

Chapter NR 417

CONTROL OF SULFUR EMISSIONS

NR 417.01 Applicability; purpose
 NR 417.02 Definitions
 NR 417.025 General limitations

NR 417.05 Petroleum refineries
 NR 417.06 Total reduced sulfur limitations
 NR 417.07 Statewide sulfur dioxide emission limitations

Note: Corrections made under s. 13.93 (2m) (b) 7., Stats., Register, December, 1996, No. 492.

NR 417.01 Applicability; purpose. (1) **APPLICABILITY.** This chapter applies to all air contaminant sources which emit sulfur dioxide or other sulfur compounds and to their owners and operators.

(2) **PURPOSE.** This chapter is adopted under ss. 285.31, 285.13, and 285.17, Stats., to categorize sulfur dioxide and sulfur compound air contaminant sources and to establish emission limitations for these sources in order to protect air quality.

History: Cr. Register, September, 1986, No. 369, eff. 10-1-86; am. (1), Register, May, 1992, No. 437, eff. 6-1-92.

NR 417.02 Definitions. The definitions contained in ch. NR 400 apply to the terms used in this chapter. In addition, the following definitions apply to the terms used in this chapter:

(1) "Equivalent air-dried kraft pulp" means pulp production which produces a loading of black liquor solids to the recovery furnace equivalent to that loading produced with kraft pulp.

History: Cr. Register, September, 1986, No. 369, eff. 10-1-86; (1) renum. from NR 400.02 (37), Register, May, 1992, No. 437, eff. 6-1-92; am. (intro.), Register, December, 1993, No. 480, eff. 1-1-96.

NR 417.03 General limitations. No person may cause, allow or permit emission of sulfur or sulfur compounds into the ambient air which substantially contribute to the exceeding of an air standard or cause air pollution. The limitation on total reduced sulfur from pulping operations is specified in s. NR 417.06.

History: Renum. from NR 154.12 (1) and am. Register, September, 1986, No. 369, eff. 10-1-86; renum. from NR 417.025, Register, August, 1996, No. 488, eff. 9-1-96.

NR 417.05 Petroleum refineries. No person may cause, allow or permit the release into the atmosphere or the burning of any fuel gas in an incinerator-waste heat boiler or process heater which contains greater than 0.10 grains of hydrogen sulfide (H₂S) per dry cubic foot at standard conditions (0.23 grams per dry cubic meter at standard conditions) unless the gases resulting from combustion are treated in a manner which prevents the release of sulfur dioxide to the atmosphere as effectively as controlling the concentration of H₂S in the fuel gas being burned.

History: Renum. from NR 154.12 (3), Register, September, 1986, No. 369, eff. 10-1-86; am. Register, May, 1992, No. 437, eff. 6-1-92.

NR 417.06 Total reduced sulfur limitations. No person may cause, allow or permit emission into the ambient air of total reduced sulfur (TRS) in excess of the limitations in this section. All emission standards in this section are based on average daily emissions.

(1) The emission of TRS from all recovery furnace stacks may not exceed 0.50 pound of reduced sulfur compounds (as sulfur) per equivalent ton of air-dried kraft pulp, or from each recovery furnace stack 17.5 ppm, expressed as hydrogen sulfide on a dry gas basis, whichever is the more restrictive. New direct sources shall meet such other limit of TRS that proves to be reasonably attainable utilizing the latest in design of recovery furnace equipment, controls, and procedures.

(2) Noncondensibles from digesters and multiple-effect evaporators shall be treated to reduce the emission of TRS equal to the reduction achieved by thermal oxidation in a lime kiln.

History: Renum. from NR 154.18 (2), Register, September, 1986, No. 369, eff. 10-1-86; am. (intro.) and (1), Register, May, 1992, No. 437, eff. 6-1-92; am. (1) and (2), r. (3), Register, December, 1993, No. 480, eff. 1-1-96.

NR 417.07 Statewide sulfur dioxide emission limitations. (1) **APPLICABILITY.** This section applies to any direct source of sulfur dioxide, with the following exceptions:

(a) Any direct source which is subject to emission limitations specified in ch. NR 418.

(b) Any direct source which is subject to an emission limitation for sulfur dioxide, imposed by statute, rule, permit, order or plan approval, which is more restrictive than an emission limitation under sub. (2) or (3).

