

# SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

## Draft Staff Report

### Proposed Rule 1165 – Control of Emissions from Municipal Solid Waste Incinerators

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# TABLE OF CONTENTS

EXECUTIVE SUMMARY .....	EX-1
CHAPTER 1: BACKGROUND	
INTRODUCTION.....	1-1
REGULATORY HISTORY .....	1-2
AFFECTED INDUSTRIES.....	1-3
PUBLIC PROCESS.....	1-4
CHAPTER 2: BARCT ASSESSMENT	
INTRODUCTION.....	2-1
ESTABLISHING EQUIPMENT CLASSES AND CATEGORIES .....	2-2
GENERAL BARCT ASSESSMENT APPROACH .....	2-3
<i>Assessment of South Coast AQMD Regulatory Requirements</i> .....	2-4
<i>Assessment of Emission Limits for Equipment</i> .....	2-5
<i>Other Regulatory Requirements</i> .....	2-5
<i>Assessment of Pollution Control Technologies</i> .....	2-8
<i>Initial BARCT Emission Limits and Other Considerations</i> .....	2-13
<i>Cost-Effectiveness Analysis &amp; Incremental Cost-Effectiveness Analysis</i> .....	2-14
CHAPTER 3: PROPOSED RULE 1165	
INTRODUCTION.....	3-1
PROPOSED RULE STRUCTURE.....	3-1
PROPOSED RULE 1165.....	3-1
<i>Subdivision (a) – Purpose</i> .....	3-1
<i>Subdivision (b) – Applicability</i> .....	3-1
<i>Subdivision (c) – Definitions</i> .....	3-1
<i>Subdivision (d) – Requirements</i> .....	3-4
<i>Subdivision (e) – Housekeeping Requirements</i> .....	3-7
<i>Subdivision (f) – Monitoring and Source Testing Requirements</i> .....	3-8
<i>Subdivision (g) – Reporting and Recordkeeping Requirements</i> .....	3-9
CHAPTER 4: IMPACT ASSESSMENT	
INTRODUCTION.....	4-1
EMISSION REDUCTIONS .....	4-1
<i>SCR Emission Reductions</i> .....	4-1
<i>Ceramic Catalytic Filter Emission Reductions</i> .....	4-3
<i>Baghouse Emission Reductions</i> .....	4-3
COSTS AND COST-EFFECTIVENESS .....	4-4
<i>Overview</i> .....	4-4
<i>Capital Costs</i> .....	4-5
<i>Recurring Costs</i> .....	4-7
<i>Summary</i> .....	4-7
INCREMENTAL COST-EFFECTIVENESS .....	4-8
SOCIOECONOMIC IMPACT ASSESSMENT.....	4-9
CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA) ANALYSIS .....	4-9

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DRAFT FINDINGS UNDER HEALTH AND SAFETY CODE SECTION 40727 .....	4-9
<i>Requirements to Make Findings</i> .....	4-9
<i>Necessity</i> .....	4-10
<i>Authority</i> .....	4-10
<i>Clarity</i> .....	4-10
<i>Consistency</i> .....	4-10
<i>Non-Duplication</i> .....	4-10
<i>Reference</i> .....	4-10
COMPARATIVE ANALYSIS .....	4-10
APPENDIX A – FACILITY AFFECTED BY PROPOSED RULE 1165 .....	A-1
APPENDIX B – RESPONSE TO PUBLIC COMMENTS .....	B-1

## EXECUTIVE SUMMARY

Proposed Rule 1165 (PR 1165) will regulate municipal solid waste incinerators within the South Coast Air Basin. Currently, the Southeast Resource Recovery Facility (SERRF) located in the Port of Long Beach is the only facility expected to be subject to PR 1165. SERRF began operation in 1988 with the expectation to operate for 30 years.

Although SERRF is currently in the process of decommissioning and shutting down, PR 1165 is still necessary to adopt due to three factors:

- California is required to address its State Implementation Plan (SIP) deficiency pursuant to the United States Environmental Protection Agency (U.S. EPA) Federal ‘Good Neighbor Plan’ for the 2015 Ozone National Ambient Air Quality Standards;
- The South Coast AQMD 2022 Air Quality Management Plan (2022 AQMP) Control Measure L-CMB-09 requires the creation of a rule to reduce oxides of nitrogen (NOx) from municipal solid waste incinerators; and
- The South Coast Air Basin Attainment Plan for the 2012 Annual PM<sub>2.5</sub> (Particulate Matter with diameter less than 2.5 microns) Standard Control Measure BCM-07 requires NOx reductions from municipal solid waste incinerators.

The U.S. EPA issued the Good Neighbor Plan on March 15, 2023, requiring that the 23 identified states meet the Clean Air Act’s “Good Neighbor” requirements by reducing air pollution that significantly contributes to downwind states’ ability to meet or maintain compliance with the 2015 National Ambient Air Quality Standards (NAAQS) for ozone. The Good Neighbor Plan identified a deficiency in California’s SIP not adequately securing emission reductions from various industries, including municipal solid waste incineration.

The 2022 AQMP included control measure L-CMB-09: NOx Reductions from Incinerators to reduce emissions of nitrogen oxides (NOx) by replacing or retrofitting incinerators and other combustion equipment associated with incinerators with zero and low NOx emission technologies.

The South Coast Air Basin Attainment Plan for the 2012 Annual PM<sub>2.5</sub> Standard includes control measure BCM-07: Emission Reductions from Incinerators by replacement or retrofits with low NOx emission technologies on incinerators and other combustion equipment associated with incinerators and better control of NH<sub>3</sub> injection used to control NOx.

Staff conducted a Best Available Retrofit Control Technology (BARCT) analysis for the municipal solid waste incineration equipment category. Staff identified cost-effective solutions to reduce NOx emissions and assist in fulfilling the requirements of the South Coast AQMD’s obligations under the U.S. EPA’s Good Neighbor Plan, the 2022 AQMP, and the South Coast Air Basin Attainment Plan.

PR 1165 will regulate NOx and PM emissions. Both NOx and PM emission reductions and proposed emission limits will be realized through the installation of BARCT. PR 1165 will also require continuous emission monitoring and periodic source testing to ensure compliance. Approved cleaning methods will be required to minimize fugitive dust emissions on facility grounds. In addition, PR 1165 will establish requirements for recordkeeping.

PR 1165 was developed through a public process. Three Working Group meetings were held. Staff met with multiple stakeholders during the rule development process and conducted one site visit.

With the adoption of PR 1165, NO<sub>x</sub> emission reductions are estimated to be 0.22 ton per day and PM emission reductions are estimated to be 0.035 ton per day. The cost-effectiveness for the rule for NO<sub>x</sub> reductions is expected to be \$26,400 per ton of NO<sub>x</sub> reduced. No cost-effectiveness calculation was performed for PM as the PM emission limits proposed under PR 1165 do not require PM-specific control technology, and therefore no PM-specific control costs are incurred.

## **CHAPTER 1: BACKGROUND**

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**INTRODUCTION**

**REGULATORY HISTORY**

**AFFECTED INDUSTRIES**

**PUBLIC PROCESS**

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## INTRODUCTION

Proposed Rule 1165 (PR 1165) is a new South Coast AQMD rule to regulate municipal solid waste incinerators within the South Coast Air Basin.

The 2022 AQMP includes control measure L-CMB-09: NO<sub>x</sub> Reductions from Incinerators to reduce emissions of NO<sub>x</sub> by replacing or retrofitting incinerators and other combustion equipment associated with incinerators with zero and low NO<sub>x</sub> emission technologies. The control measure required the development of a command-and-control rule to implement zero and low NO<sub>x</sub> emission control technologies. In addition, the South Coast Air Basin Attainment Plan for the 2012 Annual PM<sub>2.5</sub> Standard includes control measure BCM-07: Emission Reductions from Incinerators (NO<sub>x</sub>).

The U.S. EPA issued “Good Neighbor Plan” on March 15, 2023, requiring that the 23 identified states meet the Clean Air Act’s “Good Neighbor” requirements by reducing air pollution that significantly contributes to downwind states’ ability to meet or maintain compliance with the 2015 National Ambient Air Quality Standards (NAAQS) for ozone. The Good Neighbor Plan identified a deficiency in California’s SIP not adequately securing emission reductions from various industries, including municipal solid waste incineration.

On June 27, 2024, the U.S. Supreme Court granted a judicial stay regarding U.S. EPA’s Good Neighbor Plan, and that stay is expected to continue pending resolution of judicial challenges in the D.C. Circuit Court of Appeals. The reach or impacts, if any, of that stay on the Federal Implementation Plan (FIP) requirements for California may be subject to further direction or clarification by the U.S. EPA, the U.S. Supreme Court, or the D.C. Circuit Court of Appeals, but California FIP requirements are not presently invalidated or necessarily the focus of D.C. Circuit litigation.

Additionally, the U.S. EPA Good Neighbor Plan’s FIP requirements for California in part impose emission limits on sources that would fall under PR 1165. PR 1165 was originally proposed as providing an option for the California Air Resources Board (CARB) to implement into its State Implementation Plan in response to the FIP. CARB is submitting a 2024 SIP revision that relies on a mobile source ozone strategy to address, by other means, state obligations that were set out in U.S. EPA’s Good Neighbor Plan.

Notwithstanding federal or state changes with respect to California’s obligations under the FIP, PR 1165 is necessary to mandate NO<sub>x</sub> concentration emission limits at least as stringent as the NO<sub>x</sub> emission concentration limits specified in the Good Neighbor Plan for inclusion in California’s SIP.

PR 1165 conducted a BARCT analysis for the municipal solid waste incineration equipment category. Staff identified cost-effective solutions to reduce NO<sub>x</sub> emissions and assist in fulfilling the requirements of the South Coast AQMD’s obligations under the 2022 AQMP, the South Coast Air Basin Attainment Plan, and the U.S. EPA’s Good Neighbor Plan.



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## REGULATORY HISTORY

Units located within the South Coast Air Basin are subject to both the requirements specified in the unit's South Coast AQMD permit to operate as well as the requirements specified in any applicable rule.

There is no previous source-specific rule regulating the municipal solid waste (MSW) incineration equipment category. However, other regulations apply to this equipment category.

United States Code of Federal Regulations (CFR) Title 40 Part 60 Subpart Cb – Emissions Guidelines and Compliance Times for Large Municipal Waste Combustors That are Constructed on or Before September 20, 1994<sup>1</sup> (40 CFR Part 60 Subpart Cb) and Subpart Eb – Standards of Performance for Large Municipal Waste Combustors for Which Construction is Commenced After September 20, 1994 or for Which Modification or Reconstruction is Commenced After June 19, 1996<sup>2</sup> (40 CFR Part 60 Subpart Eb) provide requirements for large municipal solid waste (MSW) incinerators. 40 CFR Part 60 Subpart AAAA – Standards of Performance for Small Municipal Waste Combustion Units for Which Construction is Commenced After August 30, 1999, or for Which Modification or Reconstruction is Commenced After June 6, 2001<sup>3</sup> applies to small municipal solid waste incinerators depending on both combustion capacity (tons of MSW combusted per day) or calendar date of construction or modification.

The following rules in South Coast AQMD Regulation IV – Prohibitions are also applicable to sources that would be regulated under PR 1165, which include: Rule 404 – Particulate Matter – Concentration, Rule 405 – Solid Particulate Matter – Weight, Rule 407 – Liquid and Gaseous Air Contaminants, Rule 409 – Combustion Contaminants, Rule 475 – Electric Power Generating Equipment, Rule 476 – Steam Generating Equipment also apply, which specify particulate matter and combustion contaminant (such as NO<sub>x</sub>, CO, and sulfur compounds) emission requirements applicable to all equipment categories.

South Coast AQMD's permitting program implements the requirements of the federal and state Clean Air Act (CAA), the 2022 AQMP, and air quality rules and regulations by specifying operating and compliance requirements for stationary sources that emit air contaminants. In order to comply with federal and state CAA requirements, all major and non-major sources in the South Coast Air Basin are subject to "no net emission increase," and are subject to Best Available Control Technology (BACT) and/or Lowest Achievable Emissions Rate (LAER) source-specific, prohibitory, and toxics rules (federal, state and local), as well as other applicable requirements.

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<sup>1</sup> Reference: Code of Federal Regulations. Title 40, Subchapter I, Subchapter C, Part 60, Subpart Cb  
<https://www.ecfr.gov/current/title-40/chapter-I/subchapter-C/part-60/subpart-Cb>.

<sup>2</sup> Reference: Code of Federal Regulations. Title 40, Subchapter I, Subchapter C, Part 60, Subpart Eb  
<https://www.ecfr.gov/current/title-40/chapter-I/subchapter-C/part-60/subpart-Eb>.

<sup>3</sup> Reference: Code of Federal Regulations. Title 40, Subchapter I, Subchapter C, Part 60, Subpart AAAA  
<https://www.ecfr.gov/current/title-40/chapter-I/subchapter-C/part-60/subpart-AAAA>.

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**AFFECTED INDUSTRIES**

PR 1165 affects one facility in the South Coast Air Basin, the Southeast Resource Recovery Facility (SERRF) located in the Port of Long Beach. Figure 1-1 shows what is known as the tipping hall. Figure 1-2 shows the general flow of the process from the tipping hall, through the waste storage, to the boilers where waste is combusted and then through the post-combustion emission controls shown as dry scrubbers and baghouses. PR 1165 will require the facility to comply with lower emission concentration limits for applicable units. New units that may be installed after adoption of PR 1165 may be subject to identical or more stringent emission concentration limits.



Figure 1-1: Southeast Resource Recovery Facility (SERRF).

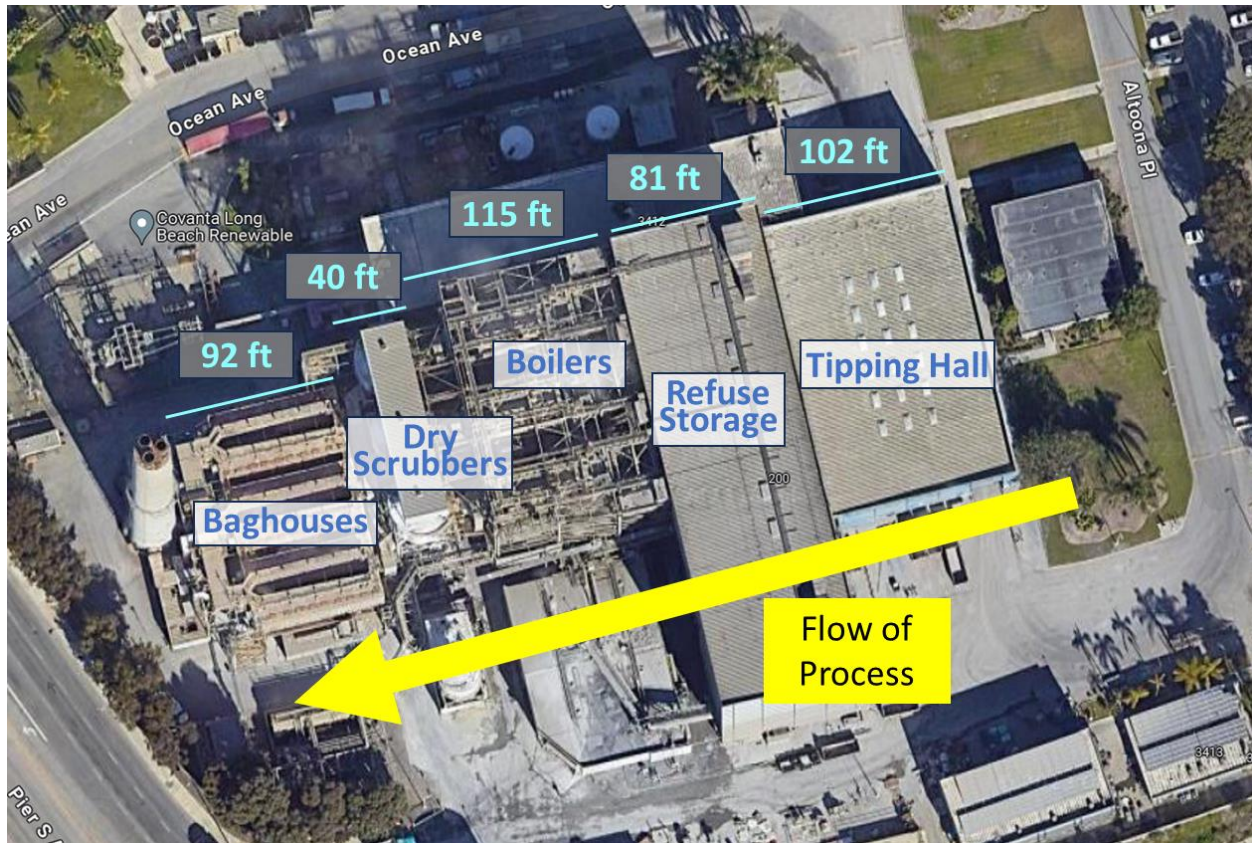


Figure 1-2: SERRF Facility (Google Maps).

