noticeable amount of leakage has occurred, either void the sample or use methods, subject to the approval of the Administrator, to correct the final results. Transfer the contents to a 400-ml glass beaker. Add polonium-209 tracer solution to the glass beaker in an amount approximately equal to the amount of polonium-210 expected in the total particulate sample. Record the activity of the tracer solution added. Add 16 M nitric acid to the beaker to digest and loosen the residue.

11.4.3 Transfer the contents of the glass beaker to the Teflon beaker containing the glass fiber filter. Rinse the glass beaker with 16 M HNO₃. If necessary, reduce the volume in the beaker by evaporation until all of the nitric acid HNO₃ from the glass beaker has been transferred to the Teflon beaker.

11.4.4 Add 30 ml of 29 M HF to the Teflon beaker and evaporate to near dryness on a hot plate in a properly operating hood.

Note: Do not allow the residue to go to dryness and overheat; this will result in loss of polonium.

11.4.5 Repeat step 11.4.4 until the filter is dissolved.

Page 132 of 181 (Subpart FF)

11.4.6 Add 100 ml of 16 M HNO₃to the residue in the Teflon beaker and evaporate to near dryness.

Note: Do not allow the residue to go to dryness.

11.4.7 Add 50 ml of 16 M HNO₃ and 10 ml of 12 M perchloric acid to the Teflon beaker and heat until dense furnes of perchloric acid are evolved.

11.4.8 Repeat steps 11.4.4 to 11.4.7 as necessary until sample is completely dissolved.

11.4.9 Add 10 ml of 12 M HCl to the Teflon beaker and evaporate to dryness. Repeat additions and evaporations several times.

11.4.10 Transfer the sample to a 250-ml volumetric flask and dilute to volume with 3 M HCI.

11.5 Sample Screening. To avoid contamination of the alpha spectrometry system, check each sample as follows:

11.5.1 Add 20 ml of 1 M HCl, 1 ml of the lanthanum carrier solution (0.1 mg La/ml), a 1 ml aliquot of the sample solution from Section 11.4.10, and 3 ml of 15 M ammonium hydroxide to a 250-ml beaker in the order listed. Allow this solution to stand for a minimum of 30 minutes.

11.5.2 Filter the solution through a filter membrane using the suction filter apparatus. Wash the filter membrane with 10 ml of water and 5 ml of ethanol, and allow the filter membrane to air dry on the filter apparatus.

11.5.3 Carefully remove the filter membrane and mount it, filtration side up, with double-side tape on the inner surface of a planchet. Place the planchet in an internal proportional counter, and count for 100 minutes.

11.5.4 Calculate the activity of the sample using Eq. 111-4 in Section 12.5.

11.5.5 Determine the aliquot volume of the sample solution from Section 11.4.10 to be analyzed for polonium-210, such that the aliquot contains an activity between 1 and 4 picocuries. Use Eq. 111–5 in Section 12.6.

11.6 Preparation of Silver Disc for Spontaneous Electrodeposition.

11.6.1 Clean both sides of the polished silver disc with silver cleaner and with degreaser.

11.6.2 Place disc on absorbent paper and spray one side with epoxy spray enamel. This should be carried out in a well-ventilated area, with the disc lying flat to keep paint on one side only. Allow paint to dry for 24 hours before using disc for deposition.

11.7 Sample Analysis.

11.7.1 Add the aliquot of sample solution from Section 11.4.10 to be analyzed for polonium-210, the volume of which was determined in Section 11.5.5, to a suitable 200-mi container to be placed in a constant temperature bath.

Note: Aliquot volume may require a larger container.

11.7.2 If necessary, bring the volume to 100 ml with 1 M HCl. If the aliquot volume exceeds 100 ml, use total aliquot.

11.7.3 Add 200 mg of ascorbic acid and heat solution to 85 °C (185 °F) in a constant temperature bath.

11.7.4 Suspend a silver disc in the heated solution using a glass or plastic rod with a hook inserted through the hole in the disc. The disc should be totally immersed in the solution, and the solution must be stirred constantly, at all times during the plating operation. Maintain the disc in solution for 3 hours.

11.7.5 Remove the silver disc, rinse with deionized distilled water, and allow to air dry at room temperature.

**11.7.6** Place the disc, with deposition side (unpainted side) up, on a planchet and secure with double-side plastic tape. Place the planchet with disc in alpha spectrometry system and count for 1000 minutes.

12.0 Data Analysis and Calculations.

12.1 Nomenclature.

A = Picocuries of polonium-210 in the Method 5 sample (from Section 12.8).

A_A= Picocuries of actinide added.

AL= Volume of sample aliquot used, in ml (specified in Section 11.5.1 as 1 ml).

As= Aliquot to be analyzed, in ml.

B_B= Procedure background counts measured in polonium-209 spectral region.

 $B_T$ = Polonium-209 tracer counts in sample.

 $C_T$ = Total counts in polonium-210 spectral region.

D = Decay correction for time "t" (in days) from sample collection to sample counting, given by: D=e^{-0.005t}

E_c= Average counting efficiency of detector (from Section 10.1.8), as counts per disintegration.

 $E_{C}$ = Counting efficiency of the detector for aliquot i of the actinide working solution, counts per disintegration.

 $E_i$ = Average counting efficiency of the internal proportional counter, as determined in Section 10.3.4, counts per disintegration.

 $E_{II}$ = Counting efficiency of the internal proportional counter for aliquot i of the 100 pCi/ml actinide working solution, counts per disintegration.

 $E_{y}$ = The fraction of polonium-209 recovered on the planchet (from Section 12.7).

F= Average activity of polonium-209 in sample (from Section 10.2.4), in pCi.

Fi= activity of aliquot i of the polonium-209 tracer solution, in pCi.

L = Dilution factor (unitless). This is the volume of sample solution prepared (specified as 250 ml in Section 11.1.10) divided by the volume of the aliquot of sample solution analyzed for polonium-210 (from Section 11.7.1).

M= Phosphorous rock processing rate of the source being tested, during run i, Mg/hr.

M_k= Phosphate rock processed annually by source k, in Mg/yr.

n = Number of calciners at the elemental phosphorus plant.

P = Total activity of sample solution from Section 11.4.10, in pCi (see Eq. 111-4).

Q_{sd}= Volumetric flow rate of effluent stream, as determined by Method 2, in dscm/hr.

S = Annual polonium-210 emissions from the entire facility, in curies/yr.

Vm(std)= Volume of air sample, as determined by Method 5, in dscm.

 $X_k$ = Emission rate from source k, from Section 12.10, in curies/Mg.

10⁻¹²= Curies per picocurie.

Page 134 of 181 (Subpart FF)

2.22 = Disintegrations per minute per picocurie.

#### 250 = Volume of solution from Section 11.4.10, in ml.

12.2 Counting Efficiency. Calculate the counting efficiency of the detector for each aliquot of the 1 pCi/ml actinide working solution using Eq. 111–1.

$$E_{\alpha} = \frac{C_s - C_B}{2.22 \text{ A}_A T}$$
 Eq. 111-1

Where:

C_B= Background counts in same peak area as C_S.

Cs= Gross counts in actinide peak.

T = Counting time in minutes, specified in Section 10.1.6 as 1000 minutes.

12.3 Polonium-209 Tracer Solution Activity. Calculate the activity of each aliquot of the polonium-209 tracer solution using Eq. 111–2.

$$F_i = \frac{C_s - C_B}{2.22 \,\mathrm{E_G}T}$$
 Eq. 111-2

Where:

C_B= Background counts in the 4.88 MeV region of spectrum the in the counting time T.

Cs= Gross counts of polonium-209 in the 4.88 MeV region of the spectrum in the counting time T.

T = Counting time, specified in Section 10.1.6 as 1000 minutes.

12.4 Control Efficiency of Internal Proportional Counter. Calculate the counting efficiency of the internal proportional counter for each aliquot of the 100 pCi/ml actinide working solution using Eq. 111–3.

$$E_{Ti} = \frac{C_s - C_B}{2.22 \text{ A}_A T}$$
 Eq. 111-3

Where:

C_B= Gross counts of procedure background.

Cs= Gross counts of standard.

T = Counting time in minutes, specified in Section 10.3.2 as 100 minutes.

12.5 Calculate the activity of the sample using Eq. 111-4.

$$P = \frac{250 \ \left(C_{s} - C_{\beta}\right)}{2.22 \ \overline{E_{I}}A_{z}T} \qquad Eq. \ 111.4$$

Where:

C_B= Total counts of procedure background. (See Section 11.1).

#### Cs= Total counts of screening sample.

T = Counting time for sample and background (which must be equal), in minutes (specified in Section 11.5.3 as 100 minutes).

12.6 Aliquot Volume. Determine the aliquot volume of the sample solution from Section 11.4.10 to be analyzed for polonium-210, such that the aliquot contains an activity between 1 and 4 picocuries using Eq. 111–5.

$$A_{\rm s} = \frac{250 \; ({\rm desired \, picocuries \, in \, ali \, quot})}{\rm P} \qquad Eq.$$

12.7 Polonium-209 Recovery. Calculate the fraction of polonium-209 recovered on the planchet, Ey, using Eq. 111-6.

111-5

$$E_{\rm T} = \frac{B_{\rm T} - B_{\rm B}}{2.22 \ \overline{\rm F} \ \overline{E_{\rm C}} \ T}$$
 Eq. 111-6

Where:

T = Counting time, specified in Section 11.1 as 1000 minutes.

12.8 Polonium-210 Activity. Calculate the activity of polonium-210 in the Method 5 sample (including glass fiber filter and acetone rinse) using Eq. 111-7.

$$A = \frac{(C_{r} - C_{B}) L}{2.22 E_{y} \overline{E_{c}} T D} \qquad Eq. \ 111-7$$

Where:

C₈= Procedure background counts in polonium-210 spectral region.

T = Counting time, specified in Section 11.1 as 1000 minutes for all alpha spectrometry sample and background counts.

12.9 Emission Rate from Each Stack.

12.9.1 For each test run, i, on a stack, calculate the measured polonium-210 emission rate, R_{Si}, using Eq. 111-8.

$$R_{ss} = \frac{(10^{-12}) A Q_{sd}}{V_{st(std)} M_i} \qquad Eq. 111-8$$

12.9.2 Determine the average polonium-210 emission rate from the stack, R_s, by taking the sum of the measured emission rates for all runs, and dividing by the number of runs performed.

12.9.3 Repeat steps 12.9.1 and 12.9.2 for each stack of each calciner.

12.10 Emission Rate from Each Source. Determine the total polonium-210 emission rate, X_k, from each source, k, by taking the sum of the average emission rates from all stacks to which the source exhausts.

12.11 Annual Polonium-210 Emission Rate from Entire Facility. Determine the annual elemental phosphorus plant emissions of polonium-210, S, using Eq. 111–9.

Page 136 of 181 (Subpart FF)

$$S = \frac{\sum_{k=1}^{n} (X_k M_k)}{E_{q_k}} = E_{q_k} 111-9$$

13.0 Method Performance.[Reserved]

14.0 Pollution Prevention.[Reserved]

15.0 Waste Management.[Reserved]

16.0 References

1. Blanchard, R.L. "Rapid Determination of Lead-210 and Polonium-210 in Environmental Samples by Deposition on Nickel." Anal. Chem., *38* :189, pp. 189–192. February 1966.

17.0 Tables, Diagrams, Flowcharts, and Validation Data[Reserved]

Method 114—Test Methods for Measuring Radionuclide Emissions from Stationary Sources

1. Purpose and Background

This method provides the requirements for: (1) Stack monitoring and sample collection methods appropriate for radionuclides; (2) radiochemical methods which are used in determining the amounts of radionuclides collected by the stack sampling and; (3) quality assurance methods which are conducted in conjunction with these measurements. These methods are appropriate for emissions for stationary sources. A list of references is provided.

Many different types of facilities release radionuclides into air. These radionuclides differ in the chemical and physical forms, half-lives and type of radiation emitted. The appropriate combination of sample extraction, collection and analysis for an individual radionuclide is dependent upon many interrelated factors including the mixture of other radionuclides present. Because of this wide range of conditions, no single method for monitoring or sample collection and analysis of a radionuclide is applicable to all types of facilities. Therefore, a series of methods based on "principles of measurement" are described for monitoring and sample collection and analysis which are applicable to the measurement of radionuclides found in effluent streams at stationary sources. This approach provides the user with the flexibility to choose the most appropriate combination of monitoring and sample collection and analysis methods which are applicable to the effluent stream to be measured.

#### 2. Stack Monitoring and Sample Collection Methods

Monitoring and sample collection methods are described based on "principles of monitoring and sample collection" which are applicable to the measurement of radionuclides from effluent streams at stationary sources. Radionuclides of most elements will be in the particulate form in these effluent streams and can be readily collected using a suitable filter media. Radionuclides of hydrogen, oxygen, carbon, nitrogen, the noble gases and in some circumstances iodine will be in the gaseous form. Radionuclides of these elements will require either the use of an in-line or off-line monitor to directly measure the radionuclides, or suitable sorbers, condensers or bubblers to collect the radionuclides.

2.1 Radionuclides as Particulates. The extracted effluent stream is passed through a filter media to remove the particulates. The filter must have a high efficiency for removal of sub-micron particles. The guidance in ANSI/HPS N13.1–1999 (section 6.6.2 Filter media) shall be followed in using filter media to collect particulates (incorporated by reference—see §61.18 of this part).

2.2 Radionuclides as Gases.

2.2.1 The Radionuclide Tritium (H–3). Tritium in the form of water vapor is collected from the extracted effluent sample by sorption, condensation or dissolution techniques. Appropriate collectors may include silica gel, molecular sieves, and ethylene glycol or water bubblers.

Tritium in the gaseous form may be measured directly in the sample stream using Method B–1, collected as a gas sample or may be oxidized using a metal catalyst to tritiated water and collected as described above.

Page 137 of 181 (Subpart FF)

2.2.2 Radionuclides of lodine. lodine is collected from an extracted sample by sorption or dissolution techniques. Appropriate collectors may include charcoal, impregnated charcoal, metal zeolite and caustic solutions.

2.2.3 Radionuclides of Argon, Krypton and Xenon. Radionuclides of these elements are either measured directly by an in-line or off-line monitor, or are collected from the extracted sample by low temperature sorption techniques, Appropriate sorbers may include charcoal or metal zeolite.

2.2.4 Radionuclides of Oxygen, Carbon, Nitrogen and Radon. Radionuclides of these elements are measured directly using an in-line or off-line monitor. Radionuclides of carbon in the form of carbon dioxide may be collected by dissolution in caustic solutions.

### 2.3 Definition of Terms

In-line monitor means a continuous measurement system in which the detector is placed directly in or adjacent to the effluent stream. This may involve either gross radioactivity measurements or specific radionuclide measurements. Gross measurements shall be made in conformance with the conditions specified in Methods A-4, B-2 and G-4.

Off-line monitor means a measurement system in which the detector is used to continuously measure an extracted sample of the effluent stream. This may involve either gross radioactivity measurements or specific radionuclide measurements. Gross measurements shall be made in conformance with the conditions specified in Methods A–4, B–2 and G–4.

Sample collection means a procedure in which the radionuclides are removed from an extracted sample of the effluent using a collection media. These collection media include filters, absorbers, bubblers and condensers. The collected sample is analyzed using the methods described in Section 3.

#### 3. Radionuclide Analysis Methods

A series of methods based on "principles of measurement" are described which are applicable to the analysis of radionuclides collected from airborne effluent streams at stationary sources. These methods are applicable only under the conditions stated and within the limitations described. Some methods specify that only a single radionuclide be present in the sample or the chemically separated sample. This condition should be interpreted to mean that no other radionuclides are present in quantities which would interfere with the measurement.

Also identified (Table 1) are methods for a selected list of radionuclides. The listed radionuclides are those which are most commonly used and which have the greatest potential for causing dose to members of the public. Use of methods based on principles of measurement other than those described in this section must be approved in advance of use by the Administrator. For radionuclides not listed in Table 1, any of the described methods may be used provided the user can demonstrate that the applicability conditions of the method have been met.

The type of method applicable to the analysis of a radionuclide is dependent upon the type of radiation emitted, i.e., alpha, beta or gamma. Therefore, the methods described below are grouped according to principles of measurements for the analysis of alpha, beta and gamma emitting radionuclides.

3.1 Methods for Alpha Emitting Radionuclides

#### 3.1.1 Method A-1, Radiochemistry-Alpha Spectrometry.

*Principle:* The element of interest is separated from other elements, and from the sample matrix using radiochemical techniques. The procedure may involve precipitation, ion exchange, or solvent extraction. Carriers (elements chemically similar to the element of interest) may be used. The element is deposited on a planchet in a very thin film by electrodeposition or by coprecipitation on a very small amount of carrier, such as lanthanum fluoride. The deposited element is then counted with an alpha spectrometer. The activity of the nuclide of interest is measured by the number of alpha counts in the appropriate energy region. A correction for chemical yield and counting efficiency is made using a standardized radioactive nuclide (tracer) of the same element. If a radioactive tracer is not available for the element of interest, a predetermined chemical yield factor may be used.

Applicability: This method is applicable for determining the activity of any alpha-emitting radionuclide, regardless of what other radionuclides are present in the sample provided the chemical separation step produces a very thin sample and removes all other radionuclides which could interfere in the spectral region of interest. APHA-605(2), ASTM-D-3972(13).

3.1.2 Method A-2, Radiochemistry-Alpha Counting.

*Principle:* The element of interest is separated from other elements, and from the sample matrix using radiochemistry. The procedure may involve precipitation, ion exchange, or solvent extraction. Carriers (elements chemically similar to the element of interest) may be used. The element is deposited on a planchet in a thin film and counted with an alpha counter. A correction for chemical yield (if necessary) is made. The alpha count rate measures the total activity of all emitting radionuclides of the separated element.

Applicability: This method is applicable for the measurement of any alpha-emitting radionuclide, provided no other alpha emitting radionuclide is present in the separated sample. It may also be applicable for determining compliance, when other radionuclides of the separated element are present, provided that the calculated emission rate is assigned to the radionuclide which could be present in the sample that has the highest dose conversion factor. IDO–12096(18).

3.1.3 Method A-3, Direct Alpha Spectrometry.

*Principle:* The sample, collected on a suitable filter, is counted directly on an alpha spectrometer. The sample must be thin enough and collected on the surface of the filter so that any absorption of alpha particle energy in the sample or the filter, which would degrade the spectrum, is minimal.

Applicability: This method is applicable to simple mixtures of alpha emitting radionuclides and only when the amount of particulates collected on the filter paper are relatively small and the alpha spectra is adequately resolved. Resolutions should be 50 keV (FWHM) or better, ASTM-D--3084(16).

3.1.4 Method A-4, Direct Alpha Counting (Gross alpha determination).

*Principle:* The sample, collected on a suitable filter, is counted with an alpha counter. The sample must be thin enough so that self-absorption is not significant and the filter must be of such a nature that the particles are retained on the surface.

Applicability: Gross alpha determinations may be used to measure emissions of specific radionuclides only (1) when it is known that the sample contains only a single radionuclide, or the identity and isotopic ratio of the radionuclides in the sample are well-known, and (2) measurements using either Method A–1, A–2 or A–5 have shown that this method provides a reasonably accurate measurement of the emission rate. Gross alpha measurements are applicable to unidentified mixtures of radionuclides only for the purposes and under the conditions described in section 3.7. APHA–601(3), ASTM–D–1943(10).

3.1.5 Method A-5, Chemical Determination of Uranium.

*Principle:* Uranium may be measured chemically by either colorimetry or fluorometry. In both procedures, the sample is dissolved, the uranium is oxidized to the hexavalent form and extracted into a suitable solvent. Impurities are removed from the solvent layer. For colorimetry, dibenzoylmethane is added, and the uranium is measured by the absorbance in a colorimeter. For fluorometry, a portion of the solution is fused with a sodium fluoride-lithium fluoride flux and the uranium is determined by the ultraviolet activated fluorescence of the fused disk in a fluorometer.