(2) **EMISSION LIMITS FOR EXISTING SOURCES.** Except as provided under sub. (5) or (8), no person may cause, allow or permit sulfur dioxide to be emitted to the ambient air from any direct source constructed on or before February 1, 1985, in amounts greater than those specified in this subsection.

(a) All steam generating units and other fuel burning equipment firing solid fossil fuel, alone or in combination with fuel burning equipment firing other fuels, at a facility which has a total heat input capacity on solid fossil fuel of greater than or equal to 250 million Btu per hour, may not emit from any stack more than 3.2 pounds of sulfur dioxide per million Btu heat input.

(b) Any steam generating unit or other fuel burning equipment firing solid fossil fuel at a facility which has a total heat input capacity on solid fossil fuel of less than 250 million Btu per hour may not emit from any stack more than 5.5 pounds of sulfur dioxide per million Btu heat input.

(c) Any steam generating unit or other fuel burning equipment firing residual fuel oil at a facility which has a total heat input capacity on residual fuel oil of greater than or equal to 250 million Btu per hour may not emit from any stack more than 1.5 pounds of sulfur dioxide per million Btu heat input.

(d) Any steam generating unit or other fuel burning equipment firing residual fuel oil at a facility which has a total heat input capacity on residual fuel oil of less than 250 million Btu per hour may not emit from any stack more than 3.0 pounds of sulfur dioxide per million Btu heat input.

(e) Any kraft mill producing pulp may not emit more than 10.0 pounds of sulfur dioxide per ton of air dried unbleached pulp from all process sources at the kraft mill. Process sources do not include equipment which derives more than 50% of its annual heat input from solid fossil fuel, residual fuel oil, wood or wood waste.

(f) Any sulfite mill producing pulp may not emit more than 20.0 pounds of sulfur dioxide per ton of air dried unbleached pulp from all process sources at the sulfite mill. Process sources do not include equipment which derives more than 50% of its annual heat input from solid fossil fuel, residual fuel oil, wood or wood waste.

(g) Any petroleum refinery shall comply with the following emission limitations:

1. The sulfur dioxide emissions from any process heater firing residual fuel oil may not exceed 0.80 pounds of sulfur dioxide per million Btu heat input from the process heater.

2. The sulfur dioxide emissions from any stack serving any fuel burning equipment firing residual fuel oil may not exceed 0.80 pounds of sulfur dioxide per million Btu heat input.

3. The sulfur dioxide emissions from any Claus sulfur recovery plant may not exceed 6,743 pounds of sulfur dioxide in any 24-hour period or 843 pounds of sulfur dioxide in any 3-hour period.

4. The sulfur dioxide emissions from all other process units may not exceed 1,035 pounds of sulfur dioxide in any 1-hour period.

(3) **EMISSION LIMITS FOR NEW SOURCES.** No person may cause, allow or permit sulfur dioxide to be emitted to the ambient air from any direct source constructed after February 1, 1985 in amounts greater than those specified in this subsection.

(a) Any steam generating unit or other fuel burning equipment firing solid fossil fuel may not emit from any stack more than 3.2 pounds of sulfur dioxide per million Btu heat input.

(b) Any steam generating unit or other fuel burning equipment firing residual fuel oil may not emit from any stack more than 1.5 pounds of sulfur dioxide per million Btu heat input.

(c) Any kraft mill producing pulp may not emit more than 10.0 pounds of sulfur dioxide per ton of air dried unbleached pulp from all process sources at the kraft mill. Process sources do not include equipment which derives more than 50% of its annual heat input from solid fossil fuel, residual fuel oil, wood or wood waste.

(d) Any sulfite mill producing pulp may not emit more than 20.0 pounds of sulfur dioxide per ton of air dried unbleached pulp from all process sources at the sulfite mill. Process sources do not include equipment which derives more than 50% of its annual heat input from solid fossil fuel, residual fuel oil, wood or wood waste.

(e) Any petroleum refinery shall comply with the following emission limitations:

1. The sulfur dioxide emissions from any process heater firing residual fuel oil may not exceed 1.5 pounds of sulfur dioxide per million Btu heat input from the process heater.

2. The sulfur dioxide emissions from any stack serving any fuel burning equipment firing residual fuel oil may not exceed 1.5 pounds of sulfur dioxide per million Btu heat input.