**PUBLIC PROCESS**

Development of PR 1165 was conducted through a public process. Staff has held three Working Group meetings on November 9, 2023; March 12, 2024; and June 12, 2024. Working Group Meetings were held virtually via Zoom. The Working Group is composed of representatives from environmental and community groups, the affected facility, public agencies, consultants, and other interested parties. The purpose of the Working Group meetings is to discuss proposed concepts and to work through the details of staff's proposal. A Public Workshop was held on July 11, 2024, to discuss PR 1165.

Staff held numerous individual meetings with stakeholders to discuss issues unique to the facility's operations, technical details of the facility's operations, and the contents of PR 1165. In addition, staff conducted site visits to understand the operations of the facility and the unique opportunities and challenges associated with the municipal solid waste incinerators regulated by PR 1165.

## **CHAPTER 2: BARCT ASSESSMENT**

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### **INTRODUCTION**

### **ESTABLISHING EQUIPMENT CLASSES AND CATEGORIES**

### **GENERAL BARCT ASSESSMENT APPROACH**

*Assessment of South Coast AQMD Regulatory Requirements*

*Assessment of Emission Limits for Equipment*

*Other Regulatory Requirements*

*Assessment of Pollution Control Technologies*

*Initial BARCT Emission Limits and Other Considerations*

*Cost-Effectiveness Analysis & Incremental Cost-Effectiveness Analysis*

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## INTRODUCTION

As part of the rule development process, staff conducted a BARCT assessment of equipment subject to PR 1165. The purpose of a BARCT assessment is to identify any potential emission reductions from specific equipment or industries and to establish a concentration limit that is consistent with California state law. Under Health and Safety Code Section 40406, BARCT is defined as:

“... an emission limitation that is based on the maximum degree of reduction achievable, taking into account environmental, energy, and economic impacts by each class or category of source.”

BARCT assessments are performed periodically for specific equipment categories to determine if current concentration limits are representative of both current technologies and maximum achievable NO<sub>x</sub> reductions. The BARCT assessment is a stepwise process that includes a robust technology assessment that seeks the maximum emission reductions achievable that are also cost-effective. See Figure 2-1.

The BARCT assessment begins with a technology assessment to establish initial BARCT concentration limits. A technology assessment identifies current regulatory requirements for specific equipment categories, established by either the South Coast AQMD or other regulatory agencies. South Coast AQMD permits to operate, source test data, and Continuous Emission Monitoring System (CEMS) data are all analyzed to identify the emission levels being achieved with technology currently used in-practice. Current and emerging technologies are evaluated to determine the feasibility of achieving lower concentration limits, specifically and only with respect to equipment capabilities and limitations. This concludes the technology assessment portion of the BARCT assessment process.

Based on the results of the technology assessment, an initial BARCT concentration limit is identified and a cost-effectiveness analysis and, if necessary, an incremental cost-effectiveness analysis will be conducted. The cost-effectiveness analysis considers the cost to implement one or more technologies that can meet the initial BARCT concentration limit determined by the technology assessment. An incremental cost-effectiveness analysis is conducted if multiple initial BARCT concentration limits are identified that vary in stringency and are each individually cost-effective. A final BARCT concentration limit is established that is both technologically feasible, achievable within the implementation schedule allowed in the proposed rule, cost-effective, and incrementally cost-effective.

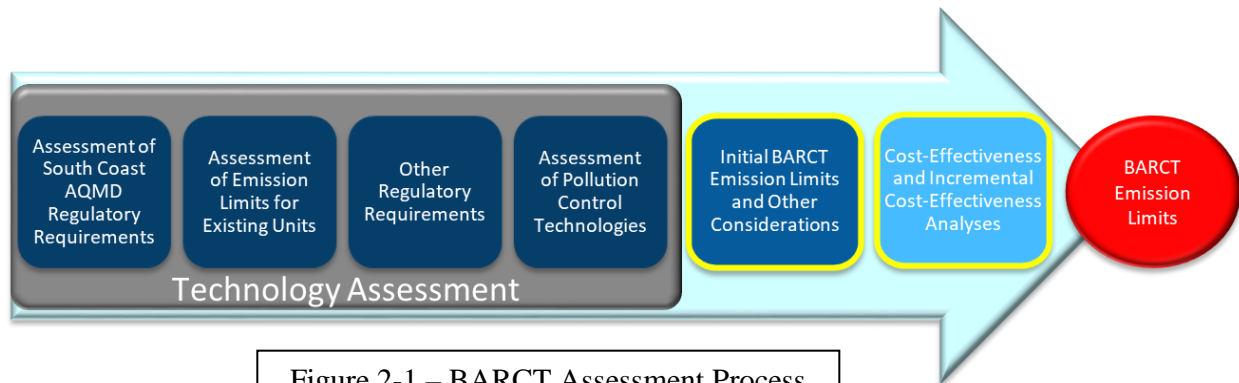


Figure 2-1 – BARCT Assessment Process

## ESTABLISHING EQUIPMENT CLASSES AND CATEGORIES

Incinerator as a term encompasses many different types of incineration equipment. For example, other air districts within California include crematories in their definition of incinerators. Specifically for waste, there is a further subdivision of incinerators depending on the type of waste they incinerate. Incinerators exist for combusting medical waste (hospital/medical/infectious waste), hazardous waste, and municipal solid waste (household, commercial, and institutional waste). Given that waste incinerators use the waste itself as the fuel source, nearly all of the emissions quantities, and the specific constituency of the emissions, come from the specific type of waste combusted. Specific attention is necessary to effectively regulate each waste incinerator equipment type.

PR 1165 establishes provisions for municipal solid waste incinerators, which affects incinerators combusting municipal solid waste (MSW). The subtypes of MSW incinerators (such as mass burn waterwall, rotary, etc.) will be subject to the rule due to the pollution control equipment being a post-combustion process that takes place downstream of the incinerator. Staff identified only one facility which included three MSW incinerators. Equipment not subject to PR 1165 includes crematories, hospital/medical/infectious waste incinerators, and hazardous waste incinerators.

The definition in PR 1165 for the MSW incinerator category, and related referenced definitions, is:

- “Municipal Solid Waste Incinerator” means any means any equipment that utilizes an exothermic process to combust Municipal Solid Waste in the presence of oxygen for the purpose of Municipal Solid Waste volume reduction. Municipal Solid Waste Incinerator does not include pyrolysis equipment, gasification equipment, nor equipment used to reduce the volume of Municipal Solid Waste by moisture removal and/or biological degradation processes.
- “Municipal Solid Waste” means Household Waste, Commercial Waste, or Institutional Waste; landscaping or yard waste including grass, grass clippings, bushes, shrubs, and bush and shrub clippings. This definition does not include: medical/infectious waste as defined by 40 CFR Part 60 Subpart Ec – Standards of Performance for New Stationary Sources: Hospital/Medical/Infectious Waste Incinerators; any waste with properties that

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make it potentially dangerous or harmful to human health or the environment and meets the criteria listed in the California Code of Regulations Title 22 Section 66261.3 – Definition of Hazardous Waste<sup>1</sup>; whole or chipped tree stumps; whole or chipped tree limbs; sewage sludge; wood pallets; construction, renovation, or demolition wastes; railroad ties; telephone poles; industrial process or manufacturing process wastes; or motor vehicles.

- “Household Waste” means material discarded by single and multiple residential dwellings, hotels, motels, and permanent or temporary housing establishments or facilities.
- “Commercial Waste” means any material discarded by stores, offices, restaurants, warehouses, nonmanufacturing activities at industrial facilities, and other similar establishments or facilities.
- “Institutional Waste” means material discarded by schools, nonmedical waste discarded by hospitals, material discarded by nonmanufacturing activities at prisons and government facilities, and material discarded by other similar establishments or facilities.

### **GENERAL BARCT ASSESSMENT APPROACH**

In identifying the initial universe that would be subject to PR 1165, staff used the South Coast AQMD’s permit database and identified SERRF as the only MSW incineration facility currently operating in the South Coast Air Basin. See Figure 2-2.

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<sup>1</sup> California Code of Regulations. Title 22, Division 4.5, Chapter 11, Article 1.  
[https://govt.westlaw.com/calregs/Document/I8384B3375B6111EC9451000D3A7C4BC3?viewType=FullText&originationContext=documenttoc&transitionType=CategoryPageItem&contextData=\(sc.Default\)](https://govt.westlaw.com/calregs/Document/I8384B3375B6111EC9451000D3A7C4BC3?viewType=FullText&originationContext=documenttoc&transitionType=CategoryPageItem&contextData=(sc.Default)).



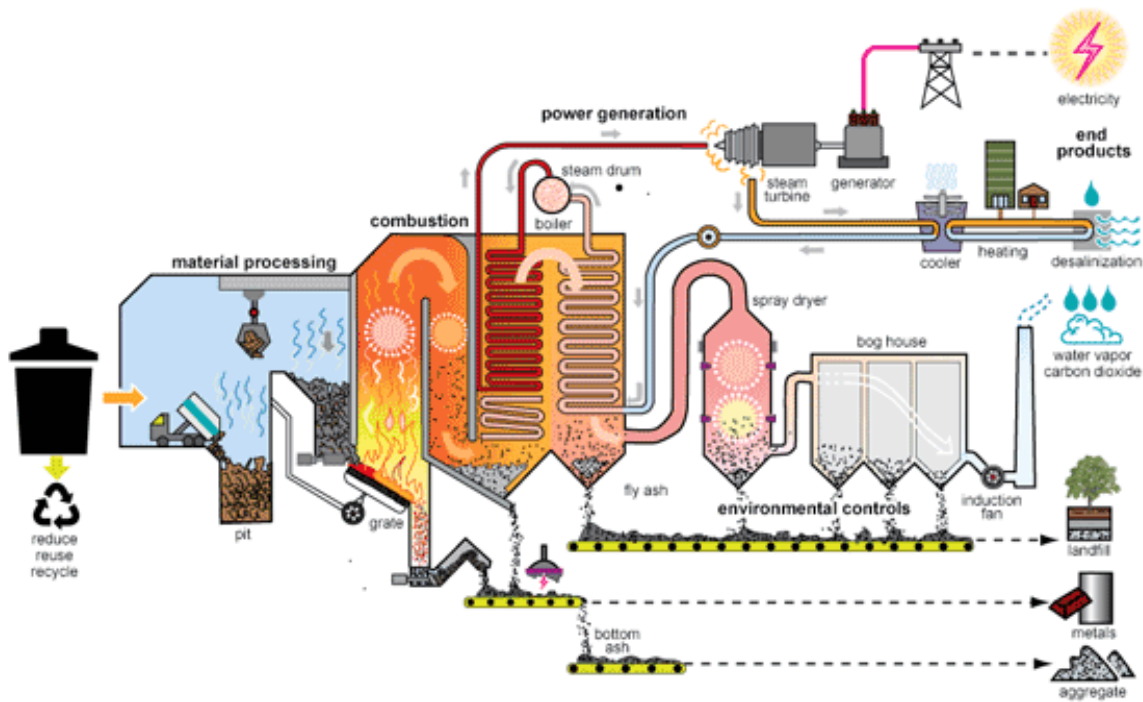


Figure 2-2: Schematic of SERRF Process.

As part of the rule development process, staff obtained data from multiple sources which included: online articles; industry publications; scientific and vendor literature; SERRF's South Coast AQMD permit applications and permits to operate; SERRF's source tests, CEMS data, annual emission reports, and inspection reports; site visits; stakeholder meetings; Working Group meetings; a public workshop; and South Coast AQMD inter-departmental meetings.

A BARCT assessment was conducted for the MSW incinerator equipment category. Each step in the BARCT process will include a discussion of the development of that specific portion of the BARCT assessment.

#### *Assessment of South Coast AQMD Regulatory Requirements*

South Coast AQMD Regulation IV rules (Rules 404, 405, 407, 409, 475, and 476) currently apply to each of the three units located at the subject facility. These rules are applicable to all equipment types and industries within the South Coast Air Basin. The lowest NO<sub>x</sub> concentration limit specified in these Regulation IV rules is 225 parts per million on volume basis (ppmv) corrected to 3% oxygen (@ 3% O<sub>2</sub>). This oxygen correction factor specifies the oxygen level to which an emission concentration measurement can be adjusted to. Higher oxygen correction factors are correlated to a higher dilution of the measured sample and a lower pollution concentration; lower oxygen correction factors are correlated to a lower dilution of the measured sample and a higher pollution concentration. This correction factor provides a means to standardize pollution concentrations that are measured at different oxygen levels in a given sample. Corrected to 7% O<sub>2</sub>, this limit equates to 175 ppmv @ 7% O<sub>2</sub>. The lowest PM concentration limit specified in these



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Regulation IV rules is 23 milligrams per cubic meter ( $\text{mg}/\text{m}^3$ ) at 3%  $\text{O}_2$  [equivalent to 0.01 grains per standard cubic foot ( $\text{gr}/\text{scf}$ ) @ 3%  $\text{O}_2$ ]. Corrected to 7%  $\text{O}_2$ , these limits equate to  $18 \text{ mg}/\text{m}^3$  ( $0.008 \text{ gr}/\text{scf}$ ).

### *Assessment of Emission Limits for Equipment*

All available source test and CEMS data were reviewed for each of the three units located at the subject facility. The permitted  $\text{NO}_x$  limit for each of the units is 225 ppmv  $\text{NO}_x$  @ 3%  $\text{O}_2$  (based on South Coast AQMD Rule 476). The permitted PM limit is  $0.01 \text{ gr}/\text{scf}$  @ 3%  $\text{O}_2$  (based on South Coast AQMD Rules 475 and 476). The three incineration units are designed and operate identically to one another.

### *Other Regulatory Requirements*

Staff assessed regulations at the local, state, national, and international levels to compare concentration limits of other air districts and air quality regulatory entities. Staff reviewed data for both newly installed as well as existing units to inform a full understanding of emission control capability as demonstrated in-practice. Data from this review was used to assess potential BARCT  $\text{NO}_x$  concentration limits with respect to other established  $\text{NO}_x$  emission limits.

#### Local

The three units at SERRF are the only known currently operating units within the South Coast AQMD's jurisdiction and no other comparison for currently operating units can be determined within the South Coast Air Quality Management District.

#### State

Staff reviewed the regulations at each of the other 34 air districts within California. Placer County Air Pollution Control District's Rule 206 – Incineration Burning was the only air district that specified a  $\text{NO}_x$  concentration limit. This  $\text{NO}_x$  concentration limit is 50 ppmv  $\text{NO}_x$  @ 12%  $\text{CO}_2$ . Based on operating data for  $\text{CO}_2$  measurements of the three units, this is approximately equivalent to the current permitted operating limit of the three units.