Applicability: This method is applicable to the measurements of emission rates of uranium when the isotopic ratio of the uranium radionuclides is well known. ASTM-E-318(15), ASTM-D-2907(14).

3.1.6 Method A--6, Radon-222-Continuous Gas Monitor.

*Principle:* Radon-222 is measured directly in a continuously extracted sample stream by passing the air stream through a calibrated scintillation cell. Prior to the scintillation cell, the air stream is treated to remove particulates and excess moisture. The alpha particles from radon-222 and its decay products strike a zinc sulfide coating on the inside of the scintillation cell producing light pulses. The light pulses are detected by a photomultiplier tube which generates electrical pulses. These pulses are processed by the system electronics and the read out is in pCi/l of radon-222.

Applicability: This method is applicable to the measurement of radon-222 in effluent streams which do not contain significant quantities of radon-220. Users of this method should calibrate the monitor in a radon calibration chamber at least twice per year. The background of the monitor should also be checked periodically by operating the instrument in a low radon environment. EPA 520/1–89–009(24).

3.1.7 Method A-7, Radon-222-Alpha Track Detectors

*Principle*: Radon-222 is measured directly in the effluent stream using alpha track detectors (ATD). The alpha particles emitted by radon-222 and its decay products strike a small plastic strip and produce submicron damage tracks. The plastic strip is placed in a caustic solution that accentuates the damage tracks which are counted using a microscope or

automatic counting system. The number of tracks per unit area is correlated to the radon concentration in air using a conversion factor derived from data generated in a radon calibration facility.

Applicability: Prior approval from EPA is required for use of this method. This method is only applicable to effluent streams which do not contain significant quantities of radon-220, unless special detectors are used to discriminate against radon-220. This method may be used only when ATDs have been demonstrated to produce data comparable to data obtained with Method A–6. Such data should be submitted to EPA when requesting approval for the use of this method. EPA 520/1–89–009(24).

3.2 Methods for Gaseous Beta Emitting Radionuclides.

3.2.1 Method B-1, Direct Counting in Flow-Through Ionization Chambers.

*Principle*: An ionization chamber containing a specific volume of gas which flows at a given flow rate through the chamber is used. The sample (effluent stream sample) acts as the counting gas for the chamber. The activity of the radionuclide is determined from the current measured in the ionization chamber.

Applicability: This method is applicable for measuring the activity of a gaseous beta-emitting radionuclide in an effluent stream that is suitable as a counting gas, when no other beta-emitting nuclides are present. DOE/EP-0096(17), NCRP-58(23).

3.2.2 Method B-2, Direct Counting With In-line or Off-line Beta Detectors.

Principle: The beta detector is placed directly in the effluent stream (in-line) or an extracted sample of the effluent stream is passed through a chamber containing a beta detector (off-line). The activities of the radionuclides present in the effluent stream are determined from the beta count rate, and a knowledge of the radionuclides present and the relationship of the gross beta count rate and the specific radionuclide concentration.

Applicability: This method is applicable only to radionuclides with maximum beta particle energies greater then 0.2 MeV. This method may be used to measure emissions of specific radionuclides only when it is known that the sample contains only a single radionuclide or the identity and isotopic ratio of the radionuclides in the effluent stream are well known. Specific radionuclide analysis of periodic grab samples may be used to identify the types and quantities of radionuclides present and to establish the relationship between specific radionuclide analyses and gross beta count rates.

This method is applicable to unidentified mixtures of gaseous radionuclides only for the purposes and under the conditions described in section 3.7.

3.3 Methods for Non-Gaseous Beta Emitting Radionuclides.

3.3.1 Method B-3, Radiochemistry-Beta Counting.

*Principle:* The element of interest is separated from other elements, and from the sample matrix by radiochemistry. This may involve precipitation, distillation, ion exchange, or solvent extraction. Carriers (elements chemically similar to the element of interest) may be used. The element is deposited on a planchet, and counted with a beta counter. Corrections for chemical yield, and decay (if necessary) are made. The beta count rate determines the total activity of all radionuclides of the separated element. This method may also involve the radiochemical separation and counting of a daughter element, after a suitable period of ingrowth, in which case it is specific for the parent nuclide.

Applicability: This method is applicable for measuring the activity of any beta-emitting radionuclide, with a maximum energy greater than 0.2 MeV, provided no other radionuclide is present in the separated sample. APHA–608(5).

3.3.2 Method B-4, Direct Beta Counting (Gross beta determination).

*Principle:* The sample, collected on a suitable filter, is counted with a beta counter. The sample must be thin enough so that self-absorption corrections can be made.

Applicability: Gross beta measurements are applicable only to radionuclides with maximum beta particle energies greater than 0.2 MeV. Gross beta measurements may be used to measure emissions of specific radionuclides only (1) when it is known that the sample contains only a single radionuclide, and (2) measurements made using Method B–3 show reasonable agreement with the gross beta measurement. Gross beta measurements are applicable to mixtures of radionuclides only for the purposes and under the conditions described in section 3.7. APHA–602(4), ASTM–D–1890(11).

Page 140 of 181 (Subpart FF)

3.3.3 Method B-5, Liquid Scintillation Spectrometry.

*Principle:* An aliquot of a collected sample or the result of some other chemical separation or processing technique is added to a liquid scintillation "cocktail" which is viewed by photomultiplier tubes in a liquid scintillation spectrometer. The spectrometer is adjusted to establish a channel or "window" for the pulse energy appropriate to the nuclide of interest. The activity of the nuclide of interest is measured by the counting rate in the appropriate energy channel. Corrections are made for chemical yield where separations are made.

Applicability: This method is applicable to any beta-emitting nuclide when no other radionuclide is present in the sample or the separated sample provided that it can be incorporated in the scintillation cocktail. This method is also applicable for samples which contain more than one radionuclide but only when the energies of the beta particles are sufficiently separated so that they can be resolved by the spectrometer. This method is most applicable to the measurement of low-energy beta emitters such as tritium and carbon-14. APHA-609(6), EML-LV-539-17(19).

3.4 Gamma Emitting Radionuclides

3.4.1 Method G-1, High Resolution Gamma Spectrometry.

*Principle:* The sample is counted with a high resolution gamma detector, usually either a Ge(Li) or a high purity Ge detector, connected to a multichannel analyzer or computer. The gamma emitting radionuclides in the sample are measured from the gamma count rates in the energy regions characteristic of the individual radionuclide. Corrections are made for counts contributed by other radionuclides to the spectral regions of the radionuclides of interest. Radiochemical separations may be made prior to counting but are usually not necessary.

Applicability: This method is applicable to the measurement of any gamma emitting radionuclide with gamma energies greater than 20 keV. It can be applied to complex mixtures of radionuclides. The samples counted may be in the form of particulate filters, absorbers, liquids or gases. The method may also be applied to the analysis of gaseous gamma emitting radionuclides directly in an effluent stream by passing the stream through a chamber or cell containing the detector. ASTM-3649(9), IDO-12096(18).

3.4.2 Method G-2, Low Resolution Gamma Spectrometry.

*Principle:* The sample is counted with a low resolution gamma detector, a thallium activated sodium iodide crystal. The detector is coupled to a photomultiplier tube and connected to a multichannel analyzer. The gamma emitting radionuclides in the sample are measured from the gamma count rates in the energy regions characteristic of the individual radionuclides. Corrections are made for counts contributed by other radionuclides to the spectral regions of the radionuclides of interest. Radiochemical separation may be used prior to counting to obtain less complex gamma spectra if needed.

Applicability: This method is applicable to the measurement of gamma emitting radionuclides with energies greater than 100 keV. It can be applied only to relatively simple mixtures of gamma emitting radionuclides. The samples counted may be in the form of particulate filters, absorbers, liquids or gas. The method can be applied to the analysis of gaseous radionuclides directly in an effluent stream by passing the gas stream through a chamber or cell containing the detector. ASTM-D-2459(12), EMSL-LV-0539-17(19).

3.4.3 Method G-3, Single Channel Gamma Spectrometry.

*Principle:* The sample is counted with a thallium activated sodium iodide crystal. The detector is coupled to a photomultiplier tube connected to a single channel analyzer. The activity of a gamma emitting radionuclide is determined from the gamma counts in the energy range for which the counter is set.

Applicability: This method is applicable to the measurement of a single gamma emitting radionuclide. It is not applicable to mixtures of radionuclides. The samples counted may be in the form of particulate filters, absorbers, liquids or gas. The method can be applied to the analysis of gaseous radionuclides directly in an effluent stream by passing the gas stream through a chamber or cell containing the detector.

3.4.4 Method G-4, Gross Gamma Counting.

*Principle:* The sample is counted with a gamma detector usually a thallium activated sodium iodine crystal. The detector is coupled to a photomultiplier tube and gamma rays above a specific threshold energy level are counted.

Applicability: Gross gamma measurements may be used to measure emissions of specific radionuclides only when it is known that the sample contains a single radionuclide or the identity and isotopic ratio of the radionuclides in the effluent

stream are well known. When gross gamma measurements are used to determine emissions of specific radionuclides periodic measurements using Methods G–1 or G–2 should be made to demonstrate that the gross gamma measurements provide reliable emission data. This method may be applied to analysis of gaseous radionuclides directly in an effluent stream by placing the detector directly in or adjacent to the effluent stream or passing an extracted sample of the effluent stream through a chamber or cell containing the detector.

3.5 Counting Methods. All of the above methods with the exception of Method A–5 involve counting the radiation emitted by the radionuclide. Counting methods applicable to the measurement of alpha, beta and gamma radiations are listed below. The equipment needed and the counting principles involved are described in detail in ASTM–3648(8).

3.5.1 Alpha Counting:

• Gas Flow Proportional Counters. The alpha particles cause ionization in the counting gas and the resulting electrical pulses are counted. These counters may be windowless or have very thin windows.

• Scintillation Counters. The alpha particles transfer energy to a scintillator resulting in a production of light photons which strike a photomultiplier tube converting the light photons to electrical pulses which are counted. The counters may involve the use of solid scintillation materials such as zinc sulfide or liquid scintillation solutions.

• Solid-State Counters. Semiconductor materials, such as silicon surface-barrier p-n junctions, act as solid ionization chambers. The alpha particles interact which the detector producing electron hole pairs. The charged pair is collected by an applied electrical field and the resulting electrical pulses are counted.

• Alpha Spectrometers. Semiconductor detectors used in conjunction with multichannel analyzers for energy discrimination.

## 3.5.2 Beta Counting:

- *Ionization Chambers*. These chambers contain the beta-emitting nuclide in gaseous form. The ionization current produced is measured.

• Geiger-Muller (GM) Counters-or Gas Flow Proportional Counters. The beta particles cause ionization in the counting gas and the resulting electrical pulses are counted. Proportional gas flow counters which are heavily shielded by lead or other metal, and provided with an anti-coincidence shield to reject cosmic rays, are called low background beta counters.

• Scintillation Counters. The beta particles transfer energy to a scintillator resulting in a production of light photons, which strike a photomultiplier tube converting the light photon to electrical pulses which are counted. This may involve the use of anthracene crystals, plastic scintillator, or liquid scintillation solutions with organic phosphors.

• Liquid Scintillation Spectrometers. Liquid scintillation counters which use two photomultiplier tubes in coincidence to reduce background counts. This counter may also electronically discriminate among pulses of a given range of energy.

#### 3.5.3 Gamma Counting:

• Low-Resolution Gamma Spectrometers. The gamma rays interact with thallium activated sodium iodide or cesium iodide crystal resulting in the release of light photons which strike a photomultiplier tube converting the light pulses to electrical pulses proportional to the energy of the gamma ray. Multi-channel analyzers are used to separate and store the pulses according to the energy absorbed in the crystal.

• High-Resolution gamma Spectrometers. Gamma rays interact with a lithium-drifted (Ge(Li)) or high-purity germanium (HPGe) semiconductor detectors resulting in a production of electron-hole pairs. The charged pair is collected by an applied electrical field. A very stable low noise preamplifier amplifies the pulses of electrical charge resulting from the gamma photon interactions. Multichannel analyzers or computers are used to separate and store the pulses according to the energy absorbed in the crystal.

• Single Channel Analyzers. Thallium activated sodium iodide crystals used with a single window analyzer. Pulses from the photomultiplier tubes are separated in a single predetermined energy range.

3.5.4 Calibration of Counters. Counters are calibrated for specific radionuclide measurements using a standard of the radionuclide under either identical or very similar conditions as the sample to be counted. For gamma spectrometers a series of standards covering the energy range of interest may be used to construct a calibration curve relating gamma energy to counting efficiency.

Page 142 of 181 (Subpart FF)

In those cases where a standard is not available for a radionuclide, counters may be calibrated using a standard with energy characteristics as similar as possible to the radionuclide to be measured. For gross alpha and beta measurements of the unidentified mixtures of radionuclides, alpha counters are calibrated with a natural uranium standard and beta counters with a cesium-137 standard. The standard must contain the same weight and distribution of solids as the samples, and be mounted in an identical manner. If the samples contain variable amounts of solids, calibration curves relating weight of solids present to counting efficiency are prepared. Standards other than those prescribed may be used provided it can be shown that such standards are more applicable to the radionuclide mixture measured.

3.6 Radiochemical Methods for Selected Radionuclides. Methods for a selected list of radionuclides are listed in Table 1. The radionuclides listed are those which are most commonly used and which have the greatest potential for causing doses to members of the public. For radionuclides not listed in Table 1, methods based on any of the applicable "principles of measurement" described in section 3.1 through 3.4 may be used.

3.7 Applicability of Gross Alpha and Beta Measurements to Unidentified Mixtures of Radionuclides. Gross alpha and beta measurements may be used as a screening measurement as a part of an emission measurement program to identify the need to do specific radionuclide analyses or to confirm or verify that unexpected radionuclides are not being released in significant quantities.

Gross alpha (Method A–4) or gross beta (Methods B–2 or B–4) measurements may also be used for the purpose of comparing the measured concentrations in the effluent stream with the limiting "Concentration Levels for Environmental Compliance" in table 2 of appendix E. For unidentified mixtures, the measured concentration value shall be compared with the lowest environmental concentration limit for any radionuclide which is not known to be absent from the effluent stream.

Radionuclide	Approved methods of analysis
Am-241	A-1, A-2, A-3, A-4
Ar-41	B–1,B–2,G–1,G–2, G–3, G–4
Ba-140	G–1, G–2, G–3, G–4
Br-82	G–1, G–2, G–3, G–4
C-11	B–1,B–2,G–1,G–2,G–3, G–4
C-14	B–5
Ca-45	B3, B4, B5
Ce-144	G–1, G–2, G–3, G–4
Cm-244	A-1, A-2, A-3, A-4
Co-60	G1, G2, G3, G4
Cr-51	G1, G2, G3, G4
Cs-134	G–1, G–2, G–3, G–4
Cs-137	G–1, G–2, G–3, G–4
Fe-55	B–5, G–1
Fe-59	G–1, G–2, G–3, G–4
Ga-67	G1, G2, G3, G4
H-3 (H ₂ O)	B5
H-3 (gas)	B-1

# Table 1-List of Approved Methods for Specific Radionuclides

Page 143 of 181 (Subpart FF)

I-123	G–1, G–2, G–3, G–4
I-125	G1
I-131	G–1, G–2, G–3, G–4
In-113m	G-1, G-2, G-3, G-4
Ir-192	G–1, G–2, G–3, G–4
Kr-85	B-1, B-2, B-5, G-1, G-2, G-3, G-4
Kr-87	B-1, B-2, G-1, G-2, G-3, G-4
Kr-88	B-1, B-2, G-1, G-2, G-3, G-4
Mn-54	G–1, G–2, G–3, G–4
Mo-99	G–1, G–2, G–3, G–4
N-13	B-1, B-2, G-1, G-2, G-3, G-4
O-15	B-1, B-2, G-1, G-2, G-3, G-4
P-32	B-3, B-4, B-5
Pm-147	B-3, B-4, B-5
Po-210	A-1, A-2, A-3, A-4
Pu-238	A-1, A-2, A-3, A-4
Pu-239	A-1, A-2, A-3, A-4
Pu-240	A-1, A-2, A-3, A-4
Ra-226	A-1, A-2, G-1, G-2
S-35	B-5
Se-75	G-1, G-2, G-3, G-4
Sr-90	B3, B4, B5
Tc-99	B3, B4, B5
Te-201	G-1, G-2, G-3, G-4
Uranium (total alpha)	A-1, A-2, A-3, A-4
Uranium (Isotopic)	A–1, A–3
Uranium (Natural)	A5
Xe-133	G-1
Yb-169	G–1, G–2, G–3, G–4
Zn-65	G-1, G-2, G-3, G-4

4. Quality Assurance Methods

Page 144 of 181 (Subpart FF)
Each facility required to measure their radionuclide emissions shall conduct a quality assurance program in conjunction with the radionuclide emission measurements. This program shall assure that the emission measurements are representative, and are of known precision and accuracy and shall include administrative controls to assure prompt response when emission measurements indicate unexpectedly large emissions. The program shall consist of a system of policies, organizational responsibilities, written procedures, data quality specifications, audits, corrective actions and reports. This quality assurance program shall include the following program elements:

4.1 The organizational structure, functional responsibilities, levels of authority and lines of communications for all activities related to the emissions measurement program shall be identified and documented.

4.2 Administrative controls shall be prescribed to ensure prompt response in the event that emission levels increase due to unplanned operations.

4.3 The sample collection and analysis procedures used in measuring the emissions shall be described including where applicable:

4.3.1 Identification of sampling sites and number of sampling points, including the rationale for site selections.

4.3.2 A description of sampling probes and representativeness of the samples.

4.3.3 A description of any continuous monitoring system used to measure emissions, including the sensitivity of the system, calibration procedures and frequency of calibration.

4.3.4 A description of the sample collection systems for each radionuclide measured, including frequency of collection, calibration procedures and frequency of calibration.

4.3.5 A description of the laboratory analysis procedures used for each radionuclide measured, including frequency of analysis, calibration procedures and frequency of calibration.

4.3.6 A description of the sample flow rate measurement systems or procedures, including calibration procedures and frequency of calibration.

4.3.7 A description of the effluent flow rate measurement procedures, including frequency of measurements, calibration procedures and frequency of calibration.

4.4 The objectives of the quality assurance program shall be documented and shall state the required precision, accuracy and completeness of the emission measurement data including a description of the procedures used to assess these parameters. Accuracy is the degree of agreement of a measurement with a true or known value. Precision is a measure of the agreement among individual measurements of the same parameters under similar conditions. Completeness is a measure of the amount of valid data obtained compared to the amount expected under normal conditions.

4.5 A quality control program shall be established to evaluate and track the quality of the emissions measurement data against preset criteria. The program should include where applicable a system of replicates, spiked samples, split samples, blanks and control charts. The number and frequency of such quality control checks shall be identified.

4.6 A sample tracking system shall be established to provide for positive identification of samples and data through all phases of the sample collection, analysis and reporting system. Sample handling and preservation procedures shall be established to maintain the integrity of samples during collection, storage and analysis.

4.7 Regular maintenance, calibration and field checks shall be performed for each sampling system in use by satisfying the requirements found in Table 2: Maintenance, Calibration and Field Check Requirements.

Sampling system components	Frequency of activity
Cleaning of thermal anemometer elements	As required by application.
Inspect pitot tubes for contaminant	At least annually.