3. The sulfur dioxide emissions from any Claus sulfur recovery plant may not exceed:

a. 0.025% by volume of sulfur dioxide at zero percent oxygen on a dry basis, if emissions are controlled by an oxidation control system or a reduction control system followed by incineration.

b. 0.030% by volume of reduced sulfur compounds and 0.0010% by volume of hydrogen sulfide calculated as sulfur dioxide at zero percent oxygen on a dry basis, if emissions are controlled by a reduction control system not followed by incineration.

(4) **MORE RESTRICTIVE EMISSION LIMITS.** The department may require a source to meet a more restrictive emission limitation than an applicable emission limitation provided under sub. (2) or (3) if the department determines that a more restrictive emission limitation is required to ensure that the source will not cause or exacerbate a violation of an ambient air quality standard or air increment for sulfur dioxide.

(5) **ALTERNATE EMISSION LIMITS.** The department may grant an alternate emission limitation to a source which is subject to an emission limitation in sub. (2) (a), (c), (e), (f) or (g) if the following conditions are met:

(a) The owner or operator of the source submits a written request for an alternate emission limitation which outlines the specific conditions or special circumstances which prevent the source from complying with the applicable emission limitation in sub. (2)

and which contains a proposed alternate emission limitation for the source.

(b) The owner or operator of the source demonstrates that the proposed alternate emission limitation will not delay attainment or prevent maintenance of an ambient air quality standard for sulfur dioxide, as demonstrated by air quality modeling acceptable to the department.

(c) If the source is subject to the emission limitation in sub. (2) (a) or (c), the proposed alternate emission limitation may not exceed 5.5 pounds of sulfur dioxide per million Btu heat input for any fuel burning equipment firing solid fossil fuel; or 3.0 pounds of sulfur dioxide per million Btu heat input for any fuel burning equipment firing residual fuel oil. The alternate emission limitation of 5.5 pounds of sulfur dioxide per million Btu heat input for solid fossil fuel burning equipment may be calculated on a 30-day rolling average for a source, if there is one or more other sulfur dioxide emission limitations applicable to the source which would assure the attainment and maintenance of the ambient air quality standards for sulfur dioxide.

(e) The owner or operator of the source demonstrates that there is a substantial cost difference between the costs required for the source's compliance with the applicable emission limitation in sub. (2) and the costs required for the source's compliance with the proposed alternate emission limitation.

(f) The owner or operator of the source demonstrates that the ambient air quality impact of the emissions from the source while emitting at the proposed alternate emission limitation, when added to the background concentration of sulfur dioxide in the vicinity of the source, does not exceed 75% of the ambient air quality standards for sulfur dioxide. In calculating the 75% figure, sulfur dioxide emissions from sources which are regulated under ch. NR 440 may not be considered. The condition in this paragraph may be waived by the department if a public hearing is held on the proposed alternate emission limitation and the public comments on the proposed alternate emission limitation indicate that there is no significant opposition to waiving this condition.

(g) The projected annual emissions of sulfur dioxide from the source, resulting from the proposed alternate emission limitation, will not exceed the annual sulfur dioxide emissions from the source in calendar years 1979 to 1983, either in terms of the highest total tons of sulfur dioxide per calendar year or in terms of the highest annual average emission rate, as expressed in pounds of sulfur dioxide per million Btu for steam generating units or fuel burning equipment or in pounds of sulfur dioxide per ton of air dried unbleached pulp for process sources at a kraft mill or sulfite mill. This condition does not apply to a source which is authorized by statute to increase its annual emissions of sulfur dioxide, to a major utility which is subject to s. 144.385, Stats., to fuel burning equipment which had the capability of firing residual fuel oil but which derived more than 50% of its annual heat input from natural gas for each calendar year from 1979 to 1983, or to fuel burning equipment which had the capability of firing coal but which derived more than 50% of its annual heat input from wood or wood waste for each calendar year from 1979 to 1983.

(h) The owner or operator of the source submits an application for and receives an elective operation permit or a modification to an operation permit for the source.

(6) **COMPLIANCE SCHEDULES.** (a) When a source is subject to the emission limitations of sub. (2), the owner or operator shall achieve final compliance with those emission limitations and so certify to the department on or before December 31, 1987.

(7) **COMPLIANCE DEMONSTRATIONS.** (a) For purposes of determining compliance with the emission limitations of sub. (2) or the alternate emission limitations of sub. (5), the owner or operator of the source shall use one or more of the following:

1. Installation, calibration, maintenance and operation of a continuous emission monitor, utilizing equipment and procedures reviewed and approved by the department under s. NR 439.09.