Placer County Air Pollution Control District, San Joaquin Valley Air Pollution Control District, and San Luis Obispo County Air Pollution Control District specified PM concentration limits of  $0.015 \text{ gr}/\text{ft}^3$  @ 12%  $\text{CO}_2$ ,  $0.1 \text{ gr}/\text{ft}^3$  @ 7%  $\text{O}_2$ , and  $0.08 \text{ gr}/\text{ft}^3$  @ 7%  $\text{O}_2$ , respectively. Each of these PM concentration limits is less stringent than the  $0.01 \text{ gr}/\text{scf}$  at 3%  $\text{O}_2$  (equivalent to  $0.008 \text{ gr}/\text{scf}$  @ 7%  $\text{O}_2$ ) PM concentration limit currently required of the three units.

#### National

The U.S. EPA has several federal regulations that specify  $\text{NO}_x$  emission limits for MSW incinerators based on both MSW throughput and date of construction or modification. These regulations and limits are shown in Table 2-1.

**Table 2-1 – Other Regulatory Requirements Summary**

U.S. EPA Regulation	Size Applicability	Date Applicability	NOx Emission Limit <sup>1</sup>
40 CFR Part 60, Subpart Cb	Large Units (greater than 250 tons per day)	Constructed on or before September 20, 1994	185 ppmv
40 CFR Part 60, Subpart Ea	Large Units (greater than 250 tons per day)	Constructed after December 20, 1989 and on or before September 20, 1994	180 ppmv
40 CFR Part 60, Subpart Eb	Large Units (greater than 250 tons per day)	Constructed after September 20, 1994 or modified after June 19, 1996	150 ppmv
40 CFR Part 60, Subpart AAAA	Small Units (greater than or equal to 35 tons per day and less than 250 tons per day)	Constructed after August 30, 1999 or modified after June 6, 2001	150 ppmv
40 CFR Part 60, Subpart BBBB	Small Units (greater than or equal to 35 tons per day and less than 250 tons per day)	Constructed on or before August 30, 1999	200 ppmv

<sup>1</sup> All values corrected to 7% O<sub>2</sub> and are averaged over a 24-hour block period

Staff also consulted the U.S. EPA's RACT/BACT/LAER Clearinghouse (RBLC) to determine NOx and PM concentration limits across all 50 states and territories.

Eight units were classified as Best Available Control Technology (BACT) across Florida, Illinois, North Carolina, Virginia, and New Jersey with NOx concentration limits ranging from 50 ppmv @ 7% O<sub>2</sub> to 174 ppmv @ 7% O<sub>2</sub>.

Three units were classified as BACT across Florida with PM concentration limits ranging from 0.004 gr/scf @ 7% O<sub>2</sub> to 0.009 gr/scf @ 7% O<sub>2</sub>, with three of the four units more stringent than the three units' 0.008 gr/scf @ 7% O<sub>2</sub> PM concentration limit.

Three regulations were classified as BARCT in Virginia and Maryland. The operating permits for two units in Virginia reference the Virginia State Air Pollution Board's 9 VAC Chapter 40 regulation when they require NOx concentration limits of 90 ppmv @ 7% O<sub>2</sub> (1-hour average) and 110 ppmv @ 7% O<sub>2</sub> (24-hour average). The Maryland Department of Environment's Chapter 26 Subtitle 11.08 regulation requires NOx concentration limits of 105 ppmv @ 7% O<sub>2</sub> (30-day rolling average) and 140 ppmv @ 7% O<sub>2</sub> (24-hour block average).

## International

The company ARC's Amager-Bakke plant, located in Denmark, is considered one of the premier waste-to-energy municipal solid waste incineration plants in the world. See Figure 2-3. Staff contacted representatives of the Amager-Bakke plant to understand their facility's emissions performance and the regulations they are subject to. The Amager-Bakke plant is subject to the European Commission's Industrial Emissions Directive 2010/75/EU for Best Available Technology. This directive requires a 111 ppmv NO<sub>x</sub> @ 7% O<sub>2</sub> and a 3.6 milligrams per cubic meter PM @ 7% O<sub>2</sub> concentration limit. Reference conditions used at the Amager-Bakke plant are corrected to 273.15 Kelvin and 101.3 kPa.



Figure 2-3: Amager Bakke  
Waste-to-Energy Plant.  
<https://a-r-c.dk/amager-bakke>.

Table 2-1 shows a summary of the most stringent NO<sub>x</sub> and PM limits found during the review of other emission concentration regulations.

**Table 2-1 – Other Regulatory Requirements Summary**

Level	Most Stringent NOx Concentration Limit	Most Stringent PM Concentration Limit
South Coast AQMD Facility	225 ppmv @ 3% O <sub>2</sub> (175 ppmv @ 7% O <sub>2</sub> ) (32 ppmv @ 12% CO <sub>2</sub> )	0.01 gr/scf @ 3% O <sub>2</sub> (0.008 gr/scf @ 7% O <sub>2</sub> )
Local	More Stringent Limits Not Identified	More Stringent Limits Not Identified
State: California Air Districts	50 ppmv @ 12% CO <sub>2</sub> (1-hour average)	0.08 gr/scf @ 7% O <sub>2</sub>
National: U.S. EPA Federal Regulations and RACT/BACT/LAER Clearinghouse	90 ppmv @ 7% O <sub>2</sub> (1-hour average) 150 ppmv @ 7% O <sub>2</sub> (24-hour average)	0.004 gr/scf @ 7% O <sub>2</sub>
International: European Commission	111 ppmv @ 7% O <sub>2</sub> (24-hour average) <sup>1</sup>	0.002 gr/scf @ 7% O <sub>2</sub>

### *Assessment of Pollution Control Technologies*

Staff reviewed multiple sources to understand the available and applicable pollution control technologies for the MSW incinerator equipment category. This included a review of scientific literature, meetings with vendors and consultants, review of other MSW incinerators, and a site visit to the SERRF facility. These sources were analyzed with the objective of identifying relevant combustion and/or post-combustion control technologies and understanding the capabilities and limitations of each technology.

Staff's initial technology assessment identified several post-combustion control technologies. These included Selective Catalytic Reduction, Selective Non-Catalytic Reduction, Ceramic Catalytic Filters, Baghouses, and Electrostatic Precipitators.

Although combustion control is quite common for other combustion equipment in the South Coast Air Basin, due to the fuel being combusted (municipal solid waste instead of natural gas), emissions originate from the waste itself being burned. In contrast, other combustion units like water boilers or process heaters use burners supplied by natural gas to provide heat to a unit. The three units are equipped with burners, which are used only for startup to bring the units up to temperature and to regulate proper combustion temperature. Once a unit reaches operating temperature, the burners are turned off, at which point the burning process is self-sustaining via the combusting of municipal solid waste. These burners are not subject to PR 1165.

The following sections provide a discussion of each of the post-combustion control technologies is below.

### Selective Catalytic Reduction (SCR)

A post-combustion control technology, SCR involves the injection of ammonia (NH<sub>3</sub>) or urea (which is vaporized into ammonia) into the flue gas stream to reduce NO<sub>x</sub> to N<sub>2</sub> and H<sub>2</sub>O via the use of catalysts. See Figure 2-4. The optimal range of flue gas temperatures corresponding to the highest NO<sub>x</sub> reductions and maximum catalyst life is 500-1,000 °F. A molar ratio of 0.9:1-1:1 NH<sub>3</sub>:NO<sub>x</sub> provides the maximum NO<sub>x</sub> reductions while minimizing “ammonia slip”. Ammonia slip occurs when ammonia from the ammonia injection passes through the catalyst bed without reacting with NO<sub>x</sub> and continues outside the flue stack to the ambient air. NO<sub>x</sub> reduction efficiencies generally can range from 80% to more than 90%.

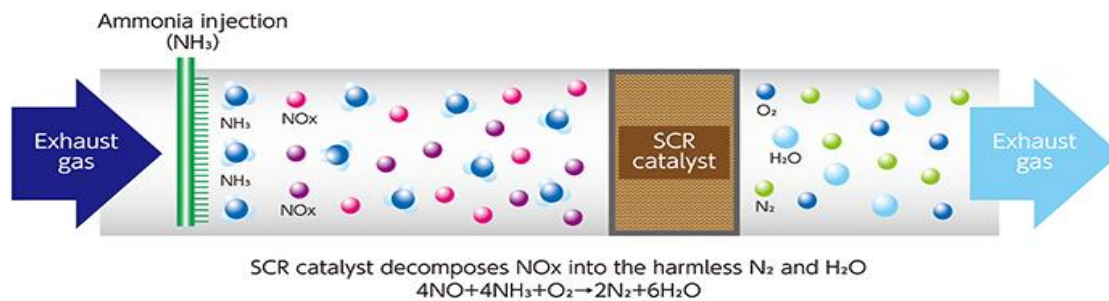


Figure 2-4: Selective Catalytic Reduction Flow Diagram.

Image source: Hitachi Zosen. SCR (Selective Catalytic Reduction) NO<sub>x</sub> Removal System.  
<https://www.hitachizosen.co.jp/english/business/field/marine/denitration.html>.

Catalysts are often installed in modular beds, with the first bed in the flue stream contributing to the most NO<sub>x</sub> reductions relative to the beds subsequent in the flue gas stream. Accordingly, catalyst beds can either be rotated or replaced on a regular basis in intervals in line with their usage. Catalysts can also be regenerated instead of replaced, which can be approximately 40% less expensive than catalyst replacement.

There is one currently operating facility located in the United States equipped with SCR, Palm Beach Renewable Energy Park located in Florida.

### Selective Non-Catalytic Reduction (SNCR)

A post-combustion control technology, SNCR involves the injection of ammonia or urea into the flue gas stream to reduce NO<sub>x</sub> to N<sub>2</sub> and H<sub>2</sub>O without the use of catalysts. See Figure 2-5. The optimal range of flue gas temperatures corresponding to highest NO<sub>x</sub> reductions is comparatively higher than that for SCR, as the catalyst integrity and efficiency is no longer a concern. This temperature range is 1,500-2,200 °F. Relative to SCR, many processes may not need to install a dilution air fan nor additional duct work due to the elevated optimal temperature range capability. A molar ratio of 2:1-4:1 NH<sub>3</sub>:NO<sub>x</sub> with a residence time of longer than one second provides the maximum NO<sub>x</sub> reductions. A higher molar ratio is necessary due to the absence of a catalyst facilitating the reaction between NH<sub>3</sub> and NO<sub>x</sub>. Due to this, ammonia slip is more of a concern with SNCR than it is for SCR.

The lack of a catalyst leads to a lower NO<sub>x</sub> reduction potential. SNCR has been demonstrated to achieve up to 60% NO<sub>x</sub> reduction efficiencies. Due to the lack of catalyst, operating costs and maintenance costs are also lower than those for SCR by approximately 20%.

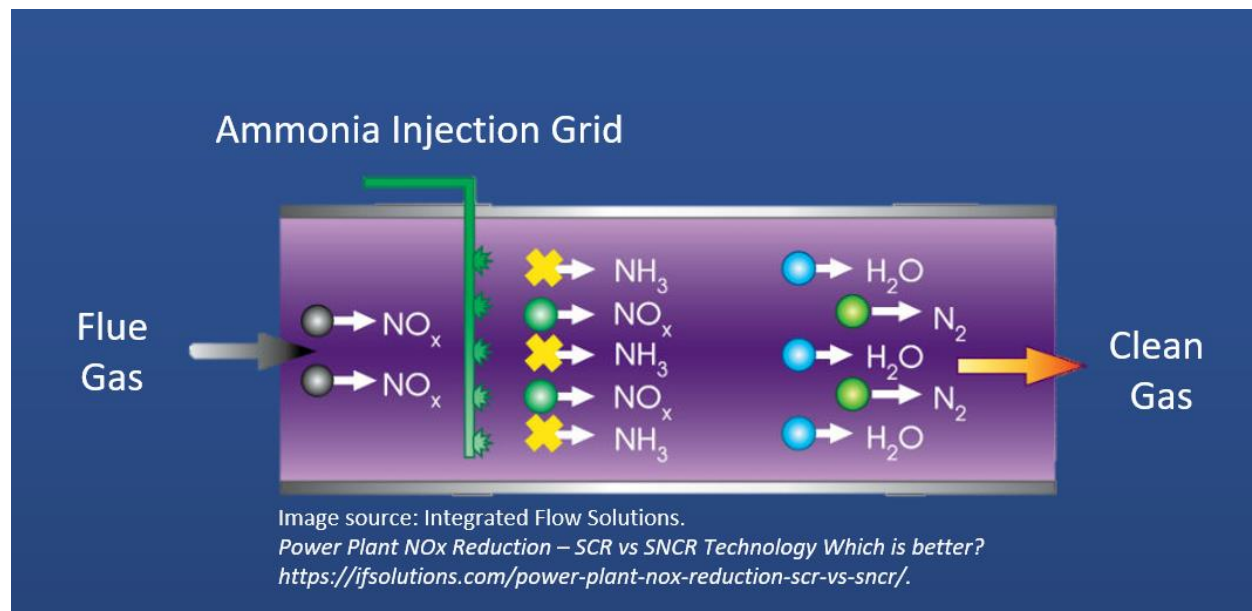


Figure 2-5: Selective Non-Catalytic Reductions Flow Diagram.

### Ceramic Catalytic Filters

As a post-combustion control technology, Ceramic Catalytic Filters (CCFs) utilize an array of catalyst-embedded ceramic tubes to non-selectively remove both NO<sub>x</sub> and PM. Such systems may also remove acid gases such as SO<sub>2</sub> and HCl through the injection of dry sorbents such as hydrated lime, sodium bicarbonate, or trona upstream of the filters. The introduction of a dry sorbent reacts with the acid gases to create reaction by-products in the form of solid particles which can be collected onto the filters. Mercury can also be controlled through the injection of powder activated

carbon upstream of the process to create reaction by-products in the form of solid particles which can be collected onto the filters.

The main benefit of CCFs is their multi-pollutant reduction capability. This feature can reduce the need for pollutant-specific pollution control equipment and thus reduce the aggregate footprint of all control technologies that may be required at a MSW incineration facility. CCFs are also resistant to high operating temperatures and corrosion and have a long operating life of the catalyst filter elements, between 5 and 10 years.

The CCF system can be modified for a facility's pollution reduction needs. The CCFs can be enhanced with additional pollutant removal capabilities and "stacked" upon one another. The base CCF configuration removes PM, dioxins, and furans. To also control NO<sub>x</sub>, catalysts can be impregnated into the CCF and ammonia injected upstream. To also control for acid gases, dry sorbents can be injected upstream. To also control mercury, powder activated carbon can be injected upstream.

The CCFs are candle-shaped ceramic filters in the form of rigid tubes with high porosity. The composition of the filters includes high-temperature binders and plasticizers to allow for thermal resilience, with the operating temperature range between 300-1,600 °F. Each filter can be significantly heavy, weighing nearly 30 pounds for the entire typical 10-foot length and 6-inch diameter tube. The ceramic filters are comprised of micrometer-length diameter fibers that allow for a high internal surface area to capture pollutants.

Flue gas is drawn through the filter tube walls by an induced-draft fan. See Figure 2-6. When the collected pollutants build up as a cake on the outside of the tube wall, the filters are cleaned through a pulse-jet of air to remove the buildup that is then collected for storage and disposal.



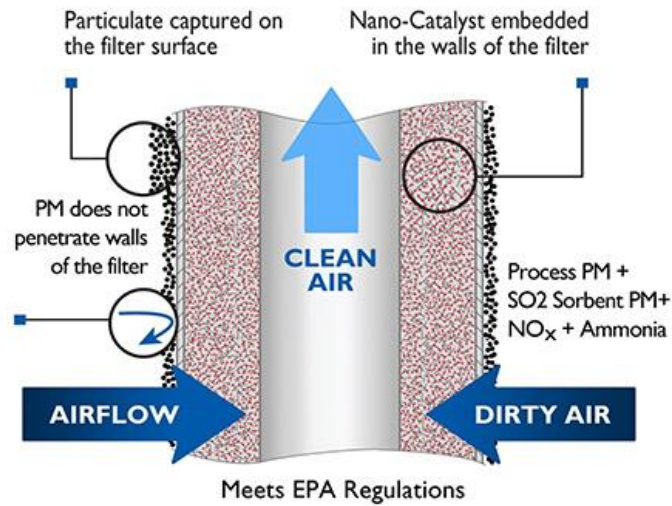


Figure 2-6: Ceramic Catalytic Filters.  
 Tri-Mer Corporation. High Temperature Filters for Hot Gas Filtration.  
<https://tri-mer.com/hot-gas-treatment/high-temperature-filter.html>.