## Table 2-Maintenance, Calibration and Field Check Requirements

deposits	
Inspect pitot tube systems for leaks	At least annually.
Inspect sharp-edged nozzles for damage	At least annually or after maintenance that could cause damage.
Check nozzles for alignment, presence of deposits, or other potentially degrading factors	Annually.
Check transport lines of HEPA-filtered applications to determine if cleaning is required	Annually.
Clean transport lines	Visible deposits for HEPA-filtered applications. Mean mass of deposited material exceeds 1g/m ² for other applications.
Inspect or test the sample transport system for leaks	At least annually.
Check mass flow meters of sampling systems with a secondary or transfer standard	At least quarterly.
Inspect rotameters of sampling systems for presence of foreign matter	At the start of each sampling period.
Check response of stack flow rate systems	At least quarterly.
Calibration of flow meters of sampling systems	At least annually.
Calibration of effluent flow measurement devices	At least annually.
Calibration of timing devices	At least annually.

4.8 Periodic internal and external audits shall be performed to monitor compliance with the quality assurance program. These audits shall be performed in accordance with written procedures and conducted by personnel who do not have responsibility for performing any of the operations being audited.

4.9 A corrective action program shall be established including criteria for when corrective action is needed, what corrective actions will be taken and who is responsible for taking the corrective action.

4.10 Periodic reports to responsible management shall be prepared on the performance of the emissions measurements program. These reports should include assessment of the quality of the data, results of audits and description of corrective actions.

4.11 The quality assurance program should be documented in a quality assurance project plan that should address each of the above requirements.

5. References

Page 146 of 181 (Subpart FF)

(1) American National Standards Institute "Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities", ANSI– N13.1–1969, American National Standards Institute, New York, New York (1969).

(2) American Public Health Association, "Methods of Air Sampling", 2nd Edition, Method 605, "Tentative Method of Analysis for Plutonium Content of Atmospheric Particulate Matter". American Public Health Association, New York, NY (1977).

(3) Ibid, Method 601, "Tentative Method of Analysis for Gross Alpha Radioactivity Content of the Atmosphere".

(4) Ibid, Method 602, "Tentative Method of the Analysis for Gross Beta Radioactivity Content of the Atmosphere".

(5) Ibid, Method 608, "Tentative Method of Analysis for Strontium-90 Content of Atmospheric Particulate Matter".

(6) Ibid, Method 609, "Tentative Method of Analysis for Tritium Content of the Atmosphere".

(7) Ibid, Method 603, "Tentative Method of Analysis for Iodine-131 Content of the Atmosphere".

(8) American Society for Testing and Materials, 1986 Annual Book ASTM Standards, Designation D–3648–78, "Standard Practices for the Measurement of Radioactivity". American Society for Testing and Materials, Philadelphia, PA (1986).

(9) Ibid, Designation D-3649-85, "Standard Practice for High Resolution Gamma Spectrometry".

(10) Ibid, Designation D-1943-81, "Standard Test Method for Alpha Particle Radioactivity of Water".

(11) Ibid, Designation D-1890-81, "Standard Test Method for Beta Particle Radioactivity of Water".

(12) Ibid, Designation D-2459-72, "Standard Test Method for Gamma Spectrometry of Water".

(13) Ibid, Designation D-3972-82, "Standard Test Method for Isotopic Uranium in Water by Radiochemistry".

(14) Ibid, Designation D-2907-83, "Standard Test Methods for Microquantities of Uranium in Water by Fluorometry".

(15) Ibid, Designation E-318, "Standard Test Method for Uranium in Aqueous Solutions by Colorimetry".

(16) Ibid, Designation D-3084-75, "Standard Practice for Alpha Spectrometry of Water".

(17) Corley, J.P. and C.D. Corbit, "A Guide for Effluent Radiological Measurements at DOE Installations", DOE/EP–0096, Pacific Northwest Laboratories, Richland, Washington (1983).

(18) Department of Energy, "RESL Analytical Chemistry Branch Procedures Manual", IDO-12096, U.S. Department of Energy, Idaho Falls, Idaho (1982).

(19) Environmental Protection Agency, "Radiochemical Analytical Procedures for Analysis of Environmental Samples", EMSL-LV-0539-17, U.S. Environmental Protection Agency, Environmental Monitoring and Support Laboratory, Las Vegas, Nevada (1979).

(20) Environmental Protection Agency, "Radiochemistry Procedures Manual", EPA 520/5-84-006, Eastern Environmental Radiation Facility, Montgomery, Alabama (1984).

(21) National Council on Radiation Protection and Measurements, NCRP Report No. 50, "Environmental Radiation Measurements", National Council on Radiation Protection and Measurement, Bethesda, Maryland (1976).

(22) Ibid, Report No. 47, "Tritium Measurement Techniques". (1976).

(23) Ibid, Report No. 58 "A Handbook of Radioactivity Measurement Procedures" (1985).

(24) Environmental Protection Agency, "Indoor Radon and Radon Decay Product Measurement Protocols", EPA 520/1– 89–009, U.S. Environmental Protection Agency, Washington, DC (1989).

Page 147 of 181 (Subpart FF)

## Method 115-Monitoring for Radon-222 Emissions

This appendix describes the monitoring methods which must be used in determining the radon-222 emissions from underground uranium mines, uranium mill tailings piles, phosphogypsum stacks, and other piles of waste material emitting radon.

1. Radon-222 Emissions from Underground Uranium Mine Vents

1.1 Sampling Frequency and Calculation of Emissions. Radon-222 emissions from underground uranium mine vents shall be determined using one of the following methods:

1.1.1 Continuous Measurement. These measurements shall be made and the emissions calculated as follows:

(a) The radon-222 concentration shall be continuously measured at each mine vent whenever the mine ventilation system is operational.

(b) Each mine vent exhaust flow rate shall be measured at least 4 times per year.

(c) A weekly radon-222 emission rate for the mine shall be calculated and recorded weekly as follows:

 $A_w = C_1 Q_1 T_1 + C_2 Q_2 T_2 + \dots C_j Q_i T_j$ 

Where:

A_w=Total radon-222 emitted from the mine during week (Ci)

C₁=Average radon-222 concentration in mine vent i(Ci/m³)

 $Q_i$ =Volumetric flow rate from mine vent i(m³/hr)

T_i=Hours of mine ventilation system operation during week for mine vent i(hr)

(d) The annual radon-222 emission rate is the sum of the weekly emission rates during a calendar year.

1.1.2 Periodic Measurement. This method is applicable only to mines that continuously operate their ventilation system except for extended shutdowns. Mines which start up and shut down their ventilation system frequently must use the continuous measurement method describe in Section 1.1.1 above. Emission rates determined using periodic measurements shall be measured and calculated as follows:

(a) The radon-222 shall be continuously measured at each mine vent for at least one week every three months.

(b) Each mine vent exhaust flow rate shall be measured at least once during each of the radon-222 measurement periods.

(c) A weekly radon-222 emission rate shall be calculated for each weekly period according to the method described in Section 1.1.1. In this calculation T=168 hr.

(d) The annual radon-222 emission rate from the mine should be calculated as follows:

$$A_{y} = \frac{52 - W_{z}}{n} \quad (A_{w1} + A_{w2} + \cdots + A_{wi})$$

Where:

A_v=Annual radon-222 emission rate from the mine(Ci)

Awi=Weekly radon-222 emission rate during the measurement period i (Ci)

Page 148 of 181 (Subpart FF)

#### n=Number of weekly measurement periods per year

W_s=Number of weeks during the year that the mine ventilation system is shut down in excess of 7 consecutive days, i.e. the sum of the number of weeks each shut down exceeds 7 days

1.2 Test Methods and Procedures

Each underground mine required to test its emissions, unless an equivalent or alternative method has been approved by the Administrator, shall use the following test methods:

1.2.1 Test Method 1 of appendix A to part 60 shall be used to determine velocity traverses. The sampling point in the duct shall be either the centroid of the cross section or the point of average velocity.

1.2.2 Test Method 2 of appendix A to part 60 shall be used to determine velocity and volumetric flow rates.

1.2.3 Test Methods A–6 or A–7 of appendix B, Method 114 to part 61 shall be used for the analysis of radon–222. Use of Method A–7 requires prior approval of EPA based on conditions described in appendix B.

1.2.4 A quality assurance program shall be conducted in conformance with the programs described for Continuous Radon Monitors and Alpha Track Detectors in EPA 520/1–89–009. (2)

2. Radon–222 Emissions from Uranium Mill Tailings Piles

2.1 Measurement and Calculation of Radon Flux from Uranium Mill Tailings Piles.

2.1.1 Frequency of Flux Measurement. A single set of radon flux measurements may be made, or if the owner or operator chooses, more frequent measurements may be made over a one year period. These measurements may involve quarterly, monthly or weekly intervals. All radon measurements shall be made as described in paragraphs 2.1.2 through 2.1.6 except that for measurements made over a one year period, the requirement of paragraph 2.1.4(c) shall not apply. The mean radon flux from the pile shall be the arithmetic mean of the mean radon flux for each measurement period. The weather conditions, moisture content of the tailings and area of the pile covered by water existing at the time of the measurement shall be chosen so as to provide measurements representative of the long term radon flux from the pile and shall be subject to EPA review and approval.

2.1.2 Distribution of Flux Measurements. The distribution and number of radon flux measurements required on a pile will depend on clearly defined areas of the pile (called regions) that can have significantly different radon fluxes due to surface conditions. The mean radon flux shall be determined for each individual region of the pile. Regions that shall be considered for operating mill tailings piles are:

(a) Water covered areas,

(b) Water saturated areas (beaches),

(c) Dry top surface areas, and

(d) Sides, except where earthen material is used in dam construction.

For mill tailings after disposal the pile shall be considered to consist of only one region.

2.1.3 Number of Flux Measurements. Radon flux measurements shall be made within each region on the pile, except for those areas covered with water. Measurements shall be made at regularly spaced locations across the surface of the region, realizing that surface roughness will prohibit measurements in some areas of a region. The minimum number of flux measurements considered necessary to determine a representative mean radon flux value for each type of region on an operating pile is:

(a) Water covered area---no measurements required as radon flux is assumed to be zero,

(b) Water saturated beaches-100 radon flux measurements,

(c) Loose and dry top surface-100 radon flux measurements,

(d) Sides-100 radon flux measurements, except where earthern material is used in dam construction.

For a mill tailings pile after disposal which consists of only one region a minimum of 100 measurements are required.

2.1.4 Restrictions to Radon Flux Measurements. The following restrictions are placed on making radon flux measurements:

(a) Measurements shall not be initiated within 24 hours of a rainfall.

(b) If a rainfall occurs during the 24 hour measurements period, the measurement is invalid if the seal around the lip of the collector has washed away or if the collector is surrounded by water.

(c) Measurements shall not be performed if the ambient temperature is below 35 °F or if the ground is frozen.

2.1.5 Areas of Pile Regions. The approximate area of each region of the pile shall be determined in units of square meters.

2.1.6 Radon Flux Measurement. Measuring radon flux involves the adsorption of radon on activated charcoal in a largearea collector. The radon collector is placed on the surface of the pile area to be measured and allowed to collect radon for a time period of 24 hours. The radon collected on the charcoal is measured by gamma-ray spectroscopy. The detailed measurement procedure provided in appendix A of EPA 520/5–85–0029(1) shall be used to measure the radon flux on uranium mill tailings, except the surface of the tailings shall not be penetrated by the lip of the radon collector as directed in the procedure, rather the collector shall be carefully positioned on a flat surface with soil or tailings used to seal the edge.

2.1.7 Calculations. The mean radon flux for each region of the pile and for the total pile shall be calculated and reported as follows:

(a) The individual radon flux calculations shall be made as provided in appendix A EPA 86 (1). The mean radon flux for each region of the pile shall be calculated by summing all individual flux measurements for the region and dividing by the total number of flux measurements for the region.

(b) The mean radon flux for the total uranium mill tailings pile shall be calculated as follows.

 $J_s = \frac{J_1 A_1 + \cdots J_2 A_2 \cdots J_i A_i}{A_i}$ 

Where:

J_s=Mean flux for the total pile (pCi/m² -s)

J_i=Mean flux measured in region i (pCi/m² -s)

A_i=Area of region i (m²)

 $A_{i}$ =Total area of the pile (m²)

2.1.8 Reporting. The results of individual flux measurements, the approximate locations on the pile, and the mean radon flux for each region and the mean radon flux for the total stack shall be included in the emission test report. Any condition or unusual event that occurred during the measurements that could significantly affect the results should be reported.

3.0 Radon-222 Emissions from Phosphogypsum Stacks,

3.1 Measurement and Calculation of the Mean Radon Flux. Radon flux measurements shall be made on phosphogypsum stacks as described below:

3.1.1 Frequency of Measurements. A single set of radon flux measurements may be made after the phosphogypsum stack becomes inactive, or if the owner or operator chooses, more frequent measurements may be made over a one year period. These measurements may involve quarterly, monthly or weekly intervals. All radon measurements shall be made

Page 150 of 181 (Subpart FF)

as described in paragraphs 3.1.2 through 3.1.6 except that for measurements made over a one year period, the requirement of paragraph 3.1.4(c) shall not apply. For measurements made over a one year period, the radon flux shall be the arithmetic mean of the mean radon flux for each measurement period.

3.1.2 Distribution and Number of Flux Measurements. The distribution and number of radon flux measurements required on a stack will depend on clearly defined areas of the stack (called regions) that can have significantly different radon fluxes due to surface conditions. The mean radon flux shall be determined for each individual region of the stack. Regions that shall be considered are:

(a) Water covered areas,

(b) Water saturated areas (beaches),

(c) Loose and dry top surface areas,

(d) Hard-packed roadways, and

(e) Sides.

3.1.3 Number of Flux Measurements. Radon flux measurements shall be made within each region on the phosphogypsum stack, except for those areas covered with water. Measurements shall be made at regularly spaced locations across the surface of the region, realizing that surface roughness will prohibit measurements in some areas of a region. The minimum number of flux measurements considered necessary to determine a representative mean radon flux value for each type of region is:

(a) Water covered area-no measurements required as radon flux is assumed to be zero,

(b) Water saturated beaches-50 radon flux measurements,

(c) Loose and dry top surface-100 radon flux measurements,

(d) Hard-packed roadways-50 radon flux measurements, and

(e) Sides—100 radon flux measurements.

A minimum of 300 measurements are required. A stack that has no water cover can be considered to consist of two regions, top and sides, and will require a minimum of only 200 measurements.

3.1.4 Restrictions to Radon Flux Measurements. The following restrictions are placed on making radon flux measurements:

(a) Measurements shall not be initiated within 24 hours of a rainfall.

(b) If a rainfall occurs during the 24 hour measurement period, the measurement is invalid if the seal around the lip of the collector has washed away or if the collector is surrounded by water.

(c) Measurements shall not be performed if the ambient temperature is below 35 °F or if the ground is frozen.

3.1.5 Areas of Stack Regions. The approximate area of each region of the stack shall be determined in units of square meters.

3.1.6 Radon Flux Measurements. Measuring radon flux involves the adsorption of radon on activated charcoal in a largearea collector. The radon collector is placed on the surface of the stack area to be measured and allowed to collect radon for a time period of 24 hours. The radon collected on the charcoal is measured by gamma-ray spectroscopy. The detailed measurement procedure provided in appendix A of EPA 520/5–85–0029(1) shall be used to measure the radon flux on phosphogypsum stacks, except the surface of the phosphogypsum shall not be penetrated by the lip of the radon collector as directed in the procedure, rather the collector shall be carefully positioned on a flat surface with soil or phosphogypsum used to seal the edge.

3.1.7 Calculations. The mean radon flux for each region of the phosphogypsum stack and for the total stack shall be calculated and reported as follows:

(a) The individual radon flux calculations shall be made as provided in appendix A EPA 86 (1). The mean radon flux for each region of the stack shall be calculated by summing all individual flux measurements for the region and dividing by the total number of flux measurements for the region.

(b) The mean radon flux for the total phosphogypsum stack shall be calculated as follows.

$$J_{s} = \frac{J_{1}A_{1} + J_{2}A_{2} + \cdots + J_{i}A_{i}}{A_{i}}$$

Where:

 $J_s$ =Mean flux for the total stack (pCi/m² -s)

J_i=Mean flux measured in region i (pCi/m² -s)

A_i=Area of region i (m²)

At=Total area of the stack

3.1.8 Reporting. The results of individual flux measurements, the approximate locations on the stack, and the mean radon flux for each region and the mean radon flux for the total stack shall be included in the emission test report. Any condition or unusual event that occurred during the measurements that could significantly affect the results should be reported.

4.0 Quality Assurance Procedures for Measuring Rn-222 Flux

A. Sampling Procedures

Records of field activities and laboratory measurements shall be maintained. The following information shall be recorded for each charcoal canister measurement:

(a) Site

(b) Name of pile

(c) Sample location

(d) Sample ID number

(e) Date and time on

(f) Date and time off

(g) Observations of meteorological conditions and comments

Records shall include all applicable information associated with determining the sample measurement, calculations, observations, and comments.

B. Sample Custody

Custodial control of all charcoal samples exposed in the field shall be maintained in accordance with EPA chain-ofcustody field procedures. A control record shall document all custody changes that occur between the field and laboratory personnel.

C. Calibration Procedures and Frequency

The radioactivity of two standard charcoal sources, each containing a carefully determined quantity of radium-226 uniformly distributed through 180g of activated charcoal, shall be measured. An efficiency factor is computed by dividing the average measured radioactivity of the two standard charcoal sources, minus the background, in cpm by the known radioactivity of the charcoal sources in dpm. The same two standard charcoal sources shall be counted at the beginning and at the end of each day's counting as a check of the radioactivity counting equipment. A background count using unexposed charcoal should also be made at the beginning and at the end of each counting day to check for inadvertent contamination of the detector or other changes affecting the background. The unexposed charcoal comprising the blank is changed with each new batch of charcoal used.

D. Internal Quality Control Checks and Frequency

The charcoal from every tenth exposed canister shall be recounted. Five percent of the samples analyzed shall be either blanks (charcoal having no radioactivity added) or samples spiked with known quantities of radium-226.

E. Data Precision, Accuracy, and Completeness

The precision, accuracy, and completeness of measurements and analyses shall be within the following limits for samples measuring greater than  $1.0 \text{ pCi/m}^2$  -s.

(a) Precision: 10%

(b) Accuracy: ±10%

(c) Completeness: at least 85% of the measurements must yield useable results.

5.0 References

(1) Hartley, J.N. and Freeman, H.D., "Radon Flux Measurements on Gardinier and Royster phosphogypsum Piles Near Tampa and Mulberry, Florida," U.S. Environmental Protection Agency Report, EPA 520/5–85–029, January 1986.

(2) Environmental Protection Agency, "Indoor Radon and Radon Decay Product Measurement Protocols", EPA 520/1-89-009, U.S. Environmental Protection Agency, Washington, DC. (1989).

[38 FR 8826, Apr. 6, 1973]

Editorial Notes: 1. ForFederal Registercitations to appendix B see the List of CFR Sections Affected, which appears in the Finding Aids section of the printed volume and on GPO Access.

2. At 65 FR 62161, Oct. 17, 2000, appendix B to part 61 was amended by revising Methods 101, 101A, 102, 103, 104, 105, 106, 107, 107A, 108, 108A, 108B, 108C, and 111. However, because the amendment contains no revised text for Method 107A, this part of the revision could not be incorporated.

## Appendix C to Part 61—Quality Assurance Procedures

Procedure 1—Determination of Adequate Chromatographic Peak Resolution

In this method of dealing with resolution, the extent to which one chromatographic peak overlaps another is determined.

For convenience, consider the range of the elution curve of each compound as running from  $-2\sigma$  to  $+2\sigma$ . This range is used in other resolution criteria, and it contains 95.45 percent of the area of a normal curve. If two peaks are separated by a known distance, b, one can determine the fraction of the area of one curve that lies within the range of the other. The extent to which the elution curve of a contaminant compound overlaps the curve of a compound that is under analysis is found by integrating the contaminant curve over the limits  $b-2\sigma_s$ to  $b+2\sigma_s$ , where  $\sigma_s$  is the standard deviation of the sample curve.