2. Collection and analysis of fuel used, utilizing equipment and procedures reviewed and approved by the department under s. NR 439.08.

3. Emission testing, utilizing equipment and procedures reviewed and approved by the department under s. NR 439.07.

4. Other appropriate methods reviewed and approved by the department.

(b) An owner or operator of a source subject to the emission limitations of sub. (2) or the alternate emission limitations of sub. (5), shall maintain complete records of emissions data and calculations used to verify emissions data at the premises of the source and shall make such records available for inspection upon request by authorized representatives of the department during regular business hours.

(8) VARIANCE FROM EMISSION LIMITS. (a) The department may grant a source-specific variance from an emission limitation provided in sub. (2), an alternate emission limitation authorized under sub. (5) or a compliance schedule in sub. (6) if compliance with the emission limitations of subs. (2) and (5) or the compliance schedule of sub. (6) are shown to be technologically or economically infeasible. A variance may be granted, by setting alternate emission limitations or alternate compliance schedules, or both, provided that:

1. The variance will not delay attainment or prevent maintenance of an ambient air quality standard for sulfur dioxide, as determined by methods acceptable to the department.

2. The owner or operator of the source for which a variance is requested demonstrates that all direct or portable sources owned or operated in the state by such person are in compliance with all applicable requirements of chs. NR 400 to 499 or are on a schedule for complying with such requirements.

3. The owner or operator submits to the department on or before December 31, 1985 a request for a source-specific variance which demonstrates, to the department's satisfaction, that compliance with the applicable emission limitation or compliance schedule from which a variance is sought is technologically or economically infeasible.

(b) A request for a source-specific variance under this subsection shall be signed by the principal executive officer, sole propri-

etor, principal governmental executive or elected official or a duly authorized representative of the source and shall contain the following information:

1. The specific conditions or special circumstances which make compliance with the applicable emission limitation or compliance schedule by the source technologically or economically infeasible.

2. If a variance from an emission limitation is sought, the owner or operator shall submit proposed emission limitations.

3. If a variance from a compliance schedule is sought, the owner or operator shall submit a proposed compliance schedule which demonstrates reasonable further progress toward final compliance and contains a date for final compliance as soon as practicable.

4. Other relevant information as required by the department.

(c) The department, in acting upon any request for a variance under this subsection, shall:

1. Act on a request for a variance within 65 business days of the filing of a completed request.

2. Offer, through public notice, the opportunity for public comments including, if requested, a public hearing.

3. State in writing the reasons for denying, or granting, or for granting in modified form, any request for a variance.

(d) The department may, after notice and opportunity for hearing, revoke or modify any variance for any of the following reasons:

1. Any term or condition of the variance has been violated.

2. Changes in ambient air quality indicate that the source has a significant adverse impact on the attainment or maintenance of any ambient air quality standard for sulfur dioxide.

3. The owner or operator did not act in good faith in demonstrating the technological or economic infeasibility of compliance with the applicable emission limitation or compliance schedule or in submitting other relevant information in support of the variance request.

History: Renum. from NR 154.12 (11) and am. Register, September, 1986, No. 369, eff. 10-1-86; am. (1) (a), (2) (a) to (d), (g) 1. and 2., (3) (a), (b) and (c) 2., (5) (c), (d) and (f), Register, May, 1992, No. 437, eff. 6-1-92; renum. (6) (a) (intro.) to be (6), r. (6) (a) 1. to 5., (b) to (d) and (9), am. (7) (a) (intro.) and 1. to 3., Register, December, 1995, No. 480, eff. 1-1-96; am. (8) (d) (intro.), Register, December, 1996, No. 492, eff. 1-1-97.

Section 1: Introduction

Section 2: Methodology

Section 3: Results

Section 4: Discussion

Section 5: Conclusion

Section 6: References

Section 7: Appendix

Section 8: Acknowledgments

Section 9: Author Biographies

Section 10: Contact Information

Section 11: Declaration of Interest

Section 12: Funding Sources

Section 13: Data Availability

Section 14: Ethics Approval

Section 15: Supplementary Materials

Section 16: Correspondence

Section 17: Peer Review

Section 18: Publication History

Section 19: Copyright

Section 20: Final Remarks

Section 21: Index

Section 22: Glossary

Section 23: Bibliography