### Baghouse

A post-combustion control technology, baghouses utilize a fabric filter for the collection and removal of PM. These systems use filter bags mounted vertically within a metal enclosure housing. An induced draft fan draws air into the system, with the air passing through the fabric filters. Particulates in the air are then captured by the filters, build up into a cake material, and are regenerated through various mechanisms. See Figure 2-7.

The bags used in these systems can be constructed of various materials and in various styles, including woven materials, nonwoven materials, pleated, felt, polyester, nylon, Teflon, Polytetrafluoroethylene (PTFE), and fiberglass. These systems are further distinguished by the type of cleaning method used to remove the collected pollutants, most commonly defined as pulse-jet, shaker, or reverse-air.

The pulse-jet system pushes a volume of compressed air into the fabric filters, dislodging the built-up particulate matter, which is then collected into a hopper and disposed of. These systems do not have to be taken offline when the pulse-jets are activated. The shaker system is taken offline during which time the fabric filters are shaken by a mechanical system. A reverse-air system operates similarly to pulse-jet systems, but instead uses a lower-pressure, higher-volume approach which improves the longevity of the bags but requires a higher-horsepower of the reverse-air blower system.



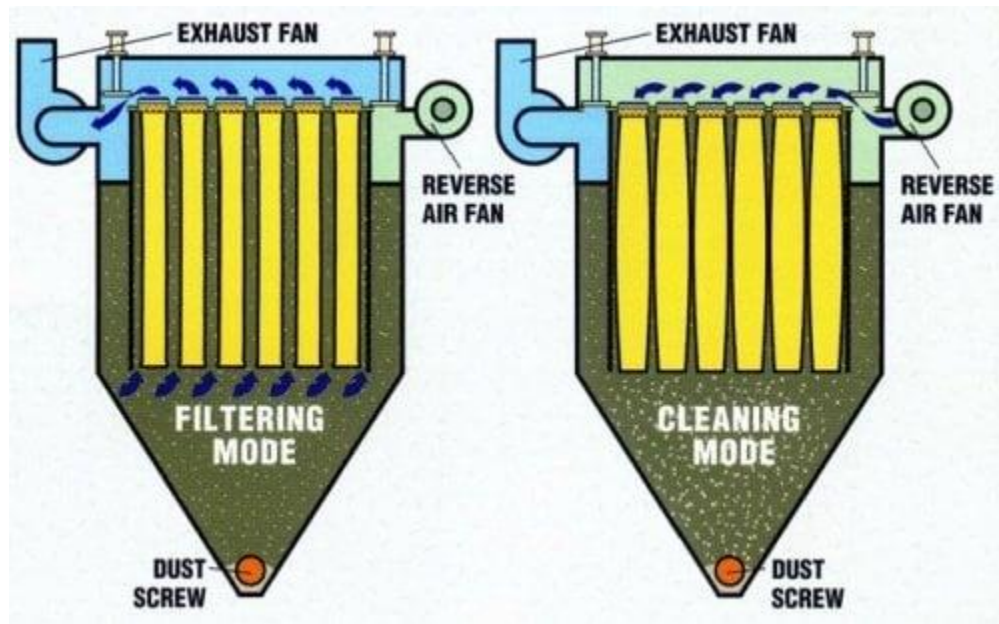


Figure 2-7: Baghouse

Image source: Micronics. Baghouse Filter Basics.

<https://www.micronicsinc.com/filtration-news/baghouse-filter-basics/>.

### *Initial BARCT Emission Limits and Other Considerations*

Staff determined an initial BARCT NO<sub>x</sub> concentration limit using the information gathered from all previous steps in the BARCT assessment process, including existing emission limits and actual emission performance levels based on stack test and CEMS data for the three units located at SERRF, other regulatory requirements, and a review of pollution control technologies. Staff also reviewed the technical information, cost components, and stated emission performance levels from control technology vendors.

Due to the varying composition of waste streams at MSW incineration facilities operating in different locations, and that all emissions from the MSW incineration process come from the waste itself, Staff adopted a more focused analysis in establishing the initial BARCT emission limit for NO<sub>x</sub>, by focusing solely on the emissions of the units at SERRF and the incremental performance that can be achieved by the installation of an SCR system. The SCR system's NO<sub>x</sub> reduction performance is robust, found across various industries including oil and gas boilers, metal heat treating furnaces, glass melting furnaces, and MSW incineration units.

The two currently operating MSW incineration facilities equipped with SCR demonstrate the feasibility of installation of an SCR system on a MSW incineration unit, and the emission reductions associated with it are based on the actual existing NO<sub>x</sub> performance data of the units operating at SERRF.

The average outlet NO<sub>x</sub> emission concentration in the exhaust stack at SERRF across the years 2018-2022, inclusive, is 75 ppmv @ 7% O<sub>2</sub>. However, due to the varying composition of the waste stream of SERRF, NO<sub>x</sub> emissions can vary to both below and above this 75 ppmv @ 7% O<sub>2</sub> figure. CEMS data from operating years of 2018-2022, inclusive, show that approximately 32% of all 24-hour block average NO<sub>x</sub> values are below 75 ppmv @ 7% O<sub>2</sub>, while 68% of all 24-hour block average NO<sub>x</sub> values are above 75 ppmv @ 7% O<sub>2</sub>.

Due to this varying nature, a higher NO<sub>x</sub> emission limit would ensure increased compliance. Using a threshold of 110 ppmv @ 7% O<sub>2</sub> instead of 75 ppmv @ 7% O<sub>2</sub>, yields a result of 98% of all 24-hour block average NO<sub>x</sub> values below 110 ppmv @ 7% O<sub>2</sub>, and only 2% of all 24-hour block average NO<sub>x</sub> values above 110 ppmv @ 7% O<sub>2</sub>.

None of the three units located at SERRF are equipped with an analyzer to measure the inlet NO<sub>x</sub> concentration into each unit's NO<sub>x</sub> post-combustion control equipment. Staff estimated the inlet NO<sub>x</sub> concentration based on an expected NO<sub>x</sub> reduction efficiency of the SNCR system installed on the three units. A NO<sub>x</sub> reduction efficiency of 60% was used, based on a U.S. EPA dataset for MSW incinerators equipped with SNCR. SCR utilizes the same principle of NO<sub>x</sub> reduction but with the addition of a catalyst to facilitate the reaction between NO<sub>x</sub> and ammonia, to yield a NO<sub>x</sub> reduction efficiency of 80% to upwards of over 90%. Staff utilized an 80% figure as the NO<sub>x</sub> reduction efficiency for SCR to provide a more conservative estimate of SCR performance. This is also conservative compared to the 90% NO<sub>x</sub> reduction efficiency quoted to staff by two independent SCR manufacturers.. Thus the 80% NO<sub>x</sub> reduction efficiency of SCR is expected to provide an estimated 33% overall NO<sub>x</sub> reduction improvement beyond the current SNCR's 60% NO<sub>x</sub> reduction efficiency.. This 33% increased performance was applied to the 98% compliance rate figure of 110 ppmv @ 7% O<sub>2</sub>, to yield an BARCT emission limit of approximately 75 ppmv @ 7% O<sub>2</sub> via the replacement of the existing SNCR system with a new SCR system. The BARCT emission limit of 75 ppmv @ 7% O<sub>2</sub> is a 32% reduction from the current NO<sub>x</sub> emission concentration of 110 ppmv @ 7% O<sub>2</sub> using SNCR control technology.

Staff identified that the majority of PM emissions comprised of condensable PM, which cannot be directly controlled by PM control technologies. Staff's BARCT emission limit for PM is based indirectly on the reduced use of condensable-precursors, namely ammonia. This reduced ammonia use would come as a result of a more efficient NO<sub>x</sub> emission reduction strategy involving the replacement of the current SNCR system with an SCR system, which utilizes a lower stoichiometric ratio of ammonia to NO<sub>x</sub> in its control scheme.

#### *Cost-Effectiveness Analysis & Incremental Cost-Effectiveness Analysis*

A cost-effectiveness analysis and incremental cost-effectiveness analysis were conducted pursuant to Health and Safety Code Section 40920.6. A summary of the costs, emission reductions, cost-effectiveness, and incremental cost-effectiveness for the Municipal Solid Waste equipment category will be discussed in this chapter. A detailed analysis of the cost-effectiveness and incremental cost-effectiveness for this equipment category is found in Chapter 4 – Impact Assessment.

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For the Municipal Solid Waste equipment category, both SCR and CCF were determined to be cost-effective. Although the South Coast AQMD does not have a cost-effectiveness threshold established for PM emission reductions, a cost-effectiveness analysis was still conducted for baghouse control technology to provide a guideline as to how costly PM emission reductions may be.

Over a 25-year period, the total costs of SCR control technology were determined to be \$55,847,000 and the estimated NOx emission reductions to be 2,033 tons. The cost-effectiveness of this control technology was calculated as \$27,500 per ton of NOx reduced.

The total costs of CCF control technology over a 25-year period was determined to be \$103,632,000 and the estimated NOx emission reductions to be 2,033 tons. The cost-effectiveness of this control technology was calculated as \$51,000 per ton of NOx reduced.

Over a 25-year period, the total costs of Baghouse control technology were determined to be \$14,261,000 and the estimated NOx emission reductions to be 25.25 tons. This calculation estimated that it would require \$564,800 to reduce one ton of PM.

## **CHAPTER 3: PROPOSED RULE 1165**

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### **INTRODUCTION**

### **PROPOSED RULE STRUCTURE**

### **PROPOSED RULE 1165**

*Subdivision (a) – Purpose*

*Subdivision (b) – Applicability*

*Subdivision (c) – Definitions*

*Subdivision (d) – Requirements*

*Subdivision (e) – Housekeeping Requirements*

*Subdivision (f) – Monitoring and Source Testing Requirements*

*Subdivision (g) – Reporting and Recordkeeping Requirements*

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## INTRODUCTION

PR 1165 establishes NO<sub>x</sub>, PM, and Opacity limits for municipal solid waste incinerators. The following information describes the structure of PR 1165.

## PROPOSED RULE STRUCTURE

PR 1165 will contain the following subdivisions:

- a) Purpose*
- b) Applicability*
- c) Definitions*
- d) Requirements*
- e) Housekeeping Requirements*
- f) Monitoring and Source Testing Requirements*
- g) Reporting and Recordkeeping Requirements*
- h) Exemptions*

### PROPOSED RULE 1165

#### *Subdivision (a) – Purpose*

The purpose of this rule is to limit NO<sub>x</sub> and PM emissions from municipal solid waste incinerators.

#### *Subdivision (b) – Applicability*

PR 1165 applies to municipal solid waste incinerators that combust 35 tons or more of municipal solid waste per day. The rule excludes three types of incinerators: hospital/medical/infectious waste incinerators, pyrolysis units, and gasification units. The emissions produced in the incineration of waste are wholly dependent upon the type of waste being incinerated, and thus the emissions profile for hospital/medical/infectious waste differs from that for municipal solid waste and requires a dedicated BARCT analysis, which is beyond the scope of PR 1165. Pyrolysis and gasification units differ from municipal solid waste incinerators via the absence of a combustion process. The pyrolysis and gasification processes are a chemical transformation through the application of heat, rather than incineration through combustion. Likewise, a dedicated BARCT analysis for that equipment category would be required and is beyond the scope of PR 1165.

#### *Subdivision (c) – Definitions*

Key definitions in PR 1165 are referenced and discussed as follows.

- *COMMERCIAL WASTE means material discarded by stores, offices, restaurants, warehouses, nonmanufacturing activities at industrial facilities, and other similar establishments or facilities.*

This defines one of the components of Municipal Solid Waste.

- *HOUSEHOLD WASTE means material discarded by single and multiple residential dwellings, hotels, motels, and permanent or temporary housing establishments or facilities.*

Another key component of Municipal Solid Waste explained.

- *INSTITUTIONAL WASTE means material discarded by schools, nonmedical waste discarded by hospitals, material discarded by nonmanufacturing activities at prisons and government facilities, and material discarded by other similar establishments or facilities.*

Another key component of Municipal Solid Waste explained.

- *MALFUNCTION means any sudden, infrequent, and not reasonably preventable failure of air pollution control and monitoring equipment, process equipment, or a process to operate in a normal or usual manner which causes, or has the potential to cause, the equipment to exceed the emission limits of an applicable rule or standard. Equipment failures that are caused in part by operator error or failure to timely complete required or schedule maintenance are not Malfunctions.*

This constitutes an equipment failure and specifies the period during which emission data collected is excluded from compliance calculations.

- *MUNICIPAL SOLID WASTE means Household Waste, Commercial Waste, or Institutional Waste; landscaping or yard waste including grass, grass clippings, bushes, shrubs, and bush and shrub clippings. This definition does not include medical/infectious waste as defined by 40 CFR Part 60 Subpart Ec; any waste with properties that make it potentially dangerous or harmful to human health or the environment and meets the criteria listed in California Code of Regulations Title 22 Section 66261.3; whole or chipped tree stumps; whole or chipped tree limbs; sewage sludge; wood pallets; construction, renovation, or demolition wastes; railroad ties; telephone poles; industrial process or manufacturing process wastes; or motor vehicles.*

Three key components, including composite mixtures, are the fuel source of Municipal Solid Waste incinerators. Several other types of waste are included or excluded from the definition of Municipal Solid Waste and therefore included or excluded from applicability to PR 1165. These inclusions and exclusions are intended to define the scope of Municipal Solid Waste and exclude bulky items of organics (such as tree stumps that are large in their original form) or bulky singular items of heavy industrial activity or commercial items (such as railroad ties). Additionally, equipment not subject to PR 1165 includes crematories, hospital/medical/infectious waste incinerators, and hazardous waste incinerators.

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- *MUNICIPAL SOLID WASTE INCINERATOR means any equipment that utilizes an exothermic process to combust Municipal Solid Waste in the presence of oxygen for the purpose of Municipal Solid Waste volume reduction. This definition does not include pyrolysis equipment, gasification equipment, nor equipment used to reduce the volume of Municipal Solid Waste by moisture removal and/or biological degradation processes.*

Equipment subject to PR 1165 consists of exothermic municipal solid waste combustion devices such as mass burn waterwall incinerators, rotary incinerators, etc. Staff identified only one currently operating facility which included three MSW incinerators. Pyrolysis and gasification equipment, which utilize little to no oxygen to thermally degrade waste, and anaerobic digesters, which utilize biological processes to reduce the volume of waste, are not subject to PR 1165.

- *SHUTDOWN means that period of time beginning when an owner or operator reduces the load or heat input, and flue gas temperatures fall below the minimum operating temperature of the NO<sub>x</sub> Post Combustion Control Equipment, if applicable, and which ends in a period of zero fuel flow or zero feedstock, or when combustion/circulation air flow ends if the unit does not use fuel for combustion.*
- *STARTUP means the time period that begins when a Municipal Solid Waste Incinerator combusts fuel, after a period of zero fuel flow or zero feedstock, or when combustion/circulation air is introduced if the Municipal Solid Waste Incinerator does not use fuel for combustion and ends when the flue gas temperature reaches the minimum operating temperature of the NO<sub>x</sub> Post Combustion Control Equipment and reaches stable conditions.*

Shutdown and Startup specify the period of operation outside of steady-state operating conditions are reached during which emission data collected is excluded from compliance calculations.