This calculation can be simplified in several ways. Overlap can be determined for curves of unit area; then actual areas can be introduced. Desired integration can be resolved into two integrals of the normal distribution function for which there are convenient calculation programs and tables. An example would be Program 15 in Texas Instruments Program Manual ST1, 1975, Texas Instruments, Inc., Dallas, Texas 75222.

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In judging the suitability of alternate GC columns or the effects of altering chromatographic conditions, one can employ the area overlap as the resolution parameter with a specific maximum permissible value.

The use of Gaussian functions to describe chromatographic elution curves is widespread. However, some elution curves are highly asymmetric. In cases where the sample peak is followed by a contaminant that has a leading edge that rises sharply but the curve then tails off, it may be possible to define an effective width for t_cas "twice the distance from the leading edge to a perpendicular line through the maxim of the contaminant curve, measured along a perpendicular bisection of that line."

Procedure 2—Procedure for Field Auditing GC Analysis

Responsibilities of audit supervisor and analyst at the source sampling site include the following:

A. The audit supervisor verifies that audit cylinders are stored in a safe location both before and after the audit to prevent vandalism.

B. At the beginning and conclusion of the audit, the analyst records each cylinder number and pressure. An audit cylinder is never analyzed when the pressure drops below 200 psi.

C. During the audit, the analyst performs a minimum of two consecutive analyses of each audit cylinder gas. The audit must be conducted to coincide with the analysis of source test samples, normally immediately after GC calibration and prior to sample analyses.

Page 154 of 181 (Subpart FF)

D. At the end of audit analyses, the audit supervisor requests the calculated concentrations from the analyst and compares the results with the actual audit concentrations. If each measured concentration agrees with the respective actual concentration within ±10 percent, he directs the analyst to begin analyzing source samples. Audit supervisor judgment and/or supervisory policy determine action when agreement is not within ±10 percent. When a consistent bias in excess of 10 percent is found, it may be possible to proceed with the sample analysis, with a corrective factor to be applied to the results at a later time. However, every attempt should be made to locate the cause of the discrepancy, as it may be misleading. The audit supervisor records each cylinder number, cylinder pressure (at the end of the audit), and all calculated concentrations. The individual being audited must not under any circumstance be told actual audit concentrations until calculated concentrations have been submitted to the audit supervisor.

Field Audit Report

Part A--- To be filled out by organization supplying audit cylinders.

1. Organization supplying audit sample(s) and shipping address

2. Audit supervisor, organization, and phone number

3. Shipping instructions: Name, Address, Attention

· ·

4. Guaranteed arrival date for cylinders_

5. Planned shipping date for cylinders____

6. Details on audit cylinders from last analysis

	Low conc.	High conc.
a. Date of last analysis		
b. Cylinder number		
c. Cylinder pressure, psi		
d. Audit gas(es)/balance gas		
e. Audit gas(es), ppm		
f. Cylinder construction		

Part B --- To be filled out by audit supervisor.

1. Process sampled

2. Audit location

3. Name of individual audit

4. Audit date_____

5. Audit results:

Low conc.	High conc.
Construction of the second	

	cylinder	cylinder
a. Cylinder number		
b. Cylinder pressure before audit, psi		
c. Cylinder pressure after audit, psi		
d. Measured concentration, ppm Injection #1* Injection #2* Average		
e. Actual audit concentration, ppm (Part A, 6e)		
f. Audit accuracy: ¹		
Low Conc. Cylinder		· ·
High Conc. Cylinder		
Percent ¹ accuracy=		
Measured ConcActual Conc.		
×100		
Actual Conc.		
g. Problems detected (if any)	:	

¹Results of two consecutive injections that meet the sample analysis criteria of the test method.

[47 FR 39178, Sept. 7, 1982]

# Appendix D to Part 61—Methods for Estimating Radionuclide Emissions

## 1. Purpose and Background

Facility owners or operators may estimate radionuclide emissions to the atmosphere for dose calculations instead of measuring emissions. Particulate emissions from mill tailings piles should be estimated using the procedures listed in reference re #2. All other emissions may be estimated by using the "Procedures" listed below, or using the method described in reference #1.

2. Procedure

To estimate emissions to the atmosphere:

(a) Determine the amount (in curies) used at facilities for the period under consideration. Radioactive materials in sealed packages that remain unopened, and have not leaked during the assessment period should not be included in the calculation.

(b) Multiply the amount used by the following factors which depend on the physical state of the radionuclide. They are:

(i) 1 for gases;

(ii) 10⁻³ for liquids or particulate solids; and

(iii) 10⁻⁶for solids.

Page 156 of 181 (Subpart FF)

If any nuclide is heated to a temperature of 100 degrees Celsius or more, boils at a temperature of 100 degrees Celsius or less, or is intentionally dispersed into the environment, it must be considered to be a gas.

(c) If a control device is installed between the place of use and the point of release, multiply emissions from (b) by an adjustment factor. These are presented in Table 1.

Controls	Types of radionuclides controlled	Adjustment factor to emissions	Comments and conditions
HEPA filters	Particulates	0.01	Not applicable to gaseous radionuclides; periodic testing is prudent to ensure high removal efficiency.
Fabric filter	Particulates	0.1	Monitoring would be prudent to guard against tears in filter.
Sintered metal	Particulates	1	Insufficient data to make recommendation.
Activated carbon filters	Iodine gas	0.1	Efficiency is time dependent; monitoring is necessary to ensure effectiveness.
Douglas bags: Held one week or longer for decay	Xenon	0.5/wk	Based on xenon half-life of 5.3 days;
Douglas bags: Released within one week	Xenon	1	Provides no reduction of exposure to general public.
Venturi scrubbers	Particulates Gases	0.05 1	Although venturis may remove gases, variability in gaseous removal efficiency dictates adjustment factor for particulates only.
Packed bed scrubbers	Gases	0.1	Not applicable to particulates.
Electrostatic precipitators	Particulates	0.05	Not applicable for gaseous radionuclides
Xenon traps	Xenon	0.1	Efficiency is time dependent; monitoring is necessary to ensure effectiveness.
Fume hoods	All	1	Provides no reduction to general public exposures.

# Table 1—Adjustment to Emission Factors for Effluent Controls

Vent stacks	All	1	Generally provides no reduction of
			exposure to general public.

#### References

(1) Environmental Protection Agency, "A Guide for Determining Compliance with the Clean Air Act Standards for Radionuclides Emissions from NRC-Licensed and Non-DOE Federal Facilities", EPA 520/1–89–002, January 1989.

(2) Nuclear Regulatory Commission, "Methods for Estimating Radioactive and Toxic Airborne Source Terms for Uranium Milling Operations", U.S. Nuclear Regulatory Commission Regulatory Guide 3.59, March 1987.

[54 FR 51711, Dec. 15, 1989]

# Appendix E to Part 61—Compliance Procedures Methods for Determining Compliance With Subpart I

1. Purpose and Background

This Appendix provides simplified procedures to reduce the burden on Nuclear Regulatory Commission (NRC) licensees, and non-Department of Energy Federal facilities in determining compliance with 40 CFR part 61, subpart I. The procedures consist of a series of increasingly more stringent steps, depending on the facility's potential to exceed the standard.

First, a facility can be found in compliance if the quantity of radioactive material possessed during the year is less than that listed in a table of annual possession quantities. A facility will also be in compliance if the average annual radionuclide emission concentration is less than that listed in a table of air concentration levels. If the facility is not in compliance by these tables, it can establish compliance by estimating a dose using screening procedure developed by the National Council on Radiation Protection and Measurements with a radiological source term derived using EPA approved emission factors. These procedures are described in a "Guide for Determining Compliance with the Clean Air Act Standards for Radionuclide Emissions From NRC-Licenced and Non-DOE Federal Facilities."

A user-friendly computer program called COMPLY has been developed to reduce the burden on the regulated community. The Agency has also prepared a "User's Guide for the COMPLY Code" to assist the regulated community in using the code, and in handling more complex situations such as multiple release points. The basis for these compliance procedures are provided in "Background Information Document: Procedures Approved for Demonstrating Compliance with 40 CFR Part 61, Subpart I". The compliance model is the highest level in the COMPLY computer code and provides for the most realistic assessment of dose by allowing the use of site-specific information.

### 2. Table of Annual Possession Quantity

(a) Table 1 may be used for determining if facilities are in compliance with the standard. The possession table can only be used if the following conditions are met:

(i) No person lives within 10 meters of any release point; and

(ii) No milk, meat, or vegetables are produced within 100 meters of any release point.

(b) Procedures described in Reference (1) shall be used to determine compliance or exemption from reporting by use of Table 2.

## Table 1—Annual Possession Quantities for Environmental Compliance

## [Annual Possession Quantities (Ci/yr)]

Radionuclide	Gaseous form*	Liquid/powder forms	Solid form*
Ac-225	9.6E-05	9.6E02	9.6E+01

Page 158 of 181 (Subpart FF)

Ac-227	1.6E-07	1.6E04	1.6E-01
Ac-228	3.4E-03	3.4E+00	3.4E+03
Ag-106	1.6E+00	1.6E+03	1.6E+06
Ag-106m	2.6E-03	2.6E+00	2.6E+03
Ag-108m	6.5E-06	6.5E-03	6.5E+00
Ag-110m	9.4E-05	9.4E-02	9.4E+01
Ag-111	6.7E-02	6.7E+01	6.7E+04
A1-26	4.0E-06	4.0E-03	4.0E+00
Am-241	2.3E-06	2.3E-03	2.3E+00
Am-242	1.8E-02	1.8E+01	1.8E+04
Am-242m	2.5E-06	2.5E-03	2.5E+00
Am-243	2.3E-06	2.3E-03	2.3E+00
Am-244	4.6E-02	4.6E+01	4.6E+04
Am-245	7.0E+00	7.0E+03	7.0E+06
Am-246	9.8E-01	9.8E+02	9.8E+05
Ar-37	1.4E+06		
Ar-41	1.4E+00		
As-72	2.9E-02	2.9E+01	2.9E+04
As-73	6.0E-02	6.0E+01	6.0E+04
As-74	4.3E-03	4.3E+00	4.3E+03
As-76	8.8E-02	8.8E+01	8.8E+04
As-77	<b>7.9</b> E–01	7.9E+02	7.9E+05
At-211	1.0E-02	1.0E+01	1.0E+04
Au-193	4.2E-01	4.2E+02	4.2E+05
Au-194	3.5E-02	3.5E+01	3.5E+04
Au-195	3.3E-03	3.3E+00	3.3E+03
Au-198	4.6E-02	4.6E+01	4.6E+04
Au-199	1.5E-01	1.5E+02	1.5E+05
Ba-131	1.0E-02	1.0E+01	1.0E+04

Page 159 of 181 (Subpart FF)

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Ba-133	4.9E-05	4.9E-02	4.9E+01
Ba-133m	9.3E-02	9.3E+01	9.3E+04
Ba-135m	5.8E-01	5.8E+02	5.8E+05
Ba-139	4.7E+00	4.7E+03	4.7E+06
Ba-140	2.1E-03	2.1E+00	2.1E+03
Ba-141	1.3E+00	1.3E+03	1.3E+06
Ba-142	1.1E+00	1.1E+03	1.1E+06
Be-7	2.3E-02	2.3E+01	2.3E+04
Be-10	3.0E-03	3.0E+00	3.0E+03
Bi-206	3.1E-03	3.1E+00	3.1E+03
Bi-207	8.4E-06	8.4E-03	8.4E+00
Bi-210	4.2E-03	4.2E+00	4.2E+03
Bi-212	4.7E-02	4.7E+01	4.7E+04
Bi-213	6.0E-02	6.0E+01	6.0E+04
Bi-214	1.4E-01	1.4E+02	1.4E+05
Bk-249	7.0E-04	7.0E-01	7.0E+02
Bk-250	1.0E-01	1.0E+02	1.0E+05
Br-77	7.5E-02	7.5E+01	7.5E+04
Br-80	1.2E+01	1.2E+04	1.2E+07
Br-80m	1.5E+00	1.5E+03	1.5E+06
Br-82	1.6E-02	1.6E+01	1.6E+04
Br-83	9.9E+00	9.9E+03	9.9E+06
Br-84	5.6E-01	5.6E+02	5.6E+05
C-11	1.3E+00	1.3E+03	1.3E+06
C-14	2.9E-01	2.9E+02	2.9E+05
Ca-41	2.7E-02	2.7E+01	2.7E+04
Ca-45	5.8E-02	5.8E+01	5.8E+04
Ca-47	1.1E-02	1.1E+01	1.1E+04
Cd-109	5.0E-03	5.0E+00	5.0E+03

Page 160 of 181 (Subpart FF)

			presentation of the second
Cd-113	3.3E-04	3.3E01	3.3E+02
Cd-113m	4.4E-04	4.4E-01	4.4E+02
Cd-115	5.4E-02	5.4E+01	5.4E+04
Cd-115m	1.0E-02	1.0E+01	1.0E+04
Cd-117	5.6E-02	5.6E+01	5.6E+04
Cd-117m	1.3E-01	1.3E+02	1.3E+05
Ce-139	2.6E-03	2.6E+00	2.6E+03
Ce-141	1.8E-02	1.8E+01	1.8E+04
Ce-143	1.0E-01	1.0E+02	1.0E+05
Ce-144	1.7E-03	1.7E+00	1.7E+03
Cf-248	2.0E-05	2.0E-02	2.0E+01
Cf-249	1.7E-06	1.7E-03	1.7E+00
Cf-250	4.0E-06	4.0E-03	4.0E+00
Cf-251	1.7E-06	1.7E-03	1.7E+00
Cf-252	6.4E-06	6.4E-03	6.4E+00
Cf-253	3.3E-04	3.3E-01	3.3E+02
Cf-254	3.6E-06	3.6E-03	3.6E+00
C1-36	1.9E-04	1.9E-01	1.9E+02
C1-38	6.5E-01	6.5E+02	6.5E+05
Cm-242	6.0E-05	6.0E-02	6.0E+01
Cm-243	3.3E-06	3.3E-03	3.3E+00
Cm-244	4.2E-06	4.2E-03	4.2E+00
Cm-245	2.3E-06	2.3E-03	2.3E+00
Cm-246	2.3E-06	2.3E-03	2.3E+00
Cm-247	2.3E-06	2.3E-03	2.3E+00
Cm-248	6.4E-07	6.4E-04	6.4E-01
Cm-249	4.6E+00	4.6E+03	4.6E+06
Cm-250	1.1E-07	1.1E-04	1.1E-01
Co-56	2.4E-04	2.4E-01	2.4E+02

Page 161 of 181 (Subpart FF)

Co-57	1.6E-03	1.6E+00	1.6E+03
Co-58	9.0E-04	9.0E-01	9.0E+02
Co-58m	1.7E-01	1.7E+02	1.7E+05
Co-60	1.6E-05	1.6E-02	1.6E+01
Co-60m	4.0E+00	4.0E+03	4.0E+06
Co-61	3.8E+00	3.8E+03	3.8E+06
Cr-49	9.0E-01	9.0E+02	9.0E+05
Cr-51	6.3E-02	6.3E+01	6.3E+04
Cs-129	1.5E-01	1.5E+02	1.5E+05
Cs-131	2.8E-01	2.8E+02	2.8E+05
Cs-132	1.3E-02	1.3E+01	1.3E+04
Cs-134	5.2E-05	5.2E-02	5.2E+01
Cs-134m	3.2E-01	3.2E+02	3.2E+05
Cs-135	2.4E-02	2.4E+01	2.4E+04
Cs-136	2.1E-03	2.1E+00	2.1E+03
Cs-137	2.3E-05	2.3E-02	2.3E+01
Cs-138	4.4E-01	4.4E+02	4.4E+05
Cu-61	4.0E-01	4.0E+02	4.0E+05
Cu-64	5.2E-01	5.2E+02	5.2E+05
Cu-67	1.5E-01	1.5E+02	1.5E+05
Dy-157	4.4E-01	4.4E+02	4.4E+05
Dy-165	5.6E+00	5.6E+03	5.6E+06
Dy-166	8.1E-02	8.1E+01	8.1E+04
Er-169	4.0E-01	4.0E+02	4.0E+05
Er-171	3.6E-01	3.6E+02	3.6E+05
Es-253	2.6E-04	2.6E-01	2.6E+02
Es-254	2.3E-05	2.3E-02	2.3E+01
Es-254m	1.8E-03	1.8E+00	1.8E+03
Eu-152	1.6E-05	1.6E-02	1.6E+01

Page 162 of 181 (Subpart FF)

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Eu-152m	3.5E-01	3.5E+02	3.5E+05
Eu-154	2.0E-05	2.0E-02	2.0E+01
Eu-155	5.2E-04	5.2E-01	5.2E+02
Eu-156	3.2E-03	3.2E+00	3.2E+03
F-18	5.6E-01	5.6E+02	5.6E+05
Fe-52	4.9E-02	4.9E+01	4.9E+04
Fe-55	1.4E-01	1.4E+02	1.4E+05
Fe-59	1.3E-03	1.3E+00	1.3E+03
Fm-254	1.8E-02	1.8E+01	1.8E+04
Fm-255	4.0E-03	4.0E+00	4.0E+03
Fr-223	1.4E-01	1.4E+02	1.4E+05
Ga-66	5.6E-02	5.6E+01	5.6E+04
Ga-67	1.1E-01	1.1E+02	1.1E+05
Ga-68	7.6E-01	7.6E+02	7.6E+05
Ga-72	3.6E-02	3.6E+01	3.6E+04
Gd-152	4.4E-06	4.4E-03	4.4E+00
Gd-153	2.0E-03	2.0E+00	2.0E+03
Gd-159	6.8E-01	6.8E+02	6.8E+05
Ge-68	2.3E-04	2.3E-01	2.3E+02
Ge-71	2.6E+00	2.6E+03	2.6E+06
Ge-77	1.0E-01	1.0E+02	1.0E+05
H-3	1.5E+01	1.5E+04	1.5E+07
Hf-181	2.5E-03	2.5E+00	2.5E+03
Hg-193m	9.5E-02	9.5E+01	9.5E+04
Hg-197	2.4E-01	2.4E+02	2.4E+05
Hg-197m	2.5E-01	2.5E+02	2.5E+05
Hg-203	5.2E-03	5.2E+00	5.2E+03
Но-166	2.8E-01	2.8E+02	2.8E+05
Ho-166m	6.0E-06	6.0E-03	6.0E+00

Page 163 of 181 (Subpart FF)

I-123 $4.9E-01$ $4.9E+02$ $4.9E$ I-124 $9.3E-03$ $9.3E+00$ $9.3E$ I-125 $6.2E-03$ $6.2E+00$ $6.2E$ I-126 $3.7E-03$ $3.7E+00$ $3.7E$ I-128 $9.3E+00$ $9.3E+03$ $9.3E$ I-129 $2.6E-04$ $2.6E-01$ $2.6E$ I-130 $4.6E-02$ $4.6E+01$ $4.6E$ I-131 $6.7E-03$ $6.7E+00$ $6.7E$ I-132 $2.0E-01$ $2.0E+02$ $2.0E$ I-133 $6.7E-02$ $6.7E+01$ $6.7E$ I-134 $3.2E-01$ $3.2E+02$ $3.2E$ I-135 $1.2E-01$ $1.2E+02$ $1.2E$ In-111 $4.9E-02$ $4.9E+01$ $4.9E$ In-115 $2.7E-04$ $2.7E-01$ $2.7E$ In-115m $1.4E+00$ $1.4E+03$ $1.4E$ In-116m $3.5E-01$ $3.5E+02$ $3.5E$ In-117 $1.3E+00$ $1.3E+03$ $1.3E$ In-117m $7.6E-02$ $7.6E+01$ $7.6E$ Ir-190 $3.5E-03$ $3.5E+00$ $3.5E$
I-124 $9.3E-03$ $9.3E+00$ $9.3E$ $I-125$ $6.2E-03$ $6.2E+00$ $6.2E$ $I-126$ $3.7E-03$ $3.7E+00$ $3.7E$ $I-128$ $9.3E+00$ $9.3E+03$ $9.3E$ $I-129$ $2.6E-04$ $2.6E-01$ $2.6E$ $I-130$ $4.6E-02$ $4.6E+01$ $4.6E$ $I-130$ $4.6E-02$ $4.6E+01$ $4.6E$ $I-131$ $6.7E-03$ $6.7E+00$ $6.7E$ $I-132$ $2.0E-01$ $2.0E+02$ $2.0E$ $I-133$ $6.7E-02$ $6.7E+01$ $6.7E$ $I-134$ $3.2E-01$ $3.2E+02$ $3.2E$ $I-135$ $1.2E-01$ $1.2E+02$ $1.2E$ $I-111$ $4.9E-02$ $4.9E+01$ $4.9E$ $In-113m$ $2.1E+00$ $2.1E+03$ $2.1E$ $In-115$ $2.7E-04$ $2.7E-01$ $2.7E$ $In-115m$ $1.4E+00$ $1.4E+03$ $1.4E$ $In-116m$ $3.5E-01$ $3.5E+02$ $3.5E$ $In-117m$ $7.6E-02$ $7.6E+01$ $7.6E$ $Ir-190$ $3.5E-03$ $3.5E+00$ $3.5E$
I-125 $6.2E-03$ $6.2E+00$ $6.2E$ I-126 $3.7E-03$ $3.7E+00$ $3.7E$ I-128 $9.3E+00$ $9.3E+03$ $9.3E$ I-129 $2.6E-04$ $2.6E-01$ $2.6E$ I-130 $4.6E-02$ $4.6E+01$ $4.6E$ I-131 $6.7E-03$ $6.7E+00$ $6.7E$ I-132 $2.0E-01$ $2.0E+02$ $2.0E$ I-133 $6.7E-02$ $6.7E+01$ $6.7E$ I-134 $3.2E-01$ $3.2E+02$ $3.2E$ I-135 $1.2E-01$ $1.2E+02$ $1.2E$ In-111 $4.9E-02$ $4.9E+01$ $4.9E$ In-113m $2.1E+00$ $2.7E-01$ $2.7E$ In-115 $2.7E-04$ $2.7E-01$ $2.7E$ In-116m $3.5E-01$ $3.5E+02$ $3.5E$ In-117 $1.3E+00$ $1.3E+03$ $1.3E$ In-117m $7.6E-02$ $7.6E+01$ $7.6E$ Ir-190 $3.5E-03$ $3.5E+00$ $3.5E$
I-126 $3.7E-03$ $3.7E+00$ $3.7E$ I-128 $9.3E+00$ $9.3E+03$ $9.3E$ I-129 $2.6E-04$ $2.6E-01$ $2.6E$ I-130 $4.6E-02$ $4.6E+01$ $4.6E$ I-131 $6.7E-03$ $6.7E+00$ $6.7E$ I-132 $2.0E-01$ $2.0E+02$ $2.0E$ I-133 $6.7E-02$ $6.7E+01$ $6.7E$ I-134 $3.2E-01$ $3.2E+02$ $3.2E$ I-135 $1.2E-01$ $1.2E+02$ $1.2E$ In-111 $4.9E-02$ $4.9E+01$ $4.9E$ In-113m $2.1E+00$ $2.1E+03$ $2.1E$ In-115 $2.7E-04$ $2.7E-01$ $2.7E$ In-115m $1.4E+00$ $1.4E+03$ $1.4E$ In-116m $3.5E-01$ $3.5E+02$ $3.5E$ In-117 $1.3E+00$ $1.3E+03$ $1.3E$ In-117m $7.6E-02$ $7.6E+01$ $7.6E$ Ir-190 $3.5E-03$ $3.5E+00$ $3.5E$
I-128   9.3E+00   9.3E+03   9.3E     I-129   2.6E-04   2.6E-01   2.6E     I-130   4.6E-02   4.6E+01   4.6E     I-131   6.7E-03   6.7E+00   6.7E     I-132   2.0E-01   2.0E+02   2.0E     I-133   6.7E-02   6.7E+01   6.7E     I-133   6.7E-02   6.7E+01   6.7E     I-134   3.2E-01   3.2E+02   3.2E     I-135   1.2E-01   1.2E+02   1.2E     In-111   4.9E-02   4.9E+01   4.9E     In-113m   2.1E+00   2.1E+03   2.1E     In-114m   4.9E-03   4.9E+00   4.9E     In-115   2.7E-04   2.7E-01   2.7E     In-115m   1.4E+00   1.4E+03   1.4E     In-116m   3.5E-01   3.5E+02   3.5E     In-117   1.3E+00   1.3E+03   1.3E     In-117m   7.6E-02   7.6E+01   7.6E     Ir-190   3.5E-03   3.5E+00 <t< td=""></t<>
I-129 $2.6E-04$ $2.6E-01$ $2.6E$ I-130 $4.6E-02$ $4.6E+01$ $4.6E$ I-130 $6.7E-03$ $6.7E+00$ $6.7E$ I-131 $6.7E-03$ $6.7E+00$ $6.7E$ I-132 $2.0E-01$ $2.0E+02$ $2.0E$ I-133 $6.7E-02$ $6.7E+01$ $6.7E$ I-134 $3.2E-01$ $3.2E+02$ $3.2E$ I-135 $1.2E-01$ $1.2E+02$ $1.2E$ I-111 $4.9E-02$ $4.9E+01$ $4.9E$ In-113m $2.1E+00$ $2.1E+03$ $2.1E$ In-114m $4.9E-03$ $4.9E+00$ $4.9E$ In-115 $2.7E-04$ $2.7E-01$ $2.7E$ In-116m $3.5E-01$ $3.5E+02$ $3.5E$ In-117 $1.3E+00$ $1.3E+03$ $1.3E$ In-117m $7.6E-02$ $7.6E+01$ $7.6E$ Ir-190 $3.5E+03$ $3.5E+00$ $3.5E$
I-130 4.6E-02 4.6E+01 4.6E   I-131 6.7E-03 6.7E+00 6.7E   I-132 2.0E-01 2.0E+02 2.0E   I-133 6.7E-02 6.7E+01 6.7E   I-134 3.2E-01 3.2E+02 3.2E   I-135 1.2E-01 1.2E+02 1.2E   In-111 4.9E-02 4.9E+01 4.9E   In-113m 2.1E+00 2.1E+03 2.1E   In-114m 4.9E-03 4.9E+00 4.9E   In-115 2.7E-04 2.7E-01 2.7E   In-115m 1.4E+00 1.4E+03 1.4E   In-116m 3.5E-01 3.5E+02 3.5E   In-117 1.3E+00 1.3E+03 1.3E   In-117m 7.6E-02 7.6E+01 7.6E   Ir-190 3.5E-03 3.5E+00 3.5E+00
I-131 $6.7E-03$ $6.7E+00$ $6.7E$ I-132 $2.0E-01$ $2.0E+02$ $2.0E$ I-133 $6.7E-02$ $6.7E+01$ $6.7E$ I-134 $3.2E-01$ $3.2E+02$ $3.2E$ I-135 $1.2E-01$ $1.2E+02$ $1.2E$ In-111 $4.9E-02$ $4.9E+01$ $4.9E$ In-113m $2.1E+00$ $2.1E+03$ $2.1E$ In-114m $4.9E-03$ $4.9E+00$ $4.9E$ In-115 $2.7E-04$ $2.7E-01$ $2.7E$ In-116m $3.5E-01$ $3.5E+02$ $3.5E$ In-117 $1.3E+00$ $1.3E+03$ $1.3E$ In-117m $7.6E-02$ $7.6E+01$ $7.6E-02$ Ir-190 $3.5E-03$ $3.5E+00$ $3.5E+00$
I-132 $2.0E-01$ $2.0E+02$ $2.0E$ I-133 $6.7E-02$ $6.7E+01$ $6.7E$ I-134 $3.2E-01$ $3.2E+02$ $3.2E$ I-135 $1.2E-01$ $1.2E+02$ $1.2E$ In-111 $4.9E-02$ $4.9E+01$ $4.9E$ In-113m $2.1E+00$ $2.1E+03$ $2.1E$ In-114m $4.9E-03$ $4.9E+00$ $4.9E$ In-115 $2.7E-04$ $2.7E-01$ $2.7E$ In-115m $1.4E+00$ $1.4E+03$ $1.4E$ In-116m $3.5E-01$ $3.5E+02$ $3.5E$ In-117 $1.3E+00$ $1.3E+03$ $1.3E$ In-117m $7.6E-02$ $7.6E+01$ $7.6E$ Ir-190 $3.5E-03$ $3.5E+00$ $3.5E$
I-133 $6.7E-02$ $6.7E+01$ $6.7E$ I-134 $3.2E-01$ $3.2E+02$ $3.2E$ I-135 $1.2E-01$ $1.2E+02$ $1.2E$ In-111 $4.9E-02$ $4.9E+01$ $4.9E$ In-113m $2.1E+00$ $2.1E+03$ $2.1E$ In-114m $4.9E-03$ $4.9E+00$ $4.9E$ In-115 $2.7E-04$ $2.7E-01$ $2.7E$ In-115m $1.4E+00$ $1.4E+03$ $1.4E$ In-116m $3.5E-01$ $3.5E+02$ $3.5E$ In-117 $1.3E+00$ $1.3E+03$ $1.3E$ In-117m $7.6E-02$ $7.6E+01$ $7.6E$ Ir-190 $3.5E-03$ $3.5E+00$ $3.5E$
I-134 3.2E-01 3.2E+02 3.2E   I-135 1.2E-01 1.2E+02 1.2E   In-111 4.9E-02 4.9E+01 4.9E   In-113m 2.1E+00 2.1E+03 2.1E   In-114m 4.9E-03 4.9E+00 4.9E   In-115 2.7E-04 2.7E-01 2.7E   In-115m 1.4E+00 1.4E+03 1.4E   In-116m 3.5E-01 3.5E+02 3.5E   In-117 1.3E+00 1.3E+03 1.3E   In-117m 7.6E-02 7.6E+01 7.6E   Ir-190 3.5E-03 3.5E+00 3.5E+00
I-1351.2E-011.2E+021.2EIn-1114.9E-024.9E+014.9EIn-113m2.1E+002.1E+032.1EIn-114m4.9E-034.9E+004.9EIn-1152.7E-042.7E-012.7EIn-115m1.4E+001.4E+031.4EIn-116m3.5E-013.5E+023.5EIn-1171.3E+001.3E+031.3EIn-117m7.6E-027.6E+017.6EIr-1903.5E-033.5E+003.5E
In-111 $4.9E-02$ $4.9E+01$ $4.9E$ In-113m $2.1E+00$ $2.1E+03$ $2.1E$ In-113m $4.9E-03$ $4.9E+00$ $4.9E$ In-114m $4.9E-03$ $4.9E+00$ $4.9E$ In-115 $2.7E-04$ $2.7E-01$ $2.7E$ In-115m $1.4E+00$ $1.4E+03$ $1.4E$ In-116m $3.5E-01$ $3.5E+02$ $3.5E$ In-117 $1.3E+00$ $1.3E+03$ $1.3E$ In-117m $7.6E-02$ $7.6E+01$ $7.6E$ Ir-190 $3.5E-03$ $3.5E+00$ $3.5E$
In-113m 2.1E+00 2.1E+03 2.1E   In-114m 4.9E-03 4.9E+00 4.9E   In-115 2.7E-04 2.7E-01 2.7E   In-115m 1.4E+00 1.4E+03 1.4E   In-116m 3.5E-01 3.5E+02 3.5E   In-117 1.3E+00 1.3E+03 1.3E   In-117m 7.6E-02 7.6E+01 7.6E   Ir-190 3.5E-03 3.5E+00 3.5E
In-114m4.9E-034.9E+004.9EIn-1152.7E-042.7E-012.7EIn-115m1.4E+001.4E+031.4EIn-116m3.5E-013.5E+023.5EIn-1171.3E+001.3E+031.3EIn-117m7.6E-027.6E+017.6EIr-1903.5E-033.5E+003.5E
In-115 2.7E-04 2.7E-01 2.7E   In-115m 1.4E+00 1.4E+03 1.4E   In-116m 3.5E-01 3.5E+02 3.5E   In-117 1.3E+00 1.3E+03 1.3E   In-117m 7.6E-02 7.6E+01 7.6E   Ir-190 3.5E-03 3.5E+00 3.5E
In-115m 1.4E+00 1.4E+03 1.4E   In-116m 3.5E-01 3.5E+02 3.5E   In-117 1.3E+00 1.3E+03 1.3E   In-117m 7.6E-02 7.6E+01 7.6E   Ir-190 3.5E-03 3.5E+00 3.5E
In-116m   3.5E-01   3.5E+02   3.5E     In-117   1.3E+00   1.3E+03   1.3E     In-117m   7.6E-02   7.6E+01   7.6E     Ir-190   3.5E-03   3.5E+00   3.5E
In-117   1.3E+00   1.3E+03   1.3E     In-117m   7.6E-02   7.6E+01   7.6E     Ir-190   3.5E-03   3.5E+00   3.5E
In-117m   7.6E-02   7.6E+01   7.6E     Ir-190   3.5E-03   3.5E+00   3.5E
Ir-190 3.5E-03 3.5E+00 3.5E
Ir-192 9.7E-04 9.7E-01 9.7E
Ir-194 2.5E-01 2.5E+02 2.5E
Ir-194m 1.5E-04 1.5E-01 1.5E
K-40 6.8E-05 6.8E-02 6.8E
K-42 2.9E-01 2.9E+02 2.9E
K-43 6.0E-02 6.0E+01 6.0E
K-44 4.9E-01 4.9E+02 4.9E
Kr-79 7.0E+00

Page 164 of 181 (Subpart FF)

Kr-81	1.8E+02		
Kr-83m	2.0E+04		
Kr-85	8.4E+02		
Kr-85m	1.1E+01		
Kr-87	2.0E+00		
Kr-88	4.2E-01		
La-140	1.6E-02	1.6E+01	1.6E+04
La-141	1.1E+00	1.1E+03	1.1E+06
La-142	2.3E-01	2.3E+02	2.3E+05
Lu-177	1.4E-01	1.4E+02	1.4E+05
Lu-177m	3.5E-04	3.5E-01	3.5E+02
Mg-28	2.1E-02	2.1E+01	2.1E+04
Mn-52	3.5E-03	3.5E+00	3.5E+03
Mn-52m	5.2E-01	5.2E+02	5.2E+05
Mn-53	5.7E-02	5.7E+01	5.7E+04
Mn-54	2.5E-04	2.5E-01	2.5E+02
Mn-56	2.5E-01	2.5E+02	2.5E+05
Mo-93	1.5E-03	1.5E+00	1.5E+03
Mo-99**	5.7E-02	5.7E+01	5.7E+04
Mo-101	8.4E-01	8.4E+02	8.4E+05
Na-22	3.2E-05	3.2E-02	3.2E+01
Na-24	2.6E-02	2.6E+01	2.6E+04
Nb-90	2.5E-02	2.5E+01	2.5E+04
Nb-93m	1.2E-02	1.2E+01	1.2E+04
Nb-94	6.0E-06	6.0E03	6.0E+00
Nb-95	2.3E-03	2.3E+00	2.3E+03
Nb-95m	2.0E-02	2.0E+01	2.0E+04
Nb-96	2.5E-02	2.5E+01	2.5E+04
Nb-97	1.0E+00	1.0E+03	1.0E+06

Page 165 of 181 (Subpart FF)

Nd-147	3.0E-02	3.0E+01	3.0E+04
Nd-149	1.1E+00	1.1E+03	1.1E+06
Ni-56	2.0E-03	2.0E+00	2.0E+03
Ni-57	2.1E-02	2.1E+01	2.1E+04
Ni-59	2.2E-02	2.2E+01	2.2E+04
Ni-63	1.4E-01	1.4E+02	1.4E+05
Ni-65	7.0E-01	7.0E+02	7.0E+05
Np-235	3.0E-02	3.0E+01	3.0E+04
Np-237	1.8E-06	1.8E-03	1.8E+00
Np-238	1.9E-02	1.9E+01	1.9E+04
Np-239	1.0E-01	1.0E+02	1.0E+05
Np-240	6.5E-01	6.5E+02	6.5E+05
Np-240m	4.7E+00	4.7E+03	4.7E+06
Os-185	9.2E-04	9.2E-01	9.2E+02
Os-191m	9.0E-01	9.0E+02	9.0E+05
Os-191	3.8E-02	3.8E+01	3.8E+04
Os-193	2.9E-01	2.9E+02	2.9E+05
P-32	1.7E-02	1.7E+01	1.7E+04
P-33	1.2E-01	1.2E+02	1.2E+05
Pa-230	6.3E-04	6.3E-01	6.3E+02
Pa-231	8.3E-07	8.3E-04	8.3E-01
Pa-233	9.3E-03	9.3E+00	9.3E+03
Pa-234	9.3E-02	9.3E+01	9.3E+04
Pb-203	8.3E-02	8.3E+01	8.3E+04
Pb-205	1.2E-02	1.2E+01	1.2E+04
Pb-209	1.1E+01	1.1E+04	1.1E+07
Pb-210	5.5E-05	5.5E-02	5.5E+01
Pb-211	1.2E-01	1.2E+02	1.2E+05
Pb-212	6.0E-03	6.0E+00	6.0E+03

Page 166 of 181 (Subpart FF)

provide the second s			
Pb-214	1.2E-01	1.2E+02	1.2E+05
Pd-103	2.1E-01	2.1E+02	2.1E+05
Pd-107	8.2E-02	8.2E+01	8.2E+04
Pd-109	9.4E01	9.4E+02	9.4E+05
Pm-143	7.6E-04	7.6E-01	7.6E+02
Pm-144	1.1E-04	1.1E-01	1.1E+02
Pm-145	5.2E-04	5.2E-01	5.2E+02
Pm-146	4.4E-05	4.4E-02	4.4E+01
Pm-147	2.6E-02	2.6E+01	2.6E+04
Pm-148	1.7E-02	1.7E+01	1.7E+04
Pm-148m	7.6E-04	7.6E-01	7.6E+02
Pm-149	2.8E-01	2.8E+02	2.8E+05
Pm-151	1.2E-01	1.2E+02	1.2E+05
Po-210	9.3E-05	9.3E-02	9.3E+01
Pr-142	2.8E-01	2.8E+02	2.8E+05
Pr-143	1.0E-01	1.0E+02	1.0E+05
Pr-144	1.5E+01	1.5E+04	1.5E+07
Pt-191	6.4E-02	6.4E+01	6.4E+04
Pt-193	2.1E-02	2.1E+01	2.1E+04
Pt-193m	4.8E-01	4.8E+02	4.8E+05
Pt-195m	1.4E-01	1.4E+02	1.4E+05
Pt-197	1.1E+00	1.1E+03	1.1E+06
Pt-197m	3.6E+00	3.6E+03	3.6E+06
Pu-236	7.0E-06	7.0E-03	7.0E+00
Pu-237	2.3E-02	2.3E+01	2.3E+04
Pu-238	2.7E-06	2.7E-03	2.7E+00
Pu-239	2.5E-06	2.5E-03	2.5E+00
Pu-240	2.5E-06	2.5E-03	2.5E+00
Pu-241	1.3E-04	1.3E-01	1.3E+02