- *WORKSPACE CLEANING METHOD means a process to remove or collect debris using a wet mop, damp cloth, wet wash, low-pressure spray nozzle, wet vacuum, dry vacuum with dust suppression, or a combination of the above methods.*

Lists the cleaning methods used to capture or collect any particulate matter on the facility grounds, as opposed to simply moving such particulate matter from one location to another.

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*Subdivision (d) – Requirements*

NOx, PM, and Opacity Emission Requirements – Paragraph (d)(1)

- ***NOx***

NOx emission concentration limits have a two-phase implementation approach. The first phase is to comply with U.S. EPA’s Good Neighbor Plan. The Good Neighbor Plan requires that two limits, 110 ppmv NOx @ 7% O<sub>2</sub> (24-hour block average) and 105 ppmv NOx @ 7% O<sub>2</sub> (30-day rolling average), be implemented at facilities. The second phase requires an emission limit based on BARCT. The BARCT assessment demonstrated that a 75 ppmv NOx @ 7% O<sub>2</sub> level is considered best available retrofit technology and is more stringent than the federal Good Neighbor Plan limits. However, staff recognizes that additional time is necessary to both permit, construct, and test retrofit equipment, and therefore a three-year time frame is provided for this process to be completed before compliance with the BARCT NOx limit is required.

- ***Total PM***

The Total PM emission concentration limits also have a two-phase implementation approach. The first limit was calculated based on the source tests for all three units conducted in 2014, 2017, 2020, and 2021. During each source test for each unit, a total of three runs were conducted during the source test for each pollutant. This resulted in a total of 36 data points for each pollutant, including Total PM. All three units operate at substantially less than their Total PM emission concentration limits on each unit’s South Coast AQMD permit to operate. Staff sought to calculate a Total PM emission concentration limit that reflects actual operating performance while including a compliance buffer between operating levels and the required limit in PR 1165.

Two methods were used to calculate this limit.

Method 1 calculated the limit using the median value and is shown in Equation 3-1. This method was used to estimate the highest level of actual emissions performance while removing the effect of outliers that were significantly higher than the remaining data set of emission concentration values.

$$\text{Proposed Limit} = (\text{Median Value of Data Set}) * 2 + 20\% \quad (\text{Eq. 3-1})$$

The median value of the 36-point dataset was 11.0 milligrams per dry standard cubic meter (mg/dscm) @ 7% O<sub>2</sub>. A 20% compliance buffer was added to provide an operating margin. Using Equation 3-1, this results in a proposed Total PM emission concentration limit of 26.4 mg/dscm @ 7% O<sub>2</sub>

Method 2 calculated the limit using the maximum value and is shown in Equation 3-2. This method was used to utilize the highest emission concentration in the operating history of all three units to ensure compliance under all operating conditions that can be expected.

$$\text{Proposed Limit} = (\text{Maximum Value of Data Set}) * 2 + 20\% \quad (\text{Eq. 3-2})$$



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The maximum value of the 36-point dataset was 37.2 dscm @ 7% O<sub>2</sub>. Using Equation 3-2, this results in a proposed Total PM emission concentration limit of 44.6 dscm @ 7% O<sub>2</sub> (the maximum value of the 36-point dataset that was reported in units of dry standard cubic feet @ 12% CO<sub>2</sub> was 5.02 grains per dry standard cubic foot @ 12% CO<sub>2</sub>).

As the result of Method 2 is higher than the current Total PM emission concentration limit for each of the three units of 0.1 grains per dry standard cubic foot @ 12% CO<sub>2</sub>, the result of Method 1 was used to establish the first phase of the Total PM emission concentration limit for PR 1165.

The second phase of the Total PM emission concentration limit was based on the percentage reduction of ammonia translated to the percentage reduction of Total PM emissions. The use of ammonia in an SNCR control technology system can lead to ammonia slip. Ammonia slip is the ammonia remaining that did not react with the NO<sub>x</sub> molecules in the flue gas. This remaining ammonia remains in the flue gas and can lead to the formation of ammonium salts, which are classified as condensable PM and are not filterable by a PM control device. The median ammonia slip of the three-unit system at the subject facility, based on the 36-point data set is 15 ppmv @ 7% O<sub>2</sub>. Reducing the use of ammonia and/or increasing the reaction percentage between ammonia and NO<sub>x</sub> will reduce the ammonia slip.

SCR control technology employs the use of a catalyst to facilitate the reaction between ammonia and NO<sub>x</sub>. SNCR control technology does not employ a catalyst. SCR control technology NO<sub>x</sub> reduction efficiency was quoted to staff at 90%, which is higher than the estimated 60% efficiency for the SNCR control technology currently installed at the subject facility. The quotes that vendors provided to staff for the installation of SCR control technology specified a 10 ppmv @ 7% O<sub>2</sub> ammonia slip.

Reducing the ammonia slip from a median value of 15 ppmv @ 7% O<sub>2</sub> to a value of 10 ppmv @ 7% O<sub>2</sub> represents a 33% decrease. The amount of ammonia used in the quoted SCR system is also 33% less than the amount currently utilized in the SNCR system. The overall reduction of condensable PM in the flue gas is thus estimated to be 33%. The median of the 36-point dataset for the mass fraction of condensable PM in the flue gas is 96%.

By replacing the SNCR control technology with a SCR control technology, the Total PM limit can be reduced from 26.4 mg/dscm @ 7% O<sub>2</sub> to 17.7 mg/dscm @ 7% O<sub>2</sub>.

This reduction is associated with the installation of SCR control technology, and additional time is necessary to both permit, construct, and test retrofit equipment. A three-year timeframe is provided for this process for the SCR installation before compliance with the lower Total PM limit is required.

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- ***PM-Filterable***

PM-Filterable emission concentration limits would not be lowered via the installation of SCR control technology, as the reduction in ammonia slip only reduces PM-Condensable emissions. Therefore, staff proposed only one PM-Filterable emission concentration limit. The 36-point data set was used. The median value of PM-Filterable was 4.24 mg/dscm @ 7% O<sub>2</sub>. The maximum value of PM-Filterable was 18.2 mg/dscm @ 7% O<sub>2</sub>. Equation 3-1 and Equation 3-2 were used to calculate a proposed PM-Filterable emission concentration limit. The result of Equation 3-1 for PM-Filterable was 10.2 mg/dscm @ 7% O<sub>2</sub>; of Equation 3-2 for PM-Filterable was 21.8 mg/dscm @ 7% O<sub>2</sub>. Staff chose the lower of these two values to establish the proposed PM-Filterable emission rate limit.

- ***PM-Condensable***

The same methodology was applied to the PM-Condensable emission concentration limits. The 36-point data set was used. The median value of PM-Condensable was 9.70 mg/dscm @ 7% O<sub>2</sub>. The maximum value of PM-Condensable was 37.2 mg/dscm @ 7% O<sub>2</sub>. Equation 3-1 and Equation 3-2 were used to calculate a proposed PM-Condensable emission rate limit. The result of Equation 3-1 for PM-Condensable was 23.3 mg/dscm @ 7% O<sub>2</sub>; of Equation 3-2 for PM-Condensable was 44.6 mg/dscm @ 7% O<sub>2</sub>. Staff chose the lower of these two values to establish the proposed PM-Condensable emission rate limit.

Using the same information for the condensable PM as evaluated for Total PM, reducing the ammonia slip from a median value of 15 ppmv @ 7% O<sub>2</sub> to a value of 10 ppmv @ 7% O<sub>2</sub> represents a 33% decrease. The amount of ammonia used in the quoted SCR system is also 33% less than currently utilized in the existing SNCR system. The overall reduction of condensable PM in the flue gas is therefore estimated to be 33%. The median of the 36-point dataset for the mass fraction of condensable PM in the flue gas is 96%.

- ***Opacity***

The process of incineration, if not controlled properly, can lead to white or black smoke from the exhaust stack of a unit. This smoke is mostly comprised of particulate matter. An opacity limit is proposed to limit the smoke produced from units. The proposed opacity limit of PR 1165 of 10% every six minutes, is currently specified in the South Coast AQMD permit to operate for each of the three units and is also the limit in the Good Neighbor Plan.

#### Odor Capture and Control – Paragraph (d)(2)

Odors from any location where MSW is stored, such as in a tipping hall or other waste unloading area, are required to be vented to an odor capture and control system. This system is required to prevent the emission of odors beyond the facility grounds and prevent public nuisance to any adjacent communities or sensitive receptors such as schools.

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### Ash Storage Containers Control – Paragraph (d)(3)

All particulate matter collected from the MSW incineration process must be stored in containers that prevent the stored material from becoming airborne via wind or other mechanisms and causing fugitive particulate matter emissions.

### Exhaust Emission Control Operation – Paragraph (d)(4)

This provision is to require the operation of any exhaust emission control system, if the minimum operating temperature is met in order for such a system to operate, including during normal operation and during periods of startup, shutdown, or malfunction. This is to prevent any uncontrolled emissions from occurring if the operating conditions are met for any exhaust emission control system, yet the system is not active to reduce emissions.

### Exhaust Emission Control-Based Startup and Shutdown– Paragraph (d)(5)

Emission data collected during startup and shutdown periods are not included for compliance determinations. This provision provides a maximum duration of time for any startup and shutdown period.

### Decommission – Paragraph (d)(6)

An owner or operator may elect to decommission a unit at any time. A South Coast AQMD permit inactivation form is required and the unit must be disconnected from all utilities, such that the unit cannot once again resume operating. The decommissioning process is intended to be a permanent event.

### *Subdivision (e) – Housekeeping Requirements*

#### Facility Cleaning Frequency – Paragraph (e)(1)

Various locations within the facility grounds must be periodically cleaned using specified cleaning methods. These methods help mitigate any fugitive dust emissions that may occur from particulate matter depositing on the grounds of the facility or on the roofs of structures within the facility and winds causing such particulate matter to become airborne.

#### Construction Cleaning Frequency – Paragraph (e)(2)

This provision is to ensure the immediate cleaning of any areas affected by construction or maintenance and to prevent any particulate matter deposited around such areas from remaining on the facility grounds until the next cleaning period specified in paragraph (e)(1).

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### Prohibited Cleaning Methods – Paragraph (e)(3)

Cleaning methods that simply move any particulate matter that may be deposited on the facility grounds are not allowed. Only those methods specified in the Workspace Cleaning Methods definition are allowed, which require only those cleaning methods that actively collect or capture deposited particulate matter on the facility grounds.

### Housekeeping Collected Material Storage Containers Control – Paragraph (e)(4)

All particulate matter collected from the conducting housekeeping must be stored in containers that prevent the stored material from becoming airborne and creating fugitive particulate matter emissions.

### *Subdivision (f) – Monitoring and Source Testing Requirements*

#### Opacity Monitoring – Paragraphs (f)(1) and (f)(2)

PR 1165 specifies an opacity limit to prevent the production of black or white smoke from the exhaust stack of any unit. This opacity is to be measured by a continuous monitoring system at all times. In the event that the continuous monitoring system ceases to operate, a certified individual must manually monitor the opacity in lieu of the continuous monitoring system until the system is operating again. This is to provide a redundancy measure and ensure that the opacity of a unit's flue gas is continuously monitored.

#### CEMS Requirement – Paragraph (f)(3)

A certified CEMS is required to be installed to continuously monitor NO<sub>x</sub> and O<sub>2</sub>. This ensures the most comprehensive emission data reporting for NO<sub>x</sub>.

#### Temperature Measurement Device Requirement – Paragraph (f)(4)

A temperature measurement device is required to be installed prior to each exhaust emission control device to ensure that the minimum operating temperature for each control equipment is maintained during normal operation.

#### Source Test Protocol Submission – Paragraph (f)(5) and (f)(6)

A source test protocol must be submitted at least 90 days prior to a scheduled source test to allow for adequate time for protocol review and approval. A previously approved source test protocol may be submitted if no alterations requiring a permit modification were performed on the unit as the test setup and conditions can reasonably be expected to be similar to those of the previous source test. A new source test protocol is required to be submitted if the Executive Officer determines that the previously approved protocol is no longer applicable or requires modification.

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### Certified Source Testing Firm and Test Methods – Paragraph (f)(7)

The South Coast AQMD offers a Laboratory Approval Program, on a method-by-method basis, to allow for a means for firms to appropriately and accurately source test emission sources. This requirement also ensures standardization across both different units as well as the same unit across time.

### *Subdivision (g) – Reporting and Recordkeeping Requirements*

#### Raw NOx Recordkeeping – Paragraph (g)(1)

Any NOx emission data collected must include the raw, uncorrected NOx value in addition to the 7% O<sub>2</sub>-corrected value. This facilitates conversions to different oxygen-corrected values. The existing CEMS on the units are already equipped to collect raw, uncorrected NOx emission data.

#### Maintenance of Compliance Records – Paragraph (g)(2)

An owner or operator must maintain compliance records for a minimum period of five years to facilitate inspections and ensure compliance with the requirements of PR 1165.

#### Opacity Monitoring Personnel Records – Paragraph (g)(3)

This provision is to ensure that compliance with the opacity requirements of PR 1165 through manual means and appropriate personnel certifications are properly documented and maintained for a minimum of five years.

#### Municipal Solid Waste Throughput Records – Paragraph (g)(4)

This provision is to ensure that MSW is properly accounted for and to ensure accurate permitting and emissions calculations are conducted.

#### Startup, Shutdown, and Malfunction Records – Paragraph (g)(5)

This provision is to ensure that all startups, shutdowns, and malfunctions are properly documented and that the appropriate CEMS data are excluded from compliance calculations. A list of scheduled startups allows for potentially excess emissions during the period of startup to be anticipated and accounted for.

## **CHAPTER 4: IMPACT ASSESSMENT**

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### **INTRODUCTION**

### **EMISSION REDUCTIONS**

*SCR Emission Reductions*

*Ceramic Catalytic Filter Emission Reductions*

*Baghouse Emission Reductions*

### **COSTS AND COST-EFFECTIVENESS**

*Overview*

*Capital Costs*

*Recurring Costs*

*Summary*

### **INCREMENTAL COST-EFFECTIVENESS**

### **SOCIOECONOMIC IMPACT ASSESSMENT**

### **CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA) ANALYSIS**

### **DRAFT FINDINGS UNDER HEALTH AND SAFETY CODE SECTION 40727**

*Requirements to Make Findings*

*Necessity*

*Authority*

*Clarity*

*Consistency*

*Non-Duplication*

*Reference*

### **COMPARATIVE ANALYSIS**

## INTRODUCTION

Impact assessments were conducted during the PR 1165 rule development process to assess the environmental and socioeconomic implications of PR 1165. These assessments include emission reduction calculations, cost-effectiveness and incremental cost-effectiveness analyses, a socioeconomic impact assessment, and a California Environmental Quality Act (CEQA) analysis. Staff has prepared draft findings and a comparative analysis pursuant to Health and Safety Code Sections 40727 and 40727.2, respectively.

## EMISSION REDUCTIONS

PR 1165 will establish lower concentration emission limits for equipment subject to this rule. Municipal Solid Waste incinerators will be required to meet 75 ppmv NO<sub>x</sub> @ 7% O<sub>2</sub>, dry. Baseline emissions for each of the three units located at SERRF were estimated from a review of Annual Emission Reports (AER reports), CEMS data, and source test results.

Staff reviewed AER reports for the emission years 2014-2017, inclusive, and 2019-2022, inclusive, which contained self-reported NO<sub>x</sub> and PM emission data. The average NO<sub>x</sub> emissions across all years were 276.21 tons per year. The average PM emissions across all years was 39.98 tons per year.

Staff reviewed CEMS data for the emission years 2018-2022, inclusive, which contained NO<sub>x</sub>, O<sub>2</sub>, and NH<sub>3</sub> emission data. The facility is not equipped with a CEMS to measure PM.

Staff reviewed source test data conducted in the years 2014, 2017, 2020, and 2021, which contained NO<sub>x</sub>, O<sub>2</sub>, and PM data.