Page 167 of 181 (Subpart FF)

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Pu-242	2.5E-06	2.5E-03	2.5E+00
Pu-243	3.8E+00	3.8E+03	3.8E+06
Pu-244	2.4E-06	2.4E-03	2.4E+00
Pu-245	2.1E-01	2.1E+02	2.1E+05
Pu-246	4.8E-03	4.8E+00	4.8E+03
Ra-223	1.3E-04	1.3E-01	1.3E+02
Ra-224	3.2E-04	3.2E-01	3.2E+02
Ra-225	1.3E-04	1.3E-01	1.3E+02
Ra-226	5.5E-06	5.5E-03	5.5E+00
Ra-228	1.3E-05	1.3E-02	1.3E+01
Rb-81	4.2E-01	4.2E+02	4.2E+05
Rb-83	1.4E-03	1.4E+00	1.4E+03
Rb-84	2.0E-03	2.0E+00	2.0E+03
Rb-86	1.7E-02	1.7E+01	1.7E+04
Rb-87	1.0E-02	1.0E+01	1.0E+04
Rb-88	1.7E+00	1.7E+03	1.7E+06
Rb-89	6.4E-01	6.4E+02	6.4E+05
Re-184	1.8E-03	1.8E+00	1.8E+03
Re-184m	3.6E-04	3.6E-01	3.6E+02
Re-186	1.9E-01	1.9E+02	1.9E+05
Re-187	9.3E+00	9.3E+03	9.3E+06
Re-188	3.7E-01	3.7E+02	3.7E+05
Rh-103m	1.7E+02	1.7E+05	1.7E+08
Rh-105	3.4E-01	3.4E+02	3.4E+05
Ru-97	8.3E-02	8.3E+01	8.3E+04
Ru-103	3.1E-03	3.1E+00	3.1E+03
Ru-105	2.9E-01	2.9E+02	2.9E+05
Ru-106	5.9E-04	5.9E-01	5.9E+02
S-35	7.5E-02	7.5E+01	7.5E+04

Page 168 of 181 (Subpart FF)

Sb-117	2.0E+00	2.0E+03	2.0E+06
Sb-122	3.9E-02	3.9E+01	3.9E+04
Sb-124	6.0E-04	6.0E-01	6.0E+02
Sb-125	1.4E-04	1.4E-01	1.4E+02
Sb-126	1.8E-03	1.8E+00	1.8E+03
Sb-126m	7.6E-01	7.6E+02	7.6E+05
Sb-127	2.0E-02	2.0E+01	2.0E+04
Sb-129	1.8E-01	1.8E+02	1.8E+05
Sc-44	1.4E-01	1.4E+02	1.4E+05
Sc-46	4.0E-04	4.0E-01	4.0E+02
Sc-47	1.1E-01	1.1E+02	1.1E+05
Sc-48	1.1E-02	1.1E+01	1.1E+04
Sc-49	1.0E+01	1.0E+04	1.0E+07
Se-73	1.6E-01	1.6E+02	1.6E+05
Se-75	1.1E-03	1.1E+00	1.1E+03
Se-79	6.9E-03	6.9E+00	6.9E+03
Si-31	4.7E+00	4.7E+03	4.7E+06
Si-32	7.2E-04	7.2E-01	7.2E+02
Sm-147	1.4E05	1.4E-02	1.4E+01
Sm-151	3.5E-02	3.5E+01	3.5E+04
Sm-153	2.4E-01	2.4E+02	2.4E+05
Sn-113	1.9E-03	1.9E+00	1.9E+03
Sn-117m	2.3E-02	2.3E+01	2.3E+04
Sn-119m	2.8E-02	2.8E+01	2.8E+04
Sn-123	1.8E-02	1.8E+01	1.8E+04
Sn-125	7.2E-03	7.2E+00	7.2E+03
Sn-126	4.7E-06	4.7E-03	4.7E+00
Sr-82	1.9E-03	1.9E+00	1.9E+03
Sr-85	1.9E-03	1.9E+00	1.9E+03

Page 169 of 181 (Subpart FF)

Sr-85m	1.5E+00	1.5E+03	1.5E+06
Sr-87m	1.2E+00	1.2E+03	1.2E+06
Sr-89	2.1E-02	2.1E+01	2.1E+04
Sr-90	5.2E-04	5.2E-01	5.2E+02
Sr-91	1.2E-01	1.2E+02	1.2E+05
Sr-92	2.5E-01	2.5E+02	2.5E+05
Ta-182	4.4E-04	4.4E-01	4.4E+02
Tb-157	2.2E-03	2.2E+00	2.2E+03
Tb-160	8.4E-04	8.4E-01	8.4E+02
Tc-95	9.0E-02	9.0E+01	9.0E+04
Tc-95m	1.4E-03	1.4E+00	1.4E+03
Tc-96	5.6E-03	5.6E+00	5.6E+03
Tc-96m	7.0E-01	7.0E+02	7.0E+05
Tc-97	1.5E-03	1.5E+00	1.5E+03
Tc-97m	7.2E-02	7.2E+01	7.2E+04
Tc-98	6.4E-06	6.4E-03	6.4E+00
Tc-99	9.0E-03	9.0E+00	9.0E+03
Tc-99m	1.4E+00	1.4E+03	1.4E+06
Tc-101	3.8E+00	3.8E+03	3.8E+06
Te-121	6.0E-03	6.0E+00	6.0E+03
Te-121m	5.3E-04	5.3E-01	5.3E+02
Te-123	1.2E-03	1.2E+00	1.2E+03
Te-123m	2.7E-03	2.7E+00	2.7E+03
Te-125m	1.5E-02	1.5E+01	1.5E+04
Te-127	2.9E+00	2.9E+03	3 2.9E+06
Te-127m	7.3E-03	7.3E+00	) 7.3E+03
Te-129	6.5E+00	6.5E+03	6.5E+06
Te-129m	6.1E-03	6.1E+00	6.1E+03
Te-131	9.4E-01	9.4E+02	2 9.4E+05

Page 170 of 181 (Subpart FF)

		presented and the second statement of the	and a second
Te-131m	1.8E-02	1.8E+01	1.8E+04
Te-132	6.2E-03	6.2E+00	6.2E+03
Te-133	1.2E+00	1.2E+03	1.2E+06
Te-133m	2.9E-01	2.9E+02	2.9E+05
Te-134	4.4E-01	4.4E+02	4.4E+05
Th-226	3.0E-02	3.0E+01	3.0E+04
Th-227	6.4E-05	6.4E-02	6.4E+01
Th-228	2.9E-06	2.9E-03	2.9E+00
Th-229	4.9E-07	4.9E04	4.9E-01
Th-230	3.2E-06	3.2E-03	3.2E+00
Th-231	8.4E-01	8.4E+02	8.4E+05
Th-232	6.0E-07	6.0E-04	6.0E-01
Th-234	2.0E-02	2.0E+01	2.0E+04
Ti-44	5.2E-06	5.2E-03	5.2E+00
Ti-45	4.0E-01	4.0E+02	4.0E+05
T1-200	4.4E-02	<b>4.4E+01</b>	4.4E+04
T1-201	1.8E-01	1.8E+02	1.8E+05
T1-202	1.0E-02	1.0E+01	1.0E+04
T1-204	2.5E-02	2.5E+01	2.5E+04
Tm-170	2.4E-02	2.4E+01	2.4E+04
Tm-171	5.9E-02	5.9E+01	5.9E+04
U-230	5.0E-05	5.0E-02	5.0E+01
U-231	1.4E-01	1.4E+02	1.4E+05
U-232	1.3E-06	1.3E-03	1.3E+00
U-233	7.6E06	7.6E-03	7.6E+00
U-234	7.6E06	7.6E-03	7.6E+00
U-235	7.0E-06	7.0E-03	7.0E+00
U-236	8.4E-06	8.4E-03	8.4E+00
U-237	4.7E-02	4.7E+01	4.7E+04

Page 171 of 181 (Subpart FF)

U-238	8.6E-06	5 8.6E-03 8.6		
U-239	8.3E+00	8.3E+03	8.3E+06	
U-240	1.8E-01	1.8E+02	1.8E+05	
V-48	1.4E-03	1.4E+00	1.4E+03	
V-49	1.3E+00	1.3E+03	1.3E+06	
W-181	1.1E-02	1.1E+01	1.1E+04	
W-185	1.6E-01	1.6E+02	1.6E+05	
W-187	1.1E-01	1.1E+02 1		
W-188	1.0E-02	2 1.0E+01 1		
Xe-122	7.6E-02	7.6E+01	7.6E+04	
Xe-123	1.6E+00	1.6E+03	1.6E+06	
Xe-125	6.0E-01			
Xe-127	7.0E+00			
Xe-129m	7.6E+01			
Xe-131m	2.2E+02			
Xe-133	5.2E+01			
Xe-133m	6.0E+01		·	
Xe-135	7.6E+00			
Xe-135m	4.2E+00			
Xe-138	9.9E-01	in a base		
Y-86	2.8E-02	2.8E+01	2.8E+04	
Y-87	2.3E-02	2.3E+01	2.3E+04	
Y-88	2.5E-04	2.5E-01	2.5E+02	
Y-90	1.1E-01	1.1E+02	1.1E+05	
Y-90m	4.3E-01	01 4.3E+02 4.3E-		
Y-91	1.8E-02	1.8E+01	1.8E+04	
Y-91m	1.6E+00	1.6E+03	1.6E+06	
Y-92	7.0E01	7.0E+02	7.0E+05	
Y-93	3.8E-01	3.8E+02	2 3.8E+05	

			and the second se
Yb-169	5.5E-03	5.5E+00	5.5E+03
Yb-175	2.1E-01	2.1E+02	2.1E+05
Zn-62	8.6E-02	8.6E+01	8.6E+04
Zn-65	4.4E-04	4.4E-01	4.4E+02
Zn-69	2.7E+01	2.7E+04	2.7E+07
Zn-69m	2.0E-01	2.0E+02	2.0E+05
Zr-86	2.4E-02	2.4E+01	2.4E+04
Zr-88	2.7E04	2.7E-01	2.7E+02
Zr-89	1.6E-02	1.6E+01	1.6E+04
Zr-93	2.8E-03	2.8E+00	2.8E+03
Zr-95	6.4E-04	6.4E-01	6.4E+02
Zr-97	4.6E-02	4.6E+01	4.6E+04

*Radionuclides boiling at 100°C or less, or exposed to a temperature of 100°C, must be considered a gas. Capsules containing radionuclides in liquid or powder form can be considered to be solids.

**Mo-99 contained in a generator to produce Technetium-99 can be assumed to be a solid.

3. Table of Concentration Levels

(a) Table 2 may be used for determining if facilities are in compliance with the standard.

1. The concentration table as applied to emission estimates can only be used if all releases are from point sources and concentrations have been measured at the stack or vent using EPA-approved methods, and the distance between each stack or vent and the nearest resident is greater than 3 times the diameter of the stack or vent. Procedures provided in Ref. (1) shall be used to determine compliance or exemption from reporting by use of Table 2.

2. The concentration table may be used to determine compliance with the standard based on environmental measurements provided these measurements are made in conformance with the requirements of §61.107(b)(5).

4. NCRP Screening Model

The procedures described in Reference (4) may be used to determine doses to members of the general public from emissions of radionuclides to the atmosphere. Both the total dose from all radionuclides emitted, and the dose caused by radioactive iodine must be considered in accordance with the procedures in Ref. (1).

#### 5. The COMPLY Computer Code

The COMPLY computer code may be used to determine compliance with subpart I. The compliance model in the COMPLY computer code may be used to determine the dose to members of the general public from emissions of radionuclides to the atmosphere. The EPA may add radionuclides to all or any part of COMPLY to cover radionuclides that may be used by the regulated community.

Table 2—Concentration Levels for Environmental Compliance

studionaterate concentration (c) m / radionaterate (c) m /	Radionuclide	Concentration (Ci/m ³ )	Radionuclide	Concentration (Ci/m ³ )
------------------------------------------------------------	--------------	------------------------------------	--------------	------------------------------------

Ac-225	9.1E-14Bi-207	1.0E-14
Ac-227	1.6E-16Bi-210	2.9E-13
Ac-228	3.7E-12Bi-212	5.6E-11
Ag-106	1.9E-09Bi-213	7.1E-11
Ag-106m	1.2E-12Bi-214	1.4E-10
Ag-108m	7.1E-15 Bk-249	5.6E-13
Ag-110m	9.1E-14Bk-250	9.1E-11
Ag-111	2.5E-12Br-77	4.2E-11
A1-26	4.8E-15Br-80	1.4E-08
Am-241	1.9E-15Br-80m	1.8E-09
Am-242	1.5E-11 Br-82	1.2E-11
Am-242m	2.0E-15Br-83	1.2E-08
Am-243	1.8E-15Br-84	6.7E-10
Am-244	4.0E-11C-11	1.5E-09
Am-245	8.3E-09C-14	1.0E-11
Am-246	1.2E-09 Ca-41	4.2E-13
Ar-37	1.6E-03 Ca-45	1.3E-12
Ar-41	1.7E09 Ca-47	2.4E-12
As-72	2.4E-11Cd-109	5.9E-13
As-73	1.1E-11Cd-113	9.1E-15
As-74	2.2E-12Cd-113	m 1.7E–14
As-76	5.0E-11Cd-115	1.6E-11
As-77	1.6E-10 Cd-115	m 8.3E-13
At-211	1.1E-11 Cd-117	6.7E-11
Au-193	3.8E-10Cd-117	m 1.6E-10
Au-194	3.2E-11 Ce-139	2.6E-12
Au-195	3.1E-12 Ce-141	6.3E-12
Au-198	2.1E-11 Ce-143	3.0E-11
Au-199	4.8E-11 Ce-144	6.2E-13
Ba-131	7.1E-12 Cf-248	1.8E-14
Ba-133	5.9E-14Cf-249	1.4E-15

Page 174 of 181 (Subpart FF)

Ba-133m	5.9E-11	Cf-250	3.2E-15
Ba-135m	1.8E-10	Cf-251	1.4E-15
Ba-139	5.6E-09	Cf-252	5.6E-15
Ba-140	1.3E-12	Cf-253	3.1E-13
Ba-141	1.4E-09	Cf-254	3.0E-15
Ba-142	1.3E09	Cl-36	2.7E-15
Be-7	2.3E-11	Cl-38	7.7E-10
Be-10	1.6E-12	Cm-242	5.3E-14
Bi-206	2.3E-12	Cm-243	2.6E-15
Cm-244	3.3E-15	Eu-156	1.9E-12
Cm-245	1.8E-15	F-18	6.7E-10
Cm-246	1.9E-15	Fe-52	5.6E-11
Cm-247	1.9E-15	Fe-55	9.1E-12
Cm-248	5.0E-16	Fe-59	6.7E-13
Cm-249	3.7E-09	Fm-254	2.0E-11
Cm-250	9.1E-17	Fm-255	4.3E-12
Co-56	1.8E-13	Fr-223	3.3E-11
Co-57	1.3E-12	Ga-66	6.2E-11
Co-58	6.7E-13	Ga-67	7.1E-11
Co-58m	1.2E-10	Ga-68	9.1E-10
Co-60	1.7E-14	Ga-72	3.8E-11
Co-60m	.4.3E-09	Gd-152	5.0E-15
Co-61	4.5E-09	Gd-153	2.1E-12
Cr-49	1.1E-09	Gd-159	2.9E-10
Cr-51	3.1E-11	Ge-68	2.0E-13
Cs-129	1.4E-10	Ge-71	2.4E-10
Cs-131	3.3E-11	Ge-77	1.0E-10
Cs-132	4.8E-12	H-3	1.5E-09
Cs-134	2.7E-14	Hf-181	1.9E-12
Cs-134m	1.7E-10	Hg-193m	1.0E-10
Cs-135	4.0E-13	Hg-197	8.3E-11

Page 175 of 181 (Subpart FF)

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Cs-136	5.3E-13Hg-197m	1.1E-10
Cs-137	1.9E-14Hg-203	1.0E-12
Cs-138	5.3E-10Ho-166	7.1E-11
Cu-61	4.8E-10Ho-166m	7.1E-15
Cu-64	5.3E-10I-123	4.3E-10
Cu-67	5.0E-11I-124	6.2E-13
Dy-157	5.0E-10I-125	1.2E-13
Dy-165	6.7E-09I-126	1.1E-13
Dy-166	1.1E-11I-128	1.1E-08
Er-169	2.9E-11I-129	9.1E-15
Er-171	4.0E-10I-130	4.5E-11
Es-253	2.4E-13I-131	2.1E-13
Es-254	2.0E-14I-132	2.3E-10
Es-254m	1.8E-12I-133	2.0E-11
Eu-152	2.0E-14I-134	3.8E-10
Eu-152m	3.6E-10I-135	1.2E-10
Eu-154	2.3E-14In-111	3.6E-11
Eu-155	5.9E-13In-113m	2.5E-09
In-114m	9.1E-13Nb-95	2.2E-12
In-115	7.1E-14Nb-95m	1.4E-11
In-115m	1.6E-09Nb-96	2.4E-11
In-116m	4.2E-10Nb-97	1.2E-09
In-117	1.6E-09Nd-147	7.7E-12
In-117m	9.1E-11 Nd-149	7.1E-10
Ir-190	2.6E-12Ni-56	1.7E-12
Ir-192	9.1E-13Ni-57	1.8E-11
Ir-194	1.1E-10Ni-59	1.5E-11
Ir-194m	1.7E-13Ni-63	1.4E-11
K-40	2.7E-14 Ni-65	8.3E-10
K-42	2.6E-10Np-235	2.5E-11
K-43	6.2E-11 Np-237	1.2E-15

Page 176 of 181 (Subpart FF)

K-44	5.9E-10Np-238	1.4E-11
Kr-79	8.3E-09Np-239	3.8E-11
Kr-81	2.1E-07Np-240	7.7E-10
Kr-83m	2.3E-05Np-240m	5.6E-09
Kr-85	1.0E-06Os-185	1.0E-12
Kr-85m	1.3E-08Os-191m	2.9E-10
Kr-87	2.4E-09Os-191	1.1E-11
Kr-88	5.0E-10Os-193	9.1E-11
La-140	1.2E-11P-32	3.3E-13
La-141	7.7E-10P-33	2.4E-12
La-142	2.7E-10Pa-230	3.2E-13
Lu-177	2.4E-11Pa-231	5.9E-16
Lu-177m	3.6E-13Pa-233	4.8E-12
Mg-28	1.5E-11Pa-234	1.1E-10
Mn-52	2.8E-12Pb-203	6.2E-11
Mn-52m	6.2E-10Pb-205	5.6E-12
Mn-53	1.5E-11Pb-209	1.3E-08
Mn-54	2.8E-13Pb-2I0	2.8E-15
Mn-56	2.9E-10Pb-211	1.4E-10
Mo-93	1.1E-12Pb-212	6.3E-12
Mo-99	1.4E-11Pb-214	1.2E-10
Mo-101	1.0E-09Pd-103	3.8E-11
Na-22	2.6E-14Pd-107	3.1E-11
Na-24	2.6E-11Pd-109	4.8E-10
Nb-90	2.6E-11Pm-143	9.1E-13
Nb-93m	1.0E-11Pm-144	<b>1.3</b> E-13
Nb-94	7.1E-15Pm-145	6.2E-13
Pm-146	5.3E-14Re-184m	3.7E-13
Pm-147	1.1E-11 Re-186	1.8E-11
Pm-148	5.0E-12Re-187	2.6E-10
Pm-148m	6.7E-13Re-188	1.7E-10

Page 177 of 181 (Subpart FF)

the second se			
Pm-149	4.2E-11	Rh-103m	2.1E-07
Pm-151	7.1E-11	Rh-105	1.3E-10
Po-210	7.1E-15	Ru-97	6.7E-11
Pr-142	1.1E-10	Ru-103	2.6E-12
Pr-143	7.1E-12	Ru-105	2.8E-10
Pr-144	1.8E-08	Ru-106	3.4E-13
Pt-191	4.3E-11	S-35	1.3E-12
Pt-193	1.8E-11	Sb-117	2.4E-09
Pt-193m	4.8E-11	Sb-122	1.4E-11
Pt-195m	3.2E-11	Sb-124	5.3E-13
Pt-197	4.0E-10	Sb-125	1.6E-13
Pt-197m	2.6E-09	Sb-126	1.4E-12
Pu-236	5.9E-15	Sb-126m	9.1E-10
Pu-237	1.9E-11	Sb-127	7.1E-12
Pu-238	2.1E-15	Sb-129	7.7E-11
Pu-239	2.0E-15	Sc-44	1.7E-10
Pu-240	2.0E-15	Sc-46	4.2E-13
Pu-241	1.0E-13	Sc-47	3.8E-11
Pu-242	2.0E-15	Sc-48	9.1E-12
Pu-243	4.2E-09	Sc-49	1.2E-08
Pu-244	2.0E-15	Se-73	1.7E-10
Pu-245	2.1E-10	Se-75	1.7E-13
Pu-246	2.2E-12	Se-79	<u>1.1E–</u> 13
Ra-223	4.2E-14	Si-31	5.6E-09
Ra-224	1.5E-13	Si-32	3.4E-14
Ra-225	5.0E-14	Sm-147	1.4E-14
Ra-226	3.3E-15	Sm-151	2.1E-11
Ra-228	5.9E-15	Sm-153	5.9E-11
Rb-81	5.0E-10	Sn-113	1.4E-12
Rb-83	3.4E-13	Sn-117m	5.6E-12
Rb-84	3.6E-13	Sn-119m	5.3E-12

Page 178 of 181 (Subpart FF)

Rb-86	5.6E-13 Sn-123	1.1E-12
Rb-87	1.6E-13 Sn-125	1.7E-12
Rb-88	2.1E-09 Sn-126	5.3E-15
Rb-89	7.1E-10Sr-82	6.2E-13
Re-184	1.5E-12Sr-85	1.8E-12
Sr-85m	1.6E-09Th-232	6.2E-16
Sr-87m	1.4E-09Th-234	2.2E-12
Sr-89	1.8E-12Ti-44	6.2E-15
Sr-90	1.9E-14 Ti-45	4.8E-10
Sr-91	9.1E-11 TI-200	4.5E-11
Sr-92	2.9E-10T1-201	1.0E-10
Ta-182	4.5E-13 T1-202	5.0E-12
Tb-157	2.5E-12T1-204	1.2E-12
Tb-160	7.7E-13Tm-170	3.3E-12
Tc-95	1.0E-10Tm-171	2.6E-11
Tc-95m	1.4E-12U-230	1.5E-14
Tc-96	5.6E-12U-231	4.2E-11
Tc-96m	6.7E-10U-232	1.3E-15
Tc-97	.7.1E-13U-233	7.1E-15
Tc-97m	7.1E-12U-234	7.7E-15
Tc-98	6.7E-15U-235	7.1E-15
Tc-99	1.4E-13U-236	7.7E-15
Tc-99m	1.7E-09U-237	1.0E-11
Tc-101	4.5E-09U-238	8.3E-15
Te-121	1.0E-12U-239	4.3E-09
Te-121m	1.2E-13U-240	<b>1.3E</b> -10
Te-123	1.4E-13V-48	1.0E-12
Te-123m	2.0E-13 V-49	1.6E-10
Te-125m	3.6E-13 W-181	6.7E-12
Te-127	1.0E-09W-185	2.6E-12
Te-127m	1.5E-13W-187	7.7E-11

Page 179 of 181 (Subpart FF)

Te-129	7.7E-09	W-188	5.3E-13
Te-129m	1.4E-13	Xe-122	9.1E-11
Te-131	9.1E-11	Xe-123	1.6E-09
Te-131m	1.0E-12	Xe-125	1.1E-11
Te-132	7.1E–13	Xe-127	8.3E-09
Te-133	9.1E-10	Xe-129m	9.1E-08
Te-133m	2.2E-10	Xe-131m	2.6E-07
Te-134	5.3E-10	Xe-133	6.2E-08
Th-226	3.4E-11	Xe-133m	7.1E-08
Th-227	3.8E-14	Xe-135	9.1E-09
Th-228	3.1E-15	Xe-135m	5.0E-09
Th-229	5.3E-16	Xe-138	1.2E-09
Th-230	3.4E-15	Y-86	3.0E-11
Th-231	2.9E-10	Y-87	1.7E-11
Y-88	2.7E-13	Zn-65	9.1E-14
Y-90	1.3E-11	Zn-69	3.2E-08
Y-90m	1.9E-10	Zn-69m	1.7E-10
Y-91	2.1E-12	Zr-86	2.4E-11
Y-91m	1.3E-09	Zr-88	3.1E-13
Y-92	8.3E-10	Zr-89	1.3E-11
Y-93	2.9E-10	Zr-93	2.6E-12
Yb-169	3.7E-12	Zr-95	6.7E-13
Yb-175	4.3E-11	Zr-97	3.8E-11
Zn-62	9.1E-11		

6. References

(1) Environmental Protection Agency, "A Guide for Determining Compliance with the Clean Air Act Standards for Radionuclides Emissions from NRC-Licensed and Non-DOE Federal Facilities", EPA 520/1–89–002, October 1989.

(2) Environmental Protection Agency, "User's Guide for the COMPLY Code", EPA 520/1-89-003, October 1989.

(3) Environmental Protection Agency, "Background Information Document: Procedures Approved for Demonstrating Compliance with 40 CFR Part 61, Subpart I", EPA 520/1–89–001, January 1989.

(4) National Council on Radiation Protection and Measurement, "Screening Techniques for Determining Compliance with Environmental Standards" NCRP Commentary No. 3, Revision of January 1989 with addendum of October, 1989.
## [54 FR 51711, Dec. 15, 1989]

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# 40 CFR Part 60, Subpart Kb – APPENDIX D

40 CFR Part 60, Subpart Kb – Standards of Performance for Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984



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PART 60-STANDARDS OF PERFORMANCE FOR NEW STATIONARY SOURCES

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## Subpart Kb—Standards of Performance for Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984

Source: 52 FR 11429, Apr. 8, 1987, unless otherwise noted.

### § 60.110b Applicability and designation of affected facility.

(a) Except as provided in paragraph (b) of this section, the affected facility to which this subpart applies is each storage vessel with a capacity greater than or equal to 75 cubic meters (m³) that is used to store volatile organic liquids (VOL) for which construction, reconstruction, or modification is commenced after July 23, 1984.

(b) This subpart does not apply to storage vessels with a capacity greater than or equal to 151 m³ storing a liquid with a maximum true vapor pressure less than 3.5 kilopascals (kPa) or with a capacity greater than or equal to 75 m³ but less than 151 m³ storing a liquid with a maximum true vapor pressure less than 15.0 kPa.

(c) [Reserved]

(d) This subpart does not apply to the following:

(1) Vessels at coke oven by-product plants.

(2) Pressure vessels designed to operate in excess of 204.9 kPa and without emissions to the atmosphere.

(3) Vessels permanently attached to mobile vehicles such as trucks, railcars, barges, or ships.

(4) Vessels with a design capacity less than or equal to 1,589.874 m³ used for petroleum or condensate stored, processed, or treated prior to custody transfer.

(5) Vessels located at bulk gasoline plants.

(6) Storage vessels located at gasoline service stations.

(7) Vessels used to store beverage alcohol.

(8) Vessels subject to subpart GGGG of 40 CFR part 63.

(e) Alternative means of compliance—(1) Option to comply with part 65. Owners or operators may choose to comply with 40 CFR part 65, subpart C, to satisfy the requirements of  $\S$ 60.112b through 60.117b for storage vessels that are subject to this subpart that meet the specifications in paragraphs (e)(1)(i) and (ii) of this section. When choosing to comply with 40 CFR part 65, subpart C, the monitoring requirements of  $\S$ 60.116b(c), (e), (f)(1), and (g) still apply. Other provisions applying to owners or operators who choose to comply with 40 CFR part 65 are provided in 40 CFR 65.1.

(i) A storage vessel with a design capacity greater than or equal to 151 m³ containing a VOL that, as stored, has a maximum true vapor pressure equal to or greater than 5.2 kPa; or

(ii) A storage vessel with a design capacity greater than 75 m³ but less than 151 m³ containing a VOL that, as stored, has a maximum true vapor pressure equal to or greater than 27.6 kPa.

(2) Part 60, subpart A. Owners or operators who choose to comply with 40 CFR part 65, subpart C, must also comply with §§60.1, 60.2, 60.5, 60.6, 60.7(a)(1) and (4), 60.14, 60.15, and 60.16 for those storage vessels. All sections and paragraphs of subpart A of this part that are not mentioned in this paragraph (e)(2) do not apply to owners or operators of storage vessels complying with 40 CFR part 65, subpart C, except that provisions required to be met prior to implementing 40 CFR part 65 still apply. Owners and operators who choose to comply with 40 CFR part 65, subpart C, must comply with 40 CFR part 65, subpart A.

(3) Internal floating roof report. If an owner or operator installs an internal floating roof and, at initial startup, chooses to comply with 40 CFR part 65, subpart C, a report shall be furnished to the Administrator stating that the control equipment meets the specifications of 40 CFR 65.43. This report shall be an attachment to the notification required by 40 CFR 65.5(b).

(4) External floating roof report. If an owner or operator installs an external floating roof and, at initial startup, chooses to comply with 40 CFR part 65, subpart C, a report shall be furnished to the Administrator stating that the control equipment meets the specifications of 40 CFR 65.44. This report shall be an attachment to the notification required by 40 CFR 65.5(b).

[52 FR 11429, Apr. 8, 1987, as amended at 54 FR 32973, Aug. 11, 1989; 65 FR 78275, Dec. 14, 2000; 68 FR 59332, Oct. 15, 2003]

## § 60.111b Definitions.

Terms used in this subpart are defined in the Act, in subpart A of this part, or in this subpart as follows:

Bulk gasoline plant means any gasoline distribution facility that has a gasoline throughput less than or equal to 75,700 liters per day. Gasoline throughput shall be the maximum calculated design throughput as may be limited by compliance with an enforceable condition under Federal requirement or Federal, State or local law, and discoverable by the Administrator and any other person.

Condensate means hydrocarbon liquid separated from natural gas that condenses due to changes in the temperature or pressure, or both, and remains liquid at standard conditions.

Custody transfer means the transfer of produced petroleum and/or condensate, after processing and/or treatment in the producing operations, from storage vessels or automatic transfer facilities to pipelines or any other forms of transportation.

Fill means the introduction of VOL into a storage vessel but not necessarily to complete capacity.

Gasoline service station means any site where gasoline is dispensed to motor vehicle fuel tanks from stationary storage tanks.

Maximum true vapor pressure means the equilibrium partial pressure exerted by the volatile organic compounds (as defined in 40 CFR 51.100) in the stored VOL at the temperature equal to the highest calendar-month average of the VOL storage temperature for VOL's stored above or below the ambient temperature or at the local maximum monthly average temperature as reported by the National Weather Service for VOL's stored at the ambient temperature, as determined:

(1) In accordance with methods described in American Petroleum Institute Bulletin 2517, Evaporation Loss From External Floating Roof Tanks, (incorporated by reference—see §60.17); or

(2) As obtained from standard reference texts; or

(3) As determined by ASTM D2879-83, 96, or 97 (incorporated by reference-see §60.17);

(4) Any other method approved by the Administrator.

Page 2 of 11 (Subpart Kb)

Petroleum means the crude oil removed from the earth and the oils derived from tar sands, shale, and coal.

Petroleum liquids means petroleum, condensate, and any finished or intermediate products manufactured in a petroleum refinery.

Process tank means a tank that is used within a process (including a solvent or raw material recovery process) to collect material discharged from a feedstock storage vessel or equipment within the process before the material is transferred to other equipment within the process, to a product or by-product storage vessel, or to a vessel used to store recovered solvent or raw material. In many process tanks, unit operations such as reactions and blending are conducted. Other process tanks, such as surge control vessels and bottoms receivers, however, may not involve unit operations.

Reid vapor pressure means the absolute vapor pressure of volatile crude oil and volatile nonviscous petroleum liquids except liquified petroleum gases, as determined by ASTM D323–82 or 94 (incorporated by reference—see §60.17).

Storage vessel means each tank, reservoir, or container used for the storage of volatile organic liquids but does not include:

(1) Frames, housing, auxiliary supports, or other components that are not directly involved in the containment of liquids or vapors;

(2) Subsurface caverns or porous rock reservoirs; or

(3) Process tanks.

*Volatile organic liquid (VOL)* means any organic liquid which can emit volatile organic compounds (as defined in 40 CFR 51.100) into the atmosphere.

Waste means any liquid resulting from industrial, commercial, mining or agricultural operations, or from community activities that is discarded or is being accumulated, stored, or physically, chemically, or biologically treated prior to being discarded or recycled.

[52 FR 11429, Apr. 8, 1987, as amended at 54 FR 32973, Aug. 11, 1989; 65 FR 61756, Oct. 17, 2000; 68 FR 59333, Oct. 15, 2003]

## § 60.112b Standard for volatile organic compounds (VOC).

(a) The owner or operator of each storage vessel either with a design capacity greater than or equal to 151 m³ containing a VOL that, as stored, has a maximum true vapor pressure equal to or greater than 5.2 kPa but less than 76.6 kPa or with a design capacity greater than or equal to 75 m³ but less than 151 m³ containing a VOL that, as stored, has a maximum true vapor pressure equal to or greater than 27.6 kPa but less than 76.6 kPa, shall equip each storage vessel with one of the following:

(1) A fixed roof in combination with an internal floating roof meeting the following specifications:

(i) The internal floating roof shall rest or float on the liquid surface (but not necessarily in complete contact with it) inside a storage vessel that has a fixed roof. The internal floating roof shall be floating on the liquid surface at all times, except during initial fill and during those intervals when the storage vessel is completely emptied or subsequently emptied and refilled. When the roof is resting on the leg supports, the process of filling, emptying, or refilling shall be continuous and shall be accomplished as rapidly as possible.

(ii) Each internal floating roof shall be equipped with one of the following closure devices between the wall of the storage vessel and the edge of the internal floating roof:

(A) A foam- or liquid-filled seal mounted in contact with the liquid (liquid-mounted seal). A liquid-mounted seal means a foam- or liquid-filled seal mounted in contact with the liquid between the wall of the storage vessel and the floating roof continuously around the circumference of the tank.

(B) Two seals mounted one above the other so that each forms a continuous closure that completely covers the space between the wall of the storage vessel and the edge of the internal floating roof. The lower seal may be vapor-mounted, but both must be continuous.

(C) A mechanical shoe seal. A mechanical shoe seal is a metal sheet held vertically against the wall of the storage vessel by springs or weighted levers and is connected by braces to the floating roof. A flexible coated fabric (envelope) spans the annular space between the metal sheet and the floating roof.

(iii) Each opening in a noncontact internal floating roof except for automatic bleeder vents (vacuum breaker vents) and the rim space vents is to provide a projection below the liquid surface.

(iv) Each opening in the internal floating roof except for leg sleeves, automatic bleeder vents, rim space vents, column wells, ladder wells, sample wells, and stub drains is to be equipped with a cover or lid which is to be maintained in a closed position at all times (i.e., no visible gap) except when the device is in actual use. The cover or lid shall be equipped with a gasket. Covers on each access hatch and automatic gauge float well shall be bolted except when they are in use.

(v) Automatic bleeder vents shall be equipped with a gasket and are to be closed at all times when the roof is floating except when the roof is being floated off or is being landed on the roof leg supports.

(vi) Rim space vents shall be equipped with a gasket and are to be set to open only when the internal floating roof is not floating or at the manufacturer's recommended setting.

(vii) Each penetration of the internal floating roof for the purpose of sampling shall be a sample well. The sample well shall have a slit fabric cover that covers at least 90 percent of the opening.

(viii) Each penetration of the internal floating roof that allows for passage of a column supporting the fixed roof shall have a flexible fabric sleeve seal or a gasketed sliding cover.

(ix) Each penetration of the internal floating roof that allows for passage of a ladder shall have a gasketed sliding cover.

(2) An external floating roof. An external floating roof means a pontoon-type or double-deck type cover that rests on the liquid surface in a vessel with no fixed roof. Each external floating roof must meet the following specifications:

(i) Each external floating roof shall be equipped with a closure device between the wall of the storage vessel and the roof edge. The closure device is to consist of two seals, one above the other. The lower seal is referred to as the primary seal, and the upper seal is referred to as the secondary seal.

(A) The primary seal shall be either a mechanical shoe seal or a liquid-mounted seal. Except as provided in §60.113b(b)(4), the seal shall completely cover the annular space between the edge of the floating roof and tank wall.

(B) The secondary seal shall completely cover the annular space between the external floating roof and the wall of the storage vessel in a continuous fashion except as allowed in §60.113b(b)(4).

(ii) Except for automatic bleeder vents and rim space vents, each opening in a noncontact external floating roof shall provide a projection below the liquid surface. Except for automatic bleeder vents, rim space vents, roof drains, and leg sleeves, each opening in the roof is to be equipped with a gasketed cover, seal, or lid that is to be maintained in a closed position at all times (i.e., no visible gap) except when the device is in actual use. Automatic bleeder vents are to be closed at all times when the roof is floating except when the roof is being floated off or is being landed on the roof leg supports. Rim vents are to be set to open when the roof is being floated off the roof legs supports or at the manufacturer's recommended setting. Automatic bleeder vents and rim space vents are to be gasketed. Each emergency roof drain is to be provided with a slotted membrane fabric cover that covers at least 90 percent of the area of the opening.

(iii) The roof shall be floating on the liquid at all times (i.e., off the roof leg supports) except during initial fill until the roof is lifted off leg supports and when the tank is completely emptied and subsequently refilled. The process of filling, emptying, or refilling when the roof is resting on the leg supports shall be continuous and shall be accomplished as rapidly as possible.

(3) A closed vent system and control device meeting the following specifications:

(i) The closed vent system shall be designed to collect all VOC vapors and gases discharged from the storage vessel and operated with no detectable emissions as indicated by an instrument reading of less than 500 ppm above background and visual inspections, as determined in part 60, subpart VV, §60.485(b).

(ii) The control device shall be designed and operated to reduce inlet VOC emissions by 95 percent or greater. If a flare is used as the control device, it shall meet the specifications described in the general control device requirements (§60.18) of the General Provisions.

Page 4 of 11 (Subpart Kb)

(4) A system equivalent to those described in paragraphs (a)(1), (a)(2), or (a)(3) of this section as provided in §60.114b of this subpart.

(b) The owner or operator of each storage vessel with a design capacity greater than or equal to 75 m³ which contains a VOL that, as stored, has a maximum true vapor pressure greater than or equal to 76.6 kPa shall equip each storage vessel with one of the following:

(1) A closed vent system and control device as specified in §60.112b(a)(3).

(2) A system equivalent to that described in paragraph (b)(1) as provided in §60.114b of this subpart.

(c) Site-specific standard for Merck & Co., Inc.'s Stonewall Plant in Elkton, Virginia. This paragraph applies only to the pharmaceutical manufacturing facility, commonly referred to as the Stonewall Plant, located at Route 340 South, in Elkton, Virginia ("site").