### *SCR Emission Reductions*

The average outlet NO<sub>x</sub> emission concentration in the exhaust stack across all years is 75 ppmv @ 7% O<sub>2</sub>. To calculate the annual tons of NO<sub>x</sub> reduced requires knowing the inlet NO<sub>x</sub> concentration prior to the NO<sub>x</sub> post-combustion control equipment. None of the three units located at SERRF are equipped with an analyzer to measure the inlet NO<sub>x</sub> concentration into each unit's NO<sub>x</sub> post-combustion control equipment.

As an alternative, staff estimated the inlet NO<sub>x</sub> concentration based on an expected NO<sub>x</sub> reduction efficiency of the SNCR system installed on the three units. A NO<sub>x</sub> reduction efficiency of 60% was used, based on a U.S. EPA dataset for MSW incinerators. This basis resulted in an estimated inlet NO<sub>x</sub> concentration of 188 ppmv @ 7% O<sub>2</sub>. The 188 ppmv @ 7% O<sub>2</sub> will be corrected to 3% O<sub>2</sub>, as the permit to operate for each of the three units at this facility specify their NO<sub>x</sub> emission concentration limits corrected to 3% O<sub>2</sub>.

The oxygen correction formula from 7% O<sub>2</sub> to 3% O<sub>2</sub> is:

$$NOx \text{ Concentration @ } 3\% O_2 = NOx \text{ Concentration @ } 7\% O_2 * \frac{20.9\% - 3\%}{20.9\% - 7\%} \quad (\text{Eq. 4-1})$$

$$NOx \text{ Concentration @ } 3\% O_2 = 188 \text{ ppm} * \left( \frac{17.9\%}{13.9\%} \right) = 242 \text{ ppm } NOx \text{ @ } 3\% O_2$$

Reverse-calculating using the inlet NO<sub>x</sub> concentration involves determining the rated heat input and the emission factor of the units. Municipal solid waste has an energy density of 8-12 MJ/kg of MSW<sup>1</sup> incinerated. Staff used a midpoint between 8-12 MJ/kg, for an average of 10 MJ/kg of MSW incinerated, which is equivalent to 1,055.87 MJ/MMBtu. The facility's South Coast AQMD permit specifies that the facility incinerates 1,380 tons of MSW per day. This equates to 52,273 kg of MSW incinerated per hour. Combining these values yields a heat input capacity for the facility of 495 MMBtu/hr. Using a 242 ppmv @ 3% O<sub>2</sub> reverse-calculated inlet NO<sub>x</sub> concentration is equivalent to a 0.293 pounds NO<sub>x</sub> per MMBtu emission factor. Multiplying the heat input capacity by the emission factor yields a value of 495 MMBtu per hour \* 0.293 pounds per MMBtu = 145.04 pounds per hour. This facility operates 24 hours per day, 365 days per year. Staff then calculated the amount of uncontrolled NO<sub>x</sub> emissions as: 145.04 pounds per hour \* 24 hours per day \* 365 days per year / 2000 pounds per ton = 635.28 tons NO<sub>x</sub> per year.

With the assumed 60% NO<sub>x</sub> reduction efficiency, the SNCR currently installed at the facility reduces the NO<sub>x</sub> emissions from the baseline of 635.28 tons NO<sub>x</sub> per year to 254.11 tons per year. This is calculated as the facility's current NO<sub>x</sub> emissions. Compared to the aggregate average AER of 276.21 tons per year, this represents a difference of 8%. Given the assumptions of heat density of MSW and the NO<sub>x</sub> reduction efficiency of the SNCR, staff considered this calculation to be consistent with AER data.

The emission reductions associated with the installation of SCR control technology will only include the increased NO<sub>x</sub> emission reductions beyond what the current SNCR control technology is reducing itself. The preceding paragraphs yielded a range of estimated NO<sub>x</sub> emissions between 254.11 tons per year to 276.21 tons per year. The lower side of this range will be used, which assumes a higher performance for the existing SNCR installation. This provides a more conservative estimate of the NO<sub>x</sub> emission reductions associated with the installation of SCR control technology.

The BARCT emission limit of 75 ppmv @ 7% O<sub>2</sub> represents an approximately 32% reduction from the current NO<sub>x</sub> emission concentration using SNCR control technology. This percentage reduction is based on a NO<sub>x</sub> concentration that the SERRF facility can meet with a 98% compliance rate — a value of 110 ppmv @ 7% O<sub>2</sub> — reduced to 75 ppmv @ 7% O<sub>2</sub>. The emission reductions associated with the installation of SCR control technology can therefore be estimated to be 254.11 tons per year \* 33% reduction = 81.32 tons per year.

The assumed useful life of SCR control technology is 25 years. Therefore, the total lifetime NO<sub>x</sub> emission reductions associated with the installation of SCR control is 81.32 tons per year \* 25 years = 2,033 tons.

A co-benefit of SCR control technology installation is a reduction in PM emissions. Installation of SCR control technology will reduce the quantity of ammonia used as well as increase the efficiency of ammonia-NO<sub>x</sub> reactions, reducing condensable PM emissions created by unreacted ammonia forming ammonium salts. The use of SCR in lieu of SNCR will reduce the current ammonia slip

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<sup>1</sup> Reference: IEA Bioenergy. *Municipal Solid Waste and its Role in Sustainability*.  
[https://www.ieabioenergy.com/wp-content/uploads/2013/10/40\\_IEAPositionPaperMSW.pdf](https://www.ieabioenergy.com/wp-content/uploads/2013/10/40_IEAPositionPaperMSW.pdf).



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of the subject facility from 15 ppmv @ 7% O<sub>2</sub> to the SCR vendor-quoted 10 ppmv @ 7% O<sub>2</sub>. Staff used the current total PM emissions of 39.98 tons per year and applied this reduction in ammonia slip, as well as applied the 96% mass fraction of condensable PM to total PM in the exhaust stack, to yield a total estimated co-benefit PM emission reduction of 12.67 tons PM per year, or 316.75 tons PM over the 25-year lifetime of the SCR control technology.

#### *Ceramic Catalytic Filter Emission Reductions*

The vendor associated with CCF control technology also installs SCR control technology. The vendor quoted an identical NO<sub>x</sub> reduction efficiency for both CCF and SCR systems. A second vendor who installs SCR control technology quoted an identical NO<sub>x</sub> emission reduction efficiency for an SCR installation. The estimated useful life of CCF control technology is also assumed to be 25 years. The NO<sub>x</sub> emission reductions associated with CCF control technology are therefore estimated to be the same as those for SCR control technology, at 2,033 tons.

#### *Baghouse Emission Reductions*

The facility is currently equipped with a baghouse to control particulate matter emissions. The average PM emissions across all years is 39.98 tons per year and includes filterable PM and condensable PM.

Filterable PM is particulate matter in the solid or liquid phase at stack conditions that can be captured, collected, and disposed of. Based on the average aggregate of all source tests available, filterable PM comprises 4% of the PM emissions from the facility's exhaust stack. Condensable PM is particulate matter in the gaseous phase at stack conditions of temperature and pressure that then condenses and/or reacts upon cooling and diluting in the ambient air to form particulate matter in the solid or liquid phase. Condensable PM is particulate matter that cannot be captured and thus continues to be airborne in the flue gas and exit the exhaust stack. Based on the average aggregate of all source tests available, condensable PM comprises 96% of the PM emissions from the facility's exhaust stack. Based on the mass fraction of filterable PM, the total average PM emissions across all years of 39.98 tons per year is comprised of 1.60 tons per year of filterable PM.

Current filterable PM concentrations were calculated as an average aggregate of all source tests available for the units at SERRF and yielded a filterable PM emission concentration of 0.0027 grains per cubic foot @ 7% O<sub>2</sub>. Staff received a quote for a baghouse proposed to use more efficient material that can reduce filterable PM emissions to a concentration of 0.001 grains per cubic foot @ 7% O<sub>2</sub>.

Staff calculated the filterable PM emission concentration reduction comparing the current filterable PM emission concentration to the filterable PM emission concentration stated in the quote.

*Filterable PM Reduction %* (Eq. 4-2)

$$\begin{aligned}
 &= \frac{(0.0027 \text{ grains per cubic foot} - 0.001 \text{ grains per cubic foot})}{0.0027 \text{ grains per cubic foot}} * 100\% \\
 &= 63\% \text{ Reduction}
 \end{aligned}$$

This reduction can then be applied to the current baseline of 1.60 tons per year of filterable PM to calculate the filterable PM emission reductions associated with the installation of the upgraded baghouse.

The total PM emission reductions associated with the upgraded baghouse can be calculated using the mass fraction of filterable PM and the filterable PM emission concentration reduction from the technology vendor.

*PM Emission Reductions* (Eq. 4-3)

$$\begin{aligned}
 &= 39.98 \frac{\text{tons PM}}{\text{year}} * 4\% \text{ mass fraction of filterable PM} \\
 &\quad * 63\% \text{ filterable PM emission concentration reduction} \\
 &= 1.01 \text{ tons filterable PM reduced per year}
 \end{aligned}$$

The estimated useful life of a baghouse is also assumed to be 25 years. The filterable PM emission reductions associated with an upgraded baghouse are estimated to be 25.25 tons.

## **COSTS AND COST-EFFECTIVENESS**

### *Overview*

The Health and Safety Code Section 40920.6 requires a cost-effectiveness analysis to be assessed when establishing BARCT requirements. The cost-effectiveness of a control technology is measured in terms of the control cost in dollars per ton of air pollutant reduced. The costs for the control technology include purchasing, installation, operation, maintenance, permitting, and compliance demonstration of the control technology. Emission reductions were based on AER reports, CEMS data, source test data, literature, and technology vendor quotes.

The 2022 AQMP established a cost-effectiveness threshold of \$325,000 per ton of NO<sub>x</sub> reduced, which when adjusted for inflation to 2023 dollars, is \$388,500 per ton of NO<sub>x</sub> reduced. A cost-effectiveness greater than \$388,500 per ton of NO<sub>x</sub> reduced requires additional analysis and a hearing before the South Coast AQMD Governing Board to discuss costs. The cost-effectiveness is estimated based on the present value of the retrofit cost, which was calculated according to the capital cost (initial one-time equipment, installation, and startup costs) plus the annual operating cost (recurring expenses over the useful life of the control equipment multiplied by a present value factor).

Staff obtained costs for retrofits from both technology vendors and cost-estimation tools. The cost analysis for post-combustion control equipment such as SCR, CCF, and baghouse considers capital costs and recurring costs.

The discounted cash flow method is used to calculate cost-effectiveness. To capitalize recurring expenses in the future and account for the time-value of money, a discount rate is applied to future cash expenditures for annual operating expenses. The following equation presents the methodology for calculating cost-effectiveness:

$$\text{Cost-Effectiveness} = \frac{\text{Capital Costs} + (\text{Increased Recurring Costs} * \text{Present Value Factor})}{\text{Emissions Reduced Over Equipment Life}} \quad (\text{Eq. 4-4})$$

Where “Present Value Factor” is a factor that capitalizes into the present-time, the discounted future cash expenditures. This factor is calculated as:

$$\text{Present Value Factor} = 1 / \left[ \frac{i * (1+i)^n}{(1+i)^n - 1} \right] \quad (\text{Eq. 4-5})$$

Where,

- $i$  = Nominal discount rate
- $n$  = Equipment useful life

For SCR, CCF, and baghouse, staff used a nominal discount rate of 4% and an equipment useful life of 25 years. This equates to a Present Value Factor of 15.62.

### *Capital Costs*

Capital costs are one-time costs that cover the components required to assemble a project. These costs include, but are not limited to, equipment, installation, permitting, and source testing. Staff reviewed two vendor quotes for SCR control technology and staff also used a costs tool to estimate costs.

### SCR

SCR Vendor 1 provided a quote for only base SCR equipment of \$3,800,000. Additional capital costs for installation, freight, and startup were not included. These additional costs were assumed to be 400% of the base equipment cost, based on the vendor quote that staff received for baghouse control technology which provided a 400% ratio for these additional costs. The base equipment and additional capital costs for this SCR Vendor 1 are therefore \$19,000,000.

SCR Vendor 2 provided a quote for only base SCR equipment of \$8,463,000. Additional costs for installation, freight, and startup were not included. These additional costs were assumed to be

400% of the base equipment cost, based on the vendor quote that staff received for baghouse control technology which increased an additional 400% to costs. The base equipment and additional costs for this SCR Vendor 2 are therefore \$42,315,000.

Staff utilized the U.S. EPA Selective Catalytic Reduction cost estimator tool (SCR Calculator)<sup>2</sup> to estimate SCR installation costs as well. This cost estimator tool accounts for installation and startup costs. Based on the energy density of MSW and the MSW incineration rate of the subject facility, continuous operation and an inlet NO<sub>x</sub> concentration of 75 ppmv @ 7% O<sub>2</sub>, the total capital costs were estimated to be \$34,455,000.

Although there is a range of capital costs between \$19,000,000 and \$42,315,000 for SCR control technology installation, staff used the median figure of this range to estimate capital costs for use in the cost-effectiveness calculation. This median figure was used primarily due to the SCR Calculator's inclusion of installation cost which is predicted to be more accurate than 400% installation and other auxiliary capital costs assumption quoted by the baghouse control technology vendor.

### Ceramic Catalytic Filter

Staff reviewed one vendor quote for a CCF system. This quote included installation and startup. The total capital cost for CCF control technology was \$44,940,000.

### Baghouse

Staff reviewed one vendor quote for an upgraded baghouse. This quote included installation and startup. The total capital cost for an upgraded baghouse technology was \$14,250,000.

### All Control Technologies

Several capital costs were included in addition to equipment. A one-time permitting fee per control technology was included and is based on the 2024-2025 Fee Schedule identified in Rule 301 Table 1B which ranges in size from Schedule C for a Selective Catalytic Reduction system to Schedule D for a Non-Ambient Temperature Baghouse system. Actual costs were then cross-referenced with Rule 301 Table 1A for Title V Alteration/Modification fees as the subject facility is a federal Title V facility. Schedule C has a Title V Alteration/Modification fee of \$7,615.64; Schedule D has a Title V Alteration/Modification fee of \$10,510.89. CCFs are not included in Rule 301 Table 1B but are assigned the same fee as Selective Catalytic Reduction due to the similarity in operation. Periodic source testing is a requirement of PR 1165 and costs were considered, but as no additional source tests are required beyond what is currently required, no additional costs were included in the cost-effectiveness analysis.

Stranded asset costs are the salvageable value for any equipment that is replaced before the end of its useful life. The subject facility's equipment has been operating since 1988, a total of 36 years

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<sup>2</sup> Reference: U.S. EPA Selective Catalytic Reduction cost estimator tool.  
<https://www.epa.gov/economicand-cost-analysis-air-pollution-regulations/cost-reports-and-guidance-air-pollution>.

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as of 2024, which is beyond the assumed 25 years of useful life of the SNCR and baghouse currently installed at the subject facility. Thus, no stranded asset costs were included in the cost-effectiveness analysis.

### *Recurring Costs*

Recurring costs are any annual or periodic costs required to operate equipment. These costs include operating and maintenance (O&M) costs such as electricity, monitoring, and consumable costs.

### SCR

Recurring costs for SCR control technology included maintenance, reagent in the form of 19% aqueous ammonia, electricity, catalyst module replacement, and administrative fees. The recurring costs were calculated using the SCR Calculator. These costs were estimated to be \$1,160,000 per year. Because there is a potential for catalyst poisoning, staff increased catalyst replacement from every 32,000 hours to every 10,000 hours. The revised recurring costs for SCR are \$1,369,000 per year. This recurring cost was applied to both SCR Vendor 1 and SCR Vendor 2 quotes.

### CCF

Recurring costs for CCF control technology included maintenance, reagent in the form of 19% aqueous ammonia, electricity, filter tube replacement, and administrative fees. Rule 1117 staff received CCF vendor quotes that included recurring costs for CCF control technology as part of the rule development process. These recurring costs were then calculated as a percentage of the capital cost. These same percentages were then applied to the capital cost for the CCF control technology vendor quote reviewed by PR 1165 staff. These recurring costs were estimated to be \$3,757,000 per year.

### Baghouse

For an upgraded baghouse, no additional recurring costs were included as the subject facility currently operates a baghouse with its associated recurring costs.

### *Summary*

The costs associated with each control technology are detailed in Table 4-1:

**Table 4-1 – Summary of Control Technology Costs**

Control Technology	Capital Costs <sup>1</sup>	Annual Costs <sup>1</sup>	Permitting Costs <sup>2</sup>	Source Testing Costs	Stranded Asset Costs	Total Costs <sup>1</sup>
<b>SCR</b>	\$34,455,000	\$1,369,000 per year (\$21,392,000 present value-discounted)	\$7,600	N/A	N/A	\$55,847,000
<b>CCF</b>	\$44,940,000	\$3,757,000 per year (\$58,684,000 present value-discounted)	\$7,600	N/A	N/A	\$103,632,000
<b>Upgraded Baghouse</b>	\$14,250,000	No Additional Costs	\$10,500	N/A	N/A	\$14,261,000

<sup>1</sup> Amounts are rounded to the nearest thousand dollars

<sup>2</sup> Amounts are rounded to the nearest hundred dollars

The cost-effectiveness associated with each control technology is detailed in Table 4-2.

**Table 4-2 – Summary of Cost-Effectiveness**

Control Technology	Total Costs	Total Lifetime Emission Reductions	Cost-Effectiveness <sup>1</sup>
<b>SCR</b>	\$55,847,000	2,033 tons NO <sub>x</sub>	\$27,500/ton of NO <sub>x</sub> Reduced
<b>CCF</b>	\$103,632,000	2,033 tons NO <sub>x</sub>	\$51,000/ton of NO <sub>x</sub> Reduced
<b>Upgraded Baghouse</b>	\$14,261,000	25.25 tons PM	\$564,800/ton of PM Reduced

<sup>1</sup> Amounts are rounded to the nearest hundred dollars

## INCREMENTAL COST-EFFECTIVENESS

An incremental cost-effectiveness analysis was conducted for each equipment category pursuant to Health and Safety Code Section 40920.6:

*“To determine the incremental cost-effectiveness under this paragraph, the district shall calculate the difference in the dollar costs divided by the difference in the emission reduction potentials between each progressively more stringent potential control option as compared to the next less expensive control option.”*

This analysis is conducted for each equipment category if multiple cost-effective pollution control technologies are identified.

Equation 4-6 is used to calculate incremental cost-effectiveness.

$$\text{Incremental Cost-Effectiveness (\$/ton)} = \frac{\text{Costs}_A - \text{Costs}_B}{ER_A - ER_B} \quad (\text{Eq. 4-6})$$

Where,

- A = Pollution control option A (\$)
- B = Pollution control option B (\$)
- ER = Emission reductions over lifetime of equipment (tons of NOx)

Per Health and Safety Code Section 40920.6, if the incremental cost-effectiveness is substantially greater than \$388,500/ton, the more stringent control technology is not pursued.

However, although two cost-effective control technologies were calculated for NOx control, they both have the identical NOx emission reduction potential, and thus the less costly NOx control technology is pursued. The SCR control technology cost is lower than that of CCF control technology, and thus SCR control technology is pursued.

## **SOCIOECONOMIC IMPACT ASSESSMENT**

A socioeconomic impact assessment has been conducted and was released for public review as a separate document at least 30 days prior to the South Coast AQMD Governing Board Hearing for PR 1165, which is scheduled for September 6, 2024 (subject to change).

## **CALIFORNIA ENVIRONMENTAL QUALITY ACT ANALYSIS**

Pursuant to the California Environmental Quality Act (CEQA) Guidelines Sections 15002(k) and 15061, the proposed project (PR 1165) is exempt from CEQA pursuant to CEQA Guidelines Section 15061(b)(3). A Notice of Exemption will be prepared pursuant to CEQA Guidelines Section 15062, and if the proposed project is approved, the Notice of Exemption will be filed with the county clerks of Los Angeles, Orange, Riverside, and San Bernardino counties, and with the State Clearinghouse of the Governor's Office of Planning and Research.

## **DRAFT FINDINGS UNDER HEALTH AND SAFETY CODE SECTION 40727**

### *Requirements to Make Findings*

Health and Safety Code Section 40727 requires that prior to adopting, amending, or repealing a rule or regulation, the South Coast AQMD Governing Board shall make findings of necessity, authority, clarity, consistency, non-duplication, and reference based on relevant information presented at the public hearing and in the staff report. To determine compliance with Health and Safety Code Section 40727, Health and Safety Code Section 40727.2 requires a written analysis comparing PR 1165 with existing regulations, to determine if PR 1165 meets certain requirements. The following provides the draft findings.

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*Necessity*

A need exists to adopt PR 1165 to provide NO<sub>x</sub>, PM, and Opacity limits for the municipal solid waste incineration industry to reflect current BARCT concentration limits.

*Authority*

The South Coast AQMD obtains its authority to adopt, amend, or repeal rules and regulations from Health and Safety Code Sections 39002, 40000, 40001, 40440, 40506, 40510, 40702, 40725 through 40728, 41508, 41700, and 42300 et seq.

*Clarity*

PR 1165 is written or displayed so that its meaning can be easily understood by the persons directly affected by them.

*Consistency*

PR 1165 is in harmony with and not in conflict with or contradictory to, existing statutes, court decisions or state or federal regulations.

*Non-Duplication*

PR 1165 will not impose the same requirements as any existing state or federal regulations. The proposed rule is necessary and proper to execute the powers and duties granted to, and imposed upon, the South Coast AQMD.

*Reference*

In adopting this rule, the following statutes which the South Coast AQMD hereby implements, interprets or makes specific are referenced: AB 617, Health and Safety Code Sections 39002, 40001, 40406, 40506, 40702, 40440(a), 40725 through 40728.5, 40920.6, and 42300 et seq.

**COMPARATIVE ANALYSIS**

Health and Safety Code Section 40727.2 requires a comparative analysis of the proposed rule with any federal or South Coast AQMD rules and regulations applicable to the same source. A comparative analysis is presented in Table 4-3.



**Table 4-3 – Comparative Analysis**

Rule Element	Proposed Rule 1165	Equivalent Federal Regulation
<b>Applicability</b>	Municipal Solid Waste incineration units that combust 35 tons or more per day of municipal solid waste	40 CFR Part 60, Subpart AAAA Municipal solid waste combustion units that combust greater than or equal to 35 tons per day but less than 250 tons per day of municipal solid waste  40 CFR Part 60, Subpart Eb Municipal solid waste combustion units that combust greater than 250 tons per day of municipal solid waste
<b>Requirements</b>	<u><b>By Date of Adoption</b></u> <ul style="list-style-type: none"> <li>• Total PM: 26.4 mg/dscm @ 7% O<sub>2</sub> (1-hour average)</li> <li>• PM–Filterable: 10.2 mg/dscm @ 7% O<sub>2</sub> (1-hour average)</li> <li>• PM–Condensable: 23.3 mg/dscm @ 7% O<sub>2</sub> (1-hour average)</li> <li>• Opacity: 10% (6-minutes)</li> </ul>	40 CFR Part 60, Subpart Cb, Subpart Ea, Subpart Eb, Subpart AAAA, Subpart BBBB:  40 CFR Part 60, Subpart Cb: NOx: 185 ppmv @ 7% O <sub>2</sub> (24-hour block average)  40 CFR Part 60, Subpart Ea: NOx: 180 ppmv @ 7% O <sub>2</sub> (24-hour block average)  40 CFR Part 60, Subpart Eb: NOx: 150 ppmv @ 7% O <sub>2</sub> (24-hour block average)  40 CFR Part 60, Subpart AAAA: NOx: 150 ppmv @ 7% O <sub>2</sub> (24-hour block average)  40 CFR Part 60, Subpart BBBB: NOx: 200 ppmv @ 7% O <sub>2</sub> (24-hour block average)

Rule Element	Proposed Rule 1165	Equivalent Federal Regulation
<b>Requirements (continued)</b>	<u><b>By May 1, 2026</b></u> <ul style="list-style-type: none"> <li>• NOx: 110 ppmv @ 7% O<sub>2</sub> (24-hour block average)</li> <li>• NOx: 105 ppmv @ 7% O<sub>2</sub> (30-day rolling average)</li> </ul>	<u><b>By Date of Adoption</b></u>  U.S. EPA Good Neighbor Plan for 2015 Ozone NAAQS NOx: 105 ppmv @ 7% O <sub>2</sub> (30-day rolling average)

Rule Element	Proposed Rule 1165	Equivalent Federal Regulation
	<p><b><u>By May 1, 2029</u></b></p> <ul style="list-style-type: none"> <li>• NO<sub>x</sub>: 75 ppmv @ 7% O<sub>2</sub> (30-day rolling average)</li> </ul> <p><b><u>By July 1, 2029</u></b></p> <ul style="list-style-type: none"> <li>• Total PM: 17.7 mg/dscm @ 7% O<sub>2</sub> (30-day rolling average)</li> <li>• PM-Condensable: 15.6 mg/dscm @ 7% O<sub>2</sub> (30-day rolling average)</li> </ul>	
<b>Reporting and Recordkeeping</b>	All data required by this rule shall be maintained for at least five years and made available for inspection by the Executive Officer	<p>40 CFR Part 60, Subpart Ea: Maintain compliance records for 2 years</p> <p>40 CFR Part 60, Subpart Eb: Maintain compliance records for 5 years</p> <p>40 CFR Part 60, Subpart BBBB: Maintain compliance records for 5 years</p>
<b>Monitoring</b>	<ul style="list-style-type: none"> <li>• Operate a COMS to measure opacity on a 6-minute basis</li> <li>• Operate a CEMS to measure NO<sub>x</sub> emissions at the corresponding oxygen correction and averaging times</li> <li>• Operate a device to continually measure temperature of the flue gas stream</li> </ul>	<p>40 CFR Part 60, Subpart Ea: Operate a COMS to measure opacity on a 6-minute basis; Operate a device to continually measure temperature at the inlet of a PM control device on a 4-hour block average basis</p> <p>40 CFR Part 60, Subpart Eb: Operate a CEMS to measure O<sub>2</sub> and CO<sub>2</sub> wherever NO<sub>x</sub>, SO<sub>2</sub>, CO, or PM are monitored</p> <p>40 CFR Part 60, Subpart AAAA: Operate a CEMS for SO<sub>2</sub>, O<sub>2</sub> or CO<sub>2</sub>, CO, and NO<sub>x</sub></p> <p>40 CFR Part 60, Subpart BBBB: Operate a CEMS for SO<sub>2</sub>, O<sub>2</sub> or CO<sub>2</sub>, CO, and NO<sub>x</sub></p>

**APPENDIX A: Facility Affected by Proposed Rule 1165**

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**Table A-1: Facility Affected by PR 1165**

Facility ID	Facility Name
44577	Southeast Resource Recovery Facility

## **APPENDIX B: RESPONSE TO PUBLIC COMMENTS**

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**Comment No. 1 (received as verbal statements during Public Workshop) – Jane Williams, Executive Director of California Communities Against Toxics**

Proposed Rule 1165 should include applicability to pyrolysis and gasification units.

**Response to Comment 1**

Proposed Rule 1165 will retain its scope specifically to municipal solid waste incinerators and not expand it to pyrolysis and gasification units. Staff is not aware of any at-scale pyrolysis or gasification units within the South Coast AQMD jurisdiction subject to the Good Neighbor Plan. New pyrolysis and gasification units would be subject to BACT/LAER requirements when they are built. This does not, however, preclude staff from initiating a new, separate rule development that will conduct a BARCT analysis on those two equipment sources at some future date if deemed necessary. Nothing in the adoption of PR 1165 would impact federal regulations. While the Good Neighbor Plan is one of several drivers of PR 1165, the South Coast AQMD is not required to adopt all aspects of the Good Neighbor Plan, only to meet the minimum NO<sub>x</sub> emission limits specified for the identified equipment categories listed in the Good Neighbor Plan

**Comment No. 2 (received as verbal statements during Public Workshop) – David Rothbart, Air Quality Committee Chair of Clean Water SoCal**

What is the need for Proposed Rule 1165 if the one facility subject to the rule is in the process of decommissioning?

**Response to Comment 2**

Proposed Rule 1165 is necessary to adopt for several reasons: California still remains under the obligation to address its SIP deficiency for purposes of meeting its obligations under the U.S. EPA Good Neighbor Plan; the 2022 AQMP Control Measure L-CMB-09 requires the creation of a rule to reduce NO<sub>x</sub> from municipal solid waste incinerators; South Coast Air Basin Attainment Plan for the 2012 Annual PM<sub>2.5</sub> Standard Control Measure BCM-07 requires NO<sub>x</sub> reductions from municipal solid waste incinerators; the BARCT analysis for this equipment category demonstrated that lower NO<sub>x</sub> and lower PM emissions can be achieved through retrofit control technology; the facility has the capacity to resume operations; recent complications with landfills within the South Coast AQMD jurisdiction pose uncertainty to the long-term ability of municipalities to redirect MSW away from SERRF to existing landfills.

**Comment No. 3 (received as verbal statements during Public Workshop) – Al Sattler (individual)**

I am requesting information on what pyrolysis units are currently operating in the South Coast Air Basin. The South Coast Air Quality Management District should be reviewing pyrolysis units currently. I am requesting information on what South Coast AQMD standard one of the currently operating pyrolysis units had passed.

**Response to Comment 3**

Staff is reviewing possible records of pyrolysis or gasification units in its database. Staff did not perform a BARCT assessment on pyrolysis or gasification units, and the BARCT emission limits

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that would result from that assessment could be very different from the emission limits currently proposed in PR 1165. There is currently no BARCT rule for either pyrolysis or gasification units. However, any given unit would undergo a permitting process with the South Coast AQMD, and during that process, be assigned conditions that the unit would be required to meet. Any new construction units would undergo a BACT or LAER review process and only be allowed to operate if the unit is compliant with the emission levels specified by the BACT and LAER guidelines.

**Comment No. 4 (received as verbal statements during Public Workshop) – Mark Abramowitz, President of Community Environmental Services**

Usually, an exemption is in place only if there is a problem or issue within the equipment category that would require an exemption from rule limits for a particular reason. There is no case that has been made that pyrolysis units should not be made subject to this rule. The District has ignored the problematic implementation of federal and state LAER and BACT requirements, and instead has focused its efforts on the implementation of new technologies through its existing source rules. It appears a backwards process that now the District is pushing pyrolysis and gasification regulation back to a BACT/LAER determination. There is a state requirement that says the District's rules must reflect BARCT. The District is ignoring pyrolysis units. Is there any reason to put in an exemption where none was asked for, and where there was no need to, for pyrolysis and gasification units?

**Response to Comment 4**

Please see Response to Comment 1. The Good Neighbor Plan is a Federal Implementation Plan that is self-implementing. The U.S. EPA's rule terms decides whether an equipment category is subject to the limits in that rule. In Clean Air Act Section 129, in reference to New Source Performance Standards (NSPS) for incinerators, we may have a role in being a delegated authority in deciding on applicability and whether an individual source type is subject to the NSPS, and whenever we do, our determination is still subject to the U.S. EPA's oversight. Issues relating to regulation of pyrolysis units and U.S. EPA's handling of those issues via policy or U.S. EPA rulemaking are not the focus of PR 1165.

**Comment No. 5 (received as verbal statements during Public Workshop) – Al Sattler (individual)**

Does PR 1165 only apply to SERRF and any other municipal solid waste incinerator, and would the District only regulate large pyrolysis or gasification units when those units come online? It would be good to have standards or rule in place for what equipment might already be here.

**Response to Comment 5**

That is correct. Staff can write future rules on any other category of equipment, including medical waste, pyrolysis, or gasification. PR 1165 is only regulating large municipal solid waste incineration facilities. There are additional and separate requirements through the BACT/LAER process, such that at the time of permitting, these units would meet the BACT or LAER requirements.