(1) For any storage vessel that otherwise would be subject to the control technology requirements of paragraphs (a) or (b) of this section, the site shall have the option of either complying directly with the requirements of this subpart, or reducing the site-wide total criteria pollutant emissions cap (total emissions cap) in accordance with the procedures set forth in a permit issued pursuant to 40 CFR 52.2454. If the site chooses the option of reducing the total emissions cap in accordance with the procedures set forth in such permit, the requirements of such permit shall apply in lieu of the otherwise applicable requirements of this subpart for such storage vessel.

(2) For any storage vessel at the site not subject to the requirements of 40 CFR 60.112b (a) or (b), the requirements of 40 CFR 60.116b (b) and (c) and the General Provisions (subpart A of this part) shall not apply.

[52 FR 11429, Apr. 8, 1987, as amended at 62 FR 52641, Oct. 8, 1997]

#### § 60.113b Testing and procedures.

The owner or operator of each storage vessel as specified in §60.112b(a) shall meet the requirements of paragraph (a), (b), or (c) of this section. The applicable paragraph for a particular storage vessel depends on the control equipment installed to meet the requirements of §60.112b.

(a) After installing the control equipment required to meet §60.112b(a)(1) (permanently affixed roof and internal floating roof), each owner or operator shall:

(1) Visually inspect the internal floating roof, the primary seal, and the secondary seal (if one is in service), prior to filling the storage vessel with VOL. If there are holes, tears, or other openings in the primary seal, the secondary seal, or the seal fabric or defects in the internal floating roof, or both, the owner or operator shall repair the items before filling the storage vessel.

(2) For Vessels equipped with a liquid-mounted or mechanical shoe primary seal, visually inspect the internal floating roof and the primary seal or the secondary seal (if one is in service) through manholes and roof hatches on the fixed roof at least once every 12 months after initial fill. If the internal floating roof is not resting on the surface of the VOL inside the storage vessel, or there is liquid accumulated on the roof, or the seal is detached, or there are holes or tears in the seal fabric, the owner or operator shall repair the items or empty and remove the storage vessel from service within 45 days. If a failure that is detected during inspections required in this paragraph cannot be repaired within 45 days, a 30-day extension may be requested from the Administrator in the inspection report required in §60.115b(a)(3). Such a request for an extension must document that alternate storage capacity is unavailable and specify a schedule of actions the company will take that will assure that the control equipment will be repaired or the vessel will be emptied as soon as possible.

(3) For vessels equipped with a double-seal system as specified in §60.112b(a)(1)(ii)(B):

(i) Visually inspect the vessel as specified in paragraph (a)(4) of this section at least every 5 years; or

(ii) Visually inspect the vessel as specified in paragraph (a)(2) of this section.

(4) Visually inspect the internal floating roof, the primary seal, the secondary seal (if one is in service), gaskets, slotted membranes and sleeve seals (if any) each time the storage vessel is emptied and degassed. If the internal floating roof has defects, the primary seal has holes, tears, or other openings in the seal or the seal fabric, or the secondary seal has

holes, tears, or other openings in the seal or the seal fabric, or the gaskets no longer close off the liquid surfaces from the atmosphere, or the slotted membrane has more than 10 percent open area, the owner or operator shall repair the items as necessary so that none of the conditions specified in this paragraph exist before refilling the storage vessel with VOL. In no event shall inspections conducted in accordance with this provision occur at intervals greater than 10 years in the case of vessels conducting the annual visual inspection as specified in paragraphs (a)(2) and (a)(3)(ii) of this section and at intervals no greater than 5 years in the case of vessels specified in paragraph (a)(3)(i) of this section.

(5) Notify the Administrator in writing at least 30 days prior to the filling or refilling of each storage vessel for which an inspection is required by paragraphs (a)(1) and (a)(4) of this section to afford the Administrator the opportunity to have an observer present. If the inspection required by paragraph (a)(4) of this section is not planned and the owner or operator could not have known about the inspection 30 days in advance or refilling the tank, the owner or operator shall notify the Administrator at least 7 days prior to the refilling of the storage vessel. Notification was unplanned. Alternatively, this notification including the written documentation may be made in writing and sent by express mail so that it is received by the Administrator at least 7 days prior to the refilling.

(b) After installing the control equipment required to meet §60.112b(a)(2) (external floating roof), the owner or operator shall:

(1) Determine the gap areas and maximum gap widths, between the primary seal and the wall of the storage vessel and between the secondary seal and the wall of the storage vessel according to the following frequency.

(i) Measurements of gaps between the tank wall and the primary seal (seal gaps) shall be performed during the hydrostatic testing of the vessel or within 60 days of the initial fill with VOL and at least once every 5 years thereafter.

(ii) Measurements of gaps between the tank wall and the secondary seal shall be performed within 60 days of the initial fill with VOL and at least once per year thereafter.

(iii) If any source ceases to store VOL for a period of 1 year or more, subsequent introduction of VOL into the vessel shall be considered an initial fill for the purposes of paragraphs (b)(1)(i) and (b)(1)(ii) of this section.

(2) Determine gap widths and areas in the primary and secondary seals individually by the following procedures:

(i) Measure seal gaps, if any, at one or more floating roof levels when the roof is floating off the roof leg supports.

(ii) Measure seal gaps around the entire circumference of the tank in each place where a 0.32-cm diameter uniform probe passes freely (without forcing or binding against seal) between the seal and the wall of the storage vessel and measure the circumferential distance of each such location.

(iii) The total surface area of each gap described in paragraph (b)(2)(ii) of this section shall be determined by using probes of various widths to measure accurately the actual distance from the tank wall to the seal and multiplying each such width by its respective circumferential distance.

(3) Add the gap surface area of each gap location for the primary seal and the secondary seal individually and divide the sum for each seal by the nominal diameter of the tank and compare each ratio to the respective standards in paragraph (b)(4) of this section.

(4) Make necessary repairs or empty the storage vessel within 45 days of identification in any inspection for seals not meeting the requirements listed in (b)(4) (i) and (ii) of this section:

(i) The accumulated area of gaps between the tank wall and the mechanical shoe or liquid-mounted primary seal shall not exceed 212 Cm² per meter of tank diameter, and the width of any portion of any gap shall not exceed 3.81 cm.

(A) One end of the mechanical shoe is to extend into the stored liquid, and the other end is to extend a minimum vertical distance of 61 cm above the stored liquid surface.

(B) There are to be no holes, tears, or other openings in the shoe, seal fabric, or seal envelope.

(ii) The secondary seal is to meet the following requirements:

Page 6 of 11 (Subpart Kb)

(A) The secondary seal is to be installed above the primary seal so that it completely covers the space between the roof edge and the tank wall except as provided in paragraph (b)(2)(iii) of this section.

(B) The accumulated area of gaps between the tank wall and the secondary seal shall not exceed 21.2 cm² per meter of tank diameter, and the width of any portion of any gap shall not exceed 1.27 cm.

(C) There are to be no holes, tears, or other openings in the seal or seal fabric.

(iii) If a failure that is detected during inspections required in paragraph (b)(1) of §60.113b(b) cannot be repaired within 45 days and if the vessel cannot be emptied within 45 days, a 30-day extension may be requested from the Administrator in the inspection report required in §60.115b(b)(4). Such extension request must include a demonstration of unavailability of alternate storage capacity and a specification of a schedule that will assure that the control equipment will be repaired or the vessel will be emptied as soon as possible.

(5) Notify the Administrator 30 days in advance of any gap measurements required by paragraph (b)(1) of this section to afford the Administrator the opportunity to have an observer present.

(6) Visually inspect the external floating roof, the primary seal, secondary seal, and fittings each time the vessel is emptied and degassed.

(i) If the external floating roof has defects, the primary seal has holes, tears, or other openings in the seal or the seal fabric, or the secondary seal has holes, tears, or other openings in the seal or the seal fabric, the owner or operator shall repair the items as necessary so that none of the conditions specified in this paragraph exist before filling or refilling the storage vessel with VOL.

(ii) For all the inspections required by paragraph (b)(6) of this section, the owner or operator shall notify the Administrator in writing at least 30 days prior to the filling or refilling of each storage vessel to afford the Administrator the opportunity to inspect the storage vessel prior to refilling. If the inspection required by paragraph (b)(6) of this section is not planned and the owner or operator could not have known about the inspection 30 days in advance of refilling the tank, the owner or operator shall notify the Administrator at least 7 days prior to the refilling of the storage vessel. Notification shall be made by telephone immediately followed by written documentation demonstrating why the inspection was unplanned. Alternatively, this notification including the written documentation may be made in writing and sent by express mail so that it is received by the Administrator at least 7 days prior to the refilling.

(c) The owner or operator of each source that is equipped with a closed vent system and control device as required in §60.112b (a)(3) or (b)(2) (other than a flare) is exempt from §60.8 of the General Provisions and shall meet the following requirements.

(1) Submit for approval by the Administrator as an attachment to the notification required by 60.7(a)(1) or, if the facility is exempt from 60.7(a)(1), as an attachment to the notification required by 60.7(a)(2), an operating plan containing the information listed below.

(i) Documentation demonstrating that the control device will achieve the required control efficiency during maximum loading conditions. This documentation is to include a description of the gas stream which enters the control device, including flow and VOC content under varying liquid level conditions (dynamic and static) and manufacturer's design specifications for the control device. If the control device or the closed vent capture system receives vapors, gases, or liquids other than fuels from sources that are not designated sources under this subpart, the efficiency demonstration is to include consideration of all vapors, gases, and liquids received by the closed vent capture system and control device. If an enclosed combustion device with a minimum residence time of 0.75 seconds and a minimum temperature of 816 °C is used to meet the 95 percent requirement, documentation that those conditions will exist is sufficient to meet the requirements of this paragraph.

(ii) A description of the parameter or parameters to be monitored to ensure that the control device will be operated in conformance with its design and an explanation of the criteria used for selection of that parameter (or parameters).

(2) Operate the closed vent system and control device and monitor the parameters of the closed vent system and control device in accordance with the operating plan submitted to the Administrator in accordance with paragraph (c)(1) of this section, unless the plan was modified by the Administrator during the review process. In this case, the modified plan applies.

(d) The owner or operator of each source that is equipped with a closed vent system and a flare to meet the requirements in 60.112b(a)(3) or (b)(2) shall meet the requirements as specified in the general control device requirements, 60.18 (e) and (f).

Page 7 of 11 (Subpart Kb)

[52 FR 11429, Apr. 8, 1987, as amended at 54 FR 32973, Aug. 11, 1989]

#### § 60.114b Alternative means of emission limitation.

(a) If, in the Administrator's judgment, an alternative means of emission limitation will achieve a reduction in emissions at least equivalent to the reduction in emissions achieved by any requirement in §60.112b, the Administrator will publish in the Federal Register a notice permitting the use of the alternative means for purposes of compliance with that requirement.

(b) Any notice under paragraph (a) of this section will be published only after notice and an opportunity for a hearing.

(c) Any person seeking permission under this section shall submit to the Administrator a written application including:

(1) An actual emissions test that uses a full-sized or scale-model storage vessel that accurately collects and measures all VOC emissions from a given control device and that accurately simulates wind and accounts for other emission variables such as temperature and barometric pressure.

(2) An engineering evaluation that the Administrator determines is an accurate method of determining equivalence.

(d) The Administrator may condition the permission on requirements that may be necessary to ensure operation and maintenance to achieve the same emissions reduction as specified in §60.112b.

#### § 60.115b Reporting and recordkeeping requirements.

The owner or operator of each storage vessel as specified in §60.112b(a) shall keep records and furnish reports as required by paragraphs (a), (b), or (c) of this section depending upon the control equipment installed to meet the requirements of §60.112b. The owner or operator shall keep copies of all reports and records required by this section, except for the record required by (c)(1), for at least 2 years. The record required by (c)(1) will be kept for the life of the control equipment.

(a) After installing control equipment in accordance with §60.112b(a)(1) (fixed roof and internal floating roof), the owner or operator shall meet the following requirements.

(1) Furnish the Administrator with a report that describes the control equipment and certifies that the control equipment meets the specifications of (1) and (1) and (1). This report shall be an attachment to the notification required by (0, 1).

(2) Keep a record of each inspection performed as required by §60.113b (a)(1), (a)(2), (a)(3), and (a)(4). Each record shall identify the storage vessel on which the inspection was performed and shall contain the date the vessel was inspected and the observed condition of each component of the control equipment (seals, internal floating roof, and fittings).

(3) If any of the conditions described in §60.113b(a)(2) are detected during the annual visual inspection required by §60.113b(a)(2), a report shall be furnished to the Administrator within 30 days of the inspection. Each report shall identify the storage vessel, the nature of the defects, and the date the storage vessel was emptied or the nature of and date the repair was made.

(4) After each inspection required by §60.113b(a)(3) that finds holes or tears in the seal or seal fabric, or defects in the internal floating roof, or other control equipment defects listed in §60.113b(a)(3)(ii), a report shall be furnished to the Administrator within 30 days of the inspection. The report shall identify the storage vessel and the reason it did not meet the specifications of §61.112b(a)(1) or §60.113b(a)(3) and list each repair made.

(b) After installing control equipment in accordance with §61.112b(a)(2) (external floating roof), the owner or operator shall meet the following requirements.

(1) Furnish the Administrator with a report that describes the control equipment and certifies that the control equipment meets the specifications of (0.112b(a)(2)) and (0.113b(b)(2)), (b)(3), and (b)(4). This report shall be an attachment to the notification required by (0.112b(a)(3)).

(2) Within 60 days of performing the seal gap measurements required by §60.113b(b)(1), furnish the Administrator with a report that contains:

Page 8 of 11 (Subpart Kb)

(i) The date of measurement.

(ii) The raw data obtained in the measurement.

(iii) The calculations described in §60.113b (b)(2) and (b)(3).

(3) Keep a record of each gap measurement performed as required by §60.113b(b). Each record shall identify the storage vessel in which the measurement was performed and shall contain:

(i) The date of measurement.

(ii) The raw data obtained in the measurement.

(iii) The calculations described in §60.113b (b)(2) and (b)(3).

(4) After each seal gap measurement that detects gaps exceeding the limitations specified by §60.113b(b)(4), submit a report to the Administrator within 30 days of the inspection. The report will identify the vessel and contain the information specified in paragraph (b)(2) of this section and the date the vessel was emptied or the repairs made and date of repair.

(c) After installing control equipment in accordance with §60.112b (a)(3) or (b)(1) (closed vent system and control device other than a flare), the owner or operator shall keep the following records.

(1) A copy of the operating plan.

(2) A record of the measured values of the parameters monitored in accordance with §60.113b(c)(2).

(d) After installing a closed vent system and flare to comply with §60.112b, the owner or operator shall meet the following requirements.

(1) A report containing the measurements required by §60.18(f) (1), (2), (3), (4), (5), and (6) shall be furnished to the Administrator as required by §60.8 of the General Provisions. This report shall be submitted within 6 months of the initial start-up date.

(2) Records shall be kept of all periods of operation during which the flare pilot flame is absent.

(3) Semiannual reports of all periods recorded under §60.115b(d)(2) in which the pilot flame was absent shall be furnished to the Administrator.

### § 60.116b Monitoring of operations.

(a) The owner or operator shall keep copies of all records required by this section, except for the record required by paragraph (b) of this section, for at least 2 years. The record required by paragraph (b) of this section will be kept for the life of the source.

(b) The owner or operator of each storage vessel as specified in §60.110b(a) shall keep readily accessible records showing the dimension of the storage vessel and an analysis showing the capacity of the storage vessel.

(c) Except as provided in paragraphs (f) and (g) of this section, the owner or operator of each storage vessel either with a design capacity greater than or equal to 151 m³ storing a liquid with a maximum true vapor pressure greater than or equal to 3.5 kPa or with a design capacity greater than or equal to 75 m³ but less than 151 m³ storing a liquid with a maximum true vapor pressure greater than or equal to 15.0 kPa shall maintain a record of the VOL stored, the period of storage, and the maximum true vapor pressure of that VOL during the respective storage period.

(d) Except as provided in paragraph (g) of this section, the owner or operator of each storage vessel either with a design capacity greater than or equal to 151 m³ storing a liquid with a maximum true vapor pressure that is normally less than 5.2 kPa or with a design capacity greater than or equal to 75 m³ but less than 151 m³ storing a liquid with a maximum true vapor pressure that is normally less than 27.6 kPa shall notify the Administrator within 30 days when the maximum true vapor pressure of the liquid exceeds the respective maximum true vapor pressure values for each volume range.

Page 9 of 11 (Subpart Kb)

(e) Available data on the storage temperature may be used to determine the maximum true vapor pressure as determined below.

(1) For vessels operated above or below ambient temperatures, the maximum true vapor pressure is calculated based upon the highest expected calendar-month average of the storage temperature. For vessels operated at ambient temperatures, the maximum true vapor pressure is calculated based upon the maximum local monthly average ambient temperature as reported by the National Weather Service.

(2) For crude oil or refined petroleum products the vapor pressure may be obtained by the following:

(i) Available data on the Reid vapor pressure and the maximum expected storage temperature based on the highest expected calendar-month average temperature of the stored product may be used to determine the maximum true vapor pressure from nomographs contained in API Bulletin 2517 (incorporated by reference—see §60.17), unless the Administrator specifically requests that the liquid be sampled, the actual storage temperature determined, and the Reid vapor pressure determined from the sample(s).

(ii) The true vapor pressure of each type of crude oil with a Reid vapor pressure less than 13.8 kPa or with physical properties that preclude determination by the recommended method is to be determined from available data and recorded if the estimated maximum true vapor pressure is greater than 3.5 kPa.

(3) For other liquids, the vapor pressure:

(i) May be obtained from standard reference texts, or

(ii) Determined by ASTM D2879-83, 96, or 97 (incorporated by reference-see §60.17); or

(iii) Measured by an appropriate method approved by the Administrator; or

(iv) Calculated by an appropriate method approved by the Administrator.

(f) The owner or operator of each vessel storing a waste mixture of indeterminate or variable composition shall be subject to the following requirements.

(1) Prior to the initial filling of the vessel, the highest maximum true vapor pressure for the range of anticipated liquid compositions to be stored will be determined using the methods described in paragraph (e) of this section.

(2) For vessels in which the vapor pressure of the anticipated liquid composition is above the cutoff for monitoring but below the cutoff for controls as defined in §60.112b(a), an initial physical test of the vapor pressure is required; and a physical test at least once every 6 months thereafter is required as determined by the following methods:

(i) ASTM D2879-83, 96, or 97 (incorporated by reference-see §60.17); or

(ii) ASTM D323-82 or 94 (incorporated by reference-see §60.17); or

(iii) As measured by an appropriate method as approved by the Administrator.

(g) The owner or operator of each vessel equipped with a closed vent system and control device meeting the specification of §60.112b or with emissions reductions equipment as specified in 40 CFR 65.42(b)(4), (b)(5), (b)(6), or (c) is exempt from the requirements of paragraphs (c) and (d) of this section.

[52 FR 11429, Apr. 8, 1987, as amended at 65 FR 61756, Oct. 17, 2000; 65 FR 78276, Dec. 14, 2000; 68 FR 59333, Oct. 15, 2003]

#### § 60.117b Delegation of authority.

(a) In delegating implementation and enforcement authority to a State under section 111(c) of the Act, the authorities contained in paragraph (b) of this section shall be retained by the Administrator and not transferred to a State.

(b) Authorities which will not be delegated to States: §§60.111b(f)(4), 60.114b, 60.116b(e)(3)(iii), 60.116b(e)(3)(iv), and 60.116b(f)(2)(iii).

[52 FR 11429, Apr. 8, 1987, as amended at 52 FR 22780, June 16, 1987]

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# **CERTIFICATE OF SERVICE**

I, Pam Owen, hereby certify that a copy of this permit has been mailed by first class mail to

Cross Oil Refining & Marketing, Incorporated, 484 East 6th Street, Smackover, AR, 71762, on

this <u>27</u>th day of <u>August</u>, 2007.

Pam Owen, AAII, Air Division