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**Comment No. 6 (received as verbal statements during Public Workshop) – Dr. Genghmun Eng (individual)**

Municipal solid waste incinerators are a source of dioxin and furan emissions and Proposed Rule 1165 should include requirements for control and continuous monitoring of these pollutants.

**Response to Comment 6**

Proposed Rule 1165's purpose is to control NOx and PM emissions from municipal solid waste incinerators. South Coast AQMD Rule 1401 – New Source Review of Toxic Air Contaminants and Rule 1402 – Control of Toxic Air Contaminants from Existing Sources regulate dioxins and other air toxics from equipment such as municipal solid waste incinerators. SERRF is currently equipped with an activated carbon powder injection system to control for dioxins, furans, and mercury. Staff reviewed all four years of source test data for each of the three MSW incinerators located at SERRF. Across all three incinerators and years, 18 data points representing dioxin/furan emissions were documented. Across this 18-point dataset, the minimum, median, average, and maximum value of dioxin/furan emissions were, in units of nanograms per dry standard cubic meter (ng/dscm) corrected to 7% oxygen, 0.13, 1.09, 1.46, and 5.13, respectively.

**Comment No. 7 (received as verbal statements during Public Workshop) – Al Sattler (individual)**

In my visits to the former waste incineration facility located in the City of Commerce, the facility did control for dioxins by maintaining certain temperatures at various zones and not allowing the operating temperatures to get too high. There was periodic testing conducted for dioxins. Similar requirements in PR 1165 would go a long way to regulating dioxins.

**Response to Comment 7**

Please see Response to Comment 6. All municipal solid waste incinerators, depending on year of construction or modification, are subject to the dioxin limits specified in 40 CFR Part 60 Subpart Cb or 40 CFR Part 60 Subpart Eb. These limits are, and will continue to be, required to be met by SERRF, even without a South Coast AQMD-specific rule limit.

**Comment No. 8 (received as verbal statements during Public Workshop) – Moses Huerta (resident city of Paramount)**

Rule 1406 references dioxin requirements. In Commerce, there is a pyrolysis unit incinerating medical waste. I support incorporating any dioxin regulations.

**Response to Comment 8**

See Response to Comment 6 and 7.

**Comment No. 9 (received as verbal statements during Public Workshop) – Dr. Genghmun Eng (individual)**

Facilities have gotten away with measuring dioxins intermittently. It is published, that dioxin often is elevated during upset periods, startup periods, and shutdown periods, so intermittent monitoring during normal operation allow emissions to appear normal, while dioxins are still going into the



environment with no control and no record. It is necessary to include a continuous monitoring system to measure dioxins, including during upsets, startups, and shutdowns.

**Response to Comment 9**

See response to Comment 7. The federal dioxin requirements cited in 40 CFR Part 60 Subpart Cb are, and will continue to be, required to be met by SERRF. These federal dioxin requirements are exempt during periods of startup, shutdown, and malfunction per the compliance and performance testing provision of 40 CFR Part 60 Subpart Eb provision 60.58. During normal operations, SERRF operates well below the 30 ng/dscm @ 7% O<sub>2</sub> emission limit specified on both the South Coast AQMD permit to operate for each of SERRF's three municipal solid waste incinerator units and in 40 CFR Part 60 Subpart Cb. Across the four years of stack test data for each of SERRF's three municipal solid waste incinerators, comprised of 18 total data points, the minimum, median, average, and maximum dioxin/furan values were 0.13, 1.09, 1.46, and 5.13 ng/dscm @ 7% O<sub>2</sub>.

**Comment Letter 1: Dr. Genghmun Eng, Received 7/2/2024**

**PR-1165 Public Comment by:**  
Genghmun Eng (“Citizen”), 5215 Lenore St., Torrance, CA 90503, 2 July 2024

Citizen's primary concern is that dioxins are neither mentioned nor controlled. As a result, Citizen proposes these PR 1165 changes:

**PR-1165 CHANGE #A1:**

Present Proposed Rule 1165(d) “Requirements” has 6 subsections, labeled 1165(d)(1)-1165(d)(6). These should be renumbered as 1165(d)[2]-1165(d)[7] with this new 1165(d)[1] inserted:

(d)[1] The owner or operator of a Unit shall comply with these following conditions:

[1a] As a minimum, an owner or operator of a Unit shall comply with all requirements of 40CFR\_Part-60\_Subpart-DDDD

[1b] In addition, the following requirement shall be met by all Units during normal Unit operations:

Dioxins/ furans (total mass basis)	4.6 nanograms per dry standard cubic meter	3-run average (collect a minimum volume of 2 dry standard cubic meters)	Performance test (Method 23 at 40 CFR part 60, appendix A-7).
Dioxins/ furans (toxic equivalency basis)	0.13 nanograms per dry standard cubic meter	3-run average (collect a minimum volume of 2 dry standard cubic meters)	Performance test (Method 23 at 40 CFR part 60, appendix A-7).

[1c] Dioxins/Furans shall be continuously monitored using a CEMS system comprised of using the best available technology for Dioxin/Furan monitoring.

[1d] The Dioxins/Furans CEMS system shall remain operational for all Unit conditions, including Unit Startup, Unit Shutdown, or Unit Upset conditions.

[1e] SCAQMD shall levy pollution penalties on the owner or operator of a Unit for any exceedance of 50 times the 1165(d)[1b] level during Unit Startup, Unit Shutdown, or Unit Upset conditions.

[1f] In the event of a SCAQMD 1165(d)[1e] penalty levy, the owner or operator of a Unit should develop and implement a Startup-Shutdown Dioxin Reduction Plan (SSDRP).

[1g] In the event of 1165(d)[1f], the owner or operator of a Unit shall have their SSDRP vetted and concurred with by the SCAQMD prior to SSDRP implementation.

1-1

**PR-1165 CHANGE #A2:**

The above 1165(d)[1b] requirements shall be added to the present PR-1165 Table 1.

**PR-1165 CHANGE #A3:**


Any other PR-1165 administrative or permit changes shall also be developed by the SCAQMD, as needed, in order to be consistent with the above new 1165(d)[1].

**CITIZEN ADDED NOTE:**

In June 1999, the US EPA added this Permit Condition and language to a Dow Chemical Permit:  
New Permit Condition: The Trial Burn Plan shall include dioxin testing, using the best available technology, so long as dioxin testing is consistent with any current policy or practice of the EPA or the California Department of Toxic Substances Control within the State of California. This new permit condition more effectively holds Dow responsible for dioxin testing to ensure that the boilers are not contributing dioxin to the environment.

1-2

SEMS-RM DOCID # 100001892



# Notification of Final Permit Decision for Dow Chemical Company

U.S. ENVIRONMENTAL PROTECTION AGENCY • REGION 9 • SAN FRANCISCO, CA • JULY 2, 1999

## Introduction

The United States Environmental Protection Agency (EPA) is issuing the final federal portion of a Hazardous Waste Facility Permit to The Dow Chemical Company in Torrance, CA.

The EPA and the California Department of Toxic Substances Control issued Dow a joint permit in 1996. A joint permit was issued because the State of California has not yet received final authorization to administer the new hazardous waste program requirements of the BIF Rule (40 CFR 266, Subpart H, and 270.66) or the air emissions standards (40 CFR 264 Subparts AA, BB, and CC), which are part of Dow's permit.

The federal portion of the RCRA permit was appealed July 26, 1996 (RCRA Appeal No. 96-7). The appeal was withdrawn on May 1, 1997 in favor of EPA reissuing the federal portion of the permit with certain revisions to make the permit even more stringent (see below for details). The changes to the permit will become effective August 2, 1999 unless the decision is appealed under 40 CFR 124.19. The remainder of the federal permit (non-changed portion) is effective immediately. ■

## Facility Description

Dow Chemical Company is located at 305 Crenshaw Boulevard in Torrance, California. The facility covers approximately 52 acres. Although the adjacent property uses are industrial, residential areas are located south and northeast of the facility. Dow began manufacturing operations in 1953. The facility manufactures polystyrene used in such items as toys, automobile interiors, insulation, and Styrofoam.

Two identical on-site boilers have been operating at the

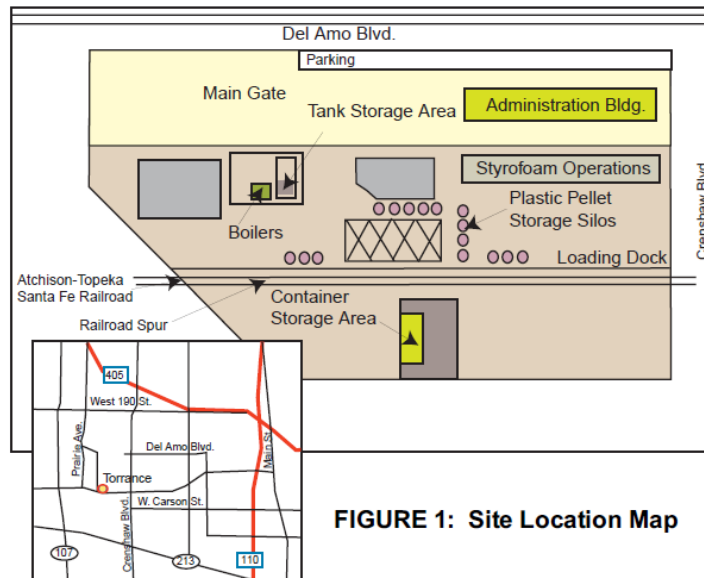



FIGURE 1: Site Location Map

facility since 1979. Each boiler is designed to accept three types of feed streams:

- ◆ 100% natural gas,
- ◆ A combination of natural gas and liquid hazardous waste (hydrocarbons recovered from the manufacturing processes), or
- ◆ 100% low NO<sub>x</sub> fuel oil used during periods of natural gas curtailment.

Dow does not currently burn hazardous waste in their boilers. If Dow decides to resume burning hazardous waste in the boilers, the waste feed will consist of hydrocarbons recovered from the polystyrene resin manufacturing process. The function of the boilers is to generate and transfer thermal energy to a heat transfer fluid. The resulting heated fluid stream supplies heat to the polystyrene resin manufacturing process. In other words, by burning hydrocarbon waste in its boilers, Dow would be offsetting its reliance on natural gas and fuel oil.

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## Appeal and Settlement

The federal portion of the RCRA permit was appealed July 26, 1996 (RCRA Appeal No. 96-7). The appeal was withdrawn on May 1, 1997 as EPA agreed to re-issue the federal portion of the permit with the changes listed below.

### ◆ Analysis of hazardous waste feed to boiler [Section VI.B.3.]

The federal portion of the permit requires that for two consecutive years from the date that Dow starts to burn hazardous waste in either of the two boilers (they currently do not burn hazardous waste), Dow must analyze the hazardous waste feed for metals and chlorine every three months (quarterly). After two years, Dow may request and obtain agency approval to conduct less frequent sampling and analysis.

**Appealed Permit Condition:** The appealed condition allowed Dow to request and obtain agency approval to conduct less frequent (though not less than annual) sampling and analysis.

**New Permit Condition:** The new condition allows Dow to request and obtain agency approval to conduct less than quarterly sampling and analysis, but at a frequency not less than once every four months for the duration of the project. The new permit condition requires Dow to conduct more frequent sampling and analysis of the hazardous waste feed to the boilers after two years than

the original appealed permit condition required. This condition more effectively ensures that any emissions problems are identified and corrected quickly.

### ◆ Mass feed rates of toxic metals and chlorine to boilers [Section VI.C.5.]

**Appealed Permit Condition:** The total mass feed rates of toxic metals and chlorine to boilers U-304 and U-305 shall not exceed the following: [40 CFR 270.32(b)(2)]

Metal/Chlorine	Total Mass Feed Rate
Arsenic	0.00068 grams/min
Antimony	0.0906 grams/min
Chromium	0.00004 grams/min
Beryllium	0.00163 grams/min
Cadmium	0.00017 grams/min
Chlorine	0.76 grams/min
Mercury	0.0173 grams/min
Silver	0.0256 grams/min
Thallium	0.0888 grams/min
Barium	0.0017 grams/min
Lead	0.182 grams/min

(Note: The chromium limit refers to total chromium, i.e. hexavalent and trivalent forms)

## Appeals

EPA final permit decisions can be appealed within thirty days under procedures in 40 CFR §124.19. Only the changed permit conditions may be appealed. Any appeals should be addressed to:



Environmental Protection Agency  
Office of the Administrator  
Environmental Appeals Board (A-101)  
401 M Street S.W., Room 1145 (West Tower)  
Washington, DC 20460

**New Permit Condition:** The total mass feed rates of toxic metals and chlorine to boilers U-304 and U-305 shall not exceed the following: [40CFR 270.32(b)(2)]

Metal/Chlorine	Total Mass Feed Rate
Arsenic	0.00068 grams/min
<b>Antimony</b>	<b>0.01010 grams/min</b>
Chromium	0.00004 grams/min
Beryllium	0.00163 grams/min
Cadmium	0.00017 grams/min
Chlorine	0.76 grams/min
<b>Mercury</b>	<b>0.00106 grams/min</b>
Silver	0.0256 grams/min
<b>Thallium</b>	<b>0.01145 grams/min</b>
Barium	0.0017 grams/min
<b>Lead</b>	<b>0.00579 grams/min</b>

(Note: The chromium limit refers to total chromium, i.e. hexavalent and trivalent forms)

The new permit condition reduces the allowed feed rates of four toxic metals to the boilers (antimony, mercury, thallium, and lead) to further ensure that operations are protective of human health and the environment.

#### ◆ Trial burn phase [Section VII.B.2.]

Dow is required to update, revise, and resubmit their Trial Burn Plan six months prior to conducting the trial burn or a performance test. The revised Trial Burn Plan must include all applicable EPA-approved test methods and procedures in effect at the time of the resubmittal.

**Appealed Permit Condition:** EPA may require additional testing and/or different test methods than were used in the original trial burn, based upon changes in policy, guidance, or regulations.

**New Permit Condition:** The Trial Burn Plan shall include dioxin testing, using the best available technology, so long as dioxin testing is consistent with any current policy or practice of the EPA or the California Department of Toxic Substances Control within the State of California.

## Information Repositories

Major documents pertaining to this permit decision, such as the Notice of Appeal and Settlement Discussions, are available for public review at:

### Torrance Civic Center Public Library

3301 Torrance Boulevard  
Torrance, CA 92714  
(310) 618-5959

### U.S. EPA, Region 9

75 Hawthorne Street  
San Francisco, CA 94105  
Contact: Vern Christianson  
(415) 744-2422



The complete Administrative Record is available for viewing at the following location:

### California Department of Toxic Substances Control

1011 Grandview Avenue  
Glendale, CA 91201  
Contact: Jacqueline Sherman  
(818) 551-2886

You can also request copies of individual documents by calling Vern Christianson at (415) 744-2422; Catherine McCracken in EPA Region 9's Office of Community Relations, San Francisco, at (415) 744-2182; or Jennifer Downey at (415) 744-2062.

This new permit condition more effectively holds Dow responsible for dioxin testing to ensure that the boilers are not contributing dioxin to the environment. ■

**INSIDE:**  
U.S. EPA Issues Final Permit Decision  
for Dow Chemical Company



United States Environmental Protection Agency, Region 9  
75 Hawthorne Street (SFD-3)  
San Francisco, CA 94105-3901  
Attn: Catherine McCracken

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**Response to Written Comment 1-1**

See Response to Comment 7 and Response to Comment 9.

**Response to Written Comment 1-2**

The Dow Chemical Plant operates a boiler that incinerates hazardous waste. Hazardous waste is specifically excluded from Proposed Rule 1165 due to the different composition and emissions profile of that hazardous waste type from the municipal solid waste type. Hazardous waste, municipal solid waste, as well as hospital/medical/infectious waste, are each different waste types composed of different types of materials that result in the production of different emissions when these wastes are incinerated.